

# 1. Children's outcomes

## Key points

- \* The first five years are a critical time in a child's life. Emotional, social, cognitive, and language development occurs at a faster rate in this period than in any other.
- \* Early childhood education and care (ECEC) can support children to flourish during this 'window of opportunity', complementing the role of families and of other early childhood development policies and services.
- \* ECEC can prepare children for school and improve their outcomes across many areas, including in adolescence and adulthood. Various programs have enabled children to:
  - be more likely to complete secondary schooling and tertiary education
  - perform better in the labour market, with higher earnings and employment
  - experience better physical and mental health outcomes.
- \* Children experiencing vulnerability or disadvantage can have the most to gain from ECEC, reducing social disparities and disrupting intergenerational cycles of disadvantage.
- \* The extent of the benefits that ECEC provides to children will hinge on the quality of the service and the characteristics of the home environment.
- \* There is a need for further research, including on the effects of service type, the amount of time children are in ECEC and staffing arrangements in services, for children of different ages.

This paper focuses on the effects of early childhood education and care (ECEC) experiences on children's outcomes. The role of ECEC in contributing to children's education and development is strongly supported by almost all inquiry participants, including providers, governments and researchers (for example, Goodstart Early Learning, sub. 125, pp. 90–95; NSW Government, sub. 158, p. 12; Queensland University of Technology School of Early Childhood and Inclusive Education, sub. 52, pp. 2–4).

Section 1 discusses the importance of the first five years of a child's life. Section 2 examines the evidence on how past ECEC programs have affected children's outcomes, and how this informs current policy choices. Section 3 considers the 'active ingredients' in successful ECEC programs. Section 4 discusses how a research agenda could inform the future evolution of ECEC policy and improve its ability to support childhood development.

## 1.1 The science of early childhood development

In the first few years of a child's life, their emotional, social, cognitive and language skills develop rapidly, with neural connections forming at a fast pace (Center on the Developing Child 2007). By age six, a child's total brain volume reaches 95% of its peak (Giedd et al. 2015).

Early childhood development does not occur at the same rate for all children, however. Differences can manifest during the early years and, afterwards, become stubborn to shift (Chaparro et al. 2020, p. 1).

The relationship between [socio-economic status (SES)] and average gray-matter volume is weak in the first year of life, but large SES-based gaps emerge between ages 1 and 3 as average gray-matter volume becomes strongly and positively correlated with SES (Hanson et al., 2013). By age 5, reading and math achievement is strongly correlated with family income (Heckman, 2006; Reardon, 2011; Figlio et al., 2014). Gaps in cognitive skills existing at that point persist throughout childhood without further widening and have strong relationships with adult productivity and life success (Cunha et al., 2006; Council of Economic Advisers, 2016b).

But the extent of these disparities is not inevitable. Sensitive or critical periods in the development of brain circuitry, where plasticity is elevated, can be a 'window of opportunity' for interventions promoting healthy brain development as early experiences shape the brain architecture on which future skill development depends (Boyce et al. 2021; Knudsen et al. 2006; Noble 2021).

Early childhood education and care can take advantage of this 'window of opportunity', with relationships between children and warm and supportive caregivers being crucial for developmental pathways. And while a child's parents play a central role in their development, children can benefit from secure relationships with multiple caregivers, whether or not these caregivers are part of their family (National Scientific Council on the Developing Child 2004).

Neuroscientists have pointed to the significance of ECEC given the rapid development of language, self-regulation, and emotional competencies in early childhood, and the potential of ECEC to mitigate the effects of early adverse experiences (Sinclair-Harding et al. 2018).

The potential of ECEC may be even greater for children experiencing vulnerability or disadvantage. Childhood development can be impaired when parents face additional challenges in providing a supportive and stimulating home environment, or there is exposure to toxic stress, poverty, or other adverse circumstances (Boyce et al. 2021; Noble 2021). When a child's home environment is less supportive of their development, the relative quality of ECEC will be higher, and they may have more to gain.

Still, while neuroscience and developmental psychology can demonstrate the significance of the early years, determining how to best set children up for healthy development requires an understanding of the effects that ECEC programs have had in practice.

## 1.2 Many ECEC programs have improved children's outcomes

### Evidence on ECEC must be considered carefully

An extensive body of research has attempted to identify how ECEC programs have affected children's outcomes. This is challenging to achieve given the complex set of factors influencing families' ECEC choices including their resources, preferences and perceptions of their child's developmental needs. Most studies

have simply compared children who did and did not attend ECEC while attempting to adjust for relevant differences between these two groups. But this approach will not isolate the effects of the ECEC services if any of these differences was not measured but relates to children's outcomes.

There have been a small number of randomised controlled trials (RCTs) that randomly determined which children attended ECEC programs, but these are mostly limited to quite specific contexts. The most prominent evidence put forward in discussions of the effects of ECEC is often characterised by an inability to isolate the role of ECEC or reflects a context of limited relevance to mainstream services in Australia, if not both (box 1.1).

### **Box 1.1 – Methodological challenges in using research on ECEC to guide policy**

The challenges in weighing up the empirical evidence on ECEC to inform particular policy decisions are well recognised (see, for example, Bray and Gray, sub. 14, pp. 28-30; Borland, sub. 94, pp. 1-7). Broadly, these involve determining whether a study was able to credibly identify the effects of the specific intervention it considered (internal validity), and, for a particular context, the relevance of that intervention, the cohort who received it, and the context in which it was delivered (external validity).

#### **Internal validity**

A group of children who access ECEC services may achieve different outcomes to a group of children who do not. Whether this provides evidence for an effect of those service depends on the characteristics of these two groups, and why only some accessed ECEC. If differences in participation are driven by factors relating to the child or their family, comparisons can provide misleading results. For example, if children from a more socio-economically advantaged background are more likely to attend than children experiencing disadvantage, differences in outcomes for those who attend will be due, at least in part, to their background.

The most common approach to this issue has been to control for whichever factors are included in the researcher's dataset and seem as though they may be a confounder, such as the education level or employment status of a child's parents (for example, this approach comprises the vast majority of papers cited in reviews such as Melhuish et al. 2015). This can reduce 'statistical bias', the average difference between the answer produced by a statistical method and the true answer. But if there is any relevant factor that does not appear in the data, or is imperfectly captured by it, this bias will not be eliminated.

It seems unlikely that all relevant factors can ever be captured. For example, even among parents who seem identical in every other (measured) respect, those who read to their children more are more likely to send them to ECEC (Azpitarte et al. 2019). Unless an observational study has data on this, it will conflate the effect of ECEC with the effect of this aspect of parental support. And even if it is included, or on its own has only a modest effect, other factors such as the quality of interactions between parents and children are impossible to perfectly measure, could plausibly correlate with ECEC enrolment decisions, and would be expected to independently affect children's outcomes.

Statistical bias matters in practice. Observational studies can be far more likely to provide a misleading indication of a statistically significant effect, produce an apparent effect that is much larger or smaller than the true effect, or produce an apparent effect that is in the opposite direction to the true effect (see, for example, Duncan et al. 2004).

The simplest approach to this issue is to randomly assign children to attend or not attend ECEC. Although these RCTs will not always be internally valid (for example, if some children drop out of the

### **Box 1.1 – Methodological challenges in using research on ECEC to guide policy**

study for reasons relating to the outcomes they would have achieved and the group to which they were assigned), this methodology is arguably the most likely to isolate the effects of a program. Due to cost and ethical concerns RCTs are rare, and too few have been conducted to create a strong evidence base on the effects of mainstream ECEC programs. Still, ‘natural experiments’ can in some circumstances provide similarly high levels of internal validity, as discussed below.

#### **External validity**

Even if an analysis credibly identifies the effect of a specific intervention, that intervention may be of questionable relevance to a particular policy decision. ECEC services and programs differ in terms of objectives, service models, pedagogy, educator qualifications and ratios of educators to children, among many other factors. And the children who are examined by different studies will vary in terms of factors including their age, level of disadvantage and the care arrangements they would have participated in if they did not attend ECEC.

Perhaps the most prominent evidence on ECEC comes from the Perry Preschool Program and the Abecedarian Project. While evaluations were plausibly able to isolate the effects of these programs for their particular cohorts, these programs were very narrowly targeted. Perry recruited 123 children in Ypsilanti, Michigan, in 1962, all with IQs below 85. Abecedarian, beginning in 1972 in Chapel Hill, North Carolina, recruited 111 children with a high score on a parental risk index based on factors such as poverty, low IQ, and being known to local social services agencies (Conti et al. 2016). These programs are also generally considered to have been very high quality. The benefits they conferred on their cohorts were extremely large, but analyses of programs that were more recent, of more typical quality levels, and served a more mainstream cohort have typically found the benefits of these programs were a fraction of those generated by Perry and Abecedarian.

While findings from individual studies are often framed as universal truths, the relevance of a particular finding about an ECEC program for a specific policy question will depend on the similarity of the interventions and the cohorts between the two contexts, which must be carefully considered.

The Commission has focused on evidence that used research designs with the potential to isolate the effects of the interventions they studied. This evidence includes RCTs, but mostly draws on research from a variety of disciplines that has analysed ‘natural experiments’, where despite ECEC participation not being determined by explicit randomisation, the details of some policy create differences in ECEC participation that may be as good as random, and unrelated to relevant child or family characteristics.

For example, if oversubscribed ECEC services determine the children to whom a place is offered through a lottery, some children will attend while others will not simply due to chance. Or if children are only eligible to attend preschool if they are born after a certain date, two children born one day apart may be identical in every respect, except that only one is eligible for an additional year of preschool. And if one jurisdiction expands access to ECEC while similar jurisdictions do not, some children will participate in ECEC only

---

because they happen to live in that jurisdiction. Many studies using techniques that take advantage of similar scenarios can credibly estimate the effects of particular ECEC programs.<sup>1</sup>

The majority of this research studied interventions that took place in other countries.<sup>2</sup> The relevance of international evidence hinges on its ability to collectively establish effects that would also be felt in Australia, which is by no means guaranteed. That an ECEC program in one country had a particular effect does not prove that the same effect would be produced by a different program in Australia. But if similar effects are demonstrated by programs with different features in a number of similar countries, then it is more likely that such effects would also be generated here. As argued by one economist:

One study, done for a different country, that comes to a particular conclusion, could be appropriately viewed as not highly relevant for Australia, due to differences such as the type of program or institutional features. However, multiple studies done for a variety of different countries, which come to similar conclusions, and where those studies cover a variety of types of programs and populations, could justifiably be argued to be identifying systematic findings, that do then become relevant. (Borland, sub. 94, p. 5)

How likely this standard is to be met, and the level of confidence we can have that a particular benefit will be realised, varies by outcome.

---

<sup>1</sup> Many others do not, as the assumptions required for these approaches to work are strong. For example, if primary school test scores improve at a faster rate in a jurisdiction that expands access to ECEC, this could not be solely attributed to ECEC if that jurisdiction also improved the quality of its primary school teaching, or changed its assessment processes. The nature of these analyses also means that the effects they identify are sometimes of narrower relevance. For example, if an age cutoff applies, being born one day earlier may make a child eligible for an ECEC program. But a study may only be able to estimate the effect of eligibility for that program, rather than participation in it. And the children who are enrolled as soon as they are eligible may differ from those who are not. The relevance of the effect that a particular study would identify if all its assumptions held, and the likelihood that its assumptions do, in fact, hold, must be carefully considered.

<sup>2</sup> The Commission has generally limited its focus to evidence from advanced economies. One meta-analysis has suggested that ECEC interventions in low- and middle-income countries have produced similar effects to those in high-income countries (Holla et al. 2021). While similarity in estimated effect sizes between these groups of countries could provide an indication of external validity between ECEC interventions, the meta-analysis groups programs expanding access to ECEC with those aiming to improve its quality, and includes estimates of effects from *eligibility* for some programs as well as estimated effects of *participation* in others. Similarities in estimated effects between countries of different income levels could be due to differences in the characteristics of interventions and how they were evaluated, rather than similarities in the effects that the same intervention would have between contexts.

## The range of potential benefits is wide

Findings from rigorous evidence show that ECEC programs can have a range of positive effects (table 1.1).

**Table 1.1 – ECEC programs have produced benefits across a wide range of outcomes**

Outcome	What has been found?	How strong is the evidence?
<b>Early cognitive skills, test scores, school readiness</b>	An improvement over various developmental and cognitive domains in early childhood.	There is extensive, often credible and fairly consistent evidence of improvements – although some programs seem to have produced null or adverse effects.
<b>Educational attainment</b>	Reductions in grade repetition, increases in high school graduation, and increases in university attendance.	A reasonable number of credible studies have found benefits to educational attainment. Findings mostly come from targeted and/or older programs.
<b>Labour market outcomes</b>	A persistent increase in employment and earnings.	Almost all the studies that estimated effects on educational attainment also consider labour market outcomes and find benefits for at least some children.
<b>Physical and mental health</b>	Improved mental and physical health outcomes that can persist well into adulthood.	A reasonable number of credible studies have found benefits to various health outcomes. Findings mostly come from older programs.
<b>Contact with the justice system</b>	Fewer offences committed and less contact with the criminal justice system.	Evidence is strong where it exists, but relatively rare. It is mostly limited to targeted programs.
<b>Social connection</b>	Improvements in sociability, ability to make friends in childhood, and relationships during adulthood.	Very few studies have measured these outcomes, and their results cannot be easily compared.
<b>Equity</b>	Greater benefits for children experiencing disadvantage.	Most studies find benefits of ECEC are greater when parental income or education is lower.

## Skills developed in early childhood

The vast majority of studies on the effects of ECEC examine some measure of cognitive skills or development during young ages, such as school readiness, school test scores, or more direct measures. Most of the time, these outcomes are improved by ECEC attendance – although there are exceptions (box 1.2). However, effects on similar measures in later years are often smaller or not found. A narrowing of benefits may be overstated by the nature of these comparisons,<sup>3</sup> but this cannot explain all the difference (Andersen et al. 2022; Cascio and Staiger 2012).

This ‘fade out’ does not preclude benefits on other outcomes later in life. Some interventions had initial cognitive benefits narrow and eventually disappear over time as children attended school, but still improved children’s educational attainment, health, earnings, and contact with the criminal justice system in adulthood

<sup>3</sup> Effects on outcomes at different ages are often compared after they are converted into the equivalent number of standard deviations (a measure of variation). If, for example, the effects of preschool on school test scores are 0.5 of a standard deviation in kindergarten but only 0.33 of a standard deviation in year 3, this may be viewed as ‘fade out’. However, gaps in achievement tend to increase as children age. The effect in both years could be an increase of 5 points on each test if the standard deviation of children’s scores on the tests increases from 10 in kindergarten to 15 in year 3. (Of course, the practical significance of increasing test scores by 5 points may differ between tests and ages.)

(Chetty et al. 2011; Deming 2009; Heckman et al. 2013). Other ECEC programs did not appear to reliably improve cognitive ability or test scores, but nonetheless improved educational attainment and earnings (Gray-Lobe et al. 2023; Havnes and Mogstad 2015). A growing literature examines the mechanisms through which these long-term benefits are realised, and suggests they relate to non-cognitive skills more than the cognitive skill measures that are most commonly examined in ECEC research.

Effects on non-cognitive skills can persist even when effects on cognitive skills do not (Chetty et al. 2011; Cornelissen and Dustmann 2019). And the benefits of one ECEC program for non-cognitive skills were found to be more powerful predictors of longer-term benefits to educational and labour market outcomes than benefits to cognitive skills (Silliman and Mäkinen 2022). The mechanism through which ECEC improves long-term outcomes is still an open question, and 'non-cognitive skills' includes many possible channels. But at the very least, identifiable effects on school readiness, cognitive skills, and test scores are not necessary for ECEC to improve the outcomes of children who participate – even if these benefits can only be observed later in life.

### **Box 1.2 – Where may some ECEC programs have failed, and why?**

Some ECEC programs and policies have attracted significant attention for their apparent negative effects on children's outcomes.

#### **Quebec**

In 1997, the Canadian province of Quebec capped parental fees for many ECEC services at \$5 CAD per day. This led to a significant expansion in the usage of ECEC – between 1997 and 2008, participation in centre-based care increased from almost 20% to almost 60% in Quebec, while the rest of Canada only saw an increase from about 10% to almost 20% (Haeck et al. 2015). However, as the children affected by the policy grew up, evidence began to suggest that their development was impaired by this expansion.

Studies have taken different approaches in evaluating this reform, and have produced different results. A series of papers compared the trend in outcomes for children in Quebec to the trend in outcomes for children in other provinces, which did not implement similar reforms. This found adverse effects of Quebec's reform on the outcomes of children across Quebec, on average (most recently, Baker et al. 2019). This comparison of outcomes between children in different provinces captures multiple factors. As well as the effect of ECEC for children who only attended due to the reform (at the quality levels experienced in Quebec during this period), it also captures the effect of any reduction in service quality that the reform may have caused for children who would have attended regardless.

Other work has found the effect of ECEC in Quebec for children who only attended due to the expansion was negative, while the average effect of ECEC across all children in Quebec during this time was positive (Kottelenberg and Lehrer 2013). These methods consider the effects of ECEC in Quebec at a point in time, and do not capture any effects of the reform on quality. Accordingly, these results could be consistent if the specific details of the reform and its implementation led to a reduction in the quality of Quebec's ECEC services, while still leaving them of sufficient quality to benefit most children.

The reform relaxed some components of quality regulation, and even then, many providers failed to comply with standards. In 2001, 42% of for-profit centres did not respect the ratio of two of every three educators being qualified. For 25% of these centres, not even one in three educators was qualified (Lefebvre et al. 2008). The expansion of ECEC took place very rapidly, with little time for providers and

### **Box 1.2 – Where may some ECEC programs have failed, and why?**

the workforce to prepare. And the expansion was overwhelmingly driven by for-profit providers, which in Quebec had a significantly lower rated quality than not-for-profit providers (Fortin 2017).

Quebec's experience may be an example of the failure of a specific ECEC policy – a very rapid move to near-zero cost, without adequate quality safeguards – but not necessarily a failure of ECEC itself.

#### **Tennessee Voluntary Prekindergarten Program (TVPK)**

In 2005, the US state of Tennessee launched a preschool program targeted at 3- and 4-year-old children experiencing disadvantage. In 2009, an evaluation began to examine children applying to 79 schools, which, when oversubscribed, randomly selected the children who were offered a place (Vanderbilt University nd). Comparing children who were offered a place to those who were not suggests that eligibility for TVPK reduced school test scores in third and sixth grade, and worsened disciplinary outcomes (Durkin et al. 2022).

It is less clear than in the case of Quebec why this program had adverse effects, particularly as many other preschool programs offered by US states have been found to benefit children. Some have called the findings into question, arguing that there was significant attrition from the sample, which differed between treatment and control groups, and seemed to have led to differences between these groups (Bartik 2014; Meloy et al. 2019). But while this is true for some outcomes collected through sampling and could bias findings using these measures, this concern does not apply to effects on other outcomes where administrative data from schools were instead used. Effects on these measures were also adverse, despite treatment and control groups seeming equivalent (Durkin et al. 2022).

Other have attributed potential adverse effects to low quality – for example, as 85% of classrooms received a score of 'less than good quality' on a measure of process quality (Lowenberg and Sklar 2022). But although scores on that process quality measure were poor in absolute terms, this is true of almost all ECEC programs, and TVPK classrooms scored better than those in some programs that have been credibly found to benefit children (Felfe et al. 2015; Tietze et al. 1996; Vermeer et al. 2016).

Similarly, some have noted that Tennessee's program only met five of ten structural quality benchmarks from the National Institute for Early Education Research (Meloy et al. 2019). But this rating was given years after the period considered by these evaluations. At the time the children in the sample participated in TVPK, its rating on the then-current scorecard from the same institute was 9/10, above that of multiple US state preschool programs that have been credibly found to benefit children (Cascio 2023).

There are other potential explanations. About a third of children who did not attend TVPK instead attended another form of ECEC (Lipsey et al. 2018). If the quality of these other forms of ECEC were higher than that of TVPK, this could contribute to an adverse effect of becoming eligible to participate in TVPK (although TVPK would still not have been beneficial relative to home-based care, unless a quality difference between TVPK and other ECEC programs for this third of the sample was large enough to outweigh benefits for the remaining two thirds). Also, despite performing better than some other states on measures of process and structural quality, TVPK was delivered at low cost – and program expenditure, even conditional on some quality measures, can predict more positive effects (Bartik 2014; Currie and Neidell 2007). And TVPK was targeted at children experiencing disadvantage, with targeted programs sometimes found to be less beneficial than universal programs (section 1.3).



## Educational attainment

Educational attainment can be both valuable in itself, and lead to other benefits. Many ECEC programs have been found to increase years of schooling, high school graduation or completion of tertiary education. Some studies have examined highly specific cohorts such as those in the Perry Preschool Program or Abecedarian Project (García et al. 2020, 2021), or interventions that took place far in the past (Haimovich Paz 2015; Herbst 2017; Rossin-Slater and Wüst 2020). However, others considered less targeted (Deming 2009; Gray-Lobe et al. 2023) or universal programs (Bingley et al. 2018; Dumas and Lefranc 2010; Gruber et al. 2023; Havnes and Mogstad 2015; Silliman and Mäkinen 2022) that were implemented more recently, and still found substantial benefits.

Benefits to educational attainment were likely contributed to by better behaviour at school, with some evidence of lasting reductions in disciplinary outcomes such as suspensions and detentions (Gray-Lobe et al. 2023; Williams 2019). Some studies have also found ECEC to lower the likelihood of school year repetition (Barnett and Jung 2021; Ladd et al. 2014). One analysis quantified the cost savings to government of the reduction in school year repetition resulting from the Spanish expansion of preschool to 3-year-olds, finding that these alone offset about 10% of program costs (van Huizen et al. 2019).

## Labour market outcomes

Many studies have identified beneficial effects on labour market outcomes, such as employment and earnings. Some only consider a highly specific cohort, but find very large benefits (García et al. 2020, 2021). Others have found more modest (although still meaningful) increases, but consider programs that were delivered long ago (Haimovich Paz 2015; Herbst 2017; Rossin-Slater and Wüst 2020). Still, more recent ECEC programs, some targeted (Deming 2009), and some universal (Bingley et al. 2018; Dumas and Lefranc 2010; Gruber et al. 2023; Havnes and Mogstad 2015; Silliman and Mäkinen 2022) have been found to increase earnings. These benefits are typically the greatest for children experiencing disadvantage, although benefits often extend to those of moderate or higher socio-economic status.

Measuring the effect of an ECEC program on earnings requires waiting until the children who attended a program are in adulthood. This makes it impossible to directly estimate earnings effects of very recent programs. Still, some papers have taken estimates of the effects of early test scores on later earnings, and used these in attempts to predict future effects on earnings based on observed test score effects.

These papers often use these estimates to calculate benefit-to-cost ratios, which, despite not considering potential benefits to non-earnings outcomes, are still generally quite high (Bartik et al. 2012; Bartik and Hershbein 2018; Cascio 2023; Kline and Walters 2015). In one of these studies, the estimated benefit-to-cost ratio of universal preschool for 4-year-olds was higher than the benefit-to-cost ratio of kindergarten for 5-year-olds, with almost identical test score benefits but lower costs (Cascio 2023). One paper was able to consider labour force participation benefits to parents alongside benefits to children, and found an even higher benefit-to-cost ratio (van Huizen et al. 2019). Still, there are challenges in attempting to predict effects on long-term outcomes based on effects on short-term outcomes.<sup>4</sup>

<sup>4</sup> Most of these papers estimate the relationship between effects on early test scores and effects on later earnings based on Chetty et al. (2011). This estimate is at the conservative end of the range of relationships found in high-quality research (Kline and Walters 2015). But the relationship identified in one study may not extend to any other context – particularly because in the paper on which most of these analyses rely, effects seemed to be driven by non-cognitive skills, while extrapolation relies on estimated relationships with cognitive skills (specifically, test scores). If the ratio of

## Physical and mental health

Some targeted ECEC programs have improved various health outcomes. The strongest results, from the Perry Preschool Program and the Abecedarian Project, are also the least generalisable (Conti et al. 2016; García et al. 2021). But the Head Start program (which, while also a targeted US preschool program, covered a somewhat broader cohort) has been found to have improved self-reported health (Deming 2009). And the introduction of a Danish targeted preschool program for 3-year-olds in the mid-20<sup>th</sup> century improved long-term mortality, making the children who were able to access it more likely to survive beyond age 65 (Rossin-Slater and Wüst 2020).

Universal programs have also produced benefits to health outcomes. An English early childhood intervention reduced hospitalisations between the ages of 11 and 15, including for mental health issues (Cattan et al. 2021). But while ECEC services were the largest component of that program, health effects were almost certainly driven at least in part by other aspects, including ante- and post-natal support. In Sweden, an expansion of access to ECEC reduced mental ill-health diagnoses both while and after children attended, and may have reduced healthcare costs during early childhood – despite a potential increase in use of preventive healthcare, which would be expected to increase healthcare costs in the short term, while reducing them in the long term (van den Berg and Siflinger 2020). The children who attended ECEC due to an expansion of access in Norway, after reaching middle age, used more preventive healthcare services if pregnant, and were less likely to receive specialist healthcare services for psychiatric issues, injuries or social problems (Breivik et al. 2020).<sup>5</sup> An expansion of centre-based day care (CBDC) for children under the age of three in Germany reduced doctor visits and diagnoses of behavioural and emotional disorders, and, for children experiencing disadvantage, obesity (Barschkett 2022). And the Spanish expansion of three-year-old preschool reduced rates of asthma, with weaker evidence of reductions in diagnoses of mental health disorders and use of prescription medication (Bosque-Mercader 2022).<sup>6</sup>

## Contact with the justice system

Effects on contact with the justice system are usually found to be strong when they are measured, but these outcomes are only measured infrequently. The Perry Preschool Program and the Abecedarian Project have both been found to reduce offending by very significant margins (García et al. 2020, 2021), but significant caveats around their relevance to Australia apply. Less targeted or universal preschool programs in the US have also been found to reduce criminal convictions (Anders et al. 2023; Gray-Lobe et al. 2023; Smith 2015).

There is less evidence outside of the US. An analysis of two Finnish reforms that affected ECEC use suggested that accessing ECEC services reduced youth criminal convictions (Gruber et al. 2023). And an expansion of universal preschool in Japan reduced juvenile arrests, particularly for violent crime, and teenage pregnancy – despite the very low baseline rates of these outcomes (Ando et al. 2023).

---

benefits to cognitive and non-cognitive skills differs when the intervention is an ECEC program, rather than a higher-quality kindergarten classroom, these predicted effects could be misleading. Still, the direction in which the results would be inaccurate is unclear, and using estimates of the same relationship from other studies would produce similar or more optimistic results. And if there are non-earnings benefits to children, benefit-to-cost ratios would be higher.

<sup>5</sup> A reduction in use of health services could indicate a decreased willingness or ability to seek medical help or an improvement in underlying health. Some aspects of these results suggest that they were driven by the latter. This includes the increase in use of preventive healthcare while pregnant, and that the reduction in visits for specialist psychiatric care seemed to be driven by fewer visits among those who used these services, rather than a reduced likelihood of ever using them.

<sup>6</sup> An increase in hospital visits – mostly by pregnant women – was also found. While worse health during pregnancy could have contributed to this increase, this explanation could not be distinguished from increases in fertility or, as found by Breivik et al. (2020), increases in health-seeking behaviour.

## Social connection

Some analyses have found benefits to various measures of social connection, or factors that could be expected to improve it. For example, starting preschool a year earlier in Germany seemed to improve children's ability to make friends during childhood (Schlotter 2011), and cause a long-term increase in sociability (Bach et al. 2019) – a strong predictor of happiness (Anglim et al. 2020).

Expansions of ECEC have also been found to reduce the likelihood of being single (Havnes and Mogstad 2011), reduce divorce rates (García et al. 2022), and seem to increase marriage rates (Silliman and Mäkinen 2022). To the extent that these findings reflect an improvement in relationship quality, this could be highly significant for wellbeing (Waldinger and Schulz 2023).

## Equity

Given that the children who are currently missing out on ECEC are more likely to be those experiencing vulnerability or disadvantage (paper 2), an expansion of access to ECEC is likely to increase participation by these children to a greater extent, reducing social disparities.

This effect will be magnified if the benefits of ECEC are larger for these children. Most credible studies have found that the benefits of ECEC are greater for children whose parents have lower education or income levels (section 1.3).

## Benefits extend beyond the individual child

The above discussion has focused on the individual benefits to the child who attends an ECEC service, but the social benefits can be far broader.

When children are better prepared for school and less likely to engage in disruptive behaviour, their classmates can benefit. By fostering a school environment that is more conducive to learning and development, there can be substantial benefits to other children, regardless of whether they accessed ECEC themselves (Ladd et al. 2014; List et al. 2023; Williams 2019).

Many of the benefits to children will also provide a fiscal return to government that would offset some of the costs of increasing access to ECEC. If labour market, health, and criminal justice outcomes are improved, this will result in higher tax revenues and reduced expenditure on government support payments and health and justice systems.

As noted above, effects of ECEC can persist for decades. They can also be intergenerational. When the children who attend ECEC services grow up and have children of their own, benefits can be passed down. Some programs have been found to improve the educational, labour market, health, and justice system outcomes of the children of the original participants (Barr and Gibbs 2022; García et al. 2021; Rossin-Slater and Wüst 2020).

And of course, ECEC can be of great benefit to parents (paper 4).

- Expansions of access to ECEC can improve parental wellbeing and reduce parental stress (Schmitz 2020; Yamaguchi et al. 2018).
- Despite leading to parents spending less time in the presence of their children, ECEC can improve the quality of that time, leading parents to spend longer on activities such as reading to their children or doing art projects with them (Cascio and Schanzenbach 2013; Chaparro et al. 2020; Gelber and Isen 2013).
- ECEC allows parents to engage with work or study, increasing the amount of resources that they can invest in their children, and building human capital from which their children can benefit (Black et al. 2014; Suhonen and Karhunen 2019).

Put simply, 'allowing parents to parent less can allow them to parent better' (Chaparro et al. 2020, p. 23).

## The Australian evidence

Thus far, discussion has considered the effects of programs across a wide range of contexts and includes, but is not limited to, evidence from Australia. Some Australian studies have been able to use techniques that credibly identify the effects of ECEC programs or their characteristics (for example, Chor et al. 2016; Rankin et al. 2022; Tseng et al. 2022). But most use observational designs and must assume that all relevant factors influencing families' choices about ECEC or ability to participate in it are perfectly captured in their data – an assumption that is difficult to justify (box 1.1).

Further, detailed data sources typically pre-date the implementation of the National Quality Framework (NQF, paper 2). The NQF strengthened requirements in most states, including on educator qualifications and educator-to-child ratios, and implemented assessments against the National Quality Standards, which were met by about 90% of services in 2023, but less than 60% of services in 2013 (ACECQA 2023a). Most Australian studies on ECEC and children's outcomes use the Longitudinal Study of Australian Children, which began in 2003, and may consider services at substantially different quality levels to those today.

With these caveats in mind, when adjusting for some components of family and child characteristics, children who attended ECEC prior to the NQF have often been found to achieve outcomes that are better or the same as similar-seeming children who did not attend.

For preschool, associations are generally positive (Biddle and Seth-Purdie 2013; Warren and Haisken-DeNew 2013; Yamauchi and Leigh 2011). And, at least for Queensland in the late 2000s, preschool has been credibly found to have positive short-term effects on school readiness and some test score and behavioural outcomes (Chor et al. 2016).

Results for CBDC attendance are mixed. Some studies have found positive associations for outcomes such as test scores or behavioural outcomes, that mostly became null or negative when using methods that can better account for child and family characteristics (Biddle and Seth-Purdie 2013; Bowes et al. 2009; Claessens and Garrett 2014; Goldfeld et al. 2016; Kalb et al. 2014; Yamauchi and Leigh 2011).<sup>7</sup>

Associations with the number of hours of CBDC that children attended are more likely to be adverse, particularly for behavioural outcomes (Biddle and Seth-Purdie 2013; Coley et al. 2015; Gialamas et al. 2014; Yamauchi and Leigh 2011). But there is strong evidence that these methodologies can find adverse associations simply due to their inadequate ability to account for selection into ECEC, and more rigorous evidence tends not to find adverse effects (section 1.3).

Some research has focused on the effects of ECEC on the developmental outcomes of Aboriginal and Torres Strait Islander children in mainstream ECEC settings. Findings are similar to the studies discussed above, and similarly related to the methodology employed, with positive associations between ECEC attendance and children's outcomes that may have been driven by factors affecting ECEC participation (Azpitarte et al. 2019; Biddle and Arcos Holzinger 2015; Falster et al. 2020). Some ECEC programs that were offered specifically to Aboriginal and Torres Strait Islander children have also been associated with positive outcomes across a range of settings, including preschool and CBDC services, and literacy programs delivered from these services (Elek et al. 2020, 2022).

The methods most commonly used in the Australian literature may not have been able to isolate the effects of ECEC. The period of time considered by most papers also saw substantial changes to the quality of services. These factors suggest a degree of caution as to what we can learn from the literature. Gaining

---

<sup>7</sup> Bowes et al. (2009) considers children who either attended centre-based day care or family day care.

greater confidence requires more recent data sources that researchers can use, and, critically, ways of analysing this data that can ensure that associations between ECEC use and children's outcomes are not being affected by other factors.

## What the evidence can (and can't) tell us

Given the difficulties in ensuring that research findings have isolated the effects of the ECEC programs that they considered, and that these programs took place in a sufficiently similar context, the effects on children's outcomes that would be brought about by an expansion of access to early childhood education and care in Australia cannot be predicted with a high degree of confidence.

Nonetheless, some lessons can be drawn from the significant number of credible analyses that have been conducted across a wide range of contexts.



### Draft finding 1.1

#### Evidence shows children benefit from attending high-quality ECEC

Most credibly evaluated early childhood education and care programs have been found to benefit children. These benefits, while difficult to quantify, can be substantial, and often extend beyond short-term effects on learning and development in early childhood to a wide array of outcomes, including educational attainment, labour market success, and physical and mental health. Benefits seem stronger for children experiencing vulnerability or disadvantage, although they can extend much more broadly.

## 1.3 Searching for the 'active ingredients' of successful ECEC programs

The previous section has focused on evaluations of ECEC programs without detailed exploration of the exact features of those programs, how these features could lead to differences in effects, or how this may inform the design of ECEC system. This section discusses some of these questions.

### Quality matters, but what is quality?

The differing levels of success of various ECEC programs or services is often attributed to their quality. Many inquiry participants have rightly emphasised the importance of ECEC being high quality (for example, Centre for Research in Early Childhood Education, sub. 21, pp. 5-7; Early Learning Association Australia, sub. 48, pp. 23-25; Centre for Policy Development, sub. 156, pp. 21-24). However, it is difficult to precisely determine the extent to which each possible component of quality actually matters for children's outcomes. Broadly, attempts to gauge quality can be divided into examinations of the interactions that children experience while in ECEC, or the structural features of ECEC programs.

### Process quality

The effects that ECEC has on a child's development depend on the quality of their interactions with educators, with other children and with their physical environment – referred to as 'process quality'. Some

metrics have been developed in attempts to measure process quality, including the Classroom Assessment Scoring System (CLASS) and the Early Childhood Environment Rating Scale (ECERS).<sup>8</sup>

While children who participate in ECEC settings with better results on these metrics generally achieve better outcomes (Perlman et al. 2016; Suchodoletz et al. 2023; Ulferts et al. 2019), this does not necessarily mean that their superior outcomes were caused by higher measured process quality. Any correlations could be due to children who were independently more likely to do well being more likely to be enrolled in higher-quality settings, for example because parents of a higher SES were in a better position to access these settings.

The usefulness of such measures for policy and practice hinges on the extent to which they are aligned with the characteristics of interactions that truly improve children's outcomes. Some evidence suggests that this alignment might not be as close as might be considered desirable.

In one study, children's learning was found not to differ meaningfully as they moved between settings with different process quality ratings as measured by CLASS (Rankin et al. 2022).<sup>9</sup> Some professional development and coaching interventions have led to significantly higher CLASS ratings, without making a difference for children's learning outcomes (Pianta et al. 2017; Yoshikawa et al. 2015). The reverse can also be true, with one intervention improving learning outcomes without significantly affecting CLASS ratings (Francis and Barnett 2019).<sup>10</sup> And the implementation of one particular curriculum led to significant improvements in ECERS ratings but not any improvements in learning outcomes (Jenkins et al. 2018).

This has led some to argue that despite process quality itself being crucial, available measures of process quality may not be particularly useful tools in attempting to improve children's learning and development outcomes (Burchinal 2018; Duncan et al. 2022). In general, services with higher process quality ratings may be of higher quality, and some interventions that improve process quality measures may also improve children's outcomes. But this will not always be the case, limiting the usefulness of these measures for policy.

## Structural quality

Another way of attempting to determine the quality of a service is by measuring aspects of its structural features, such as educator qualifications, educator-to-child ratios, or its physical environment.

Educators play a critical role in supporting children's learning and development in ECEC services, whether ensuring a safe and supportive environment, encouraging positive interactions between children, or interacting with children directly. Their ability to do this depends, among other factors, on who these educators are, how many children each of them is responsible for, and how they are supported. Given this, governments typically impose requirements on the ratios of educators to children, and the qualifications that they must hold.

These staffing requirements can increase the quality of the education and care that children receive. They also impose additional costs and make it more challenging to find a sufficiently large workforce to allow broad access to ECEC. The optimal levels of these requirements will be determined by their relative costs and benefits.

---

<sup>8</sup> ECERS is sometimes considered a measure of global quality, as it measures some features of structural quality alongside its process quality components. It has revised (ECERS-R) and extended (ECERS-E) versions.

<sup>9</sup> An effect of the emotional support subscale of CLASS on a measure of language outcomes was found. However, this was of a very small magnitude and barely statistically significant, with no adjustment made for the testing of multiple hypotheses.

<sup>10</sup> In fact, CLASS scores were lower in settings affected by the intervention, although this difference was not statistically significant.

## Qualification requirements

There are positive correlations between settings with better-qualified educators and some of the measures of process quality discussed above (Manning et al. 2017). However, this could be affected by other differences between these settings and is subject to the limitations of process quality measures. Fewer studies examine correlations with children's outcomes, but positive associations are found by some of those that do (for example, Sylva et al. 2004), although not by others (e.g., Early et al. 2007). In Australia, children who were taught by educators with a qualification that was above certificate-level achieved better outcomes, although this association was similar whether this qualification was at the degree or diploma level (Warren and Haisken-DeNew 2013).<sup>11</sup> Still, these approaches cannot rule out that differences in outcomes are caused by unobserved differences between children in settings of different quality, which could include unmeasured aspects of socio-economic advantage or parental behaviour that would independently lead children to perform better.

Indeed, there is some direct evidence that these apparent positive associations can be driven by the differences between the families that access settings of lower and higher quality. When comparing children in the same family who attended different settings, associations between educator qualifications and children's outcomes can disappear (Blau 1999). Access to an additional term of ECEC had no greater of an effect in services where a higher proportion of educators held a bachelor's degree (Blanden et al. 2022). And when children randomly gained access to services, their outcomes were no better if these services happened to have better qualified educators – which has been found for both Head Start and Danish CBDC (Currie and Neidell 2007; Drange and Rønning 2017; Walters 2015). Still, a program that provided a free vocational qualification to family day care educators in Colombia improved children's cognitive and psychosocial development and some health outcomes (Bernal 2015).

It is likely that educator qualifications will matter along some margins, for example in the Colombian program where educators went from having no qualifications whatsoever to having completed a year-length qualification. Having one highly qualified educator who can inform programming may have different effects to increasing the share of highly qualified educators. And effects of qualifications will depend, in part, on the quality of education and training systems. But the Commission has found little evidence of increases to the share of educators who hold a qualification (or whose qualification is at a higher level) that has improved children's outcomes.

Even if there were effects from being taught by a better-qualified educator, this would not necessarily indicate the extent to which stricter qualification requirements would improve children's outcomes. Any such effect could (as well as being a direct result of an educator's training) be contributed to or explained by any pre-existing differences in ability that allowed better-qualified educators to attain a higher qualification level, but also independently allowed them to better support children's development.

## Educator-to-child ratios

Evidence of benefits from higher educator-to-child ratios is similarly scarce, at least within the range of ratios permitted in developed countries. Individual studies on correlations between educator-to-child ratios and children's outcomes are mixed, with some finding positive correlations and others finding none, despite the potential for higher-SES families to select into higher quality settings (Melhuish et al. 2015). A meta-analysis

<sup>11</sup> Those taught by diploma-qualified educators performed slightly better than those taught by a degree-qualified educator, although this difference is very small relative to the level of noise in the results. This study is also often cited as evidence that outcomes are superior in those taught by educators whose qualification is specific to early childhood. But learning outcomes were more positively associated with being taught by an educator whose qualification was *not* in early childhood education and care. Claims to the contrary are based on a lack of statistical significance of the association between non-ECEC qualifications and learning outcomes, but a lack of statistical significance cannot be taken as evidence of smaller effects – particularly if the apparent association is, in fact, larger.

and systematic review of correlational studies that directly examined ratios did not find evidence that they were associated with children's outcomes (Perlman et al. 2017). And a meta-analysis comparing different ECEC programs that happened to have different ratios did not find that programs with higher ratios consistently achieved more positive effects (Bowne et al. 2017).<sup>12</sup>

Studies that can account for the potential selection of children with different characteristics into settings of different quality typically fail to find benefits to lower ratios. One study did find a reduction in preschool classroom size (which increased ratios from 1:10 to 1:7.5) improved learning outcomes, although effects were small, particularly given this could increase per-child costs by about a third (Francis and Barnett 2019).<sup>13</sup>

But an increase of ratios from averages of about 1:9 to about 1:6 in a randomised controlled trial did not significantly improve children's learning outcomes (Ruopp et al. 1979). A program that introduced teacher aides to CBDC classrooms for 1.5- to 5-year-old children did not improve their cognitive or socio-emotional skills, despite increasing costs by about 30% (Andrew et al. 2019). Multiple quasi-experimental studies have also found a lack of an effect of attending an ECEC setting with higher ratios (Blau 1999; Currie and Neidell 2007; Walters 2015) and a systematic review and meta-analysis of causal studies did not find evidence of effects from increasing ratios (Dalgaard et al. 2022).

These studies only consider variation in ratios within certain ranges, and it would be very surprising if moving from ratios of, for example, 1:20 to 1:5 made no difference. The lack of a statistically significant effect does not imply that there were no effects whatsoever, with many studies lacking the power to detect modest effects.

Analyses of particular programs can also be limited in their ability to provide lessons for policy. Even to the extent that lower ratios are beneficial *for a given quality of educator*, a system-wide reduction in ratios would require a significant increase in the number of educators, which could reduce their average quality (Jepsen and Rivkin 2009). Where there are barriers to attracting sufficient high-quality, well-qualified staff (paper 3), there can also be a trade-off between strict staffing requirements and the accessibility of ECEC services.

### Implications for policy

There is not a sufficient evidence base to determine optimal educator-to-child ratios and qualification requirements. There are few credible studies, effects are difficult to isolate due to interactions with other features of services, and they will differ by context, including the education and training systems from which educators receive their qualifications. The evidence that does exist does not provide a strong case for strengthening the current requirements prescribed by the NQF.

But although there is not strong evidence that there would be benefits from strengthening these staffing requirements, the literature is not capable of ruling out risks from reducing them. A marginal change to

---

<sup>12</sup> The paper argues that their results suggest benefits to increases in ratios when above the threshold of 1:7.5, and no effect below this threshold. However, this is a product of a choice to divide their sample into programs with ratios below 1:7.5, and above *or equal to* 1:7.5, as there is a cluster of programs with ratios of exactly 7.5 that have unusually poor effects. Better accounting for nonlinearities in this data but assuming that other relevant features of the programs were successfully controlled for would lead to the conclusion that the effect of ratios is u-shaped, for example with ratios of 1:5 leading to extremely large benefits, ratios of 1:7.5 not leading to any benefits, but ratios of 1:10 and below leading to quite large benefits. A more natural interpretation may be that there were other differences between the programs with different ratios in this sample that were causing the differences in effect sizes.

<sup>13</sup> This was achieved through a reduction in class size from 20 to 15 children. Relationships between ratios and group size (as well as structural quality features more broadly) make isolating the effects of any individual feature difficult. Some studies have found evidence suggesting that reductions to group size could have been beneficial, while increases in ratios were not (for example, Ruopp et al. 1979).



staffing requirements may lead to costs that are modest relative to total costs of delivery, so benefits that are quite small and difficult to statistically detect could still be sufficient to outweigh the direct financial costs of these staffing requirements. And where providers choose to go beyond the minimum requirements, it can be harder to determine their effects.<sup>14</sup>

### Other factors

Other educator characteristics, or policies affecting educators may also influence how ECEC affects children's outcomes. Children have been found to benefit from attending centres with a higher share of male educators (Drange and Rønning 2017; Gørtz et al. 2018). Children may also benefit from continuity of care, with more consistent contact with the same settings or educators, although it is challenging to isolate the effect of this from the factors causing children to move across settings, such as parental separation (Horm et al. 2018).

Some evidence has also suggested that an increase to educator pay improved a measure of process quality, potentially because a reduction in turnover made more experienced and qualified educators less likely to exit the sector, or because this reduction in turnover increased continuity of care (Herbst and Brown 2023). Still, other research has not found that children achieve better outcomes when their educators receive higher pay, although the methods used would not capture effects on turnover (Currie and Neidell 2007).

The Commission has not undertaken detailed analysis of research on other components of structural quality. These include the curriculum used by a service, with these set out by the Early Years Learning Framework, and the physical environment of services, which is regulated under the National Quality Framework, given the broad support for these expressed by inquiry participants.

### Each child will be affected by ECEC in a unique way

The previous section found that measures of the process or structural quality of ECEC programs are limited in their ability to predict how these programs will affect children's outcomes. But even if two programs have identical quality levels, they may still have quite different effects if they service different cohorts of children. This section considers how the benefits of ECEC may vary for children from different backgrounds, and of different ages.

### Benefits are strongest for children experiencing disadvantage, but can be broader

One of the most prominent findings from the literature, found quite consistently across contexts and methodologies, is that the benefits of ECEC are generally the greatest for children experiencing vulnerability or disadvantage. As discussed earlier, where parents may lack the resources to provide as supportive and stimulating a home environment, the quality of ECEC relative to this home environment may be higher.

It is less clear what effect ECEC will have for higher-SES cohorts. It is challenging to reach conclusions about this: many of the most credible studies only identify effects of becoming eligible for programs while actual take-up may differ by group; different studies use measurements of different components of or proxies

<sup>14</sup> For example, despite the more stringent ratio and qualification requirements in NSW, in 2022 CBDC fees were 2.7% higher than the national average (PC 2023a), and at least for CBDC delivered by large providers, staffing costs were still lower than in most states (ACCC 2023b). Some analysis has suggested that the costs of these additional requirements are higher than the benefits that they are likely to confer (NSW PC 2022). However, the findings of this modelling are dependent on its assumptions. These include that no ECEC provider will go beyond the minimum standards, which leads to a much higher estimated additional cost of 9.1%. As well as the costs of reduced labour force participation, the approach also counts higher fees for parents as a cost, while not counting the higher earnings of educators as a benefit. Other approaches to the challenges inherent to this type of analysis could produce very different results.

for SES; and it takes a far higher sample size to reliably detect differences in effects between groups than it does to estimate an overall effect.<sup>15</sup>

That said, most studies find that meaningful benefits can extend across most, if not the entire spectrum of advantage. Some studies have found effects that seem similar (Blanden et al. 2022; Dumas and Lefranc 2010; Gruber et al. 2023; Kuehnle and Oberfichtner 2017), or even potentially greater for more advantaged children (Bingley et al. 2018; Gray-Lobe et al. 2023; Hustedt et al. 2021; Montrosse-Moorhead et al. 2019). But the most common finding is that effects are larger for more disadvantaged children, while still seeming significant for children of moderate or high SES.<sup>16</sup> Still, other studies have found benefits to children experiencing disadvantage but no strong evidence of effects for other children (Cascio and Schanzenbach 2013; Felfe and Lalive 2018; Felfe and Zierow 2018; Kottelenberg and Lehrer 2013; Smith 2015), or benefits to children experiencing disadvantage and some indication of adverse effects for more advantaged children (Corazzini et al. 2021; Cornelissen et al. 2018; Fort et al. 2020; Leuven et al. 2010; Silliman and Mäkinen 2022), although these potential adverse effects are often not statistically significant.

Of course, experiences of childhood disadvantage vary by context, and the proportion of children who experience the level of disadvantage in the cohort of a particular study may differ from the proportion of children who experience a similar level of disadvantage in Australia today. Education levels (and, in particular, maternal education levels) are higher in Australia than in most developed countries (OECD 2019). Income levels are also higher, including when adjusting for inequality (UNDP 2023). And both these aspects of SES have generally improved within Australia over time. To the extent that a greater proportion of Australian parents are better resourced to provide a high-quality home environment than in the contexts examined by much of the literature, the average benefits identified by these studies may be higher than what might be expected in Australia. Still, many of the studies mentioned above do find meaningful benefits for children in moderate- and high-SES families.

### **ECEC can produce benefits at all ages, but evidence is stronger for older children**

The effects of ECEC might differ according to the age of the child who receives the service. Certainly, different pedagogies will be appropriate at different ages, and regulatory settings change across ages. Still, effects of ECEC on school readiness and early academic or cognitive outcomes by age seem surprisingly similar, at least between the ages of three and five. And while the high-quality evidence on the effects of ECEC disproportionately considers children in this age range, some programs have produced significant and lasting benefits for younger children.

A meta-analysis of many natural experiments found that programs with similar characteristics enrolling children above and below the age of 3 had similar effects on children's outcomes (van Huizen and Plantenga 2018). A separate meta-analysis of 67 US programs similarly found a lack of a consistent effect of starting age (Li et al. 2020), although it considered studies of a lower methodological quality. It did suggest that programs that targeted children under the age of 3 had larger effects, although any apparent effect of

---

<sup>15</sup> Even if a study has a sufficiently large sample size (given the effect size and level of variation in outcomes) to reliably estimate an overall effect, it will need a sample size that is 16 times higher to reliably estimate an effect that differs between two halves of that sample by an amount equalling half the size of the overall effect (Gelman et al. 2020). In most individual studies to report on differences in effects by group, these differences cannot be distinguished from noise, although this could average out when considering a sufficiently large number of studies.

<sup>16</sup> Bartik et al. 2012; Bartik and Hershbein 2018; van den Berg and Siflinger 2020; Berlinski et al. 2009; Blanden et al. 2016; Cattan et al. 2021; Corazzini et al. 2021; Datta Gupta and Simonsen 2016; Drange and Havnes 2019; Drange and Rønning 2017; Felfe et al. 2015; Gibbs 2014; Havnes and Mogstad 2015; Ladd et al. 2014; Watts et al. 2023; Yamaguchi et al. 2018; Zachrisson et al. 2023. In some of these studies, differences in effects for different groups follow different patterns across various outcome measures.

starting age in this study could be driven by other differences between the programs that were aimed at younger and older children.

Some credible studies examining the provision of ECEC to children below the age of 3 have found benefits to cognitive skills. Attending CBDC between the ages of 1 and 2 has been found across a variety of contexts to significantly improve language development, and in separate studies showed benefits to test scores at ages 7 and 10 (Berger et al. 2021; Drange and Havnes 2019; Yamaguchi et al. 2018; Zachrisson et al. 2023). Other research has failed to find benefits to academic test scores (Carta and Rizzica 2018; Kuehnle and Oberfichtner 2017). And an adverse effect on cognitive ability has been found for one intervention and cohort (Fort et al. 2020).<sup>17</sup>

There is sometimes concern over the behavioural effects of ECEC for very young children, but this is generally unsupported by the most credible evidence. These concerns are largely derived from correlations between early attendance of ECEC and behavioural issues, but this seems to be a product of selection into ECEC, rather than any effect of ECEC itself (Dearing and Zachrisson 2017). Spurious adverse associations would be produced by observational studies if ECEC did not worsen behavioural outcomes, but pre-existing behavioural issues led children to enter ECEC earlier (perhaps because their parents struggled to care for them, or hoped that ECEC would help alleviate these issues). One study found direct evidence of this, while also suggesting that children's behavioural outcomes improved the longer they attended ECEC (Yazejian et al. 2015).

Causal studies that are able to account for selection into ECEC generally do not suggest persistent adverse behavioural effects, with one study finding a reduction in aggression, and others finding short-term adverse effects that can disappear quickly (Berger et al. 2021; Dearing et al. 2015; Yamaguchi et al. 2018). An analysis of seven programs across five countries did not find evidence that any of these programs worsened behavioural outcomes, including for programs that started to measure these outcomes in the first or second year of a child's life (Rey-Guerra et al. 2023). And some ECEC programs have been found to have led to improvements in measures of mental health diagnoses or treatment later in life, including those involving ECEC attendance at a young age (section 1.2).

## **The services children attend, and how they operate, can influence outcomes**

The outcomes that ECEC produces will be influenced by the type of service that children attend, and how these services are operated. (This includes quality regulation, with the NQF discussed in paper 2, and the effectiveness of its implementation discussed in paper 8.)

### **Children do not generally seem to be at risk of 'too much' ECEC**

Children can spend quite different amounts of time in ECEC, depending on availability, parental choice and the nature of the programs in which they are enrolled. A greater number of weekly hours could be beneficial, increasing exposure to an environment conducive to childhood development. However, this would also result in children spending longer outside the home environment. This has led to concerns that a high number of weekly hours in ECEC could be detrimental.

<sup>17</sup> Differences in findings could be due to the cohort for whom effects are estimated in each study. The null findings both come from studies which estimate effects for children whose parents enrol them in ECEC as soon as they are eligible. The one study to find adverse effects used a methodology that was only able to identify effects for children of affluent and highly educated parents, and even then, the adverse effects seemed limited to the most advantaged children in the generally quite advantaged sample.

To the extent that these concerns are founded in empirical evidence, they largely originate in studies that compare children who attend for different numbers of hours, while adjusting for some observed differences between those who attend more and less. However, there are almost certainly other factors that are related to both usage of ECEC, and children's outcomes that will confound these associations. Specifically, if parents send children with pre-existing behavioural issues to ECEC more often in order to take advantage of developmental benefits, or because it may be harder to care for the children themselves, this approach would falsely attribute an increased likelihood of future behavioural issues to the increased hours of ECEC (Dearing and Zachrisson 2017).

It is harder to find evidence of potential harms of higher intensities in studies that can more credibly isolate the effects of this intensity. The previously mentioned study of seven ECEC programs across five countries also did not provide evidence of adverse behavioural effects from attending any of these programs for a greater number of hours (Rey-Guerra et al. 2023). And rigorous studies typically find benefits to academic outcomes from attending full-day, rather than half-day ECEC services, for example when children are randomly allocated to programs with different intensities (Atteberry et al. 2019; Bartik et al. 2012; Cannon et al. 2006; Felfe and Zierow 2018; Friesen et al. 2022; Gibbs 2014; Robin et al. 2006; Walters 2015). Adjusting for some other program characteristics, full-time programs seemed more likely to benefit children than part-time programs (van Huizen and Plantenga 2018).

Further, some of the programs that have been found by credible research to be the most beneficial have been highly intensive. The Abecedarian Project offered over nine hours a day of ECEC for 50 weeks a year, from the ages of zero to five (García et al. 2020). The Spanish expansion of preschool to 3-year-olds offered ECEC from 9:00am to 5:00pm, five days a week (van Huizen et al. 2019). In Japan during the period considered by a study examining the effect of attending ECEC before age 2.5, 90% of children spent at least 7 hours in ECEC a day and 90% attended at least 5 days a week (Yamaguchi et al. 2018). Each of these interventions led to significant improvements on multiple outcomes, and while it was not clear that the level of intensity of provision was necessary for these benefits, it certainly was consistent with them.

This is not to say that high intensities are optimal – even if there are additional benefits to longer hours, as some studies have found, these might not be large enough to justify the costs. And of course, low-quality ECEC is likely to be even more detrimental if children are exposed to it for longer. More research is needed to suggest optimal hours of attendance, and how these may vary by child. But given that in some cases higher intensities can lead to additional benefits, and that many highly intensive programs have been successful, there is not a strong case to be made that a high number of weekly hours in ECEC is a cause for concern.

### **Differences between service types may affect children's outcomes**

There are multiple, distinct models of ECEC provision in Australia, including:

- centre-based day care, which is provided in dedicated facilities that offer education and care for children below school age (usually aged 0–5), and usually operate five days a week, for at least several hours a day
- preschools, which primarily operate during school term and usually only for a limited number of hours each day. Preschools programs are structured, play-based learning programs, delivered by a degree qualified teacher, aimed primarily at children in the year before they commence full-time schooling and can also be offered in CBDC
- family day care (FDC), which is provided in the educator's home
- outside school hours care (OSHC), comprising before and after school hours care and vacation care.

Each may affect children's development differently, but evidence on this is scarce. For some service types, such as OSHC, there is an almost complete lack of research on effects on children's outcomes.<sup>18</sup> Even where studies can compare differences in effects by service type, variation in models for each service type between jurisdictions and over time make it unclear if findings would be relevant for Australia today.

It is plausible that CBDC and preschool could have different effects on children's outcomes, given potential differences in pedagogy, group sizes, educator-to-child ratios and access to an early childhood teacher. Some Australian evidence has pointed in the direction of children in preschool performing better than those in CBDC (Biddle and Seth-Purdie 2013; Yamauchi and Leigh 2011). However, these studies had a limited ability to account for the reasons why children attended different types of services, and used data that pre-dates the NQF – which is likely to have improved the quality of CBDC, while being less relevant for preschool delivered by state governments.

The international evidence has not identified clear differences between the effects of CBDC and preschool. In the studies examined by the Commission, the two models seem to lead to similarly consistent effects of broadly comparable magnitudes.

While family day care has a quite different model to both CBDC and preschool, it is difficult to determine which would be more beneficial, at least for most children (of course, each child will respond differently to these environments, and there will be no model that is best for all children). One study compared the effects of CBDC on language development between two groups of children, one seeming as though they would have otherwise received FDC, with the other group having parental care as their apparent alternative. These results seemed to suggest that FDC was beneficial for language development, but that CBDC, on average, conferred larger benefits (Berger et al. 2021). More direct evidence has found that, in one context, attending CBDC rather than FDC increased test scores and enrolment into academic-track high schools (Datta Gupta and Simonsen 2016).

Differences in service models between jurisdictions make these findings hard to extrapolate to Australia. In France and Denmark, where the studies mentioned above took place, ratios for young children in FDC were 1:3 and 1:5 respectively, similar to the 1:4 ratio requirement in Australia. However, neither country requires FDC educators to hold ECEC qualifications, as Australia now does,<sup>19</sup> and there are also differences in the features of CBDC between these countries.

Although the service model of ECEC is likely to have effects on children's outcomes, limitations in the quantity and quality of the evidence base do not allow clear conclusions to be drawn on the circumstances in which a particular model is ideal.

### **(When) should programs be targeted or universal?**

Internationally, many ECEC programs have been targeted at children experiencing vulnerability or disadvantage, whether through prioritisation in enrolment or in service location, or through limiting access to certain services based on measures such as family income. Many other programs are universal, and open to all children (noting that here we focus on a narrow conception of universality, where program rules do not explicitly limit access, and set aside issues of whether services are genuinely accessible to all children).

There can be advantages to targeting in some situations. Resources are allocated only to those who will benefit the most, limiting provision can make it more feasible to find a sufficient workforce, and services can

<sup>18</sup> At least for typical services, although some research has examined additional programs delivered through OSHC (for example, Milton, sub. 168).

<sup>19</sup> A requirement for new FDC educators to hold an approved Certificate III level (or higher) qualification took effect in July 2023, although existing educators at an FDC service will have until July 2024 to complete their qualification, or longer if there is reasonable justification (ACECQA 2023b).

be tailored to the specific needs of a particular cohort. However, universal programs can bring their own advantages (Fox and Geddes 2016).

- As discussed earlier, many ECEC programs have been found to benefit children across the spectrum of SES. And children from any family background, who live in any area can be developmentally vulnerable (SA Government 2023) – some of the children who may have most to gain from ECEC might not be eligible for targeted programs.
- Children experiencing disadvantage can sometimes be more likely to attend ECEC when programs are *not* targeted towards them, potentially because the basis for targeting (such as a low family income) can change quickly, stigma from targeted programs is avoided, it is less administratively burdensome to gain access, or because universal programs can establish norms of participation (Barnett 2010; Gambaro et al. 2014).
- Given the importance of peer effects for learning, children’s development may be best promoted in environments with a broader mix of social backgrounds, rather than one where children experiencing disadvantage are concentrated in the same settings (Gormley 2017).
- Broad-based community involvement may lead to a greater sustainability and quality of programs, as more – and more politically connected – families have an incentive to advocate for their effective operation. However, some evidence has suggested that any effect of this may be minimal (Barnett 2010; Greenstein 2022).

Whether these factors lead, in practice, to better outcomes for children is difficult to test empirically. But universal preschool programs in the United States seem to be much more beneficial than targeted programs, a finding that cannot be clearly explained by any other observed features of these programs (Cascio 2023). For most children, inclusion in universal services, with appropriate supports where necessary, could be advantageous in promoting their early learning and development.

That said, many of the most successful ECEC programs have been highly targeted, for example by providing trauma-informed care to a cohort of children who were at a higher risk of abuse or neglect (Tseng et al. 2022). Models of tailored support will be preferable in some situations (paper 2).

### **ECEC market structures can affect service quality**

Whether, or in what proportion ECEC is provided by governments, not-for-profit organisations, or for-profit organisations varies between jurisdictions. This could have implications for the quality of services and, ultimately, children’s outcomes. Some evidence has suggested that otherwise similar-seeming ECEC programs were more likely to improve children’s outcomes if they were delivered publicly, rather than through a market of for-profit and not-for-profit services (Corazzini et al. 2021; van Huizen and Plantenga 2018).

In Australia, only about 7% of Child Care Subsidy approved services are managed by state, territory, and local governments, with about 8% run by schools, 33% by not-for-profit providers, and 52% by for-profit providers (ACECQA 2023a).<sup>20</sup> A market system can lead to greater levels of competition than when government is the sole provider of services, and in markets for many products, competition creates an incentive to offer a high-quality product to increase an organisation’s customer base, and the prices that they are willing to pay (PC 2017, p. 98).

For this to ensure high quality in ECEC services, providers would have to compete on perceived quality, and these perceptions would have to be accurate. But there are limits to the information that can be provided by available measures of quality.

---

<sup>20</sup> Preschools are not eligible for the Child Care Subsidy unless they operate for at least 48 weeks a year. This means these figures generally do not include dedicated preschool, which comprises a significant proportion of services of ECEC services for older children, and is more likely to be delivered by state governments.

- ECEC services receive a rating against the National Quality Standard, and these ratings are publicly available. However, of all the indicators of quality included by ACECQA in surveys of families, these are rated as the least important. Almost half of families were unaware of the rating of the service they used or intended to use, and many of those who were aware did not consider these ratings to be helpful. A lack of understanding and concerns about the accuracy or recency of National Quality Standard ratings may be limiting their use (paper 8).
- Families often visit services, or rely on recommendations from other families who currently access those services. But quality is difficult to directly observe, particularly when limited to pick-up and drop-off times, or a scheduled visit when the service is aware a potential customer is watching. Parents' ratings of the quality of educators have been found to be no higher for educators who are better at improving their children's outcomes (Araujo et al. 2019). And one reform that improved the quality of interactions between educators and children led to *lower* ratings on Yelp, as parents responded to the higher fees this reform also caused, while not obviously noticing the quality improvement (Herbst and Brown 2023).

Even if parents do discover a service is low quality, they may lack an alternative, with waiting lists that are often years long and a lack of alternative providers within their local area (ACCC 2023a, p. 55) – and switching providers would require families to send their child to an unfamiliar setting. While parents do place a high weight on quality, potentially due to a limited ability to determine and base decisions on quality they also report giving as much or more weight to factors such as location, availability, and cost when choosing a service (ACCC 2023a, p. 55; ACECQA 2022, p. 48).

Where competition cannot guarantee quality in a marketised system, the incentives of different provider types become more significant. When a lower quality service can be offered without a risk to demand for that service, providers will only invest in quality if they are forced to or have a non-commercial desire to do so. While this certainly does not prevent some for-profit providers from making substantial investments in quality, organisations often respond to incentives, and for-profit ECEC providers often have a clear commercial incentive to underinvest in quality. Potentially as a result of this, measures of process quality, structural quality and quality as assessed by regulators are generally higher in not-for-profit services, both internationally (e.g., Baker et al. 2019; Blanden et al. 2016) and in Australia (ACECQA 2023a; Char et al. 2023; Harrison et al. 2023).

But while this may lead to an advantage for not-for-profit providers in terms of service quality, there are other considerations in designing an ECEC system. Quality regulation can increase the likelihood that a baseline level of quality is met by all providers. And recent expansions in the number of ECEC services have largely been driven by for-profit providers, rather than not-for-profit providers (paper 5). Any potential quality implications of ownership status may need to be traded off against service availability.

## Other policy settings matter for the outcomes ECEC will produce

Broader social systems and policy settings can affect children's experiences and development upon entry to ECEC, and whether the capabilities children develop through ECEC are built on and strengthened. This includes policies around parental leave, pre-natal and early childhood health interventions, government support payments, child protection and many other areas.

Of particular importance is the quality of later educational experiences. The benefits of high-quality ECEC are amplified when combined with other reforms that improve the quality of the schools system. For example, children did not significantly benefit from the US Head Start preschool program if they went on to attend schools that had their funding cut, while the benefits of Head Start for children who attended better-funded schools included much higher high school graduation rates and wages, and much lower adult poverty and

contact with the justice system (Johnson and Jackson 2019).<sup>21</sup> And the potential for ECEC to increase the proportion of school leavers prepared for tertiary education will not be fully realised if policy settings limit access to tertiary education, or do not sufficiently improve its quality.

ECEC will be complemented by improvements to school and tertiary education systems. The Commission has put forward recommendations in these areas (PC 2022, 2023b), and review processes prior to the next National Schools Reform Agreement and as part of the Universities Accord will be completed by the end of 2023. As well as being beneficial in their own right, high-quality and accessible school and tertiary education systems will be necessary to harness the full potential of early childhood education and care.

## **There is much we don't know about when and for whom ECEC is most beneficial**

This section has covered: methods of attempting to measure quality in ECEC and their limits; potential differences in the effects of ECEC for children of different ages and from different socio-economic backgrounds; and how the effects of ECEC may differ for systems or services that operate in different ways.

The ability to meaningfully answer these questions is limited by the complex nature of decisions around ECEC as determined by families' resources, preferences, and perceptions of the developmental needs of their children, and significant differences in children and services between jurisdictions. Nonetheless, the literature does present some lessons for ECEC, as well as areas for further exploration as part of a research agenda (section 1.4).

While the Commission will continue to consult on our reading of the evidence, many important questions are unlikely to be able to be answered without further research and, critically, data, coordination, and policy that is designed to facilitate evaluation.

### **1.4 A research agenda for ECEC**

There is much that we know about how early childhood education and care affects children's outcomes. The Commission has found that most credibly evaluated ECEC programs have been found to benefit children, that the range of potential benefits is broad, and that children experiencing vulnerability or disadvantage have the most to gain.

But while the degree of consistency with which programs have been found to be beneficial across different contexts provides more confidence that an expansion of access to ECEC in Australia would support children's development, many of the rigorous techniques that have been used elsewhere have not been applied here, including due to data availability and differences in policy design.

There is a lot of data collected in ECEC – through the administration of the Child Care Subsidy, preschool and other government programs, surveys with broad coverage, such as the Australian Early Development Census, and information submitted by service providers to regulators. But there has been a lack of data that is recent, accessible, linked and able to be used to effectively address knowledge gaps. Governments are working towards implementing a preschool outcomes measure, but data will not be available for a number of years.

---

<sup>21</sup> Many studies with similar findings compare similar-seeming children who attended schools of different quality, but this is not the most credible evidence, as there could be some unobserved factor that led some students to attend better schools that may have independently caused them to achieve better outcomes. However, Johnson and Jackson (2019) use variation in both Head Start attendance and school funding levels that comes from natural experiments and seems to be as good as random.



It is particularly challenging to go beyond estimating the effects that ECEC programs have had, to understanding why they have had these effects, how ECEC systems should best be designed to support learning and development and how children in different circumstances can benefit most from ECEC. Fully realising the potential of ECEC to improve children's lives requires credible evaluation of policy changes, as well as other research to guide the future evolution of ECEC system design, policy and practice – and set up families to make better-informed decisions on if, when, how much, and what type of ECEC would be best for their children. This requires a coordinated response to ensure that research is directed towards the most significant questions, data is available and policy design allows for credible evaluation.

## Priorities for research to support childhood development

There are some areas that should be a priority for a future research agenda where, despite their significance, there is considerable uncertainty over their effects on children's development.

- Each day that their child attends ECEC, families make choices about the length of that attendance, and government policies and provider decisions set the constraints within which these choices are made. But the quality of information to guide these decisions is limited.
- If educator-to-child ratios and qualification requirements are set at too low a level, ECEC will not optimally support childhood development. If they are set at too high a level, financial costs and workforce constraints will mean that some children will not be able to access ECEC at all. Better information on the effects of staffing requirements could inform these trade-offs.
- Children in Australia attend different models of ECEC, including CBDC, preschool, FDC, and OSHC. These types of services may support children's development in different ways, and children may vary in how well they are served by each of them, but there is limited evidence on this.

Other areas relating to the effects of ECEC on children's outcomes should also be included, such as training and professional development for educators, implications of provider type and the relationship between National Quality Standard ratings and children's outcomes. Research on understanding the different delivery models of ECEC policy, funding and service delivery that best recognise the experiences of Aboriginal and Torres Strait Islander children and families should also be conducted.

While these topics relate to children's outcomes more directly, other areas of ECEC policy should also be part of a research agenda, including on service availability, accessibility and inclusivity, measures to attract, support and retain the ECEC workforce and how ECEC supports labour force participation.

## A steward should support the research agenda

The capacity for research to answer these questions can be limited by data gaps or inaccessibility, difficulties accessing funding and policy design that does not build in evaluation mechanisms. There can also be a lack of coordination between researchers, policymakers and practitioners. Researchers may have limited visibility over which issues are being considered and what the most important questions to answer may be. Policymakers and practitioners may not understand what they need to do to allow researchers to provide answers to these questions.

Paper 9 argues that an ECEC Commission should be established to monitor and evaluate government policies as they progress towards universal ECEC, and provide advice about investment priorities. The role of this Commission would encompass supporting the development of a knowledge base to guide ECEC policy and practice, working with researchers and policymakers to identify priorities, address gaps in the availability (and existence) of data and coordinate and fund research.

While the ECEC Commission may be best placed to oversee the development of a research agenda, many actions would need to be taken before it is established. The Australian Education Research Organisation could commence the process of developing and overseeing the implementation of a research agenda.

A move towards the establishment of a universal ECEC system will only make it more critical to facilitate research to help maximise the potential of ECEC to support children to flourish. Collaboration with researchers, policymakers and practitioners, data availability and accessibility, consideration of evaluation during policy design and mechanisms to disseminate findings will all be required. In preparing the final report of this inquiry, the Commission will consider views on a research agenda for ECEC and the structure, objectives and functions of the body that would oversee it.



### Draft finding 1.2

#### There is more to learn about how ECEC programs can best improve children's outcomes

The literature on early childhood education and care programs presents some lessons about how programs and systems to improve children's outcomes might be designed, but there is also much that is not known.

- The benefits from ECEC programs can be greatest for children experiencing disadvantage or vulnerability, while extending more broadly. Services that are accessible to children from a wide range of backgrounds may, as well as reaching more children, be more conducive for the learning and development of each child who does attend.
- Benefits have been produced by programs with a wide range of features, including those with different operating models, starting ages and number of weekly hours attended. Realising the potential of ECEC for childhood development requires a better understanding of how program features affect children's outcomes.
- Factors that contribute to the quality of ECEC services can be difficult to disentangle using available measures of process or structural quality. Predictions of how children's outcomes will be affected by efforts to improve these measures, including regulated features of services such as staffing requirements, are highly uncertain.

While the ECEC Commission may be best placed to oversee a research agenda, many actions would need to be taken before one is established. The Australian Education Research Organisation could commence the process of developing and overseeing the implementation of a research agenda in the short term.

## References

- ACCC (Australian Competition and Consumer Commission) 2023a, *Childcare inquiry - June interim report*.
- 2023b, *Childcare inquiry - September interim report*.
- ACECQA (Australian Children's Education and Care Quality Authority) 2022, *National Quality Framework annual performance report 2021*, January.
- 2023a, *NQF online snapshot, Q3 2023*, <https://snapshots.acecqa.gov.au/Snapshot/index.html> (accessed 6 November 2023).
- 2023b, *Qualifications for family day care services*, <https://www.acecqa.gov.au/qualifications/requirements/family-day-care-services> (accessed 2 October 2023).
- Anders, J, Barr, AC and Smith, AA 2023, 'The effect of early childhood education on adult criminality: evidence from the 1960s through 1990s', *American Economic Journal: Economic Policy*, vol. 15, no. 1, pp. 37–69.
- Andersen, SC, Bodilsen, ST, Houmark, MA and Nielsen, HS 2022, *Fade-Out of Educational Interventions: Statistical and Substantive Sources*, CESifo.
- Ando, M, Mori, H and Yamaguchi, S 2023, *Universal Early Childhood Education and Adolescent Risky Behavior*.
- Andrew, A, Attanasio, O, Bernal, R, Sosa, LC, Krutikova, S and Rubio-Codina, M 2019, *Preschool Quality and Child Development*, Working Paper, National Bureau of Economic Research.
- Anglim, J, Horwood, S, Smillie, LD, Marrero, RJ and Wood, JK 2020, 'Predicting psychological and subjective well-being from personality: A meta-analysis', *American Psychological Association, US, Psychological Bulletin*, vol. 146, no. 4, pp. 279–323.
- Araujo, MC, Dormal, M and Schady, N 2019, 'Childcare Quality and Child Development', University of Wisconsin Press, *Journal of Human Resources*, vol. 54, no. 3, pp. 656–682.
- Atteberry, A, Bassok, D and Wong, VC 2019, 'The Effects of Full-day Pre-kindergarten: Experimental Evidence of Impacts on Children's School Readiness', *Educational Evaluation and Policy Analysis*, vol. 41, no. 4, pp. 537–562.
- Azpitarte, F, Perales, F, Zubrick, S, Kalb, G, Chigavazira, A and Farrant, BM 2019, 'Childcare Use and Its Role in Indigenous Child Development: Evidence from the Longitudinal Study of Indigenous Children in Australia', *Economic Record*, vol. 95, no. 308, pp. 1–33.
- Bach, M, Koebe, J and Peter, F 2019, *Long Run Effects of Universal Childcare on Personality Traits*.
- Baker, M, Gruber, J and Milligan, K 2019, 'The Long-Run Impacts of a Universal Child Care Program', *American Economic Journal: Economic Policy*, vol. 11, no. 3, pp. 1–26.
- Barnett, WS 2010, 'Universal and Targeted Approaches to Preschool Education in the United States', *International Journal of Child Care and Education Policy*, vol. 4, no. 1, pp. 1–12.
- and Jung, K 2021, 'Effects of New Jersey's Abbott preschool program on children's achievement, grade retention, and special education through tenth grade', *Early Childhood Research Quarterly*, vol. 56, pp. 248–259.
- Barr, AC and Gibbs, C 2022, 'Breaking the Cycle? Intergenerational Effects of an Anti-Poverty Program in Early Childhood', *Journal of Political Economy*, vol. 130, no. 12, pp. 3253–3285.
- Barschkett, M 2022, 'Age-specific Effects of Early Daycare on Children's Health', <https://papers.ssrn.com/abstract=4304668> (accessed 12 October 2023).
- Bartik, TJ 2014, 'From Preschool to Prosperity: The Economic Payoff to Early Childhood Education. WE Focus Series', *W. E. Upjohn Institute for Employment Research*, [https://research.upjohn.org/cgi/viewcontent.cgi?article=1246&ontext=up\\_press](https://research.upjohn.org/cgi/viewcontent.cgi?article=1246&ontext=up_press) (accessed 8 August 2023).
- , Gormley, W and Adelstein, S 2012, 'Earnings benefits of Tulsa's pre-K program for different income groups', *Economics of Education Review*, vol. 31, no. 6, pp. 1143–1161.
- and Hershbein, BJ 2018, 'Pre-K in the public schools: Evidence from within U.S. States', <https://www.econstor.eu/handle/10419/202883> (accessed 5 June 2023).
- van den Berg, GJ and Siflinger, BM 2020, 'The effects of day care on health during childhood: evidence by age', IFAU - Institute for Evaluation of Labour Market and Education Policy, *Working Paper Series*, [https://ideas.repec.org/p/hhs/ifauwp/2020\\_005.html](https://ideas.repec.org/p/hhs/ifauwp/2020_005.html) (accessed 1 August 2023).
- Berger, LM, Panico, L and Solaz, A 2021, 'The Impact of Center-Based Childcare Attendance on Early Child Development: Evidence From the French Elfe Cohort', *Demography*, vol. 58, no. 2, pp. 419–450.
- Berlinski, S, Galiani, S and Gertler, P 2009, 'The effect of pre-primary education on primary school performance', North-Holland, *Journal of Public Economics*, vol. 93, no. 1–2, pp. 219–234.
- Bernal, R 2015, 'The impact of a vocational education program for childcare providers on children's well-being', *Economics of Education Review*, vol. 48, pp. 165–183.
- Biddle, N and Arcos Holzinger, L 2015, 'The relationship between early childhood education and care (ECEC) and the outcomes of Indigenous children: evidence from the Longitudinal Study of Indigenous Children (LSIC)', The Australian National University, *Centre for Aboriginal Economic Policy Research*, <https://caep.r.cass.anu.edu.au/research/publications/relationship-between-early-childhood-education-and-care-ecec-and-outcomes> (accessed 2 June 2023).
- and Seth-Purdie, R 2013, 'Development risk exposure and participation in early childhood education', The Australian National University, <https://coombs-forum.crawford.anu.edu.au/publication/hc-coombs-policy-forum/3456/development-risk-exposure-and-participation-early-childhood> (accessed 1 June 2023).
- Bingley, P, Jensen, V and Nielsen, S 2018, *Effects of day care on long run child and mother outcomes*.
- Black, SE, Devereux, PJ, Løken, KV and Salvanes, KG 2014, 'Care or Cash? The Effect of Child Care Subsidies on Student Performance', MIT Press, *The Review of Economics and Statistics*, vol. 96, no. 5, pp. 824–837.
- Blanden, J, Del Bono, E, Hansen, K and Rabe, B 2022, 'Quantity and quality of childcare and children's educational outcomes', *Journal of Population Economics*, vol. 35, no. 2, pp. 785–828.
- , —, McNally, S and Rabe, B 2016, 'Universal Pre-school Education: The Case of Public Funding with Private Provision', *The Economic Journal*, vol. 126, no. 592, pp. 682–723.

- Blau, D 1999, 'The Effect of Child Care Characteristics on Child Development', University of Wisconsin Press, *Journal of Human Resources*, vol. 34, no. 4, pp. 786–822.
- Bosque-Mercader, L 2022, 'The Effect of a Universal Preschool Programme on Long-Term Health Outcomes: Evidence from Spain', <https://ideas.repec.org/p/fda/fdaddt/2022-07.html> (accessed 12 October 2023).
- Bowes, J, Harrison, L, Sweller, N, Taylor, A and Neilsen-Hewett, C 2009, 'From child care to school: Influences on children's adjustment and achievement in the year before school and the first year of school - Findings from the Child Care Choices longitudinal extension study', [http://www.community.nsw.gov.au/\\_data/assets/pdf\\_file/0008/321596/research\\_childcare\\_school.pdf](http://www.community.nsw.gov.au/_data/assets/pdf_file/0008/321596/research_childcare_school.pdf) (accessed 5 June 2023).
- Bowne, JB, Magnuson, KA, Schindler, HS, Duncan, GJ and Yoshikawa, H 2017, 'A Meta-Analysis of Class Sizes and Ratios in Early Childhood Education Programs: Are Thresholds of Quality Associated With Greater Impacts on Cognitive, Achievement, and Socioemotional Outcomes?', SAGE Publications Sage CA: Los Angeles, CA, *Educational Evaluation and Policy Analysis*, <https://journals.sagepub.com/doi/full/10.3102/0162373716689489> (accessed 17 July 2023).
- Boyce, WT, Levitt, P, Martinez, FD, McEwen, BS and Shonkoff, JP 2021, 'Genes, Environments, and Time: The Biology of Adversity and Resilience', *Pediatrics*, vol. 147, no. 2, p. e20201651.
- Breivik, A-L, Del Bono, E and Riise, J 2020, 'Effects of Universal Childcare on Long-Run Health', *Determinants of Health and Labor Market Outcomes: Three Essays in Applied Microeconomics*, <https://bora.uib.no/bora-xmlui/handle/1956/21794> (accessed 10 October 2023).
- Burchinal, M 2018, 'Measuring Early Care and Education Quality - Burchinal - 2018 - Child Development Perspectives - Wiley Online Library', *Child Development Perspectives*, vol. 12, no. 1, pp. 3–9.
- Cannon, JS, Jacknowitz, A and Painter, G 2006, 'Is Full Better than Half? Examining the Longitudinal Effects of Full-Day Kindergarten Attendance', [Wiley, Association for Public Policy Analysis and Management], *Journal of Policy Analysis and Management*, vol. 25, no. 2, pp. 299–321.
- Carta, F and Rizzica, L 2018, 'Early kindergarten, maternal labor supply and children's outcomes: Evidence from Italy', *Journal of Public Economics*, vol. 158, pp. 79–102.
- Cascio, E and Schanzenbach, DW 2013, 'The Impacts of Expanding Access to High-Quality Preschool Education', Economic Studies Program, The Brookings Institution, *Brookings Papers on Economic Activity*, vol. 44, 2 (Fall), pp. 127–192.
- and Staiger, D 2012, *Knowledge, Tests, and Fadeout in Educational Interventions*, <https://papers.ssrn.com/abstract=2050828> (accessed 28 August 2023).
- Cascio, EU 2023, 'Does Universal Preschool Hit the Target?: Program Access and Preschool Impacts', University of Wisconsin Press, *Journal of Human Resources*, vol. 58, no. 1, pp. 1–42.
- Cattan, S, Conti, G, Farquharson, C, Ginja, R and Pecher, M 2021, 'The health impacts of universal early childhood interventions: evidence from Sure Start', <https://ideas.repec.org/p/ifs/ifsewp/21-25.html> (accessed 1 August 2023).
- Center on the Developing Child 2007, *InBrief: The Science of Early Childhood Development*, Center on the Developing Child at Harvard University, <https://developingchild.harvard.edu/resources/inbrief-science-of-ecd/> (accessed 5 September 2023).
- Chaparro, J, Sojourner, A and Wiswall, MJ 2020, 'Early Childhood Care and Cognitive Development', *NBER Working Papers*, <https://ideas.repec.org/p/nbr/nberwo/26813.html> (accessed 2 August 2023).
- Char, V, Harrison, LJ and Li, H 2023, 'Macro-structural predictors of Australian family day care quality', *Frontiers in Public Health*, vol. 11, p. 1114256.
- Chetty, R, Friedman, J, Hilger, N, Saez, E, Schanzenbach, D and Yagan, D 2011, 'How Does Your Kindergarten Classroom Affect Your Earnings?', *The quarterly journal of economics*, vol. 126, pp. 1593–1660.
- Chor, E, Andresen, ME and Kalil, A 2016, 'The impact of universal prekindergarten on family behavior and child outcomes', *Economics of Education Review*, vol. 55, pp. 168–181.
- Claessens, A and Garrett, R 2014, 'The role of early childhood settings for 4–5 year old children in early academic skills and later achievement in Australia', *Early Childhood Research Quarterly*, vol. 29, no. 4, pp. 550–561.
- Coley, R, Lombardi, C and Sims, J 2015, 'Long-Term Implications of Early Education and Care Programs for Australian Children', *Journal of Educational Psychology*, vol. 107, no. 1, p. 284.
- Conti, G, Heckman, J and Pinto, R 2016, 'The Effects of Two Influential Early Childhood Interventions on Health and Healthy Behaviour', *Economic journal*, vol. 126, no. 596, pp. F28–F65.
- Corazzini, L, Meschi, E and Pavese, C 2021, 'Impact of early childcare on immigrant children's educational performance', *Economics of Education Review*, vol. 85, p. 102181.
- Cornelissen, T and Dustmann, C 2019, 'Early School Exposure, Test Scores, and Noncognitive Outcomes', *American Economic Journal: Economic Policy*, vol. 11, no. 2, pp. 35–63.
- , —, Raute, A and Schönberg, U 2018, 'Who Benefits from Universal Child Care? Estimating Marginal Returns to Early Child Care Attendance', The University of Chicago Press, *Journal of Political Economy*, vol. 126, no. 6, pp. 2356–2409.
- Currie, J and Neidell, M 2007, 'Getting inside the "Black Box" of Head Start quality: What matters and what doesn't', *Economics of Education Review*, vol. 26, no. 1, pp. 83–99.
- Dalgaard, NT, Bondebjerg, A, Klokke, R, Viinholt, BCA and Dietrichson, J 2022, 'Adult/child ratio and group size in early childhood education or care to promote the development of children aged 0–5 years: A systematic review', *Campbell Systematic Reviews*, vol. 18, no. 2, p. e1239.
- Datta Gupta, N and Simonsen, M 2016, 'Academic performance and type of early childhood care', *Economics of Education Review*, vol. 53, pp. 217–229.
- Dearing, E, Zachrisson, H and Nærde, A 2015, 'Age of Entry Into Early Childhood Education and Care and Aggression: Faint and fading associations for young Norwegian children', *Psychological science*, vol. 26.
- and Zachrisson, HD 2017, 'Concern Over Internal, External, and Incidence Validity in Studies of Child-Care Quantity and Externalizing Behavior Problems', *Child Development Perspectives*, vol. 11, no. 2, pp. 133–138.

- Deming, D 2009, 'Early Childhood Intervention and Life-Cycle Skill Development: Evidence from Head Start', *American Economic Journal: Applied Economics*, vol. 1, no. 3, pp. 111–134.
- Drange, N and Havnes, T 2019, 'Early Childcare and Cognitive Development: Evidence from an Assignment Lottery', The University of Chicago Press, *Journal of Labor Economics*, vol. 37, no. 2, pp. 581–620.
- and Rønning, M 2017, *Child care center staff composition and early child development*, <https://www.econstor.eu/handle/10419/192852> (accessed 9 June 2023).
- Dumas, C and Lefranc, A 2010, *Early schooling and later outcomes: Evidence from pre-school extension in France*, <https://econpapers.repec.org/paper/emaworpaper/2010-07.htm> (accessed 6 June 2023).
- Duncan, GJ, Kalil, A, Mogstad, M and Rege, M 2022, 'Investing in Early Childhood Development in Preschool and at Home', *NBER Working Papers*, <https://ideas.repec.org/p/nbr/nberwo/29985.html> (accessed 1 August 2023).
- , Magnuson, KA and Ludwig, J 2004, 'The endogeneity problem in developmental studies', Lawrence Erlbaum, US, *Research in Human Development*, vol. 1, pp. 59–80.
- Durkin, K, Lipsey, MW, Farran, DC and Wiesen, SE 2022, 'Effects of a statewide pre-kindergarten program on children's achievement and behavior through sixth grade', American Psychological Association, US, *Developmental Psychology*, vol. 58, pp. 470–484.
- Early, DM, Maxwell, KL, Burchinal, M, Alva, S, Bender, RH, Bryant, D, Cai, K, Clifford, RM, Ebanks, C, Griffin, JA, Henry, GT, Howes, C, Iriondo-Perez, J, Jeon, H-J, Mashburn, AJ, Peisner-Feinberg, E, Pianta, RC, Vandergrift, N and Zill, N 2007, 'Teachers' education, classroom quality, and young children's academic skills: results from seven studies of preschool programs', *Child Development*, vol. 78, no. 2, pp. 558–580.
- Elek, C, Gibberd, A, Gubhaju, L, Lennox, J, Highfold, R, Goldfeld, S and Eades, S 2022, 'An Opportunity for Our Little Ones: Findings from an Evaluation of an Aboriginal Early Childhood Learning Centre in Central Australia', *Early Childhood Education Journal*, vol. 50, no. 4, pp. 579–591.
- , Gubhaju, L, Lloyd-Johnsen, C, Eades, S and Goldfeld, S 2020, 'Can early childhood education programs support positive outcomes for indigenous children? A systematic review of the international literature', *Educational Research Review*, vol. 31, p. 100363.
- Falster, K, Hanly, M, Edwards, B, Banks, E, Lynch, JW, Eades, S, Nickel, N, Goldfeld, S and Biddle, N 2020, 'Preschool attendance and developmental outcomes at age five in Indigenous and non-Indigenous children: a population-based cohort study of 100 357 Australian children', *Journal of Epidemiology and Community Health*, p. jech-2020-214672.
- Felfe, C and Lalive, R 2018, 'Does early child care affect children's development?', *Journal of Public Economics*, vol. 159, pp. 33–53.
- , Nollenberger, N and Rodríguez-Planas, N 2015, 'Can't buy mommy's love? Universal childcare and children's long-term cognitive development', *Journal of Population Economics*, vol. 28, no. 2, pp. 393–422.
- and Zierow, L 2018, 'From dawn till dusk: Implications of full-day care for children's development', *Labour Economics*, vol. 55, pp. 259–281.
- Fort, M, Ichino, A and Zanella, G 2020, 'Cognitive and Noncognitive Costs of Day Care at Age 0–2 for Children in Advantaged Families', The University of Chicago Press, *Journal of Political Economy*, vol. 128, no. 1, pp. 158–205.
- Fortin, P 2017, 'Twelve Flawed Statements of the Fraser Institute on Quebec's Childcare Program', <https://www.semanticscholar.org/paper/Twelve-Flawed-Statements-of-the-Fraser-Institute-on-Fortin/06059f58480c51c3dc1710fe64ab10140034b181> (accessed 5 September 2023).
- Fox, S and Geddes, M 2016, *Preschool – Two Years are Better Than One*, <https://www.vu.edu.au/mitchell-institute/early-learning/preschool-two-years-are-better-than-one> (accessed 27 September 2023).
- Francis, J and Barnett, WS 2019, 'Relating preschool class size to classroom quality and student achievement', *Early Childhood Research Quarterly*, vol. 49, pp. 49–58.
- Friesen, J, Krauth, B and Cohn, RM 2022, 'The effect of universal full-day Kindergarten on student achievement', <https://ideas.repec.org/p/sfu/sfudps/dp22-01.html> (accessed 29 August 2023).
- Gambaro, L, Stewart, K and Waldfogel, J (eds) 2014, *An equal start?: Providing quality early education and care for disadvantaged children*, <https://www.jstor.org/stable/j.ctt9qgznh> (accessed 27 September 2023).
- García, JL, Bendorff, FH, Leaf, DE and Heckman, JJ 2021, *The Dynastic Benefits of Early Childhood Education*, National Bureau of Economic Research, <https://www.nber.org/papers/w29004> (accessed 31 May 2023).
- , Heckman, JJ, Leaf, DE and Prados, MJ 2020, 'Quantifying the Life-Cycle Benefits of an Influential Early-Childhood Program', *The Journal of Political Economy*, vol. 128, no. 7, pp. 2502–2541.
- , — and Ronda, V 2022, 'The Lasting Effects of Early-Childhood Education on Promoting the Skills and Social Mobility of Disadvantaged African Americans and Their Children', The University of Chicago Press, *Journal of Political Economy*, pp. 000–000.
- Gelber, A and Isen, A 2013, 'Children's schooling and parents' behavior: Evidence from the Head Start Impact Study', *Journal of Public Economics*, vol. 101, pp. 25–38.
- Gelman, A, Hill, J and Vehtari, A 2020, *Regression and Other Stories*, Cambridge University Press, Higher Education from Cambridge University Press, <https://www.cambridge.org/highereducation/books/regression-and-other-stories/DD20DD6C9057118581076E54E40C372C> (accessed 6 September 2023).
- Gialamas, A, Mittinty, MN, Sawyer, MG, Zubrick, SR and Lynch, J 2014, 'Child care quality and children's cognitive and socio-emotional development: an Australian longitudinal study', Routledge, *Early Child Development and Care*, vol. 184, no. 7, pp. 977–997.
- Gibbs, CR 2014, *Working Paper: Experimental Evidence on Early Intervention: The Impact of Full-day Kindergarten*, [https://economics.nd.edu/assets/141429/fdkexperiment\\_chloe\\_gibbs\\_sept2014\\_2\\_.pdf](https://economics.nd.edu/assets/141429/fdkexperiment_chloe_gibbs_sept2014_2_.pdf) (accessed 5 June 2023).
- Giedd, JN, Raznahan, A, Alexander-Bloch, A, Schmitt, E, Gogtay, N and Rapoport, JL 2015, 'Child Psychiatry Branch of the National Institute of Mental Health Longitudinal Structural Magnetic Resonance Imaging Study of Human Brain Development', *Neuropsychopharmacology*, vol. 40, no. 1, pp. 43–49.

- Goldfeld, S, O'Connor, E, O'Connor, M, Sayers, M, Moore, T, Kvalsvig, A and Brinkman, SA 2016, 'The role of preschool in promoting children's healthy development: Evidence from an Australian population cohort', *Early Childhood Research Quarterly*, vol. 35, pp. 40–48.
- Gormley, W 2017, *Universal vs. Targeted Pre-Kindergarten: Reflections for Policymakers*, <https://fpg.unc.edu/publications/current-state-scientific-knowledge-pre-kindergarten-effects> (accessed 10 August 2023).
- Gørtz, M, Johansen, ER and Simonsen, M 2018, 'Academic achievement and the gender composition of preschool staff', *Labour Economics*, vol. 55, pp. 241–258.
- Gray-Lobe, G, Pathak, PA and Walters, C 2023, 'The Long-Term Effects of Universal Preschool in Boston', *The Quarterly Journal of Economics*, vol. 138, no. 1, pp. 363–411.
- Greenstein, R 2022, *Targeting vs. Universalism, and Other Factors That Affect Social Programs' Political Strength and Durability*, <https://www.brookings.edu/articles/targeting-universalism-and-other-factors-affecting-social-programs-political-strength/> (accessed 27 September 2023).
- Gruber, J, Kosonen, T and Huttunen, K 2023, *Paying Moms to Stay Home: Short and Long Run Effects on Parents and Children*, National Bureau of Economic Research, <https://www.nber.org/papers/w30931> (accessed 14 June 2023).
- Haeck, C, Lefebvre, P and Merrigan, P 2015, 'Canadian evidence on ten years of universal preschool policies: The good and the bad', *Labour Economics*, vol. 36, pp. 137–157.
- Haimovich Paz, F 2015, 'Three Essays on the Economics of Education and Early Childhood', <https://escholarship.org/uc/item/z4vd7d3x9> (accessed 1 August 2023).
- Harrison, LJ, Waniganayake, M, Brown, J, Andrews, R, Li, H, Hadley, F, Irvine, S, Barblett, L, Davis, B and Hatzigianni, M 2023, 'Structures and systems influencing quality improvement in Australian early childhood education and care centres', *The Australian Educational Researcher*, pp. 1–23.
- Havnes, T and Mogstad, M 2011, 'No Child Left Behind: Subsidized Child Care and Children's Long-Run Outcomes', American Economic Association, *American Economic Journal: Economic Policy*, vol. 3, no. 2, pp. 97–129.
- and — 2015, 'Is universal child care leveling the playing field?', *Journal of Public Economics*, vol. 127, pp. 100–114.
- Heckman, J, Pinto, R and Savelyev, P 2013, 'Understanding the Mechanisms through Which an Influential Early Childhood Program Boosted Adult Outcomes', *American Economic Review*, vol. 103, no. 6, pp. 2052–2086.
- Herbst, CM 2017, 'Universal Child Care, Maternal Employment, and Children's Long-Run Outcomes: Evidence from the US Lanham Act of 1940', The University of Chicago Press, *Journal of Labor Economics*, vol. 35, no. 2, pp. 519–564.
- and Brown, JH 2023, *Minimum Wage, Worker Quality, and Consumer Well-Being: Evidence from the Child Care Market*, <https://www.iza.org/publications/dp/16257/minimum-wage-worker-quality-and-consumer-well-being-evidence-from-the-child-care-market> (accessed 7 September 2023).
- Holla, A, Bendini, M, Dinarte, L and Trake, I 2021, *Is Investment in Preprimary Education Too Low? Lessons from (Quasi) Experimental Evidence across Countries*, The World Bank, <https://documents1.worldbank.org/curated/en/929861625060766293/pdf/Is-Investment-in-Preprimary-Education-Too-Low-Lessons-from-Quasi-Experimental-Evidence-across-Countries.pdf> (accessed 4 October 2023).
- Horn, DM, File, N, Bryant, D, Burchinal, M, Raikes, H, Forestieri, N, Encinger, A and Cobo-Lewis, A 2018, 'Associations between continuity of care in infant-toddler classrooms and child outcomes', *Early Childhood Research Quarterly*, vol. 42, pp. 105–118.
- van Huizen, T, Dumhs, L and Plantenga, J 2019, 'The Costs and Benefits of Investing in Universal Preschool: Evidence From a Spanish Reform', *Child Development*, vol. 90, no. 3, pp. e386–e406.
- and Plantenga, J 2018, 'Do children benefit from universal early childhood education and care? A meta-analysis of evidence from natural experiments', *Economics of Education Review*, vol. 66, pp. 206–222.
- Hustedt, JT, Jung, K, Friedman-Krauss, AH, Barnett, WS and Slicker, G 2021, 'Impacts of the New Mexico PreK initiative by children's race/ethnicity', *Early Childhood Research Quarterly*, vol. 54, pp. 194–203.
- Jenkins, JM, Duncan, GJ, Auger, A, Bitler, M, Domina, T and Burchinal, M 2018, 'Boosting school readiness: Should preschool teachers target skills or the whole child?', *Elsevier, Economics of Education Review*, vol. 65, C, pp. 107–125.
- Jepsen, C and Rivkin, S 2009, 'Class Size Reduction and Student Achievement: The Potential Tradeoff between Teacher Quality and Class Size', [University of Wisconsin Press, Board of Regents of the University of Wisconsin System], *The Journal of Human Resources*, vol. 44, no. 1, pp. 223–250.
- Johnson, RC and Jackson, CK 2019, 'Reducing Inequality through Dynamic Complementarity: Evidence from Head Start and Public School Spending', *American Economic Journal: Economic Policy*, vol. 11, no. 4, pp. 310–349.
- Kalb, G, Domenico, T and Zakirova, R 2014, *Children's participation in early childhood education and care, and their developmental outcomes by Year 5: A comparison between disadvantaged and advantaged children*.
- Kline, P and Walters, C 2015, *Evaluating Public Programs with Close Substitutes: The Case of Head Start*, Working Paper, National Bureau of Economic Research, <https://www.nber.org/papers/w21658> (accessed 1 June 2023).
- Knudsen, EI, Heckman, JJ, Cameron, JL and Shonkoff, JP 2006, 'Economic, neurobiological, and behavioral perspectives on building America's future workforce', *Proceedings of the National Academy of Sciences*, *Proceedings of the National Academy of Sciences*, vol. 103, no. 27, pp. 10155–10162.
- Kottelenberg, MJ and Lehrer, SF 2013, 'New Evidence on the Impacts of Access to and Attending Universal Child-Care in Canada', *Canadian Public Policy / Analyse de Politiques*, vol. 39, no. 2, pp. 263–285.
- Kuehne, D and Oberfichtner, M 2017, 'Does Early Child Care Attendance Influence Children's Cognitive and Non-Cognitive Skill Development?', [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2949097](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2949097) (accessed 31 July 2023).
- Ladd, HF, Muschkin, CG and Dodge, KA 2014, 'From Birth to School: Early Childhood Initiatives and Third-Grade Outcomes in North Carolina', *Journal of Policy Analysis and Management*, vol. 33, no. 1, pp. 162–187.
- Lefebvre, P, Merrigan, P and Verstraete, M 2008, *Childcare Policy and Cognitive Outcomes of Children: Results from a Large Scale Quasi-Experiment on Universal Childcare in Canada*, <https://papers.ssrn.com/abstract=1267335> (accessed 5 September 2023).

- Leuven, E, Lindahl, M, Oosterbeek, H and Webbink, D 2010, 'Expanding schooling opportunities for 4-year-olds', *Economics of Education Review*, vol. 29, no. 3, pp. 319–328.
- Li, W, Duncan, GJ, Magnuson, K, Schindler, HS, Yoshikawa, H and Leak, J 2020, *Timing in Early Childhood Education: How Cognitive and Achievement Program Impacts Vary by Starting Age, Program Duration, and Time since the End of the Program*, Annenberg Institute for School Reform at Brown University, <https://eric.ed.gov/?id=ED610271> (accessed 2 June 2023).
- Lipsey, MW, Farran, DC and Durkin, K 2018, 'Effects of the Tennessee Prekindergarten Program on children's achievement and behavior through third grade', *Early Childhood Research Quarterly*, vol. 45, pp. 155–176.
- List, J, Momeni, F, Vlassopoulos, M and Zenou, Y 2023, 'Neighborhood Spillover Effects of Early Childhood Interventions', <https://cepr.org/publications/dp18134> (accessed 10 November 2023).
- Lowenberg, A and Sklar, C 2022, *How to Make Sense of the Latest Tennessee Pre-K Study*, New America, <http://newamerica.org/education-policy/edcentral/how-to-make-sense-of-the-latest-tennessee-pre-k-study/> (accessed 7 September 2023).
- Manning, M, Garvis, S, Fleming, C and Wong, G 2017, 'The relationship between teacher qualification and the quality of the early childhood education and care environment', *Campbell Systematic Reviews*, vol. 13, pp. 1–82.
- Melhuish, E, Ereky-Stevens, K, Petrogiannis, K, Ariescu, A, Penderi, E, Rentzou, K, Tawell, A, Slot, P, Broekhuizen, M and Leseman, P 2015, 'A review of research on the effects of Early Childhood Education and Care (ECEC) upon child development. CARE project; Curriculum Quality Analysis and Impact Review of European Early Childhood Education and Care (ECEC)'.
- Meloy, B, Gardner, M and Darling-Hammond, L 2019, 'Untangling the Evidence on Preschool Effectiveness: Insights for Policymakers', *Learning Policy Institute*, <https://learningpolicyinstitute.org/product/untangling-evidence-preschool-effectiveness-brief> (accessed 7 September 2023).
- Montrosse-Moorhead, B, Dougherty, SM, La Salle, TP, Weiner, JM and Dostal, HM 2019, 'The overall and differential effects of a targeted prekindergarten program: Evidence from Connecticut', *Early Childhood Research Quarterly*, vol. 48, pp. 134–145.
- National Scientific Council on the Developing Child 2004, *Young children develop in an environment of relationships*.
- Noble, KG 2021, 'Early Childhood: The Opportunity to Untap Human Potential', *The Scale-Up Effect in Early Childhood and Public Policy*, Routledge.
- NSW PC (NSW Productivity Commission) 2022, *Evaluation of NSW-specific early childcare regulations*, NSW Productivity Commission.
- OECD (Organisation for Economic Co-operation and Development) 2019, *CO3.1: Educational attainment by gender*.
- PC (Productivity Commission) 2017, *Introducing Competition and Informed User Choice into Human Services: Reforms to Human Services - Draft Report*, Canberra.
- (2022, *Review of the National School Reform Agreement*, Study Report, Canberra, December.
- (2023a, *3 Early childhood education and care - Report on Government Services 2023*, 7 February, Canberra.
- (2023b, *5-year Productivity Inquiry: From learning to growth*, Inquiry Report no. 100, Vol. 8, Canberra.
- Perlman, M, Falenchuk, O, Fletcher, B, McMullen, E, Beyene, J and Shah, PS 2016, 'A Systematic Review and Meta-Analysis of a Measure of Staff/Child Interaction Quality (the Classroom Assessment Scoring System) in Early Childhood Education and Care Settings and Child Outcomes', Public Library of Science, *PLOS ONE*, vol. 11, no. 12, p. e0167660.
- , Fletcher, B, Falenchuk, O, Brunsek, A, McMullen, E and Shah, PS 2017, 'Child-Staff Ratios in Early Childhood Education and Care Settings and Child Outcomes: A Systematic Review and Meta-Analysis', Public Library of Science, *PLOS ONE*, vol. 12, no. 1, p. e0170256.
- Pianta, R, Hamre, B, Downer, J, Burchinal, M, Williford, A, LoCasale-Crouch, J, Howes, C, La Paro, K and Scott-Little, C 2017, 'Early Childhood Professional Development: Coaching and Coursework Effects on Indicators of Children's School Readiness', Routledge, *Early Education and Development*, vol. 28, no. 8, pp. 956–975.
- Rankin, PS, Staton, S, Potia, AH, Houen, S and Thorpe, K 2022, 'Emotional quality of early education programs improves language learning: A within-child across context design', *Child Development*, vol. 93, no. 6, pp. 1680–1697.
- Rey-Guerra, C, Zachrisson, HD, Dearing, E, Berry, D, Kuger, S, Burchinal, MR, Nærde, A, van Huizen, T and Côté, SM 2023, 'Do more hours in center-based care cause more externalizing problems? A cross-national replication study', *Child Development*, vol. 94, no. 2, pp. 458–477.
- Robin, K, Frede, E and Barnett, S 2006, *Is More Better? The Effects of Full-Day vs Half-Day Preschool on Early School Achievement*, 1 May, <https://nieer.org/research-report/is-more-better-the-effects-of-full-day-vs-half-day-preschool-on-early-school-achievement> (accessed 21 September 2023).
- Rossin-Slater, M and Wüst, M 2020, 'What Is the Added Value of Preschool for Poor Children? Long-Term and Intergenerational Impacts and Interactions with an Infant Health Intervention', *American Economic Journal: Applied Economics*, vol. 12, no. 3, pp. 255–286.
- Ruopp, R, Travers, J, Glantz, F and Coelen, C 1979, *Children at the center: Final Report of the National Day Care Study*, Cambridge.
- SA Government 2023, *Royal Commission into early childhood education and care: final report*.
- Schlotter, M 2011, 'Age at Preschool Entrance and Noncognitive Skills before School - An Instrumental Variable Approach', <https://www.ifo.de/en/publications/2011/working-paper/age-preschool-entrance-and-noncognitive-skills-school-instrumental> (accessed 1 August 2023).
- Schmitz, S 2020, 'The Impact of Publicly Funded Childcare on Parental Well-Being: Evidence from Cut-Off Rules', *European Journal of Population = Revue Européenne De Demographie*, vol. 36, no. 2, pp. 171–196.
- Silliman, M and Mäkinen, J 2022, 'Childcare, social skills, and the labour market'.
- Sinclair-Harding, L, Vuillier, L and Whitebread, D 2018, 'Neuroscience and Early Childhood Education', Fleeer, M and Van Oers, B (eds), Springer Netherlands, Dordrecht, pp. 335–361, [http://link.springer.com/10.1007/978-94-024-0927-7\\_14](http://link.springer.com/10.1007/978-94-024-0927-7_14) (accessed 5 September 2023).
- Smith, A 2015, *The Long-Run Effects of Universal Pre-K on Criminal Activity*, <https://papers.ssrn.com/abstract=2685507> (accessed 5 June 2023).
- Suchodoletz, A von, Lee, DS, Henry, J, Tamang, S, Premachandra, B and Yoshikawa, H 2023, 'Early childhood

education and care quality and associations with child outcomes: A meta-analysis', Public Library of Science, *PLOS ONE*, vol. 18, no. 5, p. e0285985.

Suhonen, T and Karhunen, H 2019, 'The intergenerational effects of parental higher education: Evidence from changes in university accessibility', *Journal of Public Economics*, vol. 176, pp. 195–217.

Sylva, K, Melhuish, E, Sammons, P, Siraj, I and Taggart, B 2004, *Technical Paper 12 The Final Report: Effective Pre-School Education*.

Tietze, W, Cryer, D, Bairrão, J, Palacios, J and Wetzel, G 1996, 'Comparisons of observed process quality in early child care and education programs in five countries', *Early Childhood Research Quarterly*, vol. 11, no. 4, pp. 447–475.

Tseng, Y-P, Jordan, B, Borland, J, Clark, M, Coombs, N, Cotter, K, Guillou, M, Hill, A, Kennedy, A and Sheehan, J 2022, *36 months in the Early Years Education Program: assessment of the impact on children and their primary caregivers*.

Ulferts, H, Wolf, KM and Anders, Y 2019, 'Impact of Process Quality in Early Childhood Education and Care on Academic Outcomes: Longitudinal Meta-Analysis', *Child Development*, vol. 90, no. 5, pp. 1474–1489.

UNDP (United Nations Development Program) 2023, *Inequality-adjusted human development index documentation and downloads*, *Human Development Reports*, United Nations, <https://hdr.undp.org/data-center/documentation-and-downloads> (accessed 7 September 2023).

Vanderbilt University nd, *VPK Home Page*, Vanderbilt University, <https://my.vanderbilt.edu/tnprekevaluation/> (accessed 7 September 2023).

Vermeer, HJ, van IJzendoorn, MH, Cárcamo, RA and Harrison, LJ 2016, 'Quality of Child Care Using the Environment Rating Scales: A Meta-Analysis of International Studies', *International Journal of Early Childhood*, vol. 48, no. 1, pp. 33–60.

Waldinger, R and Schulz, M 2023, *The Good Life: Lessons from the World's Longest Scientific Study of Happiness*, Simon and Schuster.

Walters, CR 2015, 'Inputs in the Production of Early Childhood Human Capital: Evidence from Head Start', *American Economic Journal: Applied Economics*, vol. 7, no. 4, pp. 76–102.

Warren, D and Haisken-DeNew, J 2013, *Early Bird Catches the Worm: The Causal Impact of Pre-School Participation and Teacher Qualifications on Year 3 National Naplan Cognitive Tests*, [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2344071](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2344071) (accessed 1 June 2023).

Watts, TW, Jenkins, JM, Dodge, KA, Carr, RC, Sauval, M, Bai, Y, Escueta, M, Duer, J, Ladd, H, Muschkin, C, Peisner-Feinberg, E and Ananat, E 2023, 'Understanding Heterogeneity in the Impact of Public Preschool Programs', *Monographs of the Society for Research in Child Development*, vol. 88, no. 1, pp. 7–182.

Williams, BJ 2019, 'The spillover benefits of expanding access to preschool', *Economics of Education Review*, vol. 70, pp. 127–143.

Yamaguchi, S, Asai, Y and Kambayashi, R 2018, 'How does early childcare enrollment affect children, parents, and their interactions?', *Labour Economics*, vol. 55, pp. 56–71.

Yamauchi, C and Leigh, A 2011, 'Which children benefit from non-parental care?', *Economics of Education Review*, vol. 30, no. 6, pp. 1468–1490.

Yazejian, N, Bryant, D, Freel, K and Burchinal, M 2015, 'High-quality early education: Age of entry and time in care differences in student outcomes for English-only and dual language learners', *Early Childhood Research Quarterly*, vol. 32, pp. 23–39.

Yoshikawa, H, Leyva, D, Snow, CE, Treviño, E, Barata, MC, Weiland, C, Gomez, CJ, Moreno, L, Rolla, A, D'Sa, N and Arbour, MC 2015, 'Experimental impacts of a teacher professional development program in Chile on preschool classroom quality and child outcomes', American Psychological Association, US, *Developmental Psychology*, vol. 51, no. 3, pp. 309–322.

Zachrisson, H, Dearing, E, Borgen, N, Sandsor, A and Karoly, L 2023, 'Universal Early Childhood Education and Care for Toddlers and Achievement Outcomes in Middle Childhood', *Journal of Research on Educational Effectiveness*, pp. 1–29.