

A Critical Review of the Early Childhood Literature

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1 Introduction

Early childhood education and care (ECEC) plays a vital role in the development of Australian children and their preparation for school, and enables parents to participate in the workforce. The years from birth to age five have been identified as the most important developmental period during childhood (Shonkoff & Phillips, 2000). The capacity for change in human skill development and neural circuitry is highest early in life and decreases over time, with critical periods in early childhood during which particular skills and abilities are more readily acquired (Knudsen, Heckman, Cameron, & Shonkoff, 2006). Research has shown that brain development in the first years of life lays the foundation for language development, literacy acquisition, cognitive processes, emotional development, self-regulation and problem-solving skills, and has a lasting impact on health, future learning and life success (McCain & Mustard, 1999; Shonkoff & Phillips, 2000).

Many researchers (e.g., Heckman, 2006; Reynolds, Temple, Ou, Arteaga & White, 2011; Schweinhart, Montie, Xiang, Barnett, Belfield & Nores, 2005) have shown that the return on public investment in high quality early childhood education are substantial (Heckman, 2006). These are generated from returns to the individual in terms of increased earnings, higher education, improved physical and mental well-being, and also through the positive externalities to society in terms of reduced crime and delinquency, public expenditure savings and increased tax revenues. Early intervention programs are often more cost effective than later remediation (Carneiro & Heckman, 2003), and because learning is a cumulative process in which early skills facilitate further skill acquisition, the benefits of early interventions are larger and are maintained for longer (Heckman, 2006).

Based on the idea of “self-productivity”, by which capabilities at one age enhance capabilities at later ages, Conti and Heckman (2014) argue that a high initial investment will improve skills in later periods, which in turn increases productivity. For this reason, early investment in children, which lays the foundation for enhancing the productivity of later investments, can have substantial benefits compared to later investments alone. However, Conti and Heckman (2014) noted that early childhood interventions are not enough. To be effective, early interventions need to be followed up with investments in quality schooling and parenting.

An abundant literature has documented the largely positive impact of targeted early intervention programs (see for example, AIHW, 2015; Barnett, 2008; Melhuish, 2004; Stevens & English, 2016). Some of the best-known evidence of the benefits of high quality early education experiences on later development comes from targeted early intervention programs undertaken in the United States (e.g., Barnett, 1995). Studies of typical large-scale preschool programs also find evidence of significant short-term benefits for cognitive outcomes (e.g., Schweinhart et al., 2005). However, universal access programs often reveal weaker effects than the generally higher quality targeted programs (Barnett, 1998). One possible explanation for this difference is that targeted intervention programs are often more intensive than universal access programs, and are usually targeted at sub-populations whose need for and thus potential responsiveness to these programs may be higher than that of the population as a whole (Dumas & Lefranc, 2010).

Most studies of preschool participation find a significant benefit for cognitive outcomes in the short-term. However, evidence about the long-term cognitive and social benefits of preschool programs is mixed. Some studies, such as those of Siraj-Blatchford, Taggart, Sylva, Sammons, and Melhuish (2008) and Berlinski, Galiani, and Manacorda (2008) have concluded that preschool attendance has long-term academic and social benefits for all children. Others, including Magnuson, Ruhm, and Waldfogel (2007a, 2007b), have found that

the academic benefits of preschool attendance tend to fade over time, and that preschool attendance may be associated with poorer behavioural outcomes in the long-term.

However, whether lessons can be drawn from these studies regarding possible benefits of universal or targeted access to preschool for three year olds in Australia is unclear for several reasons.

First, several of the most well known studies of the benefits of preschool education are based on intervention programs or extensions of universal preschool programs that occurred many decades ago. While this is necessary for assessing the long-term impact of preschool programs, it is likely that the institutional contexts have changed considerably since this time, and therefore the estimated results of preschool programs that occurred, say, 50 years ago, cannot be directly translated into the current context.

Second, the targeted intervention programs that have been evaluated in the existing literature are usually small-scale studies, involving programs that are higher in quality and more intensive than universal access programs, with interventions targeted at sub-populations whose responsiveness to the program may be unrepresentative. The type and quality of programs and the outcomes measured vary considerably, with some studies reporting short term benefits that fade over time, while others find long term benefits in terms of social, economic, and health outcomes decades later.

Third, existing studies typically face challenges in dealing with the possible endogeneity of preschool enrolment with respect to other family determinants of child achievement. That is, it is very difficult to disentangle the influence of preschool programs from the influence of other characteristics of the child and their family.

Finally, much of the existing analysis has focused on the impact of kindergarten and pre-kindergarten programs that are targeted at children aged four to five years, and there is little evidence to suggest that the estimated benefits of these programs will be the same for three-year-old children. For example, based on the evidence presented to the 2014 Productivity Commission Inquiry into Childcare and Early Childhood Learning in Australia, the Productivity Commission (Productivity Commission, 2014, page 50) recommended that:

“An analysis of the effectiveness of the existing arrangements in improving development outcomes and evidence drawn from relevant Australian and overseas research is necessary before any decisions can be made on the value of extending the universal access arrangement to younger children.”

1.1 Aims of this Review

This report will undertake a critical review of the existing literature with a specific focus on the differences between the Australian preschool/early childhood education and care (ECEC) system and those where key international studies have been performed; and the extent that the findings from these international studies can be translated to the Australian context given these differences.

The review will focus on studies that examine the benefits of preschool for three-year-old children, particularly children from disadvantaged backgrounds and Indigenous children. The aim is to determine whether participation in preschool programs of varying levels of quality carries developmental benefits for different groups of children. In particular, the review will examine what elements of successful preschool programs can be drawn out from international evidence and applied in the Australian context.

The literature review will address three main questions:

1. What evidence is there on the benefits of participation in three-year-old preschool programs, and how generalisable is this evidence to the Australian setting?
2. Does participating in three-year-old preschool programs disproportionately impact disadvantaged children, or do all children show similar effects?
3. What evidence is there on benefits of preschool for Indigenous children of varying ages?

Together, the findings will highlight what we can learn from international studies about additional opportunities to promote healthy child development through the ECEC platform, as well as highlighting where additional data and evidence is needed.

The remainder of this report is structured as follows. Chapter 2 describes the Australian ECEC context. Chapter 3 describes methodological issues in exploring the relationship between preschool attendance and children's development. Chapter 4 details major international studies that have explored this relationship, and considers the strengths and weaknesses of their approach. Chapter 5 examines the evidence specifically for Indigenous children. Finally, Chapter 6 considers what lessons can be drawn from this evidence and provides recommendations for the Australian context.

2 Preschool Education in Australia

Australian families are offered a diverse range of options for education and care of their young children, including preschool, long day care, family day care, mobile children's services and home-based care (Press & Hayes, 2000). Each state and territory offers non-compulsory preschool education to children in the year prior to their first formal year of schooling. A full time preparatory school year, which precedes Year 1, is also offered in all states. Children are usually aged four in their preschool year, although it is open to three year olds in some jurisdictions (AIHW, 2015).

While early childhood programs are often assumed to be homogeneous in nature, they differ from community to community and state to state in terms of philosophical and educational approaches and the location in which programs are provided (Elliott, 2006). Preschools and kindergartens are operated by a variety of providers including schools, not-for-profit community groups and profit-making businesses; and may be stand-alone services, attached to schools or provided in child care centres. In small country towns, a preschool might operate just one day per week; and in remote or rural areas, mobile preschools which move from community to community are the only available option (Elliott, 2006).

In some states, preschool education is highly integrated with the public school system, while in others, preschool programs are most commonly provided in community-based centres or private long day care centres (Elliott, 2006). The most obvious differences between stand-alone preschools and the more integrated model offered by long day care centres are the hours of operation and sources of funding. Long day care centres have much longer operating hours than stand alone preschools, and compared to stand-alone preschools early education activities in day care centres are more likely to be spread throughout the day (Dowling & O'Malley, 2009). While long day care centres provide better support for the child care needs of working parents, there is a strong public perception that stand-alone preschools have higher standards of educational quality than preschool programs in long day care centres, mainly due to the fact that, until recently, the legislated quality requirements for stand-alone preschools were higher than those for long day care (Dowling & O'Malley, 2009).

2.1 The National Quality Framework (NQF)

In recognition of the importance of early childhood education, preschool education in Australia has recently undergone a significant restructure. Since 2008, the Australian Government has provided \$2.8 billion in funding support to states and territories to increase preschool participation through a series of National Partnership Agreements on Universal Access to Early Childhood Education. Current Commonwealth funding under the National Partnership for 2016-17 includes a focus on lifting the preschool participation rates of Indigenous, vulnerable and disadvantaged children, a significant proportion of whom live in regional and remote areas. Under the National Partnership Agreement, the Commonwealth, State and Territory governments have committed to ensuring that by 2013, all children would have access to high quality early childhood education programs in the year prior to formal schooling delivered by degree qualified early childhood teachers, for 15 hours per week, 40 weeks of the year (COAG, 2009). The programs are delivered in a variety of settings, including public, private, and community-based preschools and child care centres.

A new National Quality Standard for early childhood education and care providers has also been introduced. The key changes under this new framework are improved staff-to-child ratios, new staff qualification requirements, a new quality rating system to ensure Australian

families have access to transparent information relating to the quality of early childhood education and care services, and the establishment of a new National Body to ensure early childhood education and care is of a high quality (COAG, 2009).

The National Quality Framework (NQF), which applies to most long day care, family day care, preschool and kindergarten, and outside schools hours care services in Australia started on 1 January 2012. Key requirements such as improved educator qualifications, educator-to-child ratios, and other key staffing arrangements are being phased in between 2012 and 2020. As part of the 2015-16 Budget, the Australian Government allocated \$61.1 million over three years to support states and territories to implement the NQF.

As of 1 January 2014:

- An early childhood teacher must be in attendance all of the time when long day care and preschool services are being provided to 25 children or more, and at least some of the time when services are being provided to less than 25 children.
- Within each long day care centre or preschool, half of all staff must have (or be actively working towards) a diploma-level early childhood education and care qualification or above, and the remaining staff are required to have (or be actively working towards) a Certificate III level early childhood education and care qualification, or equivalent.

Since 1 January 2016, preschools and long day care centres will be required to have one staff member for every eleven children over the age of three.¹

By 1 January 2020, a second early childhood teacher, or another suitably qualified leader, will need to be in attendance all of the time when long day care and preschool services are being provided to more than 80 children, and at least half of the time when services are being provided to 60 children or more (ACECQA, 2013).

The National Quality Standard is a key aspect of the National Quality Framework. It sets a national benchmark for the quality of education and care services, based on seven key quality areas that are important to outcomes for children:

QA1: Educational program and practice

QA2: Children's health and safety

QA3: Physical environment

QA4: Staffing arrangements

QA5: Relationships with children

QA6: Collaborative partnerships with families and communities

QA7: Leadership and service management

Prior to these changes, the early childhood education and care experiences of Australian children varied considerably. This was partly due to distinct state and territory provisions, but also to parental participation in the labour force and the need to make manageable and affordable arrangements for work-related child care (Harrison & Ungerer, 2005). There were no nationally agreed or consistent standards for staffing across the child care and preschool sector. The type and level of qualification of the teacher or carer was linked mainly to the age

¹ A staff-to-child ratio of 1:10 for children from 36 months to school age will be retained in New South Wales, Western Australia and Tasmania where this ratio currently applies, instead of 1:11 under the National Quality Standard (COAG, 2009).

of the children, the size of the group and the type of setting, with older preschoolers typically being cared for by better qualified staff, but only in some settings and some states (Elliott, 2006). Because of the differences in the provision of preschool programs across Australia, and the gradual introduction of the new National Quality Framework, preschool children are still likely to have widely varying experiences, with different effects on learning and developmental outcomes. The latter point is highlighted in a report by the Mitchell Institute (O'Connell, Fox, Hinz, & Cole, 2016), which shows that in 2015:

- Only 74% of Australia's 15,166 ECEC services have been visited and rated by ACECQA, with 3,905 services yet to receive a rating.
- Of all services that have received a rating, 68% were rated overall as meeting or exceeding the National Quality Standard, but only 44 out of 11,261 services have received a rating of "Excellent".²
- While 85% of preschools met or exceeded the NQS, only 65% of long day care services, and only 54% of family day care services did.
- Services that were rated as "Working Towards" the NQS or "Requiring Significant Improvement" were disproportionately located in areas of concentrated disadvantage (Cloney, Cleveland, Hattie, & Tayler, 2016).
- Nearly one-in-four services experience difficulty in meeting the NQF's 'education program and practice' standard, which focuses on embedding children's individual learning, exploration and identity in everyday practice.

2.2 Preschool Attendance in Australia

Data from the Australian Bureau of Statistics (2016) indicates that in 2015, 325,273 children were enrolled in some type of preschool program. The Report on Government Services (ROGS) provides more detailed information about enrolment rates for three- and four-year-olds (SCRGSP, 2016). According to the ROGS, there were 8,989 services in Australia delivering preschool programs to children from three years of age in 2014; and while the proportion varied across jurisdictions, over half of all preschool services were delivered in long day care centres.

In 2014, 95.1% of four-year-old children were enrolled in a preschool program in the year before full time schooling, an increase from 90.9% in 2013 and 86.2% in 2012 (Table 2.1). For four-year-olds, the proportion attending a stand-alone preschool decreased slightly, from 53% in 2012 to 50% in 2014, while the proportion attending a preschool program within a long day care centre rose from 33% in 2012 to 41% in 2014.

² This may reflect the fact that 'excellent' ratings have an additional application and assessment process and require additional fees (O'Connell et al., 2016).

Table 2.1: Percentage of three and four year old children enrolled in preschool, 2012-2014

	2012	2013	2014
Three year old children enrolled in preschool			
Government Preschool	1.4	0.8	0.7
Non-Government Preschool	5.2	5.0	5.3
Total Preschool ^a	6.7	5.9	6.0
Preschool program within a long day care centre	11.2	8.9	8.9
Total^a	18.0	14.9	15.0
Four year old children enrolled in preschool in the year before formal schooling			
Government Preschool	22.0	20.3	20.5
Non-Government Preschool	31.0	29.9	29.3
Total Preschool ^a	53.3	50.4	50.1
Preschool program within a long day care centre	32.9	37.8	41.4
Total^a	86.2	90.9	95.1

Notes: ^aTotal includes multiple preschools. NSW has the highest proportion of 3-year-old children attending preschool (29.3 % in 2014 compared to 4.8% in Vic and 1.5% in Tasmania).

Source: SCRGSP (2016) Table 3A.25 Children enrolled in a preschool program, by sector, by age.

It is estimated that in 2014, 44855 children aged three years were enrolled in a preschool program. However, this figure may be an underestimate; data reported for three-year-olds enrolled in a preschool program may be incomplete due to different reporting arrangements in each jurisdiction (SCRGSP, 2016). The proportion of three-year-olds attending preschool in Australia has dropped slightly in recent years, from 18% in 2012 to 15% in 2012 and 2013. Among three-year-olds who were enrolled in a preschool program, the majority were enrolled in a program within a long day care centre; and very few attended a government preschool.

2.3 ECEC entitlements for Indigenous and disadvantaged children

While participation in preschool programs among four-year-olds is relatively high, there is evidence of differences in the proportion of children attending a preschool program, according to the location in which they live and the characteristics of their household. For example, data from the 2008 Child Care Survey (ABS, 2009) indicates that children living in more disadvantaged areas were less likely to attend preschool than children in less disadvantaged areas; children who spoke English as their main language at home were more likely to attend a preschool program; children in couple families were more likely to go to preschool than children in lone parent families; and in couple families, the likelihood of a child attending preschool increased with household income. Preschool participation rates have also been shown to vary according to the parents' level of education, particularly the education level of the mother, with participation in preschool highest among children whose mother had a degree qualification (AIHW, 2005). Similarly, Biddle and Seth-Purdie (2013) reported that children were less likely to participate in preschool when they had moved house frequently; had a sole parent or were in a two-parent family with the secondary carer (usually father) being unemployed; had a primary carer who had not finished high school or had difficulties speaking English; were identified as being Indigenous; or were seldom read to by a parent.

The Productivity Commission (2014) noted that children at risk of abuse or neglect face multiple barriers to attending ECEC, including affordability, lack of transport, parents' distrust of institutions, and parents' general concern that they will be judged. It identified a need for extra support to enable children at risk of abuse or neglect to attend ECEC services,

including the need for a full fee subsidy to ensure that children at risk of abuse or neglect are not prevented from enrolling in ECEC programs. In its submission to the Productivity Commission Inquiry, Frankston City Council stated: “one of the major challenges in working with children at risk is the initial engagement to get them to access the service in the first place. The other major challenge is the actual regular attendance in the service” (p. 5).

There is also evidence that children in rural and remote areas of Australia and children of Aboriginal and Torres Strait Islander background are less likely to attend preschool than other Australian children. In some cases, services in Indigenous or remote areas do not exist, while in others transport or distance may be a significant barrier to attendance (AIHW, 2005). Participants in the 2014 Productivity Commission inquiry into Early Childhood Education and Care identified multiple barriers preventing Indigenous families from accessing ECEC services. These barriers include:

- Lack of transport;
- Prohibitive fees, even though services may still be heavily subsidised;
- Unmet cultural or support needs of families;
- Inflexible entry points, such as access only through a referral from another service;
- Fear of racism towards families or their children, of being judged negatively, or that engagement with early childhood settings will undermine Aboriginal culture;
- Fear of what they perceive as institutions and environments of regulations and paperwork; and
- Staffing issues including challenges in recruiting and retaining Aboriginal and Torres Strait Islander staff, few staff being fluent in the local language, and a lack of systematic approaches to cultural competency training for staff.

The productivity commission noted that ECEC services often need additional support to assist with the inclusion of Indigenous children, including cultural support through staff being trained to understand and appreciate Indigenous values and protocols; and provision of educational materials reflecting local Indigenous cultural, values and significant events (Productivity Commission, 2014).

Because of the known benefits of high quality early childhood education, particularly for disadvantaged children, there are additional entitlements to preschool education for Indigenous children and those living in low-income households. These entitlements vary across states and territories. For example:

- NSW subsidises early access to community preschool for three-year-old Aboriginal children and three-year-old children from low-income families.
- In Victoria, Aboriginal and Torres Strait Islander children and children known to child protection are eligible for free kindergarten through Early Start Kindergarten funding if they are aged 3 by 30 April of the year in which they are enrolled.
- South Australia provides early access to Department funded preschool for children who are Aboriginal or under the Guardianship of the Minister after their 3rd birthday.
- Northern Territory provides early access to preschool for Aboriginal and Torres Strait Islander children living in remote areas if they turn 3 by 30 June of the year they are enrolled (ABS, 2015).

However, both Indigenous and disadvantaged children are still underrepresented in national preschool enrolments relative to their share of the national preschool age population. In 2014, 74% of four- and five-year-old Aboriginal and Torres Strait Islander children were enrolled in a preschool program in the year before full time schooling. This proportion has increased from 73% per cent in 2013 and 63% in 2012 (Table 2.2).

Table 2.2: Percentage of 4 and 5 year old Aboriginal and Torres Strait Islander children enrolled in preschool in the year before formal schooling, 2012-2014

	2012	2013	2014
Government Preschool	25.6	30.4	29.4
Non-Government Preschool	17.8	20.5	22.4
Total Preschool ^a	47.3	51.8	52.7
Preschool program within a long day care centre	12.9	19.2	18.5
Total^a	63.2	72.9	73.8

Notes: ^aTotal includes multiple preschools. No information about the percentage of 3-year-old Indigenous children enrolled in preschool is available in the 2016 Report on Government Services.

Source: SCRGSP (2016) Table 3A.25 Children enrolled in a preschool program, by sector, by age.

As universal access to preschool at age four is relatively recent, it is not yet clear if participation rates for those from Indigenous backgrounds will increase over time. The Productivity Commission (2014) estimates that if Indigenous children enrolled in ECEC and preschool at a rate similar to their representation in the general population, a further 15,000 ECEC places (1500 preschool places) would be needed.

Several studies have shown that the benefits from attending a high-quality preschool program are likely to be greatest for children from disadvantaged backgrounds; and a key issue is how to ensure that these children attend. One suggested approach to increase participation in preschool for those children who currently have lower preschool participation rates and who would receive the greatest benefit from preschool is to link preschool attendance to the receipt of some portion of the Family Tax Benefit Part A. However, the Productivity Commission (2014) concluded that, based on evidence from the School Enrolment and Attendance through Welfare Reform Measure (SEAM) program, the success of this type of incentive depends on a strong, credible threat of enforcement.³

While the existing research largely concludes that the benefits of ECEC are greatest for children from disadvantaged backgrounds, it is important to note that there is more to meeting the development needs of these children than just attending preschool. These children may have additional learning needs and/or require additional support, which may not be met by a preschool program alone (Bowes & Grace, 2014; Higgins & Morley, 2014). However, having these children attend preschool enables early identification of any additional learning needs and enable screening for health and other interventions if required (Productivity Commission, 2014).

³ The SEAM program was implemented in 2009 to increase school attendance rates among Indigenous children in the Northern Territory. Initially there were increases in participation rates (based on participation in standardised tests), but as the measures threatened under SEAM (linking welfare payments to school attendance) were never carried out the gains in participation dissipated (Justman and Peyton, 2014).

2.4 Australian evidence of the benefits of ECEC

There are few rich, Australian longitudinal datasets (with the exception of Longitudinal Study of Australian Children) that can study the effects of preschool participation on the subsequent educational outcomes of Australian children. As a result, relatively little is known about how preschool participation affects Australian children's outcomes later in life; and very little is known about the influence of attendance at preschool at age three on later outcomes. Nevertheless, there is a small research literature of relevance identifying positive effects of early childhood education and care programs on short-term educational outcomes for Australian children.

Raban (2000) provided evidence of the success of the Preschool Literacy Project (PLP), which was run in 40 preschools across Victoria between 1996 and 1999. This project involved encouraging preschool teachers to introduce literacy into their programs through various means including introducing literacy materials into the 'home' corner; placing a writing table in the room along with appropriate resources, introducing a post box for letter exchanges; and bringing the print around their room down to the children's level. After one year of primary school, students who had attended a PLP preschool had significantly higher scores on reading and writing tests as well as higher-level oral language skills and more sophisticated phonological awareness than those students who did not attend a PLP preschool. Furthermore, while the non-PLP students were seen to catch up with the PLP students after one year in school, during the second year in school, the PLP students maintained their advantage in reading and oral language proficiency.

Using data from the Child Care Choices Longitudinal Extension study, a study of the child care and early school experiences of children in urban and rural New South Wales from 2002 to 2008, Bowes and Wales (2009) found that hours of care, multiple and changeable care arrangements and the quality of the carer-child relationship were important predictors of children's achievement. Longer hours in early *formal* child care were found to be associated with poorer academic achievement, while longer hours of early *informal* care had a positive effect on social behaviour.

Boardman (2005) examined the effect of full-day and half-day kindergarten programs on the literacy and numeracy outcomes of Tasmanian children who began their preparatory year of school in January 2004. In a comparison of Performance Indicators of Primary Schools (PIPS) test scores of 884 students across 38 schools, the results indicated that there were significant academic advantages associated with having attended full-day sessions of kindergarten the previous year, in terms of reading, math and overall test scores.

Australian studies using the LSAC data have also shown evidence of the benefits of early childhood education and care programs for children in Australia (see Appendix B for details of how LSAC data relates to the NQF). For example, Harrison, Ungerer, Smith, Zubrick, and Wise (2009) found that children who were attending an early childhood or preschool program at the age of four or five were more competent in their language ability than those who were not attending an early childhood program. However, vocabulary scores were negatively associated with longer weekly hours of attendance at child care or preschool, particularly among children who were in care for more than 30 hours per week. Also using the LSAC data, Claessens (2009) examined the association between general cognitive ability and socio-emotional skills at the age of four or five and academic achievement four years later and found that cognitive ability at the age of four or five was an important predictor of achievement in middle childhood. Quite differently, Leigh and Yamauchi (2009) used LSAC data to examine the impact of non-parental care on children's behavioural outcomes at the

ages of two and three and found only small differences in the temperament of children who attended non-parental care and those who did not. The negative association between behaviour and non-parental care was weaker in child-care centres with smaller groups of children. For younger children in Australia (children aged 2-3 years), the quality of the relationship between the child and the carer was found to have a stronger influence on later developmental outcomes at ages 4-5 and 6-7 than the qualifications of the carer (Gialamas, Mittinty, Sawyer, Zubrick, & Lynch, 2014).

Warren and Haisken-DeNew (2013) used data from LSAC to examine the impact of attendance at preschool programs in the year prior to formal schooling on NAPLAN outcomes in Year 3. They found a significant positive association between preschool attendance and Year 3 NAPLAN test scores, with the most significant effects in the domains of Reading, Spelling and Numeracy. Further, children who had a preschool teacher with a relevant degree or diploma qualification had significantly higher NAPLAN scores, on average, than those who had not attended preschool, suggesting that there are significant benefits to be gained from preschool teachers who are specifically trained in developmentally appropriate teaching practices for young children. After controlling for socio-demographic characteristics, the child's cognitive ability and the home learning environment, estimates of the Average Treatment Effect on the Untreated (i.e., what the benefits of having attended preschool would have been if those children who did not attend had in fact attended) were statistically significant across all five NAPLAN domains, and slightly larger than the estimates of the benefits of preschool for those children who did attend. This result suggests that the children who missed out on attending preschool are actually the ones who would have gained the most from attending.

Using data from the B Cohort of LSAC, who were aged between four and five in 2004, Biddle and Seth-Purdie (2013) compared children's outcomes in the first few years of full-time schooling according to whether they had participated in preschool in the year before formal schooling. They found that those who participated in preschool had a lower probability of being rated by their teachers as doing poorly in school; having low maths or literacy levels; and being rated by their carer as having poor social and emotional development based on the Strengths and Difficulties Questionnaire (SDQ). However, after controlling for the number of risk factors present at the time of preschool participation, those relationships for the most part disappeared. The authors concluded that the lower risk burden of preschool participants explains most of the difference in outcomes, and that Australia as a society needs to do more to prevent exposure to risk in the first place. That is, that the standard of ECEC in 2008 (prior to the implementation of the NQS) was of insufficient quality to mitigate the impacts of disadvantage.

What is evident from this summary of the existing evidence about the effects of preschool programs in Australia is a distinct lack of evidence about the potential benefits, or lack thereof, of extending universal preschool programs to all three-year-old children. This supports the advice of the Productivity Commission (2014) that more evidence about the effectiveness of preschool programs for younger children is needed before further changes are made to the National Quality Framework (see Finding 12.2; Productivity Commission Report, 2014, pp. 50) and thereby inform the National Partnership Agreement on Universal Access to Early Childhood Education.

3 Methodological Issues in the Analysis of the Benefits of Preschool Attendance

Before proceeding to the critical review of international evidence, it is important to highlight differences in the methodologies used to evaluate the benefits of preschool; and the main issues that researchers face when attempting to evaluate the benefits of ECEC programs. One of the main issues faced by researchers attempting to identify the effects of preschool programs on children's development is that of selection bias. Children's preschool experiences are not randomly determined. Parents who place a high value on their children's education may be more likely to enroll their children in a high-quality preschool program. Therefore, better educational outcomes are not likely to be due entirely to the preschool program, but also to greater parental support. Children who attend high-quality preschool programs may also be more advantaged in terms of household income and parental education. This advantage may translate into superior levels of achievement and, if not adequately controlled for, may result in upwardly biased estimates of the effects of preschool on later academic outcomes (Berlinski et al., 2008; Spiess, Büchel, & Wagner, 2003).

The simplest approach to addressing the selection issue is to include a rich set of control variables to account for potential confounding factors (e.g., Spiess et al., 2003). However, despite the inclusion of such controls, there may be other unobserved characteristics that could result in an upward bias of the estimates of preschool effects.

Four main statistical techniques are commonly used to address the issue of selection bias in the analysis of the benefits of preschool attendance:

- **Randomised Control Trials (RCTs):** These studies involve randomly assigning children to either a treatment group that participates in an ECEC program or a control group that does not participate in the program. If randomisation is done correctly, any differences between children are also randomly distributed between the two groups, meaning that the two groups will effectively be the same apart from their participation in the program (Stevens & English, 2016). The goal of an RCT is to maximise confidence that any change observed after the implementation of a program or policy was caused by the intervention, not by some other factor. Researchers have long considered RCTs to be the most rigorous research method for determining the true impact of ECEC programs. The main shortcoming of this method is that RCTs are the most complex and expensive type of surveys to conduct. The Head Start Impact Study is an example of a Randomised Control Trial (Puma et al., 2010).
- **Regression Discontinuity Design:** This quasi-experimental method is often used to examine the short-term impact of ECEC programs on children's early outcomes. Researchers attempt to approximate random assignment by assigning children a treatment and a control group based on a "forcing variable", most commonly based on age cut-offs for participation in ECEC programs. That is, the treatment group includes those children who made the age cut-off and enrolled in an ECEC program, and the control group is the group that misses the age cut-off and enrolls in the program the following year. The premise of these studies is that children who were born just before the age cut-off are virtually identical to those born just after, so researchers can attribute any differences the study finds entirely to the program (Stevens & English, 2016). RDD studies are considered to be the most rigorous research method after randomised control trials. Their main advantage over RCTs is that they are more cost effective and relatively easy to implement on a large scale. Examples of studies that use RDD techniques include evaluations of Pre-K programs in Georgia (Peisner-

Feinberg, Schaaf, Hildebrandt, & Pan, 2015), Oklahoma (Gormley & Gayer, 2005) and the Abbott Preschool Program in New Jersey (Barnett, Jung, Youn, & Frede, 2013).

- **Propensity Score Matching:** This quasi-experimental method involves the construction of a statistical comparison group based on a model of the probability of participating in a program, using a set of observed variables the researchers believe are associated with a child's later school and life outcomes (e.g., household income, family structure, parents' education and employment status, race/ethnicity). Participants are then matched on the basis of this probability (or propensity score) to non-participants. The average treatment effect of the program is then calculated as the mean difference in outcomes across these two groups (Khandker, Koolwal, & Samad, 2010). If children in the treatment and untreated groups have the same propensity score, based on observable characteristics, then the difference between the average outcome for the treatment and control groups can be considered to be an unbiased estimator of the treatment effect of the ECEC program. The key assumption of propensity score matching is that both the outcome of interest and the treatment assignment do not depend on unobservable characteristics. However, even under the best circumstances, a propensity score analysis may not necessarily address selection bias on unobservable characteristics and thus may not produce causal estimates of the effect of preschool participation. Studies which have used propensity score matching to test for bias in their OLS estimates of the effects of preschool participation on subsequent educational outcomes include those of Magnuson et al. (2007a), Goodman and Sianesi (2005) and Warren and Haisken-DeNew (2013).
- **Instrumental Variables:** This approach involves finding a variable (or instrument) that is highly correlated with program placement, but not correlated with unobserved characteristics affecting outcomes. That is, the instrument causes variation in the treatment variable, but does not have a direct effect on the outcome variable (only an indirect effect through the treatment variable). This allows the researcher to determine the level of exogenous variation (how much the variation in the treatment variable influences the outcome variable). While this fourth approach is very easy to implement, finding an appropriate instrument can be difficult and weak instruments may result in imprecise and biased results. Examples of studies which have used an instrumental variables approach include those of Magnuson et al. (2007a), who use state preschool expenditure per child as their instrumental variable; Dumas and Lefranc (2010), who instrument preschool attendance by the average age of preschool entry by region and cohort; and Berlinski et al. (2008) who use average preschool enrolment by locality and cohort as an instrument for treatment.

In addition to the issue of selection bias, it is also very difficult for researchers to separate the influence of ECEC programs from other factors that may influence long-term outcomes. Most studies of the effects of preschool participation on later outcomes acknowledge that cognitive development is a cumulative process by which the skills acquired in the early years of life are built upon in later years. However, very few of these studies account for the effects of the quality of the school environment during the first few years of formal schooling. One notable exception is that of Magnuson et al. (2007b) who control for the quality of the early school environment using measures of class size and the amount of reading instruction provided.

They found that children who attended preschool entered elementary school with higher levels of academic skills than children who experienced other types of care. However, for children placed in small classrooms providing high levels of reading instruction, this gap was quickly eliminated. On the other hand, the disparities persisted for children who were placed in large classrooms with lower levels of reading instruction. They conclude that the longer-term effects of early childhood experience depend in part on classroom experiences during the first few years of school.

4 Critical Review of ECEC Programs

To address the first and second research questions of this review, key studies that examined the impact of attendance at three-year-old preschool for children's development were identified. Given limitations in scope and time, this review did not aim to be comprehensive; rather, it aimed to capture key studies with the most relevance and influence in this area. The studies to be examined were selected based on:

1. Expert knowledge of the most influential and highly referenced studies;
2. Geographical location, with only those studies conducted in Australia, UK, USA, Canada, and Europe examined;
3. Age of the sample, including only those studies with three year old children; and
4. Time, with only studies evaluating attendance at preschool programs after 1960 considered.

This resulted in a final list of seven studies for inclusion in the review:

1. Effective Provision of Preschool Education (EPPE)
2. Effective Preschool Provision in Northern Ireland (EPPNI)
3. HighScope Perry Preschool Study
4. Head Start Impact Study
5. The expansion of French preschool program
6. The expansion of Norway preschool program
7. Child-Parent Centre Education Program

Once relevant papers and reports were gathered, studies were coded according to the criteria in Table 1.1 below.

Table 1.1 Coding frame for included studies

Domain	Information coded
Study characteristics	Study name Country Year/s of preschool exposure Study type Sample size Sample representativeness Service description Targeted or universal Main outcomes examined
Findings	Effects of three year old preschool Effects of three year old preschool for disadvantaged children
Applicability to the Australian setting	Key limitations of the study Differences to contemporary Australian setting

Details of each study are provided in sections 4.1 to 4.8. In addition, this information is summarised in Appendix B.

4.1 Effective Provision of Preschool Education (EPPE)

The EPPE project began in 1997 and aimed to investigate the effects of ECEC of children's development for children aged three to seven years (Sylva, Melhuish, Sammons, Siraj-Blatchford, & Taggart, 2004). The main outcomes of interest were cognitive and behavioural development. The initial EPPE project spanned 1997-2004. Following this period, EPPE was extended to look at longer term outcomes, with three additional phases: Effective Preschool and Primary Education Project 3-11 (EPPE 3-11, 2003-2008), Effective Preschool, Primary and Secondary Education Project (EPPSE 3-14, 2008-2011), and the Effective Preschool, Primary and Secondary Education Project (3-16+, 2011-2014).

UK Policy Context

Since the mid 1990s the UK government has been committed to expanding early years services (Department for Education and Employment, 1999), with the dual aims of preparing children to engage with the National Curriculum when they start school, and helping parents to move into paid employment. During the period that the EPPE sample attended preschool, provision of ECEC was varied, with differences between voluntary, private and government providers, and geographical and socioeconomic differences in access to and the quality and type of services available (Taggart, Sylva, Melhuish, Sammons, & Siraj, 2015).

Since EPPE was conducted, there have continued to be significant changes to ECEC policy in the UK, some of which have been informed by findings from EPPE itself. This included the introduction of The Early Years Foundation Stage framework, which gives providers a common framework and detailed assessment and inspection processes to ensure standards are met. It also provides for universal entitlement to a funded preschool place for all three- and four-year-old children, and funded provision for disadvantaged two-year-olds. There has also been significant investment in improving staff credentials during this period.

Methodology

EPPE is a longitudinal cohort study, with 3,171 children recruited at three to seven years of age and followed longitudinally. Six English Local Authorities were chosen as the target areas for recruitment, selected to cover urban and regional areas and a range of socioeconomic levels. Specific sites were chosen randomly within each Local Authority, with children recruited from 141 ECEC settings. This included a number of different types of settings, of which children could attend more than one:

- Integrative centres (centres that combine education and care);
- Nursery schools;
- Nursery classes;
- Playgroups;
- Local authority day nurseries; and
- Private day nurseries.

In addition, 380 children who were in home care only in the years before starting school were also recruited into the study at school entry. Overall, the sample is somewhat more disadvantaged than the general population.

A wide range of measures was collected over the life of the project. The quality of each site was assessed according to structure and process domains, using the Early Childhood Environment Rating Scales (ECERS-R) (Harms, Clifford, & Cryer, 1998) and the ECERS-E

(Sylva, Siraj-Blatchford, & Taggart, 2003). The ECERS-R has seven subscales including space and furnishing, personal care routines, language and reasoning, activities, social interactions, organization and routines, and adults working together. The ECERS-E has 4 subscales: literacy, maths, science/environment, and diversity.

Characteristics of the child and their family background were measured so that these factors could be controlled for in the analyses. At the child level, this included characteristics such as birth weight, gender, health and developmental problems, and the child's previous history of early childhood education and care before the age of three. At the family level, this included characteristics such as parent education, occupation and employment, family structure, and parent educational activities in the home (e.g., reading with child). During the original phase of EPPE, outcomes were examined at the end of the preschool period (start of primary school), and then again at the end of Year 1 and Year 2.

The Start Right Report (Ball 1994), which reviewed evidence for the effects of preschool education and formulated 17 recommendations directed at governments, educators, parents and the community, identified a need for rigorous longitudinal studies that included baseline measures so that the 'value added' to children's development by preschool education (i.e., the gains from preschool education) could be established. Responding to the report's recommendations, EPPE developed a 'value added' design (Sylva et al., 2004) that aimed to estimate the contribution of preschool experiences to a child's learning and development after taking into account their prior development at entry to preschool (the baseline level) and a range of child, parent and home background factors. This methodology was selected in preference to a Randomised Controlled Trial (RCT) approach because the investigators wanted to maximize generalizability across the country, and obtain good representativeness across different demographic groups and types of ECEC settings.

In value added designs, multilevel models allow the estimation of the size of any effect related to the specific preschool attended, with centres where children made less developmental gains than predicted viewed as less effective. Analyses were also extended to investigate whether variations in quality and the extent of time spent in preschool had an impact on children's developmental gains and, in particular, whether a longer duration of higher quality preschool experience carried a positive impact. An advantage of this approach is that it can account for the way students are clustered together in preschools, and control for many child and family characteristics that could act as potential confounders. A particular weakness of this research methodology is that some of the factors associated with parents deciding to enroll their children in particular ECEC settings are not explicitly modeled. It is likely that several factors that are critical to this decision making process (e.g., availability of a type of ECEC compared to others in the local area) that have an independent influence on children's development over and above the characteristics that have already been accounted for are not included in the model. If these factors are also likely to affect gains in children's developmental outcomes such as learning, then the gains from preschool may be overestimated.

Benefits associated with participation in three-year old preschool

Children who attended higher and lower quality settings of different types for different durations were compared. A 'home only' group was also recruited at school entry but comparisons to this group should be made with caution, given how different this group was in their levels of disadvantage and demographic characteristics. Major findings from these comparisons are detailed below with a focus on effects associated with three-year-old preschool; however it should be noted that often analyses were not stratified by age of preschool attendance.

Outcomes at school entry

First, outcomes were examined at the end of the preschool period (school entry). At school entry, cognitive ability was measured according to the British Ability Scales II (Elliott, Smith, & McCulloch, 1996) and an early literary scale (Bradley & Bryant, 1985). Behavioural development was assessed according to four domains: independence and concentration, cooperation and conformity, peer sociability, and antisocial/worried behaviour.

After taking into account child, parent and family environment characteristics, children who started preschool at 2-3 years of age had higher cognitive skills at the start of primary school. Higher quality settings were also related to higher scores in pre-reading, early number concepts and non-verbal reasoning (note this was not age-stratified). The type of preschool setting that children attended also had an effect, with attendance at an integrated centre having a significant positive effect, and attendance at nursery schools having a positive association for some measures. In contrast, attendance at local authority day nurseries was associated with poorer outcomes. These effects were consistent with differences in the average level of quality across these types of settings. As well as variation in quality and outcomes across different types of preschool settings, there was also significant variation in quality and outcomes within each type of setting.

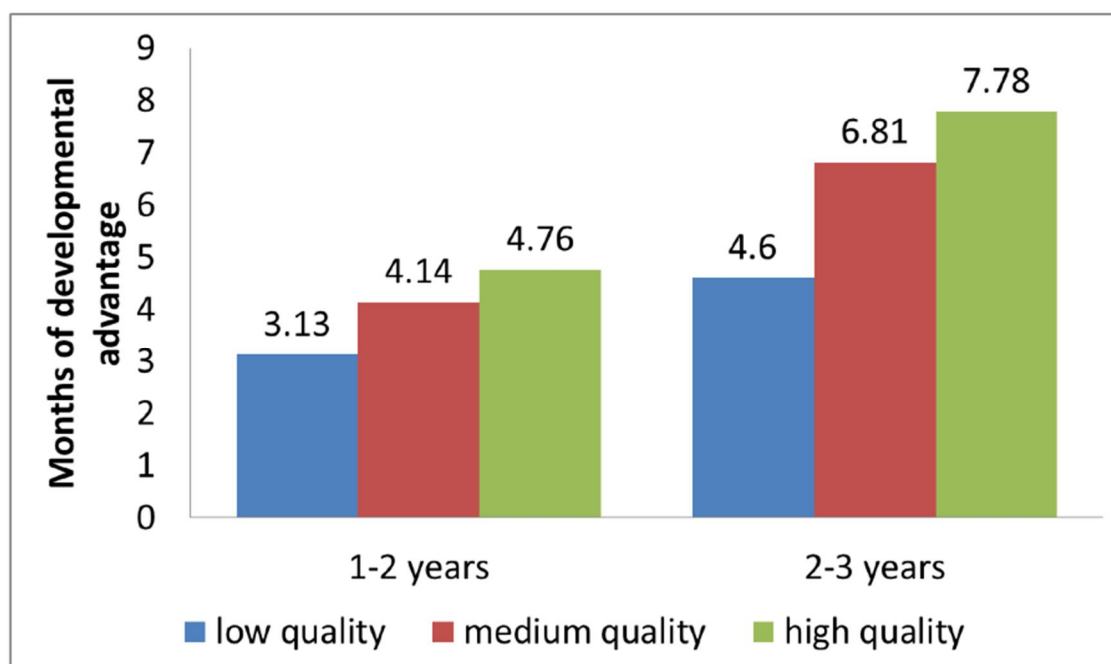
For behavioural outcomes, quality was also related to stronger outcomes, but it should be noted that these analyses were not age stratified. Children attending local authority day nurseries and private day nurseries showed poorer behavioural outcomes, whereas children who attended integrated centres or nursery classes made greater gains. Again, though, there was also substantial variation within each type of setting.

Additional analyses were undertaken to explore outcomes at school entry according to the intersection of preschool duration and quality. The comparison group was children who had only been in home care before starting school. The findings suggest that:

- Higher duration (i.e., beginning preschool at a younger age) is associated with greater benefits.
- Higher quality care is associated with greater benefits.
- Higher quality care for a higher duration was associated with the greatest benefits.

This is illustrated in Figure 4.1 below. It shows that children who attended high quality preschool for two to three years before starting school were nearly eight months ahead in their literacy skills compared to children who had not attended preschool.

Figure 4.1. Developmental advantage (in months) for duration and quality of preschool on literacy at school entry (home only group as comparison)



Source: Reproduced from reproduced from (Taggart et al., 2015)

Outcomes at the end of Grade 1

At six years of age (end of Grade 1), children’s outcomes were analysed with a focus on understanding whether the positive impacts of preschool observed at school entry were maintained. Children were administered the reading and mathematics subscales of the NFER-Nelson Primary Reading Level 1 and Maths 6 tests. Social-behavioural development was assessed using an extended version of the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997), focusing on self-regulation, positive social behaviour, antisocial behaviour and anxious behaviour.

Attendance at higher quality preschool settings continued to be positively associated with aspects of cognitive progress and behaviour. Longer duration of preschool attendance was associated with greater gains in reading and maths; an earlier start to preschool had a greater advantage to cognitive development (see Table 4.1.1). For behavioural outcomes, children who attended high-quality settings had better outcomes, but children who attended lower quality settings showed higher levels of antisocial behaviour. Overall, the results suggest that the early benefits observed were maintained at the end of Year 1.

Table 4.1.1 Effect of duration of preschool attendance at entry to school and end of Year 1

Duration	Effect of duration at entry to school and end of Year 1			
	Reading		Maths	
	Entry to school	End of Year 1	Entry to school	End of Year 1
Up to 1 year	0.12	0.26	0.34	0.32
1 – 2 years	0.28	0.17	0.45	0.36
2-3 years	0.39	0.26	0.56	0.46
> 3	0.49	0.35	0.55	0.52

Source: Reproduced from Taggart et al. (2015)

Outcomes at Grade 2

At Grade 2, findings were similar to those in Grade 1, though effects were generally somewhat weaker, possibly due to the greater impact of the school setting (Table 4.1.2). Cognitive outcomes were assessed according to reading and mathematics subscales from a national standardized assessment, and behavioural outcomes were again assessed by the Strengths and Difficulties Questionnaire (Goodman, 1997). Attending a higher quality preschool at a more effective site for a longer duration continued to be associated with developmental gains. The relationship between duration of preschool attendance and cognitive outcomes is illustrated in Table 4.1.2. For reading, effect sizes at the end of Year 1 and Year 2 were similar, but for maths had reduced somewhat over time. The size of these effects could be considered small to medium.

Table 4.1.2 Effect of duration of preschool attendance at entry to school and end of Year 2

Duration	Effect of duration at end of Year 1 and end of Year 2			
	Reading		Maths	
	End of Year 1	End of Year 2	End of Year 1	End of Year 2
Up to 1 year	0.26	0.29	0.32	0.21
1 – 2 years	0.17	0.27	0.36	0.18
2-3 years	0.26	0.29	0.46	0.22
> 3	0.35	0.36	0.52	0.29

Source: Reproduced from Taggart et al. (2015)

Comparisons between children who were only in home care before starting school and those who attended preschool should be made with caution, because these children differed in many ways to those attending preschool, including potentially ways that were not measured and so cannot be accounted for. Bearing this in mind, overall the results suggest that children in home-only care before starting school (who were also much more disadvantaged) fared much worse than those who attended preschool. By the end of Year 2, this difference was diminishing on behavioural indicators, but remained significant and substantial for cognitive indicators.

Outcomes from 7-11 years

The second phase of the EPPE project examined children's outcomes from ages 7-11 years. Beneficial effects of attending preschool continued to be evident, but the size of the effects had reduced further (Taggart et al., 2015). In addition, these benefits were evident only for children who had attended medium and high quality preschool settings. Compared to the home-only group, children attending poor quality preschool had no significant benefits; while they had slightly better prosocial behaviour this was offset by poorer ratings of hyperactivity.

Outcomes from 11-16 years

Outcomes at age 11-16 followed a similar pattern, with some positive effects of attending preschool continuing to be evident, in comparison to being in home only care before starting school (Taggart et al., 2015). For example, at age 16 effects were observed for preschool attendance on English and maths grades. There was also an effect for duration of preschool exposure, with students who spent two to three years in preschool obtaining higher grades in English and maths. Higher quality of the preschool environment was also associated with these outcomes. Beyond age 16, preschool attendance, duration, quality, and effectiveness of the site all predicted the likelihood of students following a higher academic route rather than a vocational pathway.

Outcomes for disadvantaged children

Children from all SES groups appeared to benefit from higher quality preschool when outcomes were examined at school entry, and the extent of this influence was similar across SES groups. Note that results were not broken down by duration of attendance. Clustering of disadvantaged children in particular centres was related to lower cognitive progress.

By age 11, students from disadvantaged backgrounds appeared to have greater gains from attending high quality preschool settings in terms of their behavioural outcomes. This was particularly so for children with less stimulating home learning environments in the early school years. At 14 years of age, children with poorer home learning environments had higher self-regulation if they had attended a high-quality preschool. Similarly at age 16, students with lower qualified parents achieved stronger English and math results if they attended high quality preschool.

Case studies of practice in highly effective preschool settings

The results highlighted that there was considerable variation between preschool sites in the degree of value add that they provided to children's development. The practices of 12 preschool sites that achieved slightly above average (good) or well above average (excellent) levels of value add were next explored in detailed case studies. The aim was to generate hypotheses about the specific practices that differentiate settings achieving good versus excellent outcomes for children. Information was gathered from policy documents, manager and parent interviews, and observation of staff and children. Some key features highlighted were that effective preschools tended to (Taggart et al., 2015):

- Maintain a strong educational focus but viewed academic and social development as equally important;
- Had strong leadership and good retention of skilled and knowledgeable workers;
- Had a good balance of adult led and freely chosen activities;
- Adult-child interactions involved strategies to extend children's thinking;
- Behaviour management policies supported children to understand and talk through conflict; and
- Parental involvement and engagement with their child's learning was strongly encouraged.

Conclusion

EPPE is a large longitudinal study that aimed to explore the benefits of preschool for children in the UK. It used a multilevel, value added approach to estimate the gains from preschool attendance, taking into account children's starting point and a range of family and demographic characteristics. The multilevel modelling approach is popularly used in educational research because it can account for the way children are clustered together in classes or school sites. In addition, the focus on 'value add' allows each educational site's contribution to a student's learning and development to be estimated, taking into account factors that a preschool cannot modify (e.g., levels of parental education within their student cohort). This is one of the study's main strengths.

However, it is important to note that while a wide range of characteristics of the child, the parents and the home learning environment were accounted for, it is still likely that there are other factors impacting on whether a child attends preschool (and if so of what quality and duration) that were not measured and so could not be controlled for. This means that it is not

possible to definitively determine whether differences in preschool attendance *cause* benefits to children's development and it is likely that the estimates from EPPE would be in the upper bound of what would be expected.

Despite this, EPPE does provide valuable evidence of a significant and lasting relationship between attendance at higher quality preschool settings for a longer duration and children's developmental outcomes across children from a range of family backgrounds. In addition, case studies of those sites achieving good or excellent levels of value add for their students were able to identify aspects of practice that may be beneficial. The aspects of practice that were highlighted are similarly emphasized in the National Quality Framework:

- *Maintained a strong educational focus but viewed academic and social development as equally important* relates to QA1 (Educational program and practice) and QA5 (Relationships with children)
- *Had strong leadership and good staff retention of skilled and knowledgeable workers* relates to QA7 (Leadership and service management) and QA4 (Staffing arrangements)
- *Good balance of adult led and freely chosen activities* relates to QA1 (Educational program and practice)
- *Adult-child interactions involved strategies to extend children's thinking* relates to QA5 (Relationships with children) and QA1 (Educational program and practice)
- *Behaviour management policies supported children to understand and talk through conflict* relates to QA5 (Relationships with children)
- *Encouraged parental involvement and engagement with their child's learning* relates to QA6 (Collaborative partnerships with families and communities).

The EPPE study appears to be of some relevance to the current policy questions in the Australia context. The inclusion of families from a range of socio-economic backgrounds situated in urban and rural areas make its findings broadly generalisable to a general population. The settings in which early childhood education took place were diverse and similar to those in Australia, as was the societal cultural environment and main language spoken. The sample was of sufficient size to have confidence in the reliability of the findings. The case studies have generated hypotheses about the elements of preschool education that matter for children's outcomes. However, EPPE was an observational study rather than an experimental or quasi-experimental one, which limits the strengths of the conclusions that can be drawn. Additionally, the study did not specifically focus on three-year-olds, and comparisons to the home-only group can only be made tentatively. The preschool education was provided from 1997 to 2000, and may be somewhat dated in light of policy and practice changes since that time. Thus, while the insights gained from the study are relevant to the general Australian context, the constraints associated with the findings outlined above need to be borne in mind.

4.2 Effective Preschool Provision in Northern Ireland (EPPNI)

The Effective Preschool Provision in Northern Ireland (EPPNI) project is a partner project to EPPE in England, and aimed to investigate the effects of early childhood education and care for children's development in Northern Ireland (Melhuish et al., 2006). Data have been collected from three to eight years of age. The methodology closely aligns with the EPPE study.

Policy context

EPPNI began in 1998, when early years policy was considered a low priority in the UK compared to compulsory schooling. Increasing interest in the potential of early childhood education and care to promote healthy transitions to school stimulated the EPPE study, launched in 1997, with EPPNI as a partner project beginning in 1998. The UK government has increasingly committed to expanding early years services since EPPE and EPPNI began, but each country within the UK has pursued this goal in different ways. Hence, it was considered valuable to also explore the implications of preschool for children's development in Northern Ireland.

Methodology

The EPPNI methodology closely aligns with EPPE. EPPNI is a longitudinal cohort study that aims to estimate the 'value add' that different ECEC experiences provide to children's development. A benefit of this approach, as compared to an RCT design, is that it allows different types of ECEC provision to be examined as they are implemented in usual practice. As for EPPE, a significant limitation is that while associations between preschool experiences and children's outcomes can be estimated, it is not possible to definitively determine whether preschool causes these effects. Moreover, it is likely that given that not all factors associated with parental decisions to choose ECEC are measured, that estimates from these models may overestimate the impact of ECEC.

ECEC sites were selected randomly across all Northern Ireland Education and Library Board areas, stratified to ensure coverage of ECEC types. A total of 685 children were recruited from across 80 centers. An additional 152 children with no or minimal care outside the home prior to school entry were also recruited when they began school. As for EPPE, care should be taken when interpreting differences between the home-only and ECEC groups, because they have very different background characteristics.

Different types of ECEC examined included: playgroups, private day nurseries, nursery classes/schools, and reception classes and groups. Reception classes/groups are a form of preschool provision where three and four year old children are entered into a primary school if no other form of preschool is available (typically occurs in rural areas). Depending on the number of reception children, they may have a separate class or be integrated into a class with older school children.

Child assessments were conducted from three to eight years, focusing on cognitive and behavioural functioning. Family characteristics were also assessed. Like EPPE, quality of the ECEC setting was measured according to the ECERS-R (Harms et al., 1998) and the ECERS-E (Sylva et al., 2003).

The analytic approach aimed to capture the value add that different types of ECEC settings provided, net of children's starting point and family characteristics.

Benefits associated with participation in three-year old preschool

By the start of primary school, children who attended ECEC (not disaggregated by three and four year old programs) had greater gains to their development than children in home-only care. Children attending higher quality settings also had greater gains (Melhuish et al., 2006). Type of setting also appeared relevant; children attending reception classes generally had fewer benefits than children in other types of ECEC.

The duration of attendance at preschool was consistently found to be associated with stronger outcomes in EPPE. By contrast in EPPNI, while there were small benefits of a longer duration of preschool attendance to social development at the end of Grade 1 and Grade 2, overall, there were no consistent effects for duration of attendance. This may be due to a lower level of variation in duration of preschool exposure in Northern Ireland than in England (Melhuish et al., 2006).

Case studies of practice in highly effective preschool settings

Case studies were conducted with three preschools that were identified as providing a high level of value add to their students. These case studies help to generate hypotheses about practices that may help preschools to achieve stronger outcomes for children. Based on rich qualitative data, the findings suggested the relevance of:

- Strong leadership and good staff retention, with a focus on staff development and training;
- A culture and atmosphere characterized by a warm, respectful and caring approach to the children, and supportive and professional interactions between staff;
- Strong partnerships with parents; and
- An emphasis on both social-emotional development and learning.

Findings specific to disadvantaged children

Attendance at higher quality preschool settings appeared to benefit all children. There was no evidence that disadvantaged children benefited disproportionately. Disadvantaged children had stronger outcomes when they attended centres that included children from a mix of social backgrounds, rather than high levels of clustering with other disadvantaged children (Melhuish et al., 2006).

Conclusion

The methodology employed by EPPNI is closely aligned to EPPE, and thus carries the same advantages and limitations. As an observational study, it is not possible to rule out the potential for other unmeasured factors to be influencing both who goes to preschool and their developmental gains during the preschool and primary school years. On the other hand, EPPNI replicates and enhances confidence in the major findings of EPPE. The addition of case studies of highly effective preschools to the study is valuable in highlighting potential areas of practice that may benefit children's outcomes. The aspects of practice highlighted in EPPNI again align to factors emphasised within the National Quality Framework, including:

- Strong leadership and good staff retention, with a focus on staff development and training (QA7, QA4);
- A culture and atmosphere characterized by a warm, respectful and caring approach to the children, and supportive and professional interactions between staff (QA5);
- Strong partnerships with parents (QA6); and
- An emphasis on both social-emotional development and learning (QA1, QA5).

In terms of relevance to the Australia context, the same comments apply as were made in relation to the EPPE study.

4.3 The HighScope Perry Preschool Study

The HighScope Perry Preschool Program was undertaken from 1962 to 1967 as a small, single site, demonstration project that aimed to improve the educational outcomes of disadvantaged children at high risk of school failure. This famous and widely cited intervention project has examined outcomes annually from age three to eleven years, and subsequently at 14, 15, 19, 21, 27 and 40 years, with numerous short- and long-term positive effects demonstrated over a range of areas of life.

US policy context

The U.S. ‘War on Poverty’ was launched in 1964 and highlighted the negative effects of economic disadvantage on children and families. New policy initiatives undertaken during this period included the provision of early childhood and preschool services such as Head Start to increase the likelihood that disadvantaged children would commence elementary school with the requisite skills; and the establishment of the Bureau for the Education of the Handicapped, which increased the focus on children with special needs. The HighScope Perry Preschool Program took place within this policy environment.

Methodology

A total of 123 children from low-income households residing in Ypsilanti, Michigan were recruited to the study. All children were of African-American descent and had IQs between 70 and 85 (i.e., within the lowest 15% of a normal population). The children were randomly assigned to either a no-program control group ($n = 65$) or a high-quality preschool program ($n = 58$)⁴. Children receiving the program attended an early childhood centre for two and a half hours each morning, five days per week. The program ran for eight months per year over two years (approximately 900 hours in all). Additionally, teachers visited children’s homes for one and a half hours each week to help mothers carry out the program curriculum at home.

The centre-based component was intensive and high quality, with teacher-child ratios of one adult for every five or six children. All four teachers providing the program were qualified in early childhood education, elementary education and special education. The curriculum provided experiences in the areas of personal initiative, social relations, creative representation, movement and music, logic and mathematics, and language and literacy through self-initiated learning as well as small-group and large-group activities (Schweinhart et al., 2005).

Assessments of the intervention and control groups were undertaken annually from three to eleven years, and at 14, 15, 19, 21, 27 and 40 years, with an assessment at 50 years currently underway. Levels of missing data were low, at approximately 6%.

Benefits associated with participation in the High Scope Perry Project

Statistical analyses compared the Program and Control groups, controlling for factors such as child gender, IQ level at entry to the program, fathers’ presence in the home, fathers’ type of employment, mothers’ educational level, age and employment status.

⁴ There were some exceptions to the random allocation, with siblings assigned to the same group, and children of working mothers assigned to the control group.

Children who received the Perry Preschool Program made early gains on IQ by comparison with the Control group, with 64% vs 28% respectively having an IQ of 90 or greater at school entry. However by Grade 2, group differences on IQ were no longer evident. Throughout elementary and secondary school, the Program group consistently showed greater commitment to school than the Control group, and fewer had been placed in special education classes (15% vs 34%). Similarly, the Program group's achievement levels were significantly higher as measured by standardised achievement tests at ages 9, 10, and 14; and on literacy tests at ages 19 and 27 (Schweinhart et al., 2005). A higher percentage had graduated from high school on time (67% vs. 45%) and on average, they attained a better high school grade point average (2.1 vs. 1.7 on a 4 point scale). Heckman and Kautz (2012) also suggest there are program effects on children's non-cognitive skills.

Long-term benefits of the program were evident on many aspects of life in adulthood (Schweinhart et al., 2005). For example, at 40 years, relative to the Control group, the Program group was:

- more likely to be employed (76% vs. 62%),
- have higher median annual earnings (\$20,000 vs. \$15,300),
- have more stable housing arrangements (37% vs. 28% owned their own homes),
- have savings accounts (76% vs. 50%), and
- have been arrested significantly less often (36% vs. 55% had been arrested 5 or more times in their lifetime).

Schweinhart et al. (2005) estimated that by 40 years of age, the economic return to society of the Perry Preschool program was \$244,812 per child, on an investment of \$15,166 per child. This represents a gain of \$16.14 per dollar invested. Of the total return to society, \$195,621 went to the general public, primarily through crime savings (88%), education savings (4%), increased taxes (7%) and welfare savings (1%) (Elango, García, Heckman, & Hojman, 2015).

Conclusions

The HighScope Perry Preschool program has shown that enduring educational and social benefits can ensue from the provision of a high quality intervention for intellectually challenged children from disadvantaged families. It has demonstrated consistent, impressive gains in many spheres of life for this group of children up to the age of 40 years, with large financial benefits accruing to society. The program was strongly educationally focused but did not require a large number of class hours per week (a total of 12.5 hours). Other key features were the low teacher-child ratios, highly qualified staff, and high levels of support for parents. Statistical analyses controlled for relevant child and family factors, increasing confidence that the results reflected impacts of the intervention provided. However, the sample size was small, which may make the results vulnerable to the effects of outliers.

The study also has several limitations that should be borne in mind. Allocation to intervention and comparison groups was not entirely random (e.g., children of working mothers were allocated to the control condition). The comparison was between a group receiving a high quality intervention and a group who did not receive any type of preschool program. While this likely reflects social trends in the 1960s, it does not reflect today's world in which many three-year-olds and most four-year-olds experience some form of out-of-home care. The intervention was two-pronged, with a centre-based intervention for children and weekly home-visits for parents. Other research such as the Nurse-Family Partnership (Olds et al., 1999) and the NICHD Study of Early Child Care (NICHD Early Child Care Research Network, 2005) shows that parent and family influences on children's development are substantial. It is not possible to determine which of the Perry's two major components are

responsible for its findings or whether they reflect their combination. Nor is it possible to differentiate the two components' relative importance. The program took place in the 1960s, with very different government policies and supports available for families than exist today. There have also been large societal changes in the ensuing 50 years, which may affect the study's applicability.

In terms of its relevance to the Australian context and bearing in mind the constraints outlined above, the study adds to the evidence base showing that early childhood education programs for three year-old disadvantaged populations show great promise in facilitating positive short- and long-term outcomes. However, the Perry's sample restrictions to children with IQs in the lowest 15% of the normal population who were all of African-American ethnic background may limit its applicability to the broader Australian population of disadvantaged children. The program also required highly qualified staff plus very small child-to-teacher ratios. These requirements might not be attainable for larger, publicly funded programs. Given the study's targeted nature, it cannot shed light on the value of a universal early childhood education program for all three year-old Australian children.

4.4 The Head Start Impact Study (HSIS)

The US Head Start Program began in 1965 and aimed to improve the school readiness of three-to-five year old children living in severely disadvantaged households. Head Start provides educational, social, medical, dental, nutritional and other services to children and families. Non-experimental studies have shown that participation in Head Start from the 1960s to the 1980s led to positive long-term outcomes in several areas such as school success and early adult social functioning (Deming, 2009; Garces, Thomas, & Currie, 2000; Ludwig & Miller, 2007). Additionally, higher academic attainment and earnings and crime reduction benefits were found for those from particular ethnic backgrounds and genders (Garces, Thomas, & Currie, 2002).

In 1998, the US Congress initiated an Impact Study to evaluate the immediate and longer-term effectiveness of Head Start (US Department of Health and Human Services, 1999). Four main outcomes were investigated: children's cognitive development; their socio-emotional adjustment and health status; and parenting practices. Outcomes have been assessed separately for three- and four-year olds, with the findings for three year olds the main focus of the current report. The Head Start intervention took place in 2003 and 2004. Outcomes were assessed at three and four years, the end of kindergarten, Grade 1, and the end of Grade 3 in 2008 (Puma et al., 2012).

Policy Context

The U.S. 'War on Poverty' launched by President Johnson in 1964 introduced a suite of education, health care, and social security policies and programs aimed at reducing the US national poverty rate, then at 19%. The US poverty rate has plateaued at between 11% and 15% since the 1970s, supporting the need for a continuation of programs such as Head Start.

Methodology

Head Start is provided via a range of programs, with the most common being *centre-based*, where children regularly attend classrooms and parents receive at least two home visits per year. Funding is provided to local centres, which then tailor programs to meet the needs of their local population. There is considerable heterogeneity in the content of the Head Start curricula. Zill et al. (2003) reported that 20% of Head Start programs used the High/Scope educational model (covering six developmental areas: approaches to learning; social and emotional development; physical development and health; communication, language and

literacy; cognitive development and creative arts), 39% used the Creative Curriculum model (covering 10 areas: social-emotional, physical, language, cognitive, literacy, mathematics, science and technology, social studies, the arts, English language acquisition), and 41% used another type of curriculum. Programs are provided full-day, 4-5 days per week; or part-time. To be eligible for Head Start, a child has to be living in a household whose income is below the US Federal poverty line. Thus, the HSIS focuses on children from severely disadvantaged families.

A nationally representative sample of Head Start programs was used to recruit a cohort of 4,667 three- and four-year-old children residing in 23 states across the United States in 2002. Sites were selected to provide a sufficient number of children for random allocation to a Head Start Services group or a Control group who had applied for but not been granted a Head Start service. Children allocated to the Control group did not participate in Head Start during the first year of the study but could have received other early childhood education services⁵. They could also have undertaken a Head Start program when four years of age. The methodology aimed to ensure that the Control group reflected the range of education and care services experienced by children from low-income families. Hence, the HSIS investigates the benefits of Head Start by comparison with other forms of services or care available to highly disadvantaged children in 2002. Details of the recruited sample are provided in Table 4.4.1. The ethnic background of the three year-old HSIS cohort was 37% Hispanic, 33% African-American, and 30% white or other ethnic background. The 4 year-old HSIS cohort ethnic profile differed, with 52% being Hispanic, 32% white/other, and 18% African-American.

Table 4.4.1: Number of children of each age in Head Start and Control groups

Age Cohort	Head Start Group	Control Group	Total Sample
Three-year olds	1,530	1,029	2,559
Four-year olds	1,253	855	2,108
Total	2,783	1,884	4,667

Source: Reproduced from Puma et al. (2012)

All three- and four-year olds were assessed at Baseline, the end of their four-year-old Head Start program or other type of care, and at the end of their kindergarten, first and third grade elementary school years. The three-year-old cohort was also assessed at the end of their first year Head Start Program (i.e., at 3 years). Four domains were examined: children's cognitive/academic development, socio-emotional adjustment, physical health; and parenting practices. Data sources were direct child assessments (all time-points), parent interviews (all time-points), teacher surveys (all time-points unless children were in home care only), school principal surveys (grade 3 data collection), and a child survey (grade 3 data collection). The actual measures varied across age to reflect children's differing developmental stages (U.S. Department of Health and Human Services, 2010). Response rates for the three year-old Head Start Services group ranged from 89-80% for the child assessments, 93% to 83% for the parent interviews; 88% to 63% for the teacher surveys, and 66% for principal surveys. Response rates were 5% to approximately 10% lower in the Control group.

⁵ Despite the study criteria, a number of children assigned to the Head Start Services group did not actually participate (15%), while some allocated to the Control group did receive Head Start in the first year (17%). Statistical analyses comparing a) the groups derived from the random allocation, and b) groups based on their actual participation/non-participation in Head Start were used to account for these trends. In general, the pattern of results was similar across the two sets of analyses although the size of group differences varied.

Statistical analyses used weighted data to compare mean levels on the various outcomes of the Head Start and Control groups identified at 3 years⁶, controlling for other influential child and family factors (e.g., child gender, age, ethnicity; maternal educational attainment, age, marital status).

Benefits associated with participation in three-year old Head Start

Cognitive outcomes

The Head Start group tended to be doing better on various aspects of language development than the Control group at the end of their first Head Start year (see Table 4.4.2). Fewer effects on language measures were found at four years, only one effect in this area was found at Grade 1, and none thereafter. In the area of mathematics, the Head Start group tended to have better skills at the end of their three-year-old Head Start year than the Control group, but at the end of the Kindergarten school year were significantly worse according to parent reports. At Grade 3, significantly more Head Start than Control group children had repeated a school year.

Socio-emotional outcomes

There were few significant group differences on socio-emotional adjustment as assessed by parent reports (Table 4.4.2). Head Start children showed fewer hyperactive behaviour problems at three years and the end of their kindergarten school year, and a smaller total number of behaviour problems at three years. There appeared to be relatively sustained differences on social skills/positive approaches to learning, with parent-reported differences at four years and at the end of the Kindergarten and Grade 3 school years, all to the advantage of the Head Start group. No significant group differences were evident on any teacher reported measures of socio-emotional adjustment at any time point.

Health outcomes

Several differences were found in the health area, with Head Start children more likely to have received dental care at three and four years than Control children (this is part of the Head Start service). They were also more often rated as being in excellent or good overall health at the end of the program and had greater access to health insurance coverage in their Kindergarten year (Table 4.4.2).

Parenting practices

Parents of Head Start children appeared to be using more effective parenting practices than parents of Control children, although significant differences were not extensive (Table 4.4.2). At three years, Head Start parents were less likely to have spanked their child, more likely to have read to their child, and more likely to have provided culturally enriching activities. At older ages, parents more frequently reported positive parenting and relationships with their child as well as less use of negative parenting approaches (e.g., high control and low warmth).

⁶ Results for the 4 year-old groups are not described here.

Table 4.4.2: Comparison of significant effect size differences between Head Start and Control groups

	3 years	4 years	K	Grade 1	Grade 3
Cognitive outcomes					
Pre-writing (McCarthy Draw a Design)	.14		-	-	-
Emergent literacy scale (parent report)	.35	.16	-	-	-
Letter naming	.24		-	-	-
Phonological Processing (CTOPPP)	.10	.15		-	-
Receptive Vocabulary (PPVT)	.18				
Letter-word identification (Woodcock-Johnson III)	.26				
Oral comprehension (Woodcock-Johnson III)				.08	-
Pre-academic skills (Woodcock-Johnson III)	.22				
Applied problems (Woodcock-Johnson III)	.15				
Maths skills (parent report)	-	-	-.19		
School promotion (parent report)	-	-			-.11
Socio-emotional outcomes					
Hyperactive behaviours (parent report)	-.21		-.12		
Total problem behaviours (parent report)	-.14				
Social skills and positive approaches to learning (parent report)		.11	.14		.12
Health outcomes					
Child received dental care	.33	.20			
Excellent/good overall health	.11				
Child has health insurance coverage			.14		
Parenting practices outcomes					
Closeness with parent (parent report)				.10	-
Positive parent-child relationships (parent report)				.10	-
Parent spanked the child in last week (parent report)	-.14		-.09		
Parent read to child in last week (parent report)	.15				-
Family cultural enrichment scale (parent report)	.18				-
Parenting style – authoritarian (parent report)	-	-.14		-.11	
Parenting style – authoritative (parent report)	-				.16

Source: Reproduced from Puma et al. (2012)

Notes: ($p < .10$) '-' = not measured at this time point. CTOPPP = Preschool Comprehensive Test of Phonological and Print Processing; Elison. PPVT = Peabody Picture Vocabulary Test. K = Kindergarten

Effect sizes were computed by dividing the population outcome by the measured standard deviation (Puma et al., 2012). The size of these effects could be considered in the small range, with those below .20 weaker than a small effect size

Benefits of three-year-old Head Start for specific sub-populations

Puma et al. (2012) also reported results for specific sub-populations to provide insight into whether particular sub-populations benefit more from Head Start than others. The sub-populations examined included children with special needs, children with particularly poor pre-academic skills at baseline, children/parents from differing ethnic backgrounds, those residing in urban/city locations, those in high risk households (receipt of Food Stamps, low parent education, parental unemployment, single parent household, and/or mother 18 years or less when child was born); and families in which parents/caregivers had mental health problems.

The most notable differences were found for children from households which were high-risk at baseline (characterised by receipt of food stamps or temporary assistance for needy families

(TANF); neither parent having a high school diploma or General Education Development diploma (GED); neither parent being in employment or at school; the child's biological mother being a single parent; the child's biological mother being 18 or younger when the child was born). The gap between the high-risk Head Start and Control sub-groups was significantly larger on language outcomes from pre-Kindergarten to grade 3 than the gaps found when moderate and low-risk Head Start and Control groups were compared. Findings were more mixed for the other specific sub-populations examined.

Benefits of two years of Head Start compared with Head Start at 3 years followed by a high-quality State Pre-Kindergarten year

The research next described is not based on HSIS data, but makes use of data collected in 2006 and 2007 for the Oklahoma Pre-K study (Jenkins, Farkas, Duncan, Burchinal, & Vandell, 2016). Of the four-year-old children in the Oklahoma Pre-K study who were eligible for free or reduced-priced lunches, 540 had attended Head Start at age three. Two groups were compared: those who in their second pre-Kindergarten year attended an Oklahoma Pre-Kindergarten program ($n = 211$), and those who experienced a second year of Head Start ($n = 329$). Analyses showed that both types of four-year-old programs significantly improved children's pre-reading and pre-writing skills but not their pre-mathematics skills. Further, children experiencing the Oklahoma Pre-Kindergarten program made twice as large gains in letter-word recognition than their peers attending a second year of Head Start (a difference of .46 in the respective effect sizes), and also showed greater gains in spelling, albeit not significant. These findings suggest that a more educationally focused second year of preschool education may provide greater benefits for the development of children's language and pre-reading skills than a second year of Head Start. The authors also note that the findings might reflect peer effects whereby those moving from Head Start to Pre K might experience benefits of being with peers from higher income families who have stronger school readiness skills.

Conclusions

The Head Start Impact study produced several short-term, immediate effects, particularly in the cognitive sphere, but very few long-term effects. Only in social skills/positive approaches to learning and in parenting practices do there appear to have been relatively sustained effects into the elementary school years. Thus, similar to other large-scale intervention programs (Duncan & Magnuson, 2013), effects generally appeared to fade out in elementary school. Nevertheless, other research has shown that the Head Start program can achieve long-term gains for participants in late adolescence and early adulthood. Thus, it is possible that longer-term effects might emerge in later years. Additionally, there is suggestive research that a three-year-old Head Start preschool program followed by a more educationally focused four-year-old program can achieve substantial language gains for children.

There are several possible reasons for the lack of long-term effects observed, including:

- Broad nature of program content: the Head Start program was by intent quite broad, as it aimed to focus on the 'whole child'. It is possible that a narrower, more targeted educational focus may have achieved stronger educational outcomes.
- Differences in program content: there was considerable heterogeneity in the content of the Head Start programs offered at differing sites as the curricula were determined at a local level. Depending on the needs of the local population, these could have had a stronger or weaker educational or socio-emotional focus, and some programs may have been more effective than others.

-
- Differences in quality: Head Start centres vary in quality, as indicated by Stevens and English (2016) who reported that in 2013, 40% were high quality according to the Early Childhood Environment Rating Scale (ECERS), 57% were medium quality and 3% were low quality. Teacher qualifications are another indicator of quality. Zill et al. (2003) reported that in 2000, 28% of Head Start teachers had a bachelor's degree, 19% had an associate's degree, 32% had some college experience but did not have a degree, and 74% had a Child Development Associate credential or certificate (as teachers could have more than one qualification, these percentages sum to more than 100%). In the analyses reported here, the effects of quality were not included, yet are likely to have exerted a considerable influence.
 - Definition of the Head Start and Control groups: Despite the rigorous criteria, there was leakage across the Head Start and Control groups, with some children included in the Head Start group who did not in fact attend Head Start and others in the Control Group who attended another Head Start program elsewhere. This may have obscured the findings obtained. Elango et al. (2015) cited evidence that suggests effects may be stronger when leakage is accounted for.

The Head Start Impact Study design had both strengths and limitations. On the positive side, the sample size was large, a range of outcomes was assessed using high quality, standard instruments and differing sources of report, and children were randomly allocated to groups. On the negative side, it was not possible to 'quarantine' the groups, with crossover not only across the initially selected groups but also in their type of preschool exposure at four years. This cross-over makes it difficult to clearly understand Head Start's impact. Another implication of the cross-over was that it was not possible to determine the effect of one versus two years of Head Start, because the Head Start three-year-olds could have diverse preschool experiences when four years of age. Thus it is not possible to examine dosage effects for the total sample of three year olds. In summary, the Head Start Impact Study had several methodological flaws that make it difficult to obtain a clear view of its effectiveness.

The HSIS has several important lessons for the development of Australian early education programs. These include the need for well-defined programs that are underpinned by clear program logic; a greater emphasis on the development of children's language and cognitive skills; and the benefits of an articulated program that fosters children's skill development from three to four years.

4.5 Expansion of Preschool in France

During the 1960s and 1970s, France undertook a large-scale expansion of preschool enrolment. As a result, during this period, the enrolment rate of three-year-old children rose from 35% to 90% and that of four-year-old children rose from 60% to virtually 100%. Dumas and Lefranc (2010) explored this rise in enrolment to assess the impact of preschool attendance on subsequent schooling outcomes (grade repetitions, test scores and high school graduation) and wages during adulthood. They found sizeable and persistent effects of preschool and conclude that preschool can be a tool for reducing inequalities. Their analysis shows that children from worse-off or intermediate social groups benefit more from preschool than children from better-off socioeconomic backgrounds.

Policy Context

Since the 1960s, France has developed the provision of preschool education within the context of a universal-access, publicly organised, free of charge schooling system. Pre-elementary education in France is offered nationally within *école maternelle* to children

between two and five years old, before they enter elementary school at the age of six.⁷ Despite a very old tradition in the promotion of preschool education, the current situation of universal access mostly results from the take up of enrolment that occurred in the 1960s and 1970s. Prior to this expansion, preschool participation was concentrated mainly within the urban lower class. During this period, the enrolment rate for three-year-olds rose, according to official statistics, from around 35% to more than 90%. Nowadays, virtually all children are enrolled in preschool at the age of three and around 25% are enrolled at the age of two. Enrolment at the age of two depends on the availability of vacant places with the development of preschool capacity aimed at enrolling two-year-olds targeted at disadvantaged areas, in terms of either a poor socio-economic environment or geographic seclusion.

Preschool in France is centrally administered by the ministry of Education and is usually offered within public schools in conditions that are similar to those of primary school education, with average class sizes of around 25 children.⁸ Preschool teachers are national civil servants and receive the same level of training as primary school teachers, typically a bachelor's degree level. This contrasts to the Australian preschool teaching workforce, which may contain teachers with a range of qualifications such as a certificate, diploma or degree.⁹ Children attend preschool six hours per day, four days a week, for 36 weeks per year. In 2009, the annual cost per pupil for pre-elementary education was 4,970 euros (91% of the cost per pupil for elementary education).

The stated objective of *école maternelle* is to help children reach autonomy and acquire knowledge and skills in order to promote their readiness for elementary school. Preschool follows a standardized and integrated curriculum that emphasizes language acquisition, socialisation to group interactions, psychomotor development, and the promotion of individual creativity and a positive attitude towards learning.

Methodology

Dumas and LeFranc (2010) compared the influence of preschool starting age (age two, three, or four) on later grade repetitions and test scores, high school graduation, and wages during adulthood. The data used in this study come from two sources – the DEPP panels (a set of longitudinal data sets collected by the French ministry of Education that follow French pupils throughout their school years and contain detailed information about schooling and achievement, as well as some limited information about family background) and the FQP (Formation, Qualification, Profession) Survey, which collects data about labour market outcomes, family background and schooling history for the French population aged between 20 and 65. The DEPP data used in the analysis corresponds to birth cohorts from 1969, 1972 and 1978; and the data from the FQP focuses on cohorts born between 1950 and 1973, allowing the comparison of outcomes across individuals depending on their exposure to preschool education. While both data sets provide information about the duration of exposure to preschool, only the DEPP data contains information about preschool starting age. The source of information about preschool education also differs between the two data sets, with DEPP information obtained from pupils parents when they begin primary school, while in the

⁷ This description of the French Policy context draws heavily on Dumas and LeFranc (2010).

⁸ Around 20% of children attend private preschools.

⁹ Apart from preschool programs, public provision of early child care is limited and rests to a large extent on family care. Thus preschool education is the main alternative to family-based child care. In 2007, approximately two-thirds of children under the age of three were primarily taken care of by one of their parents or a relative during the day; and among children attending preschool, almost 90% were cared for by one of their parents or a relative on Wednesdays when preschools did not operate (Ananian & Robert-Bobée, 2009).

FQP, survey respondents are asked whether they attended preschool and the duration of their preschool attendance, which may result in some degree of measurement error.

In the case of France, preschool participation was for a long time concentrated in the urban lower class, which suggests that the effect of preschool could be underestimated. Parental education is also a likely source of bias, as parents' education might influence their preferences regarding their child's preschool attendance and also their child's later outcomes. Not taking this into account in any research could potentially result in an overestimate of the influence of preschool on children's outcomes.

The issue of selection bias is addressed in two ways: first, by using a control strategy that uses information on family socioeconomic status (measured by father's occupational status and parental education, only available in FQP data) and family composition (number of siblings and birth rank), with school fixed-effects to capture the heterogeneity in the quantity and quality of preschool available to the child; second, an instrumental variables estimation strategy is used, exploiting the temporal variation within regions in access to preschool. Preschool attendance by the average age of preschool entry by region and cohort was used as an instrument, to account for possible endogeneity biases arising from omitted variables from the model.

Benefits associated with participation in three-year-old preschool

The study finds that preschool attendance has significant and lasting positive effects and helps children succeed in school and obtain higher wages in the labour market; and significant positive effects of entering preschool at an early age. Table 4.5.1 provides details of the estimated from the base model.

Table 4.5.1: Long term benefits of three-year old preschool in France

	Grade Repetitions at Age 11	Test Score in 6 th Grade	Grade Repetitions at Age 16	High School Completion	Monthly Wage
Effect of age at Preschool Entry (DEPP, Base Category = Age 3)					
Started Preschool at age two	-0.09***	0.07**	-0.14***	0.03***	--
Started Preschool at Age four	0.08***	-0.11***	0.11***	-0.04***	--
Effect of preschool duration (FQP, Base Category = less than 1 year)					
Two years	-0.04**		-0.07***	-0.01	0.02**
Three years	-0.07***		-0.10***	0.03*	0.05***

Notes: Coefficients reported as marginal effects. *** p<0.01, ** p<0.05, *p<0.1. Estimates of the influence of preschool duration on grade repetitions and high school graduation using school effects and instrumental variables to account for unobservables tend to be smaller in magnitude than those of the base specification, but significance levels remain significant, with the exception of grade repetitions at age 11, when the instrumental variables method is used.

Source: Reproduced from Dumas and LeFranc (2010)

These results indicate that starting preschool at age two rather than age three decreases the number of repetitions at age 11 by 0.09, decreases the number of repetitions at age 16 by 0.14, increases 6th grade test scores by 0.07 of a standard deviation, and increases the likelihood of graduating high school by 3 percentage points. Starting preschool at age four compared to age three increases repetitions at age 11 by 0.08, increases repetitions at age 16 by 0.11, reduces 6th grade test scores by 0.1 of a standard deviation and reduces the likelihood of high school completion by 4 percentage points. The authors note that these results seem consistent with a linear effect of preschool duration on later outcomes. The estimates of duration based on the FQP data show similar results, and also indicate that compared to those who attended

preschool for one year or less, having two years of preschool increases wages by 2 percentage points, and having three years of preschool increases wages by 5 percentage points.

This study, which identifies long-lasting effects of preschool, contradicts the results by Magnuson et al. (2007a, 2007b), who found that the academic benefits of preschool attendance tend to fade over time. The authors concluded that “preschool does not provide a one shot advantage, but rather makes children more likely to succeed at each step of their schooling career and on the labour market” (Dumas & Lefranc, 2010; p. 22).

Findings specific to disadvantaged children

To examine the influence of preschool for disadvantaged children, models were run with interactions of preschool attendance and social group, measured by the occupation of the father. The results indicated that compared to the children of farmers and manual workers, the children of higher-grade professionals received systematically lower returns from preschool; and the only exception was for test scores in Grade six, where all groups benefited from preschool to the same extent.

It seems that the significant positive effect of preschool attendance was almost entirely driven by children from middle and lower social classes, while those from upper social groups hardly benefit from preschool, but do not experience any detrimental effects from preschool attendance either. Dumas and Lefranc (2010; p. 21) concluded that: “preschool is an intervention that tends to close the gap between children from lower and upper social groups, and therefore plays a role in reducing intergenerational inequalities”. By comparison, an analysis of intergenerational transmission of inequalities in France shows that trajectories from children with different socio-economic backgrounds tend to diverge, and as children get older, school is less and less able to compensate for inequalities in background the children face. An equalising intervention later in the life cycle is therefore likely to be more expensive and would not benefit children for as long as preschool does.

Conclusion

Overall, the study provides rigorous and robust estimates of the benefits of extending universal preschool to three-year-old children. It used a large sample of French children before and after a policy change that extended three-year-old preschool participation from around one third to almost 100%. The issue of selection bias was addressed using school fixed effects and also an instrumental variable strategy. However, the set of control variables included in the analysis was limited to father's occupational status, family composition (number of siblings and birth rank) and for some cohorts, parental education – meaning that it is still possible that the positive effects of preschool were overestimated due to the absence from the analyses of other unmeasured, potentially influential factors that are correlated with preschool education.

This study of the long-term impact of universal preschool has two features that need to be considered in the Australian context. First, all French preschool teachers in école maternelle were required to have a bachelor degree, whereas there is more variability in teacher qualifications in the Australian system. Teacher qualifications are associated with better outcomes for children (e.g., Warren & Haisken-DeNew, 2013), and so might have been one of the factors driving the positive results observed. Second, children in école maternelle received a much greater dose of preschool in terms of hours of attendance (six hours per day, four days per week, for 36 weeks a year) and from a younger age (in some instances age two years, but benefits still being observed at age three years) than in the current Australian context. It can safely be assumed that there are other substantial differences in many aspects of quality of preschool programs in Australia in the present day and French preschools in the

1960s, including differences in teaching practices of qualified teachers. Therefore, it cannot be assumed that, based on the results of this study, providing three-year-old children with 24 hours of preschool per week with a degree qualified teacher will have the similar long-term benefits.

4.6 Expansion of Preschool in Norway

In the 1970s, Norway radically increased access to preschool for children aged three to six years (Havnes & Mogstad, 2009). Changes in the supply of preschool places grew more quickly in some areas of the country than others. This allowed for a natural experiment whereby children of preschool age before, during, and after the expansion of preschool services could be compared, across municipalities where the change in preschool access was faster or slower.

Policy context

A significant childcare reform occurred in 1975 in Norway, when responsibility for childcare was assigned to local governments with increased federal subsidies. The reform also included standards for educational content, group size, staff qualifications, and the physical environment of preschool settings. A key aim of the reform was to rapidly expand the number of child care places available, through increased government funding for running costs and grants for the construction of new centers.

In the years following the reform, expansion of child care proceeded at a strong pace. Child care had previously been low (10% in 1975), and so initially this reform created a very high demand that was not met by supply. This generated large variations in child care coverage across the country as the reform was implemented, as some municipalities had greater unmet demand than others owing to pre-reform availability and local political pressure to increase coverage.

At this time, Norway had a unified public school system based on a common national curriculum, with strong values of equitable access to high-quality education. There were no other significant changes in Norwegian educational policies during this period. This means that differences observed between children before and after the reform are more likely to be due to this ECEC initiative, and not to other simultaneous policy changes.

Methodology

The 1975 policy reform gave rise to a natural experiment, with some municipalities expanding access to preschool considerably (treatment group) and some with more limited expansion (comparison group) of preschool services over the implementation period. In addition, children from three to six years could be compared before and after the reform, across treatment and comparison municipalities.

Data was taken from Statistics Norway, which covered the entire resident population of Norway from 1967-2006. Linkages to other administrative datasets were also made, such as tax records. The child's adult outcomes, measured in 2006, include educational attainment, earnings, welfare dependency, and household type and composition.

Children born from 1973-1976 were the *post-reform cohort*, those born 1970-1972 were considered the *phase-in cohort*, and those born 1976-1979 were the *expansion period cohort*. Municipalities were ordered according to the percentage increase in child care coverage rates from 1976-1979; those in the top half were considered the treatment municipalities while the lower half were considered the comparison municipalities. Treatment and comparison municipalities were similar at baseline in terms of rural coverage, local government

expenditure on preschool, population size, and the proportion of children aged zero to six. Treatment municipalities had greater unmet demand for preschool prior to the reform, with local political pressure to expand access likely greater in these areas.

Data were analysed using a difference-in-differences (DD) approach, comparing the average change over time in each adult outcome variable for municipalities where preschool provision expanded rapidly (treatment group), compared to the average change over time for municipalities where expansion was slower (comparison group). An underlying assumption of such methodology is that the change in adult outcomes over time would have been the same in the treatment and comparison municipalities if there had been no reform. This assumption would be problematic if, for example, parental education was higher in the treatment than comparison municipalities, which would have led to better child outcomes over time even without the reform. To address this, models were also estimated with a set of control variables, including gender, family size, mothers' and fathers' age at first birth, mother and father education when the child was two years of age, immigrant status, and whether the family had relocated. The characteristics of the treatment and comparison municipalities were also compared and found to be similar in terms of political and demographic characteristics, though, as might be expected, treatment municipalities tended to have higher unmet needs for childcare before the reform (low ratio of childcare available to number of working mothers) and thus greater impetus to expand services quickly.

Benefits associated with participation in three-year old preschool

The implications of preschool attendance for adult outcomes were examined. However, the age of preschool participation or duration of attendance was not the focus of this study, and hence effects are reported for three- to six-year-olds generally (not disaggregated by age).

The findings suggest positive effects of greater preschool access for all adult outcomes examined. For educational attainment, for example, it was estimated that each additional child care place corresponded to an additional .35 years of education (see Figure 4.6). It was estimated that universal child care decreased the probability of dropping out of high school by six percentage points, while increasing the probability of attending college by seven percentage points.

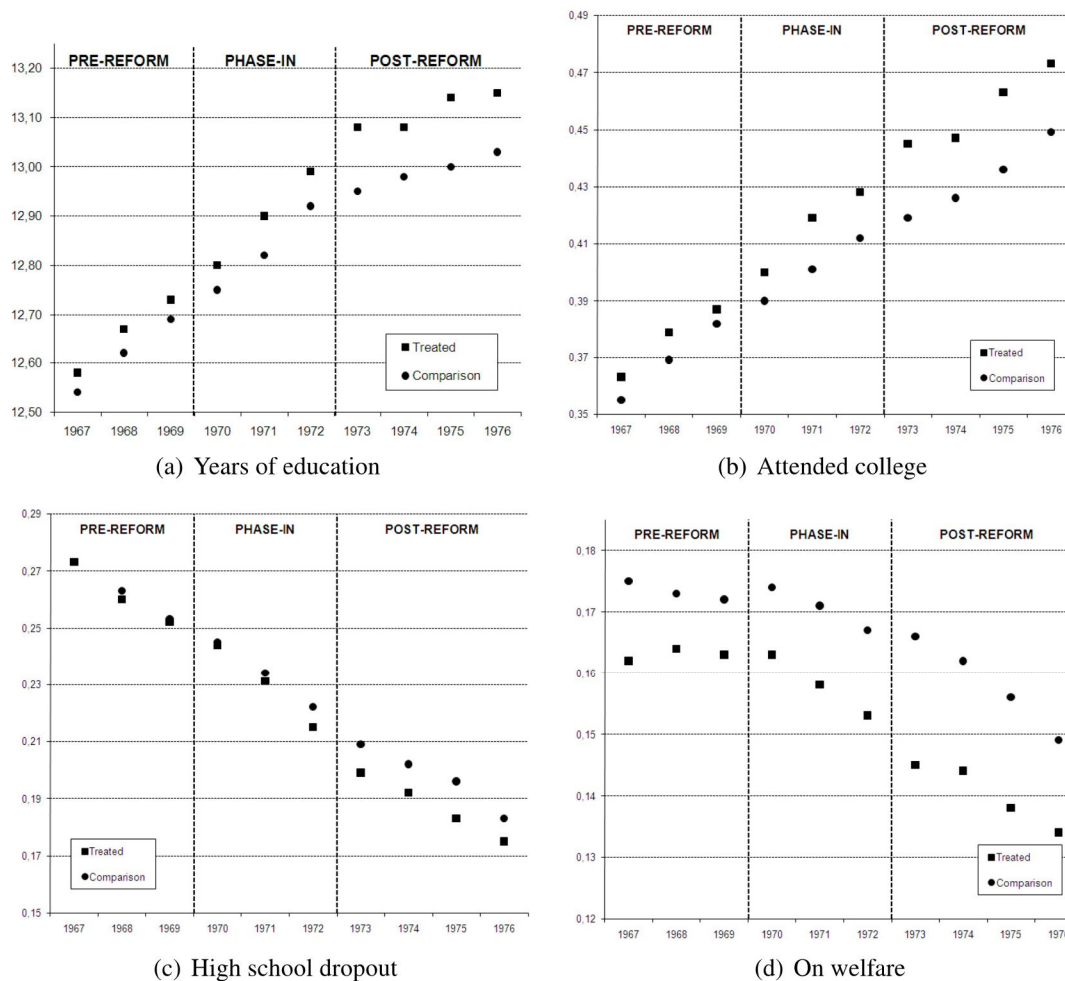


Figure 4.6. Unconditional cohort means for education and welfare dependency for cohorts born 1967–1976 by treatment and comparison group, reproduced from (Havnes & Mogstad, 2009)

Findings specific to disadvantaged children

Effects were also estimated for children with lower educated mothers separately, to explore whether these children benefited more from preschool attendance. The findings suggest that the benefits of attending childcare for later educational attainment were greater for children of lower educated mothers. The authors suggest that this comparison should be interpreted with caution, however, because there could be differences in child care take-up across different socioeconomic groups.

Conclusion

This study of universal preschool in Norway provides strong evidence of the positive long-term benefits of preschool exposure for three- to six-year-old children. However, it does not differentiate these effects according to the age that children attended preschool. This means that it has limited capacity to specifically inform questions about the impact of attending three-year-old preschool, including for disadvantaged children. In addition, the Norwegian educational system has many differences to the Australian system, and hence, it is difficult to directly generalise these findings to the Australian setting, particularly when taking into account changes since the 1970s when this preschool expansion occurred.

4.7 Child-Parent Center Education Program

The Chicago Child-Parent Centers (CPC) provide a publicly managed program for children at risk of academic underachievement due to residence in a high-poverty neighbourhood and family disadvantage. The CPCs aim to promote academic success and facilitate parental involvement in children's education through a program spanning preschool and early elementary school. CPCs have been running in Chicago public schools since 1967, and are now also provided in Illinois, Minnesota and Wisconsin.

In a study of the program's effectiveness, children born in 1979 and 1980 who did, or did not, participate in a Chicago CPC preschool program have been followed to 28 years of age. Numerous short- and long-term positive effects of the program have been found.

Policy Context

The program was funded through Title 1 of the Elementary and Secondary Education Act of 1965, an outcome of President Johnson's 'War on Poverty'. Title 1 provides financial assistance to local education authorities for the education of children from low-income families. The Act has been reauthorised every five years since its inception. To be eligible for assistance, at least 40% of a school's student population had to come from low-income families (as defined by the US Census' definition of low income). Title I funds whole-of-school programs as well as targeted programs for children who are currently failing or are at risk of doing so.

Methodology

The program is run by the public school system. In Chicago, it is provided in 19 sites to approximately 2000 children per year. CPC provides a half-day preschool program five days per week for children aged three and four years, and a half-day or full-day elementary school kindergarten program five days per week for five-year-olds. The program runs over the nine months of the elementary school year, with an eight-week summer program also available. It has three components: the development of children's reading/language skills; parental involvement; and the provision of services such as health screening, nursing services, speech therapy and free breakfasts and lunches (Reynolds, 2000). Teachers are required to have a bachelor degree and early childhood education certification. Class sizes are 17 children for a half-day program taught by a qualified teacher plus a teacher aide, and 20 students for a full-day program with a teacher and teacher aide. A head teacher, a parent-resource teacher, and a school-community representative also staff each CPC.

To be eligible for the program, children must reside in neighbourhoods that receive Title 1 funds (with a screening interview also used to identify children and families most at need); children must not be enrolled in another preschool program; and parents must agree to participate in the program at least one half day each week. The preschool component emphasises basic skills in language and mathematics through relatively structured but diverse learning experiences that include whole-class instruction, small group and individual activities (Reynolds, Temple, Ou, Arteaga, & White, 2011). The activities provided are aligned with the Illinois Early Learning Standards. An expansion program was introduced in 1978 for children in grades two and three, which involved limiting class sizes to no more than 25 children, provision of a teacher aide to assist the classroom teacher, and continued encouragement of parental involvement (Ou & Reynolds, 2006).

A prospective longitudinal evaluation of the CPC commenced in 1985 via the Chicago Longitudinal Study of Children at Risk (Reynolds, 1991), which contained a substantial proportion of children who had participated in a CPC program. Thus, the LSCAR yielded two

groups of children for longitudinal evaluation of the CPC program: a) a sample of 989 children who had completed three consecutive CPC years (two preschool years and one kindergarten year); and b) a sample of 550 children who had not attended a CPC preschool program but had received another type of preschool education. The CPC and Comparison groups were matched on age, neighbourhood locality, socioeconomic status, and eligibility for government funded early childhood programs. Statistical comparisons revealed few significant differences between the groups on these characteristics. Ninety-three per cent of children in the CPC evaluation were of African-American background. Data were collected at multiple time-points from childhood to early adulthood, for example in kindergarten, third grade, fifth grade, sixth grade (12 years), 14 years, 19-20 years, 23-24 years, 26 years, and 28 years. Retention has generally been high with data available for approximately 90% of participants at the most recent data collection at 28 years (however, a slightly higher percentage of the CPC group than the Comparison group tend to take part).

Benefits associated with participation in the CPC preschool component

Several of the major findings concerning the benefits of participation in the preschool component of the CPC are summarised below.¹⁰ When evaluated against the Comparison group and after taking into account characteristics that pre-dated the CPC preschool intervention as well as weighting for attrition where appropriate, the CPC group had the following benefits at each time period:

a. during elementary school (Reynolds, 1995):

- higher cognitive school readiness at entry to kindergarten, on average about three months;
- higher reading and mathematics achievement consistently through to grade 6; and
- higher participation by parents in elementary school.

b. at 14 years (Reynolds, 2000):

- higher achievement on reading and mathematics tests;
- less often repeated a school grade (23% vs. 38%); and
- less often been placed in special education in their lifetime.

c. at 19-20 years (Reynolds, Temple, Robertson, & Mann, 2001, 2002):

- fewer years of special education from 6 to 18 years (0.7% vs. 1.4%);
- less often experienced child maltreatment from 4 to 17 years (5% vs. 10%);
- fewer arrests (17% vs. 25%);
- fewer arrests for violent offences (9% vs. 15%); and
- more often completed secondary school (62% vs. 51%).

d. at 23-24 years (Reynolds et al., 2007):

- more often completed secondary school (71% vs. 64%);
- higher rates of four year college attendance (14.7% vs. 10.0%);

¹⁰ Due to the focus of the current report, findings are not reported for the elementary school CPC component or the expansion program

-
- fewer felony arrests (17% vs. 21%), felony convictions (16% vs. 20%), violent crime convictions (5% vs. 7%), or any conviction (20% vs. 25%);
 - lower rate of incarceration (21% vs. 26%);
 - higher rate of health insurance coverage (70% vs. 62%);
 - lower incidence of depression symptoms (13% vs. 17%); and
 - less often received public aid (on average, 28 months vs. 32 months).

e. at 26 years (Reynolds et al., 2011):

- less often repeated a school year up to the age of 15 (14% vs. 25%);
- less often received school remedial services (23% vs. 38%);
- more often completed secondary school (80% vs. 73%);
- higher average grade level completed (12.1 vs. 11.8);
- less often been placed in out-of-home care (5% vs. 9%);
- less often received a felony arrest (13% vs. 18%);
- lower rates of substance abuse (14% vs. 19%);
- higher rate of health insurance cover (77% vs. 67%); and
- higher occupational prestige (on average 2.8 vs. 2.6).

f. at 28 years (Reynolds et al., 2011):

- higher rate of on-time high school graduation (44% vs. 37%);
- higher average grade level completed (12.1 vs. 11.9);
- high socioeconomic status (34% vs. 29%);
- higher average annual income (\$11,582 vs. \$10,796);
- less often been charged with felony offence (19% vs. 25%) or experienced an arrest (48% vs. 54%);
- higher rate of health insurance coverage (76% vs. 64%); and
- lower rates of substance abuse (14% vs. 19%).

A cost-benefit analysis of the CPC program using data collected to 26 years on health and wellbeing indicated that the preschool component provided a total return to society of \$10.83 per dollar invested, within which benefits to the public were estimated to be \$7.20 per dollar invested. These came primarily from increased earnings, tax benefits, criminal justice savings, and welfare benefit savings (Reynolds et al., 2011). Additionally, the elementary school kindergarten CPC component provided a total societal return of \$3.97 per dollar invested and a \$2.11 public return, while the expansion program provided a total societal return of \$8.24 and a public return of \$5.21.

Findings specific to disadvantaged children

As this was a targeted program for disadvantaged children, all findings are applicable for disadvantaged populations, although the degree to which they may be generalised across differing societies, cultures, and countries is not known.

Conclusions

The Chicago Child Parent Center evaluation is a methodologically strong study that has shown extensive, widespread and long-term benefits of preschool education for three-year-olds. While it was not a randomised control trial, the study recruited two relatively large groups with matching used to derive a socio-economically equivalent comparison group. Attrition has been quite low, and weighting is used to account for the attrition that has occurred. Key features of this high quality program are its explicit focus on children's language/cognitive development as well as their social and emotional wellbeing; a uniform curriculum across sites; the provision of approximately 20 hours of class time per week at three and four years; the use of highly qualified teachers, teacher aides and reasonably small class sizes; a requirement of, and support for, regular parental participation that resulted in greater long-term parental investment in children's education; and the extension of the program into elementary school to help consolidate the gains made in preschool. It is likely that a combination of these aspects were responsible for the program's success; however, it is not possible to disentangle the precise contribution of program and non-program aspects to the findings.

The study showed stronger educational outcomes for children experiencing the CPC preschool program than those who experienced other types of preschool education, including consistently higher academic achievement across elementary and secondary school, a lower likelihood of repeating a grade or needing remedial services; and greater likelihood of secondary school completion. Program participants were also less likely to engage in criminal behaviour or substance misuse in early adulthood; to be doing better occupationally; and to show greater independence (e.g., less need for public aid, more likely to own their own home and to have health insurance). Additionally, the study revealed considerable financial benefits to society through its cost benefits analyses.

Thus the CPC can be considered a robustly evaluated, highly effective intervention. However, several characteristics may limit its applicability to the Australian context. This was a targeted intervention for a highly disadvantaged population. Whether the findings would generalise to a general community population is unclear. Like many other US interventions, almost all CPC recipients were of African-American background, unlike the more ethnically diverse Australian disadvantaged population. Important aspects of CPC were parental involvement, and the program's extension into elementary school. This would require a greater government investment than merely the provision of a preschool education program for three and four year olds. In short, it is likely that the CPC program would be useful for Australian disadvantaged populations, but its applicability beyond this is unknown.

5 Evidence for Indigenous Children

The third research question addressed by this report is the effects of preschool for Indigenous children. Little research has been conducted to explore this question specific to the Australian setting, and it would be difficult to generalize from international research given the unique cultural and historical circumstances of Indigenous populations. Hence, in exploring the available evidence, only Australian literature was considered. In addition, because of the paucity of Australian research, consideration was given to research relating to preschool participation at various ages (not just three year old preschool).

The potential benefits of preschool attendance for young children has specific relevance to Indigenous children. Ensuring access to ECEC in remote communities, increasing primary school attendance, and improving reading, writing and numeracy are three of the six Closing the Gap targets aimed at eliminating the socioeconomic disparity between Indigenous and non-Indigenous Australians (Holzinger & Biddle, 2015).

Recent analysis of the Longitudinal Study of Indigenous Children (LSIC) provides some insights into the outcomes associated with attending ECEC programs for indigenous children (Holzinger & Biddle, 2015). LSIC comprises two cohorts of Indigenous children from 11 different areas around Australia. Both potential short-term (two years after preschool) and longer-term (three to five years after preschool) effects have been examined in LSIC, including both cognitive skills and social-emotional wellbeing.

The findings from this analysis suggests that there was a significant short term effect of attending preschool on children's vocabulary at five to seven years, after covariates were accounted for. Longer-term effects associated with preschool attendance were also observed, with reduced social-emotional difficulties and increased reading and abstract reasoning skills. Outcomes associated with attendance at child care were also examined, but appeared to carry fewer benefits compared to preschool. Indeed, long hours at child care were associated with poorer social-emotional wellbeing. This suggests that participation in an educational, structured ECEC program with capped attendance hours is likely to be more beneficial for the cognitive and social-emotional development of Indigenous children (Holzinger & Biddle, 2015). In future, projects such as the evaluation of the Abecedarian 3A programme currently underway in the Northern Territory may also provide valuable data on the benefits of early childhood education for Indigenous children.

Engaging Indigenous families in ECEC requires some specific considerations. Effective services for Indigenous families need to provide a culturally safe environment that is supportive of Indigenous identity and focuses on the strengths within the Indigenous community (Harrison, Goldfeld, Metcalf, & Moore, 2012). Indigenous leadership and community input are key strategies for achieving this (Harrison et al., 2012). Indigenous parents may have specific concerns, such as the fear that attendance will undermine Indigenous culture and values (Trudgett & Grace, 2011). Employing local Indigenous workers in preschool settings can be one strategy in addressing this concern and engaging families (Biddle, 2007). In addition, ECEC settings needs to build cultural sensitivity and respect by embracing Indigenous learning communities and involving Indigenous parents, as well as the broader Indigenous community (Holzinger & Biddle, 2015).

Harrison et al. (2012) suggested that a number of evidence gaps in our understanding of effective ECEC programs for Indigenous children remain that require investigation in future research. This includes rigorous trials of early learning programs, to determine what is effective and beneficial for Indigenous children. Even when programs have been shown to be effective in trials, however, the process of implementation (e.g., staff training) requires careful consideration to ensure that these potential benefits are realised.

6 Implications and Key Recommendations

6.1 What evidence is there of the benefits of participation in three-year-old preschool programs, and how generalisable is this evidence to the Australian setting?

The international evidence examined in this review was consistent in suggesting that providing high quality three-year-old preschool has long-term benefits for some children. Studies of high quality demonstration projects in the United States (e.g., HighScope Perry Preschool study and Chicago Child-Parent Centers Program), expansions of high quality universal preschool in France and Norway, and longitudinal cohort studies like EPPE and EPPNI all show meaningful benefits of preschool with many extending into adolescence and/or adulthood. Thus, the review clearly demonstrates the benefits of preschool education for three-year-olds, although it was evident that some children benefited more than others, with the strongest evidence coming from programs targeted at the most vulnerable.

Cultural, contextual and temporal differences in the studies reviewed make drawing direct lessons for the Australian context difficult

There are significant questions about the applicability of this evidence to the contemporary Australian setting, however. The majority of these studies examine the impact of preschool programs delivered several decades ago. Since then, there have been significant shifts in knowledge—by professionals, as well as in the broader community—about early childhood development and ECEC, policy, and parenting behaviours. Likely due to these shifts and a greater focus by parents on other enriching activities that are readily available, the extent of the benefits observed for ECEC are lower in more recent studies than in older studies (Duncan & Magnuson, 2013). In addition, none of the studies reviewed were Australian and some were conducted within very different cultural and policy settings (e.g., the Norwegian education system has many unique features).

Obtaining robust estimates of the impact of three-year-old preschool is challenging

Much research on the benefits of three-year-old preschool has struggled to untangle the unique effects of preschool participation from other factors that influence both who goes to preschool and children's developmental outcomes (Duncan & Gibson-Davis, 2006). For example, factors like parental unemployment and financial hardship can impact on whether children participate in preschool, and can also impact on children's development. Some studies have been more successful than others in accounting for this issue, the most rigorous approach being random assignment to a preschool intervention; however, much of the evidence using a Randomised Controlled Trial (RCT) design comes from the oldest studies, focusing on high intensity targeted programs. Despite efforts to measure a range of child and family characteristics in more recent cohort studies like EPPE and EPPNI, there are still likely to be other unmeasured factors influencing which children attend preschool and their developmental pathways. The potential for selection bias therefore remains a significant issue when interpreting the results from these studies.

It should also be noted that the specific impact of providing preschool to three-year-old children was not the focus of some of the studies examined, and findings were sometimes combined for three- and four-year-olds. Hence, while the studies contain data on preschool participation at three years of age and developmental outcomes, analyses have only indirectly examined this relationship (e.g., by examining the different impact of one or two years of

preschool on outcomes). Again, this makes it difficult to interpret the findings of these studies in relation to the current review's questions.

In summary, the weight of the international scientific evidence suggests that the provision of a high quality three-year-old preschool program provides long-term benefits for some children. However, there is a clear need for contemporary Australian research specifically addressing this question, that is contextualised within the current ECEC landscape.

6.2 Does participating in three-year-old preschool programs disproportionately impact disadvantaged children, or do all children show similar effects?

A consistent pattern of results from demonstration and universal preschool studies in many countries is that preschool benefits disadvantaged children the most (Melhuish, 2004). There is consistent evidence from the United States (e.g., HighScope Perry Preschool study; Child-Parent Centre Education Program) that programs targeting disadvantaged children carry long-term benefits. A number of the studies of universal preschool programs examined here also suggest that benefits of preschool participation are greater for more disadvantaged children (e.g., Norway and France expansion studies, EPPE). Hence, this evidence does support the conclusion that children from disadvantaged backgrounds benefit disproportionately from the provision of high quality preschool at three years, therefore having the potential to reduce gaps in developmental outcomes between disadvantaged and advantaged children.

Whether benefits of three-year-old preschool also extend to children from more advantaged backgrounds is less clear. Although not disaggregated by age, the Norwegian preschool extension, EPPE and EPPNI studies all found that attendance at higher quality preschool settings appeared to have some benefit for all children (Melhuish et al., 2006; Sylva et al., 2004) albeit greater for disadvantaged children in some cohorts. In contrast, the French preschool extension study found that positive effects were concentrated to children from disadvantaged or middle-range backgrounds, while children from advantaged families experienced almost no benefit (Dumas & Lefranc, 2010). Other recent reanalysis of findings from Perry, Head Start and universal programs for older children similarly suggest that the benefits of universal provision of ECEC are more ambiguous than the clear-cut benefits to vulnerable subpopulations (Elango et al., 2015). In short, the current review did not yield strong evidence to support or refute the proposal that preschool education should be provided for all three year olds. More research evidence is needed to weigh up the value of universal (versus targeted) approaches in the Australian setting.

Some of the studies reviewed suggest that there may be increased benefits for disadvantaged children if they are placed in preschools containing peers with a mix of social backgrounds. Findings from the EPPE and EPNI studies indicated that disadvantaged children showed stronger outcomes when they attended centres that included children from diverse backgrounds, rather than centres with a high concentration of disadvantaged students (Melhuish et al., 2006; Sylva et al., 2004). Similarly, one year of Head Start followed by a year of universal Pre-K was found to be more beneficial than undertaking two years of Head Start (Jenkins et al., 2016), a possible explanation for which was the mix of advantaged peers in the universal Pre-K program. Because the mix of peers was not experimentally manipulated in these studies, the findings may also reflect other factors, such as a more targeted curriculum in the case of the Head Start versus Pre-K study. Nevertheless, together this provides some weak but suggestive evidence that disadvantaged children may benefit from social diversity in their preschool environment. Other research has also shown that bringing

together narrow groups of children or adolescents for intervention purposes, for example to reduce antisocial behaviour or inhibit substance abuse, can create ‘peer contagion’ effects where problems are exacerbated rather than reduced (Dishion & Tipsord, 2011). The potential benefit that may be gained from increasing diversity among program recipients is therefore worth consideration.

6.3 What evidence is there on benefits of preschool for Indigenous children of varying ages?

There is very limited evidence on the benefit of preschool for Indigenous children. The only study we were able to identify reported a benefit of preschool over other ECEC but it did not specifically address three-year-old provision (Holzinger & Biddle, 2015). Nevertheless, given the evidence from many other overseas studies about the benefits of quality ECEC provision at three years of age for the most disadvantaged children, it is highly likely that high quality preschool provided at age three for sufficient hours per week (see section 6.4) would provide significant benefit in “closing the gap”.

It is important to note that providing access to a three-year-old preschool program for Indigenous children is only likely to be beneficial if provided in a culturally sensitive way that effectively engages Indigenous families and communities. Engagement with Indigenous families requires local Indigenous workers, capacity building for all staff, and specific investment for these activities. To facilitate engagement with Indigenous communities having Indigenous preschool teachers is particularly critical; to ensure the best outcomes for indigenous children, training support to develop a high quality Indigenous workforce should be a priority.

6.4 Implementation issues

How many hours of three-year old preschool is supported by the evidence reviewed?

The optimal dosage of three-year-old preschool is a critical element in maximising the potential benefits of preschool programs, particularly when considering the needs of disadvantaged children. Based on evidence from this review, 15 hours of preschool per week may not be sufficient to benefit children, particularly if three-year-old preschool is targeted at disadvantaged children. Programs that we reviewed showing long-term benefits tended to provide longer hours of preschool. For example, children in the evaluation of école maternelle in France attended preschool for six hours per day, four days per week, for 36 weeks a year, while the Chicago Child-Parent Center Education Program required children to attend for 20 hours per week. Therefore the available evidence suggests that if the policy goal is to enhance the development and school readiness of three-year-old children, particularly those from disadvantaged backgrounds, then 15 hours per week may not be sufficient for meaningful gains to be realised. Thirty or more hours per week may be closer to what is needed, based on the evidence from the international studies reviewed.¹¹

Quality programs matter and qualifications are important

There is consistency across the studies examined in suggesting that the quality of the preschool environment was an important contributor to the success of preschool programs. There is broad consensus that quality involves both process elements such as the way children

¹¹ The Mitchell Institute similarly suggests that “for children experiencing significant disadvantage, access to at least 30 hours of quality early education from age 3 is optimal” (O’Connell et al., 2016).

and staff interact, and structural factors such as child to staff ratios and teacher qualifications (O'Connell et al., 2016; Tayler, Ishimine, Cloney, Cleveland, & Thorpe, 2013).

There is evidence that Australia's ECEC system is generally of high quality. A recent meta-analysis of studies from 1989 to 2012 compared results on a widely used standardised assessment of quality of child care (the Environment Rating Scales) across countries. The results suggest that ECEC settings from the Australian and New Zealand region had significantly higher quality care when compared to other regions across the globe (including North America, Europe, South America and Asia; Vermeer, van IJzendoorn, Cárcamo, & Harrison, 2016).

While the average level of quality of care was found to be high by international standards, evidence also suggests that there is substantial variation in the quality of care across Australia. The E4Kids study examined quality across 250 preschool classrooms in Australia in 2010 (Tayler et al., 2013). Overall, quality was found to be similar to that in the USA and UK, and higher in kindergarten than long day care settings. Importantly though, quality did not appear to be evenly distributed: ECEC in disadvantaged areas tended to provide a lower quality of care, particularly in the area of instructional support (Cloney et al., 2016). This is problematic given evidence that disadvantaged children have the most to gain from attending high quality settings. For example, evidence from LSAC suggests that high quality relationships in childcare closed the gap between children in low compared to high income families (Gialamas, Mittinty, Sawyer, Zubrick, & Lynch, 2015). If the policy goal is to reduce inequities in children's development, then programs in poorer areas need to be of the highest, rather than lowest, quality.

One of the structural aspects of the quality of the ECEC environment is the level of qualification possessed by ECEC teachers. Children who attended four-year-old preschool with a preschool teacher who had an early childhood education degree or diploma performed better on Grade 3 academic testing than those who did not attend preschool, whereas attending preschool with a certificate or other degree qualified teacher was not associated with these benefits (Warren & Haisken-DeNew, 2013). Teachers in preschool in the French expansion study all had a university bachelor degree, whereas there is greater diversity in the qualifications of Australian preschool teachers. This aspect of quality may have been a contributing factor to the positive effects observed, though it is difficult to generalise from the teaching practices of the 1960s. Teachers with greater knowledge of early childhood development may be more attuned to children's learning and social-emotional development, which can foster improved outcomes for children (O'Connell et al., 2016).

In terms of curriculum, the studies reviewed provide little evidence of which specific elements are responsible for driving any benefits to children's development. Overall, it is suggested from the literature that preschool programs should be developmentally appropriate and focus on both learning and social-emotional development, with an emphasis on play based activities that allow children to lead their own learning, support for language and communication (e.g., shared reading activities), and opportunities to be physically active (O'Connell et al., 2016). Qualitative evidence from EPPE and EPPNI of 35 highly effective preschool sites is similarly suggestive of a number of these principles, as well as aligning with aspects of the NQF. This included maintaining a focus on both academic and social development, having a good balance of adult-led and free-choice activities, and teachers using strategies to extend children's thinking (Melhuish et al., 2006; Sylva et al., 2004).

A three-year-old preschool curriculum needs to be sequenced with the four-year-old preschool program

Programs need to be developmentally sequenced with consideration given to where children come from and where they are heading in their language and cognitive capacities and learning experiences. For example, Jenkins et al. (2016) showed that repeating the curricula for two years was less beneficial than providing a more educationally focused curriculum in the second year. However, it was difficult to disentangle this effect from peer effects as the more educationally focused program occurred in a more diverse and advantaged preschool group whereas the second year of Head Start was with similar, very disadvantaged children (Jenkins et al., 2016). Nevertheless, this study suggests that repeating the same curricula for two consecutive years is unlikely to benefit children.

Engagement and uptake of ECEC is important

As well as access to high quality services, consideration also needs to be given to the level of uptake of these services by children from the most vulnerable families and communities. Australian evidence suggests that despite the recent reforms providing access to 15 hours of preschool per week for all four-year-olds, the most disadvantaged children have the lowest uptake of this service (Baxter & Hand, 2013; O'Connor et al., 2016). These findings suggest that any extension of three-year-old preschool programs needs to be undertaken with careful consideration of how to engage vulnerable children and their families. Evidence from the Indigenous literature is helpful in highlighting the importance of providing a safe and welcoming setting for children and families (Harrison et al., 2012), and this necessity extends to all children, including those from Indigenous, disadvantaged, and English as a second language backgrounds, as well as for children with special educational needs. In addition, parents' underlying beliefs about the role and value of ECEC are also drivers of service uptake (Baxter & Hand, 2013), which can be targeted through social marketing (O'Connell et al., 2016).

Parental involvement is an important ingredient in many successful programs reviewed

Parental involvement in their children's ECEC is important. Regular parent involvement was an integral part of several successful early childhood education interventions, such as the High-Scope Perry Project and the Chicago Child-Parent Center Program (CPC), in recognition of the crucial role parents play in children's development. Both studies required parents to participate in the program for several hours per week. The CPC study found that parental engagement in the program was associated with a greater investment in children's learning in the school years. Although the studies were not able to disentangle parent from program effects, it is likely that parents' involvement was a key ingredient. An implication for the Australian context is that it would seem beneficial to actively involve parents, both formally and informally, in their child's preschool education. This echoes conclusions from the Indigenous literature (Higgins & Morley, 2014). As well, the provision of education and training for low-income parents would appear worthwhile, as occurred in both the Perry and CPC programs.

Do you believe in magic? Gains in preschool need to be sustained throughout the education system

To be effective in supporting children's learning and social emotional development, the gains achieved through three- and four-year-old preschool need to be consolidated and reinforced through continued high quality education in the primary and secondary school settings. Preschool programs cannot provide a once-off inoculation to the many adversities that children from disadvantaged backgrounds face, such as less access to health services or

experiences of discrimination. It is therefore unrealistic to expect the benefits of preschool programs to last indefinitely, particularly if children go on to attend poor quality schooling. Brooks-Gunn (2003) argued that:

“If policy makers believe that offering early childhood intervention for two years will permanently and totally reduce SES disparities in children’s achievement, they may be engaging in magical thinking. To paraphrase Edward Zigler, there is no quick fix, either in education or anyplace else” (p. 9).

Illustrating this, Currie and Thomas (2000) showed that benefits to test scores were more likely to fade out over time for children who went on to attend poor quality schools.

Some of the research reviewed in this report speaks to the benefits of developing a sequenced, integrated program from preschool to school, as one strategy to maintain gains achieved through ECEC. Jenkins et al. (2016) showed that children’s exposure to a more educationally focused curriculum at four years was of greater benefit than a second year of Head Start, suggesting that preschool education at age four should endeavor to build upon and extend children’s experiences in three-year-old preschool. Secondly, the Child-Parent Center program extended into the first year of elementary school with the aim of consolidating the gains made from preschool. As well as developing a consistent learning environment for children from preschool to school, the CPC kindergarten environment typically had reduced class sizes (no more than 20 children) and teacher aides to assist teachers (i.e., smaller teacher-child ratios). Although it is difficult to untangle whether these strategies specifically were adding to the effectiveness of these programs, they provide examples of where consideration has been given to sustaining and maintaining benefits over time.

6.5 Developing research infrastructure to inform an evidence base for three year old preschool

As discussed earlier, many studies reviewed took place in very different contexts and cultures to Australia, and it is difficult to ascertain whether a similar provision of ECEC would have the same benefits in the Australian setting. There are a number of reasons for this, including the relative heterogeneity in the Australian ECEC system and that many studies relevant to the provision of three-year-old preschool were undertaken several decades ago. Hence, while there is fairly consistent evidence that three-year-old preschool benefits disadvantaged children, the differences to the Australian context make it difficult to draw lessons for policy development. Therefore, a strategic approach to improving the Australian evidence base around three-year-old preschool is needed. Below we outline some opportunities to address this evidence gap.

Making best use of existing resources

There are a number of opportunities to address the gap in the Australian evidence base without investing in new data collections. Supporting work to undertake research with existing longitudinal data sets to examine the potential benefit of three-year-old preschool in the Australian context is important. *Growing up in Australia: The Longitudinal Study of Australian Children* (Edwards, 2014) provides detailed information that would enable a considerable expansion of the evidence base, including addressing questions such as:

- Do Australian children benefit from attending preschool at age three?
- Are the benefits of preschool attendance at age three higher for children from disadvantaged families (e.g. low socio-economic status, culturally and linguistically diverse families, Indigenous families, etc.)?

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- Do the number of hours that children spend in educational programs at age three make a difference for later development?
 - What other elements of early childhood education programs (at age 2-3 and 4-5) make a difference for later cognitive outcomes (e.g., teacher qualifications, hours per week, teacher-child relationships, balance between child initiated and group based teacher initiated activities)?

Although the LSAC children were involved in preschool after the new National Quality Framework was introduced (in 2012), LSAC provides teacher-reported information about educator qualifications, educator to child ratios; and to some extent staffing arrangements at the program children attended. Teacher-reported information in LSAC can be used to examine how specific elements of the National Quality Standard are related to later developmental outcomes (see Appendix A), including educational program and practice (QA1), the physical environment (QA3), staffing arrangements (QA4), relationships with children (QA5), collaborative partnerships with families and communities (QA6) and leadership and service management (QA7).

Another existing study that has the potential to inform contemporary policy thinking is the E4Kids study (Tayler et al., 2016). The E4Kids study followed a sample of almost three thousand children from Victoria and Queensland in major cities and regional areas for five years from 2010 (also prior to the implementation of the National Quality Framework). While limited to Victoria and Queensland, the study provides detailed assessments of a variety of quality indicators and provides further opportunity to learn about three year old preschool in a contemporary Australian context.

The Productivity Commission inquiry recommended that the Australian Government establish a program to link information for each child from the National ECEC Collection to information from the Child Care Management System, the AEDC, and NAPLAN testing results to establish a longitudinal database (Productivity Commission, 2014). Such a database would provide more contemporary information about three year old preschool, although the extent to which quality in preschool provision and the type of education provided can be captured using administrative data systems is yet to be established.

Investing in new resources

In addition, new data could be collected as part of existing longitudinal studies. In a recent review of the impact of early childhood education and care on learning and development, the Australian Institute of Health and Welfare (AIHW, 2015) recommended that:

“Even with the ongoing fiscal pressures on all levels of government in Australia, the benefits of recruiting a new birth cohort of children into the LSAC and testing the comparative learning and developmental outcomes for participants and non-participants would shed considerable light on the impact of the National Quality Framework. It would be of great interest to be able to compare the findings of a post-Framework study with the existing cohorts. A longitudinal study could also provide insight into the durability of benefits of universal preschool for Australian children” (p. 23).

A trial of three-year old preschool provision

The evidence reviewed to date does not provide sufficient evidence to provide a nuanced policy design for the implementation of three-year old preschool provision in Australia. The most robust evidence for policy development would be from a randomised trial of three-year old preschool. The following design elements would need to be considered:

- Specific focus on Indigenous children and Indigenous-inclusive practice;
- Variation in the quality of care (e.g., highly trained teachers compared to care as usual);
- Variation in the hours provided (e.g., fifteen hours per week compared to thirty hours per week);
- Variation in the curriculum (e.g., specifically designed three-year old curriculum compared to care as usual); and
- Variation in the proportion of disadvantaged peers in classrooms (e.g., one third disadvantaged children compared to two-thirds disadvantaged children)¹².

If there are already existing investments in linked administrative data resources then data collection for such a trial would simply augment information already collected. Linked administrative data resources such as NAPLAN would provide longer-term benchmarks for children's academic achievement. A new cohort of LSAC would provide additional information about children's development and quality within centres, with detailed assessment of these factors incorporated into the data collection.

For considered policy design and implementation a trial rather than immediate rollout has a number of advantages beyond providing a nuanced and robust evidence base. It is unclear that there would be sufficient staff with early childhood education qualifications to support a national implementation of three-year-old preschool. Significant numbers of new educators would need to be trained over a period of a few years given that the evidence suggests that highly trained staff is an important prerequisite for positive long-term outcomes. Work would also need to be undertaken to evaluate whether there would be sufficient preschool and long day care centres to accommodate large numbers of three-year-olds. A trial of three-year-old preschool provision that focuses on the most disadvantaged children with an experimentally controlled mix of more advantaged children in the same centres could provide the evidence base to inform a more effective national implementation of three-year-old preschool (in some form) in the future. In planning these evaluation efforts, projects should be designed to allow for cost-benefit analysis to aide decision making (Wise, da Silva, Webster, & Sanson, 2005).

6.6 Key recommendations

From the evidence examined, the following recommendations are suggested:

- The evidence is clear that disadvantaged children have the most to gain from high quality ECEC programs, and disadvantaged children (including those from low SES, CALD, and Indigenous families) would therefore benefit from the provision of high-quality three year-old preschool. Preschool programs need to be of the highest quality

¹² Consideration would need to be given about the optimal sites for a trial. Demonstration projects could extend access to three year-old preschool in a small number of strategically chosen areas, such as those with low SEIFA and low AEDC results. Taking an area-based approach rather than screening children for eligibility based on disadvantage would help to ensure a degree of social diversity in centres and that participation does not attract stigma.

when they are targeted to disadvantaged children to achieve the desired long-term benefits.

- Australian evidence should be gathered to determine whether extending universal access to all three-year-old children would yield further benefits. The evidence base is currently not definitive on whether more advantaged children also benefit from high quality three-year-old preschool.
- Programs should have a reasonable dosage of at least 20-30 hours per week across school terms.
- Programs should have a well thought through curriculum that is sequenced into four year-old programs and primary school.
- Preschools should provide culturally appropriate settings for children from diverse backgrounds, including those from Indigenous, disadvantaged, and English-as-a-second-language families, and children with special educational needs.
- Teachers require appropriate qualifications and training, and further efforts are needed to up-skill the workforce.
- High quality evaluation should be embedded within any changes to the provision of preschool in order to demonstrate effectiveness against both participation in other types of ECEC and home-only care. An important component of the evaluation would be measuring success in promoting uptake of the services by the most vulnerable children in the community.

6.7 Conclusions

Early childhood education and care provides a powerful opportunity to improve early childhood development and promote stronger educational and occupational pathways for children over the life course (O'Connell et al., 2016). Recent policy developments in Australia have taken significant steps in building on this potential (Australian Government Department of Education and Training, 2016). It is now timely to look for further opportunities to capitalise on the ECEC platform. Extending access to preschool programs for three-year-old children is one such opportunity. This critical review of the evidence base relating to preschool provision for three-year-old children highlights a number of issues with the research conducted to date: it is clear that more local, contemporary data that can directly inform the Australian situation is needed. Even so, the international evidence has consistently observed across many countries that children from the most disadvantaged backgrounds have the most to gain from high quality preschool programs. Next steps should focus on enhancing the evidence base, particularly by embedding evaluation processes into any changes to the provision of preschool for three-year-olds, taking into account quality, equity, and implementation issues.

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8 Appendix A: How LSAC data ties in with the National Quality Framework

LSAC provides teacher-reported information about educator qualifications, educator to child ratios; and to some extent staffing arrangements at the program children attend.¹³ Teacher-reported information in LSAC can be used to examine how specific elements of the new National Quality Standard are related to later developmental outcomes. Educators are asked questions related to:

- **Educational program and practice (QA1):** How often children do teacher-directed whole group activities, teacher-supported small group activities, teacher-supported individual activities and child-initiated activities; How often children use a computer; How much time children spend watching TV/DVDs; How much time an educator spends reading or singing songs to children; How often the children use worksheets to practice literacy or numeracy skills.
- **The physical environment (QA3):** If sufficient space is available so that independent learning areas for children can be developed; if there is adequate space for a permanent quiet time/rest area for children; if resources are easily accessed to develop activities in response to children's interests; if children are able to access a range of different art and writing materials, books, and other materials to support fine motor and problem-solving skill development and gross motor skill development.
- **Staffing arrangements (QA4):** Educators are asked about the number of adults in paid positions that are typically in their group at a time when most children have arrived; and how many of those staff have a certificate, diploma or Degree level qualification.
- **Relationships with children (QA5):** Educators are asked to complete the *Student-Teacher Relationship Scale (STRS)*, which measures a teacher's perception of conflict, closeness, and dependency with a specific child.
- **Collaborative partnerships with families and communities (QA6):** Educators are asked about practices they use to involve parents (e.g., Parent orientation activities; Parent participation (e.g., as a volunteer); Formal parent-teacher meetings; Parent education programs or information sessions; Social activities for parents that promote contact or support; Regular newsletters)
- **Leadership and service management (QA7):** Whether staff can rely on colleagues for support and assistance when needed; if staff have a clear understanding of their roles and responsibilities; if staff are able to contribute to decision-making about policies and practices in the centre/school; if staff go about their work with enthusiasm; whether their personal philosophy and goals are in agreement with those of the centre/school; and whether the centre/school environment provides a positive working environment for staff.

However, it should be noted that educators are not asked specific questions about children's health and safety (QA2).

¹³ Educators are asked about the number of children and staff in the child's room, but not the total number of children and staff at the ECEC service.

9 Appendix B: Summary of studies examined

Table A1. Summary of studies examined

Name of program / study	Country	Year/s of preschool exposure	Study type	Sample size	Representativeness	Service description	Targeted or universal	Main outcomes	Effects of 3 year old preschool	Effects for disadvantaged children	Key limitations	Additional considerations
Effective Provision of Preschool Education (EPPE)	England	1997 - 1999	Longitudinal cohort study	3171	Limited to six English Local Authorities More disadvantaged children somewhat overrepresented	Children came from 141 ECEC sites. This included: Integrative centres (centres that combine education and care); Nursery schools; Nursery classes; Playgroups; Local authority day nurseries; and Private day nurseries.	Universal	Cognitive/academic and behavioural development, from school entry to 16 years of age	The duration of attendance is important with every month of preschool experienced after age 2 years linked to better cognitive and behavioural outcomes. This effect was stronger for cognitive than behavioural outcomes. Quality was also important in promoting positive outcomes.	All children benefited from preschool. Some evidence that high quality preschool had a greater benefit for disadvantaged children. Clustering of disadvantaged children in centres related to poorer outcomes.	Did not recruit home-only group until school entry. Comparisons with the home only group can only be made with caution, given that these children differ on many measured (and likely unmeasured) characteristics.	Preschool exposure occurred almost 20 years ago, and there have been significant developments in the ECEC sector both in Australia and UK since this time.
Effective Provision of Preschool in Northern Ireland (EPPNI)	Northern Ireland	1998-2001	Longitudinal cohort study	837	Cohort study with randomization of recruitment sites and children within sites. No specific data provided on representativeness.	Different types of ECEC settings examined included: playgroups, private day nurseries, nursery classes/schools, and reception classes and groups.	Universal	Cognitive and behavioural outcomes up to Grade 3	Attendance at higher quality preschool was related to stronger outcomes for children, but the effects of 3 year old programs were not specifically examined.	Disadvantaged children had stronger outcomes when they attended centers that included children from a mix of social backgrounds, rather than clustering with other disadvantaged children.	Did not recruit home-only group until school entry. Comparisons with the home only group can only be made with caution, given that these children differ on many measured (and likely	Preschool exposure occurred almost 20 years ago, and there have been significant developments in the ECEC sector both in Australia and UK since this time.

Name of program / study	Country	Year/s of preschool exposure	Study type	Sample size	Representativeness	Service description	Targeted or universal	Main outcomes	Effects of 3 year old preschool	Effects for disadvantaged children	Key limitations	Additional considerations
									There were no consistent effects of duration of preschool attendance, possibly due to low variation in duration in this sample.		unmeasured) characteristics.	
Norwegian expansion of preschool	Norway	1970-1979	Natural experiment	499,026 children, 414 municipalities	Full population, excluding children of unmarried mothers (8%). These children were excluded as cohabiting and single mothers could not be differentiated.	Examined rates of participation in child care across municipalities.	Universal	Educational attainment, earnings, welfare, and household type at 30-33 years of age	Effects for 3 year old children not specifically examined. However, results for children aged 3-6 suggest positive effects of universal preschool access on all outcomes examined.	Disadvantaged children may be somewhat underrepresented in this data. Effects on educational attainment were greater for children of lower educated mothers.	Potential differences between treated and untreated municipalities.	Exposure to preschool occurred in 1970's. Norway may have other relevant policy differences that limit generalizability, such as parental leave entitlements.
Expansion of access to preschool in France	France	1960s to 1970s	Longitudinal Cohort Study	Ranges from 5,843 to 51,255 depending on the outcome being analysed	Nationally representative sample	Preschool program, 6 days per week, delivered by a teacher with a bachelor degree	Universal	Test scores at sixth grade; Number of grade repetitions at age 11 and 16; likelihood of high school graduation; and wages in adulthood	Compared to children who started preschool at age 4, children who started preschool at age 3 had significantly higher test scores in the sixth grade; significantly lower number of grade repetitions	The positive effect of preschool attendance is almost entirely driven by children from middle and lower social classes, with almost no benefit for those from upper social groups.	Unable to identify which specific aspects of the program are effective in improving outcomes, or identification of what exactly changes for the children who have attended preschool (e.g. stronger social	Age of study (children attended preschool in the 1960's and 1970's), Differences in dosage (4 days per week, 6 hours per day).

Name of program / study	Country	Year/s of preschool exposure	Study type	Sample size	Representativeness	Service description	Targeted or universal	Main outcomes	Effects of 3 year old preschool	Effects for disadvantaged children	Key limitations	Additional considerations
									at age 11 and at age 16; and were significantly more likely to graduate from high school. Those who attended preschool for 3 years rather than one had higher monthly wages (3.6% on average).		skills, greater rule abiding conduct).	
Head Start Impact Study (HSIS)	USA	2002	Randomised controlled trial	2559 three year olds (1539 in the Head Start group and 1029 in the Control group); 2108 four year olds (1253 in the Head Start group and 855 in the Control group)	Children from severely disadvantaged families (below the poverty line), residing in 23 states across the USA	Educational, social, medical, dental, nutritional and other services	Targeted	Cognitive development, socio-emotional adjustment, physical health, parents' parenting practices	<i>Looking at cognitive and socio-emotional outcomes:</i> at three years: numerous positive effects on language and mathematics outcomes; fewer hyperactive behavior problems at four years: better literacy and phonological processing; better social skills/positive approaches to learning	Due to the nature of the sample, all results apply to disadvantaged children. Results were stronger for children from higher risk families.	The curriculum was quite broad which may have diluted its effectiveness; Curriculum content differed across centres; Centre quality varied, but was not examined or controlled in the study; The study design permitted Control group members to enter Head Start at 4, and the Head Start group to move to another type	Three year-old children generally attended Head Start for the whole a day, five days per week (i.e. 30 or more hours per week)

Name of program / study	Country	Year/s of preschool exposure	Study type	Sample size	Representativeness	Service description	Targeted or universal	Main outcomes	Effects of 3 year old preschool	Effects for disadvantaged children	Key limitations	Additional considerations
									<p>at end Kindergarten</p> <p>Poorer maths skills; fewer hyperactive behavior problems; better social skills/positive approaches to learning</p> <p>at end Grade 1</p> <p>Better oral comprehension</p> <p>at end Grade 3</p> <p>More likely to have repeated a school year; better social skills/positive approaches to learning.</p>		<p>of program making it difficult to clearly assess the Head Start's effectiveness;</p> <p>Due to the study design, not possible to examine 'dosage' effects (total years of exposure to Head Start).</p>	
High Scope Perry Preschool Study	USA	1962-1967	Random assignment to intervention and control groups	n = 58 Perry Preschool group; n = 65 Control group	African-American ethnic background, IQs between 70 and 85, low-income households, all residing in Ypsilanti, Michigan	Personal initiative, social relations, logic and mathematics, language and literacy creativity,	Targeted	Cognitive development; school achievement, socio-emotional wellbeing; adult occupational outcomes	<p>Initial IQ gains</p> <p>Higher achievement throughout elementary and secondary school</p> <p>Fewer placed in special education classes</p> <p>Higher rates of on-time secondary</p>	Due to the nature of the sample, all results apply to disadvantaged children	<p>Very small sample size</p> <p>Age of study (conducted in 1960s). Social and policy environments have changed substantially</p> <p>Low IQ sample (70-85)</p> <p>All children of African-American</p>	<p>Highly qualified staff;</p> <p>small adult-child ratios;</p> <p>weekly home-visits to parents</p>

Name of program / study	Country	Year/s of preschool exposure	Study type	Sample size	Representativeness	Service description	Targeted or universal	Main outcomes	Effects of 3 year old preschool	Effects for disadvantaged children	Key limitations	Additional considerations
									<p>school completion and higher grade-point average achieved</p> <p>Higher literacy in early adulthood</p> <p>Higher employment rates, income levels at 40 years</p> <p>Fewer engaged in criminal behavior at 40 years</p>		ethnic background	
Chicago Child-Parent Centers	United States of America	Three and four years, plus kindergarten elementary school year	Intervention group and matched comparison group	n = 989 CPC intervention group; n = 550 comparison group	Children from severely disadvantaged Chicago neighbourhoods	<p>Children's reading and language skills,</p> <p>Parental involvement,</p> <p>Health and other services, free breakfasts and lunches</p>	Targeted	School readiness; school achievement and progress; parental participation; socio-emotional wellbeing; early adult outcomes over various areas of life	<p>Higher school readiness</p> <p>Higher school achievement in elementary and secondary school</p> <p>Less need for special education, fewer repeated a grade</p> <p>Higher rates of secondary school completion; higher grade point average</p> <p>Fewer engaged in criminal behavior through</p>	Due to the nature of the sample, all results apply to disadvantaged children.	More than 90% of study participants were of African-American ethnic background	<p>Highly qualified teaching staff plus a teacher aide, as well as additional support staff</p> <p>Support for and education for parents to underpin compulsory parental involvement</p> <p>Extension of the CPC program into the first year of elementary school to consolidate gains</p>

Name of program / study	Country	Year/s of preschool exposure	Study type	Sample size	Representativeness	Service description	Targeted or universal	Main outcomes	Effects of 3 year old preschool	Effects for disadvantaged children	Key limitations	Additional considerations
									adolescence and early adulthood Less substance abuse Better occupational outcomes in early adulthood			