RESTACKING THE ODDS

21 December 2022

Hon Julia Gillard AC
Royal Commissioner into Early Childhood Education and Care
GPO Box 11025
Adelaide SA 5001

RE: Formal invitation to appear at a public hearing held by the Royal Commission in to Early Childhood Education and Care

Dear Ms Gillard

Thank you for your invitation to provide a written submission to the Royal Commission to address the following:

- Summary of Restacking the Odds evidence-based review of indicators to assess quality, quantity and participation
- Barriers, facilitators and strategies to improve participation.

Restacking the Odds is focused on tackling intergenerational disadvantage. The program aims to drive equitable outcomes by ensuring that children and families can and do access a combination of high-quality, evidence-informed services where and when they need them. The initiative is a collaboration between the Centre for Community Child Health (Murdoch Children's Research Institute (MCRI)), Social Ventures Australia (SVA) and Bain & Company.

I have provided an overview of the Restacking the Odds initiative below, with detail on the selection of evidence-based indicators to assess quality, quantity and participation in early childhood education and research findings on barriers and facilitators to improve participation. I have also attached a selection of relevant publications and summaries of our research.

Drawing on the findings from Restacking the Odds and complementary projects undertaken by the Centre for Community Child Health, I encourage you to consider the following points in your inquiry:

- The **need for multiple, effective, evidence-based strategies across the early years**, implemented concurrently and continuously (we call this stacking). Positioning early childhood education and care reforms within the broader ecosystem of early years services is critical for equitable and improved outcomes for South Australian children.
- Restacking the Odds proposes **provision of high-quality early childhood education and care for 15 hours or more per week to all children for 2 years before starting formal schooling**. It also identifies that **children from priority population groups will benefit from attending ECEC from a**

[redacted]

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- **younger age**: 3 years before the start of formal schooling. Priority groups include children living in areas of socio-economic disadvantage, children from a non-English speaking background, Aboriginal and Torres Strait Islander children and children with disability. A universal approach allows for full population coverage and is therefore more likely to deliver equitable outcomes.
- Our research supports the **continued application of the National Quality Standard** (NQS) in early childhood education and care as an important tool to support monitoring and reporting of service quality.
- Achieving the benefits from early childhood education and care – and indeed from complementary early years services – means ensuring that services are available by families where and when they need them, are high quality and are used at the appropriate dosage. I encourage the Commission to **embed a focus on quantity, participation and quality** in the delivery of early years services in South Australia. This should include collection and use of lead indicator data to assess performance and progress on a regular basis and accompanying strategies to build capability and increase capacity to use that data to measure and monitor quantity, quality and participation.
- Addressing existing **barriers to participation in ECEC** is particularly important for effective implementation of universal 3 year old preschool – noting a current disparity between enrolment and attendance. Our research on barriers and facilitators to early childhood education participation suggests that this may include reducing direct (e.g. fees) and indirect (e.g. travel) service costs; promotion of the benefits of ECEC linked to high-quality play-based learning in formal settings; and investment, time and resourcing for professional development including training staff in relationships-based and family-centred practice.
- I also encourage the Commission to consider the role **of integrated services and place-based approaches** in the implementation of early learning reforms. There is potential for South Australia to play a leading role in combining and integrating early childhood education services with other evidence-based early years strategies. Considering integration across education, health and social care is important for child development outcomes and for providing a more child-centric system. This could provide a model to inform national developments, such as the Early Years Strategy and the future of national place-based approaches.

Restacking the Odds: purpose and overview

The Australian Early Development Census (AEDC) shows us that each year, one in five children start school developmentally vulnerable. Children living in the most socio-economically disadvantaged communities are twice as likely to be vulnerable on one or more AEDC domains and three times more likely to be vulnerable on two or more domains compared to children living in communities with high levels of socio-economic advantage. These inequities have not shifted in over a decade.

There is no single solution to the complex challenges faced by many children, families and communities. The rapid development in a child's earliest years (0-8) provides the foundation for lifelong health, development and wellbeing. Establishing the conditions that children need to thrive during this critical time provides immediate and lasting benefits for individuals, families and communities. Improving children's health, development and wellbeing requires combining or 'stacking' multiple effective evidence-based strategies across the early years (0-8 years) and implementing them concurrently and continuously (See Attachment 1). Our approach was informed by the evidence-based research of economist James J. Heckman who has suggested that greater investments in early childhood development bring greater returns through better health outcomes and increased productivity. He also identified that applying multiple, complementary services across the early years will amplify the effect on a single strategy/service.

Restacking the Odds focuses on five evidence-based platforms and programs to boost children's health development and wellbeing: antenatal care; sustained nurse home visiting; early childhood education and care; parenting programs; and the early years of school (defined as reception through to Year 3). These five strategies are notably longitudinal (across early childhood), ecological (targeting child and parent), evidence-based, already available in almost all communities (i.e. better use of existing service infrastructure), and able

to be targeted to those with the greatest needs.

Our analysis of data from the Longitudinal Study of Australian Children has found that 'stacking' these five fundamental strategies, (i.e., ensuring they are all applied for a given individual) has a cumulative, positive effect on child development outcomes, measured through reading scores at ages 8-9 (see Attachment 2).

Evidence-based review of indicators to assess quality, quantity and participation

Restacking the Odds' unique approach uses data and evidence-based indicators to focus on *how* to work differently to improve outcomes for children, families and communities. It develops the skills and knowledge of practitioners, community leaders and government for collecting, understanding and using lead indicators to answer key questions including:

- **Quantity:** Are the strategies available locally in sufficient quantity, relative to the size of the target population?
- **Quality:** Are the strategies delivered effectively relative to evidence-based performance standards?
- **Participation:** Do the targeted children and families participate, and at the right dosage levels?

Lead indicators are essential. They allow service providers and other stakeholders to regularly assess performance and progress, and course-correct when required. While outcome data is the ultimate arbiter of success, lead indicators about what families and children are actually experiencing allow service providers to make adjustments and accumulate learning regularly, rather than waiting years to see outcomes.

The project's first phase completed research to develop and apply evidence-based lead indicators for the effective delivery of each of the five fundamental strategies. These indicators define how the strategies should be delivered across the dimensions of quality, quantity and participation. The full set of indicators is provided at Attachment 3.

For Early Childhood Education and Care (ECEC), measurable, best practice indicators of quality, quantity and participation were developed through a targeted rapid review of the existing research base for ECEC. This included evidence for all forms of early childhood education and care – including preschool and long day care settings.

Extensive research indicates that the education and care of young children (from birth to eight years of age) has an immense influence on long-term outcomes related to their cognition, resilience, health and wellbeing. It suggests that children from the lowest socioeconomic quintile would benefit from good quality early education opportunities prior to starting school. These benefits relate to formal ECEC models, particularly high-quality centre-based care and preschool or kindergarten programs in the one to two years immediately preceding school. AEDC data suggest that children who attend preschool are less likely to be developmentally vulnerable, even when considering level of relative disadvantage. However, the data also suggest that preschool attendance does not currently close the equity gap in developmental vulnerability.

The targeted rapid review focused on answering four questions:

1. Within an existing national quality system for ECEC, which quality areas and/or standards have the most significant effect on child developmental outcomes (i.e., cognition, language, academic, and social and emotional development)?
2. What does the evidence indicate is the most effective universal starting age, dosage (i.e. number of hours per week) and attendance duration (i.e. number of months or years) as it relates to improving child developmental outcomes?
3. Given the evidence determined from Question 2, in what quantity should a given community be delivering ECEC?
4. Do the answers to these questions differ for targeted provision to disadvantaged populations?

The evidence based indicators established in the research phase are as follows:

Quality:
To determine the indicators of quality, Australia's existing quality rating system was utilised: the National Quality Standard (NQS) implemented by the Australian Children's Education and Care Quality Authority (ACECQA). An initial mapping exercise was undertaken to determine how closely Australia's Quality Areas matched the key principles identified from the European Commission Quality Framework and on domains from standardised, objective measures of ECEC quality: the Classroom Assessment Scoring System PreK (CLASS PreK) and Early Childhood Environment Rating Scale – Revised (ECERS-R).

This initial scoping work provided confidence that important areas were not being missed when using the seven Quality Areas from the ACECQA National Quality Framework to direct the targeted literature search. A combination of literature reviews (peer-reviewed and web-based reports) and interviews with experts were then performed, to determine which ACECQA Quality Areas had the most robust evidence related to child outcomes. We found that the available evidence supports three of ACECQA's seven Quality Areas well (i.e., QA1 - Educational program and practice; QA4 – Staffing arrangements; and QA5 – Relationships with children). We identified that while 38% of Australia's ECEC centres receive an 'Exceeds' rating from ACECQA, only 25% of centres exceed the NQS standard for performance on all three of these Quality Areas.

> *Quality indicator: The proportion of ECEC services rated 'exceeding' the standard in quality areas 1, 4 and 5 and at least 'meeting' the standard in all other quality areas according to the ACECQA assessment*

Participation:
To determine participation indicators we focused on national and international longitudinal studies and utilised systematic reviews and meta-analyses, where available. The evidence was examined to determine any differential effect related to universal or targeted program participation in children from 0 to 5 years (e.g. targeted according to housing vulnerability or poverty, cultural and linguistic diversity, or low IQ).

There were three main factors identified that related to participation: i) starting age, ii) program duration, and iii) program intensity. The literature supports the importance of ECEC for all children for two years before starting school. For children from priority population groups (children residing in an area with a Socio-Economic Index for Areas Index of Relative Socio-economic Disadvantage quintile of 1, non-English speaking background, Aboriginal and Torres Strait Islander children, children with disability), the evidence suggests an earlier starting age and longer duration of ECEC is beneficial, as is a higher dose program. These benefits are only conferred for high quality programs.

The proposed participation indicators differ for universal vs targeted provision:

> *Universal participation indicator: Proportion of all children attending ECEC for 15 hours or more per week, for the two years before starting formal school*
> *Targeted participation indicator: Proportion of children experiencing disadvantage who attend ECEC for 15 hours or more per week, for at least the three years before starting formal school*

Quantity: When assessing quantity, the key considerations are whether there is sufficient ECEC infrastructure and a qualified ECEC workforce to support the relevant populations to attend for at least fifteen hours per week. Quantity indicators were developed using the best indicators of participation level (for universal and targeted provision), and community-level population data.

Quantity indicator: The number of ECEC places for 15 hours per week available to 2-5 year olds.

The full technical report of the review is attached (Attachment 4), together with the communication summary (Attachment 5).

The utility of the indicator data was tested by working across seven low-SEIFA communities to understand how the fundamental services were being delivered and accessed and the practical value of indicator data. Currently in Australia, these indicators are inconsistently collected and rarely used to inform early years services.

Our research and community level work has shown that evidence-based lead indicators can be defined and populated for each strategy and that the common framework of lead indicators can be applied across services and provide actionable insights. The data required to populate the indicators can typically be assembled, however it is often difficult to access.

The data reveals important gaps in early childhood services with the patterns in these gaps varying across communities and strategies. Service providers, policymakers and community representatives recognise the data gap and welcome our attempts to address it. One community representative commented: '…*we had very poor AEDC results. So, I was looking for data where we could show improvement. I was able to go through the Restacking the Odds data and find where we could make some easy wins'.* An ECEC service provider noted value in examining participation data – including to compare participation rates at different centres and against benchmarks and to consider opportunities to improve participation of specific population groups.

Barriers, facilitators and strategies to improve participation

For early childhood education and care, the collection of lead indicator data highlighted that significant numbers of Australian children enrolled in early childhood education and care are not attending for at least 15 hours a week. For example, data of over 10,000 children at 688 centres across Australia, sourced via a collaboration with Xplor (one of Australia's leading ECEC software platforms) showed an average of just 56 per cent of children enrolled in ECEC received the recommended dose of at least 15 hours or more care per week for 90+% of weeks over a nine month period (1 March to 30 November 2019) – see Attachment 6.

The substantive variation in the proportion of children accessing early childhood education in the year before school has been found in previous research. Studies have shown that enrolment is lower among children from families with: a single-parent; non-English speaking background; lower levels of education; both parents unemployed; Aboriginal or Torres Strait Islander (ATSI) descent; residency in rural or remote areas or socioeconomically disadvantaged communities. Similar trends have been observed in studies of attendance rates. That is, even when children from disadvantaged groups enrol in preschool programs, they typically attend for fewer hours than their non-disadvantaged counterparts.

The barriers and facilitators of participation in ECEC experienced by and most important to Australian families has been subject to only limited exploration, however. Further research was conducted to investigate these barriers and facilitators in three Australian communities. Attachment 7 provides the published research findings.

The study shows considerable convergence across parent and provider views on the importance of various ECEC participation barriers and facilitators, and highlights specific divergences. Findings indicate the need to:

a) reduce both direct and indirect service costs for families;

b) increase flexibility in program formatting so participation can be coordinated with the demands of work and other family responsibilities;
c) more effectively promote the benefits of play-based learning in formal ECEC settings; and
d) change attitudes about maternal roles and child readiness to participate in ECEC.

Developing prototypes and opportunities to scale our approach

Barriers and enablers to collecting and using indicator data

The Restacking the Odds initiative is now in a prototyping phase, in partnership with communities and service providers across Australia. This aims to better understand the key barriers and enablers to collecting, analysing and using evidence-based data amongst service providers and communities and to co-design feasible prototype solutions to embed the routine use of the Restacking lead indicators in key settings.

The most common barriers and enablers to collecting, reporting, and using the Restacking framework have been a focus of our recent research. This has used a behavioural change model, COM-B framework, to understand the elements requiring change, how they interrelate and identify the most common and important barriers and enablers. The aim is to develop evidence-informed prototype solutions to support behaviour change, in partnership with communities and service providers.

Preliminary analyses have revealed several emerging themes. The following table illustrates themes emerging across strategies and communities. Further analyses will include a more granular view of the major barriers and enablers, particularly as we work closely with services and communities to develop prototypes and interventions.

	Barriers	Enablers
Capability	• Low data literacy/knowledge • Lack of specific data skills • Dedicated time for data-related tasks	• Education • Training • Enablement
Opportunity	• Service/system structure • Service/system processes • Technology software platforms • Insufficient resources • Workplace and community data culture • Workforce shortages and staff turnover	• Tailored IT systems • Guidelines/processes • Relationships & restructuring • Environmental restructuring • Develop data culture • Generate buy-in/vision/common goals • Develop trust
Motivation	• External reporting requirements • Service/system processes • Perceived cost-benefit of staff resources for data-related tasks vs. other priorities (e.g. engagement with families and children)	• Legislation/ regulation/ incentivisation • Education/ persuasion/ incentivisation

Exploring potential to scale this approach

Alongside our research and prototype development we are exploring the appetite and barriers to implementing this approach across Australia. This includes understanding the value to the community of making investments in this type of initiative. We are engaging a wide range of partners, across governments and the sector, to explore what would be needed at a political and policy level to implement this approach widely.

As part of this we have been exploring community attitudes to investment in early childhood development and identified broad based support for doing more to help children, parents and families by offering universal early childhood education from both 3 and 4 years of age. SVA recently surveyed a representative sample of the Australian people to ask their views on early childhood education and programs that can help children thrive. Survey participants were presented with pairs of opposing statements and asked to choose the one they agreed with more. Headline findings are summarised in the table below.

A - Statements with high levels of support	B - Opposing statements
7 out of 10 people chose these statements over the opposing statements in column B: • Every child should be able to receive quality early childhood education from 3 years old at their local school [68%] • Even though childcare is an essential service Government funding has failed to keep pace, leaving families with huge costs and many unable to find childcare at all. To give every child the best start in life we should move from an ad hoc childcare system to proper early learning for 3 and 4 year olds [68%] • The longer women are out of the workforce the more likely it is they lose the skills, networks and relationships they need to succeed. To help women return to work and to give every child the best start in life government must make childcare affordable / free for every family. [67]	• Government should not be spending more on childcare, it would cost too much and lead to increased taxes • It should be the responsibility of parents to cover the costs of childcare not taxpayers • It should be the responsibility of parents to cover the costs of childcare not government • Government should not be spending more on childcare, there are more important priorities • The best care a child can receive in the first years of their life is from their mum and dad. Parents should be encouraged to stay home and care for their children • People should be free to choose whether or not they go back to work, not incentivised one way or the other with childcare subsidies • A parent should not miss out on government support because they choose to stay home with their child
7 in 10 supported this statement over the statement in column B: • Good early education helps put a child on the path to success in school and beyond. All children should be able to go to preschool even if their parents aren't working so they can begin their learning [70%]	• The Government should not be paying for children to go to preschool if their parents are not working or studying and can look after them themselves
7 in 10 supported this over opposing statements: • To make sure every child is happy and healthy and off to a great start in life every child should receive regular check ups from a nurse in the first years of their life. [72%] And 6 in 10 supported this statement: • Every child needs parents who have the support they need to be great parents. Government should offer classes where parents learn practical parenting skills, like dealing with difficult behaviour or how to best support a child's learning [63%]	Opposing statements included: • Government should not waste more money on new programs and leave parents alone unless they ask for help • It's not government's role to tell parents how they should be raising their children

I am grateful for the Commission's interest in our work and welcome the opportunity for continued engagement beyond the initial hearing in January.

Kind Regards,

Prof. Sharon Goldfeld
Director, Centre for Community Child Health

Attachments:

Attachment 1: C Molloy, T Moore, M O'Connor, K Villanueva, S West, & S Goldfeld, *A Novel 3-Part Approach to Tackle the Problem of Health Inequities in Early Childhood*, 2019. Academic Pediatrics, 21(2), 236–243. https://doi.org/10.1016/j.acap.2020.12.005

Attachment 2: C Molloy, M O'Connor, S Guo, C Lin, C Harrop, N Perini, & S Goldfeld, *Potential of 'stacking' early childhood interventions to reduce inequities in learning outcomes*, 2019. J Epidemiol Community Health, 73(12), 1078-1086. doi:10.1136/jech-2019-212282

Attachment 3: Centre for Community Child Health at Murdoch Children's Research Institute, Social Ventures Australia and Bain & Company, *The Restacking the Odds Indicator Guide: Quality, quantity and participation indicators across early years services and why they're important.*

Attachment 4: C Molloy, P Quinn, C Harrop, N Perini, S Goldfeld, *Early childhood education and care: An evidence based review of indicators to assess quality, quantity and participation: Technical report,* 2020.

Attachment 5: C Molloy, P Quinn, C Harrop, N Perini, S Goldfeld, *Early childhood education and care: An evidence based review of indicators to assess quality, quantity and participation: Communication Brief,* 2019.

Attachment 6: C Molloy, S Goldfeld, C Harrop, N Perini, *Early childhood education: A study of the barriers, facilitators, & strategies to improve participation*, 2022.

Attachment 7: R Beatson, C Molloy, Z Fehlberg, N Perini, C Harrop, & S Goldfeld. *Early Childhood Education Participation: A Mixed-Methods Study of Parent and Provider Perceived Barriers and Facilitators*, 2022. Journal of child and family studies, pp 1–18.

A Novel 3-Part Approach to Tackle the Problem of Health Inequities in Early Childhood

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The authors have no conflicts of interest relevant to this article to disclose.
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Abstract

The first 5 years of a child's life are crucial in laying the foundation for their health and developmental trajectory into adulthood. These early years are especially influenced by the surrounding environments in which children live and grow. A large international body of evidence demonstrates that children who experience disadvantage tend to fall increasingly behind over time. At the societal level, these inequities can cause substantial social burdens and significant costs across health, education, and welfare budgets. A contributing factor is that children experiencing adversity are less likely to have access to the environmental conditions that support them to thrive. Many of these factors are modifiable at the community or place level. We argue for three key—though not exhaustive—ideas that collectively could achieve more equitable outcomes for children facing disadvantage and experiencing adversity:

1. Adopt a social determinants approach to conceptualizing disadvantage;
2. Stack existing, evidence-based government and nongovernment service interventions/programs that operate at the local or community level; and
3. Use data and evidence to focus improvements for more equitable and adaptive systems.

We conclude that if adopted, these 3 ideas could contribute to the ability of local communities and networks to identify and respond to factors that address early childhood inequalities.

Keywords: child inequities; early childhood; system change

Academic Pediatrics 2021;XXX:1−8

What's New

We propose 3 ideas that collectively address early childhood inequities, by stacking interventions within the robust service "substrate" that already exists and utilizing equity based metrics to monitor and improve performance.

Equity exists when groups of people defined by social, economic, demographic, or geographic indicators are treated fairly and impartially and are not disadvantaged by any solvable differences.[1] The causes of inequities are complex and multifaceted[2,3]; however, the evidence is clear and consistent that it is the circumstance in which children live, learn, and develop, the social determinants,[4] that drive differential health and developmental outcomes: the more disadvantaged their circumstances, the poorer their health, and developmental outcomes.[5−10] The first 1000 days—the period from conception to the end of the second year—are particularly important.[11−13] This is the period when children are most developmentally plastic, thus experiences and exposures during this period have a disproportionate influence on later health and development.[10,14−16]

Gaps in both cognitive and noncognitive skills between children from advantaged and disadvantaged backgrounds begin in infancy, and widen progressively in the preschool years.[11,17] By school-age, children are already set on developmental trajectories that are difficult to shift. These disparities compromise future education, employment, and opportunities.[5,17−19]

Clearly, we should be seeking to reduce and prevent inequities.[4,20] To do so requires greater investments in prevention and early intervention initiatives in the early years.[21−24] The economic returns of investments in the early years are higher than those in later years: although it is possible to shape the development and wellbeing of children and young people when they are older, it becomes progressively harder and more costly to do so.[17,21,25,26] It is most cost effective to invest in early intervention that resolves issues as they emerge and are malleable, rather than responding to crisis, stress and trauma, which is both more challenging and more expensive to resolve later on.[21] Recent data show that

Australian state and federal governments are spending $15.2 billion each year on high-intensity and crisis support services, and it is estimated that the cost of such late intervention (ie, difficulties that could have been reduced or prevented) equates to $607 for every Australian every year.[26] On the other hand, economic data show that population-based early interventions such as quality early childhood education and care provides a strong return of 2 to 4 times the costs.[27–29] Getting it right in the early years reduces downstream expenditure on remedial education, school failure, poor health, mental illness, welfare recipiency, substance misuse, and criminal justice.[21]

Research would suggest that the imperative and opportunity for addressing inequities should remain focused in the early years. That said, the challenge is how this should best be actioned. While addressing social determinants remains an important aspect of intervention, the reality is that for most economies it is a complex and complicated policy space for which many working in pediatrics may be ill-equipped to either influence or investigate in any substantial way. We would argue that the service "substrate" that already exists in most high-income countries is the perfect starting place for change. It may well be that expertise and effort should be focused on the considerable existing government and nongovernment service investment.

To that end, we put forward 3 ideas that if implemented concurrently could see cumulative benefits and therefore accelerate change. By utilizing a conceptual framework for disadvantage grounded in social determinants, we lay bare the broader ecological factors and specifically describe the system change possibilities for children and families. We then accompany this more complex approach to addressing disadvantage with the notion of "stacking" interventions, challenging the current program paradigm that seeks effectiveness in a single program but potentially misses the mutual benefit of multiple interventions (services and/or programs) over time. And finally, we propose a series of metrics that have been developed through research. These specifically target the service and community level systems and are designed to drive change in our existing systems with the potential to be translatable across countries.

Taking both a social determinants lens to understanding disadvantage (through 4 lenses of sociodemographic, geographic environments, health conditions, and risk factors) and an ecological (child, family, community) approach offers a useful framework for policymakers to view and address the determinants of child health inequities.

Mutual and cumulative benefit of existing interventions (services and programs) that operate at the local or community level have the potential for sustained impact when delivered across early childhood and are ecological (targeting child, parent, and environment).

Service systems are supported to change when they have the right metrics and evidence for excellence, reach, and dose to drive equitable delivery processes.

IDEA 1: ADOPT A SOCIAL DETERMINANTS APPROACH TO THINKING ABOUT DISADVANTAGE

Disadvantage is multifaceted. Philosophical perspectives emphasize disadvantage as limiting opportunity and the capacity for individuals to freely lead lives they have reason to value.[30] In the context of health equity, disadvantage refers to relative position in a social hierarchy determined by wealth, power, and prestige.[31] In contrast to concepts of poverty that focus on those who are the most deprived (eg, of money or material possession), socially excluded, and/or vulnerable,[32] disadvantage exists on a continuum.

In operationalizing the concept of disadvantage, conventional approaches typically measure children's experiences of disadvantage as socioeconomic status (eg, parental education, occupation, and income), but this fails to capture the complex and multifaceted ways in which disadvantage can manifest. For children, disadvantage manifests as the circumstances in which they live, learn, and develop that drive differential health and developmental outcomes (social determinants).[4] The bio-ecological perspective further suggests that children's biology interacts with the multiple nested levels of their surrounding social and physical environments to shape child development.[33] Sources of disadvantage may therefore arise at the individual (eg, poor nutrition), family (eg, low parent education), and community-level (eg, dangerous neighborhood).[2]

A framework of child disadvantage[5] (Figure), informed by a social determinants and bio-ecological approach[5,34] better encapsulates factors that matter for child health inequities. The *sociodemographic* lens captures characteristics (eg, families from an ethnic minority background facing structural and interpersonal racism) that define subpopulation groups at risk of poorer outcomes. The *geographic environments* lens captures the characteristics of the places where children live (eg, proximity to services). The *health conditions* lens captures conditions unevenly distributed across social groups (eg, caregiver depression). The *risk factors* lens captures attributes that are associated with an increased likelihood of poor child outcomes (eg, caregiver smoking). When conceptualized together, this framework ensures the adverse impact of disadvantage is not underestimated by considering only socioeconomic disadvantage or by underestimating the potential benefit by addressing different levers for disadvantage. Further research has shown that addressing disadvantage can decrease the combined rates of physical, cognitive, and social problems by up to 70%.[35]

IDEA 2: STACK INTERVENTIONS TO MAKE A SUSTAINED DIFFERENCE

The framework is also consistent with the idea of stacking interventions across the early years of a child's life and lends itself to creating measurable, meaningful indicators across relevant factors. Despite the range of available services for children, government and communities

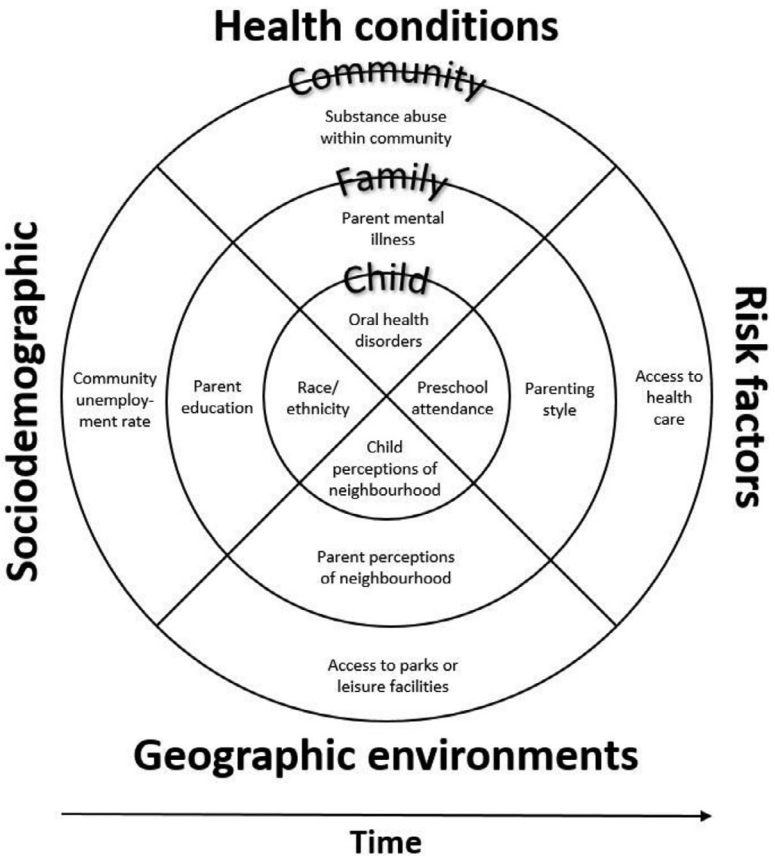

Figure. *Framework of child disadvantage, reproduced from Goldfeld, O'Connor, Chong, Gray, O'Connor, Woolfenden, Redmond, Williams, Mensah, Kvalsvig, Badland,[35] aligning a social determinants and bio-ecological perspective. Examples of relevant indicators within each lens (sociodemographic, geographic environments, health conditions, and risk factors) and level (child, family, and community) are shown. It is expected that disadvantage experienced through each of these lenses will overlap and interact to influence inequities in complex ways, and will unfold over time.*

alike often focus on importing or trialing new programs rather than improving the existing and already funded service system where a range of evidence-based interventions could be readily incorporated.[36,37] While there is a vast literature base reporting on the efficacy of individual interventions, there are few that explore the potential cumulative benefit of applying multiple services/interventions over time.[38] Further, while the services exist, they are not considered as a system. Within the policy environment they often cross sectors (eg, health, education) with few incentives to drive a coordinated stacked approach that considers the necessary metrics to maximize the mutual benefit required to address inequity. Heckman has suggested there are economic benefits that address both inequity and advance human capital by stacking services or interventions.[22] This builds on the evidence that supports effective individual interventions such as quality early childhood education[39–41] and sustained nurse home visiting programs[42–44] as promoting cognitive and non-cognitive skill formation. Heckman suggested that applying multiple, complementary services continually across the early years will amplify the effect on a single strategy/service and indeed be more effective than traditional policy initiatives, such as tuition subsidies, job training tax rebates and downstream funding/treatment for preventable conditions.[45,46] There is a vast evidence-base demonstrating a dose-response relationship between a child's exposure to risk and poorer health, cognition, and life-course outcomes,[47,48] yet there is a dearth of evidence demonstrating the potential cumulative benefit of children receiving multiple evidence-based interventions.

To determine if there was an a priori case for supporting stacking of service interventions in the Australian context, recent research examined the association between exposure to a combination of evidence-based services (antenatal care, nurse-home visiting, early childhood education and care, parenting programs, and early years of school) between 0 and 5 years on a measure of academic reading at 8 to 9 years.[38] These services were selected because they are longitudinal (across early childhood), ecological (targeting child and parent), evidence-based, already available in almost all communities, and able to be targeted to benefit the bottom 25%. As hypothesized, reading scores were higher for children who accessed more services. This finding could have significant implications for sustainably reducing inequities in early childhood. However, there was no differential benefit for children experiencing disadvantage who potentially have more to gain from these interventions, which was counter to the hypothesis.[38] Issues associated with access and quality, not tested in this study, could explain this unexpected outcome.

Importantly, for children who are unstably housed and/or experience food insecurity, Maslow's hierarchy of needs[49] would clearly suggest that these factors are critical to address as a priority. Programs such as the Supplemental Nutrition Assistance Program in the United States[50] and interventions designed to reduce intimate partner violence, one of the leading causes of housing instability,[36,51] should be considered fundamental to other critical early years services such as those discussed above. We would argue however that this is not an either/or scenario.

Approaches capitalizing on system-wide and place-based initiatives are avenues where stacking interventions could be experimentally trialed both from a developmental and cost effectiveness perspective. In order to properly assess the impact of stacking interventions, evidence-based, measurable indicators are required.

IDEA 3: USING DATA-DRIVEN, EVIDENCE-BASED SYSTEM METRICS TO DRIVE EQUITABLE, AND ADAPTIVE SYSTEMS FOR CHILDREN

Utilizing data-driven, evidence-based system metrics means communities can access more precise data to assist them with decision-making and allocation of limited resource. By building on the first 2 ideas in this paper, we argue that a next logical step is to deliver metrics on measurable and modifiable factors that are known to drive disadvantage taking the social determinants and bio-ecological approach (Idea 1) and can drive stacked responses (Idea 2).

COMMUNITY-LEVEL METRICS

The research into neighborhood or community effects on children, originally motivated by the observation that disadvantage is often geographically concentrated and intergenerational,[52] established the relationship between neighborhood socioeconomic status and children's developmental outcomes.[53,54] However, further research has shown this relationship goes beyond socioeconomic factors. For example, communities that have local amenities (eg, kindergartens and playgroups, green spaces) and services (eg, public transport), and safe places to play, also promote early childhood development.[55] Positive and stimulating environments early in a child's life are crucial to the development of foundational skills in learning and communication.[56,57] Likewise, neighborhoods with high levels of poverty and violence have the potential to negatively impact children's developmental trajectories.[58]

The Kids in Communities Study[59] investigated community-level factors associated with early childhood development in 5 community domains—physical, social, service, governance, and socioeconomic environments—in 25 communities in 5 Australian states and territories using a mix of quantitative and qualitative methods. This study identified a set of evidence-based foundational community factors (FCFs), those which lay the foundations of a good community for young children.[60] Some examples include public open space availability and quality, physical access to services (eg, walkability and public transport), and affordable housing.

The FCFs allow communities to move beyond anecdotal information to a discussion grounded in evidence about how they are tracking on community factors related to early childhood outcomes. The added richness and value of information to better understand the local context is crucial to tailoring place-based interventions most likely to be responsive and work in the community. Although there are existing collective impact approaches, such as the Asset-Based Community Development program[61] that are framed around place-based action for change using local action. This approach considers the existing services and resources available but does not conceptually drive a stacked approach to service delivery across sectors nor suggest the necessary service-level metrics that could be utilized to understand and then drive system change. While one could argue the lack of detail is purposeful to allow for local input and ingenuity, the difficulty is then generating sufficiently robust cumulative system benefit to actually address inequity. Given that these approaches are yet to deliver on outcomes it may be process and community-level metrics that could be the accelerators needed.

An extension of Kids in Communities Study is to take evidence on the built environment-specific FCFs to scale. Spatial built environment measures such as traffic exposure, public transport availability and access, park access and quality, early childhood education and care service availability, and housing, have recently been linked to the 2015 Australian Early Development Census in Australia's largest 21 urban and major regional cities and towns.[62] The Australian Early Development Census is a population measure of early childhood development completed by teachers on all children starting school every three years[63] and is widely used by policy makers, practitioners, and researchers to help measure and monitor child development outcomes in communities. The result will be early childhood development and built environment data at a small geographic scale (around the child's home) for over 235,000 children approximately 5 years of age across the country.[64] The aim is to develop evidence-informed built environment indicators for early childhood, which can help identify areas of inequity, monitor community progress, strengthen community engagement and development, assist with prioritizing effort, and help inform policy recommendations using the best local data.

SERVICE-LEVEL METRICS

In order for systems/services to respond to gaps in performance and delivery, evidence-based metrics encompassing multiple domains (eg, quality, participation, access) with balance across structure (ie, accessible), process and outcome indicators are required to allow prioritization of limited time and resource.

Although there is a paucity of research examining the link between specific indicators and improved service performance, there are examples demonstrating the value of

quality indicators in their utility to improve performance in health care. For example, the Australian Council on Healthcare Standards established the Care Evaluation Program of clinical performance measures in its accreditation program. Documented evidence showed improved management and examples of improved patient outcomes related to quality metrics.[65] Follow-up data showed a large number of indicator results actioned by a high proportion of health care organizations, which also increased over time.[65,66] The actions included review of data quality activities, policy and procedure changes, educational programs, new appointments, and equipment changes.[65] Similarly, the US National Database of Nursing Quality Indicators is designed to provide unit-level data to aid in decision-making related to improving the nursing work environment and patient outcomes.[67] Research has shown that process and provider metrics from the National Database of Nursing Quality Indicators demonstrate important associations with patient quality of care.[68,69]

Process and outcome indicators have different strengths and limitations. On the one hand, outcome indicators are often a measure of something that is important in its own right (eg, literacy rate). However, they are not a direct measure of quality[70] and are difficult to link to practice/service performance.[71] In contrast, process indicators are direct measures of quality and are easier to interpret.[70] Service systems in developed countries tend to focus on mostly outcome indicators such as national tests of reading and numeracy standards or proficiency levels at school (eg, the National Assessment Program—Literacy and Numeracy in Australia, the National Assessment of Educational Progress in the United States, and National curriculum assessment in the United Kingdom). Other outcome indicators include antenatal care visit in the first trimester (eg, Australia, the United Kingdom, New Zealand, the United States), employer/client satisfaction,[72–74] and proportion of infants who were breastfed (eg, World Health Organization, Australia—maternal and child health).[75] While these indicators provide important insights, they are difficult to shift in the short term since they are not as sensitive to differences in quality of service provision.

In line with ideas 1 and 2 above, and considering the impact that accurate measuring and monitoring of process metrics could have on service systems, we suggest that there are 3 key drivers—quality, participation, and quantity. If delivered effectively, these 3 drivers could have significant and positive effects on children experiencing adversity and begin to reduce the inequity gaps prominent in Australia and other developed countries.

Quality: Early years services need to be delivered at high quality to see benefits for children, especially for children from disadvantaged backgrounds who are most likely to miss out.[38,76] Services/interventions with quality are those for which there is robust evidence showing it delivers the desired outcomes. Examples include early childhood education and sustained home visiting programs. However, research assessing the quality and key elements of such programs also illustrate that the how and by whom is also critical to realize the benefits. International research has shown that early education programs that emphasize learning in literacy, maths, science, environment and using a diversity of cultural and theoretical approaches result in better academic and social-behavioral outcomes than ones that do not have such a focus.[77] Children also make more progress in preschools where staff have higher qualifications.[78] Several systematic reviews and meta-analyses indicate the importance of specific quality components of sustained home visiting programs,[43,79,80] as well demonstrating the importance of staff skill and training.[43]

Participation: For interventions to be effective, the right children and families need to be targeted to attend at the right dosage levels. The optimal attendance levels may vary as a function of disadvantage status and can be calculated whether the intervention/strategy is for everyone (universal provision) or targeted (intended to benefit a certain population). Indeed, national data on enrollment rates in early education fail to demonstrate the variability in actual attendance (dose), particularly among high-risk and vulnerable groups, who arguably would benefit from higher doses than the general population.[81–83]

Quantity: Availability of services locally in sufficient quantity for the target population is crucial to ensure all children have physical access to evidence-based services in the first place. Understanding quantity metrics helps us determine the quantum of effort and infrastructure needed to deliver the intervention for a given population at the right quality and dose.

While there is obvious utility in individual indicators, adapting a systems approach across the key drivers of quality, quantity, and participation would enable local communities to make better and immediate decisions on where to direct limited resources.

We are currently undertaking a project, *Restacking the Odds*, that will test process metrics across 5 evidence-based interventions, primarily delivered as services (antenatal care, sustained nurse home visiting, early childhood education and care, parenting programs, and the early years of school), across the key drivers of quality, quantity, and participation, across several communities in Australia. The aim is to establish an actionable, evidence-based framework that can be used by participants across the social system to sharpen the targeting of their work, and to improve the effectiveness of their actions. In using this approach, we hypothesize that embedding process metrics into health and education services/platforms will create real and sustainable change.

CONCLUSION

Robust research supports the adverse impact of disadvantage on children's health, development, and subsequent adult outcomes. The ability of policymakers, service providers, and communities to respond as a system rather than single programs or strategies remains a challenge. To move beyond good intentions and address the issues of inequity, we have suggested 3 ideas for

addressing childhood inequities that have applicability across international service ecosystems.

If we 1) adopt a social determinants approach to disadvantage by assessing and responding to the underlying community conditions impacting children's well-being; 2) stack service interventions simultaneously (aimed at the child and parent) and continuously (antenatal to age 8 years); and 3) measure system functioning and use the data to make improvements (using quality, quantity, and participation), then we may be able to address early childhood inequities more effectively. Although there are essential government policy levers to consider, many of the change factors are modifiable at the local level. The necessary aligned effort required across organizations may be best advanced through the emerging place-based initiatives growing in disadvantaged locations across places like the United States, United Kingdom, and Australia. Using system metrics to support local communities and place-based networks to understand and respond to factors contributing to inequitable outcomes across early childhood is doable now and makes good sense.

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Potential of 'stacking' early childhood interventions to reduce inequities in learning outcomes

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ABSTRACT

Background Early childhood interventions are critical for reducing child health and development inequities. While most research focuses on the efficacy of single interventions, combining multiple evidence-based strategies over the early years of a child's life may yield greater impact. This study examined the association between exposure to a combination of five evidence-based services from 0 to 5 years on children's reading at 8–9 years.

Methods Data from the nationally representative birth cohort (n=5107) of the Longitudinal Study of Australian Children were utilised. Risk and exposure measures across five services from 0 to 5 years were assessed: antenatal care, nurse home-visiting, early childhood education and care, parenting programme and the early years of school. Children's reading at 8–9 years was measured using a standardised direct assessment. Linear regression analyses examined the cumulative effect of five services on reading. Interaction terms were examined to determine if the relationship differed as a function of level of disadvantage.

Results A cumulative benefit effect of participation in more services and a cumulative risk effect when exposed to more risks was found. Each additional service that the child attended was associated with an increase in reading scores (b=9.16, 95% CI=5.58 to 12.75). Conversely, each additional risk that the child was exposed to was associated with a decrease in reading skills (b=−14.03, 95% CI=−16.61 to −11.44). Effects were similar for disadvantaged and non-disadvantaged children.

Conclusion This study supports the potential value of 'stacking' early interventions across the early years of a child's life to maximise impacts on child outcomes.

INTRODUCTION

Inequities in early childhood health and development are differential outcomes that are unjust and preventable and systematically effect vulnerable populations.[1] Early childhood development lays the foundation for health and well-being over the life course.[2 3] Inequities emerging in early childhood often continue into adulthood, contributing to unequal rates of low educational attainment, poor physical and mental health, and low income in adulthood.[4] This generates substantial social costs across health, education and welfare budgets.[4]

Inequities in children's outcomes are particularly apparent in the academic domain.[5] Research has shown that the academic performance of socioeconomically disadvantaged 15-year-olds is on average more than 2 years behind that of their most advantaged peers.[6] Australian data from standardised national testing (reading and maths) have found an approximate 1-year difference in skill levels between disadvantaged and advantaged children in year 3, which increased to a 3-year gap by year 9.[7] Developmental trajectories are difficult to shift as children get older,[2 3] and the link between educational underachievement and poorer health, social and life-course outcomes is well documented.[8 9] Certainly, our ability to function in complex social and economic environments is significantly influenced by reading ability and literacy. Data also show that increasing reading ability has the potential to accumulate other educational advantages that can act to reduce equity gaps and ultimately better health and quality of life (eg, see refs. [10 11]). These data highlight the importance of the early years for reducing risk and optimising health and educational achievement.

Further evidence has shown that intervening early can produce positive, sustained effects on child outcomes, in particular for children from disadvantaged families.[12 13] This includes from interventions such as antenatal care (ANC),[14] nurse home visiting (NHV),[15] early childhood education and care (ECEC),[16] parenting programme (PP)[17] and the early years of school (EYS).[18] There is strong evidence demonstrating a positive effect when each of these interventions has been evaluated as a single-strategy intervention on specific aspects of child development/behaviour at a specific point in time.[19]

In addition, interest in the potential of 'stacking' such early childhood interventions simultaneously and sequentially over time is emerging.[20 21] Heckman and Mosso emphasises the importance of 'continuity' of services (the timing, duration and quality content of child health and development services) as well as the 'complementarity' of services (different types of services with diverse focus and target groups) as being necessary to promote human capital.[22] Targeting multiple health and educational interventions in the early life of a child therefore may exceed that of a single intervention strategy. This potential 'added benefit' to children who have access to more evidence-based services throughout early childhood offers important new directions for research and policy.

While limited, research seems to support the cumulative benefit of simultaneously applying multiple evidence-based interventions. For example, the Research-based Developmentally Informed

(REDI) project in the USA conducted a randomised control trial to examine the individual and combined effect of an enhanced classroom preschool programme and home visiting programme (designed to increase parent support for home learning) for disadvantaged children aged 4–5 years.[20] Both programmes were effective at improving child outcomes 3 years later, and the combination of preschool and the home visiting programme produced better learning outcomes compared with the preschool programme alone.[20]

In contrast to the paucity of research on the added benefit of stacking multiple interventions, there is large evidence base demonstrating that exposure to multiple risk factors can combine to magnify the negative effect seen from any singular risk.[23] Research has consistently demonstrated a dose-response relationship between the number of adversities a child is exposed to (cumulative risk) and poorer health outcomes in adolescence and adulthood across a range of outcome domains.[23 24]

Given the potential mutual benefit of continuity and complementarity of services to address inequity, we hypothesised that parent report of accessing multiple early years services would yield greater effect on child developmental outcomes compared with access to fewer services. It was also expected that cumulative service use would benefit children from disadvantaged families to a greater extent than for non-disadvantaged children because they potentially have more to gain from these interventions. In secondary analyses, we also examine the cumulative risk effect (ie, the effect of exposure to more risk associated with the five interventions) on child reading, with the expectation that there would also be a similar relationship in the opposite direction. We draw on data from the Longitudinal Study of Australian Children (LSAC) to estimate the effect of 'stacking' five health and education platforms/interventions—(ANC, NHV, ECEC, PP and EYS)—on reading at age 8 to 9 years.

METHODS

Data source

The LSAC is a nationally representative sample of two cohorts of Australian children—the birth cohort of 5107 infants, and the kindergarten cohort of 4983 children aged 4 years—each of which commenced in 2004.[25] The LSAC design and sampling methodology are described elsewhere.[25 26] In brief, a complex survey design was used to select a sample that was broadly representative of all Australian children except those living in remote areas. Data were collected on multiple aspects of child development as well as family and community characteristics, and multiple information sources were utilised including parent interviews, direct child assessments and observational measures, parent and teacher self-report questionnaires and linkage to administrative data sets.

The current study drew on data from the birth cohort (51.2% male), focusing primarily on parent-reported data regarding family characteristics and environment, collected when children were aged 0–1 (Wave 1; n=5107), 2–3 (Wave 2; n=4606) and 4–5 years (Wave 3; n=4386). We also drew on children's results from a direct assessment of academic skills at 8–9 years: the National Assessment Programme—Literacy and Numeracy (NAPLAN) conducted on all Australian students. NAPLAN was successfully linked for n=3790 (86.4%) of Wave 3 participants.[27] This retention rate (85.9%) between Waves 1 and 3 compares favourably with those achieved by other comparable overseas studies.[28]

Measures

Exposure measures

We explored the effect of stacking five health and education platforms/interventions, primarily delivered as services (hereafter referred to as services for brevity), shown to be effective at improving child outcomes: ANC,[14] NHV,[15] ECEC,[16] PP[17] and the EYS.[18] The services are evidence-based and satisfy the criteria of continuity across the early years (ANC, ECEC, EYS) as well as complementarity (NV, PP). Specifically they are ecologically focused (targeting the child and parent dyad), together capturing a relatively comprehensive view of the ecological context in which children live and grow and are able to be targeted or intensified to benefit the bottom 25%.[19]

Children's exposure to each of these services was measured in LSAC by parent reports of direct service use and/or proxies (eg, poor parenting practices that would reflect the target of a PP) related to each of the five interventions (table 1). Notably, the indicators used in this study are more modifiable (eg, maternal smoking during pregnancy, parenting styles) than other commonly used indicators (eg, marital status, disability status)[23 29] (see online supplementary file 1 for more details). Each service variable was coded in two different ways: service use measures (ie, was the service accessed) and risk measures (ie, inadequate number of ANC visits). Cumulative scores were derived using a count approach. Of note, the cumulative analysis conducted here does not take into account any sequential or weighted approaches to each service strategy.

Service use measures

Service use indicators for the other four interventions were binary (yes=accessed the service or no=no access) and did not include measures of dose (how often) or duration (how long). An exception was ANC, which was measured by the number of medical visits before birth. Following previous research,[30] the ANC indicator was dichotomised using the top 20th percentile for interpretability and represented women who accessed a relatively higher level of ANC than the rest of the cohort. In relation to EYS, all Australian children attend the compulsory school years (from age 6 years) and hence all children were coded as 'yes' for access to this service. A total service use score was created by summing the number of services accessed (ie, maximum score of 5) to represent the cumulative exposure to five services.

Risk measures

The number of risk indicators ranged from 1 to 4 for each of the five services. Some indicators were binary (yes or no) and other indicators were continuous (eg, hostile parenting scores) and were dichotomised at the top 20th percentile. A summed score was then created for each service. These overall risk scores for each service were then dichotomised (0=not at risk, 1=at risk). A cumulative risk score was created to reflect how many risks children and/or their parents were exposed to across all services. The cumulative risk metric ranged from 0 to 5, with 5 representing risks associated with all five areas.

Outcome measures

Reading skill

Based on the fact that educational attainment is an important social determinant of a child's lifelong health, we have selected an academic measure as our main outcome variable. Reading skill at 8–9 years was assessed using the reading subscale of the NAPLAN assessment. Students were provided with a selection of texts in different writing styles and answered questions reflecting

Table 1 Five services and their indicators related to service use and exposure to risk

	Service use			Risk		
Service	**Indicator**	**Age**	**Values**	**Indicator**	**Age**	**Values**
Antenatal Care (ANC)	Appropriate number of medical visits before birth	0–1 years	0=inadequate service use (<10 times of visits) 1=service use (≥10 times of visits)	Inadequate number of medical visits before birth*	0–1 year	0=not at risk (≥10 times of visits) 1=at risk (<10 times of visits)
				Maternal smoking during pregnancy†	0–1 year	0=not at risk (no smoking) 1=at risk (smoking)
				Overall risk‡	**0–1 year**	**0=not at risk (0 ANC risk) 1=at risk (one or two ANC risks)**
Nurse Home Visiting (NHV)	Received a maternal and child health nurse visit in the last 12 months	0–1 year	0=no service use 1=yes service use	Did not have maternal and child health nurse visit in the last 12 months*	0–1 year	0=not at risk 1=at risk
Early Childhood Education and Care (ECEC)	Attended a preschool programme	3–5 years	0=no service use 1=yes service use	Inadequate weekly hours at day care§	2–3 years	0=not at risk (>7 hours) 1=at risk (≤7 hours)
				Did not attend a preschool programme*	3–5 years	0=not at risk (attended a preschool programme) 1=at risk (did not attend a preschool programme)
				Inadequate material resources at centre§	4–5 years	0=not at risk (>4 scores) 1=at risk (≤4 scores)
				Inadequate space resources at centre§	4–5 years	0=not at risk (>3 scores) 1=at risk (≤3 scores)
				Overall risk‡	**2–5 years**	**0=not at risk (0 or 1 ECEC risk) 1=at risk (two or three or four ECEC risks)**
Parenting Programme (PP)	Attended a parenting programme in the last 12 months	4–5 years	0=no service use 1=yes service use	Did not attend a parenting programme in the last 12 months*	4–5 years	0=not at risk (attended a parenting programme) 1=at risk (did not attend a parenting programme)
				Parenting behaviours—high hostility†	4–5 years	0=not at risk (<4.33 scores) 1=at risk (≥4.33 scores)
				Parenting behaviours—low spontaneous praise†	4–5 years	0=not at risk 1=at risk
				Parenting behaviours—low consistency†	4–5 years	0=not at risk (>3.6 scores) 1=at risk (≤3.6 scores)
				Overall risk‡	**4–5 years**	**0=not at risk (0 or 1 PP risk) 1=at risk (two or three or 4 PP risks)**
Early Years of School (EYS)	Attended early years of school	4–5 years	0=no service use 1=yes service use	Low quality of work environment§	4–5 years	0=not at risk (>4 scores) 1=at risk (≤4 scores)
				Low communication between teacher and parent§	4–5 years	0=not at risk (<2.83) 1=at risk (≥2.83 scores)
				Overall risk‡	**4–5 years**	**0=not at risk (0 EYS risk) 1=at risk (one or 2 EYS risks)**
	Total Service Use	**0–5 years**	**0=no service 1=accessed one service 2=accessed two services 3=accessed three services 4=accessed four services 5=accessed five services**	**Cumulative risk¶**	**0–5 years**	**0=no risk 1=one service overall risk 2=two service overall risks 3=three service overall risks 4=four service overall risks 5=five service overall risks**

*Indicators of direct service use.
†Proxy indicators related to service quality.
‡Overall risk within each service was created by dichotomising the summed scores of indicators in that service with the top 20th percentile.
§Indicators of service quality.
¶Cumulative risk was created by summing the overall risk score of each service. Full details of each indicator are presented in online supplementary file 1.

their comprehension of the content, key messages and meaning of particular words or phrases. Rasch modelling was used to convert the raw reading scores into scaled scores ranging from 0 to 1000.[27] Scores on the NAPLAN reading domain at year 3 were used as an indicator of academic performance at 8–9 years in this study because reading is a fundamental literacy skill[31] and has a strong correlation with students' overall academic achievement.[27]

Family characteristics measures

Socioeconomic position

Socioeconomic position (SEP) at 0–1 year was measured as a composite of each parent's self-reported annual income, highest education and occupation level. Family SEP at 0–1 year was used given the salience of this period for children's development.[32] A continuous score was created: values for each parent's income, education and occupation variable were standardised to have a mean of zero and an SD of one.[33] An unweighted mean score was created by averaging the standardised scores, which was then re-standardised to have a mean of zero and an SD of one. The bottom 25% were categorised as 'disadvantaged' and the top 75% as 'not disadvantaged'

Potential confounders and additional covariates

Covariates were identified that were not mediators and were either a cause of the exposure, or of the outcome, or of both, but not an instrumental variable.[34] Child's sex was used as a potential confounder of the relationship between intervention exposure and reading outcomes, as previous studies have shown that females perform on average better than males in reading and gender can impact on child's likelihood of service attendance.[35] To ensure NAPLAN scores were directly comparable across children, additional covariates included whether the child had repeated a grade at school by the time of NAPLAN testing and age in months when NAPLAN testing occurred.[34]

Analytic approach

Multivariable linear regression analyses with ordinary least square method were conducted to examine the five services as predictors of children's reading skills at 8–9 years. First, models were run to examine the effect of each service on reading separately, considering each service from both a use and risk perspective, within each service (eg, for all ANC variables, not taking into account the other four service variables). All models, including those subsequently described, were adjusted for child sex, whether the child had repeated a grade and child's age.

Second, analysis was conducted to examine the effect of each service use and overall risk within each service, respectively, adjusting for the other four service use variables and overall risk. Finally, analysis was undertaken to examine the added benefit of five total service use variables and the cumulative risk effect across the five services (eg, using five total service use as a predictor). Specifically, the cumulative risk score and, separately, cumulative service scores were examined as predictors of reading outcomes in linear regression models. We were also interested in whether the relationship between cumulative exposure to five services and reading outcomes was different for disadvantaged and non-disadvantaged children; therefore, we included an interaction term (ie, the number of services used × disadvantage status) in the models.

All models were adjusted for SEP, potential confounders and additional covariates described above. The percentages of missing values for all variables ranged from 0% to 36.48%. All models were analysed using multiple imputation by chained equations under the missing at random assumption to produce 20 imputed data sets, with results combined using Rubin's rules.[36] The imputation model included all variables in the analysis model and four auxiliary variables (parent's age at birth, parent English proficiency, child's Aboriginal and/or Torres Strait Islander status and two parent household status) to help predict missing data. Analyses with multiple imputation showed similar results with analyses using the sampling weights as an alternative to accounting for sample attrition; the results from imputed data are reported throughout. Analyses were conducted with Stata V.15.1.

RESULTS

Participant characteristics

The LSAC B cohort is a representative sample of 5107 children, 51% male. The average age of children was 8.5 years and 5.2% of children had repeated a grade by the time of NAPLAN testing at year 3. The mean NAPLAN reading score was 429.32±1.97, with disadvantaged children having a significantly lower mean score than non-disadvantaged children (382.78±3.10 vs 444.92±1.92, p<0.01).

Participation in service use and exposure to risk

The proportion of children accessing services across the five services were ANC (70.2%), NHV (66.5%), ECEC (81.4%) and PP (7.7%). Disadvantaged children were less likely to access each of the services than non-disadvantaged peers: ANC (66.0% vs 71.6%, p<0.01), NHV (59.1% vs 69.0%, p<0.01), ECEC (75.7% vs 83.3%, p<0.01) and PP (5.5% vs 8.4%, p=0.01).

The proportion of children exposed to risk associated with each service ranged from 22.7% to 46.1% (ANC: 41.7%, NHV: 33.5%, ECEC: 22.7%, PP: 46.1%, EYS: 40.0%). A higher proportion of disadvantaged children had been exposed to risk related to each service than non-disadvantaged children: ANC (56.5% vs 36.8%, p<0.01), NHV (40.9% vs 31.0%, p<0.01), ECEC (26.7% vs 21.4%, p<0.01), PP (59.6% vs 41.5%, p<0.01) and EYS (43.5% vs 38.8%, p=0.03).

Likewise the distribution of total service use showed that a lower proportion of disadvantaged children utilised four services than their advantaged peers (31.9% vs 42.2%, p<0.05) (figure 1A) and the distribution of cumulative risk showed disadvantaged children had higher proportion of exposure to three risks (23.7% vs 16.8%, p<0.05), four risks (13.4% vs 5.6%, p<0.05) and five risks (3.7% vs 0.9%, p<0.05) (figure 1B).

Effect of participation in service use and exposure to risk on reading

Disadvantaged children had lower reading scores than non-disadvantaged children (mean=382.78±3.10, 95% CI=376.65 to 388.92 vs mean=444.92±1.92, 95% CI=441.13 to 448.70). When the cumulative service use indicator was examined as a predictor of reading outcomes, higher total service use scores were associated with higher reading scores. After adjusting for covariates, each additional service use was associated with an increase of 9.16 points on the literacy measure. From the risk perspective, we found that the overall risk of ANC, NHV and PP was associated with an average drop of 12.53, 14.38 and 29.23 points, respectively. However, when combining the overall risk across the five services, there was a similar pattern whereby higher total cumulative risk was associated with poorer reading scores (table 2).

We found no evidence that the effect of total service use/cumulative risk on reading outcomes differed depending on whether the child was disadvantaged or not.

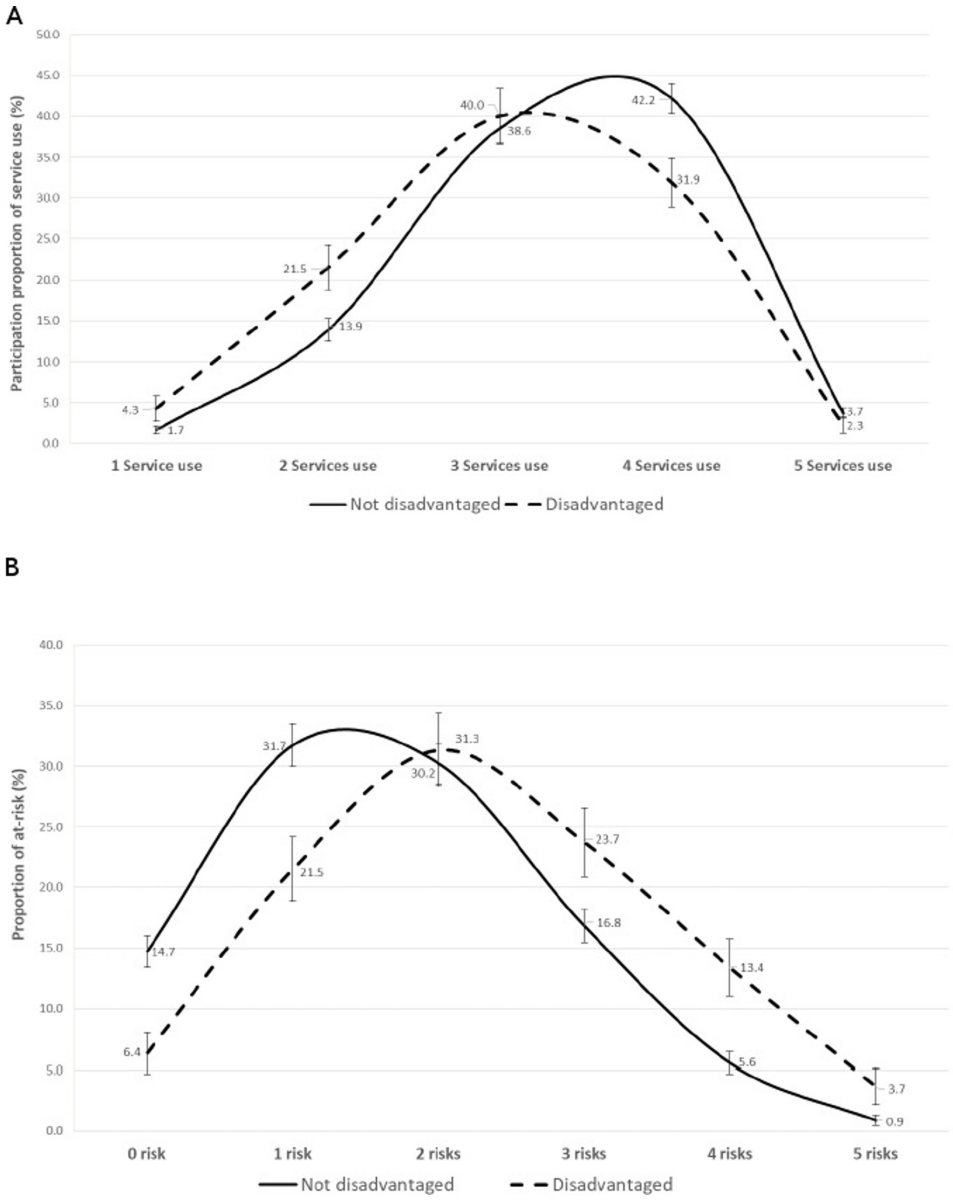

Figure 1 (A) Participation proportion of total service use. (B) Proportion of exposure to cumulative risk.

The interaction terms reflecting 'total service use × disadvantaged status' and 'cumulative risk × disadvantaged status' in each model had wide CIs overlapping zero (table 3).

DISCUSSION

This study utilised data from the LSAC to estimate the effect of 'stacking' five health and education services (ANC, NHV, ECEC, PP and the EYS) on reading at age 8–9 years. Two different approaches were utilised: direct service use (as a potential benefit) and exposure to risk (as a proxy for lack of service access). The indicators across the five services were selected from an ecological and a life course perspective, thus the total service use and cumulative risk variable captured a relatively comprehensive view of the ecological service context in which children live and grow. As hypothesised, the results suggest that children's reading scores at year 3 were higher after accessing more services and when exposed to fewer risks compared with those with lower service use and higher risks. This pattern of 'added benefit' from access to more services and 'cumulative risk' from exposure to more risks associated with five key early services was similar for disadvantaged and non-disadvantaged children, with no evidence of differential benefit.

Despite increasing policy and research interest in early childhood, this has mostly focused on single interventions or cumulative risk. However, our novel approach evaluates the 'stacking' effect of continuity (ANC, ECEC, EYS) and complementarity (NHV, PP) of service use. This aligns with findings from two recent studies, suggesting that combining early intervention strategies that target child and parent can result in better child academic outcomes beyond that of using a single intervention approach alone.[20 21] Combined with current findings, this reinforces the importance of both measuring and testing the cumulative benefit of early childhood interventions. Importantly, research has consistently demonstrated a strong link between early educational achievement and health throughout the life course.[37 38]

We also examined the effect of cumulative risk related to the five services. This cumulative risk approach has been widely used in child research to examine the adverse effect of intrapersonal, interpersonal and environmental risk factors on health and

Table 2 Linear regression models predicting reading scores at 8–9 years from service use and risk perspectives

	Service use		Risk	
Services	**Indicator**	**β (95% CI)**	**Indicator**	**β (95% CI)**
Antenatal Care	Appropriate number of medical visits before birth*	−0.84 (−7.41 to 5.72)	Inadequate number of medical visits before birth†	1.01 (−5.35 to 7.38)
			Maternal smoking during pregnancy†	−39.16 (−47.81 to −30.50)
			Overall antenatal care risk‡	−12.53 (−18.43 to −6.63)
Nurse Home Visiting	Had maternal and child health nurse visit in the last 12 months*	16.33 (9.05 to 23.61)	Did not have maternal and child health nurse visit in the last 12 months†	−17.33 (−24.49 to −10.17)
			Overall nurse home visiting risk‡	−14.38 (−21.63 to −7.14)
Early Childhood Education and Care	Attended a preschool programme*	14.16 (4.29 to 24.02)	Few weekly hours at day care†	0.09 (−10.51 to 10.69)
			Did not attend a preschool programme†	−14.58 (−24.98 to −4.18)
			Inadequate material resources at centre†	−9.01 (−18.31 to 0.28)
			Inadequate space resources at centre†	1.29 (−7.90 to 10.48)
			Overall early childhood education and care risk‡	−7.01 (−15.90 to 1.89)
Parenting Programme	Attended a parenting programme in the last 12 months*	3.27 (−9.06 to 15.59)	Did not attend a parenting programme in the last 12 months†	−4.18 (−16.28 to 7.91)
			Parenting behaviours—high hostility†	−16.90 (−24.76 to −9.05)
			Parenting behaviours—low spontaneous praise†	−23.58 (−31.27 to −15.89)
			Parenting behaviours—low consistency†	−27.48 (−35.97 to −18.98)
			Overall parenting programme risk‡	−29.23 (−36.03 to −22.44)
Early Years of School	Attended a programme of early years of school*	0 (omitted)	Low quality of work environment†	−4.11 (−12.58 to 4.36)
			Low communication between teacher with parent†	−11.84 (−19.66 to −4.01)
			Overall early years of school risk‡	−6.25 (−13.24 to 0.74)
	Total service use	9.16 (5.58 to 12.75)	Cumulative risk	−14.03 (−16.61 to −11.44)

All models were run separately, adjusting for child sex, whether child had repeated a grade, child's age in months at National Assessment Program—Literacy and Numeracy (NAPLAN) testing.
*Adjusted for all other four interventions' service use.
†Adjusted for all other intervention variables within each intervention.
‡Adjusted for all other four interventions' overall risk.

development outcomes.[23] However, few studies have specifically examined the cumulative effect of lack of access to early years services, that is, cumulative 'missing out'. It is clear from single intervention studies and population-based studies that children who miss out on early education opportunities lag behind their peers.[39] Our data suggest that this effect may be exacerbated if multiple early opportunities are missed. The results from this study are consistent with previous findings across early childhood research that suggests that higher cumulative risk relates to poorer developmental and health outcomes.[8 29]

Table 3 Linear regression models predicting reading scores at 8–9 years from service use and risk perspectives (including interaction terms)

	Reading scores at 8–9 years
Predictor	**β (95% CI)**
Model 1: Service use	
Child sex (0=male, 1=female)	12.89 (7.11 to 18.66)
Repeated grade (0=no, 1=yes)	−54.01 (−71.80 to −36.23)
Child age (continuous, months)	3.18 (2.50 to 3.87)
Disadvantaged status (0=no, 1=yes)	−67.27 (−96.77 to −37.77)
Total service use (ordinal, 1–5, 1=1 service, 5=5 services)	4.62 (0.64 to 8.61)
Disadvantaged status × total service use	3.36 (−5.88 to 12.60)
Model 2: Risk	
Child sex (0=male, 1=female)	12.48 (6.80 to 18.15)
Repeated grade (0=no, 1=yes)	−49.60 (−67.42 to −31.78)
Child age (continuous, months)	2.91 (2.23 to 3.59)
Disadvantaged status (0=no, 1=yes)	−48.14 (−63.39 to −32.90)
Cumulative risk (ordinal, 0–5, 0=0 risk, 5=5 risks)	−9.59 (−12.57 to −6.61)
Disadvantaged status × cumulative risk	−2.12 (−8.69 to 4.44)

We found that disadvantaged children were exposed to more risks with subsequent lower reading scores. Although disadvantaged children have a lot to potentially gain from services, we did not find evidence of an interaction effect of disadvantage and total service use/cumulative risk on reading. This suggests that while accessing more services seems to benefit all children, it does not translate to reducing the academic gap observed between disadvantaged and advantaged children by differentially benefiting them. Similarly, exposure to more risk factors does not appear to be more detrimental on reading outcomes for disadvantaged children.

There are at least two possible explanations for these findings. First, service quality was not examined in respect to the variable 'service use', it was simply a measure of access (yes or no). Evidence related to single interventions/early years services and their ability to close the inequity gap is variable. For example, several studies have reported that access to high-quality ECEC has stronger developmental benefits for children from disadvantaged backgrounds,[39] whereas others have found no support for this 'compensatory hypothesis'.[40] A possibility

is that what children are exposed to within a service across socioeconomic contexts are not the same. Second, only crude measures of participation were examined in the present study. All services except ANC were measured by parent report as a binary response (yes or no). Important factors such as dose and duration,[15 41] not measured here, may differ between the service experiences of disadvantaged and non-disadvantaged children. Thus, we were unable to test whether there was a differential benefit for disadvantaged children when exposed to the same services as advantaged peers, an important avenue for further research. Data related to ANC, ECEC and NHV in particular show that participation at a certain dose is important to see the benefits[15] and/or reduce risks.[42] However, studies have shown that the availability and quality of early childhood services vary as a function of socioeconomic status often to the detriment of communities with higher levels of disadvantaged.[43] Indeed, our analyses show that families from disadvantaged backgrounds access fewer services than children from more advantaged backgrounds, consistent with other national data sets (eg, ANC[44]). Understanding the reasons for poor or non-participation, particularly for disadvantaged families, is critical if communities and governments are to provide targeted, locally driven solutions, even to universal services. Important, since research shows that inequities in health and education often affect the same individuals and communities.[45]

The richness of data available across multiple early years services (ie, both access and risk variables) as well as the size and representativeness of the study sample enabled us to delve deeply into population variables that very few studies are able to accomplish. Nevertheless, there are a number of limitations that should be considered in the interpretation of these findings. First, as with any longitudinal study of this duration, there has been gradual attrition of the LSAC sample and this was greatest for the most disadvantaged children. We used multiple imputation to reduce (but cannot eliminate) the potential for selection bias arising from missing data.[25 46] Second, this is not a purpose-designed study and has not assessed the efficacy of 'stacking' interventions by randomised controlled trial, which nonetheless would likely be infeasible. Measurement of indicators across the five services is only approximate and the indicators do not allow analysis of other important factors such as quality and participation. The index of total service use/cumulative risk is additive based on an equal weight for each indicator; it is possible that services/risk factors differentially contribute to benefit/risk to reading.[47] Fourth, our research question focuses on cumulative benefit and risk, for which the relatively blunt service indicators are sufficient, but precludes in depth analysis of the relative merits of each intervention. It was beyond the scope of the current study to differentiate the relative impact of individual services, which may not be contributing equally to the overall picture, an interesting avenue for future research. Finally, it is not possible to determine causality from this data alone. For example, service attenders and non-attenders may be systematically different on other factors (eg, attitudes and beliefs) that in turn explains the association with children's reading.[48]

While previously intuitive, the finding that exposure to five early childhood services (mainly already existing) is related to better reading at age 8 years compared with access to fewer services could have an important policy and practice contribution. If future research also supports our premise that risks and benefits accumulate and disproportionately impact children/families living in disadvantage, there are opportunities to make a difference to the ongoing health and educational inequities for Australia's children. In particular, our data draw attention to the low participation rates for disadvantaged children even in universal services, suggesting governments and local communities need to better understand the barriers and implement effective solutions. Importantly, the five early years services examined here are typically already available in almost all Australian communities (and a version of these services is also available in many international contexts, particularly high-income countries), suggesting a ready-made opportunity for policy makers to consolidate on how these services/interventions are delivered and accessed. These data hold promise for approaches capitalising on system-wide and place-based initiatives that are potentially fertile ground for 'stacking' and testing evidence-based early health and education services/interventions. Similarly, place-based initiatives could also provide opportunities to explore the value of stacking with customised variables, including quality and participation dose and duration factors. We have used existing observational data to gain preliminary insights into potential impacts of stacking interventions on child development, strengthened by the temporal separation of exposures and outcomes. While a causal impact is plausible, further evidence will help to strengthen this interpretation. For example, methods based on a counterfactual framework such as propensity score matching[49] and causal mediation analysis[50] could be used to further explore the associations observed here. Triangulation with strands of different types of evidence, such as from RCT, will even further help to unpick causality.

CONCLUSION

Our study suggests that 'stacking' early years services that are continuous across the early years, evidence-based and include programme that are targeted to the most disadvantaged (complementarity of service) hold promise for maximising the impact on child educational attainment, important for health outcomes over the life course. Although 'stacking' these services failed to reduce the inequity gap between the least and most disadvantaged, this may be due to inadequate data on quality and participation dose and duration. Of concern is the finding that

What is already known on this subject

- Educational attainment is a social determinant of health and accumulates advantageously across the life course. Indeed, intervening early in children's lives lays the foundation for healthy development over the life course and is often the most cost-effective approach. Considered in isolation, a number of early childhood interventions have been found to be effective, but not sufficient to substantially close the gap in academic outcomes for disadvantaged children.

What this study adds

- This study demonstrates the potential that five early childhood interventions have a cumulative effect on reading skills by school entry. This suggests that researchers and policy makers should consider the potential value of purposefully 'stacking' through evidence-based health and education service delivery platforms for cumulative positive exposure over the early childhood years. Reducing educational and developmental inequities will likely influence health across the life course.

Policy implications

- Exposure to five evidence-based (and mainly already existing) early childhood services is related to better reading at age 8 years compared with access to fewer services.
- The five evidence-based services examined here are typically already available in almost all Australian communities (and a version of these services is also available in many international contexts, particularly high-income countries), suggesting a ready-made opportunity for policy makers to consolidate on how these services/interventions are delivered and accessed.
- These data hold promise for approaches capitalising on system-wide and place-based initiatives that are potentially fertile ground for 'stacking' and testing evidence-based early health and education services/interventions.

disadvantaged children attend fewer services than their advantaged peers. 'Place-based approaches' to community health and education are increasingly popular and signal a potential avenue for considering how systems might better stack interventions and test the impact of quality and participation dose across the early years of childhood.

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RESTACKING THE ODDS

INDICATOR GUIDE

Quality, quantity and participation indicators across early years services and why they're important

January 2023

murdoch children's research institute
SVA Social Ventures Australia
BAIN & COMPANY

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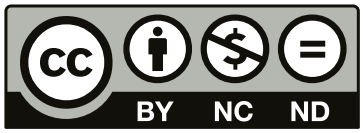

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We acknowledge the Traditional Owners of the land on which we work and pay our respect to Elders past, present and emerging.

CONTENTS

RESTACKING THE ODDS

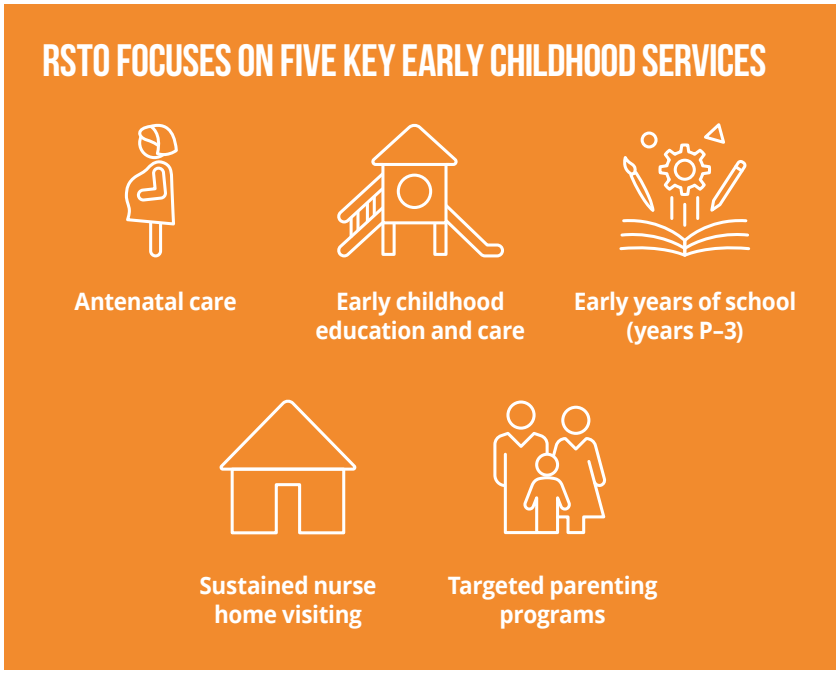
Restacking the Odds (RSTO) is a project that seeks to reduce inequity by ensuring that children and families can and do access a combination of high-quality, evidence-informed stacked services where and when they need them. By focusing on the early years and enabling services to better meet the needs of children and families, RSTO helps to create the conditions that enable all children to thrive.

BETTER EVIDENCE, STRONGER PRACTICE

RSTO's unique approach uses evidence to focus on HOW to work differently to improve outcomes for children, families and communities. It aims to develop the skills and knowledge of service providers and community-based early years initiatives for collecting, understanding and using evidence-based lead indicators to enable them to answer key questions including:

- **Quantity:** Are sufficient services available?
- **Quality:** Are we delivering high-quality services?
- **Participation:** Who is accessing our services?

Service providers, community initiatives and government policymakers can then use this information to identify approaches for addressing key service gaps for more effective and equitable service delivery.



There is no single solution to the complex challenges faced by many children, families and communities. Improving children's health, development and wellbeing requires combining or 'stacking' multiple effective evidence-based strategies across the early years (0-8 years) and implementing them concurrently and continuously.

RSTO focuses on participation in five services to boost children's health development and wellbeing: antenatal care, sustained nurse home visiting, early childhood education and care, targeted parenting programs and the early years of school. Together these five services:

- contribute to improved early childhood outcomes
- focus on children AND parents
- run throughout childhood
- are available in many Australian communities
- can be targeted to those with the greatest needs.

HOW TO USE THIS GUIDE

This guide provides evidence-based lead indicators for five key early childhood services: antenatal care, nurse home visiting, early childhood education and care, parenting programs and the early years of school (P-3). It is designed for use by:

- ☑ local community organisations
- ☑ government staff e.g. funders of services across the early years and policy advisors
- ☑ service providers
- ☑ measurement and evaluation specialists
- ☑ researchers.

The framework of lead indicators can be used to:

- better measure service performance and enable more effective and efficient services (and avoid wasting time, money and effort on approaches that fail to deliver results)
- better respond to the needs of children and families in their community, especially those experiencing vulnerability and disadvantage
- learn and share with others striving to improve children's outcomes
- capture evidence for insights, innovation and advocacy.

Priority groups

The term 'priority groups' is used throughout the guide to identify populations who may experience greater susceptibility to adverse health or learning outcomes as a result of structural inequities. Priority groups include: pregnant women under 18 years of age, refugees or asylum seeker populations, disability populations, Aboriginal and Torres Strait Islander populations, Health Care Card holders, children in out-of-home care, and culturally and linguistically diverse (CALD) populations.

Early childhood services and indicators

Lead indicators are provided for 5 services: antenatal care, sustained nurse home visiting, early childhood education and care, targeted parenting programs and the early years of school.

Indicators that measure quality, quantity and participation are provided for each service (with the exception of the early years of school as participation and quantity for this service are stipulated by legislation).

Indicator tables are colour coded to reflect different types of indicators.

Quality indicators are in orange tables.

Participation indicators are in blue tables.

Quantity indicators are in orange and white tables

A description is supplied for each indicator including why it is important and how it is calculated. A glossary is provided for each service area.

Benchmarks

Where an indicator has a national or state-based benchmark this is identified this using the following symbols:

- Indicator has a measure that enables national comparison
- Indicator has a measure that enables Victorian comparison
- Indicator has a measure that enables NSW comparison

Overtime we intend to collect and add in other state benchmarks.

Visit Restacking the Odds

For more information about Restacking the Odds visit: www.rch.org.au/ccch/Restacking_the_Odds

LEAD INDICATORS

WHAT IS A LEAD INDICATOR?

Lead indicators provide information essential to knowing whether you are on track to achieve your desired goals/outcomes. They allow service providers and other stakeholders to regularly assess performance and progress, and course correct when required. They reveal what families and children are experiencing, and allow service providers, government (local, state, federal) and communities to learn and adjust regularly, rather than waiting for years to see outcomes.

Outcome indicators provide information about whether you have achieved your expected goals.

Table 1 provides an example of a RSTO lead indicator in each of the 5 services, the potential action that could be taken to improve the performance of that indicator and the relevant outcome indicator.

Table 1: Examples of lead indicators

SERVICE	LEAD INDICATOR	POTENTIAL ACTION	OUTCOME INDICATOR
Antenatal care	% Of pregnant women who smoke who are referred to an evidence-based stop smoking service	✔ Implement a systematic process to ensure all pregnant women who smoke are referred to an evidence-based stop smoking service	% of pregnant women who smoke
Sustained nurse home visiting	% of antenatal and early post-partum visits where education /support on breastfeeding is offered	✔ Ensure program guidelines require nurses to provide early education and support, ideally before birth	% of women who breastfeed
Early childhood education and care	% of all children attending ECEC for 15 hours or more per week for the two years before starting formal school	✔ Overcome barriers to low participation rates e.g. reach out to CALD populations	Proportion of children at school entry who are developmentally on track in health, learning and psychosocial wellbeing
Parenting programs	Number of places available in supported parenting programs led by qualified facilitators, relative to the target population	✔ Provide adequate training to facilitators of parenting programs	% of children with behavioural issues
Early years of school	% of P-3 classroom teachers that provide parents with strategies to use when reading with children at home	✔ Ensure teachers are provided with appropriate reading and learning packs to use at home	% of children at expected level in reading (NAPLAN)

The RSTO indicators define how the service strategies should be delivered across three dimensions:

Quantity: this refers to the **physical access to local services in sufficient quantity**. Quantity indicators help to determine the amount of resource and infrastructure needed to deliver the service for a given population at the right quality and dose.

Quality: services or programs with 'quality' are those where **delivery aligns to the desired outcomes in the evidence-base**. High quality is needed to deliver benefits for children - especially for children from priority groups who are likely to benefit most. The way they are delivered, and by whom, are key determinants of quality.

Participation: refers to both **who uses the service** and **how much (dosage)**. Children and families need to attend at the right dosage levels for benefits to be realised. Research shows children and families experiencing disadvantage or adversity are more likely to miss out.

How were the indicators developed?

The indicators were developed based on a comprehensive review of best practice via systematic literature reviews and targeted literature scans for relevant strategies. These indicators were then assessed and refined in consultation with experts in each area. Indicators were subsequently tested in 7 communities to determine which were pragmatic to collect, resonated with communities, and provided robust measures to stimulate service provider, community and government action.

ANTENATAL CARE

Quality care during pregnancy monitors and supports the health and wellbeing of mothers and babies. This section includes a glossary of terms and:

- 21 universal quality indicators
- 3 hypertensive disorder quality indicators
- 2 mental health quality indicators
- 3 diabetes quality indicators
- 2 participation indicators
- 5 quantity indicators.

QUALITY INDICATORS | Universal

INDICATOR	WHY IT MATTERS	CALCULATION
QL 1 % of pregnant women with continuity of care from a named midwife	Women who experience continuity of care led by a midwife experience better outcomes.	**Numerator:** Pregnant women who attended 80% or more appointments with the same named midwife **Denominator:** All pregnant women who attended 5 or more appointments
QL 2 % of pregnant women who have a complete record of the minimum set of routine test results available	Screening and assessment for maternal health issues are important for mother and baby health.	**Numerator:** pregnant women who have all 'minimum set' routine test results available **Denominator:** Pregnant women who attended one or more antenatal appointments
QL 3 % of pregnant women who have their blood pressure recorded at all routine appointments	Measuring blood pressure is used to identify existing high blood pressure and hypertension. Hypertension can lead to poor infant outcomes (e.g. low birth weight, preterm birth).	**Numerator:** Pregnant women who have their blood pressure recorded at all routine appointments **Denominator:** Pregnant women who attended one or more antenatal appointments
QL 4 % of pregnant women whose BMI is calculated and recorded	A low BMI during pregnancy increases the risk of having a low birth weight baby and/or preterm birth. A high BMI during pregnancy increases the risk of baby being born preterm and/or low birth weight, gestational diabetes and hypertensive disorders, congenital anomalies and neural tube defects.	**Numerator:** Pregnant women with BMI calculated and recorded **Denominator:** Pregnant women who attended one or more antenatal appointments
QL 5 % of pregnant women whose smoking status is recorded	Smoking in pregnancy increases the risk of ectopic pregnancy, preterm birth, miscarriage, reduced birth weight, small-for-gestational-age baby, stillbirth, fetal and infant mortality and sudden infant death syndrome.	**Numerator:** Pregnant women asked about their tobacco use, with the answer documented **Denominator:** Pregnant women who attended one or more antenatal appointments

QUALITY INDICATORS | Universal

INDICATOR	WHY IT MATTERS	CALCULATION
QL 6 % of pregnant women whose alcohol use is recorded	Alcohol in pregnancy increases the risk of miscarriage, stillbirth, preterm birth and fetal alcohol spectrum disorder.	**Numerator:** Pregnant women asked about their alcohol use, with the answer documented **Denominator:** Pregnant women who attended one or more antenatal appointments
QL 7 ▲ % of pregnant women whose risk for family violence is recorded	Violence poses serious health risks to pregnant women and babies. Women exposed to violence during pregnancy are at risk of miscarriage, preterm birth, having a low birth weight baby, and are more likely to develop depression in the postnatal period.	**Numerator**: Pregnant women asked about family violence, with the answer documented **Denominator**: Pregnant women who attended one or more antenatal appointments
QL 8 % of pregnant women whose mental health history is recorded	Mental health conditions, particularly in their more severe form are often associated with impaired functioning e.g. a woman's ability to care for her infant and the formation of secure infant attachment, which may in turn be associated with poorer outcomes in the child.	**Numerator:** Pregnant women whose mental health history is recorded **Denominator:** Pregnant women who attended one or more antenatal appointments
QL 9 % of pregnant women with a mental health screen	Pregnant women are more vulnerable to depression and anxiety or worsening of symptoms. Unmanaged mental health issues can result in adverse outcomes such as miscarriage, preterm birth and small-for-gestational-age baby.	**Numerator:** Pregnant women with a complete mental health screen **Denominator:** Pregnant women who attended one or more antenatal appointments
QL 10 % of pregnant women who have their risk factor for pre-eclampsia recorded at their booking appointment	Pre-eclampsia can lead to fetal loss, preterm labour, low birth weight, perinatal death and gestational diabetes.	**A.** **Numerator:** Pregnant women who have their risk factor for pre-eclampsia recorded at their booking appointment **Denominator:** Pregnant women who attended one or more antenatal appointments **B.** **Numerator:** Pregnant women who information available that risk factor for pre-eclampsia can be calculated **Denominator:** Pregnant women who attended one or more antenatal appointments
QL 11 % of pregnant women who have a recorded measure of symphysis fundal height at all routine appointments after 24 weeks 0 days gestation	Allows detection of small-for-gestational age fetus monitor for slow or static growth.	**Numerator:** Pregnant women who have symphysis fundal height recorded at all routine appointments after 24 weeks 0 days gestation (inclusive) **Denominator:** Pregnant women who attended one or more antenatal care appointments after 24 weeks 0 days gestation

QUALITY INDICATORS | Universal

INDICATOR	WHY IT MATTERS	CALCULATION
QL 12 **%** of pregnant women who complete testing for gestational diabetes at 24 weeks 0 days to 28 weeks 6 days and have their test results available and acknowledged	Women with gestational diabetes have a higher risk of induced labour and are more likely to have a preterm birth, high birth weight, caesarean birth, hypertension and longer hospital stay than women without diabetes, and their babies are at risk of poorer outcomes.	**Numerator:** Pregnant women who complete testing between 24 weeks 0 days to 28 weeks 6 days with results available and acknowledged **Denominator:** Pregnant women who attended one or more antenatal appointments
QL 13 % of pregnant women who have a recorded fetal presentation at 30 weeks gestation	Fetal presentation after 30 weeks will influence birth plan, measuring pre-labour allows for interventions that promote vaginal birth.	**Numerator:** Pregnant women who have fetal presentation during 30 weeks gestation recorded at their appointment **Denominator:** Pregnant women who attended one or more antenatal care appointment after 30 weeks 0 days gestation
QL 14 % of pregnant women with a BMI 30 kg/m2 or > who are referred for personalised advice from a trained person on healthy eating and physical activity	Personalised advice on healthy eating and physical activity may be effective in improving women's eating behaviours and may prevent excessive weight gain. This may reduce risk of gestational diabetes, hypertensive disorders, and fetal growth.	**Numerator:** Pregnant women with a BMI 30 kg/m2 or > referred for personalised advice from a trained person on healthy eating and physical activity **Denominator:** pregnant women with a BMI 30 kg/m2 or > (incudes those whose BMI is not calculated – as per QI 5 but have height and weight available for calculation)
QL 15 % of pregnant women who smoke who are referred to an evidence-based stop smoking service	Smoking cessation interventions reduce smoking rates in pregnant women which in turn may reduce the incidences of low birth weight and preterm births.	**Numerator:** Pregnant women who smoke (>1, <1, or spontaneous) referred to an evidence-based stop smoking service **Denominator:** Pregnant women who have their smoking status recorded
QL 16 % of pregnant women who received genetic screenings before 13 weeks 6 days and have results available and acknowledged	Allows diagnosis of genetic/ chromosomal anomalies.	**Numerator:** Pregnant women who received genetic screenings before 13 weeks 6 days and have results available and acknowledged **Denominator:** Pregnant women who have their smoking status recorded
QL 17 % of pregnant women who complete an ultrasound between 18 weeks 0 days and 20 weeks 6 days and have their results available and acknowledged	Allows diagnosis of structural anomalies. Sensitivity in detecting structural anomalies increases after 18 weeks gestation. Detection of structural anomalies before 20 weeks gestation gives women the choice of terminating the pregnancy (where this is permitted under jurisdictional legislation).	**Numerator:** Pregnant women who complete an ultrasound between 18 weeks 0 days and 20 weeks 6 days, and have their results available and acknowledge **Denominator:** All pregnant women
QL 18 % of pregnant women with confirmed breech presentation after 37 weeks 0 days gestation who are offered and eligible for external cephalic version	Turning the baby (e.g. using external cephalic version [ECV]) reduces the number of babies who are breech at term, thereby improving the chance of a vaginal birth.	**Numerator:** Pregnant women with confirmed breech presentation after 37 weeks 0 days gestation (inclusive) who are offered and eligible for External Cephalic Version **Denominator:** All pregnant women diagnosed with breech presentation (diagnosis at or after 37 weeks 0 days)

QUALITY INDICATORS | Universal

INDICATOR	WHY IT MATTERS	CALCULATION
QL 19 % of pregnant women attending a 40 week appointment who are offered a vaginal examination for membrane sweeping	Membrane sweeping may be of benefit in preventing prolonged pregnancy, particularly in first pregnancies.	**Numerator:** Pregnant women who attended a 40 week appointment offered a vaginal examination for membrane sweeping **Denominator:** Pregnant women who attend a 40 week appointment
QL 20 % of pregnant women attending a 41 week appointment who are offered a vaginal examination for membrane sweeping	Membrane sweeping may be of benefit in preventing prolonged pregnancy, particularly in first pregnancies.	**Numerator:** Pregnant women who attended a 41 week appointment offered a vaginal examination for membrane sweeping **Denominator:** Pregnant women who attend a 41 week appointment
QL 21 % of pregnant women provided with verbal and written information regarding normal fetal movements during the antenatal period.	Decreased fetal movement indicates risk of adverse outcomes including: intrauterine growth restriction, fetal death or preterm birth. Antenatal education about fetal movement has been shown to reduce the time from maternal perception of decreased fetal movements to help-seeking behaviour.	**Numerator:** Pregnant women provided with verbal and written information regarding normal fetal movements **Denominator:** Pregnant women who attended one or more antenatal appointments

QUALITY INDICATORS | Hypertensive disorders

INDICATOR	WHY IT MATTERS	CALCULATION
HT 1 % of pregnant women identified at risk of pre-eclampsia who are advised to take low-dose aspirin daily	Aspirin consumption reduces risk of pre-eclampsia in at-risk women and is likely to reduce intrauterine growth restriction by about 10%.	**Numerator:** Pregnant women with increased risk of pre-eclampsia, advised to take low-dose aspirin daily **Denominator:** All pregnant women with increased risk of pre-eclampsia
HT 2 % of pregnant women with diagnosed hypertension who receive escalation of care	Women with chronic hypertension are at greater risk of pregnancy complications such as: placental abruption, super imposed pre-eclampsia, fetal loss, preterm labour, low birth weight, perinatal death, or gestational diabetes.	**Numerator:** Pregnant women with diagnosed hypertension who receive escalation of care (any of: treatment [medication], admission, increased frequency of: BP monitoring, proteinuria monitoring) **Denominator:** Pregnant women diagnosed with hypertension
HT 3 % of pregnant women diagnosed with pre-eclampsia have attended obstetrician appointment/s	Obstetricians have specialised training in antenatal care, labour care and postnatal care. They are trained in high-risk pregnancy and birthing and can perform caesarean sections. They can prescribe and monitor medication interventions.	**Numerator:** Pregnant women diagnosed with pre-eclampsia have attended obstetrician appointment/s **Denominator:** Pregnant women diagnosed with pre-eclampsia

QUALITY INDICATORS | Mental health

INDICATOR	WHY IT MATTERS	CALCULATION
MH 1 % of pregnant women identified at risk of mental health issues who have a documented mental health plan	Pregnant women are more vulnerable to depression and anxiety or worsening of symptoms. Unmanaged mental health issues can result in adverse outcomes such as miscarriage, preterm birth and small-for-gestational-age baby.	**Numerator:** Pregnant women identified at risk of mental health issues with a documented mental health plan **Denominator:** Pregnant women identified at risk of mental health
MH 2 % of pregnant women referred to a mental health professional who are followed up by an ANC provider	PW are more likely to engage in mental health services if they are supported through the process through follow up by an antenatal care provider e.g. gentle reminder, encouragement, reassurance.	**Numerator:** Pregnant women referred to a mental health professional who are followed up by an antenatal care provider **Denominator:** Pregnant women referred to a mental health professional

QUALITY INDICATOR | Diabetes

INDICATOR	WHY IT MATTERS	CALCULATION
DM 1 % of pregnant women identified at risk of gestational diabetes at the booking appointment who receive testing for gestational diabetes and have their test results available and acknowledged	Women with gestational diabetes have a higher risk of induced labour, preterm birth, high birth weight, caesarean birth, hypertension and longer hospital stay than women without diabetes. Their babies are more likely to require special care nursery/neonatal intensive care admission.	**Numerator:** Pregnant women identified at risk of gestational diabetes, at the booking appointment who receive testing for gestational diabetes, and have their test results available and acknowledged **Denominator:** All pregnant women identified at risk of gestational diabetes
DM 2 % of pregnant women with pre-existing diabetes who are seen by members of the diabetes team within 1 week of their triage	Women with pre-existing diabetes are more likely to have preterm birth, induced labour, caesarean birth, hypertension and longer hospital stay than women without pre-existing diabetes. Their babies have higher rates of stillbirth, high birth weight, low Apgar score and admission to special care nursery/ neonatal intensive care unit.	**Numerator:** Pregnant women who are seen by members of the diabetes team within 1 week of triage **Denominator:** Pregnant women who are seen by members of the diabetes team
DM 3 % of pregnant women with pre-existing diabetes who have their HbA1c results available and acknowledged	Early treatment of women with abnormal HbA1c is associated with a reduced risk of pre-eclampsia.	**Numerator:** Pregnant women with pre-existing diabetes who have their HbA1c results available and acknowledged **Denominator:** Pregnant women with pre-existing diabetes

PARTICIPATION INDICATORS

INDICATOR	WHY IT MATTERS	CALCULATION
P1a ● % of pregnant women who attend a booking appointment within the first trimester	Women attending antenatal care in the first trimester of pregnancy have lower maternal and perinatal mortality than women who attend late or not at all.	**Numerator:** Pregnant women who attend their booking appointment within 12 weeks 0 days gestation **Denominator:** All pregnant women
P1b % of pregnant women recognised in a priority group who attend a booking appointment within the first trimester	Pregnant women recognised in a priority group are at risk of poor maternal and perinatal outcomes. They are also more likely to have complex health needs and face multiple barriers accessing pregnancy care and navigating the healthcare system.	**Numerator:** Pregnant women recognised in a priority group who attend their booking appointment within 12 weeks 0 days gestation **Denominator:** Pregnant women experiencing vulnerability
P2a ● % of pregnant women who attend at least the recommended number of antenatal care appointments – 10 for 1st pregnancy, 7 for subsequent pregnancies	Pregnant women experiencing their first pregnancy may require additional education and support e.g. what to expect at each stage of pregnancy.	**Numerator:** Pregnant women who attend at least the minimum number of recommended appointments **Denominator:** Pregnant women recognised in priority group
P2b % of pregnant women recognised in a priority group who attend at least the recommended number of antenatal care appointments – 10 for 1st pregnancy, 7 for subsequent pregnancies	There is some evidence that perinatal mortality may be increased with reduced visits in some vulnerable pregnant women. Pregnant women experiencing their first pregnancy may require additional education and support e.g. what to expect at each stage of pregnancy.	**Numerator:** Pregnant women recognised in a priority group who attend at least the minimum number of recommended appointments **Denominator:** Pregnant women recognised in priority group

QUANTITY INDICATORS

INDICATOR	WHY IT MATTERS	CALCULATION
QN 1 Number of antenatal care facilities per 10,000 women of child-bearing age	To ensure adequate health infrastructure to cater for all pregnant women in a community.	**Numerator:** Number of child-bearing women (18-49 years) in the community **Denominator:** Number of antenatal care facilities in the community
QN 2 ● Number of maternity beds per 1000 pregnant women	To ensure an adequate number of maternity beds to cater for all pregnant women in a community.	**Numerator:** Number of maternity beds in the community **Denominator:** Number of 1,000 pregnant women
QN 3 ● Number of practicing general practitioners per 10,000 women of child-bearing age	To ensure an adequate number of general practitioners to cater for all pregnant women in a community.	**Numerator:** Number of full time GPs actively registered and employed in the community **Denominator:** Number of child-bearing women (18-49) in the community

QUANTITY INDICATORS

INDICATOR	WHY IT MATTERS	CALCULATION
QN 4  Number of registered midwives working in the antenatal care facilities per 10,000 women of child-bearing potential	To ensure an adequate number of general practitioners to cater for all pregnant women in a community.	**Numerator:** Number of full time Midwives actively registered and employed in the community **Denominator:** Number of child-bearing women (18-49) in the community
QN 5 Number of OB/GYNs working in the antenatal care facility per 10,000 women of child-bearing potential	To ensure an adequate number of obstetricians/gynaecologists to cater for all pregnant women in a community.	**Numerator:** Number of full time OB/GYNs actively registered and employed in the community **Denominator:** Number of full time OB/GYNs actively registered and employed in the community

ANTENATAL CARE | GLOSSARY OF TERMS

Maternal health screening and assessment

Blood group and rhesus D status	Identifies women who are Rhesus-incompatible or ABO-incompatible and who require Anti-D to avoid anaemia or severe jaundice in the fetus.
Haemoglobin	Undertaken at booking appointment and 28 weeks. Identifies iron-deficient women. Early supplementation avoids adverse outcomes such as preterm birth.
Haemoglobinopathies screen	Undertaken at booking appointment. Identifies the presence of sickle cell disease, beta thalassaemia, anaemia, microcytosis, abnormalities in the pre symptomatic phase. Presence of which influences treatments, procedures and fetus health.
Hepatitis B virus screen	Undertaken at booking appointment. Identifies women with the virus so that they can be given antiviral medication to minimise the risk of transmission to the fetus and vaccination of the baby after birth.
Hepatitis C virus screen	Undertaken at booking appointment. Identifies women with the hepatitis C virus who have an increased risk of preterm birth. Second, pregnancy treatment and interventions that increase mother-to-fetus transmission can be avoided.
HIV test	Undertaken at booking appointment. Identifies women with the virus so that they can be given antiviral medication to minimise the risk of transmission to the fetus.
Midstream specimens of urine for asymptomatic bacteriuria	Undertaken at booking appointment. Identifies women who have a urine infection - if present and untreated during pregnancy it can progress to kidney infection.
Red-cell alloantibodies	Undertaken at booking appointment and 28 weeks. Screens for antibodies in the mother's blood that might cross the placenta and attack the fetus' red blood cells, this causes hemolytic disease of the newborn. Early detection allows treatment and prevention of adverse outcomes.

Rubella susceptibility screen	Undertaken at booking appointment. Maternal rubella infection can result in spontaneous miscarriage, fetal infection (causing eye, hearing or hear problems), stillbirth, or fetal growth restriction. There is no treatment to prevent or reduce mother-to-child transmission of rubella once infection has been detected in pregnancy. Rubella vaccination is contraindicated in pregnancy, however if the mother is non-immune then vaccination can be delivered post birth to reduce risk in future pregnancies.
Syphilis screen	Undertaken at booking appointment. Identifies infected women so that they can be treated and so that transmission to babies can be prevented. In pregnancy, syphilis can result in spontaneous miscarriage or stillbirth or cause congenital syphilis infection.
Urine test for proteinuria	Undertaken at booking appointment. Proteinuria in the first trimester (0-12 weeks) may suggest kidney disease or urinary tract infection. After 20 weeks pregnancy, proteinuria is associated with pre-eclampsia.
At risk of gestational diabetes	Women with any 1 of these risk factors should be offered testing for gestational diabetes. body mass index above 30 kg/m2 previous macrosomic baby weighing 4.5 kg or above previous gestational diabetes family history of diabetes (first-degree relative with diabetes) minority ethnic family origin with a high prevalence of diabetes.
Body mass index	Calculated as: weight (kg)/height (m2).
CALD	Culturally and linguistically diverse. CALD communities are those with diverse languages, nationalities and ethnic backgrounds.
Confirmed breech presentation	Recorded that the women is a breech presentation in the medical chart.
Continuity of care from a named midwife	This is when a named registered midwife is responsible for providing all or most (≥80%) of a woman's antenatal and postnatal care and coordinating their care should they not be available.
Documented mental health plan	Documented indicates the plan was recorded in chart that appropriate referrals were made.
Family violence	Any incident or pattern of incidents of controlling, coercive or threatening behaviour, violence or abuse between those aged 16 or over who are, or have been, intimate partners or family members. This includes psychological, physical, sexual, financial and emotional abuse.
Provided with verbal and written information regarding normal foetal movements during the antenatal period.	Requires documentation of verbal correspondence accompanied by written information (e.g. brochure). This information should include a description of the changing patterns of movement as the fetus develops, normal wake/sleep cycles and factors that may modify the mother's perception of fetal movements.
"...recorded fetal presentation."	This means that fetal presentation (which specifies which anatomical part of the fetus is leading, that is, is closest to the pelvic inlet of the birth canal (cephalic, breech, or shoulder presentation)) should be documented in the medical chart.
Referred to a mental health professional who are followed up by ANC provider	In cases where it was recorded in the medical chart that the woman was referred to a mental health professional, the researcher checked whether there was follow-up by an antenatal care provider. This is some form of documentation by the antenatal care provider where they stated that they followed up with the patient to confirm that they received an appointment and/or went to the appointment with the mental health professional.

"...referred for personalised advice from an evidence-based stop smoking service"	This means that there is a referral letter for smoking cessation included in the medical chart, or there is some documentation in the medical chart to say, "referred to smoking cessation".
Risk factors for pre-eclampsia	Women are at an increased risk of pre-eclampsia if they have one high risk factor or more than one moderate risk factor for pre-eclampsia. High risk factors include hypertensive disease in a previous pregnancy, chronic kidney disease, autoimmune disease, type 1 or type 2 diabetes, chronic hypertension. Moderate risk factors include first pregnancy, age 40 years or older, pregnancy interval of more than 10 years, body mass index (BMI) of 35 kg/m2 or more at first visit, family history of pre-eclampsia, or multiple pregnancy.
Testing for gestational diabetes	Use the 2-hour 75 g oral glucose tolerance test (OGTT) to test for gestational diabetes. Oral glucose tolerance test (OGTT) results must be available and acknowledged.* (*refer to definition of "available and acknowledged" above")
"...test results available and acknowledged...."	This means that: a) The test results were included in the patient file b) If the results were not written/typed into medical records, but the result slip (e.g. for pathology/genetic screen/ultrasound) was inserted into records – the pathology slip must have been signed off by the practitioner i.e. it was acknowledged.
Triage	To triage is to decide the order of treatment.
Priority groups	Some populations may experience greater susceptibility to adverse health or learning outcomes as a result of structural inequities. Priority groups include: pregnant women experiencing vulnerability, refugees or asylum seeker populations, disability populations, Aboriginal and Torres Strait Islander populations, Health Care Card holders, children in out-of-home Care, and culturally and linguistically diverse (CALD) populations.

SUSTAINED NURSE HOME VISITING

Quality sustained nurse home visiting programs help parents to care for their children in supportive home learning environments. They generally target risk and protective factors related to prenatal health, sensitive and competent care-giving, and early parental lifecourse outcomes.

Based on the strength of evidence there were seven programs that were ranked as being 'supported by evidence', in that there was consistent evidence of benefit that was generalisable and applicable to the Australian context. These supported programs include: Nurse Family Partnership, Family Nurse Partnership, Maternal Early Childhood Sustained Home Visiting, Minding the Baby, Pro Kind, right@home and VoorZorg.

This section includes a glossary of terms and:

- 7 content quality indicators
- 15 process quality indicators
- 11 provider quality indicators
- 14 participation indicators
- 6 quantity indicators.

QUALITY INDICATORS

INDICATOR	WHY IT MATTERS	CALCULATION
QL The provision of one of 7 sustained nurse home visiting (SNHV) that reaches the high-quality threshold for each of the three quality domains of content, process, and nurse-provider.	Sustained nurse home-visiting programs improve child and parent outcomes.	Is a quality sustained nurse home visiting program provided?

QUALITY INDICATORS | Content

INDICATOR	WHY IT MATTERS	CALCULATION
QL 1 % of visits addressing home learning (e.g. talking, reading)	A stimulating home and family environment contributes to improving the long-term wellbeing and academic achievement of children.	**Numerator:** Number of visits addressing home-learning environment **Denominator:** Number of total visits
QL 2 % of visits addressing parenting skills (e.g. sensitive and responsive parenting, behaviour and discipline)	Sustained nurse home-visiting programs that address parenting issues have been shown to have benefits for child cognitive outcomes, parent behaviours and skills, and maternal outcomes.	**Numerator:** Number of visits addressing parenting skills **Denominator:** Number of total visits
QL 3 % of visits in which problem-solving skills are taught	Equip parents with skills that enable them to independently problem-solve.	**Numerator:** Number of visits in which problem-solving skills are taught **Denominator:** Number of total visits

QUALITY INDICATORS | Content

INDICATOR	WHY IT MATTERS	CALCULATION
QL 4 % of antenatal & early post-partum visits where education/support on breastfeeding is offered	Offering breastfeeding support has benefits for breastfeeding intention, initiation and duration.	**Numerator:** Number of antenatal visits and early post-partum visits less than or equal to 6 weeks after birth where breastfeeding support is offered **Denominator:** Number of antenatal visits and early post-partum visits less than or equal to 6 weeks after birth
QL 5 % of visits that address the parent's documented goals and aspirations	Patient focused support can benefit families by fostering long-term planning specific to their individual needs and concerns.	**Numerator:** Number of visits focused on at least one of the goals or aspirations identified at the beginning of the service **Denominator:** Number of total visits
QL 6 % of parents referred from a sustained nurse home visiting (SNHV) program who are offered program specific support from evidence-based programs (e.g. Triple P; Crib to Cradle; Promoting First Relationship; Smalltalk; Learning to Communicate)	Programs that target specific issues important to families and are supported by the evidence help improve outcomes.	**Numerator:** Number of parents referred to evidence-based programs **Denominator:** Number of parents referred from SNHV program
QL 7 % of parents provided information about local and free or low-cost community engagement opportunities (e.g. play groups; toy libraries; pram walking sessions; library rhyme or story time)	Community engagement is beneficial for establishing supportive relationships which in turn has benefits for maternal and child outcomes.	**Numerator:** Number of parents provided information about local and low-cost community engagement opportunities **Denominator:** Number of parents in the program

QUALITY INDICATORS | Process

INDICATOR	WHY IT MATTERS	CALCULATION
QL 8 % of parents who have their aspirations and goals documented	Documenting target issues allows the health care provider to understand the family's needs and monitor their progress.	**Numerator:** Number of parents with their aspirations and goals documented **Denominator:** Number of parents in the program
QL 9 % of parents with continuity of care	Continuity of care is beneficial for parent and child outcomes.	**Numerator:** Number of parents with same nurse for 85%+ of visits **Denominator:** Number of parents in the program with 1+ nurse visit
QL 10 % of parents with progress against aspirations and goals documented	This is important to monitor a family's progress and their response to intervention.	**Numerator:** Number of parents with progress against aspirations or goals documented **Denominator:** Number of parents in the program

QUALITY INDICATORS | Process

INDICATOR	WHY IT MATTERS	CALCULATION
QL 11 % of culturally and linguistically diverse (CALD) parents receiving a translated version of the program/ service and/or support from an interpreter	Providing a translator or translated material increases program comprehension and inclusivity for families from non-English speaking backgrounds.	**Numerator:** Number of CALD parents receiving translated program or having an interpreter present **Denominator:** Number CALD parents in program
QL 12 % of new nurse home-visitors observed implementing the program and assessed for quality	Nurse home-visitors should undergo quality assurance audits to ensure program delivery is optimal.	**Numerator:** Number of new nurse home-visitors observed implementing program and assessed for quality **Denominator:** Number of new nurse home-visitors
QL 13 % of parents whose smoking status is recorded in the first visit	Smoking is associated with poor outcomes for mother and child. Smoking should be recorded so it can be addressed as part of the intervention.	**Numerator:** Number of parents whose smoking status is recorded in the first visit **Denominator:** Number of parents in the program
QL 14 % of parents whose mental health status is recorded in the first visit	Mental health problems can affect a woman's ability to care for her infant. Women's mental health status should be recorded so it can be addressed as part of the intervention.	**Numerator:** Number of parents whose mental health status is recorded in the first visit **Denominator:** Number parents in the program
QL 15 % of parents whose family violence status is recorded in the first visit	Family violence is associated with poor outcomes for mother and child. This risk should be recorded so that it can be addressed as part of the intervention.	**Numerator:** Number of parents whose family violence risk is recorded between the 2nd-5th visit **Denominator:** Number of parents in the program
QL 16 % of parents whose alcohol and substance use status is recorded in the first visit	Alcohol and substance misuse can affect a woman's ability to care for her infant. This behaviour should be recorded so it can be addressed as part of the intervention.	**Numerator:** Number of parents whose alcohol and substance use is recorded in the first visit **Denominator:** Number parents in the program
QL 17 % of parents with a mental health concerns who are referred for psychological intervention	Mental health problems can affect a woman's ability to care for her infant. A specialised referral should be offered to identified women.	**Numerator:** Number of parents with a mental health concerns referred to psychological intervention **Denominator:** Number of parents with a mental health problem in the program
QL 18 % of parents experiencing domestic violence who are referred to an evidence-based support service	Family violence is associated with poor outcomes for mother and child. A specialised referral should be offered to identified women.	**Numerator:** Number of parents experiencing family violence referred to an evidence-based support service **Denominator:** Number of parents who experience family violence
QL 19 % of parents with drug or alcohol problems referred to an evidence-based support service	Alcohol and substance misuse can affect a woman's ability to care for her infant. A specialised referral should be offered to identified women.	**Numerator:** Number of parents with alcohol/substance misuse referred to evidence support service **Denominator:** Number of parents with alcohol/substance misuse problems

QUALITY INDICATORS | Process

INDICATOR	WHY IT MATTERS	CALCULATION
QL 20 % of parents experiencing financial difficulty provided information about avenues for assistance	Financial difficulty can affect the mother's ability to care for her infant. Women experiencing financial difficulty should be provided with information about avenues for assistance.	**Numerator:** Number of parents with financial difficulties provided info on assistance avenues **Denominator:** Number of parents with financial difficulty
QL 21 % of parents given opportunity to provide nurse feedback during program/ service implementation	Feedback and communication enable individualised program content, strengthening women's self-efficacy and self-advocacy and increasing program flexibility and service implementation development.	**Numerator:** Number of parents with opportunity to provide nurse feedback during program **Denominator:** Number of parents in the program
QL 22 % of parents given opportunity to provide confidential program feedback	Provision of confidential program feedback is important to ensure program fidelity (i.e. the degree to which an intervention or program is delivered as intended.)	**Numerator:** Number of parents with the opportunity to provide confidential program feedback **Denominator:** Number of parents in the program

QUALITY INDICATORS | Provider

INDICATOR	WHY IT MATTERS	CALCULATION
QL 23 % of parents who rate the program and nurse-family relationship highly (average score >80% on satisfaction measures) on exit survey (administered regardless of completion)	This is important to ensure program fidelity (i.e. the degree to which an intervention or program is delivered as intended) and to monitor the nurse-family relationship which is important for successful program delivery.	**Numerator:** Number of parents rating program and nurse-family relationship highly (avg score >80%) **Denominator:** Number of parents taking exit survey
QL 24 % of nurse home-visitors with specialised child & family training and at least 2 years nursing experience	An experienced nursing staff has the skill base for successful program delivery.	**Numerator:** Number of nurse home-visitors with specialised child & family training **Denominator:** Number of nurse home-visitors
QL 25 % of nurse home-visitors with program/service specific training	Specialised training provides staff with an opportunity to update their skills in accordance with the most up to date evidence.	**Numerator:** Number of nurse home-visitors with program/service specific training **Denominator:** Number of nurse home-visitors
QL 26 % of nurse home-visitors provided training which included role playing exercises	Role-play enables parents to rehearse techniques and strategies whilst receiving real-time feedback, improving parent outcomes.	**Numerator:** Number of nurse home-visitors provided training including role-play exercises **Denominator:** Number of nurse home-visitors

QUALITY INDICATORS | Provider

INDICATOR	WHY IT MATTERS	CALCULATION
QL 27 % of nurse home-visitors receiving monthly supervision including reflection (on experiences, thoughts, and feelings about visit) and not merely administration or case-management	Monthly reflective supervision is demonstrated to have positive effects on several parent outcomes by affording the staff the ability to be more effective in supporting family needs.	**Numerator:** Number of nurse home-visitors receiving monthly supervision including reflection **Denominator:** Number of nurse home-visitors
QL 28 % of nurse home-visitors who have received Family Partnership Training or an equivalent working in partnership with families program	Training in Family Partnerships is demonstrated to have a positive effect on parent-child interaction, the child's developmental progress and psychological functioning, resulting in better life outcomes.	**Numerator:** Number of nurse home-visitors who received Family Partnerships Training (or equivalent) **Denominator:** Number of nurse home-visitors
QL 29 % of nurse home-visitors who have undertaken professional development relevant to their current work in the past 12 months	Engaging in professional development is important for skill maintenance and ensuring that staff are up to date with the most recent research.	**Numerator:** Number of nurse home-visitors who have undertaken relevant PD in the past 12 months **Denominator:** Number of nurse home-visitors
QL 30 % of supervisors provided supervision-specific training	Supervision of program providers with a reflective component is a key element to effective program implementation and fidelity.	**Numerator:** Number of supervisors provided supervisor-specific training **Denominator:** Number of supervisors
QL 31 % of nurse home-visitors with caseloads as defined by the program/service	Caseloads vary among programs. Adherence to a benchmark set around 20-30 cases per nurse are demonstrated to have the largest positive effect on a range of child/parent outcomes.	**Numerator:** Number of nurse home-visitors with caseloads as defined by the program/service **Denominator:** Number of nurse home-visitors
QL 32 Nurse home visitors have access to multi-disciplinary support	Access to multi-disciplinary support, particularly from social care practitioners, increases the effectiveness of SNHV programs.	**Numerator:** Nurse home visitors have access to multi-disciplinary support (practitioners of other professions available for advice and home visiting, within the team)
QL 33 % of nurse home-visitors provided training in cultural competence	Staff cultural competency has been demonstrated to result in higher levels of engagement including reaching some high-risk pregnant women.	**Numerator:** Number of nurse home-visitors provided training in cultural competence **Denominator:** Number of nurse home-visitors

PARTICIPATION INDICATORS

INDICATOR	WHY IT MATTERS	CALCULATION
P % of parents from priority groups who attend a high quality SNHV program	NHV programs that reach and retain mothers in priority groups are shown to improve mother and infant health outcomes and well-being.	**Numerator:** Number of parents from priority groups who attend a high quality SNHV program at the right dose (25+ visits by child age 2 years) **Denominator:** Number of parents from priority groups in the community
P1 % of parents receiving at least 25 home visits by child age 2 years	Advantages to increased intensity of SNHV programs during optimal time-period includes extended opportunities for rapport building, and individualising services for family's specific needs.	**Numerator:** Number of parents receiving 25+ visits by child age 2 years **Denominator:** Number of parents in program
P2 % of parents retained in program until child age 2 years	Participant retention indicates program effectiveness, and has potential to support the consensus that programs should start early (antenatal) and be available to families until child age 2 years.	**Numerator:** Number of parents retained in program until child age 2 years **Denominator:** Number of parents in the program
P3 % of parents receiving at least 15 home visits by child age 1 year	Advantages of high intensity home visits during fist year include assisting with adjustments to parenting roles and the intensive demands of early infant care.	**Numerator:** Number of parents receiving 15+ visits by child age 1 year **Denominator:** Number of parents in the program
P4 % of parents receiving fewer visits in the 2nd year than in the 1st year of being in the program	Understanding the impacts of SNHV program intensity in the first year is crucial to determining optimal dose requirements.	**Numerator:** Number of parents receiving fewer visits in the 2nd year than in the 1st year of being in the program **Denominator:** Number of parents in the program
P5 % of funded hours delivered	Funding levels are seen to impact on program participation, including increasing or inhibiting access to programs.	**Numerator:** Number of service hours delivered **Denominator:** Number of service hours funded
P6 % of parents from priority groups	Understanding demographics allows for tailoring of services to reach priority populations and increase program effectiveness.	**Numerator:** Number of parents from priority groups in program **Denominator:** Number of parents in program
P7 % of referred Aboriginal and Torres Strait Islander parents accepting a place	Identifying program uptake of key populations provides evaluation of program effectiveness and promotes strategies to increase participation in programs that will benefit intended community.	**Numerator:** Number of Aboriginal and Torres Strait Islander parents accepting a place **Denominator:** Number of Aboriginal and Torres Strait Islander parents referred
P8 % of referred CALD parents accepting a place	Identifying program uptake of key populations provides evaluation of program effectiveness and promotes strategies to increase participation in programs that will benefit intended community	**Numerator:** Number of CALD parents accepting a place **Denominator:** Number of CALD parents referred

PARTICIPATION INDICATORS

INDICATOR	WHY IT MATTERS	CALCULATION
P9 % of parents who are visited at home at least twice in the third trimester.	Higher frequency of home visits in the third trimester are associated with positive improvements in maternal behaviour and health outcomes for the mother and child.	**Numerator:** Number parents with 2+ visits in the 3rd trimester **Denominator:** Number of parents referred antenatally
P10 % of parents visited at least weekly in the first month following birth.	Intensive weekly home visiting in the first month following birth are associated with positive improvements in maternal behaviour and health outcomes for the mother and child.	**Numerator:** Number of parents with at least 4 visits in the first month after birth **Denominator:** Number parents referred before child age 1 month
P11 % of parents visited at least fortnightly to child age 3 months**.**	Continued early home-based intervention - delivered fortnightly for the child aged 1-3 months - are more successful in developing parent's self-efficacy and improving long term child health outcomes.	**Numerator:** Number of parents with at least 8 visits in the first 3 months after birth **Denominator:** Number of parents referred before child age 3 months
P12 % of parents from priority groups who are visited at home at least twice in the third trimester.	High frequency home-based intervention increases accessibly and likelihood of program participation for women from priority groups and is associated with positive improvements in maternal behaviour and health outcomes for the mother and child.	**Numerator:** Number of parents from priority groups with 2+ visits in third trimester **Denominator:** Number of parents from priority groups referred antenatally
P13 % of parents from priority groups who are seen at least weekly in the first month following birth.	Women from priority groups benefit from weekly home visiting in the first month following birth, with increased intensity being associated with positive improvements in maternal behaviour and health outcomes for the mother and child.	**Numerator:** Number parents from priority groups with weekly visits until child age 1 month **Denominator:** Number parents from priority groups referred by age 1 month

QUANTITY INDICATORS

INDICATOR	WHY IT MATTERS	CALCULATION
QN The number of places offered in a local community, in high quality SNHV programs.	To ensure adequate health infrastructure and workforce capacity for delivery of a nurse home-visiting program.	**Numerator:** Number of funded SNHV program places **Denominator:** Number of births in the community/1000
QN 1 MCH Facility Density: Number of Maternal and Child Health (MCH) centres in community per 1000 births	To ensure adequate health infrastructure and workforce capacity for delivery of a nurse home-visiting program.	**Numerator:** Number of MCH facilities in community **Denominator:** Number of births in the community/1000
QN 2 Funded SNHV program hours: Number per 1000 births	To ensure that health infrastructure and workforce capacity for delivery of a nurse home-visiting program.	**Numerator:** Funded SNHV program hours **Denominator:** Number of births in the community/1000
QN 3 Maternal and Child Health Nurse Density: Number per 1000 births	To ensure that adequate and appropriate workforce capacity for delivery of a nurse home-visiting program.	**Numerator:** Number SNHV nurses **Denominator:** Number of births in the community/1000
QN 4 Social Care Practitioner Density: Number in SNHV team per 1000 births	To ensure adequate and appropriate workforce capacity for delivery of a nurse home-visiting program.	**Numerator:** Number of Social Care Practitioners in SNHV team **Denominator:** Number of births in the community/1000
QN 5 Community Health Worker Density: Number in SNHV team per 1000 births	To ensure that adequate and appropriate workforce capacity for delivery of a nurse home-visiting program.	**Numerator:** Number of community health workers in SNHV team **Denominator:** Number of births in the community/1000

SUSTAINED NURSE HOME VISITING | GLOSSARY OF TERMS

Avenues for assistance for financial difficulty	Referrals to government programs made to parents experiencing financial difficulty.
Community engagement opportunities	Opportunities for social interactions with the community.
Cultural competence	Cultural competence is the ability to understand, communicate with and effectively interact with people across cultures. Cultural competence encompasses: being aware of one's own world view, developing positive attitudes towards cultural differences, and gaining knowledge of different cultural practices and world views.
Education/support on breastfeeding	Recorded in notes that there was a discussion about breastfeeding or breastfeeding education provided or resources provided (e.g. a pamphlet) about breastfeeding given.
Evidence based programs	Evidence- based programs are programs that have a sufficient evidence base and have undergone rigorous evaluation, demonstrating effectiveness in a specific population group.
Evidence-based support service for domestic violence	Evidence-based support for an intervention/program means that a research trial has been conducted to show that the intervention/program is effective. Some interventions/programs with evidence-based support for reducing domestic violence involve either (1) sessions of professional counselling or (2) contact with an intimate partner violence advocate. Sessions typically occur during and after pregnancy.
Evidence-based support for drug or alcohol problems	Evidence-based support for an intervention/program means that a research trial has been conducted to show that the intervention/program is effective. One example of a program with evidence-based support for reducing drug and alcohol misuse is the Durham Connects nurse home visiting program.
Family and domestic violence	'Family and domestic violence' covers a wide range of abusive behaviours committed in the context of intimate relationships such as those involving family members, children, partners, ex-partners, or caregivers. Family and domestic violence can include many types of behaviour or threats, including: physical violence, sexual abuse, emotional abuse, verbal abuse and intimidation, economic and social deprivation, damage of personal property and abuse of power. Types of relationships also vary.
Family Partnership Training	The Family Partnership Model is an innovative approach based upon an explicit model of the 'helping' process that demonstrates how specific 'helper' qualities and skills, when used in partnership, can enable parents and families to overcome their difficulties, build strengths and resilience, and fulfil their goals more effectively.
High-quality sustained nurse home visiting program	A high-quality sustained nurse home visiting program (SNHV) program is one of the seven sustained, supported programs – Nurse Family Partnership, Family Nurse Partnership, Maternal Early Childhood Sustained Home Visiting (MECSH), Minding the Baby, Pro Kind, right@home or VoorZorg –or a NHV program that reaches the high-quality threshold for each of the three quality domains of content, process, and nurse-provider.
Home learning	Home learning is an activity that a child is asked to complete outside of the school day, either on their own or with an adult.
Living with adversity	For the purposes of these indicators, we identify priority groups who may experience greater susceptibility to adverse health outcomes as a result of structural inequities. Priority groups include: pregnant women experiencing vulnerability, refugees or asylum seeker populations, disability populations, Aboriginal and Torres Strait Islander populations, Health Care Card holders, children in out-of-home care, and culturally and linguistically diverse (CALD) populations.

Multidisciplinary support	Multidisciplinary support is when professionals from a range of disciplines work together to deliver comprehensive care that addresses as many of the patient's needs as possible.
SNHV with continuity of care	Continuity of care means that the family has had the same nurse for ≥85% visits.
Parent	For the purpose of this report a parent is defined as a person performing the role of a primary caregiver to a child. This person may be different from the person who is the child's biological parent, for example it could include grandparents, stepparents, foster parents, or other carers
Priority groups	Priority groups are those populations who may experience greater susceptibility to adverse health outcomes as a result of structural inequities. Priority groups include: pregnant women experiencing vulnerability, refugees or asylum seeker populations, disability populations, Aboriginal and Torres Strait Islander populations, Health Care Card holders, children in out-of-home care, and culturally and linguistically diverse (CALD) populations.
Rate the program and nurse-family relationship highly	Average score >80% on satisfaction measures.
Referred for psychological intervention	This means that there is a referral letter for psychological intervention included in the medical chart, or there is some documentation in the medical chart to say referred to psychological intervention.
Right dose of SNHV	Completed a sufficient number of hours or sessions of the SNHV program.
Role playing exercise	A role-play exercise is an assessment activity in which candidates act out an imaginary scenario that closely mirrors a situation that could occur in the job they have applied for.

EARLY CHILDHOOD EDUCATION AND CARE

Quality early childhood education and care (ECEC) provides valuable play-based opportunities for learning, developmental and social engagement for children before they begin school. This section includes a glossary and:

- 1 quality indicator
- 2 participation indicators
- 1 quantity indicator.

QUALITY INDICATOR

INDICATOR	WHY IT MATTERS	CALCULATION
QL 1  The proportion of early childhood education and care (ECEC) services rated 'exceeding' the standard in quality areas 1, 4 and 5 and at least 'meeting' the standard in all other quality areas according to the ACECQA assessment	ECEC services are associated with improved child outcomes (cognitive/ academic and social-emotional).	**Numerator:** Number of 'ECEC services rated 'exceeding' the standard in quality areas 1, 4 and 5 and at least 'meeting' the standard in all other quality areas according to the ACECQA assessment **Denominator:** Number of ECEC services

PARTICIPATION INDICATORS

INDICATOR	WHY IT MATTERS	CALCULATION
P1 | universal  Proportion of all children attending ECEC for 15 hours or more per week for the two years before starting formal school	ECEC starting age, program duration and program intensity are associated with children's cognitive, academic, language and socio-emotional outcomes.	**Numerator:** Number of children who receive 15+ hours of ECEC two years before commencing formal schooling **Denominator:** Community population of children aged 3-5 years
P2 | targeted Proportion of children from priority groups who attend ECEC at least three years before starting formal school for 15 hours or more per week	Optimal levels of ECEC starting age, program duration and program intensity, associated with children's cognitive, academic, language and socio-emotional outcomes vary for children from priority groups.	**Numerator:** Number of children from priority groups who attend 15+ hours ECEC per week at least three years before starting formal school **Denominator:** Community population of children in priority groups that attend at least three years before school

QUANTITY INDICATOR

INDICATOR	WHY IT MATTERS	CALCULATION
QN 1 ● Number of ECEC places per target population (2-5 years) per 15 hours per week	To ensure adequate ECEC places for the population (2-5 years).	**Numerator:** ECEC approved places meeting 15h+ per week X proportion of places that are for 2-5 year olds **Denominator:** Number of theoretical places required to supply target population (2-5 years) with 15h+

EARLY CHILDHOOD EDUCATION AND CARE | GLOSSARY OF TERMS

ACECQA assessment	The Australian Children's Education and Care Quality Authority's quality rating system for early childhood education and care.
Quality areas 1,4 and 5 of ACECQA assessment	QA1: Educational program and practice QA4: Staffing arrangements QA5: Relationships with children
Children from priority groups (P2)	There is no common definition for children experiencing disadvantage however, some populations may experience greater susceptibility to adverse health outcomes as a result of structural inequities. RSTO identifies these are priority groups. Priority groups include: pregnant women experiencing vulnerability, refugees or asylum seeker populations, disability populations, Aboriginal and Torres Strait Islander populations, Health Care Card holders, children in out-of-home care, and culturally and linguistically diverse (CALD) populations.
Core population count	Core population (denominator) counts all 3-4 year olds and 30% of 5 year olds assuming 30% haven't started school yet (source Census data).

PARENTING PROGRAMS

Quality parenting programs can enhance parents' confidence and competence in providing the environments and experiences that help children to thrive.

Parenting programs, in this context, include interventions delivered to the parent with the aim to prevent, improve or optimise child behaviours or emotional outcomes.

Nine parenting programs met the criteria for 'supported', showing clear and consistent evidence of benefit. These include: Family Check-Up; Incredible Years; Parent-Child Interaction Therapy; Parent Management Training-Oregon Model; Triple P; Tuning into Kids; Child-Parent Psychotherapy; Common Sense Parenting; and Community Parent Education Program (COPE).

This section contains

- 1 quality indicator
- 1 participation indicator
- 1 quantity indicator.

QUALITY INDICATOR

INDICATOR	WHY IT MATTERS	CALCULATION
QL 1 The parenting program is one of the nine supported programs and is implemented according to the best practice parameters associated with that program.	Parenting programs rated as supported and administered according to program parameters are strongly linked with the ability to prevent, improve, or optimise child behavioural or emotional outcomes.	**Numerator:** The number of supported parenting programs offered and implemented according to best practice parameters **Denominator:** Total number of parenting program interventions that deliver a set curriculum to the parent with the aim to prevent, improve, or optimise child behavioural or emotional outcomes

PARTICIPATION INDICATOR

INDICATOR	WHY IT MATTERS	CALCULATION
P1 The proportion of targeted families (i.e. those with 2-8 year olds experiencing behaviour problems) enrolled in a supported parenting program who attend at least 85% of the program's sessions.	Higher levels of enrolment and retainment in supported programs are proven to benefit at-risk families. Identifying program uptake of key populations provides understanding of program effectiveness and promotes strategies to increase participation.	**Numerator:** The proportion of families enrolled in a supported parenting program who attend at least 85% of the programs' sessions **Denominator:** Estimated number of children aged 2–8 years in that local community at risk of, or with behavioural problems (~15% of the population)

QUANTITY INDICATOR

INDICATOR	WHY IT MATTERS	CALCULATION
QN 1 The number of places available in supported parenting programs led by qualified facilitators, relative to the target population.	To ensure adequate supported parenting program places - administered according to program parameters - are available for targeted families**.**	**Numerator:** The number of supported parenting programs places offered in a local community and led by qualified facilitators **Denominator:** Estimated number of children aged 2-8 years in that local community at risk of, or with, behavioural problems* (~15% of the target population)

*Estimates are based on Australian Bureau of Statistics 2016; and Longitudinal Study of Australian Children (LSAC)

PARENTING PROGRAMS | GLOSSARY OF TERMS

Supported parenting programs	One of the nine parenting programs demonstrating clear and consistent evidence of benefit for children and parents.
Targeted families	Parents whose children have behavioural issues (higher prevalence in families experiencing disadvantage).

EARLY YEARS OF SCHOOL

The early years of school provide foundational skills for lifelong learning. This section includes a glossary and:

- 6 content knowledge quality indicators
- 7 differentiated teaching quality indicators
- 3 social emotional support quality indicators
- 5 staff development and leadership quality indicators
- 2 peer teaching quality indicators
- 2 physical activity quality indicators
- 1 class size quality indicator
- 7 partnerships with families quality indicators.

Participation and quantity indicators are not included as they are stipulated by legislation.

QUALITY INDICATOR | Content knowledge

INDICATOR	WHY IT MATTERS	CALCULATION
QL1 % of P-3 classroom teachers who utilise the school curriculum to plan pedagogical content delivery	Pedagogical content knowledge is associated with student academic performance and a school curriculum can assist teachers to identify and consistently implement effective teaching strategies.	**Numerator:** Number of P-3 classroom teachers who use the school curriculum to plan pedagogical content delivery **Denominator:** Total number of P-3 classrooms teachers
QL2 % of P-3 classrooms that balance the amount of time spent in reading and writing activities	Literacy interventions that balance reading and writing instruction time have positive effects on both reading and writing outcomes.	**Numerator:** Number of P-3 classrooms that balance the amount of time spent in ready and writing activities **Denominator:** Total number of P-3 classrooms
QL3 % of P-3 classrooms implementing daily literacy instruction that explicitly builds skills in phonics, phonemic awareness, spelling, morphology, reading fluency and comprehension strategies, and handwriting	For each of the skills listed, explicit instruction has demonstrated positive effects on the respective child literacy outcomes. Additionally, explicit instruction in some skills leads to improved performance on other literacy skills/measures.	**Numerator:** Number of P-3 classrooms implementing daily literacy instruction that explicitly builds skills in phonemic, phonemic awareness, spelling, morphology, reading fluency and comprehension strategies and handwriting **Denominator:** Total number of P-3 classrooms
QL4 % of P-3 classrooms that incorporate regular use of manipulatives in numeracy instruction	Manipulative-based mathematics instruction has positive effects on a range of mathematical skills including understanding place value, arithmetic, fractions, geometry and algebra.	**Numerator:** Number of P-3 classrooms that incorporate regular use of manipulatives in numeracy instruction **Denominator:** Total number of P-3 classrooms teachers
QL5 % of P-3 classroom teachers who have formal training in evidence-based teaching methods	Subject-specific professional development has demonstrated positive effects on child academic achievement.	**Numerator:** Number of P-3 classroom teachers who have formal training in evidence-based teaching methods **Denominator:** Total number of P-3 classrooms teachers

QUALITY INDICATOR | Content knowledge

INDICATOR	WHY IT MATTERS	CALCULATION
QL6 % of P-3 classroom teachers who have formal training in evidence-based teaching methods who regularly coach other staff delivering P-3 literacy and numeracy	Compared with usual practice, teacher coaching has demonstrated positive effects on both teacher instruction and student achievement.	**Numerator:** Number of P-3 classroom teachers who have formal training in evidence-based teaching methods who regularly coach other staff delivering P-3 literacy and numeracy **Denominator:** Total number of P-3 classrooms

QUALITY INDICATOR | Differentiated teaching

INDICATOR	WHY IT MATTERS	CALCULATION
QL7 % of P-3 students whose academic development in literacy and numeracy is systematically assessed and documented	Systematic assessment and documentation of student academic development is critical for identifying student strengths and weaknesses and subsequently using this information to appropriately tailor instruction for students.	**Numerator:** Number of P-3 students whose academic development in literacy and numeracy is systematically assessed and documented **Denominator:** Total number of P-3 students
QL8 % of P-3 students whose literacy and numeracy instruction is tailored according to the results of systematic assessment of their academic development	Tailoring instruction to student needs leads to stronger academic development and more equitable instruction.	**Numerator:** Number of P-3 students whose literacy and numeracy instruction is tailored according to systematic assessment of academic development **Denominator:** Total number of P-3 students
QL9 % of P-3 students who regularly receive instruction in small groups	Small group instruction has demonstrated larger effects than whole-class instruction on early literacy skills such as letter name and letter sound knowledge.	**Numerator:** Number of P-3 students who regularly receive instruction in small groups **Denominator:** Total number of P-3 students
QL10 % of P-3 students for whom assessment data indicates the need for individualised instruction in literacy or numeracy who receive an evidence-based Tier 3 intervention	For a relatively small proportion of students, intensive individualised instruction is necessary for students who would otherwise struggle to meet minimum standards in literacy and numeracy development.	**Numerator:** Number of P-3 students who require individualised instruction according to assessment data who receive an evidence-based Tier 3 intervention **Denominator:** Total number of P-3 students for whom assessment data indicates the need for individualised instruction
QL11 % of P-3 classroom teachers with formal training in evidence-based differentiated teaching strategies	Differentiated teaching strategies (e.g. small group instruction, computerised differentiation, and individualised feedback) demonstrate positive effects on reading outcomes for P-3 children.	**Numerator:** Number of P-3 classroom teachers with formal training in evidence-based differentiated teaching strategies **Denominator:** Total number of P-3 classrooms teachers
QL12 % of staff with formal training or tertiary qualifications in special education for P-3 students needing additional support	A significant proportion of P-3 students struggle to respond adequately to whole-of-class instruction and will require specialised instruction to meet minimum standard benchmarks.	**Numerator:** Number of staff with formal training or tertiary qualifications in special education for P-3 students needing additional support **Denominator:** Total number of staff

QUALITY INDICATOR | Differentiated teaching

INDICATOR	WHY IT MATTERS	CALCULATION
QL13 % of staff delivering additional support to P-3 students who have formal training in the provision of evidence-based Tier 2 and Tier 3 learning interventions	A significant proportion of P-3 students struggle to meet minimum standard benchmarks in literacy and/or numeracy without the provision of Tier 2 and/or Tier 3 learning interventions.	**Numerator:** Number of staff delivering additional support to P-3 students who have formal training in the provision of evidence-based Tier 2 and Tier 3 learning interventions **Denominator:** Number of staff who are delivering additional support to P-3 students
QL14 % of P-3 lessons utilising digital technology for instruction in interactive rather than static conditions	Use of digital technology in classrooms has demonstrated positive effects on student academic achievement when the technology utilised requires student interaction rather than passive reception of information.	**Numerator:** Number of P-3 lessons using digital technology in interactive conditions **Denominator:** Number of P-3 lessons using digital technology
QL15 % of P-3 classrooms utilising interactive digital technology platforms to supplement literacy and numeracy instruction	Supplementing traditional classroom instruction with interactive digital technology platforms has been shown to improve student academic achievement across a range of subjects. There is strong evidence for the effectiveness of several technology-based literacy and numeracy interventions.	**Numerator:** Number of P-3 classrooms that use interactive digital technology platforms to supplement literacy and numeracy instruction **Denominator:** Total number of P-3 classrooms
QL16 % of P-3 classroom teachers who have received formal training in the use of interactive digital instruction materials and incorporate these in their classes	A plethora of interactive digital instruction materials are readily available, with many commercially produced, and mass marketed. Teachers should have formal training to build competence in selection and implementation of materials characterised by features with a strong evidence base.	**Numerator:** Number of P-3 classroom teachers who have received formal training in the use of interactive digital instruction materials and incorporate these in their classes **Denominator:** Total number of P-3 classrooms teachers
QL17 An evidence-based social-emotional development program is implemented across the school and activities to maintain the skills developed in the program are delivered on a regular basis (i.e. every term)	There is good evidence that universal and whole-of-school social-emotional development programs have positive effects on child psycho-social and academic development.	Is an evidence-based program being implemented and activities regularly undertaken?

QUALITY INDICATOR | Social emotional support

INDICATOR	WHY IT MATTERS	CALCULATION
QL18 % of families (with a child in grade P-3) indicating that their child feels safe at school on annual parent surveys	School climate is associated with child psycho-social wellbeing and academic development. There is a tendency for children who experience bullying, harassment, or exclusion at school to experience greater psychological distress and poorer academic achievement.	**Numerator:** Number of families (with a child in grade P-3) indicating that their child feels safe at school on annual parent surveys **Denominator:** Total number of families with a child in grade P-3

QUALITY INDICATOR | Social emotional support

INDICATOR	WHY IT MATTERS	CALCULATION
QL19 % of families (with a child in grade P-3) who agree on parent opinion surveys that teachers at the school treat students fairly and/or student behaviour is well managed	Parent perceptions of teacher competence in managing student behaviour provide an important measure of the school learning environment.	**Numerator:** Number of families (with a child in grade P-3) who agree on parent opinion surveys that teachers at the school treat students fairly **Denominator:** Total number of families with a child in grade P-3
QL20 % of P-3 classroom teachers who have completed formal training in evidence-based social-emotional development programs (such as teaching mindfulness strategies)	Implementation of school-based mindfulness strategies have demonstrated positive effects on measures of child mental health and well-being, cognition, and behaviour. Teachers are well-positioned to deliver mindfulness strategy instruction and promote regular and timely practice of such strategies.	**Numerator:** P-3 classroom teachers who have completed formal training in evidence-based social-emotional development programs **Denominator:** Total number of P-3 classroom teachers

QUALITY INDICATOR | Staff development and leadership

INDICATOR	WHY IT MATTERS	CALCULATION
QL21 % of staff professional development (PD) opportunities approved by the school principal that are characterised by both (a) active teacher learning experiences and (b) use of modelling/simulations	Professional development opportunities characterised by active teacher learning and use of modelling/simulations are associated with positive effects on teacher instruction and student academic achievement	**Numerator:** Number of approved PD opportunities that are characterised by both (a) active teacher learning experiences and (b) use of modelling/simulations **Denominator:** Total number of approved PD opportunities
QL22 % of approved PD opportunities that are informed by student needs (I.e. based on data)	PD opportunities specifically targeting areas of greatest student need should lead to substantive improvements in those areas.	**Numerator:** Number of PD opportunities informed by student needs **Denominator:** Total number of approved PD opportunities
QL23 % of P-3 classroom teachers with formal training in an evidence-based classroom management strategy	Implementation of evidence-based classroom management strategies can have a positive impact on student academic, behavioural and social-emotional development	**Numerator:** Number of P-3 classroom teachers with formal training in an evidence-based classroom management strategy **Denominator:** Total number of P-3 classroom teachers
QL24 % of professional learning courses undertaken by teachers that are evidence-based	Professional learning courses can be costly and are expected to translate to measurable improvements in student development. Utilising courses that are evidence-based should increase the likelihood that participation in PD leads to improved student outcomes	**Numerator:** Number of professional learning courses undertaken by teachers that are evidence-based **Denominator:** Total number of professional learning courses undertaken by teachers
QL25 % of teachers that currently receive in-service teacher coaching that is considered best practice	Positive effects on student achievement and teacher instruction have been observed in studies where best practice teacher coaching is a core component of professional development.	**Numerator:** Number of teachers that currently receive best practice in-service teacher coaching **Denominator:** Total number of P-3 classrooms teachers

QUALITY INDICATOR | Peer teaching

INDICATOR	WHY IT MATTERS	CALCULATION
QL26 % of P-3 classrooms that implement evidence-based peer tutoring activities in the weekly literacy/numeracy blocks	Peer tutoring has demonstrated positive effects across a range of subject areas and across a range of student abilities.	**Numerator:** % of P-3 classrooms implementing weekly evidence-based peer tutoring **Denominator:** Total number of P-3 classrooms
QL27 % of P-3 classroom teachers with formal training in evidence-based peer teaching methods	Peer tutoring effects are moderated by a range of factors. Formal training should prepare teachers with the tools to use the most effective peer teaching strategies	**Numerator:** Number of P-3 classroom teachers who have formal training in evidence-based peer teaching methods **Denominator:** Total number of P-3 classrooms teachers

QUALITY INDICATOR | Physical activity

INDICATOR	WHY IT MATTERS	CALCULATION
QL28 % of P-3 classrooms where physical activity is incorporated in academic instruction on a daily basis (whether by in class activity breaks, exercise prior to lessons, or use of movement to facilitate instruction)	Strategies to increase student physical activity during the school day generally demonstrate positive effects on school engagement, student learning and health outcomes.	**Numerator:** Number of classrooms where physical activity is incorporated in academic instruction on a daily basis **Denominator:** Total number of P-3 classroom
QL29 % of P-3 classroom teachers who have received at least some informal training in strategies to incorporate movement in academic instruction	Increasing the amount of time students spend in formal Physical Education classes may not be a viable strategy in the context of multiple and sometimes competing curricular demands. However, classroom teachers are well-positioned to incorporate movement with academic instruction and/or implement physical activity breaks during class.	**Numerator:** Number P-3 classrooms teachers who have received at least some informal training in strategies to incorporate movement in academic instruction **Denominator:** Total number of P-3 classroom teachers

QUALITY INDICATOR | Class size

INDICATOR	WHY IT MATTERS	CALCULATION
QL30 % Of P-3 classes that comprise 22 students or less	Student performance on standardised measures of reading, mathematics, and social science indicate that student academic achievement benefits more in classes comprised of 22 students or fewer, than larger classes.	**Numerator:** Number of classes with 22 students or less **Denominator:** Total number of P-3 classes

QUALITY INDICATOR | Partnerships with families

INDICATOR	WHY IT MATTERS	CALCULATION
QL31 % of P-3 teachers who are aware of the school's family partnership policy and implement it into their usual practice with families	Parent involvement with child learning both at home and at school is positively associated with child academic achievement. Family partnership policies provide some guidance for teachers to encourage parent/family involvement.	**Numerator:** Number of P-3 classroom teachers who are aware of the school's family partnership policy and implement it into their usual practice with families **Denominator:** Total number of P-3 classroom teachers
QL32 % of families (with a child in grades P-3) indicating that the school actively encourages and emphasises the importance of regular parent-child reading at home	Strategies to encourage parent-child reading at home generally have a positive effect on measures of child literacy development.	**Numerator:** Number of families (with a child in grades P-3) indicating that the school actively encourages the importance of regular parent-child reading at home **Denominator:** Number of families with a child in grades P-3
QL33 % of families (with a child in grades P-3) indicating that the school has provided information about specific strategies for parents to use when reading with their children	Most parents and caregivers are not trained literacy instructors or experts. Enjoyment and effectiveness of home-reading practice may benefit when parents or caregivers receive information about specific reading strategies to try.	**Numerator:** Number of families (with a child in grades P-3) indicating that the school has provided information about specific strategies to use when reading with their children **Denominator:** Number of families with a child in grades P-3
QL34 % of P-3 classroom teachers indicating that they have provided parents with strategies to use when reading with children at home	Parent and teacher perceptions of whether information about reading strategies has been communicated may differ. A divergence in family and teacher responses may indicate a need to improve communication strategies	**Numerator:** Number of P-3 teachers who indicate they provide parents with strategies to use when reading with children at home **Denominator:** Total number of P-3 classroom teachers
QL35 % of P-3 classroom teachers indicating that they monitor parent home reading on a regular basis (i.e. weekly)	A monitoring system may be useful for teachers to identify and respond to households requiring greater support with home reading practice	**Numerator:** Number of P-3 classroom teachers indicating that they monitor parent home reading on a regular basis **Denominator:** Total number of P-3 classroom teachers
QL36 % of P-3 classroom teachers who provide additional support to parents who have indicated difficulties with home reading practice	Families experiencing difficulties with home reading practice are less likely to persist when barriers are not adequately identified and addressed	**Numerator:** Number of P-3 classroom teachers who provide additional support to parents who have indicated difficulties with home reading practice **Denominator:** Total number of P-3 classroom teachers
QL37 % of P-3 classroom teachers who provide parents evidence-based materials to encourage and support reading at home	Evidence-based home reading strategies should translate to more successful and sustained practice	**Numerator:** Number of P-3 classroom teachers who provide parents evidence-based material to encourage and support reading at home **Denominator:** Total number of P-3 classroom teachers

Balanced reading and writing	Literacy instruction whereby no more than 60% of time is allocated to either reading or writing.
Best practice teacher coaching	To be considered best practice, coaching should be characterised by at least four of the six following criteria: individualised (1:1 feedback), intensive (conducted at least fortnightly), sustained (provided over a substantive period of time), context-specific (tailored to the teacher's' class), focussed (provides specific tasks for teachers to practice), and combined with curriculum-specific materials/resources.
Classroom management strategies	The strategies teachers use in the classroom to create an environment that supports and facilitates student learning. Examples of evidence-based classroom management strategies include PATHS, the Good Behaviour Game, the Incredible Years Teacher Classroom Management Program, and Proactive Classroom Management Program.
Classroom teachers	Teaching staff who regularly supervise the main literacy and numeracy instructional blocks (i.e. not casual relief teachers or specialist subject teachers such as those delivering instruction in Art, Science, Technology, Physical Education, or Languages Other Than English for example).
Differentiated teaching	Modifications to instructional delivery that enable teachers to tailor instruction to the needs of students across a range of abilities and learning needs.
Evidence-based interventions	Strategies that have demonstrated positive and statistically significant effects of at least moderate magnitude (i.e. standardised mean differences of 0.3 or more) or practical importance in at least two randomised controlled trials, on relevant outcomes (i.e. student academic performance or psychosocial development).
Formal training	Participation in external professional development opportunities (such as workshops run by independent organisations).
Informal professional development	Training or skill development opportunities that are developed and implemented internally by schools (e.g. coaching from more senior teachers in same school) or between school clusters (e.g. communities of professional development meetings involving teachers from multiple schools sharing knowledge or experience or 'practice wisdom').
P-3	The first year of school to grade 3 (children are approximately 5 to 8 years of age*).
Materials to support reading at home	Examples include materials that describe dialogic reading practices, interactive listening to child read, and tutoring specific skills such as alphabet knowledge or word reading strategies.
NAPLAN	The National Assessment Program – Literacy and Numeracy (NAPLAN) is a series of tests for Australian students in years 3, 5, 7 and 9 that provide information on progress in literacy and numeracy.
Peer tutoring	Structured activities in which same-age, cross-ability, student pairs receive explicit instruction and guidance in tutoring one another.
Tier 2 intervention	Additional small-group instruction for students who do not make adequate progress with classroom instruction or who fail to meet benchmarks on screening measures (intensity of intervention is varied according to group size, frequency and duration of intervention, and level of provider training).
Tier 3 intervention	Intensive one-to-one supports specifically targeting skills deficits that are provided when students do not adequately respond to Tier 1 or Tier 2 instruction.
Safety at school	Is defined in terms of response to school survey item "I feel safe at school"†, or items assessing whether students have experienced bullying or physical or verbal maltreatment (e.g. "I have been bullied at my school this term", "I have often been teased in an unpleasant way or called names at my school" ‡).

School encouragement of parent-child reading	Is defined in terms of response to school survey item, “This school works with me to support my child's learning"†, or other similar items available through state school surveys (e.g. “This school works with me to support my child's learning”, "Staff at this school are responsive to my enquiries” ◊).
Small group	Groups comprising no more than six students.

* As the term ‘kinder’ has often been used to refer to the first year of formal schooling (both in the international literature and some Australian states) we use the terms P-3 to refer to the early years of school.

‡ Survey item examples from the Framework for Improving Student Outcomes, Student Attitudes Survey

† An agreed student item in the Australian Curriculum and Assessment Reporting Authority (ACARA) School Survey

◊ Survey item examples from Queensland School Opinion Survey, Parent Items.

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RESTACKING THE ODDS

RESTACKING THE ODDS

TECHNICAL REPORT

Early childhood education and care: An evidence based review of indicators to assess quality, quantity and participation.

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RESTACKING THE ODDS

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ACECQA	Australian Children's Education and Care Quality Authority
AECD	Australian Early Development Census
CCC	Child Care Choices
CC-HOME	Child-care HOME
CIS	Caregiver Interaction Scale
CLASS	Classroom Assessment Scoring System
CLASS PreK	Classroom Assessment Scoring System PreK
COAG	Council of Australian Governments
ECEC	Early Childhood Education and Care
ECERS	Early Childhood Environment Rating Scale
ECERS-E	Early Childhood Environment Rating Scale Extension
ECERS-R	Early Childhood Environment Rating Scale – Revised
EYLF	Early Years Learning Framework
EPPE	Effective Provision of Pre-School Education (EPPE) Study
EPPNI	Effective Pre-school Provision in Northern Ireland
EPPSE	Effective Provision of Pre-School Education, Primary, and Secondary (EPPSE) Study
ES	Effect Size
IEA	International Association for Evaluation of Educational Achievement (IEA) Pre-Primary project
LSAC	Longitudinal Study of Australian Children
NAPLAN	National Assessment Program – Literacy and Numeracy
NCAC	National Childhood Accreditation Council
NCEDL	National Center for Early Development and Learning
NICHD	National Institute of Child Health and Human Development
NICHD SECCYD	National Institute of Child Health and Human Development Study of Early Child Care Youth Development
NHMRC	National Health and Medical Research Council
NQF	National Quality Framework
NQS	National Quality Standards
OECD	Organisation for Economic Co-Operation and Development
ORCE	Observational Record of Caregiving Environment
PIRLS	Progress in International Reading Literacy Study
QA	Quality Area
RCT	Randomised Controlled Trial
REA	Restricted Evidence Assessment
TIMSS	Trends in International Mathematics and Science Study

EXECUTIVE SUMMARY: EARLY CHILDHOOD EDUCATION & CARE

Restacking the Odds: Project Background

Too many children are born into circumstances that do not provide them with a reasonable opportunity to make a good start in life. Disadvantaged circumstances for children lead to developmental inequities in physical health, social-emotional wellbeing, and academic learning. These inequities emerge in early childhood and often continue into adulthood, contributing to unequal rates of low educational attainment, poor mental and physical health and low income. In some cases, this experience is part of a persistent cycle of intergenerational disadvantage. Inequities constitute a significant and ongoing social problem, and along with substantial economic costs have major implications for public policy.

To redress developmental inequities, research has shown that efforts should be delivered during early childhood (pregnancy to 8 years of age) to have the greatest benefits. Thus, *Restacking the Odds* focuses on five key evidence-based interventions/platforms in early childhood (*see Figure 1: Five Fundamental Strategies)*:

- Antenatal care;
- Sustained nurse home visiting;
- Early childhood education and care;
- Parenting programs; and
- The early years of school.

These five strategies are only a subset of the possible interventions available, but have been selected carefully. They are notably *longitudinal* (across early childhood), *ecological* (targeting child and parent), *evidence-based*, and able to be *targeted* to benefit the 'bottom 25 per cent' (i.e., those most disadvantaged). The premise is that by 'stacking' these fundamental interventions (i.e., ensuring they are all applied for a given individual) there will be a cumulative effect - amplifying the impact and sustaining the benefit.

For each of the five strategies, the intent is to use a combination of data-driven, evidence-based and expert-informed approaches to develop measurable, best practice indicators of quality, quantity (access) and participation (reach):

Quality: Are the strategies *delivered effectively*, relative to evidence-based performance standards? A strategy with "quality" is one for which there is robust evidence showing it delivers the desired outcomes. A large number of research studies have explored aspects of this question (i.e., "what works?"). Therefore, *particular attention is paid to the quality dimension in this report*.

Participation: Do the *appropriately targeted* children and families *participate* at the right dosage levels? "Participation" shows what portion of the relevant groups are exposed to the strategy at the level required to generate the desired benefit. (For example, what portion of the group are attending the number of hours of early education required for positive

outcomes). Participation levels can be calculated whether the strategy is universal (for everyone), or targeted (intended to benefit a certain part of the population).

Quantity: Are the strategies *available locally* in sufficient quantity to meet the needs and size of the target population? "Quantity" helps determine the quantum of effort and the infrastructure needed to adequately deliver the strategy for a given population.

In this project, indicators of quality, participation and quantity will be used to help identify gaps and priorities in Australian communities. This will include testing preliminary indicators in 10 communities over the next 3 years to determine which are pragmatic to collect, resonate with communities, and provide robust measures to stimulate community and government action. The findings summarised in this report - *Early Childhood Education and Care* - will provide essential inputs to guide subsequent work for the *Restacking the Odds* project. There is a similar report for each of the five strategies.

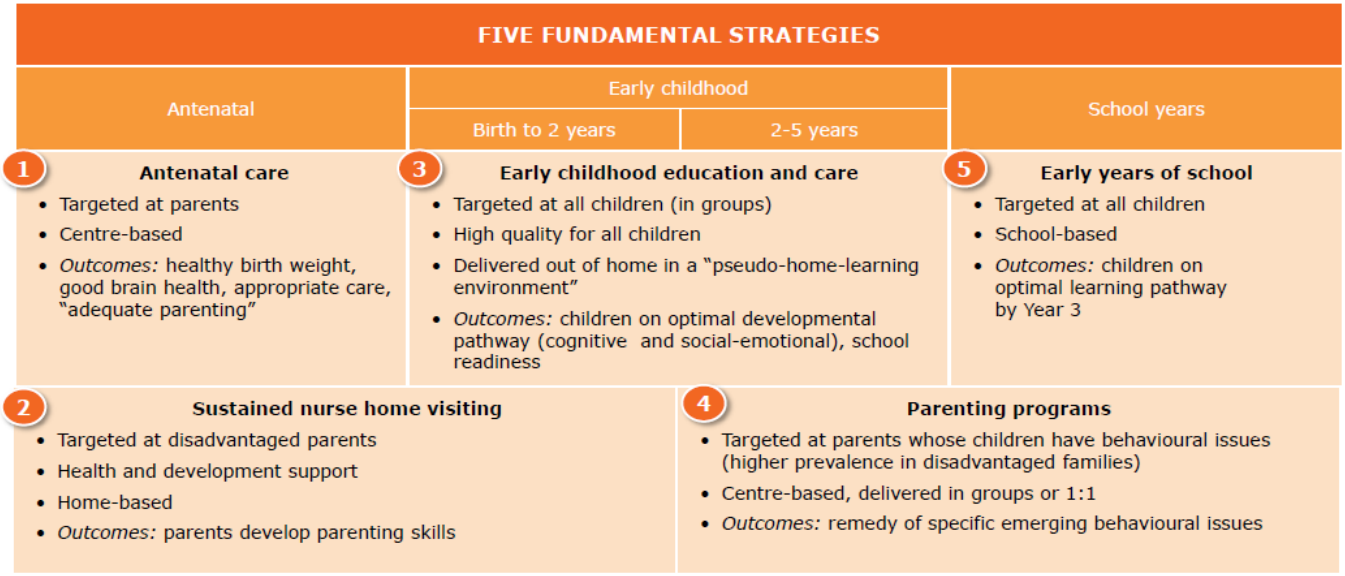

Figure 1: Five fundamental strategies

Introduction: Early Childhood Education and Care

Early Childhood Education and Care (ECEC) is a potential way to reduce inequities in child health and developmental outcomes. Extensive research indicates that the education and care of young children (birth to eight years of age) can have an immense influence on long-term outcomes related to cognition, language, health, and wellbeing [1, 2]. For example, the Australian Early Development Census (AEDC) data suggest that children who attend preschool are less likely to be developmentally vulnerable, even when considering level of relative disadvantage [3]. Much of the research originally used to support ECEC originated from the USA and focused largely on the positive effect of ECEC on disadvantaged children [4]. However, there has been a more recent shift to optimise ECEC programs for all children (e.g. [5, 6]) and these studies suggest that participation in high quality ECEC has the potential to provide all preschool-aged children with an opportunity to develop life-long skills for learning and wellbeing.

The benefits of attending ECEC are related the quality of ECEC programs. Rating scales assessing quality include aspects of structural quality (i.e. how the ECEC system is designed and organised, such as the number of professionally trained staff) and process quality (i.e. practices within an ECEC setting, such as relationships and interactions between staff and children). Research has shown that ECEC programs for children aged 3 to 5 years with an emphasis on literacy, maths, science, environment and using a diversity of cultural and theoretical approaches result in better academic and social-behavioural outcomes [7]. Children have been shown to make more progress in preschools where staff have higher qualifications, and international research has reported that objective measures of quality (e.g. the Classroom Assessment Scoring System PreK and Early Childhood Environment Rating Scale - Revised) are related to better outcomes for children (e.g. [5, 7-9]). Several studies have also reported that the relationship between ECEC quality and benefits to child development is stronger for children from disadvantaged backgrounds (e.g. [10-12]). However, others have found no support for this 'compensatory hypothesis' suggesting that even high-quality ECEC is insufficient to totally compensate for environmental disadvantage (e.g. [13, 14]). It nevertheless remains important to increase participation for disadvantaged children.

In 2016, 43% of all Australian children aged 0-5 years were enrolled in ECEC services, and 92% of 4-year-old children were enrolled in a preschool program [15]. To be considered enrolled, the child must have attended the ECEC program for at least one hour during the reference period, or be absent due to illness or extended holiday leave and expected to return. The enrolment rate for 4-year-old children is on par with other OECD nations (average 84%) [16], but some large subgroups of Australian children are substantially less likely to participate in ECEC programs. These subgroups include children from low socio-economic backgrounds, remote communities, Indigenous backgrounds, non-English speaking backgrounds, and those with a disability or special health care needs [17, 18]. Inadequate reach of high quality ECEC programs to the most vulnerable/disadvantaged is likely to result in widening the child development inequity gap.

Aim

This restricted targeted review addresses four key questions:

1. Within an existing national quality system for ECEC, which quality areas and/or standards have the most significant effect on child developmental outcomes (i.e., cognition, language, academic, and social and emotional development)?

2. What does the evidence indicate is the most effective (universal) starting age, dosage (i.e. number of hours per week), and attendance duration (i.e. number of months/years) as it relates to improving child developmental outcomes (cognition, language, academic, and social emotional development)?

3. Given the evidence determined from Question 2, in what quantity should a given community deliver ECEC?

4. Do the answers to these questions differ for targeted provision to disadvantaged populations?

Method

This literature review utilised a targeted restricted evidence assessment (REA) research methodology. REA uses similar methods and principles to a systematic review but makes concessions to the breadth and depth of the process, to enable faster completion. Rigorous methods for locating, appraising and synthesising the evidence related to a specific topic are utilised, but the methodology places some limitations on the search criteria and on how the evidence is assessed. For this review we sought data from primarily large longitudinal national/international cohort studies (peer-reviewed and grey literature – i.e. unpublished or not commercially published written material), although there are some advantages (i.e. large samples, multiple outcomes, unselected population "real-world"), there are also several limitations (i.e. no causal effects, selective follow-up loss).

Quality, participation and quantity

The REA considered the three drivers of quality, quantity, and participation as related to ECEC and child outcomes, as follows:

1. Quality

To determine the indicators of quality, Australia's existing quality rating system was utilised: the National Quality Standard (NQS) implemented by the Australian Children's Education and Care Quality Authority (ACECQA). An initial mapping exercise was undertaken to determine how closely Australia's Quality Areas matched the key principles identified from the European Commission Quality Framework and on domains from standardised, objective measures of ECEC quality [the Classroom Assessment Scoring System PreK (CLASS PreK) and Early Childhood Environment Rating Scale – Revised (ECERS-R)]. This initial scoping work provided confidence that important areas were not being missed when using the seven Quality Areas from the ACECQA National Quality Framework to direct the targeted literature search. A combination of literature reviews (peer-reviewed and web-based reports) and interviews with experts were then performed, to determine which ACECQA Quality Areas had the most robust evidence related to child outcomes. This determined the Quality Areas used for the recommended indicators for ECEC quality.

2. Participation

To determine participation indicators we focused on national and international longitudinal studies and utilised systematic reviews and meta-analyses, where available, with good quality and low bias. Study quality includes an assessment of *internal validity* (the degree to which the design and conduct of the study avoid bias, e.g. through randomisation, allocation concealment and blinding), and *external validity* (the extent to which the results of the study can be generalised to the population outside the study).

The evidence was then examined to determine any differential effect related to universal or targeted program participation in children from 0 to 5 years (e.g. targeted according to housing vulnerability or poverty, culturally and linguistically diversity, or low IQ). We used the evidence to develop indicators for the key dimensions of participation that relate to improved child outcomes, including optimal starting age, duration and dosage.

3. Quantity

Quantity indicators require agreed indicators for both the numerator (participation data) and denominator (population data). Quantity indicators were developed using the best indicators of participation level (for universal and targeted provision), and community-level population data. Again, the domain experts were consulted for their perspectives.

Ranking the Evidence

Individual studies were assessed for effectiveness across the three domains of functioning (cognitive/language, academic, and social-emotional) based on the following criteria:

- *Supported*: clear evidence of benefit, with sustained benefits of at least 1 year, and without evidence of harm or risk to participants. Populations examined are similar to, and results are clinically sensible to apply to, the Australian context.
- *Promising*: evidence suggestive of benefit of at least 6 months and without evidence of harm or risk to participants. Populations examined may be somewhat different to the Australian population, affecting generalisability and applicability to the Australian context. Meta-analyses and systematic reviews of moderate quality will be ranked as promising due to increased risk of bias.
- *Not supported*: There is evidence of harm or risk to participants.
- *Null*: no difference found between comparison groups.

Once each study was evaluated for effectiveness, an overall ranking of the evidence was determined using the following classifications (adapted from [19]). See Appendix D for full details.

- *Supported*. Clear, consistent evidence of benefit.
- *Promising*. Evidence suggestive of benefit but more evidence needed.
- *Mixed*. Data is mixed and could show evidence of harm or risk.
- *Not adequately addressed*. Insufficient evidence in the target research-base.
- *Not supported*. There is evidence of harm or risk to participants.

Findings

Quality Indicators

The ACECQA framework for national quality standards defines seven Quality Areas (QA) (see Appendix A for full detail of related elements), which were divided into two categories:

TEACHING-RELATED FACTORS	ENVIRONMENT-RELATED FACTORS
QA1 – Educational program and practice	*QA2 - Children's health and safety*
QA4 – Staffing arrangements	*QA3 - Physical environment*

QA5 – Relationships with children

QA6 – Collaborative partnerships with families and communities

QA7 - Leadership and service management

The research review provided evidence that the three teaching-related factors are associated with improved child outcomes (cognitive/academic and social-emotional). Conversely, we did not find clear evidence that the environment-related factors directly improve child developmental outcomes. Table 1 provides an overview of the evidence-base by Quality Area (QA). Appendix E provides a detailed list of the evidence separated into Quality Areas.

Table 1: Summary of the overall evidence base

QUALITY AREA	COGNITIVE & ACADEMIC	SOCIAL-EMOTIONAL
TEACHING-RELATED FACTORS		
Educational program and practice	• Supported	• Supported
Staffing arrangements	• Supported	• Supported
Relationships with children	• Supported	• Supported
ENVIRONMENT-RELATED FACTORS		
Children's health and safety	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence base
Physical environment	• Promising	• Not adequately addressed in target evidence base
Collaborative partnerships with families and communities	• Promising	• Promising
Leadership and service management	• Promising	• Not adequately addressed in target evidence base

Quality Areas rated as Supported (1, 4 and 5)

Quality Area 1 – Educational program and practice.

Two systematic reviews of moderate to high quality were identified [20, 21], which provided evidence that educational programs and practice were related to positive child outcomes (cognitive/academic and social emotional). These findings were further supported by a meta-analysis of low-to-moderate quality [22] and three major international trials:

- Effective Provision of Pre-School Education (EPPE) Study (e.g. [7])
- The National Institute of Child Health and Human Development Study of Early Child Care Youth Development (NICHD SECCYD) Studies (e.g. [4, 23, 24], and
- The International Association for Evaluation of Educational Achievement (IEA) Pre-Primary project [25].

Quality Area 4 – Staffing arrangements. There is strong evidence that certain aspects of staffing arrangements in ECEC settings – including staff-child ratios, group size, staff experience and qualifications – affect cognitive and social-emotional child outcomes. The evidence base for this included:

- Three systematic reviews/meta-analyses (high quality/low bias), examining outcomes across a range of study types (e.g. cross-sectional, longitudinal, correlational, experimental, and quasi-experimental studies) [26-28].

- One systematic review [29] and one meta-analysis [22] (both moderate quality, some risk of bias) examining outcomes from experimental and quasi-experimental studies and several national and international trials.
- The Longitudinal Study of Australian Children (LSAC) [30].
- Data from several major longitudinal studies: the EPPE study [31], NICHD SECCYD study [8], National Center for Early Development and Learning's (NCEDL) Multi-State Study of Pre-Kindergarten [32, 33].

Quality Area 5 – Relationships with children. Our search strategy did not yield any high quality systematic reviews or meta-analyses relevant to Quality Area 5. However, a substantive and frequently cited literature review was identified, which reported that there was some support for an association between staff relationships with children and both behavioural and cognitive child development. The findings of the review are also supported by a second review and international trials, EPPE, NICHD SECCYD, IEA Pre-primary longitudinal, cross-national study, Dutch pre-COOL study, and local Australian data strengthening the generalisability and applicability of the findings. In addition, the evidence base related to Quality Area 1 (specifically Standard 1.2 - Educators and co-ordinators are focused, active and reflective in designing and delivering the program for each child) and Quality Area 4 (specifically Educators, co-ordinators and staff members are respectful and ethical) are also relevant to Quality Area 5. Thus, overall the evidence was rated as "supported".

Other Quality Areas (2, 3, 6, and 7)

The other four Quality Areas of the NQS (QA2, QA3, QA6 and QA7) were rated as "Promising" or "Not adequately addressed in target evidence-base".

Quality Area 2 – Children's health and safety.

Quality Area 3 – Physical environment.

Quality Area 6 – Collaborative partnerships with families and communities.

Quality Area 7 – Leadership and service management.

Recalibrating the quality rating system

Today, an ECEC service can receive an overall "Exceeds" rating under Australia's National Quality Standard if it *meets* the quality standards in all seven Quality Areas (QA), and e*xceeds* the standard in at least four of the seven areas, including at least two of:

- QA1 - Educational program and practice
- QA5 - Relationships with children
- QA6 - Collaborative partnerships with families and communities
- QA7 - Leadership and service management

This means that an ECEC service can receive an overall "Exceeds" rating while not exceeding the standard in *any* of the three evidence-based areas (i.e., QA1, QA4, QA5). Furthermore, data from publicly available ACECQA ratings show that ECEC services are *least likely* to meet elements related to

Quality Area 1, which is one of the three evidence-supported domains. This suggests a significant quality gap in ECEC services nationally[1].

If the scoring system were recalibrated to give greater weight to the three Quality Areas that the evidence shows have a significant effect on child outcomes this is how it could look:
To receive an overall 'Exceeds' rating a service would need to meet the quality standards in all seven areas, and exceed the standard in all three evidence-based areas:

- QA1 – Educational program and practice
- QA4 – Staffing arrangements
- QA5 – Relationships with children

The National Quality Standards are presented in Appendix A, including a detailed set of practices associated with each Quality Area.

Quality indicator

The proportion of ECEC services rated 'exceeding' the standard in quality areas 1, 4 and 5 and at least 'meeting' the standard in all other quality areas according to the ACECQA assessment.

Participation Indicators

There were three main factors identified that related to Participation: i) starting age, ii) program duration, and iii) program intensity. The key findings for universal and targeted participation are detailed below, and an overview of the evidence ranking is presented in *Table 2* for universal provision and *Table 3* for targeted provision of ECEC. See Appendix F (universal) and Appendix G (targeted) for a detailed list of the evidence.

[1] National Quality Framework Snapshot Q4 2017, Australian Children's Education & Care Quality Authority.

Table 2: Summary of the overall evidence base; starting age, program duration, program dose (for universal provision)

STARTING AGE	COGNITIVE & LANGUAGE	ACADEMIC	SOCIAL-EMOTIONAL
0-2 years	• Supported	• Promising	• Mixed
2-3 years	• Supported	• Promising	• Mixed
3-4 years	• Promising	• Promising	• Not adequately addressed in target evidence-base
4-5 years	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base

PROGRAM DURATION	COGNITIVE & LANGUAGE	ACADEMIC	SOCIAL-EMOTIONAL
Less than 1 year	• Not adequately addressed in target evidence-base	• Supported	• Not adequately addressed in target evidence-base
1-2 years	• Promising	• Supported	• Not adequately addressed in target evidence-base
2-3 years	• Supported	• Supported	• Not supported
More than 3 years	• Supported	• Supported	• Not supported

PROGRAM DOSE	COGNITIVE & LANGUAGE	ACADEMIC	SOCIAL-EMOTIONAL
Part time	• Supported	• Supported	• Not adequately addressed in target evidence-base
Full time (> 15 hours)	• Mixed	• Not adequately addressed in target evidence-base	• Not supported

Table 3: Summary of the overall evidence base; starting age, program duration, program dose (for targeted provision)

STARTING AGE	COGNITIVE & LANGUAGE	ACADEMIC	SOCIAL-EMOTIONAL
0-2 years	• Supported	• Supported	• Supported
2-3 years	• Not adequately addressed in target evidence-base	• Supported	• Not supported
3-4 years	• Supported	• Supported	• Supported
4-5 years	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base

PROGRAM DURATION	COGNITIVE & LANGUAGE	ACADEMIC	SOCIAL-EMOTIONAL
Less than 1 year	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base
1-2 years	• Supported	• Supported	• Supported
2-3 years	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base
More than 3 years	• Supported	• Supported	• Supported

PROGRAM DOSE	COGNITIVE & LANGUAGE	ACADEMIC	SOCIAL-EMOTIONAL
Part time	• Supported	• Supported	• Supported
Full time (> 15 hours)	• Supported	• Supported	• Supported

Universal ECEC Participation

Starting Age

The evidence is not clear-cut across domains of functioning (cognition and language, academic, and social-emotional), however a starting age between 3 and 4 years provides the best balance of outcomes with no "risk or harm" documented in the studies reviewed.

Program Duration

On balance, the evidence related to duration *Supports* programs of two years. Although there was good evidence for programs between two and three years' duration for cognitive and academic achievement, there was also some evidence (local data) that suggests programs longer than two years have detrimental effects on social-emotional outcomes.

Program Dose (intensity)

Due to the potential detrimental effect of full time provision of ECEC on child outcomes, the evidence best *Supports* part-time provision for universal access.

Universal participation indicator

Proportion of all children attending ECEC for 15 hours or more per week for the two years before starting formal school.

Targeted ECEC Participation

Starting Age

Most of the population samples in the research were from the US and may differ in ways that affect the generalisability to the Australian context. For example, most of the targeted samples drew from predominantly African-America populations and from the 1960s and 1970s. On balance, the evidence suggests that children from at-risk backgrounds would likely benefit from an earlier start to ECEC compared with the general population. The evidence *Supports* a starting age of 0 to 2 years.

Program Duration

Unlike for the universal provision of ECEC, there was no evidence of an increased risk of social-emotional difficulties associated with programs of longer duration. The limitations noted above regarding generalisability and applicability to the Australian context are also relevant here, but given the quantity and relative strength of the Abecedarian findings, the evidence *Supports* programs of at least three years' duration.

Program Dose

The research regarding program dose for children from disadvantaged backgrounds *Supports* full time provision of ECEC. There are some potential issues with generalisability of the research to the Australian context (US-based research, selective samples of low IQ, African-American people).

Targeted participation indicator

Proportion of all children experiencing disadvantage who attend ECEC for 15 hours or more per week, for at least the three years before starting formal school

Quantity Indicators

The determination of the required quantity of ECEC services in a given community is a function of the size of the population, the portion of the population participating, and the effort required to provide the right standard of care. This is largely a practical consideration, and the literature reviewed did not provide any specific data related to this driver. However, two relevant measures of quantity were considered:

- Is there sufficient ECEC infrastructure? i.e., number of ECEC places per defined population (per 15 hours).
- Is there a sufficient workforce? i.e., number of ECEC workers or teachers.

Quantity indicator

The number of ECEC places for 15 hours per week available to 2-5 year olds

CONCLUSIONS

ECEC quality indicators

Restacking the Odds proposes using the evidence related to the Quality Areas to recalibrate how a service is rated for overall quality, by emphasising the three Quality Areas that have a significant effect on child outcomes.

The current Quality Rating System

A service can receive an overall "Exceeds" the National Quality Standard if:
The service meets *all* standards and receives an Exceeds National Quality Standard rating in at least four Quality Areas, including at least two of the following areas:

- QA1 - Educational program and practice
- QA5 - Relationships with children
- QA6 - Collaborative partnerships with families and communities
- QA7 - Leadership and service management

Restacking the Odds Quality Rating System

To receive an exceeding rating, a service would need to attain an *Exceeds* National Quality Standard rating in all three evidence-based Quality Areas:

- QA1 – Educational program and practice
- QA4 – Staffing arrangements
- QA5 – Relationships with children

And must at least "Meet" the National Quality Standard in the remaining four Quality Areas.

Quality indicator

The proportion of ECEC services rated 'exceeding' the standard in quality areas 1, 4 and 5 and at least 'meeting' the standard in all other quality areas according to the ACECQA assessment.

ECEC participation indicators

Two indicators were selected that encapsulated the three factors related to participation; one pertained to universal participation whilst the other related to targeted participation, as follows:

- The proportion of all children, aged 3 to 5 years in a given area, who attend ECEC for at least 15 hours per week.

- The proportion of children, aged 2 to 5 years in a given area, from disadvantaged backgrounds and/or with special needs (children residing in an area with a Socio-Economic Index for Areas [SEIFA] Index of Relative Socio-economic Disadvantage [IRSD] quintile of 1, non-English speaking background, Aboriginal and Torres Strait Islander children, children with disability) who attend ECEC for at least (more than) 15 hours per week

Universal participation indicator

Proportion of all children attending ECEC for 15 hours or more per week, for the two years before starting formal school

Targeted participation indicator

Proportion of all children experiencing disadvantage who attend ECEC for 15 hours or more per week, for at least three years before starting formal school

ECEC quantity indicators

The determination of the required quantity of ECEC services in a given community is a function of the size of the population, the portion of the population participating, and the effort required to provide the right standard of care. This is largely a practical consideration, and the literature reviewed did not provide any specific data related to this driver. There are however two measures that are related to quantity:

- Is there sufficient ECEC infrastructure? i.e., number of ECEC places per defined population (per 15 hours).
- Is there sufficient workforce? i.e., number of ECEC workers/teachers.

Quantity indicator

The number of ECEC places for 15 hours per week available to 2-5 year olds

BACKGROUND: RESTACKING THE ODDS

Too many children are born into circumstances that do not provide them with a reasonable opportunity to make a good start in life. Disadvantaged circumstances for children lead to developmental inequities in physical health, social-emotional wellbeing, and academic learning – that is, differential outcomes that are preventable. Inequities emerging in early childhood often continue into adulthood, contributing to unequal rates of low educational attainment, poor mental and physical health and low income. In some cases, this experience is part of a persistent cycle of intergenerational disadvantage. Inequities constitute a significant and ongoing social problem and – along with the substantial economic costs – have major implications for public policy.

The importance of early childhood and the impact of this period on long-term developmental outcomes has been well documented. Research has demonstrated that this period is crucial for brain development across all domains, and that both risk and protective factors encountered by the child during this time can have life-long impacts [35]. In particular, exposure to multiple risk factors predicts more severe, adverse developmental consequences compared with a singular risk factor (e.g. [36, 37]). Furthermore, research has shown that developmental interventions that isolate only one risk factor are less likely to work than those that are multi-faceted (e.g. [38-40]). The premise behind the latter approach to intervention is that resources/assets accumulate and the benefits of multiple assets accrue, leading to more positive outcomes. In line with this premise and with evidence on cumulative risk, it is the hypothesis of *Restacking the Odds* that inequities can be reduced by using existing, evidence-based interventions and approaches from service providers of the following five strategies: antenatal care; sustained nurse home visiting; early childhood education and care; parenting programs; and the first 3 years of school. These strategies are notably longitudinal (across early childhood), ecological (targeting child and parent), evidence-based, and able to be targeted (aimed at benefiting the 'bottom 25 per cent', namely the most disadvantaged). By 'stacking' these fundamental interventions (i.e., ensuring they are all applied), it is predicted that there will be a cumulative effect, amplifying the effect and resulting in sustained benefits.

In order to achieve this, the *Restacking the Odds* project seeks to use the existing evidence within the five fundamental strategies of early childhood, to develop best practice benchmark frameworks that better define indicators of quality, access (quantity), and reach (participation).

This report focuses on the strategy of *Early Childhood Education and Care*. There is a similar report for each of the five strategies.

INTRODUCTION: EARLY CHILDHOOD EDUCATION AND CARE

The early years are a time of rapid brain development, and a secure and nurturing environment provides a solid base for learning. An extensive research base indicates that the education and care of young children (birth to eight years of age) has an immense influence on long-term outcomes related to resilience, health, and wellbeing. Specifically, early childhood education and care (ECEC) programs offered during the first five years strengthen social and cognitive development [1, 2]. ECEC has been associated with positive short- and long-term outcomes in literacy, cognition, social-emotional development, and future academic success. Participation in high quality ECEC has the potential to provide all preschool children with an opportunity to develop life-long skills for learning and wellbeing [41]. Previous research (predominately US-based) has focused largely on the impact of ECEC on disadvantaged children, demonstrating benefits across a broad spectrum of outcomes [4]; however, there has been a more recent shift to optimise ECEC programs for all children (e.g. [5, 6]).

Universal access to ECEC services is therefore a way improve developmental outcomes for Australian children. There is a clear need for this in Australia, with 15 per cent of children from the lowest socio-economic quintile (around 60,000 children in total) entering school as "developmentally vulnerable", as measured by the Australian Early Development Census (AEDC) [42]. The AEDC is a teacher-report measure of the development of all children starting school and is completed every 3 years. Children are classified as "developmentally vulnerable" if they demonstrate a much lower (lowest 10%) than average ability in the developmental competencies in a domain. The five AECD domains include language and cognitive skills, communication skills and general knowledge, physical health and wellbeing, social competence and emotional maturity. While overall levels of developmental vulnerability have not shifted significantly, the gap between the poorest and wealthiest communities, and between remote/rural and metropolitan areas, has increased. This finding is significant given the evidence that many children who enter school developmentally vulnerable fail to catch up to their peers (e.g. [43, 44]). National studies show ECEC as a potential way to impact child outcomes. For example, AEDC data suggest that children who attend preschool are less likely to be developmentally vulnerable, even when considering level of relative disadvantage. Furthermore, research from the Longitudinal Study of Australian Children (LSAC) demonstrates that children who attend preschool score higher on year 3 National Assessment Program – Literacy and Numeracy (NAPLAN) tests, with a reduced probability of being rated by their carer as having poor social and emotional development [30].

The benefits of attending ECEC are related, in particular, to the quality of ECEC programs, with quality having been shown to have a significant influence on child outcomes. Rating scales assessing quality include aspects of structural quality (i.e. how the ECEC system is designed and organised, such as the number of professionally trained staff) and process quality (i.e. practices within an ECEC setting, such as relationships and interactions between staff and children). ECEC programs for children aged 3 to 5 years with an emphasis on literacy, maths, science, environment and using a diversity of cultural and theoretical approaches result in better academic and social-behavioural outcomes [7]. Staff qualifications and ratings of quality are also related. Children have been shown to make more progress in preschools where staff have higher qualifications, and objective measures of quality (e.g. the Classroom Assessment Scoring System PreK and Early Childhood Environment Rating Scale – Revised) are also related to better outcomes for children (e.g. [5, 7-9]).

Whilst the research shows that high quality ECEC services can improve child outcomes, the data shows that those children at greatest risk of poor outcomes may not be accessing these services. In 2014, 43% of all Australian children aged 0-5 years were enrolled in ECEC services, and 95% of 4-year-old children were enrolled in a preschool program in the year before school [15]. To be considered enrolled, the child must have attended the ECEC program for at least one hour during the reference period, or be absent due to illness or extended holiday leave and expected to return. The enrolment rate for 4-year-old children are on par with other OEDC nations (average 84%) [16], but some large subgroups of Australian children are substantially less likely to participate in ECEC programs. This includes children from low socio-economic backgrounds, remote communities, Indigenous backgrounds, non-English speaking backgrounds, and those with a disability or special health care needs [17, 18]. Inadequate reach of high quality ECEC programs to the most vulnerable/disadvantaged is likely to result in widening the child development intergenerational disadvantage gap further.

AIM

This restricted targeted review addresses 4 key questions:

1. Utilising an existing ECEC national quality system, which quality areas and/or standards have the most significant effect on child outcomes (i.e., cognition, language, academic, and social emotional development)?

2. What does the evidence indicate is the most effective (universal) starting age, dosage (i.e. number of hours per week), and duration (i.e. number of months/years) as it relates to improving child developmental outcomes (cognition, language, academic, and social emotional development)?

3. Given the evidence determined from question 2, in what quantity should a given community deliver ECEC?

4. Do the answers to these questions differ for targeted provision to disadvantaged populations?

DEFINITIONS

ECEC Quality

Although there is no internationally recognised definition of ECEC quality, measures used to assess quality typically include both structural and process elements. *Structural quality* refers to the way the ECEC system is designed and organised (e.g. the number of professionally trained staff, the design of the curriculum). *Process quality* relates to the practices within an ECEC setting (e.g. relationships and interactions between staff and children, day-to-day pedagogic practices of staff) [45].

ECEC Participation

Refers to the dosage (hours) and duration (years/months) of ECEC services available to the targeted population.

ECEC Quantity

Refers to the capacity of ECEC services within a defined (local) area, relative to the size of the target population.

THE AUSTRALIAN ECEC CONTEXT

Australian families are offered a diverse range of options for the education and care of their young children. ECEC services provide one or more of the following service types:

- Child care – refers to formal child care services provided to children aged 0-12 years, including:
    - Long day care,
    - Family day care,
    - Outside school hours care (OSHC), and
    - Occasional care.
- Preschool (kindergarten) – refers to services delivering a preschool program by a qualified teacher to children, mainly in the year or two before they begin full time schooling.

Whilst these are the *types* of services available, in practice, there is significant variation in the actual services provided to the public. The is because the ECEC arrangements in Australia are complex and differ between the states and territories in terms of the range of services offered, the extent of those services, and the model of service integration. Furthermore, the Australian ECEC system is managed by a range of different organisations including:

- local government-managed services,
- school-managed services,
- community-based organisations, for-profit providers, and
- not-for-profit providers with government subsidies available to families.

(Services outside the scope of this review of ECEC services include primary schools and in-home care).

The situation of multiple service types and providers is further complicated by the diverse ECEC funding arrangements (all levels of government and families contribute).

National Quality Framework

Australia has an established quality rating system with associated quality indicators, the National Quality Framework (NQF). The overarching objective of the NQF is to improve educational and developmental outcomes for children attending ECEC services, through driving quality improvement in service delivery [46].This system was implemented in 2013, however, development of the NQF began in 2007 when the Australian ECEC system underwent major reform following a change of government.

The decision to introduce a National Quality Framework came from the recognition that consistent quality standards across jurisdictions and across services was required to ensure Australia had a world-class ECEC system. Historically, there was a gap in the quality of 'child care' services and 'preschools/kindergartens' services, due to the view that childcare existed primarily to provide support to working families [47]. Furthermore, as each state and territory ran their own ECEC regulatory system, there was significant administrative and regulatory duplication of services between the Commonwealth and states and territories.

A central part of this reform was the formation of the Council of Australian Governments (COAG), a cross jurisdiction council which includes representatives from all three tiers of government (federal, state and local). COAG was commissioned to consider ways of creating a national approach to ECEC that was consistent with Australian and international research, but in practice, mainly relied upon recommendations provided by the Organisation for Economic Co-Operation and Development [48]. The OECD is an intergovernmental economic organisation with 35 member countries, which was founded in 1961. The OECD provides a foundation to identify good practices, including aspects of quality that are critical to the provision of ECEC services and contribute to positive outcomes for children.

Under COAG, the core of the Australian Government's reform agenda for ECEC focused on three key aspects of early childhood services:

1. National Quality Standards and enhanced regulatory arrangements;
2. A quality rating system, and;
3. A national early years learning framework.

[49].

These three aspects of ECEC were developed by COAG, and are described in more detail below.

National Quality Standards

In 2009, COAG produced the *National Quality Framework for Early Childhood Education and Care and School Age Care* (National Quality Framework; NQF). The NQF was designed to provide national minimum standards to drive improvements in quality across Australia, and includes the National Quality

Standards (NQS). The NQS were developed following an "extensive and targeted consultation process with and between a panel of experts" and also involved field testing [49]. Seven quality standards were developed, based upon research and/or consensus from panel experts. The standards are also consistent with quality indicators identified by the OECD (educational concept and practice, structural quality, interactions between educators and children and targeting services to meet the needs of families and local communities) [50]. The NQS sets a national benchmark in 7 quality areas (QA) for 18 standards (see Appendix A for full detail of related elements):

1. Educational program and practice (QA1);
2. Children's health and safety (QA2);
3. Physical environment (QA3);
4. Staffing arrangements (QA4);
5. Relationships with children (QA5);
6. Collaborative partnerships with families and communities, (QA6) and;
7. Leadership and service management (QA7)

[50].

Quality Rating System

The NQS is accompanied by a national assessment and rating process, reporting the quality of each service against five rating levels:

i) Significant Improvement Required,

ii) Working Towards NQS,

iii) Meeting NQS,

iv) Exceeding NQS, and

v) Excellent.

Each of the seven quality areas consist of two to three quality standards; high-level outcome statements. There are *also* two to three elements under each of the quality standards – these are specific outcome sentences that describe how the standard should be achieved (see Appendix A for detail).

The NQS includes a total of 58 elements, which are assessed as being met or not. A service is required to meet all the elements within a standard to be rated as "Meeting" that standard. A service must meet all seven standards to attain an overall rating of "Meeting" the National Quality Standards. In addition, a service can receive an "Exceeding" rating (as determined by the assessor) for each standard and can receive an overall "exceeds" the National Quality Standard *if* the service meets *all* standards and

receives an Exceeds National Quality Standard rating in at least four quality areas, including at least two of the following areas:

- Educational program and practice (QA1)
- Relationships with children (QA5)
- Collaborative partnerships with families and communities (QA6)
- Leadership and service management (QA7)

The "Excellent" rating can only be awarded by the national body, the Australian Children's Education and Care Quality Authority (ACECQA), upon application from the approved service provider.

The quality rating system was developed following a consultation process with stakeholders. ACECQA is the national body that guides and reports on the NQF (including the NQS), while regulatory authorities in each state and territory are responsible for its implementation (see Table 4).

Table 4: National Quality Rating System

Rating Level	How the overall rating is determined
Significant improvement required	• Service does not meet 1 of the 7 quality areas or a section of the legislation and there is a significant risk to the safety, health and wellbeing of children. • The regulatory authority will take immediate action.
Working towards National Quality Standard	• Services provides a safe education and care program. • There are 1 or more areas identified for improvement.
Meets National Quality Standard	• Service meets the National Quality Standard. • Service provides quality education and care in all 7 quality areas.
Exceeds National Quality Standard	• Service goes beyond the requirements of the National Quality Standard in at least 4 of the 7 quality areas, with at least two of these being quality areas 1, 5, 6, or 7.
Excellent	• Service promotes exceptional education and care, demonstrates sector leadership and is committed to continually improving. • Awarded by ACECQA. • Services rated Exceeding National Quality Standard in all quality areas may choose to apply for this rating.

Early Years Learning Framework

The NQS also supports the implementation of an early years curriculum, titled *Belonging, Being and Becoming: The Early Years Learning Framework* (EYLF). This framework guides early childhood educators in the provision of quality early childhood educational programs and practice, through curriculum and pedagogy. The EYLF was designed to bring together the multiple perspectives of the Australian community about how best to support children's learning from birth to five years and their transition to school. The EYLF considers diversity of cultural, spiritual, and theoretical approaches to ECEC across Australia, and it is intended to be a resource for educators, parents, and the broader community who have an interest in child development [51].

METHOD

The literature review utilised a targeted Restricted Evidence Assessment (REA) methodology. REA is a research methodology that uses similar methods and principles to a systematic review, but makes concessions to the breadth and depth of the process in order to be completed within a short timeframe. Rigorous methods for locating, appraising and synthesising the evidence related to a specific topic are utilised; however the methodology places a number of limitations in the search criteria and in how the evidence is assessed.

ECEC Quality, Participation and Quantity

Australia has an established quality rating system (the National Quality Standards) with associated quality indicators. So, as a matter of pragmatics the existing national system was used, with robust evidence mapped against this rating system to either endorse or adapt the current scoring methodology and system indicators related to quality. The *Restacking the Odds* methodology for the ECEC strategic area involved seven key steps, which are described in detail below. The first three steps are unique to the methodology employed to the quality driver.

1. Interview – ACECQA representative

An informal interview with Rhonda Livingstone, National Education Leader and General Manager Educational Leadership from ACECQA was conducted, in order to seek (a) her expertise about the relative importance of different aspects of quality on child outcomes, and (b) any official documentation outlining the evidence-base underpinning the NQS. Ms Livingstone was involved in the development of the ACECQA National Quality Standards (NQS). The major objective of the interview was to seek any official documentation outlining the evidence-base underpinning the NQS.

2. Mapped the European Commission Key Principles of a Quality Framework against the National Quality Standards (refer to Appendix B)

The *European Commission Key Principles of a Quality Framework* is a benchmark, which is part of the Education and Training 2020 Strategy. It addresses the challenge of (a) providing access to child care and education for all, and (b) raising the quality of ECEC provision.

The development of this framework was a process that included ECEC experts and policy-makers from across Europe, who reviewed the existing evidence from policy and practice as well as cross-national research findings. The "*Proposal for Key Principles for a Quality Framework for Early Childhood Education and Care*" outlines the attributes identified as crucial for enhancing the quality of service provision [33].

Increasing access to high quality ECEC is a major focus of the European benchmark. The European benchmark, emphasises the importance of improving access for children from disadvantaged backgrounds and for improving the quality of provision and support for ECEC teachers. In 2011, the European Commission launched a process of cooperation to address these two major challenges (access and quality). The process included the establishment (in 2012) of a Thematic Working Group as part of the Education and Training 2020 work programme.

The focus of the Thematic Working Group was to identify and review key policy actions which had led to improvements in ECEC quality and access. The Group, which was comprised of ECEC experts and policy makers from across Europe, reviewed the existing evidence from policy and practice in Member States, as well as cross-national research findings. The Group highlighted five areas where action has led to clear improvements in the quality of provision:

1. access;
2. workforce;
3. the curriculum;
4. evaluation and monitoring; and
5. governance and funding.

Within these five areas, there were ten broad actions (Quality Statements – see Appendix B), which were designed so that they could be used by Member States to improve the quality of ECEC provision and support all children, their families and the community [33].

These ten quality statements were mapped against the NQF. The purpose of this mapping exercise was to determine if there were any important areas not covered by the seven Quality Areas of the NQF.

3. CLASS PreK and ECERS-R mapped against NQS (refer to Appendix B)

The Classroom Assessment Scoring System PreK (CLASS PreK) and Early Childhood Environment Rating Scale – Revised (ECERS-R) are valid and reliable tools used to assess ECEC quality. The measurement domains from CLASS PreK and ECERS-R were mapped against the existing National Quality Standards, to determine which areas were best supported by existing measures of quality shown to relate to child outcomes. As with the mapping exercise above, these standardised measures of ECEC quality were examined, to ensure that important areas were not missed by only focusing the literature search on the seven Quality Areas of the NQF.

4. Targeted literature research

The following steps (a to d) were applied across the 3 key drivers (quality, participation, and quantity).

(a) Systematic reviews and meta-analyses

Search Strategy

A targeted search of the academic literature was conducted, and sought to identify systematic reviews, meta-analyses, randomised controlled trials, and other relevant primary research by searching standard academic and clinical databases. This process was directed by information from major national and international studies, and included grey literature where necessary.

The following databases were used to identify relevant primary literature related to this topic: Ovid MEDLINE, SCOPUS, ERIC, PsychINFO, Cochrane library, and PubMed.

The quality of the systematic reviews and/or meta-analyses was assessed using the PRISMA checklist [52] (see Appendix C).

Search Terms

The search terms were kept broad at this first step, in order to cover relevant papers across the three key drivers (quality, quantity, participation). The Title/s, Abstract/s, MeSH terms, and Keywords lists were:

- *early childhood education, preschool, kindergarten.*
- *systematic review, meta-analysis, review.*

Paper Selection

Systematic reviews or meta-analyses were included if they were evaluating any aspect of ECEC related to any of the three key drivers (quality, quantity, participation).

(b) Targeted search strategy

For each of the drivers, there was a focus on the key studies identified either by experts or within the systematic reviews/meta-analyses. The studies included did not undergo a quality and bias check.

Search Terms: Quality

The NQS provided the context from which a targeted search strategy was developed, to determine which factors within the seven quality standards have the greatest impact on child outcomes.

The following studies were identified as key projects with data related to quality:

- *The National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (NICHD SECCYD) studies*
- *The Effective Provision of Pre-School Education (EPPE) study*
- *The International Association for Evaluation of Educational Achievement (IEA) Pre-Primary Project*

Search Terms: Participation

A targeted search of government reports and reviews - particularly those reporting on large scale randomised controlled trials (RCTs) and/or nation-wide projects with longitudinal data – was conducted. This process was directed by information from major national and international studies and included grey literature where necessary. The following studies were identified as key projects reporting on participation-related parameters:

- *The National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (NICHD SECCYD) studies*
- *The Effective Provision of Pre-School Education (EPPE) study*
- *Longitudinal Study of Australian Children*

- *Abecedarian project*
- *Early Head Start*
- *Perry Preschool Project*
- *Milwaukee Project*
- *Project Care*

Search Terms: Quantity

The following search terms specific to the research questions were included in searching the Title/s, Abstract/s, MeSH terms, and Keywords lists:

- *early childhood education, preschool, kindergarten*
- *availability, access, quantity, transport, distance travelled, neighbourhood/s, community/ies*

Paper Selection

Key papers examining aspects of quality, quantity, or participation were included in this restricted review.

(c) Ranking the Evidence

Individual studies were assessed for effectiveness across the three domains of functioning (cognitive/language, academic, and social-emotional) based on the following criteria:

- *Supported*: clear evidence of benefit, with sustained benefits of at least 1 year and without evidence of harm or risk to participants. Populations examined are similar to, and results are clinically sensible to apply to, the Australian context.
- *Promising*: evidence suggestive of benefit of at least 6 months and without evidence of harm or risk to participants. Populations examined may be somewhat different to the Australian population, affecting generalisability and applicability to the Australian context. Meta-analyses and systematic reviews of moderate quality will be ranked as promising due to increased risk of bias.
- *Not supported*: There is evidence of harm or risk to participants.
- *Null*: no difference found between comparison groups.

Once each study was evaluated for effectiveness, an overall ranking of the evidence was determined using the following classifications (adapted from [19]). See Appendix D for full details.

- *Supported*. Clear, consistent evidence of benefit.
- *Promising*. Evidence suggestive of benefit but more evidence needed.
- *Mixed*. Data is mixed and could show evidence of harm or risk.

- *Not adequately addressed*. Insufficient evidence in the target research-base.
- *Not supported*. There is evidence of harm or risk to participants.

5. Development of Draft Indicators

Indicators were developed, based on those which were determined by the evidence to be the best indicators of quality, participation, and quantity.

6. Expert Evaluation of Draft Indicators

The distilled list of indicators was vetted by an Australian and two international ECEC experts:

- *Professor Iram Siraj* PhD, OBE. Professor of Child Development and Education University of Oxford.
- *Professor Edward Melhuish* CSci, CPsychol, FBPsS, FAcSS, OBE. Professor of Human Development, Birkbeck, University of London and Professor of Human Development, and Academic Research Leader, University of Oxford.

These experts were asked to independently comment on the developed list of ECEC quality, quantity, and participation indicators.

RESULTS

ECEC Quality

1. Interview with the ACECQA representative: NQS development

The interview with Rhonda Livingstone, National Education Leader, General Manager Educational Leadership from ACECQA provided the context to the development of the NQS.

Overall, the development of the NQS (detailed below) involved drawing upon:

- The standards that were previously included in the National Childhood Accreditation Council (NCAC),
- National and international research and practice, and
- Quality indicators of the Classroom Assessment Scoring System (CLASS).

The development of the NQS drew upon standards that were previously included in the NCAC, and also utilised the quality indicators of the Classroom Assessment Scoring System PreK (CLASS PreK); [53] and the Early Childhood Environment Rating Scale – Revised (ECERS-R) [54]. Based on Ms Livingstone's account, the experts had initially tried to "*cherry pick the best and throw it into a big melting pot*" – however they then realised that there was a need to consider outcomes for children and look at the research evidence that supported better developmental outcomes. Consequently, the experts then looked more broadly at the research and practices regarding quality outcomes for children which was occurring in the UK, New Zealand, and the US. In addition, the experts considered the context of learning from experience in regulating for minimum quality (NCAC Quality Assurance). The Australian context was also considered, in terms of culture and the guiding principles that underpin the whole regulatory standards. This included the recognition and value of Aboriginal and Torres Strait Islander (ATSI) culture as well as the role of parents as child's first educator (which are embedded in the guiding principles of the NQF. The development of the NQS also drew upon quality indicators used in the Classroom Assessment Scoring System (CLASS), particularly with regard to what is considered to be 'exceeding practice' (there are several versions of CLASS that target different ages groups). The Australian Council for Education Research was also consulted with regard to the description of 'exceeding' for the NQS rating system.

As a result of these processes, quality areas were developed based on evidence linking these domains with positive child outcomes, as follows:

- Quality Area 1- Educational program and practice,
- Quality Area 4 - Staffing arrangements, and
- Quality Area 5 - Relationships with children.

Four other quality areas and standards were also developed, based largely on legislation/regulation requirement

- Quality Area 2 - Children's health and safety,
- Quality Area 3 - Physical environment,
- Quality Area 6 - Collaborative partnerships with families and communities, and
- Quality Area 7 - Leadership and service management.

2. NQS Mapping: the European Commission Key Principles of a Quality Framework

The ten Quality Statements from the European Commission Key Principles of a Quality Framework were mapped against Australia's NQS. There were several points of overlap between these two documents (see Appendix B for details). Specifically, the following quality areas and standards were addressed in both frameworks: Quality Area 1 (standard 1 & 2); Quality Area 4 (Standard 4.1); Quality Area 5 (Standard 5.1); Quality Area 6 (standard 6.1 & 6.2); Quality Area 7 (Standard 7.1). The two domains not covered by the European Commission Key Principles of a Quality Framework were Quality Area 2 (Children's health and safety) and Quality Area 3 (Physical environment).

This initial scoping work provided confidence that any important areas were not being missed when using the seven Quality Areas from the National Quality Framework to direct the targeted literature search.

3. NQS mapping against objective measures of quality: ECERS-R AND CLASS

Similar to the mapping exercise above, valid and reliable measures of ECEC quality (ECERS-R and CLASS) were compared with the NQS (see Appendix B), to ensure that important areas were not missed [53, 54].

The CLASS incorporates items to measure both structural and process aspects of ECEC quality. Areas demonstrating the most substantial overlap were *Quality Areas 1 and 5. Quality Area 1* (Educational programs and practice) included items such as productivity, concept development, language modelling, literacy focus, and teacher sensitivity, and *Quality Area 5* (Relationships with children) included the following domains; positive climate, negative climate, and regard for student perspectives. *Quality Area 4* overlapped with the entire emotional support domain; and included elements such as positive climate, negative climate, teacher sensitivity, regard for child perspectives, and behaviour guidance. *Quality Area 3* overlapped with just one item; instructional learning formats.

ECERS-E also measures structural and process aspects of quality ECEC, and showed a higher number of overlapping themes with the NQS compared with the CLASS, including *Quality Areas 1, 4, and 5* noted above. In addition, the ECERS- E also includes at least two items in the other four NQS areas (details are provided in Appendix B).

In summary, the overlapping themes identified, with quality measures and the European Commission Key Principles compared with the NQS, highlight the relative importance of Quality Areas 1, 4, and 5. As mentioned above, this initial scoping work provided confidence that no important areas were being missed, when using the seven Quality Areas from the National Quality Framework to direct the targeted literature search.

4. Targeted literature research

A targeted search of the academic literature sought to identify systematic reviews, meta-analyses, randomised controlled trials, and other relevant primary research, by searching standard academic and clinical databases. Few relevant systematic reviews and meta-analyses of acceptable quality were identified, and those that were found are described in relation to the appropriate *Quality Area (QA 1-7 listed below)*.

Three major national and international trials were identified as providing evidence relevant to a number of the quality areas of interest in this report. These studies are described in brief below. These studies are only referred to thereafter where they are relevant and applicable to the Australian context.

1. The Effective Provision of Pre-School Education (EPPE) study was the first major longitudinal, mixed-methods study to investigate the effects of ECEC provision on children's cognitive, social, and behavioural development. This study used a national sample of over 3,000 UK children between the ages of 3 and 11 years, who were recruited between 1997 and 1999 [7]. The EPPE project covered a range of different types of ECEC provision, and included a comparison group of children who had minimal or no ECEC experience. Data was collected on child and family background characteristics; child cognitive, social and emotional developmental measures; and preschool characteristics. Preschool characteristics included 'structural' features (such as child/staff ratios, staff training, policies, curriculum, and parental involvement) and 'process' features (such as interactions between children and between staff and children, and the structuring of activities). The EPPE study used the following measures of ECEC quality and child outcomes:

    - ECERS-R: a revised version of the Early Childhood Environment Rating Scale which covers space and furnishings, personal care routines, language reasoning, activities, interaction, programme structure, and parents and staffing [55].
    - ECERS-E: an extension of the ECERS focused on the English curriculum, which covers literacy, mathematics, science and environment, and 'diversity' [7].
    - CIS: Caregiver Interaction Scale, which assesses positive relationships, permissiveness, detachment, and punitiveness of staff [56].

    The EPPE study also conducted in-depth case studies of 12 ECEC centres rated as 'good' or 'excellent' in terms of effectiveness (producing better than expected outcomes based on child and

home characteristics). The case studies were conducted retrospectively using document analysis, interviews and observation; in order to give further detail about good practice.

2. The National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (NICHD SECCYD) was a longitudinal study of the development of a demographically and ethnically diverse sample of over 1000 children in the USA. Children were recruited at 1 month of age in 1991, and followed through to adolescence [23]. Quality of ECEC was measured using (a) the Observational Record of Caregiving Environment (ORCE), which involves observing and recording child behaviour, activities, and interactions with adults and other children [24], and (b) the Child-care HOME (CC-HOME) a global rating of quality which is focused on the quality of the caregiving environment more broadly, including ratings for responsivity, modelling and acceptance [4]; and measures of structural features including staff-child ratio, group size and staff education level [23]. The researchers also measured child development and family characteristics, including the quality of maternal care.

3. The International Association for Evaluation of Educational Achievement (IEA) Pre-Primary Project was a longitudinal, cross-national study of ECEC. The project examined the association between the structural and process characteristics of ECEC settings of children who attended ECEC at age 4 years and their cognitive and language performance at age 7 years. The sample of 1,897 children came from 10 countries (developed and developing), and while Australia was not included, findings which were consistent across these 10 countries can reasonably be generalised to the Australian setting (i.e., similar demographics, healthcare systems). Observations of ECEC centre quality were made using instruments specifically developed for this study through collaboration between researchers across countries; and these instruments covered child behaviour, adult behaviour, structural features, family characteristics, and child development [25].

Where appropriate, studies that were based in Australia were included, in order to assist with the interpretation of the evidence and the extent to which is the information is generalisable and applicable to the population of interest (i.e. Australian children).

Data was also extracted from the European Commission *Key Principles of a Quality Framework for Early Childhood Education and Care* (described above), which used the research literature to determine the key priority areas [33].

The results below consider the research as related to each quality area (QA1-7). This is not an exhaustive summary of the evidence related to the *National Quality Standards*. Rather, it is a summary of a targeted search, focused on well-known high quality longitudinal studies, systematic reviews and meta-analyses, and evidence identified by experts in the European Commission *Key Principles of a Quality Framework for Early Childhood Education and Care*. See Appendix E for a list of the evidence-base related to each of the quality areas.

Table 5 provides a summary of the overall evidence base.

Table 5: Summary of the overall evidence base

UNIVERSAL		
QUALITY AREA	**COGNITIVE & ACADEMIC**	**SOCIAL-EMOTIONAL**
TEACHING-RELATED FACTORS		
Educational program and practice	• Supported	• Supported
Staffing arrangements	• Supported	• Supported
Relationships with children	• Supported	• Supported
ENVIRONMENT-RELATED FACTORS		
Children's health and safety	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence base
Physical environment	• Promising	• Not adequately addressed in target evidence base
Collaborative partnerships with families and communities	• Promising	• Promising
Leadership and service management	• Promising	• Not adequately addressed in target evidence base

Quality Area 1: Educational program and practice

Standard 1.1 - An approved learning framework informs the development of a curriculum that enhances each child's learning and development

There are two major factors contained within *Standard 1.1*. Firstly, it stipulates that ECEC programs should have a structured, explicit curriculum that is embedded within practice. Secondly, it specifies via the Quality Elements that child learning and development outcomes emphasised by the curriculum should include "identity, connection with community, wellbeing, confidence as learners and effectiveness as communicators" (see Appendix A for a full list of Quality Standards and associated Elements). An approach targeting these quality elements is referred to in this report as 'holistic' but there are a number of synonymous terms used in the literature such as 'cognitive developmental', 'balanced', 'global', 'comprehensive' and 'constructivist'. Holistic curricula aim to foster academic progress alongside other aspects of child development, and balance structure with flexibility. This is in contrast to programs which focus more exclusively on school readiness in terms of numeracy and literacy, referred to henceforth as 'academic' curricula [33]. This project sought to determine the strength of evidence underlying both of these aspects of *Standard 1.1*:

1) An explicit curriculum embedded in practice, and

2) A holistic approach to the curriculum.

Below is the research gathered which relates to this area of the Standard.

A systematic review, synthesising 38 randomised-controlled trials and matched-control studies on the effects of 27 specific ECEC programs in the US, investigated the effect of these programs on cognitive outcomes of children aged 3-5 [20]. ECEC programs were categorised as either 'academic' or 'cognitive-developmental' (holistic). Analyses revealed that compared with control conditions (e.g., standard practice or an alternative program(s)), programs in both the 'academic' and 'cognitive-developmental' categories were associated with greater child developmental progress in the areas targeted by the particular program (whether it be language, literacy, phonological awareness, mathematics or cognition). Notably, the average effect sizes were small. Holistic programs were found to have better

long-term effects on social adjustment (such as reduced delinquency, teenage pregnancy, and welfare dependency and increased educational and employment levels), based on a small subset of studies which continued to adolescence or adulthood. This review was of moderate quality, with detail lacking in the description of the search strategy and the results of individual studies. No risk of bias assessment across the studies was presented. In addition, comparison conditions of the included studies were highly variable and not always described in sufficient detail. The authors also noted that in most of the studies, teachers received a higher degree of support in implementing the curriculum than would be typical when a new program is implemented at scale. This suggests that the broad implementation of such programs outside of the context of a study may not produce effects of the same magnitude.

A more recent systematic review by the same lead authors drew upon 32 randomised-controlled trials and matched control studies, to examine the effects of 22 ECEC programs on the cognitive development of children aged 3-5 years [21]. In contrast to the previous review, programs were either categorised as 'comprehensive approaches' with a balance of skill-focused and child-initiated activities (holistic), or 'developmental-constructivist approaches' which include little direct teaching of literacy skills and focus upon child-initiated activities [21]. Control conditions varied across studies, either representing standard practice or an alternative program to the 'intervention' program. Notably, the control group programs all used developmental-constructivist models. The review reported significant evidence of positive language and literacy outcomes at the completion of preschool and kindergarten follow-up for comprehensive ECEC programs which balanced skill-focused and child-initiated activities. The review also found that developmental-constructionist programs had a smaller effect, which was not statistically significant.

This review was generally of high quality, with the exceptions that some detail was lacking in the description of the search strategy, and that there was no risk of bias assessment across the studies presented. This review provided evidence that structured holistic curricula which balance direction from ECEC staff and children are associated with greater gains in child cognitive developmental outcomes, as compared with ECEC settings lacking in structured curricular guidance. It should be noted that neither of the systematic reviews described above investigated short-term social and emotional outcomes, due to a lack of objective measures in the included studies.

A third systematic review was identified that aimed to assess aspects of ECEC quality amongst low-income and ethnic minority populations in the Unites States. However, the available data was insufficient to draw any meaningful conclusions about the relative importance of different aspects of quality which were being studied [57].

One longitudinal trial had information related to *Standard 1.1,* the EPPE study. Neither the NICHD SECCYD nor the IEA specifically addressed questions related to the presence or nature of curricula. In the EPPE study, researchers devised the ECERS-E assessment of process quality, which consisted of the subscales: Literacy, Mathematics, Science and Environment, and Diversity [7]. There was a significant positive correlation between scores on the ECERS-E (representing the quality of curriculum delivery) and child cognitive development, in terms of pre-reading, non-verbal reasoning and early number concepts [7]. Case studies of 'good' and 'excellent' ECEC centres revealed that curriculum leadership from managers, and curriculum knowledge amongst ECEC workers, were key attributes related to

effectiveness in producing better child outcomes than expected - based on child and home characteristics. It was also observed that teachers in effective ECEC settings provided traditional "teaching" in addition to providing play environments and routines conducive to learning, with a balance between staff-initiated and child-initiated activities [5, 7]. This last finding provides support for holistic approaches to curriculum development.

The European Commission *Proposal for key principles of a Quality Framework* also considered curricula. In the summary of the evidence regarding ECEC curricula, the authors of this paper stated that curricula were powerful tools to improve the effectiveness of ECEC [33]. Based on research, including work from the field of developmental psychology [58], the conclusion was reached that holistic approaches are understood to be more appropriate than those that only emphasise subject-specific, sequential academic learning. The authors caution that in order to have this positive effect, curricula must be aligned with principles of good practice, including:

- Explicit yet broad learning goals as opposed to age-specific standards, due to variability in child development,
- An emphasis on reflective practice,
- A balance in focus between learning and wellbeing, and
- Curricular guidance on how staff may provide a diverse range of play and learning environments for children.

Standard 1.2 - Educators and co-ordinators are focused, active and reflective in designing and delivering the program for each child

A meta-analysis of 123 studies, which included US studies between 1960 and 2010, reported that 'individualised instruction' (a focus on each child's individual progress and needs) had a positive effect on cognitive development [22]. The reputed reason behind this was that when teachers had the opportunity to match content to children's particular needs, children were better able to learn new concepts [22]. However, there is potential flaw in this interpretation. The category termed 'individualised instruction' is a combined category, constructed by the researchers based upon a number of factors assumed to be conducive to 'a focus on each child's individual progress and needs'. These factors were: the program had a formal curriculum; class size of fewer than 10 children; 5 or less children per staff member; or the program used primarily small group or individual instruction. Thus, the finding relates to the umbrella term 'individualised instruction', rather than reflecting a specific association between child outcomes and the pedagogical behaviour of ECEC staff. This meta-analysis was rated as moderate-to-low quality and a number of risks of bias were identified. Issues included a lack of information on individual studies, high rates of missing data in included studies, the inclusion of low quality studies, and the inclusion of studies which were many decades old. As such, this meta-analysis only provides weak, indirect evidence for *Standard 1.2*. This finding could be interpreted as supporting the importance of a formal curriculum, small class sizes and generous staff-child ratios; however due to the non-specific and weak nature of this finding, it is not discussed in relation to *Standard 1.1* or *Quality Area 4*.

The EPPE study findings provided support for a positive link between *Standard 1.2* and child developmental outcomes. As mentioned previously, one subscale of the ECERS-E used to assess quality in the EPPE study was 'diversity'. This subscale includes items related to curriculum differentiation, individual record keeping, observation and ability grouping, and as such is highly relevant to *Standard 1.2*. ECEC centres scores on this subscale were significantly correlated with child progress in pre-reading, non-verbal reasoning and early number concepts [7]. Findings from the case studies further support the importance of delivering the teaching program in a way that thoughtfully considers the individual needs of each child. Observations of teachers suggested that in effective centres, the following practices were common: formative assessment (although detailed feedback was rarely provided to children during tasks); record keeping of child progress shared with parents regularly; selection of activities to appropriately challenge the child; curriculum differentiation; open-ended questioning; and the practice of 'sustained shared thinking' (in which an adult and a child work together intellectually to address an issue or extend a train of thought)[5, 7, 59]. Importantly, it was also observed that the most effective staff demonstrated comprehensive understanding of the curriculum, in a way that allowed them to apply the most relevant aspects of the curriculum to the children in any given context [7].

An analysis from the NICHD SECCYD investigated the associations between child outcomes and several measures of ECEC quality, including 'language stimulation'. This variable encompassed a number of caregiver behaviours including directing questions or other talk to a child, reading aloud to a child, responding to a child's vocalisations, and teaching a child an academic skill. This variable is therefore linked to the kind of individual attention assessed by *Standard 1.2*. In the study, language stimulation was found to be positively associated with children's performance on 5 out of 6 measures of cognition and language skills, at ages 15, 24, and 36 months. There was no association with any measures of social-emotional development [60].

The IEA Pre-Primary project provided further support for a positive link between *Standard 1.2* and child developmental outcomes. This project found that children's language scores at age 7 tended to be higher amongst those who had attended ECEC centres where they were allowed to freely choose activities, and where less time was spent on whole group activities [25]. The authors proposed several factors which may explain this benefit. Firstly, when children propose an activity, it is more likely to interest them than an activity that a teacher might propose, especially to a whole group. Teachers are then able to introduce vocabulary which is interesting to the child, facilitating learning. Secondly, a child is more likely to be able to select an activity that is of an appropriate level of difficulty. Thirdly, free choice activities often require children to interact verbally with one another, developing their linguistic and social skills [25].

The importance of focused, reflective practice was also supported in the European Commission report. The report underlined the importance of building flexibility into the curriculum, so that ECEC staff could work with children's interests and allow the child to be the protagonist of their own learning [33]. Based on the reviewed evidence, the report recommended that effective ECEC staff are able to link children's interests and questions with appropriate aspects of the curriculum. This was considered essential to the development of shared meaning and understanding, with such flexibility being crucial so that curriculum adherence did not become rigid or narrow. Furthermore, research reviewed in the report

indicated that the ability to work collegially, pedagogical experimentation, regular planning, practice-based research, and professional development were effective elements of reflective practice and continuous improvement. Many of these practices are consistent with those observed in the EPPE case studies of effective ECEC settings. More on the linkages between professionalism and quality of pedagogical practices will be discussed in relation to *Quality Area 4 – Staffing Arrangements*.

Cultural diversity was another key reason identified in the in the European Commission report for the importance of tailoring curriculum delivery to each child [33]. Mono-cultural approaches to ECEC are identified as barriers to participation in ECEC for minority ethnic groups, with implications for child development and for families and societies as a whole [33]. This assertion is largely based on findings from The Roma Early Childhood Inclusion (RECI) Overview Report (a qualitative research project across 4 countries in Eastern and Central Europe focusing on children from a disadvantaged ethnic community) and other policy-related reports. The European Commission report proposed that along with structural and system-level steps to diminish barriers to marginalised groups, flexible and culturally sensitive curriculum delivery was crucial to ensuring that children of all social and cultural backgrounds receive effective education. It also highlighted the importance of partnerships with parents, which will be discussed in detail in relation to *Quality Area 6 – Relationships with families*.

In summary, there were two systematic reviews and one meta-analysis that examined the relationship between positive child developmental outcomes and the presence and implementation of an explicit, structured curriculum. One of these was of high quality, and reported that comprehensive early childhood programs that have a balance of skill-focused and child-initiated activities had significant evidence of positive literacy and language outcomes at the end of preschool and on follow-up measures at kindergarten. Although the included studies were all US programs and focused on high poverty communities, the review was rated as Supported since the included studies were all of high quality and the results are generally applicable and generalisable to the Australian context [21]. Although the remaining systematic review and meta-analysis also provide evidence that educational program and practice is related to positive child outcomes (cognitive/academic and social emotional), these were of low-to-moderate quality, thus were rated as Promising.

There were three longitudinal international trials (EPPE, NICHD SECCYD, and IEA Pre-primary longitudinal, cross-national study) that provided Support for Quality Area 1 in terms of cognitive/academic functioning. However, only the EPPE study found a positive relationship between structured curricula and social-emotional outcomes.

Overall, the evidence Supports Quality Area 1. See Appendix E for a list of the evidence-base related to this quality area.

Quality Area 2: Child's health and safety

Standard 2.1 - Each child's health is promoted

Standard 2.2 – Healthy eating and physical activity are embedded in the program for children

Standard 2.3 – Each child is protected

Child health and safety is an important right and is a legal requirement under the Education and Care Services National Law and the Education and Care Services National Regulations. ECEC centres have a duty of care to ensure that some standards are met (e.g. *Standard 2.3 – Each child is protected*).

There is very little evidence in the literature of an association between any of the components of *Quality Area 2* and positive cognitive, academic, or social-emotional development of children attending ECEC. The EPPE study included an assessment of 'personal care routines' in ECEC centres, which is one of the ECERS subscales. Analysis using complex value-added models revealed no association between personal care routine scores and any measures of child development at age 7 [61]. The NICHD SECCYD study investigated the relationship between hygiene and child cognitive, social, and health outcomes and found no evidence of an association. However, it may be that ECEC centres in the sample consistently reached adequate levels of hygiene due to state and local standards. While it is possible that failing to meet such standards may be problematic, this data suggests that once thresholds are met, hygiene practices are unlikely to be an area easily manipulated to improve child outcomes [23]. The IEA Pre-Primary Project did not include any measures of the features of health and safety covered by *Quality Area 2*.

The absence of research data does not mean that the aims of promoting child safety, health eating, and exercise are unimportant, or that efforts to ensure these standards are met should be in any way diminished. Rather, the purpose of this review is to highlight quality areas most related to developmental outcomes - as these areas hold the most potential to improve child outcomes.

> Given the paucity of research in this area and the findings from the EPPE and NICHD SECCYD study that show no association between specific aspects of "health safety" and child outcomes, Quality Area 2 was rated as Not adequately addressed in the target evidence-base.

Quality Area 3: Physical environment

Standard 3.1 - The design and location of the premises is appropriate for the operation of a service

Standard 3.2 - The environment is inclusive, promotes competence, independent exploration and learning through play

Standard 3.3 - The service takes an active role in caring for its environment and contributes to a sustainable future

A systematic review of 18 experimental and quasi-experimental studies was conducted, to investigate the evidence regarding writing interventions which target preschool literacy skills. This review

suggested that the provision of additional literacy-related materials led to increases in length and complexity of literacy-related play [62]. Overall, the systematic review was rated as being of moderate risk of bias due to missing information on methodology, inadequate detail regarding individual studies and a lack of assessment of risk of bias (within or across studies). However, one study in the review was of particular relevance to *Quality Area 3*; the study considering the impact of literacy-related materials in the physical environment. The finding concerning literacy-related materials was based on only one experimental study, with a sample size of 91 children aged 3 – 5 years. The study compared the play behaviour of children a control group (who had access to typical play objects, books and paper) to those in an intervention group (who were provided with many additional literacy-related objects such as cookbooks, play money, grocery packages and maps) [63]. The study found that children in the intervention group showed significant differences in the frequency, duration and complexity of literacy exhibitions in play. The children from the intervention group also included literacy objects in more varied and practical ways in their play and showed with more explicit language use, as compared with the non-intervention group. No other systematic reviews or meta-analyses addressing an association between any of the topics related to *Quality Area 3* and child developmental outcomes were identified, indicating a lack of research in this area.

The EPPE study included an assessment of 'space and furnishings' in ECEC centres, which is one of the ECERS subscales. Analysis using complex value-added models revealed no association between space and furnishing scores and any measures of child development at age 7 [61]. The space and furnishings quality score was correlated with high positive relationship scores and low detachment scores between the child and ECEC educator, as measured using the Caregiver Interaction Scale. However, this association between the physical environment and some aspects of process quality is a correlation only and does not provide evidence of a causal link. Observations from the EPPE case studies were that "good" and "excellent" ECEC centres had a welcoming appearance, acceptable or good resources and space, and displayed children's work in the setting. However, there was great variation in the quality of outdoor play environments, suggesting that a high quality outdoor environment is not necessarily required in order to produce good child developmental outcomes [7].

The NICHD SECCYD study found evidence that the physical environment can positively affect memory and language development: young children with access to more stimulating, varied and well organised materials (including materials to stimulate maths, movement, music, language, art, and play) received higher scores on tests of language comprehension and short-term memory at age 4.5 years [60]. The authors claimed that this finding was particularly rigorous, since the children themselves were unlikely to influence the physical environment at all (in contrast to, as an example, conversations with staff, which some children may pursue more than others). However, this study had some limitations including high rates of attrition, affecting generalisability. There is a need, therefore, for the replication of these findings, particularly in the Australian context.

The IEA Pre-Primary Project reported that children's cognitive performance at age 7 was associated with the availability of a wide variety of equipment and materials in ECEC settings [25]. Results showed that every standard deviation increase in the variety of materials (based on a list of 112 types of materials) resulted in a 0.09 point increase in children's age-7 cognitive scores.

An Australian study of 48 children aged 17-31 months attending long-day childcare, reported that unsatisfactory play materials (materials not appropriate to the child's stage of development) had a negative effect on the complexity of pretend play, which may have implications for cognitive development. This study has been included here, since the Australian sample speaks to the applicability of the findings to the Australian context. However, this was an observational study with no comparison group, and the sample size was small [64].

Quality Areas 2 and *3, (Child's health and safety* and *Physical environment* respectively), are interrelated, with the physical environment impacting upon the ability of ECEC staff to ensure and promote child health and safety. For example, it has been claimed in some literature reviews of ECEC quality that it is important for environments to be designed in order to the reduce risk of disease, and to be calm and quiet enough to allow uninterrupted sleep [65, 66]. However, robust evidence linking these factors to child developmental outcomes is lacking.

In summary, there is some evidence that the physical environment of ECEC settings is associated with child developmental outcomes. The physical environment is an aspect of the structural quality of ECEC settings, and it may be that rather than directly impacting developmental outcomes, it moderates the effect of other factors - such as teaching practices - on child outcomes [8]. Yet such models remain largely speculative based on the currently available evidence. In any case, ECEC centres must meet many of the standards under Quality Area 3 for reasons of safety, law, or accreditation.
Although one relevant systematic review was identified (moderate quality, moderate risk of bias), it only included one experimental study that reported on a specific aspect of Quality Area 3 (i.e. additional literacy-related materials). Several other studies suggested an association between the physical environment and specific aspects of process quality, but each had limitations affecting their generalisability (i.e. small sample size, high attrition), and the topics covered did not provide sufficient information to adequately critique the entirety of this Quality Area. Therefore, the overall rating of the evidence was Promising for cognitive/academic outcomes and not adequately addressed in the target evidence-based for social-emotional outcomes.

Quality Area 4—Staffing arrangements

Standard 4.1 - Staffing arrangements enhance children's learning and development and ensure their safety and wellbeing

There is strong evidence that cognitive, social and emotional child outcomes are affected by various aspects of staffing arrangements in ECEC settings, including staff-child ratios, group size, staff experience and qualifications.

It is important to note that whereas many of the quality elements discussed under Quality Area 1 – Educational Program and Practice are 'process features' of quality (i.e. pedagogy), most aspects of

staffing arrangements are best understood as 'structural features' of quality. As previously mentioned, rating scales assessing quality include aspects of structural quality (e.g., the design and organisation of the ECEC system, including the number of professionally trained staff) and process quality (e.g., the practices within an ECEC setting, such as relationships and interactions between staff and children). It has been hypothesised that structural quality affects child outcomes indirectly by influencing process quality, which in turn effects child developmental outcomes [8, 9]. Therefore, rather than investigating only direct effects of staffing arrangements on child development, this evaluation of the evidence also focused on the effect staffing arrangements have on process quality features - which are understood to directly impact on child outcomes.

Staff training & qualifications

A systematic review and meta-analysis examined the relationship between the level and type of education of the lead teacher and the quality of ECEC, as measured by the Early Childhood Environment Rating Scale (ECERS) and the Infant Toddler Environment Rating Scale (ITERS) [27]. The review – published by the Campbell Collaboration in 2017 - included 48 comparative and correlational studies with 82 independent samples published between 1980 and 2014. Overall, there was a positive correlation between teacher qualifications and overall quality scores of the Environment Rating Scales (r=0.198, confidence limits 0.133, 0.263). Statistically significant positive correlations were also found between lead teacher qualifications and the following subscales of the ECERS and ITERS: program structure; activities; language and reasoning; parent and staff; interactions. Notably, the "interactions" subscale in ECERS and ITERS covered supervision of general and gross motor activities, discipline and child-staff and staff-staff interactions. The review was rated overall as of high quality and low risk of bias, although because the included studies are correlational rather than experimental, there is no direct evidence of causation. Nonetheless, this review provides strong evidence that the qualifications of the lead teacher in ECEC settings is related to the quality of ECEC.

A systematic review and meta-analysis of experimental and quasi-experimental studies that were published between 1980 – 2005, showed a significant positive association between professional development training of ECEC staff and staff competency (*d*=0.45, S.E.=0.10) [29]. A subset of studies which included child developmental data was analysed, to investigate the effect of staff training levels on child behavioural outcomes. However, the association found was not significant (*d*=0.55, S.E.=0.30). There were only 4 studies in this subset, therefore it is possible that the sample size was too small to detect an association. Importantly, the meta-analysis found that not all of the training interventions delivered to staff were equally effective. Training programs which lacked a fixed curriculum tended to be less effective, as did those which were delivered to large groups of staff. This systematic review was rated as being of moderate quality and a number of risks of bias were identified. Firstly, the results of individual studies are not presented, nor was the full electronic search strategy. Secondly, some of the studies included in the systematic review presented a high risk of bias. For example, three studies employed a pre-post test design and had attrition rates of 35%, 41% and 50%; thus the sample exposed to the intervention condition was likely to be systematically different from the control sample (although it is difficult to predict the degree or direction of resulting bias). Thirdly, no risk of bias assessment across studies was reported. Despite these limitations, this systematic review and meta-analysis provides some support for an association between staff training and staff competency. Below, the evidence from large prospective cohort studies is discussed, which support the findings from this meta-

analysis and address a wider range of forms of training and qualifications (including generalist education and initial formal qualifications).

The EPPE study identified a positive relationship between manager qualification level and ECEC centre quality, as measured using the ECERS-R tool [7]. Case studies of successful centres revealed that staff with high qualifications (Level 5 e.g. Bachelor of Education or Post Graduate Certificate of Education) were found to (a) provide more instruction, compared with staff without qualifications or with lower level qualifications (such as the National Vocational Qualification or the National Nursing Examination Board qualification), and (b) often provided pedagogical role modelling to less qualified staff. More highly qualified staff also engaged more frequently in the practice of 'sustained shared thinking' and exhibited more effective interactions with children. Evidence regarding the quality of interactions between staff and children will be outlined under *Quality Area 5 – Relationships with children*.

Multilevel analyses in the EPPE study found a significant positive correlation between the percentage of staff-hours with Level 5 qualifications and child progress in pre-reading, social/behavioural measures such as increased co-operation and conformity, and reduced antisocial/worried behaviour [7]. The authors noted that there are complex inter-relationships between qualifications, staff-child ratios, and overall measures of quality, and that that this link between staff qualifications and child outcomes may operate indirectly through one or more of these factors. Research on the characteristics of leaders and managers of ECEC centres will be discussed further under *Quality Area 7 – Leadership and service management*.

Data from the NICHD SECCYD was analysed using structural equation modelling. The researchers reported that staff training positively affected child cognition and social skills in a mediated pathway via process quality of care such as staff behaviour, as measured using the ORCE [8]. In another study, NICHD SECCYD data were analysed in relation to whether or not the child's ECEC centre had met child care standards (in terms of staff-child ratio, group size, staff general education, and staff training in child development), as set by the American Public Health Association and the American Academy of Pediatrics [67]. Meeting standards for general staff education (some College in any field) was associated with higher mean language comprehension scores, higher school readiness scores, and lower behavioural problems scores at 36 months, as compared with children attending ECEC centres not meeting the education standards. The same associations were observed for children attending ECEC centres meeting specific staff training standards (some post-high school training in child development, early childhood education, or a related field) compared to children attending services not meeting these standards [67]. The IEA Pre-Primary Project found a series of factors that were related to children's cognitive performance at age 7, including the number of staff years of experience [25].

In the Australian context, national assessment results of Year 3 children (NAPLAN) were used in a large-scale Longitudinal Study of Australian Children (LSAC). The researchers found that children whose 3-year-old preschool teachers had a degree or diploma qualification (as opposed to a certificate) had significantly higher numeracy and literacy scores at Year 3 [30]. This effect was even stronger when staff had specialised in early childhood education as opposed to education of older children (which tends to focus more on academic instruction), and the authors speculated that this may be due to

greater awareness of developmentally appropriate practices [30]. These results provide strong support for this quality standard.

In addition to formal staff qualifications, there is evidence that ongoing professional training and teacher coaching contribute to better child outcomes. In a study of 533 ECEC classrooms in the USA, the quality of child care was associated not only with the highest level of formal education (baccalaureate degree), but also, with staff-reported attendance at professional training workshops. Moderate effect sizes were reported, even after controlling for staff-child ratio and staff experience [68]. Further supporting evidence comes from a comparison of the EPPE study [7] with its Northern Irish counterpart, the Effective Pre-school Provision in Northern Ireland (EPPNI) project [69]. Both studies evaluated the quality of ECEC settings using the same tool (ECERS-R), and across most types of ECEC settings the quality was found to be equivalent between England and Northern Ireland. The exception was that the quality of playgroup settings was significantly higher in Northern Ireland compared with England. Further investigation revealed that staff levels of training correlated with this pattern; with playgroup staff in Northern Ireland having considerably higher levels of training than their English counterparts, due to government investment in in-service professional development for large numbers of playgroup staff [69].

Early and colleagues (2006) analysed data from the National Center for Early Development and Learning's (NCEDL) Multi-State Study of Pre-Kindergarten in the USA. This study involved 237 state funded pre-kindergarten classrooms and over 800 children, and investigated associations between staff education, classroom quality and child academic achievement [32]. Analysis of covariance was conducted across six variables of staff education, four measures of classroom quality, and seven measures of child outcomes. The analysis found an association between staff having a Bachelor and (a) higher scores on the ECERS Teaching and Instruction subscale, and (b) higher child scores on a standardised measure of math achievement.

The European Commission report also endorses the importance of staff training: its third *Statement* is that ECEC services should have "well-qualified staff whose initial and continuing training enables them to fulfil their professional role" [33]. According to the report, this training should include formal qualifications as well as ongoing professional development. This is based on evidence including the meta-analysis described above [29], the EPPE study [7] and the NCEDL study [32]. The report also drew upon policy-related literature, in order to detail recommendations for how professionalisation of ECEC staff may be encouraged by ECEC institutions, government institutions and non-governmental bodies [33].

In summary, there is strong evidence that staff qualifications and experience tend to enhance pedagogy, thereby indirectly enhancing child outcomes across cognitive, social, and emotional domains. The 2017 Campbell Collaboration systematic review and meta-analysis provides strong correlational evidence for a link between staff qualifications and ECEC quality [27]. The 2007 systematic review and meta-analysis of experimental and quasi-experimental evidence [29] suggests that professional development training is related to staff competence. Despite the limitations and risk of bias of the review, this conclusion is supported by evidence from prospective longitudinal studies. In addition, while the association between staff training and child outcomes reported in the meta-analysis

was not found to be significant, this relationship is supported by findings from EPPE, NICHD SECCYD, IEA Pre-Primary, and the Australian LSAC.

Staff-child ratios & group size

Four systematic reviews/meta-analyses were identified as relevant to this topic. Two of these were briefly evaluated in relation to *Quality Area 1* and found to be of insufficient quality and demonstrating several sources of bias, thus were excluded from further analysis [22, 57]. The other two studies were considered. The first, a recent systematic review and meta-analysis, utilised data from a comprehensive database of US-based ECE program evaluations (experimental and quasi-experimental). This review was found to be of high quality and was included [26]. The review examined the association between group size, child-teacher ratio, and program effect sizes on child cognitive, achievement, and social emotional outcomes. The researchers found that group size and child-teacher ratios had a non-linear relationship with cognitive and achievement effect sizes. Specifically, a reduction in child-teacher ratio by one child, for situations with ratios of 7.5:1 and lower, predicted an effect size of 0.22 standard deviations (SD). A similar pattern occurred when there was one less child in classes sizes of 15 children and lower (SD, 0.10). No relationship was identified for larger class sizes and child-teacher ratios. Due to a small sample, it was not possible to draw any inferences related to socio-emotional outcomes. Although analyses revealed a significant association between child-teacher ratios and class size, the effect sizes were small and the authors concluded that utilising this mechanism as a driver for improved ECEC effectiveness is likely to have limited penetration.

The second study was a recent systematic review of 29 cross-sectional or longitudinal studies (and a meta-analysis of three studies), investigated the effect of child-staff ratios on child outcomes. The review did not find any evidence that reducing child-teacher ratios beyond current/recognised thresholds would produce cognitive, academic, or socio-emotional gains [28]. Receptive language (measured by the Peabody Picture Vocabulary Test) was the only outcome for which a meta-analysis could be conducted (since no other measures were used in three or more studies), and this revealed no significant association with staff-child ratios. This systematic review and meta-analysis was rated as being of high quality and low risk of bias, suggesting it represents a reliable synthesis of the available evidence from cross-sectional and longitudinal studies. However, it cannot necessarily be concluded that restrictions on class sizes and child-staff ratios could be relaxed with no impact on child outcomes. All classes included in the Perlman review were in compliance with local regulations (which vary according to age group, and ranged from 5 to 14.5 children per adult). Furthermore, in the studies included by Bowne and colleagues, child-staff ratios ranged from 5:1 to 15:1 and group sizes ranged from 11 to 25 [26]. As such, no conclusions can be drawn regarding the impact of child-staff ratios and class sizes beyond these limited ranges. There are also several other possible explanations for the lack of association, which include: curvilinear associations (as supported by the findings of Bowne and colleagues described above); moderation or mediation effects; potential imprecision caused by a mismatch between the units of measurement of predictors (class level) and child outcomes (individual level); inconsistent measures of child outcomes; and the observational – rather than experimental - nature of the majority of studies on this topic [28]. In addition, the children in the included studies were of pre-school age (30-72 months), and, as will be discussed below, some research suggests that staff-child ratios and group sizes may impact on younger age groups (less than 3 years) more strongly than on pre-school aged children.

By contrast, the EPPE study found a significant link between low child-staff ratios and child progress in early number concepts, although this was the only measure of cognitive development on which an association was found. No associations were observed with social/behavioural developmental measures [7].

In a study using NICHD SECCYD data to investigate the effect of meeting standards relating to structural quality (described above), meeting professionally recommended child-staff ratio standards was associated with lower behavioural problem scores at age 24 months and 36 months. Meeting the recommended standards for group size was not significantly associated with any of the measured child developmental outcomes [67]. Another analysis of NICHD SECCYD data focused on communicable diseases. The researchers found that children aged 37 to 54 months attending ECEC in groups of more than 6 children were more likely to suffer from respiratory tract illness, gastrointestinal tract illness and ear infections, as compared with children attending ECEC in small groups and children cared for at home [70]. In another NICHD study which involved the follow-up of children at ages 15, 24, and 36 months, the study found that small group sizes and low child-staff ratios were positively related to quality of care [71]. As previously mentioned, it is hypothesised that structural quality features such as child-staff ratios and group size indirectly affect child outcomes, by directly influencing process features of quality. In line with this, a structural equation analysis of the data found that low child-staff ratios positively affected child cognition and social skills in a mediated pathway - from childcare- structural features of quality through process features to child outcomes [8]. Indeed, child-staff ratios were found to be the strongest and most consistent predictor of positive caregiving across different ECEC settings and child ages in the NICHD SECCYD (compared to group size, staff education, beliefs and experience), with 1:1 ratios being particularly beneficial. Notably, the effect size of child-staff ratio and group size decreased in childcare for children older than 3 years [71]. This suggests that small group sizes and child-staff ratios may have a greater impact on younger children than on older children such as those in preschool settings.

Similar to the limitations related to the effects of staff training and qualifications described above, there are significant gaps in the evidence regarding child-staff ratios and group sizes. This is largely due to confounding between various structural aspects of quality, and a lack of randomised controlled trials. A particular difficulty lies in setting appropriate standards for staff-child ratios or group sizes, given the variability in effects according to age group, the type of ECEC service, other potential factors related to local settings, and the difficulty in disentangling one structural quality feature from others.

In summary, the evidence indicates that for two highly correlated parameters (child-staff ratios and group size), child-staff ratio is the more important factor, although there is also substantial evidence on the impact of group size. However, the evidence also suggests that the benefits of further reductions in group size and child-staff ratios, beyond those already stipulated by regulations, are likely to be minimal in relation to the resources required. Of note, there is a paucity of randomised controlled trials in this field of research, and evidence instead comes from observational studies of ECEC settings in which existing standards of staff qualifications and staff-child ratios are usually met. Therefore, there is no data to support the lowering of thresholds for these aspects of staffing arrangements.

Wages and working conditions

A final structural aspect of staffing conditions that is likely to be associated with process quality is working conditions, including rates of pay for ECEC staff. As discussed in the European Commission

report, good conditions are likely to assist in the recruitment of motivated, high quality staff [33]. It is also argued that poor working conditions can be detrimental to the ability of ECEC centres to retain staff and therefore leads to high turnover rates, which in turn is detrimental to the quality of care being provided. The link between high turnover rates and the quality of relationships between staff and children is discussed in relation to *Quality Area 5*.

Standard 4.2 - Educators, co-ordinators and staff members are respectful and ethical

The evidence base concerning *Standard 4.2* is closely linked to *Quality Area 5 – Relationships with children*. Given the strong relationship between these standards, the evidence is summarised for both elements below.

In summary, there is evidence that certain aspects of staffing arrangements in ECEC settings affect cognitive child outcomes, including staff-child ratios, group size, staff experience and qualifications, and wages and working conditions. The evidence-base included three high quality systematic reviews/meta-analyses, data from several major longitudinal studies; the EPPE study, NICHD SECCYD, National Center for Early Development and Learning's Multi-State Study of Pre-Kindergarten, as well as local Australian data (directly generalisable and applicable) from the Longitudinal Study of Australian Children. The evidence-base also included a moderate quality systematic review and one meta-analysis, which were both rated as Promising in terms of supporting Quality Area 4.

The evidence-base as it relates to social-emotional outcomes was less compelling, with one high quality systematic review/meta-analysis supporting staffing arrangements and one longitudinal study rated as Promising. Although there were two other systematic reviews/meta-analyses, the findings related to staffing arrangements and social-emotional outcomes did not show an affect.

Based on the evaluation of these individual studies, the overall rating for Quality Area 4 was judged to be Supported. See Appendix E for a list of the evidence-base related to this quality area.

Quality Area 5—Relationships with children

Standard 5.1 - Respectful and equitable relationships are developed and maintained with each child

Standard 5.2 - Each child is supported to build and maintain sensitive and responsive relationships with other children and adults

Much of the evidence described above in relation to *Standard 1.2 - Educators and co-ordinators are focused, active and reflective in designing and delivering the program for each child* is relevant to *Quality Area 5: Relationships with children.* This is because the ability to tailor an educational program to the needs and abilities of an individual child rests, in a large part upon, the relationship between the staff member and the child (interactional quality). In particular, established relationships are crucial to

providing culturally appropriate education and care to a child [33, 66]. Children develop well when they take risks and explore new things. Trusting and warm relationships with ECEC staff can provide the secure basis which allows such exploration [66]. The evidence outlined in the following paragraphs, focuses on directly relating measures of the quality of relationships between staff and children to child outcomes. The body of evidence surrounding the effects of staff turnover and stability of care on child developmental outcomes (discussed briefly under *Quality Area 4*) will also be considered in the overall evaluation of the evidence. This is relevant to *Quality Area 5*, because the quality of interactions between children and staff is related to stability of care and child outcomes. Characteristics of the high quality relationships described above take time to develop, and the scope for strong relationships is likely to be limited where high staff turnover and irregular hours of work occur frequently in an ECEC setting.

No high quality systematic reviews or meta-analyses relevant to *Quality Area 5* were identified. However, a substantive and frequently cited literature review was identified and included. Whilst not as robust as a systematic review, this paper provided an overall perspective on the evidence base. Zaslow and colleagues conducted this literature review of 39 studies investigating the quality features, dosage, and thresholds of ECEC associated with positive child development [72]. They reported that (a) three studies found a reduction in behavioural problems associated with supportive relationships between children and ECEC staff [73-75], and (b) one study found a positive association between emotional support (as measured using the CLASS instrument) and mathematics skills [73]. These studies provide some support for an association between staff relationships with children and both behavioural and cognitive child development outcomes.

The EPPE study investigated the association between child developmental outcomes and interactional quality, as measured by the Caregiver Interaction Scale (CIS) [7]. In terms of cognitive outcomes, pre-reading progress was positively associated with positive relationships between staff and children, and negatively associated with the negative subscales (punitiveness, permissiveness, and detachment). In terms of social-emotional outcomes, total CIS scores were (a) positively associated with child independence and concentration, co-operation and conformity, peer sociability, and (b) negatively associated with anti-social/worried behaviour at school entry. These associations were even stronger when only the 'positive relationship' subscale of the CIS was considered [7]. High scores on the *interaction* subscale of the ECERS-R (which covers multiple aspects of staff-child and child-child interactions), was also positively associated with several cognitive and social-behavioural outcomes at entry to primary school. Socio-economic status did not influence these associations, indicating that children from all socio-economic groups can benefit from high quality relationships with ECEC staff [7].

Observations from the EPPE case studies further supported these findings. It was reported that good and excellent ECEC settings were generally "warm, caring, safe, secure and supportive" towards children, and that staff were respectful, calm and engaged with children [7]. In relation to disciplinary practices, staff in the most effective settings responded to behavioural problems by supporting children to rationalise and discuss their conflicts, rather than trying to distract children or command them to stop [31]. Furthermore, in highly effective ECEC settings there were generally higher proportions of long-serving staff. This provides some support for the idea that low staff turnover is related to better interactional quality and in turn, positive child development [76]. Children in effective ECEC settings

also participated in both individual and group play [7]. This finding is relevant to *Standard 5.2,* as it concerns the way children are supported to build relationships with their peers. The implications of mixed types of play (individual versus group) for child outcomes is explored below, in relation to findings from the NICHD SECCYD and IEA studies.

There is evidence that the way children are encouraged to interact in preschool effects both social and behavioural outcomes, as well as language development. The IEA Pre-Primary Project found that language scores at age 7 were likely to be higher when children spent less time during ECEC in whole group activities and were instead often allowed to freely choose their own activities [25]. It has also been suggested that social formats outside whole group activities require children to interact with their peers more meaningfully than during whole group activities, and as such, may support the development of relationship –building skills [25, 77].

Multivariate analyses of NICHD SECCYD data revealed (a) positive associations between positive caregiver ratings (as measured by the ORCE and CC-HOME scores) and cognitive ability and cooperation, and (b) negative associations between these ratings of quality and behavioural problems [4, 8, 78]. Another NICHD SECCYD study provided insight into the effect ECEC social formats may have on the way children interact with their peers later in childhood [79]. A long-term follow-up study investigated associations between child outcomes and the social format in which children spent their time in preschool (i.e. alone, in pairs, small groups, or in medium or large groups such as whole class activities). The authors reported that a greater amount of time spent in small groups and pairs (as opposed to alone or in medium or large groups) was associated with children being more socially outgoing and cooperative by the time they reached third grade. However, more time spent in small-medium sized groups or in pairs was also associated with increased aggression in third grade, suggesting that these arrangements may foster both positive and negative outgoing behaviour [79]. The study also investigated associations between the frequency of positive and negative peer interactions in preschool and social functioning at third grade (as assessed using mother report, teacher report, child self-report and classroom observations). More frequent positive peer interactions in preschool was associated with (a) lower rates of aggression in third grade according to maternal and teacher report, (b) more friends according to self and teacher report, and (c) higher popularity and lower isolation according to teacher report. In contrast, higher frequency of negative peer interactions was associated with greater aggression and fewer friends according to teacher report [79]. Another analysis of NICHD SECCYD data provided an indication that the disruption of relationships between staff and children may negatively impact upon child outcomes. The researchers found that changing from one ECEC setting to another predicted a negative effect on language development at 15 months [80], indicating that the stability of ECEC care may be important to child development, even at this young age.

Other evidence concerning the effect of stability of care comes from the Australian context. The Child Care Choices (CCC) Longitudinal Extension study of the ECEC experiences of 677 children in urban and rural New South Wales investigated the ECEC features predicting child adjustment and achievement until the first year of school [81]. Results showed that positive relationships between children and staff during early experiences of ECEC were predictive of (a) more positive relationships with staff in the year before school and in the first year of school, and (b) a higher frequency of children reporting that they liked school. By contrast, poorer relationships with ECEC staff in the early years of ECEC predicted more

socio-emotional difficulties and more conflict with teachers in the first year of school. The CCC study also reported on the relationship between attending more different types of child care arrangements and child outcomes. Children who attended more different types of child care arrangements per week generally had lower literacy scores in the year before school. Notably, this predictive effect had disappeared by school age, and there were no observed effects on numeracy. Children who attended higher numbers of different child care arrangements per week also demonstrated (a) lower levels of prosocial behaviour as rated by parents in the year before school and in the first year of school, (b) more behavioural difficulties in the year before school, (c) lower child-reported liking of school, and (d) more conflict between the child and teacher at school [81]. While these latter findings relate more to child attendance patterns than to features of ECEC settings, they do provide some support to the suggestion stability in relationships between staff and children is important to a range of child developmental outcomes.

The results from the CCC study are consistent with other research on stability of care in ECEC. In a literature review investigating associations between structural and process features of ECEC, Huntsman reported that stability in care was consistently related to positive child developmental outcomes (including greater wellbeing and less internalising behaviour), whereas high staff turnover was associated with poorer ratings of ECEC quality and poorer child outcomes [82].

The aforementioned evidence is not an exhaustive list of the research on this topic, and other longitudinal studies with large sample sizes (such as the Dutch pre-COOL study of 850 children, and a US study of 1175 ethnically diverse children) have produced broadly consistent results [83, 84]. This indicates that the association between positive staff-child relationships and child cognitive, social and emotional development are generalisable, including to the Australian population.

The importance of positive relationships between ECEC staff and children is also identified as a key principle in the European Commission report. Based on the Commission's literature review, the presence of trusting and stable interactions between staff and children is essential, in order to foster a child's sense of identity and meaning [33]. Respectful and equitable interactions allow for a balance between child-led and staff-led activities, and permits the optimisation of play opportunities in differing social formats, both being important for child cognitive development [33].

In summary, the search strategy utilised did not yield any high quality systematic reviews or meta-analyses of relevance to Quality Area 5. However, a substantive and frequently cited literature review was identified, which reported that there was some support for an association between staff relationships with children and both behavioural and cognitive child development outcomes. The findings of that review were supported by a second review and international trials, (EPPE, NICHD SECCYD, IEA Pre-primary longitudinal, cross-national study, the Dutch pre-COOL study, and local Australian data), strengthening the generalisability and applicability of these findings. In addition, the evidence base related to Quality Area 1 (specifically Standard 1.2 - Educators and co-ordinators are focused, active and reflective in designing and delivering the program for each child) and Quality Area 4 (specifically Educators, co-ordinators and staff members are respectful and ethical) is also relevant to Quality Area 5, and so overall the evidence was rated as "Supported". See Appendix E for a list of the evidence related to this quality area.

Quality Area 6—Collaborative partnerships with families and communities

Standard 6.1 - Respectful and supportive relationships with families are developed and maintained

Standard 6.2 - Families are supported in their parenting role and their values and beliefs about childrearing are respected

A recent meta-analysis was identified relating to Quality Area 6. The study investigated the relationship between child outcomes and parental involvement in preschool and the early years of school [85]. Preschool children were the focus of six of the 46 studies, and the outcomes of these studies included reading, language, maths, literacy, overall grade, child behaviour, self-control and adjustment to school. The meta-analysis included a range of operationalisations of the concept of 'parental involvement' including: the educational activities of parents in the home; family-school partnerships characterised by open communication, healthy relationships, mutual respects and balance of power (the focus of *Standard 6.1* and *Standard 6.2*); and family-school-community partnerships (the focus of *Standard 6.3*). This paper reported a strong positive correlation (magnitude 0.509) between 'parental involvement' and child learning outcomes. However, the role of families (i.e., the educational activities of parents in the home) was the more important driver of this relationship compared with the role of preschools, schools, or communities (family-school and family-school-community partnerships). Furthermore, when age was taken into account, the relationship between 'parental involvement' and child outcomes was statistically significantly weaker for preschool children as compared with children in grades 3-6 [85]. This suggests that the influence of parental involvement in early childhood education and care may vary by age. It is also important to note that 'pre-school' (including children aged 3-5) was the youngest age category included in this meta-analysis, therefore there is no evidence regarding earlier years of ECEC. The risk of bias of this meta-analysis was rated as moderate. This was due to missing information around the design and results of individual studies, and the fact that both the search strategy and the funding arrangements were not reported. In addition, unpublished studies were included in an attempt to address publication bias, however the academic vigour of the unpublished studies was dubious and no effort was made to determine the quality of these studies. Overall, the

strongest findings of this meta-analysis pertain to children of school age and to the role of parents in the home, rather than the role of ECEC staff in liaising with parents (which is the focus of *Quality Area 6*). Coupled with the moderate quality and risk of bias, this meta-analysis alone provides only weak support for *Quality Area 6* in the context of ECEC.

The finding that parental involvement in the home learning environment is strongly related to child developmental outcomes is further supported by evidence from the EPPE study, NICHD SECCYD and IEA Pre-Primary project [24, 25, 59]. For example, quantitative data from the EPPE study support a link between what parents do with their children in the home environment (e.g. visiting a library, reading together, playing with letters and numbers, singing songs and rhymes) and cognitive outcomes at age 3 [59].

Quality Area 6 assesses the extent to which ECEC settings collaborate with families and other organisations in the community, resting on the assumption that such collaboration allows for greater gains in child development than when all these groups are acting in isolation. Findings from the EPPE study provide some evidence that child intellectual development is greater when ECEC settings encourage high levels of parental engagement in the child's learning. The quantitative data of the EPPE study included the 'Provision for Parents' item of the ECERS-R 'Parents and Staff' subscale. This item concern the extent to which parents are involved in decision making about the child's learning program, and the sharing of child-related information between staff and the parents. [59]. Analyses revealed a positive correlation between this item and child ability to identify picture similarities, although no significant associations with any other measures of cognition or social-emotional development were identified [59]. There are three major pathways by which such collaboration could be beneficial to child development. Firstly, it may allow ECEC staff to encourage and support parents to provide more effective education in the home environment. Secondly, input from parents may improve the quality of education and care in the ECEC setting (for example, by allowing for more appropriate tailoring of the learning program to each child, including culturally relevant activities/learnings). Thirdly, collaboration may shape ECEC service, improving the inclusiveness of services and increase participation in ECEC. The evidence regarding these three pathways is outlined below.

1. Collaboration leading to more effective learning in the home environment

In light of the association between collaboration between parents and staff and child development arising from the quantitative aspect of the EPPE study, the EPPE case studies investigated whether there were any attributes of effective ECEC settings which may have encouraged such parenting behaviours [59]. The researchers found that in all case study settings, parents were encouraged to read with their children. However in the most effective ECEC settings, the educational aims, child-related information, and decisions about the child's learning program were shared between parents and staff [7, 31, 59]. One reason this engagement was thought to be effective was that it allowed parents to support children at home with appropriate materials and activities [7]. The EPPE Researchers observed that some ECEC centres in high socio-economic status areas were producing greater gains in child development than expected after controlling for background characteristics, despite not displaying consistently good pedagogic practice. In seeking an explanation for this observation, researchers identified the strong collaborative relationships between parents and ECEC staff in these settings (involving shared educational aims and pedagogic efforts made at home by parents) as a likely factor [7{Siraj-Blatchford,

2002 #104, 59]. The benefits of such partnerships were also observed in low socio-economic status settings in the case studies. However in more disadvantaged areas, parental involvement was less common and more proactive efforts from staff were required in order to support parents in developing a positive home learning environment [59].

The NICHD SECCYD and the IEA Pre-Primary project did not include measures regarding the extent or nature of collaboration between ECEC settings and families [23, 25]. Therefore, these studies provide no further insight into any possible relationship between collaboration and improvements in parenting practice and child developmental outcomes.

The importance of collaboration between ECEC, families and other stakeholders in the community is emphasised throughout the European Commission report, which asserts that parents should be respected as the 'first educators of the child' [33]. The report recommends that parents be involved in an equal partnership, in which their voices inform educational practice and the development of the curriculum. This includes democratic decision-making structures (e.g. parental committee), clear communication and documentation of children's activities, and an openness to changing practices and values based on input from families of children [33]. The recommendation of equal partnership is made on the basis that such approaches can promote a higher level of parental engagement in child learning in the home environment. The is supported by evidence from the EPPE study described above, as well as from its Northern Irish counterpart EPPNI [69]. There is also evidence from a German study of 111 ECEC staff [33], which found a link between a measure of 'transparency towards parents' and several child cognitive outcomes including media literacy, maths/science, and learning and meta-cognitive competence. Notably, no significant link was found between 'cooperation with parents' and any child outcomes [86].

2. Collaboration leading to more effective learning in the ECEC environment

As described, the EPPE study provides some evidence that collaboration between families and ECEC staff is beneficial to child development, along with suggestions this may be due to positive effects on parenting practice as supported by some case study findings. However, the EPPE study does not investigate the possibility that improvements in child outcomes may also arise from parental input into ECEC practice. Likewise, the NICHD and the IEA Pre-Primary project did not include measures regarding the extent or nature of collaboration between ECEC settings and families; therefore an investigation of associations between such collaboration and improvements in ECEC practice or in child developmental outcomes was not possible [23-25].

The European Commission report suggested that collaboration with families improved child outcomes via improvements to ECEC practice, as well as via improvements to parenting practice. The report asserted that input from families assisted in the delivery of a learning program to each child through flexible, reflective practice, particularly in ECEC contexts of high cultural diversity. The evidence base around the importance of such flexible program delivery is strong, as described in relation to *Quality Area 1*. However, in the European Commission report, no direct evidence for an association between parental involvement in ECEC and improvements in ECEC staff delivery of an educational program was presented. Instead, these assertions were largely supported by grey literature and policy

recommendations, which were not traceable (in order to critique the primary evidence upon which these claims rest). Notably, the evidence that collaboration with parents is associated with improvements in ECEC quality is not required in order for *Standards 6.1* and *6.2* to be supported. This is simply one mechanism by which a collaboration has been hypothesised to operate, in addition to the impacts on parenting practices described above.

3. Collaboration shaping inclusive ECEC services

Involving parents in decisions around ECEC provision may improve the inclusivity of services, and is seen as a way to increase the likelihood that parents will develop a positive understanding of the benefits of their child attending ECEC [33]. The European Commission report brings together evidence suggesting that ECEC settings which are inclusive of families and diverse cultural values are likely to be better able to promote children's participation in ECEC, particularly in disadvantaged communities [33]. In this way collaboration between staff and parents may both improve the inclusiveness of services and increase participation in ECEC.

In summary, some evidence from the EPPE study suggests that collaboration between ECEC staff and families is associated with improvements in child cognitive development, due to improvements in parenting practice in the home learning environment. However, this is largely based on the EPPE case studies which are considered a "low" level of evidence according to the NHMRC hierarchy of evidence. There is also some evidence that collaboration may increase participation rates, however the overall evidence base is limited. The only meta-analysis identified as investigating this association was of moderate risk of bias, and found that partnerships between families and schools were less important than the role of parental involvement in child education in the home. Furthermore, the meta-analysis did not include children younger than preschool age, and the data suggesting the association between parental involvement and child outcomes at preschool-age was weak. There was no investigation of collaboration with families in other longitudinal studies such as the NICHD SECCYD and the IEA Pre-Primary project.

There is strong evidence that both the child's experience of ECEC and the child's experience of the home learning environment are associated with cognitive development; and the idea that collaboration between ECEC staff and families has the potential to be beneficial in both directions seems intuitive. This is reflected in the recommendations of policy-related documents such as the European Commission report, which highlights the potential of collaboration to increase the participation of a diverse range of families in ECEC services. In light of this, *Standard 6.1 - Respectful and supportive relationships with families are developed and maintained* and *Standard 6.2 - Families are supported in their parenting role and their values and beliefs about childrearing are respected* were rated as "*Promising*", due to the lack of direct evidence from large-scale, rigorous studies.

Standard 6.3 - The service collaborates with other organisations and service providers to enhance children's learning and wellbeing

Findings of a meta-analysis relevant to *Standard 6.3* are discussed in *Standard 6.1* and *Standard 6.2* above [85].

Neither the EPPE study, the NICHD SECCYD nor the IEA Pre-Primary project investigated associations between child learning, child wellbeing or ECEC quality *and* the extent or nature of collaborations between ECEC centres and other organisations or services in the community.

Specific policy-related reports advocate establishing collaborative relationships with a range of stakeholders in the community, including organisations and service providers. However, there is very little primary research that supports this philosophy [87, 88].

The European Commission report recommends collaboration between organisations with related but traditionally divided responsibilities regarding early childhood education, care and wellbeing. Recommendations include inter-agency cooperation, intra-professional partnerships, and networking between ECEC centres, social services and health services, NGOs, schools and local authorities. The report also suggests that these stakeholders (along with families) be included in monitoring and evaluation, in order to foster greater engagement and sense of ownership. However, the research listed in support of these recommendations does not include any substantial primary evidence investigating an association between ECEC collaboration with other organisations and child learning and wellbeing. It consists largely of other policy-related reports such as the OECD *Starting Strong III - A Quality Toolbox for Early Childhood Education and Care* report [89]. This OECD paper based its recommendations on this topic on a range of sources, including a literature review which reported benefits of collaboration with community organisations [90]. Notably, this review covered education from preschool through to high school, and upon closer investigation, none of the evidence in the literature review concerning community collaborations is drawn from the ECEC context. An exception to this lack of primary evidence came from a study of 111 individually licenced family child care providers in Canada [91]. The study found that the total score on the Family Day Care Rating Scale (a global observational measure of quality adapted from the ECERS to suit family day care rather than centre-based care) was predicted by whether the provider was involved with an organised child care association or network, and whether they made use of community resources to support caregivers [91]. As this finding is drawn from a very

In summary, one relevant meta-analysis was identified, of moderate quality and moderate risk of bias. The strongest findings of this meta-analysis pertained to children of school age, and to the role of parents in the home, rather than the role of ECEC staff in liaising with parents, which is the focus of QA6. There were no other effects found between aspects of collaborative partnerships with families and communities and other cognitive and social-emotional outcomes. This meta-analysis was therefore rated as Promising for Quality Area 6 in the context of ECEC.

The EPPE study suggested that collaboration between ECEC staff and families was associated with improvements in child cognitive development. This was based largely on the EPPE case studies, which are considered a "low" level of evidence according to the NHMRC hierarchy of evidence [34]; thus was also rated as Promising. There was one review that indicated a positive association between Quality Area 6 and cognitive and social-emotional outcomes, however this review focused on older school children. Other major international/national trials did not report on the relationship between child outcomes and collaborations with families. Therefore, Quality Area 6 was rated as Promising overall, based on the existing evidence. See Appendix E.

specific ECEC arrangement (individually licenced family child care providers in Canada), the generalisability of the findings to other ECEC contexts is uncertain.

Quality Area 7—Leadership and service management

Standard 7.1 - Effective leadership promotes a positive organisational culture and builds a professional learning community

Standard 7.2 - There is a commitment to continuous improvement

Standard 7.3 - Administrative systems enable the effective management of a quality service

There were no systematic reviews or meta-analyses identified investigating questions directly related to *Quality Area 7* in the context of ECEC.

The EPPE study produced a number of findings which support the importance of leadership and management in producing high quality ECEC service. As mentioned (*see Quality Area 1*), case studies of 'good' and 'excellent' ECEC centres revealed that curriculum leadership from managers, and curriculum knowledge amongst ECEC workers, were key attributes related to effectiveness in producing better child outcomes than expected (based on child and home characteristics). As described in relation to *Quality Area 4 – Staffing arrangements*, there was a link between manager qualification level and ECEC centre quality, as measured using the ECERS-R tool. Mean scores were higher in centres where managers had Level 5 qualifications (e.g. Bachelor of Education or Post Graduate Certificate of Education) compared to those with lower level qualifications (such as the National Vocational Qualification or the National Nursing Examination Board qualification) [7].

The importance of leadership and management can be inferred from much of the evidence from EPPE described in previous sections, by virtue of the control leaders and managers have over the operation, activities and culture of an ECEC setting. Examples include the provision of professional development opportunities (see *Quality Area 4*), curriculum development and systems for flexible implementation of the learning program (see *Quality Area 1*). However, more specific associations between leadership and management and ECEC quality or child outcomes have not been investigated in either the EPPE study or the NICHD SECCYD [24]. The IEA Pre-Primary project included questions regarding 'management policies' in a survey of ECEC providers, however no associations with ECEC process quality or child outcomes was reported [25].

The European Commission report recommended the importance of leadership in a range of contexts. The report advocated the need for support at all levels – including the level of ECEC management – to create working conditions which are supportive of effective teaching practices, including opportunities for teamwork, planning and reflective practice [33]. The evidence for such reflective and effective pedagogical practices is outlined in relation to *Quality Area 1*, however the assertion of links between leadership and such practices in the European Commission report rest upon common sense assumptions and existing policies or opinion surveys, rather than direct evidence of impact on ECEC process quality [33].

The European Commission report also emphasised the importance of monitoring and evaluation, which is in line with *Standard 7.2 - There is a commitment to continuous improvement* and *Standard 7.3 - Administrative systems enable the effective management of a quality service*. The report asserted that

monitoring and evaluation should involve all relevant stakeholders, and always be conducted according to the best interests of the child [33]. The report refers to research on the negative side-effects of making performance indicators of schools publicly available [92]. However, this assertion is drawn from the context of schools rather than ECEC, and relates to broader policy-level and regulatory questions rather than management practices within individual ECEC settings. Overall, there is a lack of direct evidence presented to link such management practices to improvement in ECEC process quality or child developmental outcomes.

The lack of the evidence around leadership and management in the context of ECEC stands in stark contrast to the depth of research into leadership and governance in the context of primary schools. Whilst it is not within the scope of this project to summarise the substantial research base at schools, it is reasonable to assert that leadership and management are also important for ECEC. Based on the small amount of evidence within the ECEC literature - but influenced by the potential link with the school-based evidence - *Quality Area 7* has been rated as *Promising*.

In summary, no systematic reviews or meta-analyses investigating questions directly related to leadership and service management were identified in the context of ECEC. The case studies from the EPPE Study suggested that curriculum leadership from managers, and curriculum knowledge amongst ECEC workers, were key attributes related to effectiveness in producing better child cognitive outcomes [31]. However, as mentioned above, this is considered a "low" level of evidence, so this study was only rated as *Promising*. There were several other studies, including a systematic review [93] and meta-analysis [94], which examined leadership/management in schools and the effect on cognitive outcomes. Although these findings are not directly applicable and generalisable to the ECEC context, they were rated as *Promising*. The IEA Pre-primary longitudinal, cross-national study examined management policies and the relationship to child cognitive outcomes via a survey, however no positive associations were reported. No studies were identified that reported on the relationship between leadership and social-emotion outcomes.

Therefore, the overall rating for *Quality Area 7* was "*Promising*" for cognitive/academic outcomes and "*Not adequately addressed in target evidence base*" for social-emotional outcomes.

Quality indicator

The proportion of ECEC services rated 'exceeding' the standard in quality areas 1, 4 and 5 and at least 'meeting' the standard in all other quality areas according to the ACECQA assessment

ECEC Participation

To determine participation indicators, this report focused on national and international longitudinal studies, and also utilised systematic reviews and meta-analyses where available with good quality and low bias. The evidence was examined to determine any differential effect related to universal or targeted program participation in children from 0 to 5 years (e.g., targeted according to housing vulnerable/poverty, culturally and linguistically diverse, low IQ).

Universal provision of ECEC

Starting Age, Intensity (dose) & Program Duration

There were three main factors identified that relate to Participation; i) starting age, ii) program duration, and iii) program intensity. The findings are detailed below, and an overview of the evidence ranking is presented in Table 6 for universal provision of ECEC. See Appendix F for a detailed list of the evidence; with individual studies were ranked as ("supported", "promising", "not supported").

Table 6: Summary of the overall evidence base; starting age, program duration, program dose (universal) - duplicated table

STARTING AGE	COGNITIVE & LANGUAGE	ACADEMIC	SOCIAL-EMOTIONAL
0-2 years	• Supported	• Promising	• Mixed
2-3 years	• Supported	• Promising	• Mixed
3-4 years	• Promising	• Promising	• Not adequately addressed in target evidence-base
4-5 years	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base

PROGRAM DURATION	COGNITIVE & LANGUAGE	ACADEMIC	SOCIAL-EMOTIONAL
Less than 1 year	• Not adequately addressed in target evidence-base	• Supported	• Not adequately addressed in target evidence-base
1-2 years	• Promising	• Supported	• Not adequately addressed in target evidence-base
2-3 years	• Supported	• Supported	• Not supported
More than 3 years	• Supported	• Supported	• Not supported

PROGRAM DOSE	COGNITIVE & LANGUAGE	ACADEMIC	SOCIAL-EMOTIONAL
Part time	• Supported	• Supported	• Not adequately addressed in target evidence-base
Full time (> 15 hours)	• Mixed	• Not adequately addressed in target evidence-base	• Not supported

Meta-analyses

Two relevant meta-analyses were identified by the search strategy [95, 96].

Leak and colleagues (2010) used a meta-analytic database that was compiled by the US National Forum on Early Childhood Policy and Programs. The database had (a) a complete set of impact data

for ECE programs meeting screening criteria and offered to children between the ages of 3 and 5, and (b) partially complete data for programs offered to younger children that also extended into ages 3-5. The researchers examined 117 studies on the effect of starting age and program duration on cognitive and achievement outcomes. Regarding starting age, the analyses by Leak et al reported wide variation in impact estimates on cognition and academic achievement at all starting ages. Although a simple trend line fit to these (unweighted) effect sizes had a modest negative slope, indicating somewhat larger effect sizes with earlier-starting programs, the relationship was not statistically significant. The mean effect size for programs beginning before age 3 was 0.39, and was 0.20 and 0.28 for programs starting between 3 and 4 and 4 or later, respectively. In regards to program duration, there was a modest increase in average effect size for longer programs. The mean effect sizes for the relatively small number of programs longer than 2 years averaged 0.21 SD larger than programs lasting between six months and one year, the difference was not statistically significant [95]. There were limitations to the report. It was unclear which studies were eventually included in the analyses, and indeed the quality of those included studies, despite the fact that that the analyses controlled for study quality [95]. Furthermore, there was inadequate information on both outcome measurements (e.g. valid and reliable tools) and domains (e.g. language versus IQ). As a result, the overall quality was rated as low-moderate, and It was not possible to drawn any meaningful conclusions about the potential differential effect of various ECEC programs on different cognitive or academic outcomes.

The second meta-analysis reviewed international evidence (non-US) on the benefits of early childhood interventions for cognition, behaviour, health, and amount of schooling, [96]. The review included 30 interventions in 23 countries (developed and developing countries). Analyses revealed that there was a small advantage (average effect size) for child development outcomes in interventions of 1 and 3 years or more duration (ES 0.30–0.31), compared with programs less than 1 year (ES 0.20). However, the results were not disaggregated into short versus long-term effects. Importantly, the duration of intervention had positive effects on health outcomes, but negative effects on schooling. The review also found that, intervention programs involving just infants/toddlers had larger average effect sizes (0.34) in relation to child development outcomes (cognitive gains; behavioural change; health gains; and amount of schooling) compared with pre-kinder (0.28) and programs with both infants/toddlers and pre-kinder (0.19) [96]. Interventions that targeted a more defined age bracket (infants/toddlers) versus infants to pre-kinder age (3 and 4 years) were more consistently related to better behavioural outcomes. Notably, the estimated cognitive effects declined over time: 0.69 for immediate impact; 0.35 at ages 5–10, and 0.28 beyond age 10. Inadequate information on the studies that were included/excluded and the level of study quality beyond mention of study design (e.g., RCT versus quasi-experimental design) was a serious limitation of this meta-analysis.

The EPPE study, as mentioned previously, was the first major European longitudinal study investigating the effects of ECEC on children's cognitive, social, and behavioural development. This study included children from a range of socio-economic backgrounds, and a comparison group of children who had minimal or no ECEC experience (this study is now referred to as the EPPSE study as it also includes secondary school outcomes (The Effective Pre-school, Primary, and Secondary Education project)). There are several papers that reported on the short and longer-term outcomes of the EPPE study in regards to intellectual functioning and social emotional development. Results suggest that more hours

of group care (versus more hours of individual care e.g., grandparents/nannies) up to 18 months of age were related to higher cognitive scores, including a marginal effect on language [97]. Furthermore, results at age 3 years demonstrated that children who attended centre-based care (pre-school) before the age of 3 years had better cognitive skills at the start of the project (i.e. when assessed at age 3 years) compared with those who started at over 3 years old (controlling for other child, parent, and home environment factors) [61]. There was no difference between children who started before age 2 years and those who started between 2 and 3 years. Conversely, the data also indicated that starting early in a group setting, particularly before the age of 2, led to slightly increased behaviour problems at age 3 and 5 years [31]. The cognitive gains present at age 3 years for children attending pre-school early continued to be evident at school-age (***key stage 1***: 6-7 years) [31, 61]. In relation to duration, moderate to strong effects at entry to primary school (age 5) and in Years 1 and 2 (ages 6 and 7 respectively) were identified for duration (in months) of children's pre-school experience [31].

Results from the end of ***key stage 2*** (7 to 11 years) found that children who attended pre-school, compared with those who had minimal or no ECEC experience, had higher levels of attainment in English and mathematics; with effect sizes of 0.22 and 0.26 respectively reported. The type of pre-school attended was also important. Significant differences were found for English in relation to the type of pre-school attended, as compared with none attended, for: Playgroup (ES=0. 22); Private day nurseries (ES=0.28); Local authority day nurseries (ES=0.20); and Nursery School (ES=0.35). However, for Nursery Classes and Combined Centres, effect sizes were not significant: Nursery Class (ES=0.10) Combined Centres (ES=0.18). A similar pattern was found for outcomes in mathematics, with significant benefits for attainment for: Nursery Class (ES=0.20); Playgroup (ES=0.26); Private day nurseries (ES=0.31); Local authority day nurseries (ES=0.28); and Nursery Schools (ES=0.30) compared with no pre-school. There was no difference for Combined Centres (ES=0.22) [98].

The duration of attendance at pre-school (measured in months) was also of relevance. There was a statistically significant benefit for English for those who attended pre-school (compared with those with minimal or no ECEC) with the exception of the largest duration – over 36 months: Months 0-12 (ES=0.23); Months 12-24 (ES=0.20); Months 24-36 (ES=0.24); Months Over 36 (ES=0.20)[98]. For mathematics, each time period was statistically significant when compared to "no pre-school": Months 0-12 (ES=0.28); Months 12-24 (ES=0.24); Months 24-36 (ES=0.26); Months over 36 (ES=0.32). The findings suggest that there is no clear advantage for longer pre-school attendance related to better academic outcomes, but rather, suggest that attending pre-school at all is better than not attending at all [98].

The quality of pre-school was also found to be an important determinant of cognitive attainment. Results from the EPPE study cohort at age 11 years, found that children who attended low quality pre-schools no longer showed a significant cognitive benefit in attainment after six years in primary school, as compared with children who had minimal or no ECEC experience. This was also the case for children who attended medium quality pre-schools, for English but not Mathematics. It was also reported that the cognitive attainment of more disadvantaged children is enhanced by having attended high quality or highly effective pre-schools; however it was the more advantaged pupils that gained most from attending such pre-schools [98].

The EPPE study also looked at the social-behavioural development. Attending pre-school compared with staying at home still had a positive effect on 'Pro-social' behaviour at age 10 years [99, 100]. There was no difference between groups on any other dimensions of social-behavioural development. An early start at pre-school (i.e., before the age of 2 years) was significantly associated with better 'Pro-social behaviour', and was no longer associated with increased 'Anti-social' behaviour at age 10. This was in contrast to findings at earlier follow-up time points [31, 100]. As with cognitive development, it is the quality of the pre-school experience that matters. Children who attended higher quality pre-schools showed the most benefits in all-round social behavioural development at age 10 years, including 'Self-regulation' and 'Prosocial behaviour' [100]. In contrast, children without pre-school experience showed better outcomes for 'hyperactivity' (i.e., showed fewer hyperactive symptoms), when compared with children who attended pre-school [99, 100].

The National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (NICHD SECCYD) [23, 24], which has been mentioned previously, is part of the National Institutes of Health (NIH) and lies within the U.S. Department of Health and Human Services. This study aimed to collect data about different non-maternal child care arrangements, and about the children and families who do and do not use child care. There were four phases to the study, based on the ages of the children when the information or data were collected (Phase 1: 0-3 years; Phase 2: through first grade; Phase 3: through sixth grade; Phase 4: through ninth grade). The researchers collected data at 10 sites around the country. On average, children in the NICHD Study spent 27 hours each week in child care, between the ages of 6 months and 4½ years. The main findings for each phase of the study in relation to intensity and duration are as follows:

Phase 1 (0-3 years):

- Analyses (adjusted for maternal vocabulary score, family income, child gender, observed quality of the home environment, and observed maternal cognitive stimulation) indicated that the overall quality of child care, and language stimulation in particular, was consistently but modestly related to cognitive and language outcomes at ages 15, 24, and 36 months [101].

- After adjusting for child care quality, cumulative experience in centre-based care was associated with better outcomes than participation in other types of care.

- The cumulative number of hours in child care did not contribute to the prediction of children's cognitive or language development in any analysis [101].

Phase 2 Findings (through first grade):

- The more time children spent in any of a variety of non-maternal care arrangements across the first 4.5 years of life, the more externalising problems and conflict with adults were manifested at 54 months of age and in kindergarten (as reported by mothers, caregivers, and teachers) [102, 103].

- More time in care not only predicted problem behaviour as measured on a continuous scale in a dose-response pattern, but also, predicted at-risk (though not clinical) levels of problem behaviour, as well as assertiveness, disobedience, and aggression [102].

- The number of hours in centre care were also related to cognitive and language outcomes. More hours of childcare in infancy was associated with lower pre-academic test scores and more hours in the toddler period was associated with higher language scores [8, 13, 78, 104].

Phase 3 Findings (through sixth grade):

- The results indicated that although parenting was a stronger and more consistent predictor of children's development than early child-care experience, higher quality care predicted higher vocabulary scores and more exposure to centre care predicted more teacher-reported externalizing problems [105].

Phase 4 Findings (through ninth grade):

- Higher quality care predicted higher cognitive–academic achievement at age 15, with escalating positive effects at higher levels of quality [106].
- The association between quality and achievement was mediated, in part, by earlier child-care effects on achievement [106].
- High-quality early child care also predicted youth reports of less externalizing behaviour [106].
- More hours of non-relative care predicted greater risk-taking and impulsivity at age 15, relations that were partially mediated by earlier child-care effects on externalizing behaviours [106].

NICHD SECCYD is a landmark study and has involved considerable investment both financially and in terms of child follow-up and measurement. As such, the results from this study have received substantial attention and credibility. It should be noted, however, that the sample size is relatively small (n=1,300) and the follow-up phases suffered from significant attrition. Although scores were imputed for missing data, it is possible that it was missing in a systematic way (i.e. which ECEC refused to participate in quality measurement).

The Longitudinal Study of Australian Children (LSAC) follows the development of 10,000 children and their families from all parts of Australia. A report on the analysis of LSAC data (n=5,107) examined the relationship between children's early education and care from infancy through preschool and their cognitive and behavioural functioning in 1st grade. It was found that greater duration (number of years) and intensity (number of hours) of exposure to centre settings predicted small benefits for fluid intelligence, but no gains in vocabulary or academic skills. Greater duration and intensity of centre ECEC exposure was also predictive of behavioural issues (i.e., lower attention skills, higher conduct problems, and lower prosocial behaviours). Results were not moderated by family socio-economic resources (i.e., household income, parent's highest educational level, and home cognitive stimulation) [107].

The Effective Pre-school Provision in Northern Ireland (EPPNI) project [108], the North Ireland counterpart of the EPPE study as previously mentioned, is a longitudinal study of child development

from 3 to 11 years. The cohort included 683 children randomly selected from 80 preschools, and 151 children recruited without preschool experience. Analyses revealed that preschool experience was related to performance in English and mathematics at age 11. Specifically, high-quality preschools showed consistent effects that were reflected not only in improved attainment at age 11 years in English and mathematics, but also, in improved progress in mathematics over primary school. Children who attended high-quality preschools were 2.4 times more likely to attain Level 5 in English, and 3.4 times more likely to attain Level 5 in mathematics, compared with children without preschool experience [108].

Trends in International Mathematics and Science Study (TIMSS) & Progress in International Reading Literacy Study (PIRLS) [109, 110].

TIMSS and PIRLS are large-scale assessments designed to inform educational policy and practice by providing an international perspective on teaching and learning, in mathematics and science in the case of TIMSS, and reading literacy in the case of PIRLS. TIMSS conducts comprehensive assessments of mathematics and science for students in Year 4 and Year 8. This is combined with extensive data about country, school, and classroom learning environments. TIMSS was first conducted in 1995, and reports every four years on the achievement of Year 4 and Year 8 students. More than 60 developed and developing countries from across the world participated in TIMSS in 2015. Australia has participated in all six TIMMS cycles, with over 570 schools and more than 16 000 students at Year 4 and Year 8 involved. PIRLS involves comprehensive reading literacy assessments for Year 4 students, and has been conducted every five years since 2001. Around 50 countries and 11 benchmarking entities participated in PIRLS 2016. Australia participated in PIRLS for the first time in 2011, and in 2016 around 286 Australian schools with over 6000 students in Year 4 involved.

Results from TIMMS and PIRLS show that in the countries with near-universal participation in early education and care (>70 per cent), there is a strong correlation between pre-primary education and grade 4 test scores [109, 110]. Attendance in pre-primary education differed dramatically from country to country. However, on average, the fourth grade students with at least 3 years of pre-primary education (43%), or even more than one year (33%), had higher average achievement than their counterparts with only one year or less of pre-primary education. Most notably, the 13% of students, on average, that did not attend preschool, had much lower than average mathematics achievement [109].

Child Care and Early Education Quality Features, Thresholds and Dosage and Child Outcomes project (USA). The overarching goal of this project was to examine existing evidence and provide new evidence on the issue of early education and care. The literature review examined research data on quality and the threshold of dosage related to child outcomes. The review revealed that greater exposure to centre-based care was associated with stronger cognitive outcomes in young children. However, the results were inconsistent for social outcomes. The researchers also found that in more recent research, greater sustained exposure to high quality care was found to narrow the gap on measures of achievement between children from low versus high income backgrounds [72].

Appendix F provides a citation list by evidence ranking (“supported”, “promising”, “not supported”).

Summary

Starting Age

There was only one systematic review or meta-analysis of moderate quality and risk of bias that evaluated the effect sizes of starting age in relation to cognitive and academic achievement [95]. This work revealed that programs commencing before age 3 had larger effect sizes in comparison with programs that started later. The longitudinal EPPE study provided support for programs that start early (0 to 3 years) across all domains of functioning. Another high quality trial (NICHD SECCYD) presented data which suggested that earlier starting ages are "Promising" for cognitive and academic achievement. The evidence-base related to starting age and social-emotional outcomes was more variable than for academic and cognitive achievement, however local data suggest that starting early (2 to 3 years) is related to *poorer* outcomes in this domain [107]. The NICHD study also reported poorer social-emotional outcomes with earlier starting ages [102] [103], and the findings of the EPPE study varied depending on when the follow-up occurred, some demonstrating a positive effect [111], others negative consequences [31].

The evidence is not clear-cut across domains of functioning (cognition and language, academic, and social-emotional), however a starting age between 3 and 4 years provides the best balance of outcomes with no "risk or harm" documented in the studies reviewed.

Program Duration

Two meta-analyses examined program duration in relation to cognitive and academic achievement. One was of moderate quality and risk of bias, and reported that programs longer than two years were associated with moderate increases in effect size for cognitive and academic outcomes [95]. This study was therefore rated as *Promising* for programs lasting two years or longer. The other meta-analysis was of low quality, with several sources of bias identified [96]. However, it found a small advantage for child developmental outcomes for programs with durations of one and three years. This study was rated as *Promising* for programs of three years or more.

The EPPE study was the only longitudinal international trial to report on program duration. The study found that high quality preschool coupled with longer duration (two to three years) had the strongest effect on cognition and academic achievement, and demonstrated sustained benefits of approximately two to four years [31]. This was supported by another EPPE follow-up approximately four years later, which showed that preschool duration of between 24 and 36 months had the largest positive effects on English at age 7 to 11 [98].

Local data from LSAC showed that program durations from two to more than three years resulted in cognitive and academic gains, but had detrimental effects on social-emotional outcomes [107]. Data from TIMSS and PIRLS studies supported programs of at least three years related to academic achievement [109, 110].

On balance, the evidence related to duration *Supports* programs of two years. Although there was good evidence for programs between two and three years' duration for cognitive and academic achievement, there was also some evidence (local data) which suggests programs longer than two years have detrimental effects on social-emotional outcomes.

Program Dose (intensity)

The EPPE study provided support for part-time universal provision of ECEC, which is consistent with local data from the LSAC [31] [108] [107]. Several papers reporting on the US-based NICHD Study found evidence for a positive relationship between full time provision of ECEC during toddlerhood and higher language scores; but also found that greater hours of ECEC in infancy was related to lower pre-academic scores [8, 13, 78, 104]. The NICHD studies also reported that higher ECEC doses (average of 27 hours per week) related to poorer social-emotional outcomes in grade one of school.

Due to the potential detrimental effect of full time provision of ECEC on child outcomes, the evidence best *Supports* part-time provision for universal access.

Universal participation indicator

Proportion of all children attending ECEC for 15 hours or more per week, for the two years before starting formal school

Targeted provision of ECEC

The findings for the targeted provision of ECEC are detailed below, and an overview of the overall evidence ranking for this topic is presented in *Table 7*. See Appendix G for a detailed list of the evidence; individual studies were ranked as ("supported", "promising", "not supported").

Table 7: Summary of the overall evidence base; starting age, program duration, program dose (targeted) – duplicated table

STARTING AGE	COGNITIVE & LANGUAGE	ACADEMIC	SOCIAL-EMOTIONAL
0-2 years	• Supported	• Supported	• Supported
2-3 years	• Not adequately addressed in target evidence-base	• Supported	• Not supported
3-4 years	• Supported	• Supported	• Supported
4-5 years	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base

PROGRAM DURATION	COGNITIVE & LANGUAGE	ACADEMIC	SOCIAL-EMOTIONAL
Less than 1 year	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base
1-2 years	• Supported	• Supported	• Supported
2-3 years	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base
More than 3 years	• Supported	• Supported	• Supported

PROGRAM DOSE	COGNITIVE & LANGUAGE	ACADEMIC	SOCIAL-EMOTIONAL
Part time	• Supported	• Supported	• Supported
Full time (> 15 hours)	• Supported	• Supported	• Supported

Starting Age, Intensity (dose) & Program Duration

The Abecedarian Project [112] is a longitudinal study, beginning in the 1970's, which targeted African-American mothers with low IQ and low income in North Carolina. One hundred and eleven children of

these mothers were randomised into 2 groups. The intervention group participated in a full-time program, involving centre-based care and home-visits from 3 months of age until school-age (5 to 8 years). The control group received family support, social services, low-cost or free paediatric care, and child nutritional supplements but no additional childcare. The ECEC program had one qualified early childhood educator for (a) every three infants and toddlers until age 3, and (b) every 6 children over age 3 years. The program focused on language, cognitive, perceptual-motor, and social aspects of development.

Study participants were assessed during the intervention years on a range of developmental domains, with assessments at 6, 12, 18, 24, 30, 42, 48, and 54 months of age. Results indicated that children who participated in the intervention arm of the project out-performed control participants on every follow-up test from 18 months to 54 months. Of note, intervention participants consistently scored in the "average" range, whereas children in the control group scored in the "below average" range from 18 months (having scored in the "average" range up until 12 months of age) [113].

Subsequent follow-up of families who participated in the Abecedarian project were conducted at age 5, 8, 12, 15, and 21 years. Results indicated that the positive effects of ECEC on cognition and academic skills continued through primary school [114], and persisted to age 15 years [112, 115]. The effect for cognitive outcomes in elementary school was reported to be 0.71 SD [116]. The results generally supported an intensity hypothesis, in that scores on cognitive and academic achievement measures increased as the duration of treatment increased [112]. Furthermore, there were positive educational, occupational, and socio-emotional outcomes identified in young adulthood, showing the long-term positive effects of the Abecedarian project [117, 118]. As with other follow-ups on the Abecedarian Project, earlier starts in ECEC resulted in larger effect sizes [118, 119].

Early Head Start, a US federal intervention program, began in 1995 and targeted disadvantaged communities, serving parents and children from birth to age 3 years [120]. Early Head Start aimed to promote children's development and provided childcare, developmental assessments, and health and parenting services. There were 3 models of intervention; centre-based, home visiting, and a combination of the two.

Early Head Start was later evaluated through a RCT across 17 sites in the US, including 3,001 families; intervention group (n=1,513) and control group (n=1,488). The RCT involved a comprehensive follow-up of children and families at the end of the Head Start program, when children were aged 3 years. The trial found that children participating in the program performed better than control children in cognitive and language development, and showed higher emotional engagement sustained attention, and lower aggression [120]. Inferences, based on the findings above, regarding optimal starting age and program duration are complicated by the fact that there was variably around when children entered and left the Early Head Start program. For example, programs had latitude as to when to enrol families—in the prenatal period or during the first year of life. The average age at random assignment was 5 months, with one quarter of the families enrolling while the mother was still pregnant. The average length of enrolment for Early Head Start families in the research sample was 22 months. Results

imply that a starting age between 0-5 months for approximately 2 years result in positive cognitive, language, and social gains.

Subgroup analyses examining the effect of the mode of delivery (i.e. centre-based, home-based, or both) found that the mixed approach resulted in significant gains for children in language and social-emotional domains as compared with the control group. Additionally, parents in the mixed approach group were rated as more supportive and less detached during play, were more likely to read to their child daily, and a smaller number reported spanking their child when compared with the control group [120].

The Milwaukee Project [121], was designed to facilitate the intellectual development of very young, disadvantaged children. The Milwaukee Project employed an intensive (full day) educational program that was child-oriented and centre-based. The program was for very young, high-risk children, beginning before 6 months of age and finishing at school-age. The program also provided job and academic training for mothers. The original cohort was selected from 40 newborns who had a mother with an IQ lower than 80.

The development of the intervention cohort was assessed from infancy through to age 15 years (n=17) and compared with a control group (n=18). Effects of the program on IQ at age 6 years showed that all intervention children had higher IQs than controls, with an average gain of 25 points. Although IQ declined after leaving the program, there were still beneficial effects reported into adolescence [121]. Academic achievement on the other hand, was reported to be similar in both groups at age 14 years. It is important to note that the Milwaukee Project had a small sample size and a relatively high attrition rate, making the findings difficult to generalise. Thus for the purposes of this report, the results have been rated as *Promising*.

Project Care, run by the team involved in the Abecedarian Project, was a RCT involving 65 families, with 2 intervention arms and one control condition. The most intensive intervention included family education combined with a centre-based educational day-care program; and the less intensive intervention group received the home-based family education program only. The control group receive neither [122]. The program targeted low income African-American families, starting shortly after birth and continued for a period of 54 months. It was unclear how many hours of centre-based educational care were received.

Children were assessed using (a) the Bayley Scales of Infant Development at 6, 12, and 18 months of age, (b) the Stanford-Binet Intelligence Test at 24, 36, and 48 months, and (c) the McCarthy Scales of Children's Abilities at 30, 42, and 54 months. Children in the educational day-care plus family support group scored higher on each of the tests compared with the other intervention group and the control condition [122].

This study is limited by the small sample size and insufficient data surrounding duration and intensity of attendance. The population studied (i.e. African-America families) is specific to the USA and as such, the findings of the study may not be generalisable or applicable to the Australian context. As a result, this program was rated as *Promising*.

The Perry Preschool Project is a longitudinal study that began in the 1960's, for children aged 3 years from African-American families and low socio-economic status. One hundred and twenty-three children with IQs lower than 90 were randomly assigned to intervention (n=58) or control (n=65). The control group did not receive a preschool program. The intervention group received a centre-based program run for half a day, 5 days a week, supplemented by 90-minute weekly home visits. The intervention condition involved high-quality educationally oriented curriculum (High Scope curriculum – active participatory learning) and well-trained staff. Preschool was provided each weekday morning in 2.5-hour sessions taught by certified public school teachers with at least a bachelor's degree. About 75 percent of the children participated for two school years (at ages 3 and 4); the remainder participated for one year (at age 4). The teachers also provided a weekly 1.5-hour home visit to each mother and child, designed to involve the mother in the educational process and help implement the preschool curriculum at home.

Follow-up data from program has suggested that at the end of the program when children were aged 5-6 years, language and general cognitive ability had improved for the intervention group as compared with the control group. IQ gains were no longer apparent at age 8 years, however gains in academic skills (reading and maths) were present and remained so at age 14 and 27 [123]. In addition, the intervention group had better classroom and personal behaviour as reported by teachers.

Although there were very few reported group differences in intellectual and academic performance between ages 15 and 23 years, a pattern of group differences in community behaviour did emerge at age 15 and became more pronounced at age 23. These differences were revealed in follow-up studies, conducted when participants were aged 27 and 40 years. The follow-up data demonstrated that the intervention group experienced less youth misconduct, fewer years of special education, reduced drug use, reduced teen pregnancy, enhanced employment, reduced welfare dependence, reduced crime, and a higher high school graduation rate [123-125].

A study on the Perry Preschool Project which performed a cost-benefit analysis [125] reported that the program had significant individual financial benefits and financial benefits to the general public. The treatment group were reported as having significantly higher earnings at age 40 years. For the general public, higher tax revenues, lower criminal justice system expenditures, and lower welfare payments easily outweighed program costs; they repay $12.90 for every $1 invested. Program gains were mainly from reduced crime by males [125].

Major strengths of this study were the low attrition rate and the long follow-up period (data on 91 to 94% of participants were included up until age 40 years). Although the effects of this program on cognitive and academic gains were limited, the social and financial benefits were significant.

Head Start

The Head Start program was initiated in the 1960s. It typically includes centre-based early education and care from 3 years of age on at least a half-time basis. The Head Start intervention is federally funded, but administered by each US state independently. As such, the program varies considerably between and even within states, which makes the program difficult to evaluate as the results are unlikely to be comparable between sites.

To this end, it is difficult to synthesise the findings on this program. However, Bloom and Weiland (2015) have provided a comprehensive analysis of variation in Head Start effects across individual children, policy-relevant subgroups of children, and Head Start centres. This was performed by using data from the Head Start Impact Study - a nationally representative multi-site randomised trial. As expected, past estimates of the average effect of Head Start programs mask a wide range of relative program effectiveness [126]. The following points are a summary of the main findings from this study:

- Head Start produced a "compensatory" pattern of effects that increased cognitive outcomes the most for the children with the weakest initial cognitive skills. This tended to equalise cognitive skills across program participants.

- Head Start increased cognitive outcomes more for dual language learners and Spanish-speaking children (two highly overlapping subgroups) than for other children. This suggests that much of the program's effect on cognitive outcomes represents "compensation" for limited prior English.

- The Head Start "treatment contrast" (differences between key features of individual Head Start programs and their local alternatives, including parent care) varied substantially across Head Start centres, reflecting the fact that the "value added" by any Head Start program depends on both the program itself and the quantity and quality of other local options for early child education. For example, there was substantial variation in the treatment contrast with respect to hours of care, teacher education, and classroom quality.

- Head Start effects on cognitive and socio-emotional outcomes relative to those of local alternatives varied substantially across Head Start centres. Some Head Start centres were much more effective than their alternatives, while others are much less effective than their alternatives, with a broad range of centres operating between these extremes.

[126].

Due to the issues discussed above, it is difficult to summarise the potential benefits of the Head Start program. However, it appears that cognitive, educational, and social gains are possible and that the quality of such programs is a significant determining factor.

<u>The Effective Provision of Pre-School Education (EPPE) study</u>

The EPPE study (described in more detail above) was not designed specifically for highly vulnerable families. However, subgroup analyses at Key Stage 2 were undertaken to understand the differential effect of attending pre-school at age 2 compared with age 3 years or older for varying degrees of disadvantage. No differential effects were found in academic or social-behavioural outcomes for children eligible for Free School Meals and for children whose mothers had low educational qualifications, as compared with mothers who had higher educational qualifications. However, children classified as "high multiple disadvantage" who attended pre-school at age 2 compared with 3 years or older, were found to have better English attainment in Year 6 (ES=0.19). Furthermore, children from families with a medium-level income and children from families of medium-level socio-economic status (SES) (i.e., skilled manual/skilled non-manual) had better "self-regulation" in Year 6 if they started

preschool at age 2, compared to those who started pre-school later at age 3 years or older (ES=0.18 for medium SES and ES=0.22 for medium income level). Controlling for significant background characteristics (e.g., gender, home learning environment), there were also differential effects for children who came from unemployed families. Children from this background who started pre-school at age 2 years had worse 'pro-social' behaviour in Year 6 compared with children from similar families who started pre-school at age 3 years or older (ES=-0.35). There were no other significant differential effects on social-behavioural outcomes (hyperactivity, self-regulation, and anti-social behaviour) for other measures of disadvantage (e.g., SES, level of mother's qualification) [111].

Appendix G provides a citation list by evidence ranking ("supported", "promising", "not supported").

Summary of Targeted provision

Starting Age

For highly vulnerable children and families (with low socio-economic status or risk of low IQ), the developmental benefit of targeted provision of ECEC - and an early starting age of 0-2 years - is well supported by evidence from the Abecedarian Project (e.g. [112, 117, 118]). This was a well-designed randomised controlled trial, with multiple follow-up studies ranging from 18 months to adulthood. The Early Head Start program also supports an early start to ECEC, with benefits across all domains [120]. Two other US-based programs (Milwaukee Project and Project Care), were rated as *Promising* in relation to a starting age of 0-2 years for improved outcomes for cognition and language [121, 122], due to their small sample size and selective populations (i.e. low IQ; African-American mothers) which affects the generalisability to the Australian context.

The EPPE study examined academic and social-emotional outcomes in a subset of disadvantaged children who attended preschool at either 2 years or 3 years. A positive association was reported for English attainment, however there were some negative associations with prosocial behaviour [111].

The Perry Preschool Project, on the other hand, found positive associations between a starting age 3-4 years and cognition, academic achievement, and social-emotional functioning [123-125].

Most of the population samples of the aforementioned studies are drawn from the US and may differ in some meaningful ways, affecting the generalisability and applicability to the Australian context. For example, most of the targeted samples are drawn from predominantly African-America populations and are from 1960s and 1970s. On balance, children from at-risk backgrounds would likely benefit from an earlier start to ECEC compared with the general population. Data *Support* a starting age of 0 to 2 years.

Program Duration

The Abecedarian Project demonstrated a positive association between ECEC for greater than 3 years duration and cognitive, academic, and social-emotional outcomes [112, 118, 119, 127]. Findings from the Milwaukee Project and Project Care were consistent with these results [121, 122], but were rated as *Promising* due to the small sample size and selective populations (i.e. low IQ; African-American mothers), which affect their generalisability to the Australian context.

The Early Head Start program and the Perry Preschool Project support programs of two years across all three outcome dimensions (cognitive, academic, and social-emotional).

Unlike for the universal provision of ECEC, there was no evidence of an increased risk of social-emotional difficulties associated with programs of longer duration for targeted provision of ECEC. The limitations noted above regarding generalisability and applicability to the Australian context are also relevant here, however given the quantity and relative strength of the Abecedarian findings the evidence *Supports* programs of at least 3 years duration.

Program Dose (intensity)

There was limited data available to compare the relative benefit of higher levels of ECEC intensity. However, the results of the Abecedarian project are convincing - suggesting full time provision is related to better cognitive and language, academic, and social-emotional outcomes in both the short- and long-term [112, 118, 119, 127].

The Perry Preschool project (part-time provision) reported significant social gains over a sustained period into adulthood, as well as 1 – 2 year sustained cognitive and language benefits.

The research regarding program dose for children from disadvantaged backgrounds *Supports* full time provision; noting that there are some potential issues with the generalisability (US-based research, selective samples of low IQ, African-American people).

Targeted participation indicator

Proportion of all children experiencing disadvantage who attend ECEC for 15 hours or more per week, for at least three years before starting formal school

ECEC Quantity

The search strategy utilised did not yield any relevant studies related to quantity. However nationally, Australia collects data on 2 relevant workforce metrics:

- The proportion of paid primary contact staff employed at approved child care services with a relevant formal qualification (at or above Certificate level III), or three or more years of relevant experience
- The proportion of teachers delivering preschool programs (across all services) who are at least three year university trained and early childhood qualified. Teachers are defined using the following worker roles: principal/director/coordinator/teacher in charge and group leader/teacher. At least three year university trained includes: 'Bachelor degree (3 years or more equivalent)', 'Bachelor Degree (4 years pass and honours)', 'Graduate diploma/certificate and above.'

Data for the first measure is collected through the National Early Childhood Education and Care Workforce Census. Data for the second comes from 'Microdata: Preschool Education, Australia' which is part of the National Early Childhood Education and Care Collection.

There is no national measure/indicator for service availability.

The determination of required quantity of ECEC services in a given community is a function of the size of the population, the portion of the population participating, and the effort required to provide the right standard of care. This is largely a practical consideration, and the literature reviewed did not provide any specific data related to this driver. However, there are two dimensions that are related to quantity:

- Is there sufficient ECEC infrastructure? i.e., the number of ECEC places per defined population (per 15 hours).
- Is there sufficient workforce? i.e., the number of ECEC workers/teachers.

Quantity indicator

The number of ECEC places for 15 hours per week available to 2-5 year olds

CONCLUSIONS

Using the factors identified in the research literature, key indicators were developed using quality, quantity, and participation metrics that informed the development of an evidence-based benchmark framework for ECEC.

ECEC quality indicators

Restacking the Odds **proposes using the evidence related to the Quality Areas to recalibrate how a service is rated for overall quality, by emphasising the three Quality Areas that have a significant effect on child outcomes.**

The current Quality Rating System

A service can receive an overall "Exceeds" the National Quality Standard if:
The service meets *all* standards and receives an Exceeds National Quality Standard rating in at least four Quality Areas, including at least two of the following areas:

- QA1 - Educational program and practice
- QA5 - Relationships with children
- QA6 - Collaborative partnerships with families and communities
- QA7 - Leadership and service management

Restacking the Odds Quality Rating System

To receive an exceeding rating, a service would need to attain an *Exceeds* National Quality Standard rating in all three evidence-based Quality Areas:

- QA1 – Educational program and practice
- QA4 – Staffing arrangements
- QA5 – Relationships with children

And must at least "Meet" the National Quality Standard in the remaining four Quality Areas.

Quality indicator

The proportion of ECEC services rated 'exceeding' the standard in quality areas 1, 4 and 5 and at least 'meeting' the standard in all other quality areas according to the ACECQA assessment

ECEC participation indicators

Universal Provision

Two indicators were selected that encapsulated the three factors related to participation; one pertained to universal participation whilst the other related to targeted participation of ECEC. The indicators were:

- The proportion of all children, aged 3 to 5 years in a given area, who attend ECEC for at least 15 hours per week.

- The proportion of children, aged 2 to 5 years in a given area, from disadvantaged backgrounds and/or with special needs (children residing in an area with a Socio-Economic Index for Areas [SEIFA] Index of Relative Socio-economic Disadvantage [IRSD] quintile of 1, non-English speaking background, Aboriginal and Torres Strait Islander children, children with disability) who attend ECEC for at least 15 hours per week.

Current Australian Indicators

Nationally, Australia collects participation data on subgroups of children who are considered "targeted special needs" and "disadvantaged", as follows:

- The proportion of children aged 3–5 years enrolled in a preschool program who are from targeted special needs groups (non-English speaking background, Aboriginal and Torres Strait Islander children, children with disability & children from regional & remote areas);

- The proportion of children aged 4 to 5 years enrolled in a preschool program in the year before school who are disadvantaged (residing in an area with a Socio-Economic Index for Areas (SEIFA) Index of Relative Socio-economic Disadvantage [IRSD] quintile of 1).

The national indicators do not provide sufficient information about whether the level of participation in ECEC is reaching the level research has identified as important to benefit child outcomes. Over the next three years *Restacking the Odds* will endeavour to collect *actual* attendance data (i.e. not enrolment data) on the 2 indicators.

Universal participation indicator

Proportion of all children attending ECEC for 15 hours or more per week, for the two years before starting formal school

Targeted participation indicator

Proportion of all children experiencing disadvantage who attend ECEC for 15 hours or more per week, for at least three years before starting formal school

ECEC quantity indicators

The determination of the required quantity of ECEC services in a given community is a function of the size of the population, the portion of the population participating, and the effort required to provide the right standard of care. This is largely a practical consideration, and the literature reviewed did not provide any specific data related to this driver. However, there were two dimensions that were related to quantity:

- Is there sufficient ECEC infrastructure? i.e., number of ECEC places per defined population (per 15 hours).

- Is there sufficient workforce? i.e., number of ECEC workers/teachers.

Current Australian Indicators

Nationally, Australia collects data on 2 relevant workforce metrics:

- The proportion of workers delivering preschool programs who are at least three year university trained and early childhood qualified.
- The proportion of teachers delivering preschool programs who are at least three year university trained and early childhood qualified.

There is no national measure/indicator for service availability.

> **Quantity indicator**
>
> The number of ECEC places for 15 hours per week available to 2-5 year olds

Strengths of approach

One of the major strengths of the approach used was that it was pragmatic, fitting within already established systems and processes. To this end, there were no attempts to reinvent new methods and metrics, but rather we utilised an already well established national quality rating system.

Limitations of approach

By utilising a targeted restricted review methodology certain concessions are made about the depth and breadth of the reviewed literature. Therefore, we did not systematically critique all relevant literature with the broad quality areas review. This means that there may be a number of relevant trials and studies that could add value to the literature summarised in this review.

Implications

The preliminary indicators and thresholds we have selected will help identify gaps and priorities for ECEC in Australian communities. We will test them in ten communities over the next three years to determine which are pragmatic to collect, resonate with communities, and provide robust measures to stimulate community and government action. We will follow a similar path for the other four fundamental strategies that Restacking the Odds is focusing on – antenatal care, sustained nurse home visiting, parenting programs, and the early years of school.

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APPENDICES

Appendix A: National Quality Standards

Elements	
Quality Area 1: Educational program and practice	
Standard 1.1	An approved learning framework informs the development of a curriculum that enhances each child's learning and development
1.1.1	Curriculum decision making contributes to each child's learning and development outcomes in relation to their identity, connection with community, wellbeing, confidence as learners and effectiveness as communicators
1.1.2	Each child's current knowledge, ideas, culture, abilities and interests are the foundation of the program
1.1.3	The program, including routines, is organised in ways that maximise opportunities for each child's learning
1.1.4	The documentation about each child's program and progress is available to families
1.1.5	Every child is supported to participate in the program
1.1.6	Each child's agency is promoted, enabling them to make choices and decisions and influence events and their world
Standard 1.2	Educators and co-ordinators are focused, active and reflective in designing and delivering the program for each child
1.2.1	Each child's learning and development is assessed as part of an ongoing cycle of planning, documenting and evaluation
1.2.2	Educators respond to children's ideas and play and use intentional teaching to scaffold and extend each child's learning
1.2.3	Critical reflection on children's learning and development, both as individuals and in groups, is regularly used to implement the program
Quality Area 2: Children's health and safety	
Standard 2.1	Each child's health is promoted
2.1.1	Each child's health needs are supported
2.1.2	Each child's comfort is provided for and there are appropriate opportunities to meet each child's need for sleep, rest and relaxation
2.1.3	Effective hygiene practices are promoted and implemented
2.1.4	Steps are taken to control the spread of infectious diseases and to manage injuries and illness, in accordance with recognised guidelines
Standard 2.2	Healthy eating and physical activity are embedded in the program for children
2.2.1	Healthy eating is promoted and food and drinks provided by the service are nutritious and appropriate for each child
2.2.2	Physical activity is promoted through planned and spontaneous experiences and is appropriate for each child
Standard 2.3	Each child is protected
2.3.1	Children are adequately supervised at all times
2.3.2	Every reasonable precaution is taken to protect children from harm and any hazard likely to cause injury
2.3.3	Plans to effectively manage incidents and emergencies are developed in consultation with relevant authorities, practised and implemented
2.3.4	Educators, co-ordinators and staff members are aware of their roles and responsibilities to respond to every child at risk of abuse or neglect
Quality Area 3: Physical environment	

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Standard 3.1	The design and location of the premises is appropriate for the operation of a service
3.1.1	Outdoor and indoor spaces, buildings, furniture, equipment, facilities and resources are suitable for their purpose
3.1.2	Premises, furniture and equipment are safe, clean and well maintained
3.1.3	Facilities are designed or adapted to ensure access and participation by every child in the service and to allow flexible use, and interaction between indoor and outdoor space
Standard 3.2	The environment is inclusive, promotes competence, independent exploration and learning through play
3.2.1	Outdoor and indoor spaces are designed and organised to engage every child in quality experiences in both built and natural environments
3.2.2	Resources, materials and equipment are sufficient in number, organised in ways that ensure appropriate and effective implementation of the program and allow for multiple uses
Standard 3.3	The service takes an active role in caring for its environment and contributes to a sustainable future
3.3.1	Sustainable practices are embedded in service operations
3.3.2	Children are supported to become environmentally responsible and show respect for the environment
Quality Area 4: Staffing arrangements	
Standard 4.1	Staffing arrangements enhance children's learning and development and ensure their safety and wellbeing
4.1.1	Educator-to-child ratios and qualification requirements are maintained at all times
Standard 4.2	Educators, co-ordinators and staff members are respectful and ethical
4.2.1	Professional standards guide practice, interactions and relationships
4.2.2	Educators, co-ordinators and staff members work collaboratively and affirm, challenge, support and learn from each other to further develop their skills, to improve practice and relationships
4.2.3	Interactions convey mutual respect, equity and recognition of each other's strengths and skills
Quality Area 5: Relationships with children	
Standard 5.1	Respectful and equitable relationships are developed and maintained with each child
5.1.1	Interactions with each child are warm, responsive and build trusting relationships
5.1.2	Every child is able to engage with educators in meaningful, open interactions that support the acquisition of skills for life and learning
5.1.3	Each child is supported to feel secure, confident and included
Standard 5.2	Each child is supported to build and maintain sensitive and responsive relationships with other children and adults
5.2.1	Each child is supported to work with, learn from and help others through collaborative learning opportunities
5.2.2	Each child is supported to manage their own behaviour, respond appropriately to the behaviour of others and communicate effectively to resolve conflicts
5.2.3	The dignity and rights of every child are maintained at all times
Quality Area 6: Collaborative partnerships with families and communities	
Standard 6.1	Respectful supportive relationships with families are developed and maintained
6.1.1	There is an effective enrolment and orientation process for families
6.1.2	Families have opportunities to be involved in the service and contribute to service decisions

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6.1.3	Current information about the service is available to families
Standard 6.2	Families are supported in their parenting role and their values and beliefs about child rearing are respected
6.2.1	The expertise of families is recognised and they share in decision making about their child's learning and wellbeing
6.2.2	Current information is available to families about community services and resources to support parenting and family wellbeing
Standard 6.3	The service collaborates with other organisations and service providers to enhance children's learning and wellbeing
6.3.1	Links with relevant community and support agencies are established and maintained
6.3.2	Continuity of learning and transitions for each child are supported by sharing relevant information and clarifying responsibilities
6.3.3	Access to inclusion and support assistance is facilitated
6.3.4	The service builds relationships and engages with their local community
Quality Area 7: Leadership and service management	
Standard 7.1	Effective leadership promotes a positive organisational culture and builds a professional learning community
7.1.1	Appropriate governance arrangements are in place to manage the service
7.1.2	The induction of educators, co-ordinators and staff members is comprehensive
7.1.3	Every effort is made to promote continuity of educators and co-ordinators at the service
7.1.4	Provision is made to ensure a suitably qualified and experienced educator or co-ordinator leads the development of the curriculum and ensures the establishment of clear goals and expectations for teaching and learning
7.1.5	Adults working with children and those engaged in management of the service or residing on the premises are fit and proper
Standard 7.2	There is a commitment to continuous improvement
7.2.1	A statement of philosophy is developed and guides all aspects of the service's operations
7.2.2	The performance of educators, co-ordinators and staff members is evaluated and individual development plans are in place to support performance improvement
7.2.3	An effective self-assessment and quality improvement process is in place
Standard 7.3	Administrative systems enable the effective management of a quality service
7.3.1	Records and information are stored appropriately to ensure confidentiality, are available from the service and are maintained in accordance with legislative requirements
7.3.2	Administrative systems are established and maintained to ensure the effective operation of the service
7.3.3	The Regulatory Authority is notified of any relevant changes to the operation of the service, of serious incidents and any complaints which allege a breach of legislation
7.3.4	Processes are in place to ensure that all grievances and complaints are addressed, investigated fairly and documented in a timely manner
7.3.5	Service practices are based on effectively documented policies and procedures that are available at the service and reviewed regularly

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Appendix B: NQS comparison with European Commission Quality Statements & Standardised Measures of Quality

National Quality Framework (NQS) for ECEC	Classroom Assessment Scoring System (CLASS)	Early Childhood Environment Rating Scale - Revised (ECERS-R)	European Commission Key principles of a Quality Framework
Quality Area 1: Educational programs and practice			
An approved learning framework informs the development of a curriculum that enhances each child's learning and development. Educators and co-ordinators are focused, active and reflective in designing and delivering the program for each child.	**Classroom Organization**: Productivity: How well teachers manage instructional time and routines so that students have the maximum number of opportunities to learn. **Instructional Support:** Concept Development: The degree to which instructional discussions and activities promote students' higher-order thinking skills versus a focus on rote and fact-based learning. **Instructional Support**: Language Modelling: The quality and amount of teachers' use of language stimulation and language-facilitation techniques during individual, small-group, and large-group interactions with children. **Instructional Support**: Literacy Focus: Reflects the quality with which teachers deliver activities focusing children on "code units" of early literacy (e.g., letters, words, phonemes) **Emotional support:** Teacher sensitivity: Encompasses teachers' responsivity to students' needs and awareness of students' level of academic and emotional functioning. The highly sensitive teacher helps students see adults as a resource and creates an environment in which students feel safe and free to explore and learn	**Language Reasoning**: Encourage children to communicate: Activities and materials that promote language development should be available for use throughout the classroom and the daily schedule. Teachers should establish an environment where language exploration and usage is encouraged. **Interactions**: Supervision of gross motor activities: Caregivers should use gross motor activities as learning opportunities to promote positive social interactions and to encourage the development of skills and new experiences. **Program Structure**; Group time: In group-care situations, the focus needs to be on meeting individual needs and guiding children as they interact in small groups. Whole group activities should be kept to a minimum and limited to gatherings that follow the interests and involvement of the children. **Language Reasoning**; Using language to develop reasoning skills: Children are encouraged to talk through their thought processes.	**Statement 5**; a curriculum based on pedagogic goals, values and approaches which enable children to reach their full potential in a holistic way. **Statement 6;** a curriculum which requires staff to collaborate with children, colleagues and parents and to reflect on their own practice**.**
Quality Area 2: Children's health and safety			

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National Quality Framework (NQS) for ECEC	Classroom Assessment Scoring System (CLASS)	Early Childhood Environment Rating Scale - Revised (ECERS-R)	European Commission Key principles of a Quality Framework
Each child's health is promoted.		**Personal care routines**; Nap/Rest: Nap and/or rest time should be appropriately scheduled and supervised for the children in the group. Adequate separation of cots helps to prevent the spread of germs. Soft music or a soothing story helps to facilitate a peaceful rest time that is important in helping children to balance the day and renew their energy. **Personal care routines;** Health practices: Practicing preventive measures, such as washing hands after handling pets or wiping noses, help to educate children to achieve life-long health practices. Taking appropriate action when children are sick will minimize the spread of germs. **Personal care routines**; Safety practices: Protecting children is critical in providing quality care, whether through adequate supervision or minimizing hazards both inside and outside. Caregivers should anticipate potential safety problems and demonstrate, model, and teach children safe practices. **Space and furnishings**; Gross motor play: Children need daily opportunities to exercise large muscles, run in open spaces, and practice gross motor skills. (Safety is always a number one priority.) Space to develop children's large muscles through a variety of play experiences should be made safe by providing adequate cushioning for fall zones. All play equipment should be safe and effective monitoring should be implemented to teach children safe play behavior and to safeguard against accidents.	
Healthy eating and physical activity are embedded in the program for children.			
Each child is protected.			
Quality Area 3: Physical environment			

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National Quality Framework (NQS) for ECEC	Classroom Assessment Scoring System (CLASS)	Early Childhood Environment Rating Scale - Revised (ECERS-R)	European Commission Key principles of a Quality Framework
The design and location of the premises is appropriate for the operation of a service.	**Classroom Organization**; Instructional Learning Formats: The degree to which teachers maximize students' engagement and ability to learn by providing interesting activities, instruction, centres, and materials. Considers the manner in which the teachers facilitate activities so that students have opportunities to experience, perceive, explore, and utilize materials.	**Space and furnishings**; Child related display: Every child needs to know that others value his/her play or work. Artwork or other individual work that is created by the children should be displayed in the classroom at the child's eye-level. This promotes feelings of positive self-esteem and sends the message to the child that his/her work is valued and appreciated Indoor space Furniture for routine care, play and learning Furnishings for relaxation and comfort Room arrangement Space for privacy Gross motor play Gross motor equipment	
The environment is inclusive, promotes competence, independent exploration and learning through play.			
The service takes an active role in caring for its environment and contributes to a sustainable future.			
Quality Area 4: Staffing arrangements			
Staffing arrangements enhance children's learning and development and ensure their safety and wellbeing.		**Parent and Staff;** Staff continuity is maintained with groups of children in care. This includes one to two staff members who lead the group everyday. Children rarely change to new groups or staff members. A stable group of substitutes familiar with the children and program are always available. **Parent and Staff;** Separate adult bathrooms are provided for staff. Storage for personal belongings with security provisions and facilities for meals and snacks are provided when	**Statement 3;** Well-qualified staff whose initial and continuing training enables them to fulfil their professional role.

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National Quality Framework (NQS) for ECEC	Classroom Assessment Scoring System (CLASS)	Early Childhood Environment Rating Scale - Revised (ECERS-R)	European Commission Key principles of a Quality Framework
Educators, co-ordinators and staff members are respectful and ethical.	Entire **Emotional support** domain	necessary. At least one break daily is scheduled for staff working in classrooms. Lounge or adult planning space is available with adult sized furniture. Accommodations are made for staff members that have disabilities **Parent and Staff**; Equipped office space, which includes file/storage space and office equipment including phone, needed for daily use. Some space available for individual adult meetings that are separate from areas used by children.	
Quality Area 5: Relationships with children			
Respectful and equitable relationships are developed and maintained with each child.	**Emotional support;** Positive climate: Reflects the overall emotional tone of the classroom and the connection between teachers and students. Considers the warmth and respect displayed in teachers' and students' interactions with one another as well as the degree to which they display enjoyment and enthusiasm during learning activities. Negative climate: Reflects the level of expressed negativity such as anger, hostility, or aggression demonstrated by teachers and/or children. Low scores represent fewer instances of expressed negativity in the classroom. Regard for student perspectives: The degree to	**Interactions;** Staff-child interactions: Caregivers, who are nurturing and responsive, promote the development of mutual respect between children and adults. Children, who trust adults to provide for their physical, psychological, and emotional needs, develop their own sense of self-worth and self-esteem. **Interactions;** Interactions among children: Because self-regulation, proper emotional expression, and positive social relationships are such essential skills for later schooling and life, teachers must encourage children to develop acceptable behaviors by providing a setting that encourages real opportunities for initiative	**Statement 2;** provision that encourages participation, strengthens social inclusion and embraces diversity

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National Quality Framework (NQS) for ECEC	Classroom Assessment Scoring System (CLASS)	Early Childhood Environment Rating Scale - Revised (ECERS-R)	European Commission Key principles of a Quality Framework
Each child is supported to build and maintain sensitive and responsive relationships with other children and adults.	which the teachers' interactions with students and classroom activities place an emphasis on students' interests, motivations, and points of view, rather than being very teacher-driven. This may be demonstrated by teachers' flexibility within activities and respect for students' autonomy to participate in and initiate activities.	taking and competence building. Providing opportunities for children to work and play together, to solve conflicts in productive ways, and to participate in group activities are ways teachers promote positive social relationships. **Space and furnishings;** Child related display: Every child needs to know that others value his/her play or work. Artwork or other individual work that is created by the children should be displayed in the classroom at the child's eye-level. This promotes feelings of positive self-esteem and sends the message to the child that his/her work is valued and appreciated.	
Quality Area 6: Collaborative partnerships with families and communities			
Respectful supportive relationships with families are developed and maintained.		**Parents and Staff;** Parents and staff participate in an evaluation of the program annually. Parents are made aware of philosophy and approach practiced in the program and is urged to observe in child's group prior to enrollment. Much sharing of child-related information between parents and staff with a variety of alternatives are used to encourage family involvement in the children's program. Parents and staff participate in an evaluation of the program annually. Parent resources are provided and parents are referred to other professionals when needed.	**Statement 6;** a curriculum which requires staff to collaborate with children, colleagues and parents and to reflect on their own practice. **Statement 2;** provision that encourages .participation, strengthens social inclusion and embraces diversity. **Governance statement;** Stakeholders in the ECEC system have a clear and shared understanding of their role and responsibilities, and know that they are expected to collaborate with partner organisations.
Families are supported in their parenting role and their values and beliefs about child rearing are respected.			
The service collaborates with other organisations and service providers to enhance children's learning and wellbeing.			
Quality Area 7: Leadership and service management			

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National Quality Framework (NQS) for ECEC	Classroom Assessment Scoring System (CLASS)	Early Childhood Environment Rating Scale - Revised (ECERS-R)	European Commission Key principles of a Quality Framework
Effective leadership promotes a positive organisational culture and builds a professional learning community.		**Parents and Staff;** Thorough orientation for new staff takes place and monthly staff meetings are held to include staff development activities. In-service training, workshops, and conferences are provided for staff members. This includes opportunities to belong to professional organizations supporting young children. Professional resources and materials are provided on site for staff to access. Annual written evaluation of performance shared with staff at least yearly. This includes supervisory observations and well as feedback from individual staff members regarding their identified strengths and weaknesses. Action is taken to implement the recommendations of the evaluation.	**Statement 4**; supportive working conditions including professional leadership which creates opportunities for observation, reflection, planning, teamwork and cooperation with parents. **Statement 7;** monitoring and evaluating produces information at the relevant local, regional and/or national level to support continuing improvements in the quality of policy and practice. **Statement 8;** monitoring and evaluation which is in the best interest of the child.
There is a commitment to continuous improvement.			
Administrative systems enable the effective management of a quality service.			

Appendix C: PRISMA Systematic review & meta-analysis quality and bias checklist

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
ADMINISTRATIVE INFORMATION					
Title					
Identification	1a	Identify the report as a protocol of a systematic review	☐	☐	
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	☐	☐	
Registration	2	If registered, provide the name of the registry (e.g., PROSPERO) and registration number in the Abstract	☐	☐	
Authors					
Contact	3a	Provide name, institutional affiliation, and e-mail address of all protocol authors; provide physical mailing address of corresponding author	☐	☐	
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	☐	☐	
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	☐	☐	
Support					
Sources	5a	Indicate sources of financial or other support for the review	☐	☐	
Sponsor	5b	Provide name for the review funder and/or sponsor	☐	☐	
Role of sponsor/funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	☐	☐	
INTRODUCTION					
Rationale	6	Describe the rationale for the review in the context of what is already known	☐	☐	
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	☐	☐	
METHODS					
Eligibility criteria	8	Specify the study characteristics (e.g., PICO, study design, setting, time frame) and report characteristics (e.g., years considered, language, publication status) to be used as criteria for eligibility for the review	☐	☐	

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
Information sources	9	Describe all intended information sources (e.g., electronic databases, contact with study authors, trial registers, or other grey literature sources) with planned dates of coverage	☐	☐	
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	☐	☐	
STUDY RECORDS					
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	☐	☐	
Selection process	11b	State the process that will be used for selecting studies (e.g., two independent reviewers) through each phase of the review (i.e., screening, eligibility, and inclusion in meta-analysis)	☐	☐	
Data collection process	11c	Describe planned method of extracting data from reports (e.g., piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	☐	☐	
Data items	12	List and define all variables for which data will be sought (e.g., PICO items, funding sources), any pre-planned data assumptions and simplifications	☐	☐	
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	☐	☐	
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	☐	☐	
DATA					
Synthesis	15a	Describe criteria under which study data will be quantitatively synthesized	☐	☐	
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data, and methods of combining data from studies, including any planned exploration of consistency (e.g., I^2, Kendall's tau)	☐	☐	
	15c	Describe any proposed additional analyses (e.g., sensitivity or subgroup analyses, meta-regression)	☐	☐	

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Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	☐	☐	
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (e.g., publication bias across studies, selective reporting within studies)	☐	☐	
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (e.g., GRADE)	☐	☐	

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Appendix D: Overall ranking of the evidence

OVERALL RANKING OF THE EVIDENCE	
	Definition
Supported	No evidence of harm or risk to participants. A well conducted systematic review or meta-analysis or at least one longitudinal study found the intervention to be more effective than a comparison group on at least one child outcome related to cognition and language, academic achievement, or social-emotional functioning. A positive effect was maintained at least 12 months. Populations examined are similar to, and results are sensible to apply to, the Australian context.
Promising	No evidence of harm or risk to participants. A systematic review or meta-analysis of moderate quality or at least one longitudinal study found the intervention to be more effective than a comparison group on at least one child outcome related to cognition and language, academic achievement, or social-emotional functioning. A positive effect was maintained at least 6 months. Populations examined may be somewhat different to the Australian population; affecting generalisability and applicability to the Australian context.
Mixed	The data reported across studies is inconsistent. Some data may provide evidence of harm or risk to participants. Generalisability and applicability to the Australian context is also variable.
Not adequately addressed	The data reported across studies is very limited (i.e. only focuses on a small aspect of the concept) or a small number of studies have reported null results. Data is unclear as it relates to the Australian context.
Not Supported	A well conducted systematic review or meta-analysis or at least one longitudinal study found harmful effects or the overall weight of the evidence suggest a negative effect on participants.

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RESTACKING THE ODDS

Appendix E: Evidence list by quality area

EARLY CHILDHOOD EDUCATION & CARE			
UNIVERSAL			
QUALITY AREA 1 - Educational program and practice			
Standard 1.1: An approved learning framework informs the development of a curriculum that enhances each child's learning and development **Standard 1.2:** Educators and co-ordinators are focused, active and reflective in designing and delivering the program for each child			
	Supported	**Promising**	**Null**
Cognitive /Academic	• Systematic Review [21] • EPPE/EPPSE [5, 31, 128] [5, 7, 59] • NICHD SECCYD [60] • IEA Pre-primary longitudinal, cross-national study [25]	• Systematic Review [20] • Meta-analysis [22]	
Social-emotional	• EPPE/EPPSE [5, 31, 128]	• Systematic Review [20]	
QUALITY AREA 2 - Children's health and safety			
Standard 2.1: Each child's health is promoted **Standard 2.2:** Healthy eating and physical activity are embedded in the program for children **Standard 2.3:** Each child is protected			
	Supported	**Promising**	**Null**
Cognitive /Academic			• EPPE/EPPSE [61] • NICHD SECCYD [23]
Social-emotional			• EPPE/EPPSE [61] • NICHD SECCYD [23]
QUALITY AREA 3 - Physical environment			
Standard 3.1: The design and location of the premises is appropriate for the operation of a service **Standard 3.2:** The environment is inclusive, promotes competence, independent exploration and learning through play **Standard 3.3:** The service takes an active role in caring for its environment and contributes to a sustainable future			
Cognitive /Academic		• Systematic review [62] • NICHD SECCYD [60] • IEA Pre-primary longitudinal, cross-national study [25]	• EPPE/EPPSE [61]

		• Australia study [64]	
Social-emotional			• EPPE/EPPSE [61]

QUALITY AREA 4 - Staffing arrangements			
Standard 4.1: Staffing arrangements enhance children's learning and development and ensure their safety and wellbeing **Standard 4.2:** Educators, co-ordinators and staff members are respectful and ethical			
	Supported	**Promising**	**Null**
Cognitive /Academic	Systematic review & meta-analysis [27] [28] [26] • EPPE [31] • NICHD SECCYD [8, 101] • IEA Pre-primary longitudinal, cross-national study [25] • Australia: LSAC/NAPLAN results [30] • EPPNI Project [69] • National Center for Early Development and Learning's (NCEDL) Multi-State Study of Pre-Kindergarten [32]	• Meta-analyses [22] Systematic review & meta-analysis [29]	
Social-emotional	Systematic review & meta-analysis [27]	• NICHD SECCYD [8]	Systematic review & meta-analysis [29] [26]

QUALITY AREA 5 - Relationships with children			
Standard 5.1: Respectful and equitable relationships are developed and maintained with each child **Standard 5.2:** Each child is supported to build and maintain sensitive and responsive relationships with other children and adults			
	Supported	**Promising**	**Null**
Cognitive /Academic	• Review [82]	Review [72]	

	• EPPE [31] • NICHD SECCYD [4, 8, 80, 101] • IEA Pre-primary longitudinal, cross-national study [25] Australian studies (CCC): [64, 81] • Dutch pre-COOL study [129]		
Social-emotional	• Review [72] [82] • EPPE [31] • NICHD SECCYD [4, 8, 101] • Dutch pre-COOL study [129]	• EPPE [31] – case studies	

QUALITY AREA 6 - Collaborative partnerships with families and communities

Standard 6.1: Respectful and supportive relationships with families are developed and maintained
Standard 6.2: Families are supported in their parenting role and their values and beliefs about childrearing are respected
Standard 6.3: The service collaborates with other organisations and service providers to enhance children's learning and wellbeing

	Supported	**Promising**	**Null**
Cognitive /Academic		• EPPE [7, 31, 59] – case studies • Germany study [86] • Review [90]	• Meta-analysis [85]
Social-emotional		• Review [90]	• Meta-analysis [85]

QUALITY AREA 7 - Leadership and service management

Standard 7.1: Effective leadership promotes a positive organisational culture and builds a professional learning community
Standard 7.2: There is a commitment to continuous improvement
Standard 7.3: Administrative systems enable the effective management of a quality service

	Supported	**Promising**	**Null**
Cognitive /Academic		• *Indirect:* EPPE [31] – case studies	• IEA Pre-primary longitudinal, cross-national study

		• Impact of leadership in schools: ○ English national mixed methods study [130] ○ Systematic review [93] ○ Meta-analysis [94] ○ Synthesis of >800 meta-analyses [131]	[25]
Social-emotional			

* Indirect evidence of association with outcome

** No evidence of association between staff-child ratios & outcomes, however ratios were in compliance with regulations

Appendix F: Citation List by Evidence Ranking: universal provision

EARLY CHILDHOOD EDUCATION & CARE			
UNIVERSAL			
Starting Age	**Studies**		
	Cognitive & language	**Academic**	**Social-emotional**
Supported			
0-2 years	• EPPE [61, 97]		• EPPE [111]
2-3 years	• EPPE [61, 97] – **Key Stage 1**		• EPPE [111]
3-4 years			
4-5 years			
Promising			
0-2 years	• NICHD [101]– **Phase 1** • NICHD [105] – **Phase 3**	• NICHD [106] – **Phase 4**	• EPPE [99, 100] – **Key Stage 2**
2-3 years	• *Meta-analysis [95]* • NICHD [101]– **Phase 1** • NICHD [105] – **Phase 3**	• *Meta-analysis [95]* • NICHD [106] – **Phase 4**	
3-4 years	• NICHD [105] – **Phase 3**	• NICHD [106] – **Phase 4**	
4-5 years			
Not Supported			
0-2 years			• EPPE [31] – **Key stage 1** • NICHD [102, 103]
2-3 years			• LSAC [107] • NICHD [102, 103]
3-4 years			
4-5 years			
Program Duration	**Studies**		
	Cognitive & language	**Academic**	**Social-emotional**
Supported			
0 to 12 months		• EPPE [98] – **Key stage 2**	
12 to 24 months		• EPPE [98] – **Key stage 2**	
24 to 36 months	• EPPE [31] – **Key stage 1** • LSAC	• EPPE [31] – **Key stage 1** • EPPE [98] – **Key stage 2**	

	[107]		
Over 36 months	• LSAC [107]	• TIMSS & PIRLS [109, 110]	
Promising			
0 to 12 months			
12 to 24 months	• *Meta-analysis* *[95]*	• *Meta-analysis* *[95]* • TIMSS & PIRLS [109, 110]	
24 to 36 months		• *Meta-analysis* *[96]* • TIMSS & PIRLS [109, 110]	
Over 36 months		• *Meta-analysis* *[96]*	
Not Supported			
0 to 12 months			
12 to 24 months			
24 to 36 months			• LSAC [107]
Over 36 months			• LSAC [107]
Program Dose	**Studies**		
	Cognitive & language	**Academic**	**Social-emotional**
Supported			
Part time	• EPPE [31] • LSAC [107]	• EPPE [31, 108]	
Full time > 15 hours	• NICHD [8, 13, 78, 104] – **Phase 2 (TODDLER PERIOD)**		
Promising			
Part time			
Full time > 15 hours	• LSAC [107]		
Not Supported			
Part time			
Full time > 15 hours	• NICHD [8, 13, 78, 104] – Phase 2 **(INFANCY)**		• LSAC [107] • NICHD

			[23, 24] NICHD [102, 103] **Phase 2**

Appendix G: Citation List by Evidence Ranking: targeted provision

EARLY CHILDHOOD EDUCATION & CARE			
TARGETED			
Starting Age	**Studies**		
	Cognitive & language	**Academic**	**Social-emotional**
Supported			
0-2 years	• Abecedarian project [113] – **Follow-Up: 18-54 months** [114, 116] – **school-age** [112, 115] – **15 years** [117, 118] [119] – **young adulthood** • Early Head Start [120]	• Abecedarian project [114] – **school-age** [112, 115] – **15 years** [117, 118] [119] – **young adulthood** • Early Head Start [120]	• Abecedarian project [118] [117, 119] – **young adulthood** • Early Head Start [120]
2-3 years		• EPPE [111] – **Key Stage 2 (high disadvantage)**	
3-4 years	• Perry Preschool Project [123-125]	• Perry Preschool Project [123-125]	• Perry Preschool Project* [123-125]
4-5 years			
Promising			
0-2 years	• Milwaukee Project [121] • Project Care [122]		
2-3 years			
3-4 years			
4-5 years			
Not Supported			
0-2 years			
2-3 years			• EPPE [111] – **Key Stage 2 (high disadvantage)**
3-4 years			
4-5 years			
Program Duration	**Studies**		
	Cognitive & language	**Academic**	**Social-emotional**
Supported			
1 year			
	• Early Head Start [120]	• Early Head Start [120]	• Early Head Start [120]

2 years	• Perry Preschool Project [123-125]	• Perry Preschool Project [123-125]	• Perry Preschool Project [123-125]
2-3 years			
More than 3 years	• Abecedarian [127] [112] [118] [119]	• Abecedarian [112] [118] [119]	• Abecedarian [118] [119]
Promising			
1 year			
2 years			
24 to 36 months			
Over 36 months	• Milwaukee Project [121] • Project Care [122]		
Not Supported			
1 year			
2 years			
24 to 36 months			
Over 36 months			
Program Dose	**Studies**		
	Cognitive & language	**Academic**	**Social-emotional**
Supported			
Part time	• Perry Preschool Project [123-125]	• Perry Preschool Project [123-125]	• Perry Preschool Project [123-125]
Full time	• Abecedarian [127] [112] [118] [119]	• Abecedarian [112] [118] [119]	• Abecedarian [118] [119]
Promising			
Part time			
Full time	• Milwaukee Project [121]		
Not Supported			
Part time			
Full time			

* Socio-emotional outcomes include reduced youth misconduct, crime, & drug-us

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THE TEAM

Restacking the Odds is a collaboration between three organisations, each with relevant and distinctive skills and resources:

- ***Murdoch Children's Research Institute (MCRI)*** brings deep knowledge and credibility in the area of health and educational research, along with a network of relevant relationships
    - **Prof Sharon Goldfeld** –Director Centre for Community Child Health and Theme Director Population Health, Royal Children's Hospital and Murdoch Children's Research Institute
    - **Dr Carly Molloy** – Senior Project Lead, Murdoch Children's Research Institute
- ***Bain & Company*** brings expertise in the development of effective strategies that deliver real results
    - **Chris Harrop** – a senior partner, and a member of Bain's worldwide Board of Directors

- ***Social Ventures Australia (SVA)*** brings expertise in providing funding, investment and advice to support partners across sectors to increase their social impact
    - **Nick Perini** – Director, SVA Consulting.

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RESTACKING THE ODDS

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COMMUNICATION BRIEF

Early childhood education and care: An evidence based review of indicators to assess quality, quantity, and participation

V1.0 June 2019

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RESTACKING THE ODDS

RESTACKING THE ODDS: PROJECT BACKGROUND

Inequities emerging in early childhood often continue into adulthood, contributing to unequal rates of low educational attainment, poor mental and physical health and low income. In some cases, this experience is part of a persistent cycle of intergenerational disadvantage. Inequities constitute a significant and ongoing social problem and – along with the substantial economic costs – have major implications for public policy.

To redress inequities, research tells us that efforts should be delivered during early childhood (pregnancy to eight years of age) to deliver the greatest benefits. Restacking the Odds focuses on five key evidence-based interventions/platforms in early childhood: antenatal care; sustained nurse home visiting; early childhood education and care; parenting programs; and the early years of school (see *Figure 1: Five Fundamental Strategies*).

These five strategies are only a subset of the possible interventions, but we have selected them carefully. They are notably *longitudinal* (across early childhood), *ecological* (targeting child and parent), *evidence-based, already available* in almost all communities, and able to be *targeted* to benefit the 'bottom 25 per cent'. Our premise is that by 'stacking' these fundamental interventions (i.e., ensuring they are all applied for a given individual) there will be a cumulative effect - amplifying the impact and sustaining the benefit.

Our intent is to use a combination of data-driven, evidence-based and expert informed approaches to develop measurable best practice indicators of quality, quantity and participation for each of the five strategies:

Quality: Are the *strategies delivered effectively*, relative to evidence-based performance standards? A strategy with 'quality' is one for which there is robust evidence showing it delivers the desired outcomes. A large number of research studies have explored aspects of this question (i.e., "What works?"). Therefore, we pay particular attention to the quality dimension in this report.

Participation: Do the *appropriately targeted* children and families *participate* at the right dosage levels? 'Participation' shows us what portion of the relevant groups are exposed to the strategy at the level required to trigger the desired benefit. (For example, attending the required number of antenatal visits during pregnancy). Participation levels can be calculated whether the strategy is universal (for everyone), or targeted (intended to benefit a certain part of the population).

Quantity: Are the strategies *available locally* in sufficient quantity for the target population? 'Quantity' helps us determine the quantum of effort and infrastructure needed to deliver the strategy adequately for a given population.

These indicators will help identify gaps and priorities in Australian communities. We will test preliminary indicators in 10 communities over the next three years to determine which are pragmatic to collect, resonate with communities, and provide robust measures to stimulate community and government action.

The findings summarised in this report provide essential inputs to guide our subsequent work. There is a similar report for each of the five strategies.

FIVE FUNDAMENTAL STRATEGIES

Antenatal	Early childhood		School years
	Birth to 2 years	2-5 years	

1 Antenatal care
- Targeted at parents
- Centre-based
- *Outcomes:* healthy birth weight, good brain health, appropriate care, "adequate parenting"

3 Early childhood education and care
- Targeted at all children (in groups)
- High quality for all children
- Delivered out of home in a "pseudo-home-learning environment"
- *Outcomes:* children on optimal developmental pathway (cognitive and social-emotional), school readiness

5 Early years of school
- Targeted at all children
- School-based
- *Outcomes:* children on optimal learning pathway by Year 3

2 Sustained nurse home visiting
- Targeted at disadvantaged parents
- Health and development support
- Home-based
- *Outcomes:* parents develop parenting skills

4 Parenting programs
- Targeted at parents whose children have behavioural issues (higher prevalence in disadvantaged families)
- Centre-based, delivered in groups or 1:1
- *Outcomes:* remedy of specific emerging behavioural issues

Figure 1: Five fundamental strategies

EARLY CHILDHOOD EDUCATION AND CARE: RESEARCH SUMMARY

OVERVIEW

Early childhood education and care (ECEC) is defined as any arrangement providing education and care for children aged 0 to the first year of formal schooling regardless of the setting, funding, opening hours, or program content [1]. In Australia the sector is large and complex, with a range of services offered by a mix of non-profit and for-profit providers.

In 2016, 43% of all Australian children aged 0-5 years were enrolled in ECEC services, and 92% of children were enrolled in a preschool program in the year before school [2][1]. The enrolment rate for four year-olds is high relative to other Organisation for Economic Co-operation and Development (OECD) nations (which average 84%) [3], but some large subgroups of Australian children are substantially less likely to participate in ECEC programs – including children from low socioeconomic backgrounds, remote communities, Indigenous backgrounds, non-English speaking backgrounds, and those with a disability or special health care needs [4, 5]. Further, nationally-reported enrolment figures do not elucidate the ECEC dosage children actually receive (i.e. the number of hours children attend ECEC per week).

Significant policy reforms have been delivered over the last decade targeting service access and quality. This includes the introduction of universal access (providing access to 15 hours of preschool education for all 4 year-olds), the introduction of a National Quality Framework (NQF) (providing a national approach to regulation to drive service quality improvements) and introduction of the means-tested Child Care Subsidy Package (designed to support access to affordable ECEC). International research has demonstrated the link between quality frameworks and associated indicators of service performance to maintain, restore, or improve performance [6-9]. Establishing a National Quality Framework for ECEC is consistent with international best practice, and provides an excellent mechanism to drive improvements in ECEC service quality.

Despite these changes, there are enduring challenges to ensure that high quality services are available and accessible to all children and families. These include issues of affordability, cultural inclusion, service quality and viability.

ECEC and developmental outcomes for children

The Australian Early Development Census (AEDC) is a national, teacher-reported population measure of the development of all children starting school. The AEDC is undertaken every three years, and assesses development across five domains: physical health and wellbeing; social competence; emotional maturity; language and cognitive skills; and communication skills and general knowledge.

Every year, about 18.5% of children from Australia's lowest socioeconomic quintile enter school developmentally vulnerable on two or more domains, almost three times the rate for children in the highest socioeconomic quintile (6.5%) [10]. Furthermore, while overall levels of developmental vulnerability in Australia have not shifted significantly in recent years, the gap between the poorest and wealthiest communities, and between remote/rural and metropolitan areas, has increased [10].

Extensive research indicates that the education and care of young children (from birth to eight years of age) has an immense influence on long-term outcomes related to their cognition, resilience, health and wellbeing (e.g. [11]) suggesting that children from the lowest socioeconomic quintile would benefit from good quality early education opportunities prior to starting school.

Notably, evaluations of model programs in the US dating back to the 1960-70s, targeted toward children living in adversity, have well established the benefit of ECEC in the areas of academic, cognitive and social-emotional domains (e.g. [12]). However, more recent research from Australia [13] and the UK [14, 15] for example, suggests that participation in high quality ECEC has the potential to provide all preschool-aged children (usually defined as the year or two before full time schooling) with an opportunity to develop lifelong skills for learning and wellbeing. This research has supported policy shifts in Australia to make ECEC programs available for all children.

In Australia, national studies show that ECEC is associated with better outcomes for children. For example, AEDC data shows that children who attend preschool are less likely to be developmentally vulnerable even when considering their level of relative disadvantage [16, 17]. Similarly, research from the Longitudinal Study of Australian Children (LSAC) demonstrates that children who attend preschool in the year before school score higher on Year 3 National Assessment Program for Literacy and Numeracy (NAPLAN) tests, with lower probability of being rated by their carer as having poor social and emotional development [18].

Not all ECEC is the same: quality matters

The research clearly shows that the *quality* of ECEC programs has a significant influence on developmental outcomes for children. Rating scales assessing quality include aspects of *structural quality* (i.e. the design and organisation of the ECEC system, including the number of professionally trained staff) and *process quality* (i.e. the practices within an ECEC setting, such as relationships and interactions between staff and children).

1 To be considered "enrolled" the child must have attended the ECEC program at least one hour during the reference period, or be absent due to illness or extended holiday leave and expected to return.

International research has shown that ECEC programs for children aged 3 to 5 years with an emphasis on literacy, maths, science, environment and using a diversity of cultural and theoretical approaches result in better academic and social-behavioural outcomes [19]. Children also make more progress in preschools where staff have higher qualifications (e.g. [18]). It has also been found that preschools that score well on standardised, objective measures of quality such as the Classroom Assessment Scoring System (CLASS) and Early Childhood Environment Rating Scale (ECERS) have better outcomes for children, and the association is strongest for children from disadvantaged backgrounds (e.g. [14, 19-21]).

More broadly, several studies have reported that the relationship between ECEC quality and benefits to child development are stronger for children from disadvantaged backgrounds (e.g. [22-24]). However, others have found no support for this 'compensatory hypothesis' suggesting that even high-quality ECEC is insufficient to totally compensate for environmental disadvantage (e.g. [25, 26]). It nevertheless remains important to increase ECEC participation for disadvantaged children.

AIM

Our targeted rapid review of the existing research base for ECEC sought to answer four key questions:

1. Within an existing national quality system for ECEC, which quality areas and/or standards have the most significant effect on child developmental outcomes (i.e., cognition, language, academic, and social and emotional development)?
2. What does the evidence indicate is the most effective universal *starting age*, dosage (i.e. number of hours per week) and *attendance duration* (i.e. number of months or years) as it relates to improving child developmental outcomes?
3. Given the evidence determined from Question 2, in what quantity should a given community be delivering ECEC?
4. Do the answers to these questions differ for targeted provision to disadvantaged populations?

METHOD

Our literature review utilised a targeted restricted evidence assessment (REA) research methodology. REA uses similar methods and principles to a systematic review but makes concessions to the breadth and depth of the process to enable faster completion. Rigorous methods for locating, appraising and synthesising the evidence related to a specific topic are utilised, but the methodology places some limitations on the search criteria and on how the evidence is assessed. For this review, we sought data primarily from large, longitudinal, national or international cohort studies.

Quality

To determine the indicators of quality, we used Australia's existing quality rating system - the National Quality Standard (NQS) implemented by the Australian Children's Education and Care Quality Authority (ACECQA). We undertook an initial mapping exercise to determine how closely Australia's Quality Areas (as utilised by ACECQA) matched the key principles identified from the European Commission Quality Framework and, on domains from standardised, objective measures of ECEC quality (Classroom Assessment Scoring System PreK [CLASS PreK] and Early Childhood Environment Rating Scale – Revised [ECERS-R]). This initial scoping work provided confidence that we were not missing any important areas when using the seven Quality Areas from the ACECQA NQF to direct our targeted literature search. We then utilised a combination of literature reviews (peer-reviewed and web-based reports) and expert interviews to determine which Quality Areas had the most robust evidence related to child development outcomes. This determined the Quality Areas used for our recommended indicators for assessing ECEC quality. A full description of the search strategy is provided in the *Technical Report* [43].

Participation

To determine participation indicators, we focused on national and international longitudinal studies and utilised systematic reviews and meta-analyses, where available, with good quality and low bias. Study quality includes an assessment of *internal validity* (the degree to which the design and conduct of the study avoid bias, e.g. through randomisation, allocation concealment and blinding), and *external validity* (the extent to which the results of the study can be generalised to the population outside the study).

We examined the evidence to determine any differential effect related to universal or targeted program participation in children from 0 to 5 years (e.g. targeted according to housing vulnerability or poverty, culturally and linguistically diversity, or low IQ). We used the evidence to develop indicators for the key dimensions of participation that relate to improved child outcomes, including optimal starting age, duration and dosage.

Quantity

Quantity indicators require agreed indicators for both numerator (participation data) and denominator (population data). We developed quantity indicators using the best indicators of participation level (for universal and targeted provision), and community-level population data.

Ranking the evidence

We assessed individual studies for demonstration of ECEC effectiveness across the three domains of functioning (cognitive/language, academic, and social-emotional), and classified them into the following categories:

- *Supported*. Clear evidence of sustained benefits of at least one year, and without evidence of harm or risk to participants. Populations examined are similar to the Australian context, and results are sensible to apply to that context.
- *Promising*. Evidence suggestive of benefit of at least six months, and without evidence of harm or risk to participants. Populations examined may be somewhat different to the Australian population, affecting generalisability to the Australian context. Meta-analyses and systematic reviews of moderate quality are ranked as 'Promising' due to increased risk of bias.
- *Not supported*. There is evidence of harm or risk to participants.
- *Null*. No difference found between comparison groups.

Once each individual study was evaluated, we determined an overall ranking of the evidence using the classifications below, adapted from [27]. See Appendix A for full details.

- *Supported*. Clear, consistent evidence of benefit
- *Promising*. Evidence suggestive of benefit but more evidence needed.
- *Mixed*. Data is mixed and could show evidence of harm or risk.
- *Not adequately addressed*. Insufficient data in the target evidence-base.
- *Not supported*. There is evidence of harm or risk to participants.

Expert opinion

We vetted our set of indicators with three senior international ECEC experts:

- *Professor Iram Siraj* PhD OBE. Professor of Child Development and Education, University of Oxford.
- *Professor Edward Melhuish* CSci, CPsychol, FBPsS, FAcSS, OBE. Professor of Human Development, Birkbeck, University of London & Professor of Human Development, & Academic Research Leader, University of Oxford

These experts agree that the dose and duration of quality ECEC should be proportionately greater for vulnerable children. Although this is consistent with our own research, we have recommended only part time provision for both universal and targeted groups. Our rationale behind part time provision for targeted groups is based on the evidence that both part time and full time are effective at improving outcomes. Further research about the cost-benefit ratio for part and full time would help elucidate the correct dose for targeted groups.

FINDINGS FOR EARLY CHILDHOOD EDUCATION AND CARE

Overall, our review found a growing body of research examining the association between universal and targeted access to ECEC on children's developmental outcomes. This research generally provides evidence of the benefits of ECEC for child developmental outcomes. However, data predominantly comes from observational studies (rather than intervention studies) and shows variability in terms of what ECEC programs work best.

Since the bulk of research is from international studies there is a question of applicability of the findings to the Australian context. The Australian research base itself has limitations, as it often uses data collected prior to the introduction of the NQF, and so does not incorporate beneficial outcomes that may have occurred post-NQF, due to an increased focus on service quality.

To date there have been no published Australian comparison trials. Notably, the research is limited in its ability to consider the comparability of different ECEC programs that vary substantially, particularly in terms of dose and other resources such as student-teacher ratios. For example, the Abecedarian Project has a much higher participation intensity compared with other lower-resourced programs such as those typically offered in Australia.

Quality indicators

Australia has an established National Quality Framework, which provides a national approach to regulation and assessment of associated quality indicators (the NQS). The overarching objective of the NQF is to improve educational and developmental outcomes for children attending ECEC services, through driving improved quality in service delivery [28].

The NQS defines seven Quality Areas (see Appendix B for full detail of related elements), which we have divided into two categories, as shown below.

TEACHING-RELATED FACTORS

QA1 – Educational program and practice
QA4 – Staffing arrangements
QA5 – Relationships with children

ENVIRONMENT-RELATED FACTORS

QA2 - Children's health and safety
QA3 - Physical environment
QA6 – Collaborative partnerships with families and communities
QA7 - Leadership and service management

We found clear evidence that the teaching-related factors are associated with improved child developmental outcomes (cognitive/academic and social-emotional). Conversely, we did not find clear evidence that the environment-related factors directly improve child developmental outcomes. However, this does not mean they aren't important enablers for effective ECEC. For example, the provision of the right physical environment is a prerequisite for the delivery of a safe and stimulating education program. Details are summarised in Table 1, and described below.

Quality Area 1 – Educational program and practice. There is strong evidence that educational programs and practice affect cognitive and social-emotional child outcomes. We identified two systematic reviews (of moderate to high quality) [29, 30], which provide evidence that educational program and practice is related to positive child outcomes (cognitive/academic and social emotional). These findings were further supported by a meta-analysis of low-moderate quality [31] and three major international studies:

- Effective Provision of Pre-School Education (EPPE) Study (e.g. [19]),
- The National Institute of Child Health and Human Development Study of Early Child Care Youth Development (NICHD SECCYD) Studies (e.g. [20, 32, 33]), and
- The International Association for Evaluation of Educational Achievement (IEA) Pre-Primary project [34].

Quality Area 4 – Staffing arrangements. There is strong evidence that certain aspects of staffing arrangements in ECEC settings – including staff-child ratios, group size, staff experience and qualifications – affect cognitive and social-emotional child outcomes. The evidence base included:

- Three systematic reviews or meta-analyses (high quality/ low bias), examining outcomes across a range of study types (e.g. cross-sectional, longitudinal, correlational, experimental, and quasi-experimental studies) [35-37].
- Another systematic review/meta-analysis (moderate quality, some risk of bias) examining outcomes from experimental and quasi-experimental studies and several national and international trials [38].
- The Longitudinal Study of Australian Children (LSAC) [18].
- The EPPE study [39], NICHD SECCYD [20], National Center for Early Development and Learning's (NCEDL) Multi-State Study of Pre-Kindergarten [40].

Quality Area 5 – Relationships with children. Our review did not yield any high quality systematic reviews or meta-analyses relevant to Quality Area 5. However, a substantive and frequently cited literature review was identified which reports that there is some support for an association between staff relationships with children and both behavioural and cognitive child development [41]. The findings of the review are also supported by several international studies, EPPE, NICHD SECCYD, IEA Pre-primary longitudinal, cross-national study, and the Dutch pre-COOL study. The generalisability and applicability of these findings are further strengthened by local Australian data from the Child Care Choices (CCC) Longitudinal Extension study [42].

In addition, the evidence base related to Quality Area 1 (specifically, educators and coordinators are focused, active and reflective in designing and delivering the program for each child) and Quality Area 4 (specifically, educators, co-ordinators and staff members are respectful and ethical) are relevant to Quality Area 5. Consequently, we rated the overall evidence as "supported".

We rated the other four Quality Areas of the NQS (QA2, QA3, QA6 and QA7) as 'Promising' or 'Not adequately addressed in the target evidence-base'. A summary of the relevant evidence can be found in our detailed technical report [43].

Table 1: Summary of the overall evidence base

QUALITY AREA	COGNITIVE & ACADEMIC	SOCIAL-EMOTIONAL
TEACHING-RELATED FACTORS		
Educational program and practice	• Supported	• Supported
Staffing arrangements	• Supported	• Supported
Relationships with children	• Supported	• Supported
ENVIRONMENT-RELATED FACTORS		
Children's health and safety	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence base
Physical environment	• Promising	• Not adequately addressed in target evidence base
Collaborative partnerships with families and communities	• Promising	• Promising
Leadership and service management	• Promising	• Not adequately addressed in target evidence base

Restacking the Odds assessment of ECEC services

Under Australia's NQS[2], an ECEC service can receive an overall 'Exceeds' rating if it meets the quality standards in all seven Quality Areas, and exceeds the standard in at least four of the seven, including at least two of:

- QA1 - Educational program and practice
- QA5 - Relationships with children
- QA6 - Collaborative partnerships with families and communities
- QA7 - Leadership and service management

In Q1 2018, 38% of Australia's ECEC centres met this standard, and therefore achieved an 'Exceeds' rating. These centres are doing many things well. However, Restacking the Odds is especially interested in understanding how many centres exceed the standard on all three of the Quality Areas which our review of the evidence has shown to have a demonstrable benefit on children's development, i.e.:

- QA1 – Educational program and practice
- QA4 – Staffing arrangements
- QA5 – Relationships with children

As shown in Figure 2, only 25% of centres met this hurdle (while also at least meeting the standard on the other four quality areas). This scarcity is more pronounced in low SEIFA (Socioeconomic Indexes for Areas) areas. Figure 3 shows the portion of services meeting this standard, displayed against their SEIFA level. Only 19% of services in the lowest SEIFA decile (most disadvantaged) meet this standard, compared with 27% in the highest SEIFA decile (most advantaged).
This analysis suggests that Australia has a significant gap between current ECEC service delivery and the evidence-based drivers of quality that make the most difference for child development, and that this is especially true in more disadvantaged areas. ACEQAS's rating data also show that QA1 (Educational program and practice) is the element with the greatest room for improvement. We have provided the NQS in Appendix B. It includes a detailed set of practices associated with each Quality Area.

Quality indicator

The proportion of ECEC services rated 'exceeding' the standard in quality areas 1, 4 and 5 and at least 'meeting' the standard in all other quality areas according to the ACECQA assessment.

Participation indicators

We identified three main participation-related factors: starting age, attendance duration, and dosage (part time/full time). We detail the key findings below, providing an overview of the evidence ranking for both universal provision of ECEC (Table 2) and targeted provision (Table 3).

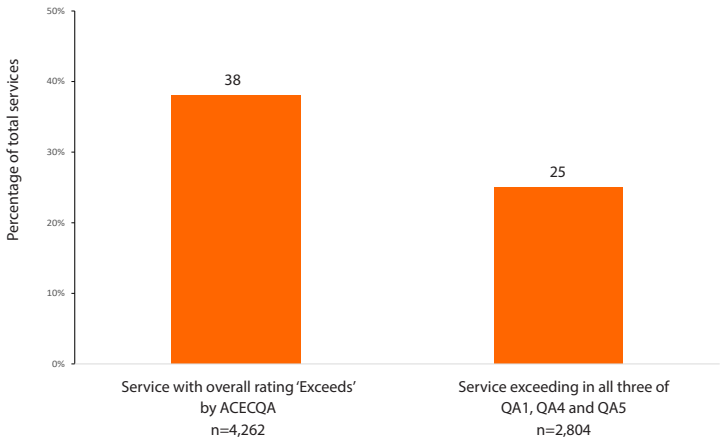

Figure 2: ECEC service ratings [3]

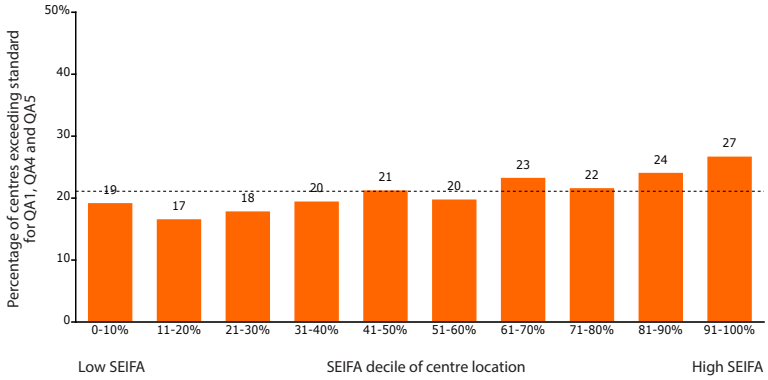

Figure 3: Centre ratings grouped by SEIFA decile

2. Note that modifications made to the NQF in February 2018 mean that all standards within a Quality Area now need to be rated Exceeding NQS, for that Quality Area to be rated Exceeding NQS. However, there were no changes made to the way in which an overall 'Exceeds' NQS rating is calculated across Quality Areas.
3. National Quality Framework Snapshot Q1 2018, Australian Children's Education & Care Quality Authority.

Table 2: Summary of the overall evidence base (for universal provision)

UNIVERSAL ECEC			
STARTING AGE	**COGNITIVE & LANGUAGE**	**ACADEMIC**	**SOCIAL-EMOTIONAL**
0-2 years	• Supported	• Promising	• Mixed
2-3 years	• Supported	• Promising	• Mixed
3-4 years	• Promising	• Promising	• Not adequately addressed in target evidence-base
4-5 years	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base
PROGRAM DURATION	**COGNITIVE & LANGUAGE**	**ACADEMIC**	**SOCIAL-EMOTIONAL**
Less than 1 year	• Not adequately addressed in target evidence-base	• Supported	• Not adequately addressed in target evidence-base
1-2 years	• Promising	• Supported	• Not adequately addressed in target evidence-base
2-3 years	• Supported	• Supported	• Not supported
More than 3 years	• Supported	• Supported	• Not supported
PROGRAM DOSE	**COGNITIVE & LANGUAGE**	**ACADEMIC**	**SOCIAL-EMOTIONAL**
Part time	• Supported	• Supported	• Not adequately addressed in target evidence-base
Full time (> 15 hours)	• Mixed	• Not adequately addressed in target evidence-base	• Not supported

Table 3: Summary of the overall evidence base (for targeted provision)

TARGETED ECEC			
STARTING AGE	**COGNITIVE & LANGUAGE**	**ACADEMIC**	**SOCIAL-EMOTIONAL**
0-2 years	• Supported	• Supported	• Supported
2-3 years	• Not adequately addressed in target evidence-base	• Supported	• Not supported
3-4 years	• Supported	• Supported	• Supported
4-5 years	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base
PROGRAM DURATION	**COGNITIVE & LANGUAGE**	**ACADEMIC**	**SOCIAL-EMOTIONAL**
Less than 1 year	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base
1-2 years	• Supported	• Supported	• Supported
2-3 years	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base	• Not adequately addressed in target evidence-base
More than 3 years	• Supported	• Supported	• Supported
PROGRAM DOSE	**COGNITIVE & LANGUAGE**	**ACADEMIC**	**SOCIAL-EMOTIONAL**
Part time	• Supported	• Supported	• Supported
Full time (> 15 hours)	• Supported	• Supported	• Supported

Universal provision

Starting age

There was only one systematic review or meta-analysis of moderate quality and risk of bias that evaluated the effect sizes of starting age in relation to cognitive and academic achievement [44]. This work revealed that programs commencing before three years of age had larger effect sizes than programs that started later, so was rated as 'Promising'. The longitudinal EPPE study provided support for programs that start early (birth to three years old) across all domains of functioning, and another high quality study (the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development, or NICHD SECCYD) presented data that suggest earlier starting ages are 'Promising' for cognitive and academic achievement. The evidence-base related to starting age and social-emotional outcomes was more variable with at least three studies showing poorer [13, 45, 46] outcomes or both positive and negative outcomes [39, 47] with earlier starting ages.

The evidence is not clear-cut across domains of functioning (cognition and language, academic, and social-emotional), however a starting age between three and four years old provides the best balance of outcomes with none of the reviewed studies showing poorer outcomes.

Program duration

Two meta-analyses examined program duration in relation to cognitive and academic achievement. One was of moderate quality and risk of bias, and reported that programs longer than two years were associated with moderate increases in effect size for cognitive and academic outcomes [44]. We therefore rated this study as 'Promising' for programs lasting two years or longer. The other was low quality with several sources of bias identified [48]. However, it found a small advantage for child developmental outcomes for programs with durations of one and three years. We rated this study as 'Promising' for programs of three years or more.

The EPPE study was the only longitudinal international research to report on program duration, and found that high quality preschool coupled with longer duration (two to three years) had the strongest effect on cognition and academic achievement, and demonstrated sustained benefits of approximately two to four years [39]. This was supported by another EPPE follow up approximately four years later that showed preschool duration between 2 and 3 years had the largest positive effects on English scores at age 7 to 11 [49].

Data from the LSAC showed that program durations from two to more than three years resulted in cognitive and academic gains, but had detrimental effects on social-emotional outcomes [13]. Notably, the LSAC data were collected prior to the implementation of the NQF and so it is unclear what impact potential quality improvements may have had on outcomes. Data from Trends in International Mathematics and Science Study (TIMSS) and Progress in International Reading Literacy Study (PIRLS) support programs of at least three years related to academic achievement [50, 51].

On balance, the evidence related to duration 'Supports' programs of two years. Although there was good evidence for programs between two and three years' duration for cognitive and academic achievement, there was also some evidence (local data) suggesting that programs longer than two years may have a negative impact on social-emotional outcomes. Importantly, this data does not take into account the quality of the program and it is likely that the relationship between duration and social skills is influenced by aspects of quality care and education.

Program dose (intensity)

The EPPE study provides support for part time universal provision of ECEC, which is consistent with local data from LSAC [13, 39, 52]. Several papers reporting on the US-based National Institute of Child Health and Human Development (NICHD) Study found evidence for a positive relationship between full time provision during toddlerhood and higher language scores, but also found that greater hours of ECEC in infancy was related to lower pre-academic scores [25, 53-55]. The NICHD studies also report that higher ECEC doses (average of 27 hours per week) relate to poorer social-emotional outcomes in grade one.

The evidence for part time provision of ECEC is supportive, but the evidence for full time provision is mixed. Therefore, our conclusion is that the evidence best supports part time provision for universal access.

Universal participation indicator
Proportion of all children attending ECEC for 15 hours or more per week, for the two years before starting formal school

Targeted provision

Starting age

For highly vulnerable children and families (with low socio-economic status or risk of low IQ), the developmental benefit of targeted provision of ECEC - and an early starting age of 0-2 years - is well supported by evidence from the Abecedarian Project (e.g. [12, 56, 57]). This was a well-designed randomised controlled trial, with multiple follow-up studies ranging from 18 months to adulthood. The evidence applies to all three domains of functioning (cognitive, academic, social-emotional). The Early Head Start program also supports early start ECEC across all domains [58]. Two other US-based programs (Milwaukee Project and Project Care), were rated as 'Promising' in relation to a starting age of 0-2 years for improved outcomes for cognition and language [59, 60] due to their small sample size and selective populations (i.e. low IQ;

African-American mothers) which affect their generalisability to the Australian context.

The EPPE study examined academic and social-emotional outcomes in a subset of disadvantaged children attending preschool at either 2 or 3 years and found a positive association for English attainment. However, there were some negative associations with prosocial behaviour [47].

The Perry Preschool Project found positive associations between starting age 3 to 4 years and cognition, academic achievement, and social-emotional functioning [61-63].

Most of the population samples are from the US and may differ in ways that affect the generalisability to the Australian context. For example, most of the targeted samples drew from predominantly African-America populations and from the 1960s and 1970s. On balance, children from at-risk backgrounds would likely benefit from an earlier start to ECEC compared with the general population. The evidence 'Supports' a starting age of 0 to 2 years.

Program duration

The Abecedarian Project demonstrated a positive association between ECEC attendance for over three years and improved cognitive, academic, and social-emotional outcomes [12, 57, 64, 65]. The Milwaukee Project and Project Care were consistent with these results [59, 60], but were rated as 'Promising' due to the small sample size and selective populations (i.e. low IQ; African-American mothers), which affect their generalisability to the Australian context.

The Early Head Start programs and the Perry Preschool Project support programs of two years across all three outcome dimensions (cognitive, academic, and social-emotional).

Unlike universal provision of ECEC, there was no evidence of an increased risk of social-emotional difficulties associated with programs of longer duration. Limitations regarding generalisability and applicability to the Australian context are relevant here, but given the quantity and relative strength of the Abecedarian findings the evidence 'Supports' programs of at least three years' duration.

Program dose (intensity)

There was limited data available to compare the relative benefit of higher levels of ECEC intensity. However, the results of the Abecedarian project are convincing - suggesting full time provision is related to better cognitive and language, academic, and social-emotional outcomes in both the short- and long-term [12, 57, 64, 65].

The Perry Preschool project (part time provision) reported significant social gains over a sustained period (into adulthood) as well as sustained (1-2 years) cognitive and language benefits.

The research regarding program dose for children from disadvantaged backgrounds 'Supports' full time and part-time provision. There are some potential issues with generalisability (US-based research, selective samples of low IQ, African-American people). Without a cost-benefit assessment of the relative effect of part time and full time provision for disadvantaged groups it is difficult to recommend full time provision when there is evidence that part time provision is also effective at improving child outcomes.

Targeted participation indicator
Proportion of children experiencing disadvantage who attend ECEC for 15 hours or more per week, for at least the three years before starting formal school

Current Australian participation indicators

Nationally, Australia collects some participation data for two subgroups of children:

- The proportion of children aged three to five years enrolled in a preschool program who are from targeted special needs groups (non-English speaking background, Aboriginal and Torres Strait Islander children, children with disability, and children from regional and remote areas);
- The proportion of children aged four to five years enrolled in a preschool program in the year before school who are disadvantaged (residing in an area with a SEIFA Index of Relative Socio-economic Disadvantage [IRSD] quintile of 1).

These national indicators are based on enrolment, and do not provide sufficient information about whether the dosage of participation in ECEC is at the level that research has identified is important to benefit child outcomes. Restacking the Odds aims to collect actual attendance data (not only enrolment data) for these two sub-groups in the communities we work with.

Quantity indicators

The required quantity of ECEC services in a given community is a function of the size of the population, the portion of the population participating, and the effort required to provide the right standard of care. This is largely a practical consideration, and the literature reviewed did not provide any specific data related to this driver. However, there are two relevant dimensions for quantity:

- Does the ECEC infrastructure provide places sufficient for the defined population to attend for fifteen hours or more?
- Is there a sufficient workforce of qualified ECEC workers and teachers?

Current Australian quantity indicators

Nationally, Australia collects data on two relevant workforce metrics:

- The proportion of paid primary contact staff employed at approved childcare services with a relevant formal qualification (at or above Certificate level III), or three or more years of relevant experience.
- The proportion of teachers delivering preschool programs (across all services) who are at least three-year university trained and early childhood qualified. Teachers are defined using the following worker roles: principal/director/coordinator/teacher in charge and group leader/teacher. At least three-year university trained includes: 'Bachelor degree (3 years or more equivalent)', 'Bachelor Degree (4 years pass and honours)', 'Graduate diploma/certificate and above.'

Note that Quality Area 4 sets the benchmark for teacher-to-child ratios and qualification requirements. There is no national indicator for service availability.

Quantity indicator
The number of ECEC places for 15 hours per week avaliable to 2-5 year olds

CONCLUSION

We have established an evidence based set of indicators for best practice indicators of ECEC quality, participation and quantity.

Quality

We used Australia's existing quality rating system (ACECQA) to determine the indicators of quality with regard to positive impact on child development, and found that the available evidence supports three of ACECQA's seven Quality Areas well (i.e., QA1 - Educational program and practice; QA4 – Staffing arrangements; and QA5 – Relationships with children). We identified that while 38% of Australia's ECEC centres receive an 'Exceeds' rating from ACECQA, only 25% of centres exceed the NQS standard for performance on all three of these Quality Areas.

Quality indicator
The proportion of ECEC services rated 'exceeding' the standard in quality areas 1, 4 and 5 and at least 'meeting' the standard in all other quality areas according to the ACECQA assessment.

Participation

The literature supports the importance of ECEC for all children. However, the participation thresholds differ for universal versus targeted provision.

Universal participation indicator
Proportion of all children attending ECEC for 15 hours or more per week, for the two years before starting formal school

Targeted participation indicator
Proportion of children experiencing disadvantage who attend ECEC for 15 hours or more per week, for at least the three years before starting formal school

Quantity

When assessing quantity, the key considerations are whether there is sufficient ECEC infrastructure and a qualified ECEC workforce to support the relevant populations to attend for at least fifteen hours per week.

Quantity indicator
The number of ECEC places for 15 hours per week avaliable to 2-5 year olds

The preliminary indicators and thresholds we have selected will help identify gaps and priorities for ECEC in Australian communities. We will test them in ten communities over the next three years to determine which are pragmatic to collect, resonate with communities, and provide robust measures to stimulate community and government action. We follow a similar path for the other four fundamental strategies that Restacking the Odds is exploring – antenatal care, sustained nurse home visiting, parenting programs, and the early years of school.

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RESTACKING THE ODDS

APPENDICES

Appendix A: Overall ranking of the evidence

OVERALL RANKING OF THE EVIDENCE	
	Definition
Supported	Clear, consistent evidence of benefit. No evidence of harm or risk to participants. A well conducted systematic review or meta-analysis (++ or +) or at least two RCTs found the intervention to be more effective than a control group on at least one child or parent valid outcome measure. A positive effect was maintained for at least 6 months.
Promising	Evidence suggestive of benefit but more evidence needed. No evidence of harm or risk to participants. At least one RCT found the intervention to be more effective than a control group on at least one child or parent valid outcome measure.
Evidence fails to demonstrate effect	A well conducted systematic review or meta-analysis or at least one RCT found the intervention to be ineffective compared with a control group. The overall weight of the evidence does not support the benefit of the practice.
Unknown	The data reported across trials is inconsistent. One or more RCTs show a high level of bias. There are insufficient trials to provide an evaluation of the evidence-base.
Concerning practice	At least 1 RCT of low risk of bias where the practice has shown to have no effect or a negative effect sustained over at least 1 year.

Appendix B: ACECQA National Quality Standard

Elements	
Quality Area 1: Educational program and practice	
Standard 1.1	An approved learning framework informs the development of a curriculum that enhances each child's learning and development
1.1.1	Curriculum decision making contributes to each child's learning and development outcomes in relation to their identity, connection with community, wellbeing, confidence as learners and effectiveness as communicators
1.1.2	Each child's current knowledge, ideas, culture, abilities and interests are the foundation of the program
1.1.3	The program, including routines, is organised in ways that maximise opportunities for each child's learning
1.1.4	The documentation about each child's program and progress is available to families
1.1.5	Every child is supported to participate in the program
1.1.6	Each child's agency is promoted, enabling them to make choices and decisions and influence events and their world
Standard 1.2	Educators and co-ordinators are focused, active and reflective in designing and delivering the program for each child
1.2.1	Each child's learning and development is assessed as part of an ongoing cycle of planning, documenting and evaluation
1.2.2	Educators respond to children's ideas and play and use intentional teaching to scaffold and extend each child's learning
1.2.3	Critical reflection on children's learning and development, both as individuals and in groups, is regularly used to implement the program
Quality Area 2: Children's health and safety	
Standard 2.1	Each child's health is promoted
2.1.1	Each child's health needs are supported
2.1.2	Each child's comfort is provided for and there are appropriate opportunities to meet each child's need for sleep, rest and relaxation
2.1.3	Effective hygiene practices are promoted and implemented
2.1.4	Steps are taken to control the spread of infectious diseases and to manage injuries and illness, in accordance with recognised guidelines
Standard 2.2	Healthy eating and physical activity are embedded in the program for children
2.2.1	Healthy eating is promoted and food and drinks provided by the service are nutritious and appropriate for each child
2.2.2	Physical activity is promoted through planned and spontaneous experiences and is appropriate for each child
Standard 2.3	Each child is protected
2.3.1	Children are adequately supervised at all times
2.3.2	Every reasonable precaution is taken to protect children from harm and any hazard likely to cause injury
2.3.3	Plans to effectively manage incidents and emergencies are developed in consultation with relevant authorities, practised and implemented
2.3.4	Educators, co-ordinators and staff members are aware of their roles and responsibilities to respond to every child at risk of abuse or neglect
Quality Area 3: Physical environment	
Standard 3.1	The design and location of the premises is appropriate for the operation of a service

Appendix B: ACECQA National Quality Standard (cont.)

3.1.1	Outdoor and indoor spaces, buildings, furniture, equipment, facilities and resources are suitable for their purpose
3.1.2	Premises, furniture and equipment are safe, clean and well maintained
3.1.3	Facilities are designed or adapted to ensure access and participation by every child in the service and to allow flexible use, and interaction between indoor and outdoor space
Standard 3.2	The environment is inclusive, promotes competence, independent exploration and learning through play
3.2.1	Outdoor and indoor spaces are designed and organised to engage every child in quality experiences in both built and natural environments
3.2.2	Resources, materials and equipment are sufficient in number, organised in ways that ensure appropriate and effective implementation of the program and allow for multiple uses
Standard 3.3	The service takes an active role in caring for its environment and contributes to a sustainable future
3.3.1	Sustainable practices are embedded in service operations
3.3.2	Children are supported to become environmentally responsible and show respect for the environment
Quality Area 4: Staffing arrangements	
Standard 4.1	Staffing arrangements enhance children's learning and development and ensure their safety and wellbeing
4.1.1	Educator-to-child ratios and qualification requirements are maintained at all times
Standard 4.2	Educators, co-ordinators and staff members are respectful and ethical
4.2.1	Professional standards guide practice, interactions and relationships
4.2.2	Educators, co-ordinators and staff members work collaboratively and affirm, challenge, support and learn from each other to further develop their skills, to improve practice and relationships
4.2.3	Interactions convey mutual respect, equity and recognition of each other's strengths and skills
Quality Area 5: Relationships with children	
Standard 5.1	Respectful and equitable relationships are developed and maintained with each child
5.1.1	Interactions with each child are warm, responsive and build trusting relationships
5.1.2	Every child is able to engage with educators in meaningful, open interactions that support the acquisition of skills for life and learning
5.1.3	Each child is supported to feel secure, confident and included
Standard 5.2	Each child is supported to build and maintain sensitive and responsive relationships with other children and adults
5.2.1	Each child is supported to work with, learn from and help others through collaborative learning opportunities
5.2.2	Each child is supported to manage their own behaviour, respond appropriately to the behaviour of others and communicate effectively to resolve conflicts
5.2.3	The dignity and rights of every child are maintained at all times
Quality Area 6: Collaborative partnerships with families and communities	
Standard 6.1	Respectful supportive relationships with families are developed and maintained
6.1.1	There is an effective enrolment and orientation process for families
6.1.2	Families have opportunities to be involved in the service and contribute to service decisions
6.1.3	Current information about the service is available to families
Standard 6.2	Families are supported in their parenting role and their values and beliefs about child rearing are respected

Appendix B: ACECQA National Quality Standard (cont.)

6.2.1	The expertise of families is recognised and they share in decision making about their child's learning and wellbeing
6.2.2	Current information is available to families about community services and resources to support parenting and family wellbeing
Standard 6.3	The service collaborates with other organisations and service providers to enhance children's learning and wellbeing
6.3.1	Links with relevant community and support agencies are established and maintained
6.3.2	Continuity of learning and transitions for each child are supported by sharing relevant information and clarifying responsibilities
6.3.3	Access to inclusion and support assistance is facilitated
6.3.4	The service builds relationships and engages with their local community
Quality Area 7: Leadership and service management	
Standard 7.1	Effective leadership promotes a positive organisational culture and builds a professional learning community
7.1.1	Appropriate governance arrangements are in place to manage the service
7.1.2	The induction of educators, co-ordinators and staff members is comprehensive
7.1.3	Every effort is made to promote continuity of educators and co-ordinators at the service
7.1.4	Provision is made to ensure a suitably qualified and experienced educator or co-ordinator leads the development of the curriculum and ensures the establishment of clear goals and expectations for teaching and learning
7.1.5	Adults working with children and those engaged in management of the service or residing on the premises are fit and proper
Standard 7.2	There is a commitment to continuous improvement
7.2.1	A statement of philosophy is developed and guides all aspects of the service's operations
7.2.2	The performance of educators, co-ordinators and staff members is evaluated and individual development plans are in place to support performance improvement
7.2.3	An effective self-assessment and quality improvement process is in place
Standard 7.3	Administrative systems enable the effective management of a quality service
7.3.1	Records and information are stored appropriately to ensure confidentiality, are available from the service and are maintained in accordance with legislative requirements
7.3.2	Administrative systems are established and maintained to ensure the effective operation of the service
7.3.3	The Regulatory Authority is notified of any relevant changes to the operation of the service, of serious incidents and any complaints which allege a breach of legislation
7.3.4	Processes are in place to ensure that all grievances and complaints are addressed, investigated fairly and documented in a timely manner
7.3.5	Service practices are based on effectively documented policies and procedures that are available at the service and reviewed regularly

RESTACKING THE ODDS

THE TEAM

Restacking the Odds is a collaboration between three organisations, each with relevant and distinctive skills and resources:

Murdoch Children's Research Institute (MCRI) is an independent medical research institute. MCRI's research covers the breadth of health and medical research from basic science through to clinical sciences and population health. MCRI is committed to giving all children the opportunity to have a happy and fulfilled life.

Prof Sharon Goldfeld – Deputy Director Centre for Community Child Health and Co-group leader Policy and Equity, Royal Children's Hospital and Murdoch Children's Research Institute

Dr Carly Molloy – Senior Research Officer and Project Manager, Murdoch Children's Research Institute

Social Ventures Australia (SVA) supports partners across sectors to increase their social impact. SVA helps business, government and philanthropists to be more effective funders and social purpose organisations to be more effective at delivering services.

Nicholas Perini – Principal, SVA Consulting

Bain & Company is one of the world's leading management consulting firms. Bain works with executives and organisations to help them make better decisions, convert those decisions into actions, and deliver sustainable success.

Chris Harrop – Partner, and member of Bain's worldwide Board of Directors

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RESTACKING THE ODDS

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Early childhood education: A study of the barriers, facilitators, & strategies to improve participation

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CHRISTOPHER HARROP
NICHOLAS PERINI

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Executive summary

AUSTRALIAN CHILDREN ARE MISSING OUT ON EARLY EDUCATION

Participation in high quality early childhood education (ECE) benefits child health and development. Though beneficial for all children, the positive effects of ECE participation are especially important for children
from disadvantaged / vulnerable backgrounds.

Every year, about 18.5% of children from Australia's lowest socioeconomic quintile enter school developmentally vulnerable on two or more domains fo the Australian Early Development Census, almost three times the rate for children in the highest socioeconomic quintile (6.5%). In recent years the gap between the poorest and wealthiest communities has increased.

Although Australian government policy supports universal access to ECE programs for 15 hours per week in the year before starting school, many children are still missing out. Those missing out are disproportionately from disadvantaged backgrounds.

We want to understand how families experience
the factors that act as participation barriers and facilitators We also want to hear about potential solutions or strategies to increase participation so all children can benefit from ECE.

The following summary includes findings from 63 surveys completed by service providers and 45 parents, 18 in-depth interviews with service providers and 21 parent interviews, reviews of the literature and 4 focused interviews with communities/service providers who demonstrated improved attendance.

SOLUTIONS TO INCREASING ATTENDANCE

Staff skill, including training and capacity building with a focus on family-centred and/or relationship-based practice, together with investment in maintaining a skilled workforce are critical to overcoming barriers to ECE.

Cultural inclusivity, including cultural awareness and cultural safety are required to support Indigenous and culturally and linguistically diverse families

Service partnerships and interagency collaboration should be leveraged to support families, build stronger community connections, increase trust in the community service sector and improve efficiency in use of public resources (e.g. cooperation/cross promotion of MCH & ECEC services)

Services and government need to do better in terms of collecting, using, and responding to ECE data. A more systematic approach is needed to build evidence and share it widely

Facilitators to ECE attendance

- Information about the benefits of ECE for families
- Knowing educators are professionally trained
- Ensuring that families feel educators understand their child(ren)
- Good communication about what is involved in the centre's services

Barriers to ECE attendance

- Direct and indirect costs of participation
- Parents not being aware of the benefits
- Families not knowing how to access services
- Views about maternal roles and child readiness to attend

The Social Ecological Model

Methodology to frame reported barriers & facilitators to ECE participation; attendance & dose

A FRAMEWORK FOR UNDERSTANDING SOCIAL SYSTEMS WITHIN THE CONTEXT OF ECE

The Social Ecological Model (SEM) is a theory-based framework for understanding the multifaceted and interactive effects of personal and environmental factors that determine behaviours, and for identifying behavioural and organisational leverage points and intermediaries for health promotion within organisations.

FOUR NESTED LEVELS FOR UNDERSTANDING ECE PARTICIPATION

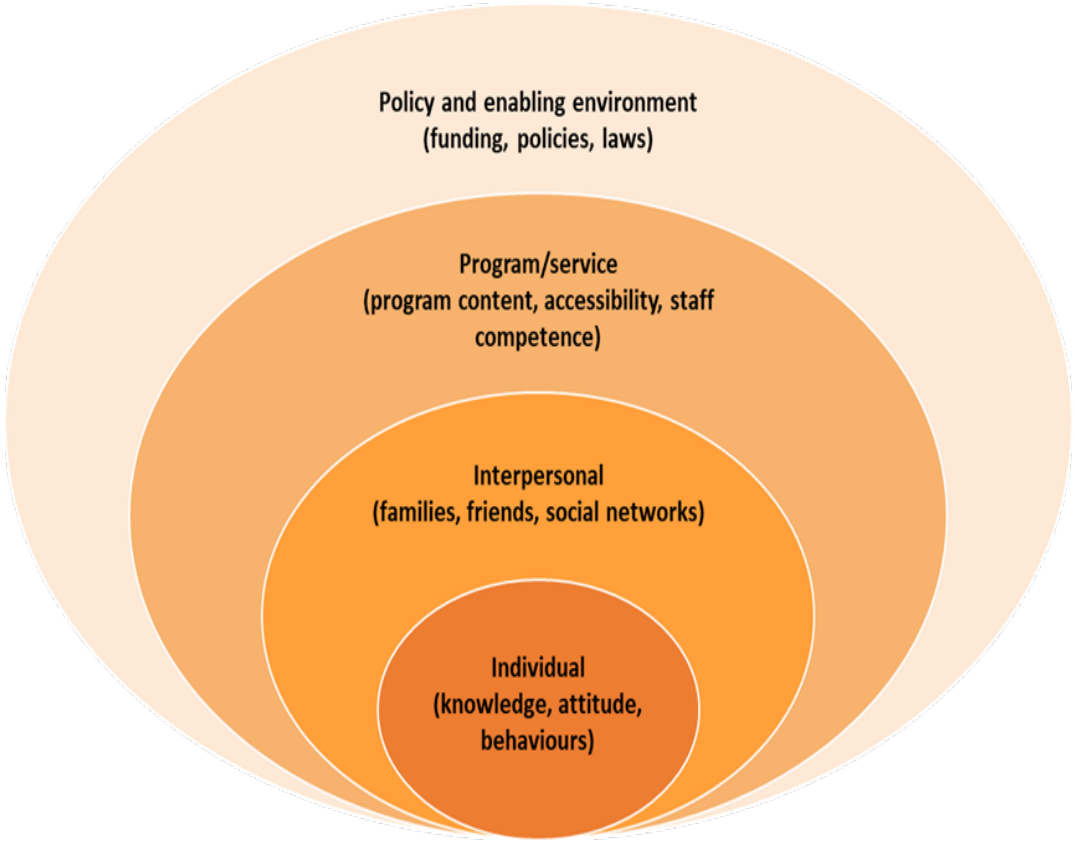


Figure adapted from the Centers for Disease Control and Prevention (Centers for Disease Control and Prevention (CDC)).

Findings from qualitative interviews

Strategies to improve attendance at early childhood education

Qualitative interviews were selectively undertaken with four organisations (four different initiatives) who reported some success in improving ECE participation: 1) promoting 3-year-old kinder for ATSI families, 2) co-location of a culturally and linguistically diverse (CALD) supported playgroup with a kinder, 3) Linking and supporting refugee and asylum seeker families to ECEC, and 4) ECEC provider support for families experiencing disadvantage. The following strategies were common themes across initiatives and rated as having 'Potential' to increase ECE participation, particularly for children experiencing vulnerability.

PRACTICE ELEMENTS

What is delivered:

All practice elements were identified at the program/service level of the Social-Ecological Model

Staff skills
Family-centred, strengths-based, and relationship building approaches influence attendance

Service procedures
Recruitment and enrolment strategies; coordinated, complementary services and early years' service partnerships; in-home support

Aboriginal inclusivity
Community consultation and intergenerational involvement; Aboriginal workforce; flexible and inclusive programs and services

Cultural inclusivity
Cultural awareness and cultural safety for CALD communities

IMPLEMENTATION ELEMENTS

How it is delivered:

Implementation elements were categorised at the program/service level and policy and enabling environment level of the Social-Ecological Model.

Staff training and capacity building
Investment in workforce training

Service partnerships
Formal and informal partnerships

Accessibility
Fee subsidy or flexible brokerage funding and transport assistance

Government support
Funding models and policy agreements

Aboriginal community involvement
Consultation with Koorie Engagement Support Officers (KESO), Koorie Preschool Support Assistants (KPSA) and Aboriginal and Torres Strait Islander (ATSI) staff)

Cultural awareness and localised training
Formal and informal opportunities to strengthen inclusivity; strengths-based, and trauma-informed approaches

Infrastructure
Shared infrastructure; fit for purpose data systems

SUSTAINABILITY ELEMENTS

What maintains ongoing delivery:

Sustainability components fell within the program/service and policy and enabling environment levels.

Maintaining a skilled workforce
Retention of skilled staff, opportunities for continued learning

Building sector level cultural inclusivity Services for Aboriginal people led by Aboriginal people; building cultural competence capabilities

Investment in infrastructure

Purpose-built / needs-based infrastructure

Ongoing government support / commitment Ongoing government funding

Strengthening early years' service sector Partnerships / collaboration and coordinated care; service management and data collection

The voice of service providers

Strategies to improve attendance at parenting programs

Qualitative interviews were selectively undertaken with four organisations (four different initiatives) who reported some success in improving ECE participation: 1) promoting 3-year-old kinder for ATSI families, 2) co-location of a culturally and linguistically diverse (CALD) supported playgroup with a kinder, 3) Linking and supporting refugee and asylum seeker families to ECEC, and 4) ECEC provider support for families experiencing disadvantage. The statements are from these interviews that illustrate the main themes described by the service providers.

PRACTICE ELEMENTS

> *As an Aboriginal person, I feel safe going there [to kindergarten]. You book in, you see the acknowledgement, they've got artwork, they've got language names, they've got resources, they fly the flags. All these sorts of things that weren't there before. All that stuff is the measure of success, I think. What I see as improvements in services."*
>
> Chair of the local Aboriginal Community Controlled Organisation, 2020

> *Educators have posted a lot of information for families to help them understand, for instance, the value of reading to your child every day, "*
>
> Senior Educator, Co-located Kinder & CALD Playgroup, 2020

IMPLEMENTATION ELEMENTS

> *It's based in relationships. It's going to where people are, and working with them to overcome their challenges, and support them into attending kindy, and maintaining kindy enrolments…[It's about] making sure family is connected to all the different supports that they need, so they can then think about their child and prioritise their early education"*
>
> Community Hub Co-Ordinator, Linking Refugee & Asylum Seeker Families, 2020

> *Each year we hold a [community outreach] day…. where we bring all the services together, and then we invite families to come and talk to the services, and that's where we have information on, what's kindy? How to enrol your child. Child Centrelink is there, so they can ask questions about childcare subsidies. Kindies are there to promote their service."*
>
> Pilot Project Co-ordinator, Linking Refugee & Asylum Seeker Families,, 2020

SUSTAINABILITY ELEMENTS

> *We're in partnership with Multicultural Australia, and their part of the contract is to provide bicultural support... They're able to go out and… help kindy educators build the capacity to understand that child's culture and needs."*
>
> Community Hub Co-Ordinator, Linking Refugee & Asylum Seeker Families, 2020

> *It's more like a culture that we're trying to spread through the organization.. if we're doing a thing, we try really hard to build in some sort of simple, automated data collection as part of it. "*
>
> Senior Manager, ECE Provider Supporting Families Experiencing Disadvantage 2020

Findings of a mixed methods study: Facilitators

Facilitators of participation in early childhood education (identified by parents & service providers)

INDIVIDUAL LEVEL FACILITATORS

Positive parent attitudes and beliefs
About ECE for school readiness, learning, and socialisation

Parent capacity
Saved money to pay kinder fees

Parent self-attributes
Initiative and confidence to seek ECE information from peers and teachers

Logistics
Car ownership, residential proximity to ECE service

INTERPERSONAL LEVEL FACILITATORS

Peer / social group norms
"Word of mouth" from friends, family, parent networks

Social environment
Sense of belonging at ECE services; peer group norms and beliefs

PROGRAM & SERVICE LEVEL FACILITATORS

Staff skills
Qualifications / training; non-judgemental attitudes; supportive behaviour, demonstrating genuine understanding of each child

High quality education (content and delivery)

Good communication
Adequate advertising; providing information about what is involved in the centre's services; promotion of benefits to attending

Program format
Flexible hours; sessions available in all day blocks rather than shorter periods across the week

Inviting atmosphere
Less formal; provision of food

Involving families
Letting them know how they can help their child's learning

Accessibility strategies
Use of a kinder bus or school bus; lower service fees

Cultural inclusivity
Language translation of class content and parent communications

Service procedures
Interagency collaboration to engage CALD families; promoting parent awareness

POLICY & ENVIRONMENT LEVEL FACILITATORS

Infrastructure
Reliable public transport; more educators; more services; number of classes rather than kindergartens

Funding
To build kinder buildings, rooms, programs, or parent outreach

Government subsidies
For 3-year-old kinder, long day care for working parents

Government
Flexibility in the cut-off date for three / four-year old kinder eligibility

Legislation
To make ECE participation mandatory

Findings of a mixed methods study: Barriers

Barriers to participation in early childhood education (identified by parents & service providers)

INDIVIDUAL LEVEL BARRIERS

Problems with transport
Distance too far, no transport, cost of transport

Prescriptive norms
Feeling that it is a mother's role to educate and care for the child

Previous negative experiences
with other professionals concerning the child

Health
Parent medical or mental health, substance use

Parent forms of disadvantage
Such as low-income, non-English-speaking background, unemployment, homelessness

Parent attitudes or beliefs
Perceptions of services as expensive childminding rather than education; feeling that parents don't need help educating and caring for their child(ren)

Parent concerns
Distrust of services; fear of authority, worry about being judged; worry about privacy of information

INTERPERSONAL LEVEL BARRIERS

Family dynamics
Separation, divorce, domestic violence

Social environment
Lack of belonging at ECE service; peer group norms

Family scheduling conflicts
Logistics with school-age children, or multiple children close in age having different routines, family travel commitments

Complex issues
Child protection orders; conflicts with caring for siblings with additional needs

PROGRAM & SERVICE LEVEL BARRIERS

Cost
Service fees for long day care, fee gap for kinder

Benefits unclear
of attendance or additional hours

Limited service hours
Inconvenient drop off and pick up times; clashes with work commitments

Program format
Session timing, length, and frequency

Service inaccessibility
Waitlists; location; cost of long day care and 3-year-old kinder

Inadequate promotion
of how to access ECE services, and what ECE involves

Lack of skilled educators / staff
Poor rapport with parents; lack of bilingual interpreters; inadequate training for interacting with children who have special / additional needs)

Service procedures
Difficult enrolment process

POLICY & ENVIRONMENT LEVEL BARRIERS

Concession ineligibility
Owing to: confusion about refugee status visa-types; income just above Health Care Card threshold

Lack of local infrastructure
ECE service capacity / choice

Insufficient funding
to build staff capacity to engage families

Lack of legislation
to mandate attendance

Lack of funding
for 3-year-old kinder*

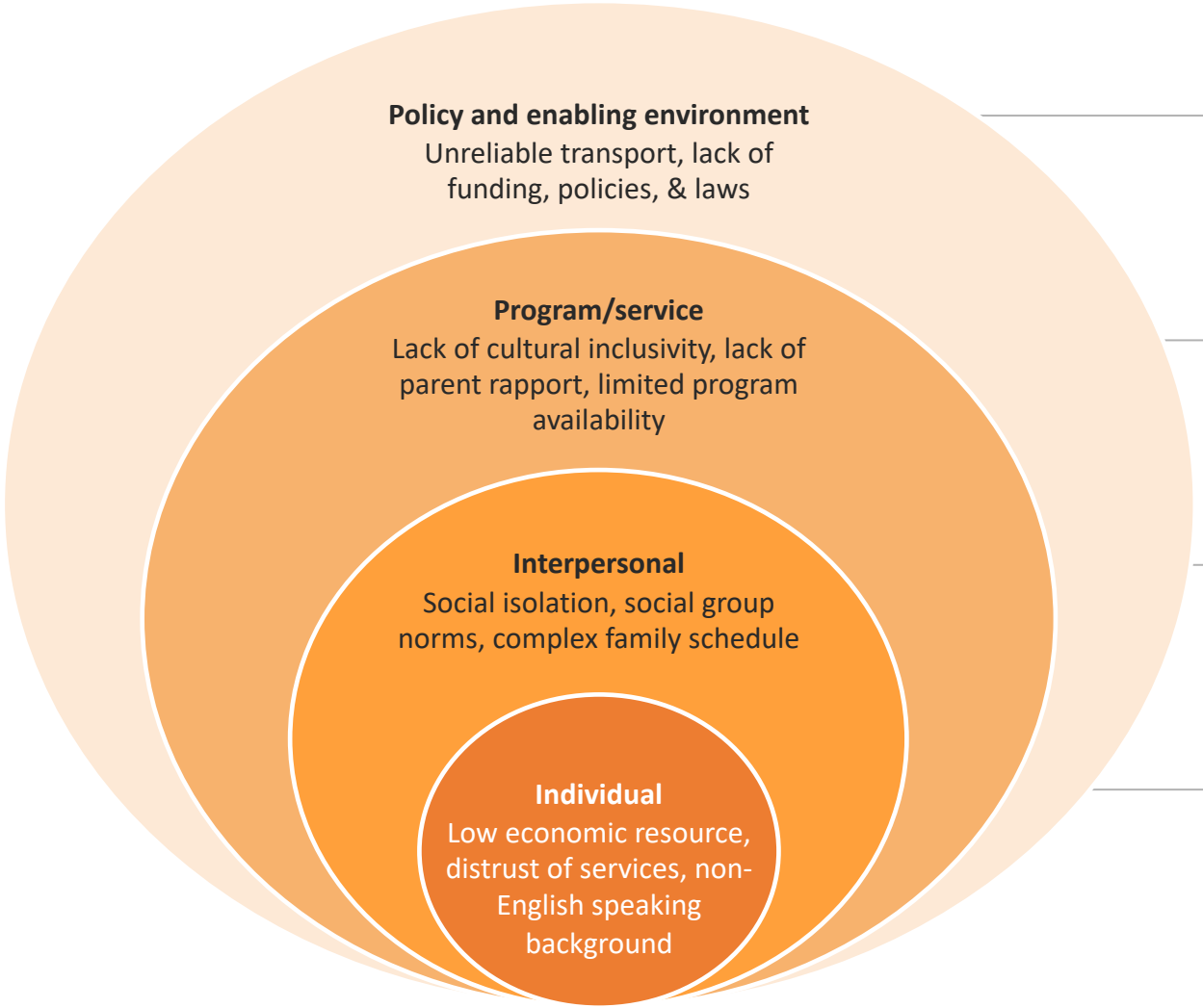
Changes to subsidies
such as the introduction of the activity test

Eligibility rules based on child age at a specific date

*Note that Victoria has committed to subsidising 15 hours 3-year-old kinder per week for all children by 2029. Currently, 21 (of 79) council areas should receive 15 hours. All other areas are expected to offer 5 hours by 2022

The family journey

POTENTIAL BARRIERS NEED TO BE ADDRESSED AT EACH STAGE OF THE FAMILY JOURNEY



Attract families	Recruit families	Retain families
National ECE benefits campaign	Funding for enrolment support staff	Policy to increase non-attendance follow-up
Local promotion & advertising	Streamline & simplify enrolment processes	Provide professional development to improve staff skill
Encourage word-of-mouth promotion	Provide enrolment assistance at community events	Facilitate parent social interactions or events
No cost (including LDC hours, food provision)	Adopt family-centred / strength-based approaches to relationship building	Build sector cultural inclusivity

Implications of study findings

Improving participation in early childhood education needs to be tackled at multiple levels to close the equity gap for Australian children

SERVICE-LEVEL ACTIONS

- Ensure staff are trained in strengths-based partnership models of care
- Ensure staff are culturally competent
- Offer programs in accessible locations, especially for low-SES communities
- Consider low / no cost options for disadvantaged families without Childcare Subsidy (CCS) access
- Schedule sessions allowing flexibility for different family circumstances
- Advertise the benefits of ECE widely using multiple channels and link to tangible outcomes (e.g. school readiness)
- Customise approaches to engage specific high-risk populations
- Collaborate with local families and organisations (feedback, promotion)
- Provide opportunities for families to ask questions & seek additional information
- Collect and evaluate enrolment & attendance data & monitor the success of new engagement approaches

COMMUNITY-LEVEL ACTIONS

- Local council commitment to improving access to ECE services for hard to reach families
- Local council efforts to promote the benefits of ECE to families, including utilising existing health platforms & popular services (e.g. Maternal & Child Health services, supported playgroups)
- Local council facilitation of collaborative partnerships with ECE providers
- Local council facilitation of data collection and data sharing between organisations

SECTOR-LEVEL ACTIONS

- Commission media campaigns promoting the importance of ECE for child development
- Invest time and resourcing to increase professional development opportunities, using existing PD platforms
- Commitment to training staff in relationships-based and family-centred practice
- Commitment to training educators in best-practice for building relationships and interaction with children
- Advocating for workforce wellbeing and retention
- Peak bodies (such as ACA, ACCS, ACECQA, CELA,ECA, ELAA, ELCCA, SNAIC)* to provide services with additional supports for increasing quality, and improving data collection & reporting

*Australian Childcare Alliance, Australian Community Children's Service, Australian Children's Education and Care Quality Authority, Community Early Learning Australia, Early Childhood Australia, Early Learning Association Australia, Early Learning & Care Council of Australia, Secretariat of National Aboriginal and Islander Child Care

GOVERNMENT-LEVEL ACTIONS

- Commitment to long-term policy & funding nationally
- Commit to improving data collection and reporting on attendance, including data for ATSI and vulnerable groups
- Address the limitations of the current Childcare Subside System so that families from low SES and vulnerable backgrounds can access quality ECE services
- Simplify application processes to access support (e.g. Additional Childcare Subsidy that requires frequent re-application)
- Investment in the development and testing of ECE enrolment and attendance packages, especially for disadvantaged / underrepresented groups
- Commitment to promoting benefits of ECE (such as commissioning media campaigns to endorse and normalise participation)

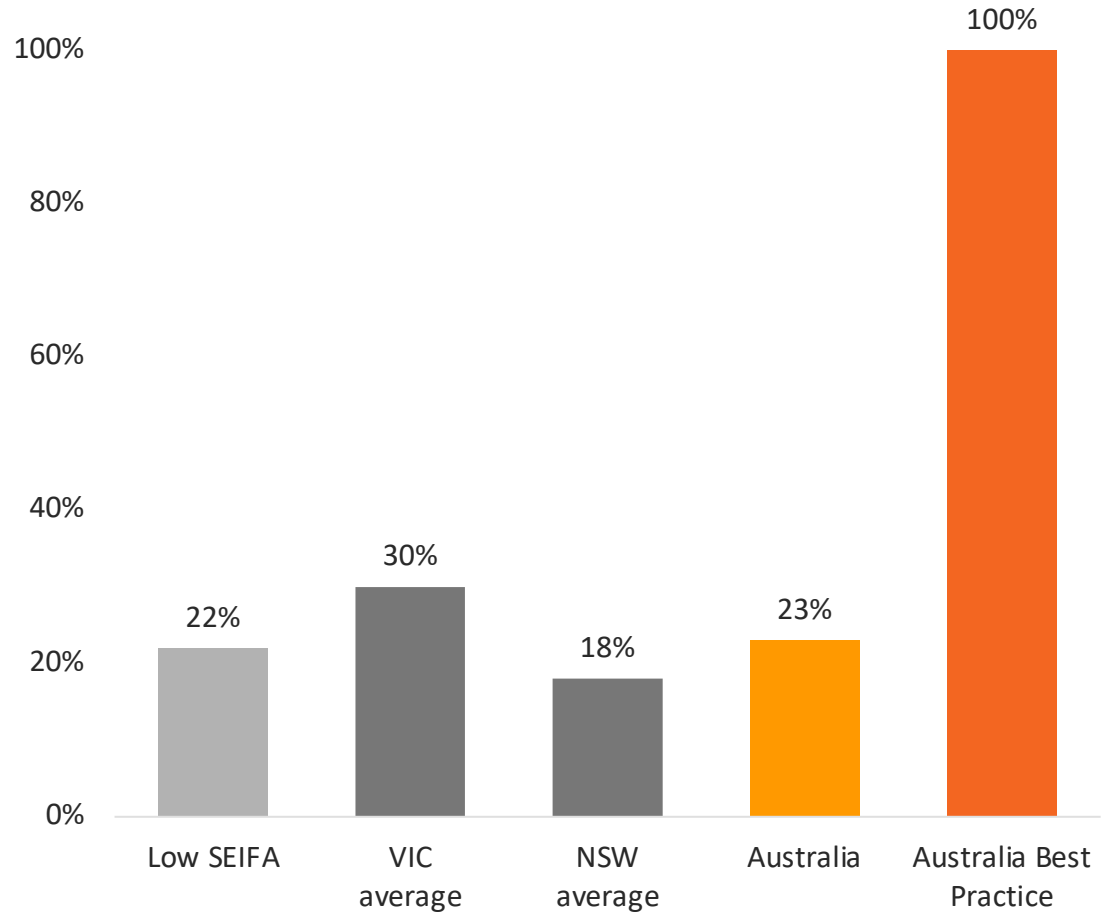
RESTACKING THE ODDS

Australian children are missing out on early education

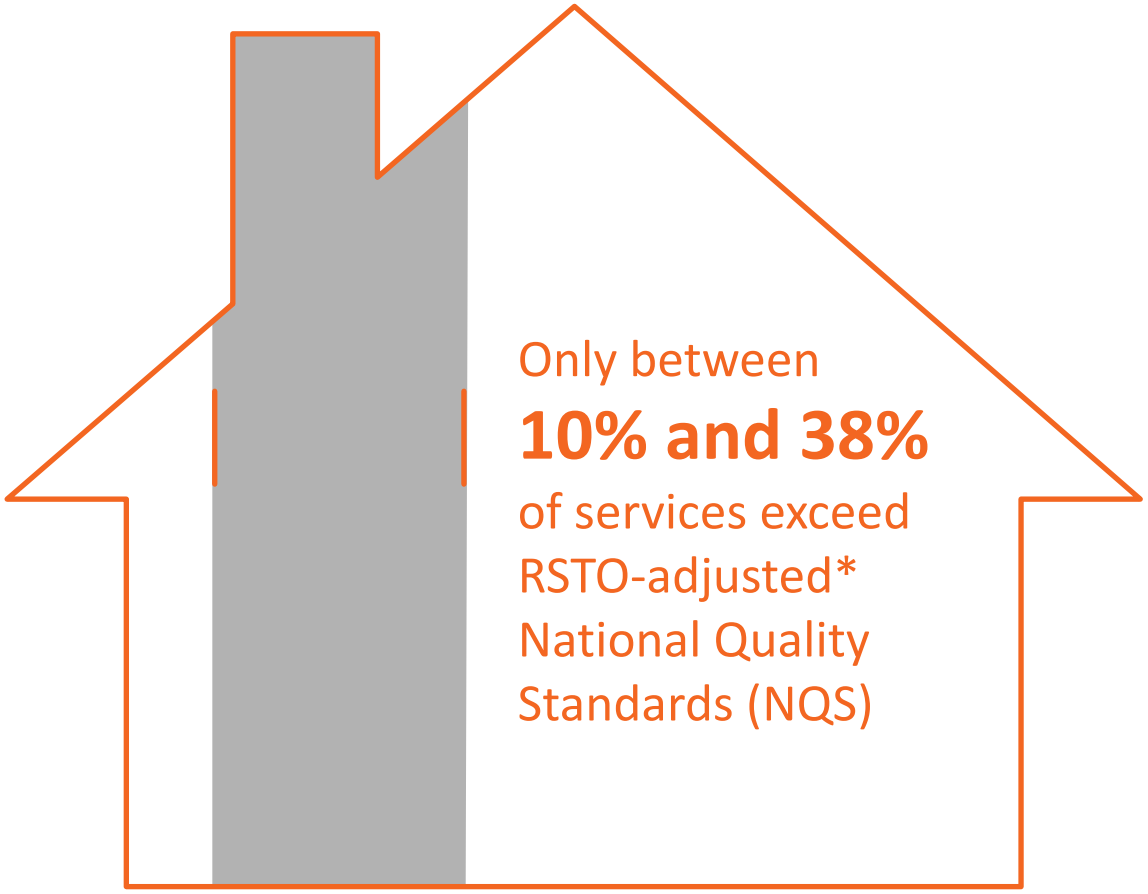
There are not enough high quality ECE services in Australia

Data from ACECQA & Australian communities who participated in the Restacking the Odds research project

PERCENT OF ECE SERVICES RATED "EXCEEDING" RSTO ADJUSTED NQS



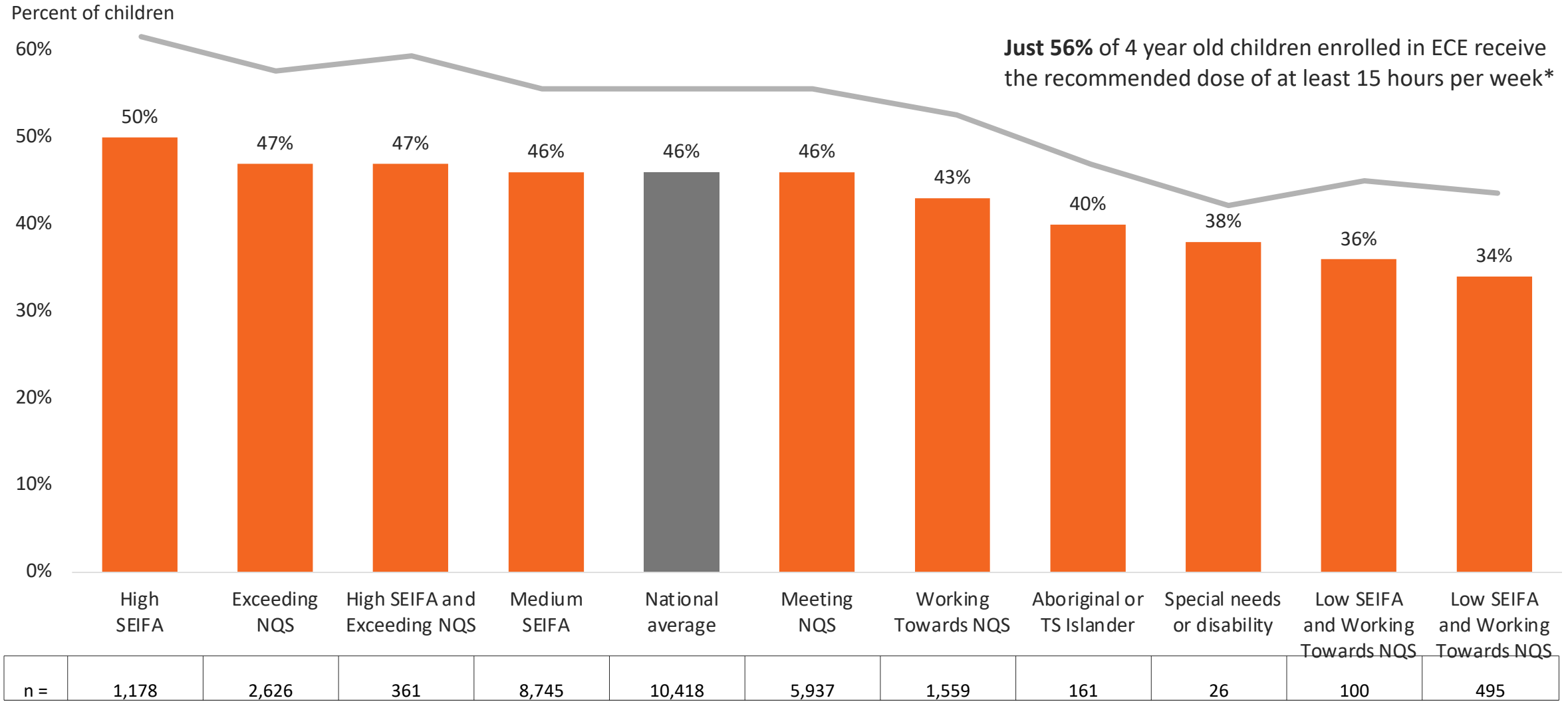
IN COMMUNITIES WHO PARTICIPATED IN RESTACKING THE ODDS, ACCESS TO *HIGH QUALITY* ECE IS LIMITED



*The RSTO-adjusted National Quality Score definition of 'exceeding' requires a service meets the quality standards in all seven areas, and exceeds the standard in all three evidence-based areas: QA1 Educational program and practice, QA4 – Staffing arrangements, and QA5 – Relationships with children

Almost half of all enrolled Australian children are missing out on the right dose of ECE

Attendance levels are lower in poorer quality services and areas with higher disadvantage



n =	1,178	2,626	361	8,745	10,418	5,937	1,559	161	26	100	495

> = 15 hours every week > = 15 hours for 90%+ of weeks

*Data covers >10,000 children at 688 centres. National average is 56% for the line chart Source: Xplor attendance data (1 March – 30 November, 2019) based on 90% of weeks

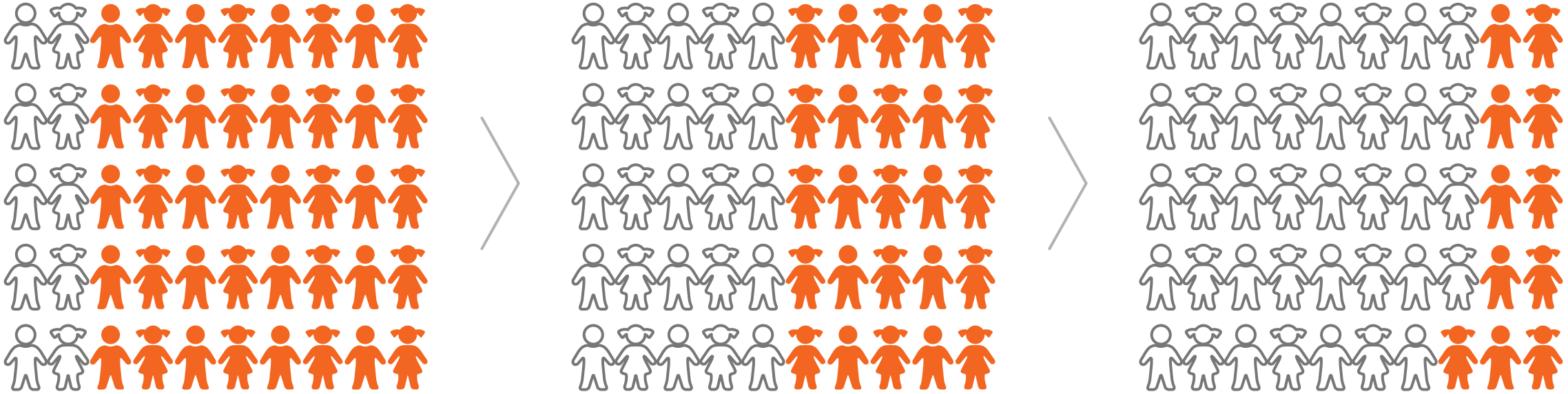
Attendance at ECE in the year before school

Data from Australian communities who participated in the Restacking the Odds research project

Just 1,101 of 3,032 children (36%) enrolled at RSTO-participating ECE services in the year before school attended 15+hr per week of ECE

Almost 2 in every 3 enrolled children are not receiving the recommended dose

THE NUMBER OF CHILDREN MISSING OUT VARIES ACROSS COMMUNITIES



~19% ~50% ~77%

Percent of children in the year before school who are enrolled in ECE but not receiving 15+ hours ECE per week

Source: Attendance statistics calculated using combined data from RSTO, Xplor and state government departments of education

Participation of vulnerable groups

Data from Australian communities who participated in the Restacking the Odds research project

RESEARCH DEMONSTRATES THAT DISADVANTAGED CHILDREN BENEFIT MOST FROM EARLY EDUCATION

Yet children from disadvantaged communities disproportionately miss out – in some cases the odds of missing out are almost three-fold.

The gap between children from the most disadvantaged and least-disadvantaged communities is widening.

CHILDREN MISSING OUT ON PRESCHOOL / KINDER IN 2014

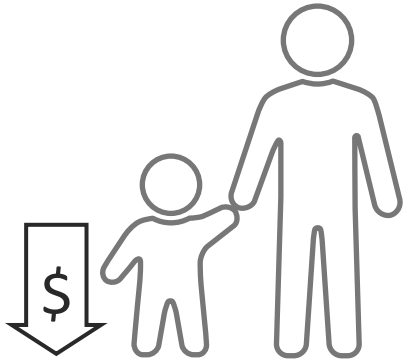
~14% (low SEIFA) vs **~5%** (high SEIFA)

~16% (Indigenous) vs **8%** (non-Indigenous)

~13% (NESB) vs **~8%** (English-speaking background)

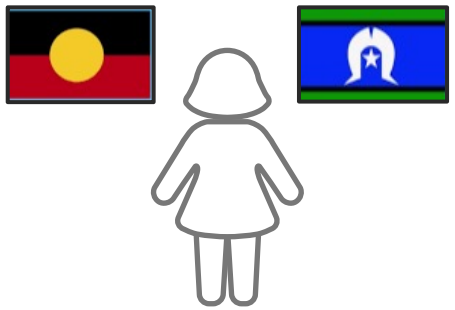
Data is from the Longitudinal Study of Australian Children (Molloy et al 2019) and teacher report data from the Australian Early Development Census (O'Connor et al. 2020)

CHILDREN BY AT-RISK/ PRIORITY GROUP RECEIVING 15+ HOURS OF ECE



Children from families with a Healthcare Card

12-74%



Children with ATSI background

50%

Children with a disability

13-38%

Children from a NESB

19-32%

Note: Attendance statistics calculated using combined data from RSTO, Xplor and state government departments of education. Abbreviations: NESB, non-English speaking background

Positive initiatives to increase ECE participation (trialled in RSTO communities)

"Relationships has to be where you start because unless you've got your families on board and know truly what they want, you could be going in the wrong direction."

PROMOTING 3-YEAR-OLD KINDERGARTEN FOR ABORIGINAL FAMILIES

Trial objective: Address low participation rates among Aboriginal & Torres Strait Islander families

Location: 6 sites in regional Victoria

Partners: Aboriginal Best Start and a local Aboriginal Community Controlled Organisation (ACCO)

Strategies: A number of 'small change ideas' underpinned by Aboriginal knowledge & relationships in the community

- Plan, Do, Study, Act cycles - data is captured in a centralised data portal
- A family-centred, strengths-based approach that incorporated cultural competence training
- Utilised specific skills and relationships of culturally specific key liaison personnel: Koorie Engagement Support Officers (KESOs) and Koorie preschool Assistants (KPSAs)
- Incorporated culturally-specific content, practices, and design (e.g. murals displaying ATSI artwork, Aboriginal flag, and ATSI books / resources)
- Interagency collaboration

Reported impact: 70% increase in ATSI enrolment from 2018-2019; attendance rate in 1st quarter of 2019 reached 92% of target.

Limitations: Proportion of all eligible ATSI children enrolled each year not reported so unclear how much of a difference a 70% increase makes overall. Attendance target rate not reported.

> *I keep saying don't undervalue that informal relationship-building. That's key. It really is. Between educators and parents. It has to be authentic"*
>
> Program Facilitator, 2020

CO-LOCATION OF SUPPORTED PLAYGROUP AND KINDERGARTEN

Trial objective: Increase kindergarten enrolment and attendance among CALD families

Location: Metropolitan LGA, Victoria

Partners: Supported Playgroups run by the council , the local council and kindergarten management

Strategies: Created a shared space at the kindergarten for Playgroups (that were already well-attended by CALD families)

- Focus on building relationships
- Information exchange
- Professional development training in trauma-informed practices (e.g. for working with refugee families)
- Interagency collaboration – Maternal Child Health, Supported Playgroups, Kindergarten,
- Bi-cultural Supported Playgroup workers

Reported impact: 50% of play group children enrolled in kindergarten early. Educator reported that CALD families previously enrolled late or not at all.

Limitations: Lack of data showing proportion of CALD children enrolled prior to and following initiation of participation strategies. Lack of attendance data specific to CALD families.

> *We have educators who speak community languages… and they'll directly ring parents...and try and talk them through it. "*
>
> Senior Educator, Co-located Kinder & CALD Playgroup, 2020

Note: Evidence that the initiatives work is limited by a lack of administrative pre-post data which could demonstrate that increases in enrolment and attendance rates have indeed occurred - and correlate with the implementation of participation strategies)

Positive initiatives to increase ECE participation (trialled in RSTO communities)

"Relationships has to be where you start because unless you've got your families on board and know truly what they want, you could be going in the wrong direction."

LINKING REFUGEE & ASYLUM SEEKER FAMILIES TO ECE

Trial objective: Increase kindergarten attendance among refugee and asylum seeking families

Location: Metropolitan LGA, Queensland

Partners: State Government, a non-government organisation who work with refugee / asylum seeker families and Community Hubs

Strategies: Investigated and identified the main barriers to participation: lack of awareness about ECE availability and benefits, cost, transport and language

- Early Educators employed by Community Hubs delivered a child development-focused program, promoted the importance of kindergarten, linked families directly with kindergartens and provided enrolment assistance
- Brokerage funding (from the Universal Access National Partnership) financed ECE places for families and transport
- ECE staff received professional development in trauma informed practice and family diversity training

Reported impact: Increased enrolment from no targeted families to 45 (in year 1) and 90 (in year 2).

Limitations: Data does not show proportion of targeted families enrolled. No attendance data

> *[The] Department of Education funded us for two teachers, and enrolments, and working with the services. And then they funded Multicultural Australia for the bicultural support workers and also capacity building".*
>
> Community Hub Co-Ordinator, Linking Refugee & Asylum Seeker Families, 2020

ECE PROVIDER SUPPORT FOR FAMILIES EXPERIENCING DISADVANTAGE

Trial objective: Increase attendance rates among families experiencing disadvantage

Location: Multiple sites across Australia

Partners: Major ECE service provider, State & Commonwealth government, Child Protection agencies

Strategies: Weekly monitoring of attendance for each child, together with staff check-ins to identify barriers

- *Early Learning Fund*, Service provides eligible families with heavily subsidised access to at least two days per week ECE (family co-contribution of $5/day)
- *Staying Connected*, targets children at risk of child abuse or in child protection. Families are contacted weekly. Decision trees are used to draw on internal & external supports. Also supported by State and Commonwealth Government and child protection agencies

Reported impact: Service data indicated 90% of families receiving the ELF met participation target (i.e. 600 hours in year before school).

Limitations: Participation target required attendance over two consecutive days. It is unclear if remaining 10% of children also received 600 hours (on non-consecutive days). No enrolment data or analysis of children in Staying Connected initiative.

> *I think we need to continue to push really strongly as a sector for a universal door that is like an emergency department. Like it doesn't matter where you're from, it doesn't matter what your parents do, it doesn't matter what's wrong with you. This door is open to you and you can come as often as you want to come*
>
> Senior Manager, ECE Provider Supporting Families Experiencing Disadvantage 2020

Note: Evidence that the initiatives work is limited by a lack of administrative pre-post data which could demonstrate that increases in enrolment and attendance rates have indeed occurred - and correlate with the implementation of participation strategies

Strategies trialled to improve ECE participation

Findings from a review of the literature; peer-review & evaluation reports

A restricted systematic review was undertaken of the peer-reviewed literature - there was only one peer-reviewed intervention case study identified. This study described the evaluation of a government imitative in New Zealand. International and Australian evidence databases and research institutes were also searched for grey literature – although we identified 56 government-initiated and 20 community-initiated programs/initiatives, only 36 had a publicly available report, and only 3 included participation as an outcome and were included for analyses.

ENGAGING PRIORITY FAMILIES

Trial objective: Engaging Priority Families (EBF) government initiative was designed to increase ECE participation in areas where there are high numbers of children starting school who have not participated in ECE.

Targets: 3 and 4 year old children from low-income and / or Maori / Pasifika families.

Location: New Zealand areas with low ECE uptake.

Funding: New Zealand Ministry of Education.

Delivery: Community non-government organisations.

Strategies to improve participation: *Brokerage, knowledge & support.* Employment of culturally appropriate and skilled coordinators working with families to increase ECE participation and access to health, financial and family support services.

Outcome: Study results suggested that in some instances EPF coordinators were able to: connect families with key social agencies, assist with increasing family knowledge of ECE services, and support families to find the 'right' ECE service for them.

Limitations: The EPF initiative was not tested in a controlled efficacy trial. Findings are based on the subjective experiences of only a small sample of parents (n = 12) and service providers (n = 12) who participated in the program.

ACCESS TO EARLY LEARNING

Trial objective: 1) support vulnerable three-year-old children to attend a kindergarten program for 15 hours per week before attending a funded kindergarten program at age four, 2) build parenting capacity, 3) build ECE service and educator capability.

Targets: Vulnerable 3-year old children.

Location: Victoria (four metro and three regional sites).

Funding: Victorian State Government.

Delivery: Local government, community organisations.

Strategies to improve participation: *No cost, brokerage, professional development, interagency coordination, partnerships & relationship building.* No cost to families for 15 hours ECE per week, enrolment caseworkers, Family and In-Home Support workers, professional development in family-centred and strength-based approaches for educators, Partnerships (governance groups to drive links between program and supports), holistic supports-including brokerage (current and ongoing family needs addressed).

Outcome: Increased child enrolment for most children in the program – 260 of 267 were enrolled for 15+ hours & children attended an average of 81% of enrolled hours.

Limitations: Families who did not have sufficient English to understand the consent materials were ineligible to participate. Data sourced through survey/interview may have disproportionately come from highly engaged families, potentially skewing families' experiences toward those that were more positive about the program.

Strategies trialled to improve ECE participation

Findings from a review of the literature; peer-review & evaluation reports

WORKING TOGETHER FOR 3 YEAR OLDS (WT3)

Trial objective: 1) to create a shared, innovative and effective approach to address barriers to participation in ECE experienced by vulnerable children, 2) develop a pilot program using a co-design process with families, educators, community and service representatives.

Targets: Vulnerable children in the year before kinder

Location: Tasmania (five sites)

Funding: Tasmanian State Government

Delivery: Department of Education, Tasmanian Council of Social Services, Australian Centre for Social Innovation

Strategies: *No cost, relationships, community engagement, interagency collaboration.* Co-design, no cost to families for 400 hrs ECE per child for 1 year, employment of early learning consultants, engagement workers and senior social workers to deliver the program, work with families and build service capacity.

Outcome: Increase in the proportion of WT3 children who attended 10+ hours of ECEC between February and June 2019. Over the 18-week period, 55% of children were averaging 10+ hrs per week, and in the final two months it increased to 73% (range: 5% - 85% of children p/wk.).

Limitations: research shows that children experiencing disadvantage should attend 15+hours per week (every week) for at least three years. Some weeks attendance for 10 hours was as low as 5% and never reached above 85% shows there are likely additional barriers to families attending for the optimal dose.

NSW ABORIGINAL CHILD & FAMILY CENTRES

Trial objective: 1) To increase the proportion of ATSI three- and four-year-old children participating in ECEC services, 2) increase the proportion of ATSI children and families accessing a range of services

Targets: Aboriginal and Torres Strait Islander children

Location: Nine NSW sites (metro, regional, and rural)

Funding: Initially Commonwealth, now NSW Department of Family and Community Services (FACS)

Delivery: Local governance: ATSI-community control

Strategies: *Community involvement, culturally appropriate, interagency collaboration, ATSO employment & governance.* Purpose-built centres for co-location of integrated and culturally appropriate services (including ECE, Maternal & Cild Health services, parenting and family support), specialised liaison roles

Outcome: The number of attendances at early childhood education (including preschool, playgroup, reading groups and homework clubs) increased from 90 in 2013 to 193 in 2014.

Limitations: Although these figures indicate increased activity at the ACFCs is it ultimately difficult to determine how many children were specifically accessing ECEC and does not provide any insight as to whether children were receiving the recommended 15+ hours a week

Australia has a number of federal & state-based policies designed to improve ECE participation

Existing policies recognise the importance of ensuring equitable access to ECE and increasing participation of vulnerable or disadvantaged children, but lack adequate reporting mechanisms and analysis to track their impact

UNIVERSAL ACCESS NATIONAL PARTNERSHIP (UANP)

- Agreement between the Commonwealth and each of the States / Territories
- Supports universal access by funding 600 hours (i.e. 15 hrs /week) for all children in the year before school
- State jurisdictions are responsible for implementing and maintaining quality ECE programs and for delivering strategies to increase participation of children from disadvantaged backgrounds
- Undergone two evaluations

NATIONAL PARTNERSHIP AGREEMENT FOR INDIGENOUS EARLY CHILDHOOD DEVELOPMENT

- Agreement between Commonwealth and jurisdictional governments
- Aimed to ensure all indigenous 4 year old children had access to quality ECE
- Funded construction of 38 Child & Family Centres with integrated early childhood services for health & education
- Child and Family Centres were designed and operated by Indigenous communities, and governed autonomously or in partnership with jurisdictional governments
- Commenced 2009, expired 2014

ABORIGINAL AND TORRES STRAIT ISLANDER EDUCATION STRATEGY 2015

- Built on previous initiatives to continue Commonwealth and jurisdictional education minister commitment to improving ATSI education outcomes
- Attendance and engagement were identified as one of seven priority areas
- All priority areas underpinned by principles of: achieving potential, equity, accountability, cultural recognition, relationships, partnerships, local approaches & quality

CHILD CARE SUBSIDY / ADDITIONAL CHILDCARE SUBSIDY

- Package includes the Child Care Subsidy (universal strategy to alleviate cost to families) and the Child Care Safety Net comprising: Additional Childcare Subsidy (for highly vulnerable families), Community Child Care Fund (grants system for services), and Inclusion Support Programme (service capacity building for children with disability or additional needs)
- Amended in 2017 with higher means test threshold and expanded activity test to determine eligibility

LIMITATIONS

LINKING REFUGEE & ASYLUM SEEKER FAMILIES TO ECE

- Enrolment indicators in both evaluations are likely to be inflated
- Limited enrolment data for ATSI and vulnerable / disadvantaged children
- Narrow definition of vulnerability / disadvantage (SEIFA)
- The metric used to report attendance is inconsistent with the defined indicator

NATIONAL PARTNERSHIP AGREEMENT FOR INDIGENOUS EARLY CHILDHOOD DEVELOPMENT & ABORIGINAL AND TORRES STRAIT ISLANDER EDUCATION STRATEGY 2015

- Enrolment data was available for 2013 only, making it unclear if the policy increased enrolment of ATSI children over time
- Attendance data is limited to interview case studies and does not separate use of MCH from ECE services at CFCs
- Providers report that withdrawal of ongoing Commonwealth funding means efforts to grow services and implement strategies to increase participation are hindered or suspended while staff focus on funding applications

CHILD CARE SUBSIDY / ADDITIONAL CHILDCARE SUBSIDY

- Package evaluated in 2019 by AIFS; identified issues with the activity test impacting families from vulnerable backgrounds
- No assessment of the effectiveness of the policy on participation - in relation to enrolment and attendance

Victorian policies relevant to ECE participation

VICTORIAN EARLY YEARS & DEVELOPMENT FRAMEWORK

Children 0-8 years

- Intended to guide early childhood professionals in working together with families to enable positive child outcomes
- Principles underpinning the policy are consistent with research

MARRUNG ABORIGINAL EDUCATION PLAN (2016-2026)

- **Aim**: to support young Aboriginal and Torres Strait Islanders in education goals from early childhood to higher education and skills
- Explicitly recognises importance of increasing ECE access and participation
- Promotes cultural inclusivity in ECE services & provides relevant training

EARLY CHILDHOOD REFORM PLAN (2017)

- Two of the four key areas for reform directly relate to ECE participation:
  a) Supporting higher quality services and reducing disadvantage in ECE,
  b) Making early childhood services more accessible and inclusive
- Includes funding reform to support co-location with schools, guarantee ECE positions for families with highest need, expand inclusion program for children with disability, and provide culturally relevant services

POLICY LIMITATIONS (STATE & FEDERAL)

- There is a need for policy-level commitment to (and facilitation of mechanisms) ensuring that rigorous evaluation, of the effectiveness of ECE policies on participation (i.e. enrolment and attendance), is both conducted and made publicly available
- There is a need for policy to better support the development of data systems that would enable research efforts to access and utilise comprehensive administrative information from all ECE services (so that questions about enrolment and attendance together with child risk factors can be explored with reliable data at local, state, and national levels). Further policy support is also needed to ensure that data from ECE services can be linked to other data sets (e.g. NAPLAN, school surveys, Medicare data)

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ORIGINAL PAPER

Early Childhood Education Participation: A Mixed-Methods Study of Parent and Provider Perceived Barriers and Facilitators

Ruth Beatson[1] · Carly Molloy[1,2] · Zoe Fehlberg[1] · Nicholas Perini[3] · Christopher Harrop[4] · Sharon Goldfeld[1,2]

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Abstract

Participation in high-quality early childhood education and care (ECEC) benefits children and society. Policy recognition of this manifests through government subsidy strategies to increase ECEC access in the years immediately preceding school. Yet despite this action, many children do not receive the recommended amount. This study utilizes a mixed-methods design to investigate ECEC participation barriers and facilitators in three Australian communities. Parents and service providers completed online questionnaires (45 parents, 63 providers) and semi-structured interviews (21 parents, 16 providers). Results showed that issues related to both direct (e.g., fees) and indirect (e.g., travel) costs are particularly important barriers for families, and are well-recognized by providers. A range of factors were also considered important for facilitating participation (e.g., effective promotion of the benefits linked to high-quality play-based learning in formal settings, professional training of staff). Findings demonstrated the ecological complexity of participation. Strategies to address barriers and harness facilitators are required across multiple levels.

Keywords Early childhood education · Preschool · Kindergarten · Parent engagement · Mixed methods

Highlights

- Participation in high-quality early childhood education benefits children.
- Many children do not receive the recommended dose of early childhood education.
- Parents and providers see various participation costs as important barriers.
- Providers may underestimate barriers relating to maternal role beliefs.
- Promotion of child benefits and staff training may facilitate participation.

Early childhood education and care (ECEC) models delivered outside the family home include long day care, preschool or kindergarten, family day care, occasional care, and outside school-hours care. Research shows participation in formal ECEC models, particularly high-quality center-based care and preschool or kindergarten programs in the 1–2 years immediately preceding school, has a variety of benefits to child health and development (AIHW, 2015, Goldfeld et al., 2016, Warren, O'Connor, Smart, & Edwards, 2016). Investment in the delivery of high quality ECEC also has clear economic advantages, with benefits resulting from increases in productivity through greater labor force participation (of parents, and later children) and cost savings from anticipated reductions in expenditure associated with remedial education, unemployment, justice, and health services (Aos, Lieb, Mayfield, Miller, & Pennucci, 2004, Barnett & Masse, 2007,

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Heckman, 2006, Nores, Belfield, Barnett, & Schweinhart, 2005, PwC, 2014, 2019).

Early randomized controlled studies dating back to the 1960s and 1970s demonstrated that high quality ECEC participation for children from disadvantaged backgrounds led to improved academic achievement, later educational attainment and health outcomes measured decades later (Muennig, Schweinhart, Montie, & Neidell, 2009, Nores et al., 2005, Ramey et al., 2000). More recently, meta-analyses of experimental and quasi-experimental studies primarily targeting disadvantaged children have shown that ECEC participation has positive effects across a range of short, medium and long-term outcomes (Aos et al., 2004, McCoy et al., 2017).

There is also a growing body of literature demonstrating positive effects of universal ECEC participation (Van Huizen & Plantenga, 2018). Major longitudinal studies in the United Kingdom (e.g., the Effective Provision of Preschool Education study: Sammons et al., 2008, Sylva, Melhuish, Sammons, Siraj-Blatchford, & Taggart, 2004), United States (e.g., Early Childhood Longitudinal Study: Magnuson, Ruhm, & Waldfogel, 2004) and Australia (e.g., Longitudinal Study of Australian Children: Sanson et al., 2002, Warren & Haisken-DeNew, 2013) consistently demonstrate positive associations of preschool attendance with academic performance and some also show positive effects on social-emotional development outcomes. In Australia, population-level cross-sectional research has shown that compared with other forms of ECEC (e.g., family day care), preschool attendance in the year before starting school is associated with significantly lower odds of developmental vulnerability across a range of domains including physical health and well-being; social competence; language and cognitive skills, and communication skills and general knowledge (Goldfeld et al., 2016).

Despite the well-recognized benefits of participation in high quality ECEC, a significant proportion of children miss out (O'Connor et al., 2016). These children are disproportionately from culturally and linguistically diverse families (e.g., indigenous or migrant, non-English speaking backgrounds), those experiencing socio-economic disadvantage, and less stimulating home learning environments (Baxter & Hand, 2013, Biddle & Seth-Purdie, 2013, Coley, Votruba-Drzal, Collins, & Miller, 2014, Gilley, Tayler, Niklas, & Cloney, 2015, Magnuson & Waldfogel, 2005, O'Connor et al., 2016, Sylva et al., 2004). For example, studies have shown that the percentage of children enrolled in preschool in the year before starting school is lower among children from families with: a single-parent; non-English speaking background; lower levels of education; both parents unemployed; Aboriginal or Torres Strait Islander (ATSI) descent; residency in rural or remote areas or socioeconomically disadvantaged communities (AIHW, 2015, Biddle & Seth-Purdie, 2013, O'Connor et al., 2016, Warren et al., 2016). Similar trends have been observed in studies of *attendance* rates (ABS, 2020, Gilley et al., 2015). That is, even when children from disadvantaged groups enroll in preschool programs, they typically attend for fewer hours than their non-disadvantaged counterparts.

Yet, the number of preschool hours received (that is exposure to preschool as an effective intervention) is important. Reviews of previous research show from 2–3 years of age, part-time attendance is beneficial for the general population, and that disadvantaged children may benefit from more hours or full-time attendance (AIHW, 2015, Melhuish et al., 2015). For example, there is evidence that 15–30 h ECEC per week significantly predicts higher reading and mathematics skills among children from high-income families, but that at least 30 h per week is required before a significant association emerges for children from low income families (Loeb, Bridges, Bassok, Fuller, & Rumberger, 2007). Other evidence indicates 2 years of high quality ECEC for 15 h per week has a protective effect equivalent to having a tertiary-educated mother (Sylva, Melhuish, Sammons, Siraj-Blatchford, & Taggart, 2010). Though there is also some evidence that formal ECEC is associated with increased behavioral problems (Magnuson, Ruhm, & Waldfogel, 2007, Magnuson et al., 2004), the relationship is likely moderated by a variety of factors including family background, program quality, intensity and duration or starting age (Biddle & Seth-Purdie, 2013, Loeb et al., 2007, Magnuson et al., 2007).

Recognizing the positive effects of formal ECEC participation, several governments have developed national commitments to universal access in the year or 2 years prior to school commencement. In Australia, the 2008 National Partnership Agreement on Early Childhood Education introduced a commitment to preschool access for all children with an entitlement of 15 h per week, 40 weeks a year in the year before starting school (Harrington, 2014). The entitlement to free ECEC for all 3- and 4-year-old children is 15 h per week in England and 20 h per week in New Zealand (AIHW, 2015). A global benchmark set by the United Nations Children's Fund similarly encourages preschool attendance for at least 15 h per week among 4–5 year old children (AIHW, 2015). Throughout this paper, we, therefore, refer to families with children receiving at least 15 h per week of formal ECEC (i.e., preschool or kindergarten or long day care) as recommended-attendance families. We use the term limited-attendance families for those not enrolled or not attending at least 15 h per week. However, as noted above, some research suggests that 15 h per week may not be sufficient to improve child development outcomes among the most disadvantaged children (Loeb et al., 2007, Warren et al., 2016).

Despite recognition of the advantages afforded by good quality ECEC, and international support for policy reform aiming to increase quality and access (Barnett, 2010, Harrington, 2014), there is little published research exploring the factors that facilitate or impede ECEC participation. Broad reviews of the literature on 'hard-to-reach' families document a wide range of barriers to accessing health, social, and education services (Boag-Munroe & Evangelou, 2012), and comprehensive investigations of the factors associated with selection of center-based ECEC models have been conducted (Coley et al., 2014). Yet, relatively few publications have specifically focused on (a) ECEC participation barriers and facilitators per se, or (b) the relative importance of different factors, as perceived by parents and providers.

In the United States, qualitative studies with disadvantaged families from ethnically diverse and particularly Hispanic or African American communities have identified a range of barriers to ECEC participation (Ansari, Pivnick, Gershoff, Crosnoe, & Orozco-Lapray, 2020, Susman-Stillman, Englund, Storm, & Bailey, 2018). These include issues related to access, ethnic or racial discrimination, child illness (e.g., chronic health problems, medical appointments), demands of family life (e.g., balancing work and school schedules; housing instability; caring for sick or disabled relatives), transport access and reliability, additional childcare needed to enable attendance at short-day programs, and social isolation. In New Zealand, interviews with parents and providers indicate that cost (e.g., fees, transportation), accessibility (e.g., location, hours of operation, placement capacity) and cultural relevance (e.g., language and program content) of ECEC programs are the main barriers experienced by low income indigenous communities (Mitchell & Meagher-Lundberg, 2017). Similar barriers were identified in interviews conducted with families from several disadvantaged communities in New South Wales, Australia. Specifically, prominent themes related to cost, quality of services, transport, and a perception that young children should be cared for by mothers exclusively (Grace, Bowes, & Elcombe, 2014).

Previous research findings indicate that multi-faceted and interactive effects of personal and environmental factors influence ECEC participation (Coley et al., 2014, Susman-Stillman et al., 2018). One theoretical framework that recognizes such complexity in human behavior and may be useful for understanding ECEC participation is the Social-Ecological Model (SEM; CDC, 2020). This model identifies four nested, hierarchical levels of influence. Factors may be understood to operate at the level of the individual (e.g., knowledge, attitudes), interpersonal relationships (e.g., families, friends), program or service (e.g., staff competence, accessibility), and policy-enabling environment (e.g., funding, policy, laws). Categorization of factors at these levels should facilitate identification of critical leverage points to increase ECEC participation. Despite the potential utility of applying this theoretical framework to ECEC participation research, it has not yet been tested.

Another limitation of the existing literature is that there has been little within-study exploration of the views held by different stakeholders. Few of the studies cited above systematically explored the perceptions of both service providers and parents, and where both views were canvassed (e.g., Mitchell & Meagher-Lundberg, 2017), analysis was not conducted separately. Similarly, within-study comparison of different parent group perspectives (i.e., views among those with low versus high ECEC participation rates) was lacking. Stakeholders from each of these groups may have had different experiences and unique perspectives that have shaped their views. It is important to consider views from multiple perspectives to develop a comprehensive understanding of ECEC participation. Advantages include (a) reducing the likelihood that particular barriers or facilitators will be missed; (b) cross-validation of common barriers and facilitators; and (c) potential to diagnose divergences in views that may be contributing to unsatisfactory ECEC participation rates.

The extant literature is also predominantly qualitative in nature, drawing on interviews and focus groups. As the presence of a researcher and concerns with self-presentation may influence participant responses to interview questions, it is important to supplement such research with other methodologies (e.g., anonymous surveys). In addition to minimizing social pressures to respond a particular way or within a relatively short timeframe, questionnaires afford quantitative exploration of the relevant issues. In the case of ECEC participation research, quantitative investigation can extend the literature beyond identification of various barriers and facilitators to an understanding of which factors stakeholders most consistently rate as important. Mixed methods investigations are needed to more thoroughly investigate the complex issues affecting ECEC participation.

The aim of the present mixed methods study was to investigate various stakeholder views on formal ECEC participation in three Australian communities. More specifically, the study addressed the following research questions:

1. Which potential barriers, previously identified in the research literature, are most consistently rated highly important by (a) limited-attendance families, and (b) ECEC providers?
2. Which potential ECEC participation facilitators are most consistently rated highly important by (a) limited-attendance families; (b) recommended-attendance families; and (c) formal ECEC providers?

3. Which specific issues underly the barriers and facilitators most consistently rated as highly important, and at what levels of the social-ecological model do barriers and facilitators operate?
4. Do parents and providers have similar perspectives on ECEC participation barriers and facilitators?

Method

Research Design

The approach to inquiry was question-driven and conducted pragmatically, utilizing a convergent (i.e., concurrent) mixed methods data collection strategy (Fetters & Freshwater, 2015) comprising an online questionnaire and interview with an overlapping sample of participants. Qualitative and quantitative data were collected in parallel such that the analysis of one data set did not inform the development of the other. The analytic strategy included quantitative analysis of descriptive statistics from questionnaire responses and a codebook-based thematic analysis of interviews (Braun, Clarke, Hayfield, & Terry, 2019). Quantitative analyses measured the extent to which parents and providers considered a range of potential barriers and facilitators important while interview data provided more detailed insights into how barriers and facilitators were experienced, and why some were considered especially important. Differences in parent and provider perspective were explored. The investigation was part of a larger project that included a parallel study of participation in parenting programs (Molloy et al., 2020). The methodological approach for both studies was similar, and studies were jointly approved by the [institution omitted for blind review] Human Ethics Committee (#2019.016).

Researcher Description

The project was designed and conducted by a team comprising predominantly Caucasian Australian female researchers with formal tertiary qualifications in psychology and pediatrics, and previous experience conducting both quantitative and qualitative research with marginalized populations. Additionally, significant input from Caucasian Australian males with formal business qualifications and experience in the private and not-for-profit sectors contributed significantly to the conceptualization of the study.

Researcher-Participant Relationship

Relationships between the research team and key stakeholders were established in an earlier study of ECEC quality in three target communities. Whereas the study coordinators had established prior relationships with key stakeholders, most researchers conducting interviews had not.

Participants

Primary caregiver and provider participants were drawn from three Australian local government areas including two metropolitan and one regional jurisdiction (Brimbank, Wyndham and Central Goldfields, respectively). Population statistics indicate higher rates of unemployment and lower levels of education among communities in these areas, relative to the broader Australian population (ABS. 2016 (2016)). Previous research (Molloy et al., 2020) indicates a substantive proportion (up to 70%) of children attending preschool or kindergarten in these areas do not receive at least 15 h per week in the year before school, and that the proportion is even higher among children with indicators of disadvantage (e.g., disability, parent welfare, non-English speaking background).

Primary caregiver participants were predominantly biological parents, though the study was open to others (e.g., grandparents, step-parents, foster parents, or other carers). For brevity, the term "*parent*" is used. Parents were eligible to participate in the *questionnaire* if they had a child aged 2–5 years who was not yet attending primary school. Parents were also eligible to participate in the *interview*, if their child was either not enrolled in a formal ECEC program (defined as long day care or kindergarten program for the year before starting school, or 3-year-old kindergarten program), or attended the ECEC program less than 15 h per week. That is, parents were eligible to participate in the questionnaire regardless of ECEC attendance amount but interviews were restricted to those who received less than 15 h ECEC per week. In total, 45 parents completed the questionnaire and 21 completed the interview. Though some parents completing the interview also completed a questionnaire, not all did so. Table 1 describes the demographic profile of parent questionnaire respondents.

Interviewees shared similar characteristics: 91% were mothers, 53% were 26–36 years of age, 33% had a Non-English-Speaking Background, 91% did not identify as a refugee or asylum seeker, and 95% indicated they were not of Aboriginal or Torres Strait Islander decent. Approximately half of all parent interviewees were from regional Victoria (52%).

A range of professionals with experience and/or expertize in early childhood services were invited to participate. Questionnaires were restricted to those indicating that they currently worked in a preschool, kindergarten or long day care service, but interviews were open to a wider range of providers (e.g., Maternal and Child Health nurses, supported playgroup facilitators, family

Table 1 Demographic characteristics of parent questionnaire respondents

	ECEC participation status		
	<15 h ECEC	15+ h ECEC	All parents
Number of respondents	15[a]	30	45
Mean age (SD), years	29.93 (5.27)	35.67 (6.93)	33.75 (6.93)
Age range, years	19–37	24–57	19–57
Gender, female: *n* (%)	14 (93.33)	27 (90.00)	41 (93.18)
English main language spoken at home, *n* (%)	10 (66.67)	27 (90.00)	37 (82.22)
Education, *n* (%)			
Primary school	0 (0.00)	0 (0.00)	0 (0.00)
Secondary-year10	3 (21.43)	2 (6.90)	5 (16.28)
Secondary-year12	4 (28.57)	3 (10.34)	7 (11.63)
Trade or certificate qualification	2 (14.29)	11 (37.93)	13 (30.23)
Undergraduate degree	4 (28.57)	6 (20.69)	10 (23.26)
Post-graduate degree	1 (7.14)	7 (24.14)	8 (18.60)
Health care Card Recipient, *n* (%)	8 (53.33)	13 (43.33)	21 (46.67)
Refugee or asylum seeker, *n* (%)	1 (6.67)	0 (0.00)	1 (2.22)
Aboriginal or Torres Strait Islander, *n* (%)	1 (6.67)	0 (0.00)	1 (2.22)
Family income, *n* (%)			
<$25,000	1 (7.14)	3 (10.00)	4 (9.09)
$25,000–50,000	6 (42.86)	6 (20.00)	12 (27.27)
$50,000–85,000	5 (35.71)	9 (30.00)	14 (31.82)
$85,000+	2 (14.29)	12 (40.00)	14 (31.82)
Disadvantaged circumstances (self-rated), *n* (%)	0 (0.00)	4 (13.33)[b]	4 (8.88)
Only 1 child aged 2–5 years, n (%)	11 (73.33)[c]	21 (70.00)[d]	32 (71.11)
Age of eldest child 2–5 years, M(SD)[e]	4.00 (0.82)	4.22 (0.44)	4.15 (0.55)
Child living with respondent full-time, *n* (%)	15 (100)	29 (96.67)	44 (97.78)
ECEC Enrollment, *n* (%)			
Kinder/preschool	3 (20.00)	20 (66.67)	23 (51.11)
Long day care	6 (40.00)	20 (66.67)	26 (57.78)
Both Kinder & LDC	1 (6.66)	10 (33.33)	11 (24.44)
Other care[f]	0 (0.00)	1 (3.33)	1 (2.22)
ECEC Attendance Dose			
Mean (SD), hours per week	7.62 (3.88)[g]	21.76 (8.43)	15.86 (11.20)
Range, hours per week	2–12	15–42	0–42

[a]For seven families, the eligible child was either not enrolled or currently received no formal ECEC service; [b]The main form of disadvantage was low income ($n = 3$). All other forms were selected by two or fewer respondents. Only two respondents indicated experiencing two forms of disadvantage, and two others experienced three or more forms of disadvantage; [c]Only one participant had more than two children between 2–5 years. [d]Nine participants indicated two children between 2–5 years; [e]Item presented to participants with more than one child only. Therefore, descriptive statistics are based on four responses in the <15 h group and nine responses in the 15+ group; [f]Other types included family day care, relative or friend care, occasional care, out of school-hours care, playgroup and other; [g]Calculation based on low-attender subsample ($n = 8$)

day care providers, occasional care workers, parenting program facilitators). In total, 63 providers completed the questionnaire and 16 completed the interview. See Table 2 for the demographic profile of providers completing the questionnaire. Interviewees comprised a mix of professionals who had direct contact with families ($n = 9$) or administrative roles ($n = 7$), and worked in regional ($n = 9$) or suburban ($n = 7$) communities.

Recruitment Procedures

Consultations with peak bodies (i.e., professional and advocacy organizations such as Early Childhood Australia, Early Learning Association Australia) and early childhood services were leveraged to recruit participants. Primary contacts employed within ECEC services were asked to promote the study among clients and the ECEC workforce

Table 2 Demographic profile of providers the completing questionnaire

Characteristic	*N* (%)
Gender, Female	63 (100.00)
Education level	
Year 10 or less	0 (0.00)
Secondary-Year11	1 (1.59)
Secondary-Year12	13 (20.63)
Trade or certificate qualification	23 (36.51)
Undergraduate degree	21 (33.33)
Post-graduate degree	5 (7.94)
Service Setting, %	
Kinder or Preschool role	43 (68.25)
Long day care role	13 (20.63)
Specialized or Targeted Service[a, b]	30 (47.62)
Work role, %	
Involves direct contact with families	43 (68.25)
Manager/supervisor	22 (34.92)
Experience, %	
Less than 12 months	3 (6.82)
12 months to 3 years	5 (11.36)
More than 3 years	36 (79.55)
Serve disadvantaged families, %	59 (93.65)
Top 5 forms of family disadvantage	
Low income	41 (65.08)
Limited English[b]	36 (57.14)
Low education	32 (50.79)
Lack of social support	29 (46.03)
Presence of mental health condition	26 (41.27)

[a]Examples of specialized or targeted services referred to Culturally or Linguistically Diverse (CALD), Aboriginal or Torres Strait Islander (ATSI) backgrounds, and children with disabilities. [b]Due to technical error, this item was not administered to the first 10 participants

using a variety of strategies (e.g., dissemination through professional networks, intranet, emails, flyers, announcements at meetings, word-of-mouth). Subsequently, a snowball sampling method was used whereby participants were encouraged to invite others who might be eligible and interested in participating. The questionnaire link was advertised in the Childhood Early Learning Australia newsletter and Facebook page. Browser cookies were not used to prevent participants from completing the questionnaire multiple times. The rationale for this was to ensure that providers could participate at work on shared devices, and parents without internet access or electronic devices at home could also use shared resources (e.g., friends' devices, public library computers). Eligible participants who finished questionnaires were also invited to complete interviews. As approved by the ethics committee, interview parents received a $20 supermarket gift card as a token of appreciation. Recruitment took place between April 2019 and October 2020, however, almost all parent questionnaire respondents ($n = 42$, 93%) participated prior to the emergence of COVID-19 or disruptions to accessing ECEC as a result of the global pandemic. In contrast, most providers participated after March 2020 ($n = 53$, 84%).

Quantitative Instruments

English-language questionnaires were constructed to assess the extent to which various factors were considered barriers to, or facilitators of, ECEC participation. Separate versions were constructed so that parents considered how their personal circumstances affected ECEC participation whereas providers considered the factors with reference to families in their community (see online supplementary file). Questionnaires were also tailored so that parents who indicated their child received at least 15 h of formal ECEC per week were asked about facilitators only. All questionnaires included screening and demographic items, questions regarding disadvantage, and a list of potential barriers and facilitators. In cases where families had multiple children aged 2–5 years, parents were instructed to answer with reference to their eldest child. Questionnaires were constructed to take less than 15 min and were primarily web-based though paper versions were also available. Online versions were hosted using RedCap software (Harris et al., 2019), and utilized the compulsory question function for eligibility screening items only. Usability was tested prior to going live, confirming participants were able to navigate back and forth through the 7–13 web pages.

Eligibility screening

To assess participant eligibility the parent questionnaire asked "Are you a parent or guardian or caregiver of a child aged 2–5 years who has not yet started school?". To assess provider eligibility respondents indicated the type of ECEC service in which they were involved. Check-boxes were used (for long day care, family day care, occasional care, supported playgroups, schooling, maternal and child health) and a free response option was available to expand on any other type of early childhood or family service.

Demographic profile

All questionnaires included respondent gender and education items. Parent versions also included items to indicate: age, family income, language, Aboriginal or Torres Strait Islander (ATSI) heritage, and refugee status. Gender, ATSI, and refugee items included "prefer not to answer" options. Following the main demographic items, respondents were asked whether they considered their own (parents) or some

family clients (providers) "current living circumstances as disadvantaged, vulnerable, and/or living in adversity". Those answering affirmatively were asked to select the forms of disadvantage most relevant from the following list: unemployment, low income, poverty, low education, homelessness or unstable housing, youth, rural or remote location, lack of social support or help, ethnicity or culture, refugee or asylum seeker, immigrant, physical health or disability issues, mental health concerns, family violence, drug or alcohol issues, and 'other'.

ECEC participation status

To determine formal ECEC participation status and separate limited-attendance from recommended-attendance families, several items concerned enrollment and attendance. More specifically, these asked whether the child was formally enrolled in a preschool or kindergarten service and/or a long day care service, the number of hours enrolled per week for each service, and the number of hours the child typically attended each service. Following previous research, other models of ECEC were considered informal.

Barriers and facilitators

To determine the perceived importance of factors thought to influence participation in formal ECEC services, respondents were presented with a list of potential barriers and facilitators. Item development was informed by analysis of themes previously identified in the research literature (Ansari et al., 2020, Coe, Gibson, Spencer, & Stuttaford, 2008, Grace et al., 2014, Mitchell & Meagher-Lundberg, 2017, Susman-Stillman et al., 2018) and consultation with experts in the field. Each item was rated on a 5-point scale ranging from 'not at all important' or "not very important" through "somewhat important" to "very important" or "extremely important". Example barrier items from the parent questionnaire include: "problems with the childcare service location" and "the cost of services". Example facilitators include: "free transport to/from the service" and "having information about the likely benefits of my child attending the service".

Item construction was tailored so that wording and selection was appropriate and relevant for each respondent group. For example, those indicating that their child did not attend a formal ECEC service were asked whether there were *no* places available at their preferred service, whereas those indicating that their child attended less than 15 h were asked whether there were *not enough* spaces for their child to attend for more hours. Parents who had not enrolled their eligible child in ECEC services were asked to consider barriers to enrollment, whereas parents of limited-attenders rated the extent to which each potential barrier impacted attendance. Provider items referred to "families" whereas parent items were presented in the first person. For facilitators, all parents were instructed to consider the extent to which each factor *was* or *would be* important 'to whether or not (and how much) your child attends kindergarten/preschool and/or long day care'.

Qualitative Interviews

The purpose of qualitative interviews was to explore in depth how barriers and facilitators were experienced by families, and how providers perceived family experiences. Mean duration was 21 min ($SD = 11$, range 6–38 min) for parents and 41 min ($SD = 13$, range 24–71 min) for providers. The majority were conducted in person ($n = 9$ parents, 13 providers) with the remainder by telephone (for participants who indicated this would be more convenient). All commenced with an assessment of participant consent and screening items to confirm eligibility (i.e., parent respondents had a child 2–5 years of age not currently receiving 15 h or more ECEC or enrolled at school, and providers worked in child or family services). Demographic information for parents covered age, relationship to- and living situation with- the child, education, postcode, indigenous background, and refugee or asylum seeker status.

Interviews were semi-structured and conducted reflexively so that questions were appropriate to the ECEC status of respondents. Interviewers first asked whether the family used preschool or kindergarten, long day care services, or any other forms of care. They then asked open-ended questions to ascertain why eligible children received the type and amount of care reported (or lack thereof), and whether families (a) faced any difficulties in accessing services, (b) found participation challenging in any ways, (c) had considered in what circumstances participation might increase, or (d) if anything could be done to ensure children received the amount of ECEC parents would like. More detailed information about the schedule used to guide interviewers is available from the corresponding author upon request. All responses were recorded and transcribed verbatim.

Data Analysis

Survey data were imported into STATA and checked for consistency and response bias. Descriptive statistics were prepared separately for providers and parents. Parent responses were further separated by ECEC participation status so that families with limited attendance (i.e., non-enrollment or less than 15 h per week) could be compared with recommended-attendance families. Although it is possible to differentiate limited-attendance families who had enrolled their child(ren) from those who had not, these sub-samples were small and data was combined.

Interview transcripts were uploaded to NVivo for thematic analysis. The unit of analysis was individual comments (i.e., a single sentence could contain multiple themes and each was coded). Comments were categorized according to the four levels of the SEM framework (individual; relationship-interpersonal; program-service; policy-enabling environment). As sub-categories emerged within each level, these were added to the coding guide. The guide was initially developed by three researchers who coded all transcripts. When uncertainty arose around coding data or creating new codes, discussions were held by the team to resolve these issues. Data was then double-coded by two trained researchers. Themes and sub-themes were analysed separately for provider and parent interviews.

The strategy adopted to integrate findings from quantitative and qualitative methods involved identifying the barriers and facilitators most consistently rated highly important and mapping these to corresponding themes emerging in the qualitative analysis.

Results

Questionnaire participation rates were acceptable and completion rates were high (Eysenbach, 2004). Of 63 consenting parents, 45 (71%) participated (i.e., progressed beyond the demographic section of the questionnaire) and, of these, 44 (98%) completed all but the final section of the questionnaire. Of 88 consenting providers, 63 (72%) participated with all but 1 (98%) answering items on the final page of the questionnaire.

Quantitative Analyses

Table 3 shows the percentage of respondents rating each potential barrier very or extremely important, by respondent group. For brevity, we refer to the collapsed responses as *highly important* and the provider version of items is listed; references to 'family' were presented in the first person for parents. Barriers are presented in order of importance (according to providers), not order of presentation in the questionnaire.

Overall, providers were more inclined than parents to rate each of the potential barriers as highly important, with one exception (relating to maternal role beliefs). Of the 17 items presented to providers, 12 were endorsed as highly important by at least half the sample, and all but one by more than a third. In contrast, only one of the items presented to parents was rated highly important by at least half the participants (service costs), and one other (maternal role) by at least a third of the participants. One in five parents rated more than two barriers as highly important.

Among limited-attendance families, the barriers most consistently rated highly important were: (a) cost of services (50%) and (b) a view that it is a mother's role to educate and care for her young children (42%). For providers, the barriers most consistently rated highly important related to: (a) the benefits of formal ECEC being unclear to families (89%), (b) families not knowing how to access services (79%), and (c) the cost of services (73%).

Table 4 shows the percentage of respondents rating each potential facilitator very or extremely important, by respondent group. Among limited-attendance families, the potential facilitators most consistently rated highly important were: (a) knowing that educators and/or staff are professionally trained (73%), (b) having food provided at the service (60%), and (c) having information about the likely benefits of ECEC attendance (50%). The potential facilitator next most consistently rated highly important related to provision of all-day sessions rather than shorter blocks spread over the week (33%). For recommended-attendance families, the potential facilitators most consistently rated highly important were: (a) knowing that educators and/or staff are professionally trained (93%), (b) having good communication about what is involved in ECEC (93%), (c) having information about the likely benefits of ECEC (76%), and (d) feeling that educators understood their child (70%). Among providers, the potential facilitators most consistently rated highly important were: (a) ensuring that families feel educators understand their child (97%), (b) having good communication about what is involved in ECEC (90%), and (c) families having information about the likely benefits of ECEC (82%). A large percentage of providers also rated as highly important: (d) knowing that educators and/or staff are professionally trained (80%). Thus, two of the top four facilitators as rated by providers were also among the top three facilitators as rated by parents.

Consistent with the barrier ratings, providers were generally more inclined than parents to rate each of the potential facilitators highly important, with only two exceptions; though both groups rated educator training and provision of food at services important, parents were more inclined to do so. Of the 17 items administered, 11 were rated highly important by more than half the providers, 7 by recommended-attendance families, and 3 by limited-attendance families.

Qualitative Analyses

Of the 31 parents who consented to participate in the interview, 21 met eligibility criteria. Of the 16 consenting providers, all were eligible and completed the interview. Drawing on the SEM, interview responses were coded with emergent themes mapped to the four levels of the

Table 3 Barriers rated very or extremely important by respondent type

Barrier Items, *n* (%)	Parents <15 h ($n = 14$)[a]	Providers ($n = 63$)
Benefits of these services (or additional hours) are not clear to families	4 (28.57)	55 (88.71)[b]
Not knowing how to access these services^	1 (14.29)	50 (79.37)
The cost of services	7 (50.00)	46 (73.02)
Parents/guardians having previous negative experience with other professionals concerning their child^	0 (00.00)	43 (68.25)
Having a significant medical/mental health condition	1 (07.14)	42 (67.74)[b]
Not knowing enough about these services^	2 (28.57)	40 (65.57)[c]
Problems with transport (i.e., too far to travel, no transport, cost of transport)	2 (14.29)	41 (65.08)
Problems with childcare hours (i.e., inconvenient drop off and pick up times, clashes with work commitments)	3 (21.43)	39 (61.90)
Families find the enrollment process too difficult	NA	34 (53.97)
Problems with the childcare service location (i.e., inconvenient location, unwelcoming venue)	2 (14.29)	33 (53.23)[b]
Worry about being judged	1 (07.14)	32 (50.79)
Concern that the service is not culturally sensitive^	0 (0.00)	30 (50.00)[d]
Worry about information being kept private^	2 (28.57)	30 (48.39)[b]
Parents/guardians having alcohol and/or drug problems	NA	30 (45.90)[c]
Concern for their child's safety at the service^	1 (14.29)	28 (45.16)[b]
Feeling that they don't need help educating and caring for their children^	2 (28.47)	28 (44.44)
Families are unable to get a place in their preferred ECEC service	0 (00.00)	28 (44.44)
Lack of skilled educators/staff (e.g., they do not engage well, don't offer bilingual interpreters)	4 (28.57)	27 (42.86)
Perceptions that educators/staff are not respectful (i.e., don't recognize parents as experts on their child, patronizing)	2 (14.29)	27 (42.86)
Feeling that it is a mother's role to educate and care for their child	6 (42.86)	17 (32.69)[e]
No space for my child to attend more hours per week at the service#	1 (14.29)	NA
Difficulties with the enrollment process^	0 (00.00)	NA

Notes: All analysis excludes missing cases. ^items presented only to parents indicating that their child did not attend a formal ECEC service; #item presented only to parents indicating that child did attend a service; [a]One parent skipped all barrier items; [b]missing data for 1 case; [c]missing data for 2 cases; [d]missing data for 3 cases; [e]missing data for 11 cases (item was not presented due to technical error)

framework: individual, interpersonal-relationship, program-service, or policy-enabling environment. Detailed results are shown in Supplementary Tables A.1, A.2. The number of respondents citing factors at each level may be less than the sum of respondents coded for each sub-theme. This is because multiple sub-themes were coded where participants discussed more than one issue.

Overview of barriers and facilitators

As shown in Table A.1 (online only), analysis of qualitative interviews revealed almost all parents identified barriers operating at the individual and program-service level. About half discussed issues at the policy-environment level, and just over a quarter raised interpersonal-relationship level themes. A similar pattern was observed for providers: all discussed barriers at the individual and program-service levels, whereas fewer (about two thirds) discussed issues at the policy-environment level. In contrast to parents, most providers also discussed interpersonal-relationship issues.

Table A.2 (online only) shows almost all parents and all providers identified facilitators at the program-service level. About half the parents discussed individual and policy-environment level facilitators, and just under a quarter discussed interpersonal-relationship level themes. Almost all providers also discussed policy-enabling environment themes. Fewer (about a third) discussed individual and interpersonal-relationship level facilitators.

Individual level barriers and facilitators

At the individual level, the most common *barriers* discussed by parents related to logistics, economic disadvantage, and child health or behavioral issues. The most common themes to emerge in interviews with providers related to parent disadvantage, parent attitudes or beliefs,

Table 4 Facilitators rated very or extremely important by respondent type

Items[a], *n* (%)	Parents			Providers
	<15 h ($n = 15$)	15 h + ($n = 30$)	All ($n = 45$)	All[b] ($n = 63$)
Families feeling like educators understand their child	7 (46.67)	28 (93.33)	35 (77.78)	58 (96.67)[c]
Good communication about what is involved in the center's services	7 (46.67)	28 (93.33)	35 (77.78)	54 (90.00)[c]
Having information about the likely benefits of one's child attending the service	7 (50.00)[d]	22 (75.86)[d]	29 (67.44)[e]	49 (81.67)[c]
Knowing that the educators/staff are professionally trained	11 (73.33)	28 (93.33)	39 (86.67)	48 (80.00)[c]
Actively including diverse cultures and backgrounds^	2 (13.33)	7 (23.33)	9 (20.00)	48 (78.69)[e]
Access to public transport close to home/service	3 (20.00)	5 (17.86)[e]	8 (18.60)[e]	45 (73.77)[e]
Welcoming and less formal service atmosphere	1 (06.67)	18 (60.00)	19 (42.22)	42 (68.85)[e]
Free transport to/from the service	1 (06.67)	5 (17.24)[d]	6 (13.64)[d]	36 (60.00)[c]
Ability to visit/attend to child while at the service	6 (40.00)	10 (33.33)	16 (35.55)	28 (54.90)[f]
Having food provided for children at the center	9 (60.00)	19 (63.33)	28 (62.22)	31 (51.67)[c]
Knowing that their primary language is integrated into child's learning	4 (26.67)	15 (50.00)	19 (42.22)	31 (51.67)[c]
ECEC service sessions that are all-day blocks rather than shorter periods	5 (33.33)	11 (36.67)	16 (35.55)	28 (45.90)[e]
Co-location of ECEC service with local primary school	2 (13.33)	8 (26.67)	10 (22.22)	27 (45.00)[c]
Educators/staff having same ethnicity as parent	3 (20.00)	4 (13.33)	7 (15.55)	19 (38.00)[f]
Both male and female educators/staff	4 (26.66)	10 (33.33)	14 (31.11)	22 (36.07)[e]
Female educators/staff	3 (20.00)	6 (20.00)	9 (20.00)	21 (35.00)[c]
Male educators/staff	2 (13.33)	5 (16.66)	7 (15.55)	22 (26.23)[e]

^The parent version of this item was: "Service including activities that relate to my culture/background"; [a]The provider version of items is listed in the table but parents viewed equivalent items presented in the first person; [b]One provider did not answer any facilitator items and another missed 9 items; [c]data missing for 3 cases; [d]data missing for 1 case; [e]data missing for 2 cases; [f]missing data for 12–13 cases due to technical error
Note: Analysis excludes missing cases

and logistics. Sub-themes relating to disadvantage and logistics were similar for parents and providers. Respondents from both groups noted that low incomes and unemployment made it difficult for parents to afford service fees or transportation costs incurred to access ECEC services (e.g., fuel, fare, vehicle registration, and maintenance). Logistics sub-themes were also similar across groups with both discussing competing demands (for work and family schedules), and problems with transport (e.g., due to not owning a car, not having a licence to drive, or living too far from services to walk). Where parents discussed child health, most focused on children contracting illnesses at ECEC services and the harms this caused the family, either physically and/or financially. For families who are self-employed or in casual positions, the effects of ECEC participation on health may be critical. Medical appointments or treatments and physical stamina were also discussed, though to a lesser extent. With regard to parent attitudes and beliefs, both parents and providers discussed concerns about child readiness. As one parent put it: "They are only little; they still need time with their family". Providers also focused heavily on parents not appreciating the value of ECEC participation. This often related to misconceptions about play-based learning and seeing services as merely (expensive) babysitting arrangements.

At the individual level, the main *facilitator* themes to emerge concerned parent beliefs or attitudes. Both parents and providers discussed the opportunities afforded by ECEC participation for social skills development with peers, school readiness (e.g., toilet training, listening to educators etc.), and parent respite.

Interpersonal-relationship level barriers and facilitators

Whereas few parents discussed *barriers* at the interpersonal-relationship level, a substantive proportion of providers discussed several ways in which family dynamics and complex issues could impede ECEC participation. For providers, the most common sub-theme related to family violence. In contrast, both parents and providers noted *facilitating* aspects of the social environment. Several respondents stated that knowledge of

ECEC services had been facilitated by discussions with family members, or friends and acquaintances from community service settings (e.g., playgroups, schools) and facilities (e.g., parks, playgrounds).

Program-service level barriers and facilitators

At the program-service level, the most common *barrier* theme to emerge in interviews for both parents and providers related to accessibility. Within this theme, the most common sub-theme related to service fees, though difficulties with service location and limited places or long waitlists were also discussed. Other major themes emerging for both parents and providers related to program formatting (particularly inconvenient session timing and duration) and service procedures (e.g., confusing or complex enrollment processes). As one parent observed: "your local center offers three short days, but you work and need long days". Though accessibility, program formatting, and service procedures emerged as the major themes for both parents and providers, barriers relating to ECEC staff skills (e.g., rapport building and sensitive engagement with families) were discussed by a substantive proportion of providers but relatively few parents.

Consistent with barrier themes, the main *facilitator* themes emerging for parents related to accessibility, program formatting and services procedures. For providers, the main facilitators concerned staff, service procedures, and accessibility. Thus, service accessibility and service procedures were among the main sub-themes to emerge in both parent and provider interviews. Among both parents and providers, accessibility sub-themes included affordability, location, and transport. Respondents noted that participation was or would be facilitated when fees were heavily subsidized or waived, services were within walking distance of family residences, or able to facilitate transportation of children in some way. Suggested transportation arrangements included utilization of a school bus, and access to fuel vouchers.

The main service procedure facilitation sub-themes focused on inter-agency collaboration and easing enrollment processes, with the two often interlinked. For example, several respondents indicated that maternal and child health nurses are well-positioned to promote ECEC enrollment, providing timely information at routine check-ups about how, when, and where to enroll in ECEC services. Other opportunities for cross-promotion included partnering with libraries, primary and allied health providers, and human services. Strategies for assisting families to complete enrollment procedures included simplified registration, data linking to immunization and birth records, and personalized assistance to overcome challenges presented by both online and paper-based systems. One service provider noted: "we will quite often sit down with the families, fill out the forms with them".

In addition to facilitating service accessibility and procedures, program formatting was a prominent sub-theme for parents. Several indicated greater flexibility in session timing, duration, or frequency to better co-ordinate with other responsibilities (e.g., work, care for school-age or infant siblings), could increase participation. Some also suggested greater flexibility in session timing and duration was needed to better suit their child's health or development (e.g., shorter days for 3-year-old children). For providers, staff skills emerged as a prominent facilitator sub-theme. Comments mainly focused on the critical importance of educator competence in building rapport and respectful relationships with families.

Policy-environment level barriers and facilitators

At the policy-environment level, approximately two thirds of all parent and provider interviewees discussed *barriers* relating to government policies. These mostly concerned eligibility criteria for accessing subsidized ECEC, particularly relating to family income, but also to restrictions to eligibility based on child age and citizenship or visa-type. Another theme that emerged for both parents and providers concerned funding to better support children with additional health care or developmental needs. Difficulties with inadequate infrastructure were raised less frequently but both parents and providers suggested the quantity and capacity of existing ECEC services, and availability of public transport, was inadequate in their geographic location.

In terms of *facilitation*, both parents and providers discussed aspects of government policy and infrastructure that would increase ECEC participation. Most discussion of government policy related to heavily subsidized or free ECEC, though two providers suggested legislation making ECEC participation mandatory would increase service use. With regard to infrastructure both parents and providers indicated a need for (a) more ECEC centers or increased service capacity within the local area, and (b) public transport options for families who do not have access to a car or driver license or cannot walk to the nearest ECEC service.

Summary of Key Insights Emerging from the Questionnaire and Interviews

Table 5 shows how the qualitative interviews drew out specific issues underlying the barriers and facilitators identified as important in the questionnaire. It also shows where the interviews identified critical issues that did not emerge as strongly in the questionnaire. Overall, the three

Table 5 Key insights from the questionnaire and interviews

Questionnaire items	Corresponding quotations from interviews providing elaboration on the complexity of underlying issues
The cost of services	"if they don't fall into the category of being able to get the additional childcare [subsidy/rebate], some of them just can't afford that $20 a day" [provider]
(Main barrier for limited-attendance families, and third most-endorsed barrier by providers)	"I have two kids. If I send both of them to the day care, for the long day care, it would be very expensive for us to manage, so we can't afford that." [parent]
	"[children] bringing all the illnesses home…[it's] not so much me and the baby getting sick but then my husband [is] getting sick and not being able to work." [parent on hidden/indirect costs of ECE]
Feeling that it is a mother's role to educate and care for their child	"I just think that it's more beneficial for me and my children to have them home at the moment until, you know, they're of an age where it'd be more beneficial for them to be in that structured kind of learning environment." [parent]
(Second largest barrier for limited-attendance families, but least endorsed barrier for providers)	"I think there's a bit of separation anxiety from mom's part as well, that she's not wanting to let her baby go off" [provider]
	"unless you [are] working, they [the children] should be at home" [parent]
Having information about the likely benefits of one's child attending the service	"some people just see it as babysitting" and "because it's a play-based program and because they don't see that there's any learning taking place, families don't value it" [providers]
(Main barrier endorsed by providers, and a top facilitator among parents)	"Normally after some good chats with the families, and explaining the benefits, most of the families do stay" [provider]
	"[the children] learn how to interact with other children, about correct behavior" [parent]
Knowing educators/staff are professionally trained	"It comes back to the families feeling comfortable in the space too and knowing that we accept and we value each and every person" [provider]
(Main facilitator anticipated by limited-attendance families, and a top facilitator endorsed by other parents and providers)	"When I look at the professional development of our staff, no, I don't think they've had routine comprehensive respectful education about integrative partnerships" [provider]
Problems with childcare hours	"your local center offers three short days, but you work and need long days" [parent]
(Not identified as a main barrier in the questionnaire, but extensively noted in interviews)	"if I run the kids to two different places and pick them up from two different places, that's half my day gone" [parent]

main messages to consistently emerge from the questionnaire and interviews pertained to ECEC costs, awareness of benefits, and staff skills or training. The one theme that appeared more salient in interviews than questionnaires concerned ECEC program scheduling and how this interacts with the various other competing demands families encounter. In contrast, it was the questionnaire that identified the importance of maternal roles, and although not discussed at length, interviews provided key insights into factors that might underpin endorsement of this factor. The selected quotes suggest, for example, that the maternal role barrier may be underpinned by parent perceptions of child development, feelings of anxiety, and prescriptive views about legitimate uses of parent time.

Discussion

Previous research has shown substantive variation in the proportion of children accessing ECEC in the year before school (Goldfeld et al., 2016, O'Connor et al., 2016), but limited exploration of the barriers and facilitators experienced by and most important to Australian families. This study contributes to existing ECEC participation research in several important ways. First, it simultaneously investigates both parent and provider perspectives. Second, it not only identifies key barriers and facilitators, but also provides an indication of relative importance of these factors for different stakeholders. Third, it utilizes a theory-based approach to form a structured and policy-relevant understanding of the ecological complexity that shapes ECEC participation. Finally, the mixed methods approach draws out specific details of how Australian families experience major barriers and facilitators to suggest specific strategies that hold promise for increasing ECEC participation.

Barriers

Consistent with prior research where Australian parents frequently raised themes related to cost and maternal role perceptions (Grace et al., 2014), the present study similarly found these were especially pertinent barriers to ECEC participation. These barriers were most consistently rated highly important by parent questionnaire respondents, and issues with costs were especially salient in interviews. Almost three quarters of providers and half the parent questionnaire respondents in this study rated cost as highly important, and issues relating to costs were discussed in many of the interviews. These findings suggest that cost may be the largest barrier to parents accessing the recommended ECEC dose, despite national policy statements that ECEC should be accessible to parents "in a manner that ensures cost does not present a barrier" (Harrington, 2014).

The importance of cost is consistent with previous research, which shows preschool attendance is typically higher in jurisdictions where preschool programs are government-funded (Baxter & Hand, 2013, Bennett & Tayler, 2006, O'Connor et al., 2016). This barrier must be addressed if participation rates are to increase. Interviews suggest strategies to address ECEC costs will need to consider broadening eligibility criteria for accessing subsidized care, particularly for those with no health care card or visa-based residency. Additional strategies could explore ways to reduce: indirect costs associated with transport (e.g., fuel, car maintenance); cumulative fees for families with multiple children; and hidden costs such as having to take time off paid work when children contract illnesses at ECEC services. The problem with illness may be exacerbated in a post-COVID environment, until wide-scale full-dose vaccination is possible. As it is common for children to experience multiple illnesses each year and common cold symptoms (e.g., cough) can linger for months, families may be unable to justify paying for ECEC places when children are frequently unable to attend for extended periods.

The finding that maternal role perceptions were rated highly important by more than a third of both parents and providers is also consistent with previous research. Indeed, this emerged as a major theme in interviews conducted with another Australian sample - parents from disadvantaged communities in NSW (Grace et al., 2014). Interviews in the present investigation suggested both maternal rights and responsibilities are at play here. Responses reflected both (a) views that families have an inherent right to care for and educate their young children, enjoying this short and precious period in life, and (b) societal norms and prescriptive expectations (e.g., that if a mother is not working, children should be at home). Tied to both views, and consistent with previous Australian research (e.g., Hand, Baxter, Sweid, Bluett-Boyd, & Price-Robertson, 2014), was a clear and consistent perception that young children are not developmentally ready to attend formal ECEC settings and that family-based care is more appropriate. Understanding these nuances is important for formulating strategies to address the 'maternal role' barrier.

Extending findings from prior research, the study found providers were generally more inclined than parents to rate each of the potential barriers (and facilitators) as highly important. This likely reflects differences in perspective and the framing of questionnaire and interview questions; parents were instructed to consider personal experiences, whereas providers considered collective experiences. It is likely that providers also had in mind populations experiencing more intense and varied forms of disadvantage than those experienced by the parent sample. This is important to consider as the data from providers suggests that in addition to prohibitive costs, low ECEC participation may also be

driven by poor or ineffective promotion of the benefits ECEC provides children and their families, and how families can access ECEC services. Consistent with this, interviews with parents suggested there may be some misconceptions about the benefits of play-based learning, and confusion or difficulty with enrollment processes. Our findings suggest a need to address beliefs that play-based learning is not 'educational' and provide practical assistance with enrollment processes (e.g., language translation, finding immunization information).

It is interesting that the sole barrier not endorsed by a larger proportion of providers than parents related to maternal roles. It may be that providers underestimate this barrier and need to better promote within communities a view that it is normal, acceptable and beneficial for mothers to share care and education responsibilities with formal ECEC services. The importance of promoting the benefits of ECEC participation is well appreciated by providers but may be more effective if coupled with initiatives to address maternal role barriers. Although several limited-attendance families indicated an ability to visit or attend to their children while at a service would facilitate participation, further research is needed to identify other specific strategies providers could implement to better acknowledge maternal role beliefs and support family priorities.

Overall, the analysis of ECEC barriers indicates that the barriers considered most important by parents and providers are similar. The findings suggest a need to (a) reduce service costs, (b) more effectively promote the benefits of ECEC participation, and (c) change attitudes about maternal roles.

Facilitators

The investigation of potential facilitators showed substantive alignment in the factors most parents and providers considered particularly important. Consistent with prior research (Grace et al., 2014), parents considered staff training an especially important facilitator. Questionnaire responses showed educator and staff training was consistently rated highly important by both parents and providers. Though few parents expanded on the importance of staff skills in the interviews, providers indicated that skills in establishing sensitive and supportive relationships with families are critical to facilitating ECEC participation. Parent responses to questionnaire items assessing the importance of good communication, and perceiving that educators understand their children, were also consistent with this view. Indeed, these were among the top four facilitators endorsed by parents whose children received the recommended ECEC dose, and among the top five for parents whose children did not. For limited-attendance families, communication and understanding were rated highly important by almost half the sample. Given the smaller sample size this should be interpreted cautiously, but may indicate that for these parents, such facilitators may not be sufficient to increase ECEC participation. For example, it may be that other factors need to be addressed first (e.g., cost, maternal role beliefs). Alternatively, it could be that problems with communication and perceptions of educator understanding at local ECEC services hindered full participation for these parents. However, this seems unlikely given few parents in this group indicated in either the questionnaire or interview that a lack of staff skills or disrespectful educators were barriers to participation.

Across all respondent groups, having information about the likely benefits of one's child attending a formal ECEC service was also consistently rated highly important and was among the top four facilitators in the questionnaire. Interviews indicated that parents appreciated the opportunities ECEC afforded school readiness and social-emotional skills development, though these appeared less salient to those who had not yet enrolled their children in kindergarten or LDC. Interviews also illustrated a variety of strategies that could better communicate and directly demonstrate the benefits of attendance. These included disseminating pamphlets, hosting open days, and running activities for children at local markets where educators can talk with parents and display the types of learning resources and opportunities on offer at local services. Providers also recognized the outreach opportunities afforded by such strategies for building relationships with families in their community, and assisting parents to overcome specific barriers associated with enrollment procedures.

In contrast to the general alignment across groups regarding the facilitators most consistently rated highly important (i.e., staff training and understanding, good communication, benefits of attendance), there was notable variation in the relative ranking of having food provided at ECEC services. This facilitator was the second most important for limited-attendance families, but eleventh for providers, and one of only a few potential facilitators more consistently rated highly important by parents than providers. This may suggest providers underestimate the importance of food as a potential facilitator. Interestingly, the importance of food was not discussed in interviews by many parents or providers. Rather, the main focus was on strategies that increase service availability (e.g., having enough services or service capacity) and accessibility (e.g., low or no cost, transportation). Nevertheless, the finding that more than half of all respondent groups rated it highly important suggests providing food at services may be a useful strategy for increasing participation. This may especially be the case for families experiencing food insecurity.

Broad Implications

Overall, the findings indicate that ECEC participation is shaped by multiple factors operating across a range of social-ecological levels and this is consistent with previous

research (Grace et al., 2014, Hand et al., 2014). For each family, there are likely to be multiple barriers and facilitators operating at various levels. As such, multi-tiered approaches may be needed to effectively increase ECEC participation. Though some program-service level barriers might be addressed directly by program providers (e.g., better promotion of benefits and local staff skills), efforts to address issues at the policy-enabling environment level (e.g., access to free care, funding to increase service capacity) are probably needed to have a substantive effect on ECEC participation.

Barriers to ECEC participation occur within a broad social context and interact with national issues such as housing affordability, food insecurity, and inequitable access to workplace entitlements. Within this context, many families may struggle to overcome barriers that might be considered mere inconveniences (e.g., program formatting, service location, children contracting common illnesses): depending on family circumstances, such barriers can be insurmountable at the individual family and program-service levels. Without strategies to address barriers operating at the highest levels of the social-ecological model, ECEC participation may remain infeasible and incompatible with the demands of daily living for many families. However, reform at the policy-enabling environment level, coupled with the implementation of program-service level efforts at the frontline, could significantly improve ECEC participation.

Limitations

Consistent with previous research (Ansari et al., 2020, Grace et al., 2014, Hand et al., 2014, Susman-Stillman et al., 2018), the results rely on a convenience sample, and this may introduce some bias. It is unclear how many potential participants viewed but did not submit a questionnaire. However, questionnaire and interview *completion* rates were very high among those who consented to participate, and demographic data indicated the socio-economic status of parent participants was reasonably diverse. As anticipated, there were challenges in recruiting a large sample of families who had not enrolled their children in ECEC services. Nevertheless, approximately half the limited-attendance group comprised families who had not enrolled their children at all, and the identification of facilitating factors among families with higher attendance rates provides useful direction for the development of practices and policies to increase participation.

Along a similar line, few parent participants considered themselves disadvantaged, vulnerable, or experiencing adversity. As such, the findings from parent participants may underestimate the importance of many ECEC barriers for such groups. On the other hand, almost all providers indicated that their ECEC organization served some disadvantaged families. Having canvassed the views of providers partially offsets the risk of underestimating the importance of potential barriers.

Finally, it is important to acknowledge that experimental research is needed to test causal relationships between barriers (or facilitators) and ECEC participation levels. However, canvassing parent and provider perspectives promotes a comprehensive and deep understanding of the complex issues at play. This groundwork is crucial for ensuring that the development of initiatives to boost ECEC participation is informed, efficient and acceptable. It provides services with specific ideas for diagnosis of local barriers and possible solutions to trial within their specific context.

Directions for Future Research

This study has documented a range of barriers hampering ECEC participation, the perceived importance of those barriers, and a variety of strategies thought to facilitate ECEC participation among families from a range of socio-economic backgrounds (in terms of education and income). However, further research is needed to explore the factors affecting ECEC participation among more specific subgroups such as rural and remote versus urban populations, and families experiencing different forms of disadvantage (e.g., single-parent families, relatively young parenthood, extreme poverty, disability, or health issues). Such work is needed not only to determine the extent to which the factors identified in the current research influence ECEC participation among these groups, but to check for additional barriers and facilitators. Along a similar line, there is also a need to conduct research with fathers. Current methods of enlisting parents in ECEC research inadvertently target mothers as they are typically more engaged in all ECEC service types. The experiences, thoughts, feelings, and behaviors of fathers have been neglected in early childhood research (Ames, Glenton, & Lewin, 2017, Ancell, Bruns, & Chitiyo, 2016), but are likely very important for understanding how family dynamics might influence ECEC participation. This information could be particularly instructive for the development of strategies to address maternal role beliefs that block ECEC participation.

Further research is also needed to identify and test specific strategies for addressing ECEC participation barriers. For each barrier, there are likely to be solutions operating at different levels of the social-ecological model. For example, strategies to reduce participation costs, or promote the benefits of ECEC participation, can be applied at both program-service and policy-environment levels. At the program-service level, indirect transportation costs could be reduced by the operation of kindergarten buses (potentially in partnership with primary schools) or facilitation of family

car-pooling. At the policy-environment level, costs could be reduced by providing free public transport to and from ECEC services, expanding government eligibility criteria for access to subsidized ECEC, or providing incentives for services to reduce fees. Likewise, strategies to promote parent awareness of ECEC benefits may operate at different levels (e.g., government-funded national media campaigns, employment of outreach coordinators, grassroots advertising by providers). Future research should also explore the acceptability, feasibility, and effectiveness of various strategies to increase ECEC participation.

Conclusion

Overall, this study shows considerable convergence across parent and provider views on the importance of various ECEC participation barriers and facilitators, and highlights specific divergences. Findings indicate the need to: (a) reduce both direct and indirect service costs; (b) increase flexibility in program formatting so participation can be coordinated with the demands of work and other family responsibilities; (c) more effectively promote the benefits of play-based learning in formal ECEC settings; and (d) change attitudes about maternal roles and child readiness to participate in ECEC. Application of the SEM framework to interview data demonstrates the ecological complexity of ECEC participation, and illustrates the importance of both addressing barriers and harnessing facilitators across multiple levels. As such, the study provides a valuable resource for policy development and decision-making that could substantively increase ECEC participation, and by extension reduce both the individual and societal economic burdens associated with missed ECEC opportunities.

Data Availability

In compliance with ethics approval raw data is not publicly available. It will be stored electronically and then destroyed either 7 years following project completion or 5 years from publication of results.

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Compliance with Ethical Standards

Conflict of Interest The authors declare no competing interests.

Ethics Approval The study was approved by the Royal Children's Hospital Human Ethics Committee and performed in accordance with the Declaration of Helsinki.

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