

# Promoting equity for multilingual children in early childhood

Research report

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# The Australian Education Research Organisation (AERO) is Australia's national education evidence body, working to achieve excellence and equity in educational outcomes for all children and young people.

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## Acknowledgement of Country

AERO acknowledges the Traditional Custodians of the lands, waterways, skies, islands and sea Country across Australia. We pay our deepest respects to First Nations cultures and Elders past and present. We endeavour to continually value and learn from First Nations knowledges and educational practices.

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## Acronyms

Acronym	Full term
AEDC	Australian Early Development Census
AME	average marginal effects
AvEDI	Australian version of the Early Development Instrument
CALD	culturally and linguistically diverse
CCB	Child Care Benefit
CCMS	Child Care Management System
EAL/D	English as an Additional Language or Dialect
ECEC	early childhood education and care
EYLF V2.0	Early Years Learning Framework Version 2.0
FaFT	Families as First Teachers
I-EAL/D	Indigenous English as an Additional Language or Dialect
IRSD	Index of Relative Socio-economic Disadvantage
LBOTE	Language Background Other Than English
LSAC	Longitudinal Study of Australian Children
LSIC	Longitudinal Study of Indigenous Children
MADIP	Multi-Agency Data Integration Program
MSI	Multiple Strengths Index
NQS	National Quality Standard
PIT	Personal Income Tax
SEIFA	Socio-economic Index for Areas
SES	socio-economic status
VIF	Variance Inflation Factor

## Glossary

Term	Definition
Culturally and linguistically diverse (CALD)	<p>A widely used term in Australian policy with a variety of definitions, CALD usually refers to migrant and refugee populations whose country of birth is not Australia and who speak a language other than English (Pham et al., 2021).</p> <p>Recognising the linguistic and cultural heritage of the First Nations people of this continent, AERO refers to multilingual Aboriginal and Torres Strait Islander children and families separately from CALD children and families in this report.</p>
Developed English proficiency/proficient in English	<p>A term this report uses to refer to children from a Language Background Other Than English (LBOTE) whose teacher rated their English proficiency as ‘well’ or ‘very well’ on the Australian Early Development Census (AEDC). These children may or may not be learning English as an Additional Language or Dialect (EAL/D).</p>
Emerging multilingual children	<p>A term used in this report to refer to children from a Language Background Other Than English whose teacher rated their English proficiency ‘poor’ on the AEDC.</p> <p>Goldfeld and colleagues (2014) used the term ‘emerging bilingual’ to describe this population in their analysis of the AEDC data. The use of the word ‘emerging’ acknowledges their home language ability rather than only describing their difficulties with English.</p> <p>We adopted ‘multilingual’ (rather than ‘bilingual’) to recognise that children in this cohort may be learning more than 2 languages (for example, see Verdon &amp; Mcleod, 2015).</p> <p>The AEDC contains 2 measures of English proficiency: listening and spoken proficiency. We use proficiency in English listening as our primary measure to define whether a child is emerging as multilingual. These children may be proficient in one or more languages other than English. Not all emerging multilingual children were considered by their teacher to be learning English as an Additional Language or Dialect.</p>
English as an Additional Language or Dialect (EAL/D)	<p>A term used to define those whose first language is a language or dialect other than English and who require additional support to develop proficiency in Standard Australian English (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2023). Not all children from a Language Background Other Than English are considered EAL/D learners; some are learning English as their primary language.</p> <p>This term can refer to First Nations children, who are alternatively described by the term ‘Indigenous English as an Additional Language or Dialect’ or ‘I-EAL/D’ learners.</p>



Term	Definition
Indigenous English as an Additional Language or Dialect (I-EAL/D)	A term used to differentiate First Nations children learning English as an Additional Language or Dialect and children of non-English speaking migrant backgrounds. I-EAL/D learners may speak traditional languages and/or 'new languages', which include contact languages like Kriol and Yumplatok (AIATSIS & ANU, 2020).
Language Background Other Than English (LBOTE) or Multilingual children	<p>A broad term used in Australian education data collections. It refers to children from households where at least one parent speaks a language other than English at home. English may also be spoken in the home in addition to other languages, and in some cases the child will be fluent in English. The LBOTE designation does not capture children's proficiency in their home language or in English. This term includes First Nations children, and children born in Australia and overseas.</p> <p>This report follows the AEDC definition of LBOTE children as children who speak a language other than English at home, or who speak English at home but are considered EAL/D.</p>



# Executive summary

## Overview

Achieving equitable learning and development outcomes for young children in Australia is a common goal for governments, peak bodies and providers. However, identifying which policy settings and practices best achieve equity for different priority cohorts is challenging.

This report provides system decision-makers with insights about the early childhood education and care (ECEC) experiences that appear to contribute to more equitable outcomes for a priority cohort who are disproportionately developmentally vulnerable – multilingual children who are not yet proficient in English in their first year of school, or ‘emerging multilingual children’.

Australian ECEC settings are increasingly linguistically diverse. About 1 in 4 children in Australia (including First Nations children) speaks a language other than English at home (Department of Education, Skills and Employment [DESE], 2022). On average, multilingual children are thriving according to the Australian Early Development Census (AEDC). Yet those who are not yet proficient in English in their first year of school experience developmental vulnerability at significantly higher rates than their multilingual peers.

It is well understood that multilingual children thrive when they are supported to maintain and develop their home language(s) alongside learning English (Eisenclas et al., 2013). The Early Years Learning Framework V2.0 (EYLF V2.0) describes ways teachers and educators can affirm children’s home languages and cultural identities towards their successful learning, development and wellbeing in each of the 5 learning outcomes (Australian Government Department of Education [AGDE], 2022). However, there is limited research on the experiences of multilingual children in Australia in their early years, and how ECEC could improve outcomes for those being left behind.

The Australian Education Research Organisation (AERO) used linked national early childhood datasets to explore which experiences – in and out of ECEC – facilitate better outcomes for emerging multilingual children. We analysed data from the Multi-Agency Data Integration Program (MADIP), First Five Years: What makes a difference? (2019), in the Australian Bureau of Statistics DataLab. This covered about 70,000 observations of children with Language Background Other Than English (LBOTE) and 4,000 observations of emerging multilingual children. The results represent only correlations and not causation.

## Key findings

### **Multilingualism is a strength, but emerging multilingual children face challenges, some of which are unrelated to language**

Multilingual children typically perform as well as or better than their monolingual peers on a range of academic, social and emotional measures (Fox et al., 2019). Evidence suggests these advantages can be lifelong, extending well beyond linguistic outcomes (Byrd, 2012; Fox et al., 2019; Pliatsikas et al., 2020). However, multilingual children are a diverse cohort, with varying academic, social and emotional experiences.

Multilingual children who are First Nations or who are not proficient in English in their first year of school (emerging multilinguals) face multiple challenges. Our analysis found, compared with other multilingual children, emerging multilingual children were more likely to:

- be first-generation migrants; live in regional or remote areas; and/or live in families with lower socio-economic status (SES) and/or disposable incomes
- have parents with lower levels of education, English proficiency, and involvement at school; and are less likely to have parents who regularly read to them at home
- experience a higher incidence of emotional or behavioural challenges and other impairments, including physical disabilities.

Some of these challenges are related to language; others the result of intersecting factors associated with experiences of disadvantage or discrimination, which First Nations multilingual children experience at higher rates. These challenges can contribute to developmental vulnerability in their first year of full-time school.

### **Emerging multilingual children participate in ECEC at lower rates but may have more to gain from an early start**

We found emerging multilingual children who had more than one year of ECEC prior to starting school had better outcomes on the AEDC domains than their peers who received informal care without ECEC. Our results also suggested there are additional benefits for these children compared with emerging multilingual children with only one year of care.

Unfortunately, emerging multilingual children were less likely than other multilingual children to use ECEC in the early years (between 2013 and 2016). This was often associated with intersecting disadvantages, with multilingual children from low-SES and remote areas, and children from migrant families who experienced resettlement difficulties less likely to participate in ECEC. Among emerging multilingual children, living remotely was the most powerful driver of non-participation in ECEC. These findings suggest that targeted initiatives that address cost and geography-based access barriers could improve participation for emerging multilingual children.

Emerging multilingual children were also less likely than their multilingual peers to use ECEC in the year before school (in 2017). Overall, efforts to improve participation need to start earlier, where gaps in participation for emerging multilingual children are the greatest.

## **An early start in family day care followed by 4-year-old preschool appears to be a uniquely beneficial pathway**

A complex combination of factors influences the effect of ECEC on children's learning and development. While some factors – especially ECEC quality – matter for all children, our analysis points to factors that may especially benefit emerging multilingual children.

Our findings suggest that family day care may be an important complement to preschool for emerging multilingual children.

When we analysed children's pathways from one ECEC setting to another, we found that emerging multilingual children had better outcomes when they participated in family day care in the early years (between 2013 and 2016), followed by standalone preschool in the year before school (2017). This combination of settings appears to benefit children's Language and Cognitive Skills (school-based), strengths – measured by the Multiple Strengths Index (MSI) – and Social Competence on the AEDC more than any other combination of participation. Other pathways also benefit emerging multilingual children, but results suggested to a lesser extent. For example, family day care followed by standalone preschool was associated with an increase in Language and Cognitive Skills (school-based) scores between 1.2 to 2 times larger than for those children using long day care followed by standalone preschool.

We hypothesise several reasons for the beneficial pathway from family day care into preschool for emerging multilingual children:

- Family day care may provide a 'soft entry point' for emerging multilingual children into education settings.
- Many family day care educators are multilingual, making them well-placed to support the child's learning and maintenance of their home language and culture.
- Very young emerging multilingual children may benefit from a small group experience, before they transition into a larger setting.
- The composition of family day care groups – which are often multi-age and may include siblings or other emerging multilingual children – may also play a role.
- Family day care/preschool settings may be uniquely complementary. For example, unlike a child who took the family day care into standalone preschool pathway, a child under 3 who participated exclusively in family day care until they started school did not have significantly different outcomes from a child who had no ECEC at all. Similarly, one year of standalone preschool in the year before school appeared less beneficial than multiple years of ECEC.

## Recommendations

Based on the findings, we identify 6 key opportunities for policymakers, peak bodies and providers to target strategies for improving outcomes for multilingual children through ECEC. These are:

1. Explore strategies that remove cost barriers to multilingual families' early participation in ECEC, especially for low-income and regional and remote families.
2. Ensure policy and planning for provision recognise the potential benefits of family day care followed by preschool participation for multilingual children experiencing disadvantage.
3. Ensure engagement with multilingual families addresses the intersecting factors related to disadvantage, connecting them with a range of relevant supports.
4. Ensure outreach with families helps them understand how earlier participation in high-quality ECEC can benefit their child. Facilitate better access where possible.
5. Actively build connections between standalone preschool, family day care and long day care settings in the same area to facilitate effective transitions between complementary setting types known to benefit emerging multilingual children.
6. Support quality improvement across all setting types, such as reciprocal learning for educators, teachers and leaders about effective practices for supporting emerging multilingual children and their families.

### Recommendations for further research

Further research could explore the following questions:

- Why do some combinations of ECEC settings appear to be more beneficial than other pathways for some children?
- What role does quality play in the relationship between ECEC participation and outcomes? Are there specific aspects of quality that matter more for outcomes than others? How do these relationships vary depending on children's backgrounds?
- How could family preferences related to child rearing, language use, cultural practices and expectations of education inform policymakers, providers, teachers, and educators on how our ECEC system can better engage families from diverse backgrounds?

Answering these questions could assist policymakers, peak bodies, providers, teachers and educators in understanding how ECEC can contribute to more equitable outcomes for multilingual children.

For example, understanding more about family preferences, and why some children seem to benefit more from specific pathways, would allow better engagement and targeted policies to improve access and participation. Understanding the aspects of quality that matter most could assist with spreading practices that work, ensuring children and families are well-supported in whatever setting they choose.

# 1. Introduction

Lifting participation and outcomes for First Nations children<sup>1</sup> and children across culturally and linguistically diverse (CALD) communities is a priority for Australian ECEC (Nous Group, 2020). At the same time, the richness of cultural and linguistic diversity in Australian society presents challenges for identifying which policy settings and practices will have the greatest impact. Close analysis of relevant data and evidence is needed to identify promising approaches that deliver benefits for specific groups.

Proficiency in English is a key factor in how children and families engage with the ECEC system, and the outcomes that this engagement helps to achieve. In the 2021 AEDC National Report, children identified as having LBOTE who were not yet proficient in English in their first year of full-time school (emerging multilingual children) had high rates of developmental vulnerability across all domains (DESE, 2022).<sup>2</sup> Despite improved outcomes for other LBOTE children, developmental vulnerability among emerging multilingual children has remained at similar levels for over a decade and shows no signs of abating (DESE, 2022).

Our study used linked national data to examine enablers of positive learning and development outcomes for emerging multilingual children, within the larger cohort of LBOTE children. We analysed how children's background characteristics and patterns of participation in ECEC relate to their outcomes, to identify factors that might assist policymakers, peak bodies and ECEC providers in decisions about policies, programs and other interventions aimed at supporting this cohort.

Our research aimed to answer the following questions, which were informed by consultation with governments and ECEC sector leaders:

- How does proficiency in English relate to learning and development outcomes for multilingual children in Australia at the time they start school?
- How does English proficiency relate to use of ECEC services by multilingual children overall?
- Which types of ECEC use are linked to better outcomes for emerging multilingual children?

Our analysis explored differences in the backgrounds, experiences and resources among multilingual children, comparing emerging multilingual children with their more English-proficient LBOTE peers, focusing on understanding strengths and the conditions that support positive outcomes for emerging multilingual children.

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1 Who often speak Aboriginal or Torres Strait Islander traditional languages, new languages (such as Kriol and Yumplatok) or Aboriginal Australian English.

2 All domains except Communication Skills and General Knowledge, which is not reported for this cohort because it overlaps with English proficiency.

## The Australian Early Development Census

The outcomes used in this report are drawn from the AEDC. The AEDC is a nationwide census of early childhood development that provides a snapshot of how Australia's children are faring at the community and population level. The AEDC domains have been shown to predict children's later outcomes in health, wellbeing and academic success. As such, it can provide evidence to support policy, planning and action for health, education and community support.

The AEDC data is collected using the Australian version of the Early Development Instrument (AvEDI) in a child's first year of full-time school. Based on their knowledge and observations of children in their class, teachers respond to approximately 100 questions across the 5 domains of the AEDC (Box 1). These teacher-responses are combined into a score for each child on the 5 AEDC domains. Using benchmarks calculated in 2009, children are then classified to be 'developmentally on track', 'developmentally at risk' or 'developmentally vulnerable' on each domain.

### Box 1: The 5 AEDC domains and the Multiple Strengths Index (MSI)

There are 6 measures of learning and development outcomes available in the AEDC. Of these, 5 are specific measures of different 'domains', with the 6th being a general combination of those 5 domains that measure a child's overall strengths. The 5 domain scores range from 0 to 10.

The **Language and Cognitive Skills (school-based)** domain measures a child's basic literacy, advanced literacy, basic numeracy, and interest in literacy, numeracy and memory.

The **Communication Skills and General Knowledge** domain measures a child's communication skills and general knowledge based on broad developmental competencies and skills.

The **Social Competence** domain measures a child's overall social competence, responsibility and respect, approach to learning and readiness to explore new things.

The **Emotional Maturity** domain measures a child's prosocial and helping behaviours, and absence of anxious and fearful behaviour, aggressive behaviour and hyperactivity and inattention.

The **Physical Health and Wellbeing** domain measures a child's physical readiness for the school day, physical independence, and gross and fine motor skills.

The **MSI** combines some information from all 5 domains into a general measure of a child's strengths. Unlike the domains, the MSI is on a scale from 0 to 100.

## Overview of LBOTE children in Australia

Children from Language Backgrounds Other Than English are a significant and diverse group, reflecting the increasing diversity of the Australian population:

- More than 1 in 4 children in Australia speaks a language other than English at home (DESE, 2022). This is similar to the proportion of adults (Australian Bureau of Statistics [ABS], 2021a).
- Among Australia's First Nations children, up to 1 in 4 speaks a First Nations language variant at home (Department of Social Services, 2020).<sup>3</sup> Brinkman et al. (2012) found that in the 2009 AEDC, 1 in 5 First Nations children was classified as an EAL/D learner by their teacher. Among First Nations children within the Footprints in Time: The Longitudinal Study of Indigenous Children (LSIC), up to 8 languages were spoken (McLeod et al., 2014).
- Over 50% of Australians were born overseas or have a parent born overseas, and more than 300 languages are spoken in Australian households (ABS, 2021a, 2021b).
- Between 2009 and 2019, about 41% of all recent arrivals (migrants who arrived to live in Australia for more than 1 year) spoke English as their main language at home. Almost half of recent arrivals did not speak English well or at all when they first arrived in Australia. Of recent arrivals on humanitarian visas, 95% spoke a language other than English at home, and about 70% were not yet proficient English speakers (ABS, 2019).

In our sample<sup>4</sup> using 2018 data in MADIP First Five Years, 67,817 children came from an LBOTE (22% of all children) using the LBOTE indicator in the AEDC. Of these, 4,243 (6.25%) were emerging multilingual children using our definition. A sizeable minority (12%) of emerging multilingual children were considered LBOTE but not learning EAL/D. That is, these children are reported as speaking English as their first language and having a poor English proficiency.

### Multilingualism and First Nations children

First Nations children speak a diverse set of languages in Australia ([Box 2](#)). These languages play a pivotal role in Indigenous children's engagement and achievement in education (AIATSIS & ANU, 2020). The right of Indigenous children to use Language (home languages) is enshrined in both EYLF V2.0 (AGDE, 2022) and the United Nations Convention on the Rights of the Child (1989).

<sup>3</sup> This study estimated up to 1 in 4 children spoke First Nations language or creole at home in 2015. However, the authors noted that due to the collection method, certain language groups may be over-represented so the language use in this survey cannot be understood in terms of population prevalence (Department of Social Services, 2020).

<sup>4</sup> These figures differ to the sample size in the underlying 2018 AEDC dataset because some children in the AEDC are not linked to MADIP. For example, there are 78,298 LBOTE children in the 2018 AEDC dataset (DESE, 2022). In our regression results, we only include children if no parent speaks English as their primary language.



## Box 2: Languages spoken by First Nations children

The National Indigenous Languages Report (2020) shows that Aboriginal or Torres Strait Islander people who have Language Backgrounds Other Than English include speakers of:

- » First Languages or traditional languages – languages spoken by First Nations people prior to colonisation. Almost 10% of First Nations people are reported to be speaking a traditional language at home. Of 141 Aboriginal and Torres Strait Islander language varieties in the study, 123 are in use but only 12 are spoken fluently by all generations.
- » New languages or creoles (such as Kriol and Yumplatok) – languages formed from contact between speakers of traditional languages and English. They have historical influences from their source languages, including English, but they are not automatically understood by Standard Australian English speakers.
- » Aboriginal Australian English – variants of English that differ somewhat from Standard Australian English, but which Standard Australian English speakers can more or less understand. These are varieties of English (just as Standard Australian English and American English are varieties of English).

These languages can be spoken as a first language or an additional language. Often traditional languages are the dominant language spoken in central Australia and far-north Northern Territory. New languages are the dominant language in some communities of northern Queensland, Western Australia and the Northern Territory, where young people may learn a new language/creole from birth, a traditional language as an additional language and then English as an additional language or dialect (mostly in school/ECEC settings). In other parts of Australia, traditional languages are typically an additional language (AIATSIS & ANU, 2020).

Many traditional languages are considered endangered. Australia has one of the highest rates of language loss worldwide, and is one of the regions with the highest proportion of endangered languages (Bromham et al., 2022). According to the National Indigenous Australian Agency (NIAA), there are an estimated 150 Aboriginal and Torres Strait Islander languages currently in use in Australia, with only 14 of these languages considered 'strong' (ABS, 2021c; NIAA, 2023). Research has shown years in formal schooling to be associated with greater language endangerment and loss of language diversity (Bromham et al., 2022). The Australian education system therefore has a responsibility to reverse these trends and ensure maintaining and teaching traditional languages is a sector priority.

Unfortunately, educators and teachers may not recognise the different languages or dialects of First Nations children, and consequently these children may not be treated as I-EAL/D learners (Steele & Wigglesworth, 2021). As such, I-EAL/D learners can remain invisible in classrooms, mainstream curriculum areas and assessment practices, with advocacy, research and practices tending to keep I-EAL/D learners on the periphery (Angelo & Hudson, 2020).

Disaggregation to examine the experiences and outcomes of I-EAL/D learners within the group of EAL/D children is out of scope for this study, owing to limitations in the data and methods. Further details are provided in the [Technical appendix: Data and methods](#).

## How our study builds on previous work

Prior Australian studies examining outcomes for children from LBOTE families and/or learning EAL/D have used AEDC data to understand learning and development outcomes for this cohort in successive collections (Goldfeld et al., 2011, 2014; O'Connor et al., 2014). Researchers have also examined learning and development for LBOTE children over time in longitudinal studies using E4Kids (Niklas et al., 2018) and data from the Longitudinal Study of Australian Children (LSAC) (O'Connor et al., 2018).

Our study builds on this work by analysing relationships within Australia's most comprehensive national dataset on child learning and development and ECEC, the MADIP First Five Years data asset. In addition to the AEDC, this dataset includes rich information from a wide range of sources that can provide insight into how children's early experiences impact their learning and development outcomes (see [Technical appendix: Data and methods](#) for details). Results from the analysis are framed using relevant research literature to show how they contribute to the ongoing growth of evidence about this important cohort.

Each section concludes with a key finding to inform policy and practice for emerging multilingual children in Australian ECEC services. These implications are intended to spark further discussion and reflection – including with multilingual children, families and communities themselves – to better understand what will work best to meet their needs and aspirations. A theme running through all these implications is that multilingual children's experiences are complex and diverse and require nuanced support that is culturally responsive and evidence-based. This report demonstrates the role that deep analysis of large-scale data can play in informing these conversations, alongside insights from lived experience and practice.



## Limitations

The analysis in this study is informed primarily by research literature using quantitative methods. While there is much to be learned from these approaches, there are also limitations. As such, alongside the findings presented here, other evidence that provides insights about how multilingual children's experiences vary should be considered.

In the case of this report these limitations include:

- The analytical results of this report represent associations between study variables and are not sufficient for causal inference.
- Data may be missing or not measured 'at the right time' for our research. For example, this study relies on:
  - a measure of a child's English proficiency measured in the child's first year of full-time school (when the AEDC is collected) – after their use of ECEC services. There may be children for whom ECEC improved both their English proficiency and their AEDC domain scores who are systematically excluded from our sample because their English proficiency is measured only after the intervention. A similar dynamic holds for information about the home environment from the AEDC.
  - children's participation in services that were eligible for the Child Care Benefit (now called the Child Care Subsidy) for the period between 2013 and 2016. Use of services funded through other programs – such as Budget Based Funded services (now the Community Child Care Fund) – is not recorded in the dataset. Excluded services include Aboriginal community-owned centre-based services, 3-year-old funded preschool, services in regional and remote areas where the sustainability of provision is an issue, and state/territory-funded alternatives to centre-based ECEC such as Families as First Teachers (FaFT) programs. Data on children's preschool participation in the year before school (2017) is provided via the AEDC.
  - Australian Children's Education & Care Quality Authority data on National Quality Standard (NQS) ratings are not available within the MADIP First Five Years dataset for preschool services and other services that were not eligible for the Child Care Benefit.
- Educators who may not share the child's language background (or have the knowledge to assess their language status) collecting data on the child's language status. This could result in some First Nations children being incorrectly excluded from the sample in cases where educators and teachers do not recognise First Nations children as I-EAL/D learners. It also limits the assessment of children's home-language proficiency. This restricts the analysis from differentiating children who might be experiencing global delays in their learning from those who are starting to learn English but otherwise are developmentally 'on-track'.

## 2. Supporting emerging multilingual children to thrive

The relationship between children's language background and their early learning and development is complex and depends on both their proficiency in English and other factors in their home and family background.

For the entire LBOTE group, the 2021 AEDC National Report shows notable but decreasing gaps in outcomes on the AEDC domains – relative to their English-only peers – that have steadily narrowed since the AEDC baseline in 2009 (DESE, 2022):

- In 2021, 50% of LBOTE children were developmentally on track on 5 domains compared with 56% of children with English-only backgrounds. Meanwhile, 42% of LBOTE children were developmentally on track on 5 domains compared with 53% of children with English-only backgrounds in 2009.
- In 2021, 25% of LBOTE children were developmentally vulnerable on one or more domains compared with 21% of children with English-only backgrounds. Meanwhile, 32% of LBOTE children were developmentally vulnerable on one or more domains compared with 22% of children with English-only backgrounds in 2009.
- LBOTE children had similar or lower rates of developmental vulnerability in the areas of Physical Health and Wellbeing, and Emotional Maturity compared with children with English-only backgrounds (DESE, 2022).

However, there is significant diversity among LBOTE children. These trends are based on averages that do not account for this diversity and, as such, obscure the findings for some LBOTE children who experience powerful factors associated with disadvantage – including English proficiency – that need to be addressed.

The 2021 AEDC National Report also shows that emerging multilingual children have lower developmental vulnerability than English-only children who are not proficient in English (DESE, 2022). This suggests within the emerging multilingual cohort there may be 2 cohorts:

- those who are delayed in developing their ability to speak English, but are otherwise not exhibiting delays in their social, emotional, and cognitive learning and development
- those with indicators of developmental difficulties in language generally, which are predictive of global delays in their social, emotional, and cognitive learning and development.

Though it is likely each cohort would have different experiences and outcomes, it exceeds the present study to disentangle these 2 cohorts.



## Multilingual children proficient in English have an advantage

Typically, multilingual children who are proficient in English achieve strong outcomes in the early years. Australian research examining AEDC data has found multilingualism to be a protective factor for LBOTE children who were proficient in English (when controlling for sociodemographic factors). Goldfeld et al. (2014) found that LBOTE children proficient in English had lower odds of being developmentally vulnerable on the Emotional Maturity and Physical Health and Wellbeing domains than their monolingual peers, and about half the odds of being developmentally vulnerable compared to their LBOTE peers not yet proficient in English.

International studies have found similar benefits of multilingualism, including:

- higher scores and faster development on teacher-reported social and emotional learning and development measures (approaches to learning, self-control and externalising behaviours) from school entry to Year 8 (Halle et al., 2012)
- superior performance on executive control tasks at age 6 (Barac & Bialystok, 2012)
- a long-term decrease in social and emotional difficulties, particularly for boys and children whose parents have lower levels of education (Cobb-Clark et al., 2021).

A large body of empirical studies also suggests there are lifelong benefits associated with being multilingual, well beyond linguistic outcomes. These include positive associations with cognitive abilities, aging and health, employability, academic achievement, communicative and intercultural competence and creativity, reflected both in behavioural assessments (Fox et al., 2019) and studies of brain structure and function (Pliatsikas et al., 2020). Evidence suggests that these long-term benefits are more pronounced among those with balanced proficiency in their home language and their additional language (Pliatsikas et al., 2020).



## First Nations children and the benefits of multilingualism

Studies that look at developmental vulnerability of First Nations children on the AEDC tend to include measures of I-EAL/D status rather than a measure of multilingualism (that is, a child who speaks a traditional or new language and English equally well, or who is proficient in English while having a traditional or new language as a second language). As such, the benefits on the AEDC domains of being proficient in a traditional and/or a new language in conjunction with English are unclear.

Descriptive data show children who report speaking a First Nations language as their main language or who speak a First Nations language and English equally well are more likely to have lower social and emotional difficulties (Department of Social Services, 2020). And, in general, learning home language(s) supports a strong sense of identity, wellbeing and community for all children, including for First Nations families and communities (AIATSIS & ANU, 2020). For example, throughout life, First Nations people who speak Aboriginal or Torres Strait Islander languages (both traditional and new) are more likely to report having higher social connectedness, social efficacy, positive emotional wellbeing, and a range of personal economic benefits (AIATSIS & ANU, 2020; Dockery, 2011).

## Children not proficient in English face multiple disadvantages

In Australia, emerging multilingual children show greater developmental vulnerability than their English-proficient multilingual peers. And gaps in developmental vulnerability between multilingual children by English proficiency have been widening since the AEDC baseline (DESE, 2022).

The 2021 AEDC National Report shows that across the 4 AEDC domains (Physical Health and Wellbeing, Social Competence, Emotional Maturity and Language and Cognitive Skills (school-based))<sup>5</sup> emerging multilingual children were:

- more likely to be developmentally vulnerable – 5% to 7% (about 3,788 to 5,192) of English-proficient multilingual children were developmentally vulnerable compared with 25% to 39% (about 1,874 to 3,001) of emerging multilingual children in 2021
- less likely to be developmentally on-track – 79% to 86% (about 56,00 to 59,500) of English-proficient multilingual children were on track compared with only 33% to 45% (about 2,500 to 3,400) of emerging multilingual children in 2021.

Studies that focus on I-EAL/D learners show that being an I-EAL/D learner is one of a range of ‘modifiable risks’ that largely explains differences in developmental vulnerability between First Nations and non-Indigenous children (Guthridge et al., 2016). And Silburn et al. (2018) found that once I-EAL/D and a range of economic- and health-related factors are accounted for, First Nations status was not a predictor of developmental vulnerability.

<sup>5</sup> We do not consider the Communication Skills and General Knowledge domain because the 2 measures of proficiency are 2 of 6 instruments that contribute to that domain score. This essentially means any emerging multilingual will automatically be considered developmentally vulnerable on this domain – for example, the AEDC National Report shows over 90% of children rated as having poor English proficiency are developmentally vulnerable on the Communication Skills and General Knowledge domain.

Evidence suggests that early gaps can persist. For all children, early learning and development predicts later academic achievement and student wellbeing (Brinkman et al., 2013; Gregory et al., 2021; The Centre for Adolescent Health, Murdoch Children's Research Institute [MCRI], 2018). Research also indicates that low English proficiency may compound these long-term effects:

- I-EAL/D children in the Northern Territory had lower self-regulation, executive function and early literacy and numeracy skills than First Nations children who spoke English as a first language. These differences persisted into lower Year 3 NAPLAN scores in reading and numeracy. In contrast, the same study found that EAL/D children from non-Indigenous backgrounds had similar Year 3 NAPLAN scores to monolingual, non-Indigenous children despite also having lower self-regulation, executive function and early literacy and numeracy skills (He et al., 2021).
- Multilingual children who had not attained English proficiency by age 6–7 continued to show poorer literacy outcomes according to analysis of LSAC data. Children experiencing socio-economic disadvantage were also more likely to be in this group than their more advantaged peers (O'Connor et al., 2018).
- A study of 129 multilingual children (also using LSAC) found that stronger English proficiency in the first year of school predicted significantly higher language and literacy scores at the end of primary school (Dennaoui et al., 2016).
- Halle et al. (2012) found that multilingual children who were proficient in English in their first year of school had better cognitive and behavioural skills at Year 8 than their peers who took longer to become proficient.
- Cavicchiolo et al.'s (2020) longitudinal study of more than 2,000 immigrant children in primary school found that children's language proficiency predicted their psychological wellbeing one year later.

One explanation for these differences is that low levels of English proficiency may limit children's ability to benefit from educational experiences in ECEC services and schools – where English is the language of instruction. Children who start school with limited English proficiency must simultaneously learn English and navigate the academic and social demands of the new environment (MacSwan & Pray, 2005). In addition, school-based assessments (including the AEDC) measure the skills, knowledge and behaviours that children demonstrate in a Standard Australian English-language context; multilingual children, however, may display different behaviours to those expected, depending on their stage of English learning (Clarke, 2009).

Supports are available, such as the adaptations and services funded through the Inclusion Support Program in ECEC. And, in schools, jurisdictions often maintain tools that help teachers assess typical second language acquisition and/or provide learning supports (NSW Department of Education, 2022; Queensland Department of Education, 2018). Nevertheless, researchers argue that curriculum and pedagogy in Australian education are typically based on the assumption that children are monolingual, meaning opportunities to build on the linguistic resources that multilingual children bring are missed (Creagh, 2016; Slaughter & Cross, 2021).



Another explanation is that emerging multilingual children experience other risk factors associated with developmental vulnerability. Limited proficiency in the dominant language may contribute to stress, negative social feedback (Dawson & Williams, 2008; Dowdy et al., 2011) or social isolation (Cavicchiolo et al., 2020). Children who are emerging multilingual children are also more likely to have other intersecting experiences associated with disadvantage, such as living in a low-SES area (O'Connor et al., 2018) or having parents with a high-school education or less (Niklas et al., 2018). In some studies, achievement gaps between emerging multilingual children and their English-proficient peers were reduced once socio-economic factors were accounted for (Dennaoui et al., 2016). The presence of these factors helps explain why emerging multilingual children are more likely to be developmentally vulnerable on AEDC domains not directly related to language skills.

### Emerging multilingual children experience intersecting factors associated with disadvantage

Our analysis of the 2018 AEDC data (see [Technical appendix: Data and methods](#) for method) examined a range of background characteristics that may affect emerging multilingual children's AEDC domain outcomes. It found that emerging multilingual children (N = 4,243) are more likely than their English-proficient peers (N = 63,574) to have a range of background characteristics associated with systemic disadvantage or discrimination, including:

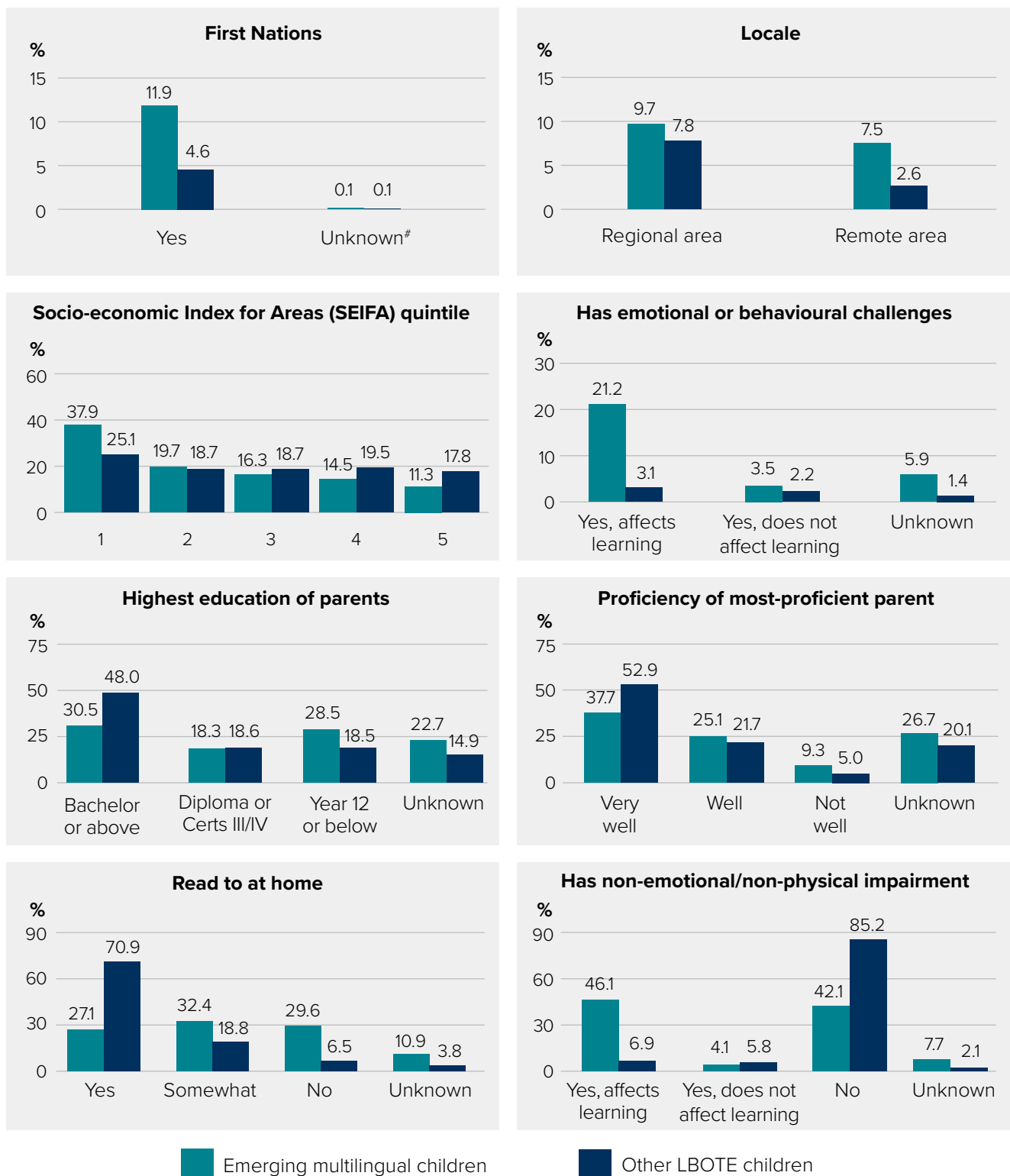
- **General demographics** – Emerging multilingual children are more likely to be Aboriginal or Torres Strait Islander; first-generation migrants; live in regional or remote areas; and/or live in families with lower SES ([Figure 1](#)). Emerging multilingual children also typically have parents with a disposable income about \$15,000 to \$16,000 lower than the disposable income of parents of multilingual children with 'good' English proficiency.
- **Home and family** – Parents of emerging multilingual children have lower levels of education, English proficiency, involvement at school, and are less likely than other parents to regularly read to their children at home ([Figure 1](#)).
- **Emotional, behavioural and other challenges** – Emerging multilingual children experience a higher incidence of emotional or behavioural challenges and other impairments<sup>6</sup> compared with other LBOTE children, as reported by their teachers ([Figure 1](#)). They also have a higher incidence of physical disabilities that affect learning (3% of emerging multilingual children have a physical disability compared with 0.4% of other LBOTE children).

When interpreting these findings, the limitations of the AEDC as a teacher-reported measure must be considered. For example, it is possible that some vulnerabilities observed by teachers (such as behavioural issues) stem from difficulties emerging multilingual children may encounter when communicating at school.

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<sup>6</sup> Other impairments include whether the child has a visual, hearing or speech impairment or has a learning difficulty.

**Figure 1: Characteristics of LBOTE children**



Notes:

- a. Sample of 4,243 emerging multilingual children and 63,574 other LBOTE children
- b. # denotes suppression of variable. Variables with more than 90% of the group total or with fewer than 10 observations have been suppressed.
- c. Chi-squared tests show all multilingual distributions are significantly different from other LBOTE distributions with at least 90% certainty.
- d. Highest education of parents and proficiency of parents are drawn from the 2016 census.

## Implications

### Supporting emerging multilingual children involves addressing multiple forms of disadvantage as well as nurturing their strengths

The evidence is clear that multilingual children have many strengths that make multilingualism an asset for lifelong learning and development. However, reaping the benefits of multilingualism in Australian education settings requires proficiency in English – the dominant language of instruction in most ECEC services and schools. It also requires that emerging multilingual children and their families receive support to offset other factors that contribute to developmental vulnerability. These factors interact with and can amplify the difficulties associated with limited English proficiency.

Any support provided to emerging multilingual children and families should uphold the benefits of home language proficiency. Experts agree that LBOTE children benefit when both their home language and English language learning and development are well-supported (McCabe et al., 2013). For young LBOTE children, the home language is the basis for developing meaningful relationships and social skills, learning about communication and interaction (Siraj-Blatchford & Clarke, 2000) and developing a strong sense of identity (Bialystok, 2001; Espinosa, 2005). When a child's learning in their home language is not supported and encouraged, they are put at risk of losing their home language, cultural identity (Espinosa, 2010) and the long-term benefits of multilingualism.

Given the strong evidence of the importance of proficiency in the home language for children's learning and development, families' perspectives on their child's proficiency in their home language would provide valuable data for further analysis.

## 3. Improving access for emerging multilingual children

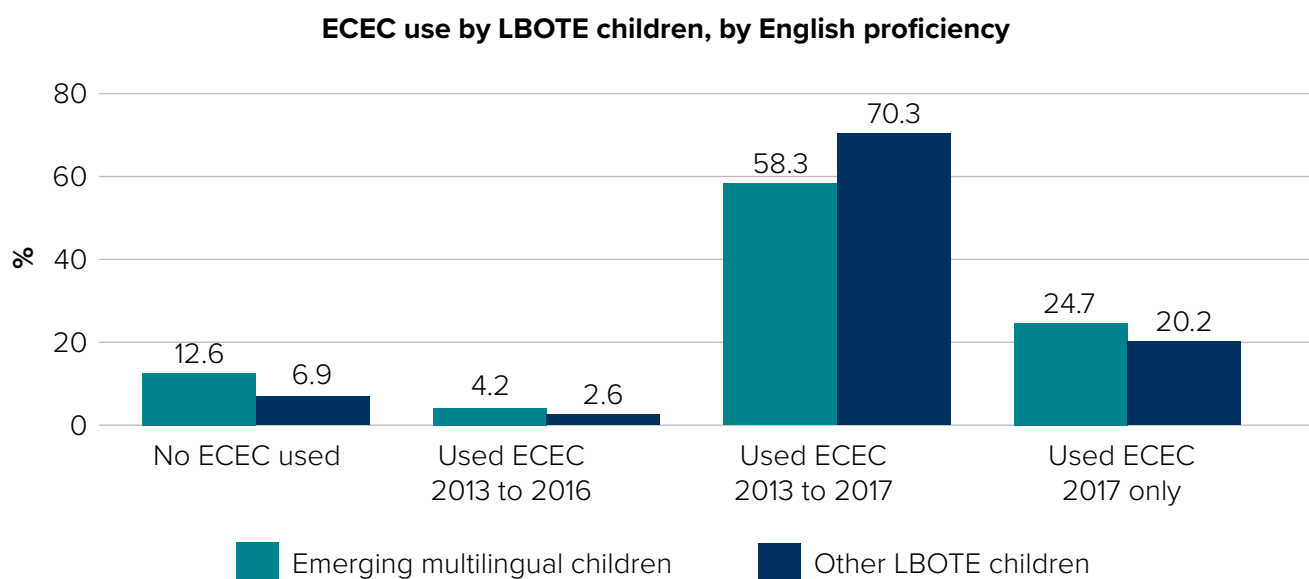
The intersecting risk factors that emerging multilingual children experience affect their interaction with the ECEC system. Participation in ECEC matters because of its potential to boost children's learning and development and compensate for disadvantage. Participation in ECEC (particularly preschool programs) has been associated with higher English proficiency (O'Connor et al., 2014) and verbal abilities (Niklas et al., 2018), and reduced developmental vulnerability in 4 of 5 AEDC domains (with the exception of the Emotional Maturity domain) compared to other ECEC services or parental care, even when controlling for SES (Goldfeld et al., 2016).

Despite the potential benefits, children learning EAL/D are less likely to attend preschool programs. Niklas et al. (2018) found that 1 in 3 multilingual children in their sample did not attend a preschool program or received very few hours. Similarly, the Australian Early Childhood Education Development Experience Research Project found that families of children from language backgrounds other than English were significantly more likely to rely on parent-only care until the age of 3. Children cared for mainly by their parents in the year before school had the highest rates of developmental vulnerability at school entry according to the AEDC, and of these, 30% were LBOTE children (Collier et al., 2019). Further, of the 5 care arrangements considered by Collier et al. (2019), parent-only care had the highest proportion of LBOTE children.

## Emerging multilingual children are more likely to start ECEC later or not at all

In 2017, nearly 90% of all eligible children were enrolled in a preschool program in the year before school (Australian Institute of Health and Welfare, 2020). In our sample, only 83% of emerging multilingual children were enrolled in ECEC at some point in the year before school,<sup>7</sup> compared to 90% of other LBOTE children. This difference was even larger for earlier ECEC use – 62% of emerging multilingual children were enrolled in some sort of ECEC service between 2013 and 2016 (around age 0 to 3) or between 2013 and 2017 (around age 0 to 4), compared to 72% of other LBOTE children (Figure 2).

**Figure 2:** Emerging multilingual children are more likely to commence ECEC in the year before school



Notes:

- Children in our sample were typically aged 4 in 2017 and aged 0 to 3 in 2013 to 2016.
- Chi-squared tests show the multilingual children's distribution is statistically different from the other LBOTE children's distribution with 95% certainty.

### SES and location may drive differences in ECEC use

Multilingual children's use of informal care arrangements are largely driven by multiple experiences associated with disadvantage. We ran 2 separate logistic regressions<sup>8</sup> to estimate predictors of whether a multilingual family only used informal care arrangements (no ECEC) between 2013 and 2016 (aged 0 to 3) and in 2017 or the year before school (aged 4) (see [Table 19](#) in [Technical appendix: Data and methods](#) for full results).

<sup>7</sup> These indicators capture whether a child attended ECEC at all within the time periods specified. That is, if a child attended an ECEC service for one day in 2017 they would be counted within the 'used ECEC in 2017 only' category. Although our data begin from 2013 (when most children in our sample were aged 0), some children were born before 2013 and so may have attended ECEC in earlier years.

<sup>8</sup> Logistic regressions estimate the probability an outcome occurs while accounting for a range of factors. This allows us to compare which factors affect the probability a child used informal care, and how much they matter.

These results show the 2 factors most strongly associated with a later start in ECEC for multilingual children were:

- Facing difficulties resettling – Children who had experienced resettlement difficulties were about 25.5 percentage points more likely to be in informal care between 2013 and 2016.
- Living remotely – Children who lived remotely were also about 25.3 percentage points more likely to be in informal care between 2013 and 2016.

In both cases, in the year before school, multilingual children facing difficulties resettling and living remotely were just as likely as their peers to be in ECEC.

Emerging multilingual children were 4.4 percentage points more likely to use informal care in 2013 to 2016 and 3 percentage points more likely to use informal care in 2017 than other LBOTE children. But several other factors were stronger predictors of informal care in 2013 to 2016, including:

- First Nations children were 17 percentage points more likely to participate in informal care than their non-Indigenous LBOTE peers.
- Children living regionally were 10 percentage points more likely to be in informal care than their peers in a major city.
- Children with parents who were not in the labour force were about 8 percentage points more likely to be in informal care than children with parents who worked full-time.
- Children living in an area classed as Socio-economic Index for Areas (SEIFA)<sup>9</sup> quintile 1 and 2 were about 5 percentage points more likely to be in informal care than children classed as quintile 5.

Of these, only SEIFA status and parental labour force participation remained predictors of informal care in the year before school.

### **Region of birth is a strong predictor of ECEC use**

A child's region of birth is also associated with their ECEC use. For some regions, the effect broadly remains or increases in the year before school.

These associations likely reflect a range of other differences related to region of birth, including different levels of:

- socio-economic resources
- cultural preferences for ECEC
- average educational attainment.

Further research is warranted to explore these relationships in the data – including engagement with LBOTE families – to better understand the relative advantages and disadvantages of both preschool and informal education and care.

<sup>9</sup> The AEDC includes the Index of Relative Socio-economic Disadvantage (IRSD) measure of SEIFA. It summarises information about the economic and social conditions of people and households within an area, accounting for factors like income, education, unemployment, health and housing.



## Implications

### **Targeted support for ECEC access must start early and be differentiated to address multiple drivers and preferences for ECEC use**

Our evidence supports the effectiveness of existing policy arrangements encouraging children who experience disadvantage to access ECEC in the year before school. SES- or location-related gaps in ECEC participation in the year before school are narrower than in earlier years of ECEC use, including for some emerging multilingual children. This suggests that efforts to improve participation may need to target earlier years, where the gaps in participation for emerging multilingual children are the greatest. The earlier a child starts attending ECEC, the more total hours they are likely to attend (Niklas et al., 2018), providing more opportunities to develop English proficiency.

The additional risk factors experienced by many emerging multilingual children suggest that broadly targeted initiatives that address cost and access barriers to ECEC are likely to improve participation of emerging multilingual children – as they do for all children experiencing vulnerability or disadvantage.

At the same time, emerging multilingual children may face other barriers or disincentives to use ECEC that require a more nuanced approach. Some families may prefer not to use ECEC because of cultural preferences for child rearing. Some families choose ECEC services that have the capacity to provide continuity and support for their child's home language and cultural practices, while others may prefer an immersive, English-only ECEC experience for their child. In some cases, the perceived (or actual) quality of available ECEC services may be lower than care available in the family.

Support for emerging multilingual children to access ECEC must therefore not only ensure that a service is available, but also that families can choose a service that is high quality and responsive to their language, culture and preferences. [Section 4](#) examines LBOTE families' current choices about ECEC services and the relative benefits of those choices, to inform support that addresses access, cultural responsiveness and quality.

## 4. ECEC service types that benefit emerging multilingual children

To explore how ECEC is related to outcomes for emerging multilingual children, it is necessary to look closely at the many different types of ECEC services. Within the general patterns of ECEC usage described above, many variations are possible in the type, quantity and quality of ECEC that children use. The Australian ECEC sector contains 3 main types of ECEC services for children aged birth to the year before school:

- **long day care:** a full-day, centre-based education and care program for children from birth to the year before school
- **preschool/kindergarten:** an education and care *program* delivered by a degree-qualified teacher for a designated number of hours in the year(s) before school,<sup>10</sup> either in a standalone service, within a long day care program or (in some jurisdictions) in a school. (In this report we use the term ‘standalone preschool’ to mean any funded preschool program delivered in any setting other than a long day care.)
- **family day care:** a full-day education and care program for children from birth to the year before school delivered in the educator’s home.

Children may be enrolled concurrently in more than one setting. For example, a child may attend family day care on some days and a standalone preschool on others, or attend family day care early/late in the day and a preschool program in between.

Our report differentiates between 5 settings/combinations: long day care without a preschool program, long day care in conjunction with a preschool program,<sup>11</sup> family day care, family day care in conjunction with a standalone (or school-based) preschool and a standalone (or school-based) preschool/kindergarten.

Children attend ECEC services for varying days per week and hours per day, depending on families’ needs and service availability. The quality of services also varies, as assessed under the NQS.

Of these variables, the evidence is strongest that the quality of the ECEC matters when it comes to shifting children’s learning and development trajectories (Burchinal, 2018; Burchinal et al., 2016; Melhuish et al., 2015; Rankin et al., 2022). In Australia, there is some relationship between quality and service type, making it difficult to isolate the direct effect of quality and the structural features of the ECEC programs (Thorpe et al., 2020). For example, Niklas et al. (2018) found that participation in setting types other than preschool did not significantly predict verbal abilities for LBOTE children but attributed this pattern to the higher average quality of preschools in Australia rather than the service type itself.

<sup>10</sup> While delivery of preschool through national agreements focuses on the year before school, some jurisdictions are extending preschool delivery to 2 years before school (and some already deliver preschool programs 2 years before school for some children).

<sup>11</sup> We cannot differentiate between children who attend a long day care with a preschool program and children who attended a long day care program as well as a standalone preschool.



In this report, we measure quality using the NQS, which is one way to assess the quality of ECEC services.

Our analysis begins by summarising the main differences in setting type attended by emerging multilingual children compared with other LBOTE children, then explores whether setting type matters when it comes to AEDC domains. For the latter section, our regressions controlled for sociodemographic factors like household income, parent employment status, socioeconomic index of their school's area (SEIFA, IRSD) to reduce (to the extent possible) differences related to family characteristics that are associated with both ECEC participation and AEDC outcomes.

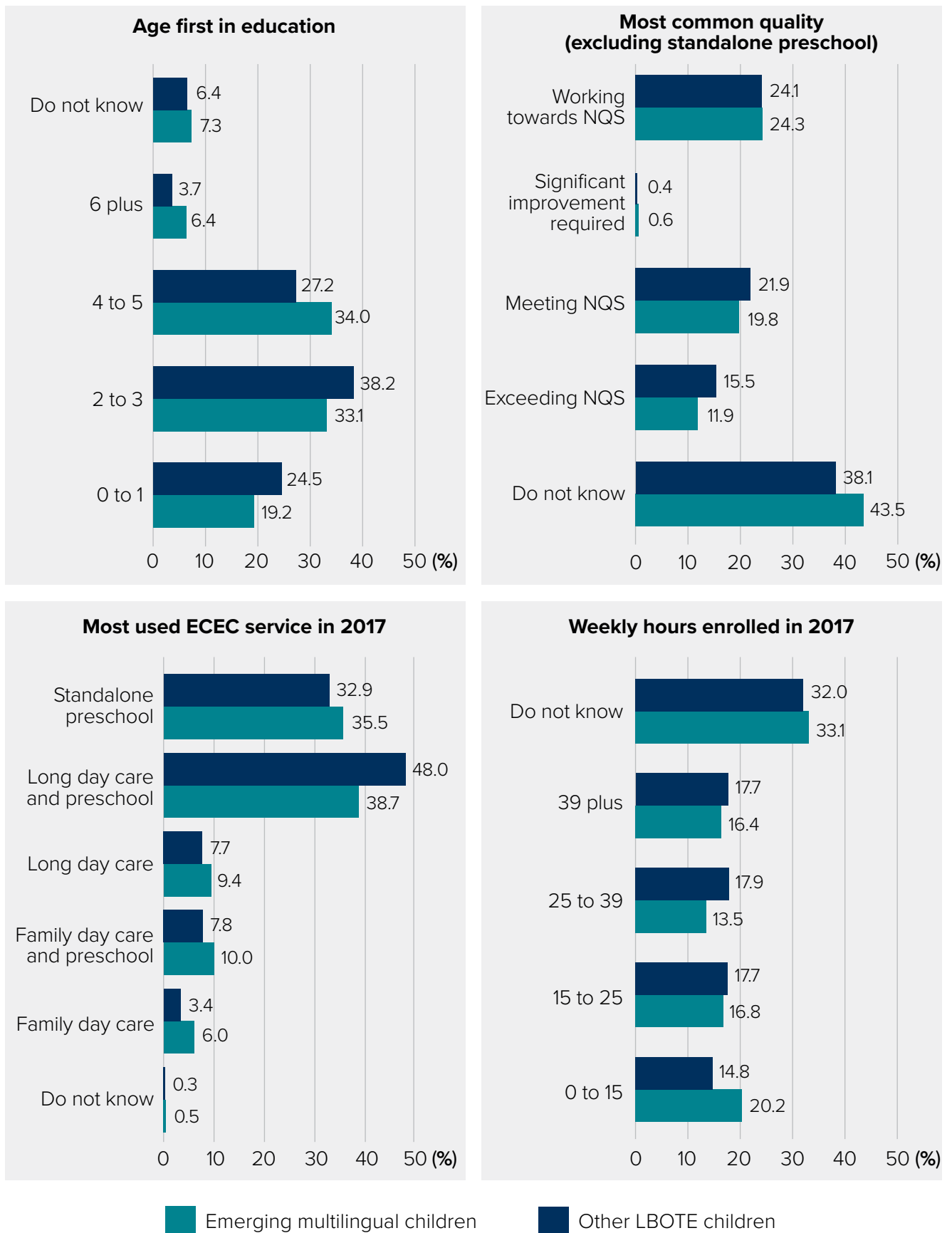
## English proficiency is linked to differences in ECEC time, type and quality

Emerging multilingual children experience the ECEC system in different ways to other LBOTE children. This section summarises key differences in patterns of participation:

- **Time in ECEC services** – Emerging multilingual children are more likely to start ECEC later and are more likely to enroll in ECEC for fewer than 15 hours per week.
- **Type of ECEC** – In the year before school, emerging multilingual children are less likely to attend a long day care service with a preschool program, and more likely to attend standalone preschool or family day care (with or without attendance at a standalone preschool, either concurrently or previously).
- **Quality of ECEC** – Data on ECEC quality in this analysis is limited by the exclusion of data on preschool quality. Among children in family day care or long day care, emerging multilingual children were less likely than other LBOTE children to attend a service that was meeting or exceeding the NQS. This may be an artifact of them being more likely to attend standalone preschool (the quality of which is unknown in the data).

Whether these differences matter depends on whether they are associated with improvements in children's learning and development outcomes. The remainder of this analysis explores the association between outcomes and each of these variables. This gives some indication – within the limitations of the data – about what kinds of ECEC experiences may make a difference for emerging multilingual children.

**Figure 3:** Types of ECEC usage by LBOTE children, by English proficiency



Note: Chi-squared tests show the multilingual children’s distributions are not statistically different from the other LBOTE children’s distributions.

## Time in ECEC is associated with better language and cognitive development, especially when emerging multilingual children start attending ECEC earlier

Emerging multilingual children may benefit from more than one year of ECEC (of any service type) to develop their Language and Cognitive Skills (school-based). Use of ECEC services between 2013 and 2016 was associated with a 0.65 point higher score in the Language and Cognitive Skills (school-based) domain, reflecting a higher achievement of about 12%<sup>12</sup> – see [Table 11 in Technical appendix: Data and methods](#). In contrast, the positive association for ECEC use in 2017 with the Language and Cognitive Skills (school-based) domain was not statistically significant when compared with no ECEC use during those periods.<sup>13</sup>

Compared with other factors for an emerging multilingual child's Language and Cognitive Skills (school-based), use of ECEC in 2013 to 2016 is about:

- one-third as important as being read to at home occasionally
- equally important as having parents involved with school or as having parents with a bachelor's degree or better.

Accounting for the effects of age first enrolled, a child in our cohort who had at least 2 years of ECEC before starting school in 2018 (starting ECEC at age 3) saw a total increase in the Language and Cognitive Skills (school-based) domain of about 1.19 points (a 21% increase in achievement for the average emerging multilingual child).

The larger association with Language and Cognitive Skills (school-based) and ECEC use in the first 3 years of a child's life (2013 to 2016) compared to in the year before school may reflect a cumulative effect of ECEC. That is, the longer the child is in ECEC, the more time they have to build strengths associated with ECEC, leading to better outcomes. This could be a direct effect (where more ECEC is better) or an indirect effect (where a child takes time to adjust to ECEC before they begin to reap the benefits or become more proficient in English, which facilitates improvements across other AEDC domains).

On the other hand, this association may reflect limitations to the methodology, such as the effect of parental choices or the child's characteristics that we do not observe. For example:

- The effect of ECEC use between 2013 and 2016 may appear larger if emerging multilingual children who have more advanced development are also more likely to use ECEC in the first 3 years of life (2013 to 2016).
- The effect of ECEC use in 2017 may appear smaller if ECEC usage in the year before school (2017) – typically with educators with degree qualifications – improves the English proficiency of some children who would have *otherwise* been considered emerging multilingual (that is, some children may no longer appear in our sample because they attended ECEC). If this improvement in English proficiency is correlated with improvements in other domains, this can increase the average developmental vulnerability for the *remaining* emerging bilingual children.

<sup>12</sup> The average emerging multilingual child's Language and Cognitive Skills (school-based) domain score is 5.7, while the average among LBOTE children with a developed English proficiency is 8.2, and those with a well-developed English proficiency is 9.4.

<sup>13</sup> Although the statistical significance of the difference between ECEC use in 2013 to 2016 and 2017 was not confirmed, the results suggest a stronger positive association for ECEC use in 2013 to 2016 and scores on the Language and Cognitive Skills (school-based) domain.

Given learning and development and English proficiency is only measured in the first year of full-time school in our data, our methodology cannot account for these possibilities.

Emerging multilingual children with earlier entry into ECEC (between 2013 and 2016) also had higher scores on the Emotional Maturity and Physical Health and Wellbeing domains, with no statistically significant association for ECEC use in 2017 in these domains compared with no ECEC.<sup>14</sup> The associations of ECEC use with domain scores between 2013 and 2016 were also about 3.5 times larger for emerging multilingual children than for other LBOTE children across the Language and Cognitive Skills (school-based), Emotional Maturity, and Physical Health and Wellbeing domains.

### Quality of care may make a difference to some domains for emerging multilingual children

Looking at differences in quality among family day care and long day care services (noting that our dataset does not include the quality of standalone preschools), we found the relationship of service quality to children's AEDC outcomes varied depending on the outcome of interest. For example, emerging multilingual children who participated in family day care and long day care settings that met the NQS had higher MSI scores (on average) than emerging multilingual children who participated in settings that were working towards the NQS. We did not find a difference in their scores on the Language and Cognitive Skills (school-based), Social Competence or Emotional Maturity domains.

Interestingly, emerging multilingual children attending ECEC services rated as exceeding the NQS exhibited statistically equivalent scores across all domains to emerging multilingual children attending services rated as working towards the NQS. Given the known importance of quality for learning and development outcomes, these results imply future research is needed to understand the aspects of quality most important for supporting learning and development outcomes for these children. Especially because, even with the large dataset at hand, these regressions have a relatively small sample size.

### Types of ECEC have complex links to outcomes

Our analysis found mixed results overall in the associations between the use of different types of ECEC by emerging multilingual children and their AEDC outcomes in the year before school. Some service types showed benefits for some AEDC domains but not others, and some even had negative associations. These results point to the limitations of the analysis and the need for better data architecture for Australia's ECEC system. Linking types of ECEC participation to child outcomes is inherently challenging, as effects of different service types may be mediated through other variables (such as quality or hours of attendance).

The clearest result emerged when we analysed children's pathways through the ECEC system. To do this, we looked at the service type a child used most in their first 3 years (2013 to 2016) and the service type they used most in the year before school (2017), to examine which combinations of settings were associated with the strongest outcomes.<sup>15</sup> Children who did not use ECEC in both periods were included in the analysis as the comparison group.

<sup>14</sup> When we used an alternative definition of emerging multilingualism (using both speaking and listening proficiency) we found ECEC use in the year before school was also associated with improvements in Language and Cognitive Skills (school-based) scores. But that there was no association between ECEC and the Emotional Maturity domain.

<sup>15</sup> To simplify the pathways, we combined several settings defined in our previous analysis. In particular, 'long day care' and 'long day care and preschool' are now considered as 'long day care'. 'Family day care' and 'family day care and preschool' are considered as 'family day care'. Meanwhile, preschool specifically refers to attending a standalone preschool only.

## Family day care followed by preschool may especially benefit emerging multilingual children

For emerging multilingual children, a combination of family day care followed by standalone preschool was most strongly linked to better AEDC domain outcomes. Emerging multilingual children using this pathway had 2.59 point ( $p = 0.01$ ) higher scores in the Language and Cognitive Skills (school-based) domain compared with not using ECEC – up to about 2.7 times as large as the associations of other ECEC pathways. It was also associated with increases in the Social Competence domain (assoc. = 1.34 points,  $p = 0.035$ ) and the Physical Health and Wellbeing domain (assoc. = 1.42 points,  $p = 0.02$ ).

The family day care to standalone preschool pathway (compared with no ECEC use) was the only pathway associated with improvements in the MSI – which is on a scale of 0 to 100 while the domain scores are on a scale of 0 to 10 – with a relatively large association of 11.72 points ( $p=0.03$ ).

Using an alternative definition of emerging multilingual<sup>16</sup> lowered the association between the family day care to preschool pathway with the Language and Cognitive Skills (school-based) domain (assoc. = 1.45 points,  $p = 0.01$ ) to be more aligned with other ECEC pathways. However, under this alternative definition, the family day care to standalone preschool pathway still had the largest association with Language and Cognitive Skills (school-based) scores and was the only pathway to show consistent benefits across most domains, including being the only pathway associated with increases in the MSI.

The benefits of this combination appear to arise from its complementarity, rather than benefits of family day care alone. Of children who used ECEC in 2017 and 2013 to 2016, children who had used family day care in both periods were the only ones with no statistically significant Language and Cognitive Skills (school-based) results compared with those who had not used ECEC. This suggests that family day care may work best followed by a standalone preschool program.

Starting in long day care and moving to a standalone preschool was also a beneficial ECEC pathway for emerging multilingual children across multiple domains. It supported Language and Cognitive Skills (school-based) at a similar level to the other pathways (assoc. = 1.27,  $p = 0.02$ ), alongside improvements on the Emotional Maturity (assoc. = 0.91 points,  $p = 0.03$ ), Social Competence (assoc. = 0.85 points,  $p = 0.08$ ), and Physical Health and Wellbeing (assoc. = 1.05,  $p = 0.02$ ) domains.

These results, although consistent, should be viewed in the context of small sample sizes and may not generalise to a broader population. Specifically, both pathways are relatively uncommon. Among emerging multilingual children:

- fewer than 2% used the family day care to standalone preschool pathway while about 11% used family day care in both periods
- about 5% used the long day care to standalone preschool pathway while 29% used long day care in both periods.

Other combinations of services – for example, long day care from before 2016 then long day care (including or excluding a preschool program) in the year before school – were only statistically significant on the Language and Cognitive Skills (school-based) and Physical Health and Wellbeing domains. They also had weaker effects on those domains than the most beneficial pathways.

See [Technical appendix: Data and methods](#) for full results.

<sup>16</sup> Using both speaking and listening proficiency

## Implications

### Family day care may be an important complement to preschool for emerging multilingual children

These findings show the complex combination of factors that influence the effect of ECEC on children's learning and development. While some factors – especially ECEC quality – are proposed to matter for all children in the literature, this analysis points to factors that may especially benefit emerging multilingual children. These indicative findings warrant further exploration in policy and future research.

The apparent benefits of starting ECEC earlier for emerging multilingual children suggest that better access to ECEC could improve learning and development outcomes. In particular, these results support policies that extend universal access to funded ECEC programs to 3-year-olds recently made by some jurisdictions.

The combination of family day care and standalone preschool seemed particularly beneficial for emerging multilingual children in comparison to other pathways through the ECEC system. There are many possible reasons for this, including:

- smaller group sizes in family day care
- group composition, including the possibility of children remaining with siblings who share the same language
- the possibility for families to choose a family day care educator who shares their home language and culture
- a particularly beneficial sequencing of language supports (both own-language and English)
- sample size and selection effects within the regression design.

Further research should explore the relationship of the factors outlined above to outcomes, as well as:

- What factors can sustain and support the benefits of informal care arrangements in the early years to a child's home language, culture, and learning and development?
- What lessons can other setting types learn from the strengths associated with the family day care to standalone preschool pathway?

These findings are not in themselves sufficient grounds to privilege one type of ECEC participation over another, or to make assumptions about the preferences of emerging multilingual children and their families. Instead, they are valuable starting points for discussions about what makes the most difference to learning and development for emerging multilingual children, and how cultural responsiveness and individualised support for children can be embedded into quality ECEC services of all types.

## Conclusion

Typically, multilingual children who are proficient in English achieve strong outcomes in the early years on a range of academic, social and emotional measures (Dennaoui et al., 2016; DESE, 2022; Goldfeld et al., 2014). They can also have better learning and development outcomes than their monolingual peers (Fox et al., 2019). These benefits can be lifelong and extend well beyond linguistic outcomes, including in ways that contribute to a strong sense of identity, wellbeing and connectedness with their culture and community (AGDE, 2022; Byrd, 2012; Fox et al., 2019).

### Effective support must address multiple forms of disadvantage

Emerging multilingual children experience developmental vulnerability at significantly higher rates than their peers. Emerging multilingual children face multiple challenges – some related to language, others the result of intersecting factors commonly associated with experiences of disadvantage or discrimination. These challenges can contribute to developmental vulnerability in the first year of full-time school.

Effective support for emerging multilingual children, therefore, involves addressing multiple forms of disadvantage while nurturing their strengths. In addition, supporting emerging multilingual children to thrive must include encouraging learning and maintenance of their home language alongside Standard Australian English.

### Earlier ECEC participation may be beneficial

English proficiency fundamentally influences how children and families from CALD communities interact with the ECEC system, and the outcomes of that engagement.

Emerging multilingual children are less likely to use ECEC than other children. When emerging multilingual children do use ECEC, they are more likely to start later and use different service types.

Lower participation in ECEC is often due to intersecting factors related to disadvantage, with multilingual children from low-SES and regional areas, and those who have experienced resettlement difficulties less likely to participate in ECEC. In the year before school, these gaps in participation narrow or disappear, suggesting universal access policy arrangements in the year before school are working.

Further efforts to improve participation need to start earlier, where gaps in participation for emerging multilingual children are the greatest. Our results suggest this may have benefits given that emerging multilingual children who had more than one year of ECEC prior to starting school had better AEDC outcomes than their peers who had informal care (no ECEC), as well as seemingly greater gains than those with only one year of ECEC.

Building effective relationships between the ECEC sector and families earlier could benefit emerging multilingual children. Such support should be differentiated to address multiple drivers and preferences for ECEC use. For example, children who are emerging multilinguals living in low-SES or remote areas are more likely to have been in informal care than their multilingual peers in those same areas. This suggests targeted initiatives that address cost and geography-based access barriers are likely to improve participation for emerging multilingual children.



## Opportunities for cross-sector learning

Emerging multilingual children may benefit more from specific ECEC pathways. Participating in family day care in the early years, followed by standalone preschool in the year before school, appeared to benefit children's Language and Cognitive Skills (school-based), strengths [according to the MSI], and Social Competence more than other combinations of participation. Other pathways (such as starting in long day care followed by standalone preschool) appeared to benefit emerging multilingual children to a lesser extent.

Building and maintaining connectivity and transitions across services is vital because the benefits of these combinations appear to arise from their complementarity. For example, family day care from the early years until starting school seemed to have fewer benefits compared with combining family day care with preschool. Similarly, one year of standalone preschool in the year before school seemed to be less beneficial than multiple years of ECEC.

These findings suggest there may be opportunities for other setting types to learn from practices in family day care. For example, family day care may provide a 'soft entry point' for emerging multilingual children, with multilingual educators supporting both the child's learning and maintenance of their home language and culture. Or very young emerging multilingual children may benefit from the small groups found in family day care, before they transition into larger settings. The composition of family day care groups – which are often multi-age and may include siblings or other emerging multilingual children – may also play a role. Testing these hypotheses requires further research.

## Next steps for AERO and researchers

Further research could explore the following questions:

- Why do some combinations of ECEC settings appear to be more beneficial than other pathways for some children?
- What role does quality play in the relationship between ECEC participation and outcomes? Are there specific aspects of quality that matter more for outcomes than others? How do these relationships vary depending on children's backgrounds?
- How could family preferences related to child rearing, language use, cultural practices and expectations of education inform policymakers, providers, teachers, and educators on how our ECEC system can better engage families from diverse backgrounds?

Answering these questions could assist policymakers, peak bodies, providers, teachers and educators in understanding how ECEC can contribute to more equitable outcomes for emerging multilingual children. For example, understanding more about family preferences, and why some children seem to benefit more from specific pathways, would allow better engagement and targeted policies to improve access and participation. Understanding the aspects of quality that matter most could assist with spreading practices that work, ensuring children and families are well-supported in whatever setting they choose.

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## Technical appendix: Data and methods

### Data

Our research draws data from the First Five Years MADIP project. This project connects the 2015 and 2018 AEDC with data from a range of administrative data sources, including:

- measures of ECEC usage via the CCMS and NQS collections
- additional measures of child and family characteristics collected via the census and PIT data
- measures of other government service use such as Medicare, disability support and Centrelink administrative data.

Our research takes the 2018 AEDC (collected in the child's first year of full-time school at about age 5) as its base dataset, adding in data from MADIP's 2013 to 2017 CCMS, 2013 to 2017 NQS, 2016 census and 2015 to 2018 income tax collections. We focus on 2018 AEDC data because it is the most recent available in First Five Years project, and its linkages with the other datasets are better than those of earlier AEDC collections.

The AEDC measures child development trends using teacher observations in the first year of full-time school where, typically, English is the language of instruction. The AEDC has been validated for use in First Nations and CALD communities. It provides useful indications of how children are faring at the community and population level, and where more support might be required. However, it does not meaningfully measure home-language proficiency of LBOTE children.<sup>17</sup>

In our sample, we exclude children who have not been linked to the MADIP spine and, in regression results that use AEDC domains as the dependent variable, children who do not have at least one valid domain score. We also only include children in the regressions if both parents have a language background other than English.

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<sup>17</sup> Although there is an indicator that measures whether the child is proficient in their home language, it is not based on validated instruments.

**Table 1:** Datasets used to derive variables in this report

<b>Variables</b>		
<b>CCMS and NQS variables</b>		
Hours enrolled in ECEC	Most common quality of ECEC used	Family's eligibility for Child Care Benefit (CCB)
Age first observed in education (set to age in school if not observed using ECEC in CCMS or AEDC)	Most used ECEC service type (type derived from NQS, CCMS then AEDC; hours of use derived from CCMS then AEDC)	
<b>AEDC variables</b>		
First Nations status (combined with MADIP's 'ever Indigenous' flag)	How often the child was read to at home	% of children who were LBOTE in year level (derived)
Gender	How often the child's parents are involved in their schooling	Class size
Experience of resettlement difficulties	Unemployment rate in local area	Whether the child was in a multi-year class
Whether the child had any physical health concerns	Remoteness status	Whether the child had any other health concerns
Whether the child had any emotional or behavioural health concerns	SEIFA (IRSD) of local area	% of children who were LBOTE in class (derived)
Number of days absent from school	State of residence	
Whether child was absent for cultural reasons	School's median SEIFA (IRSD) status (derived)	
<b>Census and Personal Income Tax collections</b>		
Parental disposable income (log)	English proficiency of most proficient parent	Generation of immigration
Highest educational attainment of either parent	Parental labour force status	Number of children in household

Disposable income calculations are not readily available in PIT. We used the following definition of disposable income, with each category listed below being the sum of a range of variables with PIT.

Disposable income = Employee income + business income + investment + superannuation + other income – total deductions – taxes.



### Measuring emerging multilingualism

The AEDC includes 2 measures of English proficiency – the first measures whether a child is proficient in listening to instructions in English and the second measures whether they are proficient in speaking in English. This report mostly uses the first measure, because children who are reported as ‘not proficient’ by the listening measure have lower AEDC outcomes than those reported as having ‘poor proficiency’ by the speaking measure. We ran sensitivity tests by defining emerging multilingual children using both the spoken and listening measures (that is, children who are reported as having ‘poor proficiency’ in either listening, speaking or both).

### Measuring learning and development outcomes

Our research considers 5 different learning and development outcomes, including 4 of the 5 AEDC domains<sup>18</sup> – Language and Cognitive Skills (school-based), Emotional Maturity, Social Competence and Physical Health and Wellbeing – and the MSI. The MSI measures a child’s developmental strengths on a scale of 0 to 100, showing what is going well for children when they start their first year of full-time school. It combines information from all 5 domains of the AEDC, focusing on the more advanced skills, competencies and dispositions to provide a summary of the child’s strengths.

<sup>18</sup> We do not consider the Communication Skills and General Knowledge domain because the 2 measures of proficiency are 2 of 6 instruments that contribute to that domain score. These 2 measures also contribute to forming the MSI, but are 2 of 39 instruments and so are less of a concern. Sensitivity tests using an alternative measure of proficiency were conducted to see if our results were sensitive to this, with results being overall consistent between the different measures of English proficiency (conditional on being different measurements).

The detailed focus on the Language and Cognitive Skills (school-based) domain grounds the effects within a domain that is most relevant for academic outcomes (Gregory & Brinkman, 2016). Meanwhile, the results on the MSI and other domains provide additional context, acknowledging that building strengths in other domains is important for a range of long-term outcomes.

Proficiency in English is a strong predictor of developmental vulnerability on the Language and Cognitive Skills (school-based) domain; however, it is not a perfect predictor. Examination of descriptive statistics<sup>19</sup> suggests sufficient variation in outcomes in the continuous and discrete distributions of Language and Cognitive Skills (school-based) scores among our cohort of interest. Thus, exploring the experiences and background characteristics that contribute to better outcomes in this domain could inform efforts to help shift the dial for children in this cohort.

Focusing on enabling strengths highlights opportunities to support children's outcomes. This does not necessarily mean those opportunities will lead to fewer vulnerabilities – children can display developmental vulnerabilities while still demonstrating strengths in their learning and development. For example, children in some communities may be developmentally vulnerable on a specific AEDC domain, such as Language and Cognitive Skills (school-based), but show strengths in other domains, such as Social Competence, Emotional Maturity or Communication Skills and General Knowledge (AEDC, 2019).

Given this, it is important to consider learning and development holistically. As such, associations between enablers and the other domains and the MSI are discussed where appropriate.

## Measuring ECEC use

Augmenting AEDC data with the CCMS and the NQS datasets improves the measures of ECEC usage, allowing a closer examination of the relationship of ECEC participation and quality to AEDC outcomes (Table 2).

Within the MADIP First Five Years dataset, it is possible to examine quality of family day care and long day care. However, the data related to enrolment in standalone preschool is only available through the AEDC. Moreover, the specific preschool service in which the child was enrolled is not captured, and therefore cannot be linked to the NQS data. Consequently, all examinations of quality in this report exclude standalone preschools.

To explore the effects of ECEC use as an enabler of learning and development, we considered 5 dimensions of ECEC service usage (Table 2).

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<sup>19</sup> For example, the mean domain score of emerging multilingual children is between 5 and 6 in all domains except the Communication Skills and General Knowledge domain (in which emerging multilingual children have an average of 1.6). Further, the standard deviation of the domain scores were larger for emerging multilingual children than for other LBOTE children in all domains (except for the Communication Skills and General Knowledge domain). Finally, emerging multilingual children have a 50% chance of being developmentally vulnerable on the Language and Cognitive Skills (school-based) domain, which is similar to their chance of developmental vulnerability on Physical Health and Wellbeing (45%) and Social Competence (58%) domains. By comparison, emerging multilingual children have over a 90% chance of being developmentally vulnerable on the Communication Skills and General Knowledge domain.

**Table 2:** Dimensions of ECEC use

ECEC measure	Dimension	MADIP First Five Years data
Enrolment	Total participation	We used the CCMS and AEDC to measure whether a child used any ECEC, including their most-used service type. This includes participation in long day care, family day care and standalone preschools.
	Average hours enrolled	We used the CCMS enrolment data to develop a measure of the average hours of ECEC service usage. <sup>20</sup> This includes average hours enrolled in long day care or family day care services.
	Number of years of use	We used the time a child first appears in the CCMS or the AEDC to measure the number of years they used ECEC. This includes participation in long day care, family day care and standalone preschool.
	Timing of ECEC use	We used the time a child first appears in the CCMS or the AEDC to measure the age they first used formal education and care. This includes participation in primary school, long day care, family day care and standalone preschool.
Quality	Quality	We measured the service quality to which the child was exposed for the greatest period. This excludes standalone preschool participation, which is not linked to the NQS in MADIP First Five Years. The NQS assesses overall quality into 5 groups (Needs Significant improvement, Working Towards the NQS, Meets the NQS, Exceeds the NQS, and Excellent). We combine the final 2 quality ratings (Exceeds the NQS and Excellent). Ties in most common quality assessment were randomly decided.

We examined these measures (except for timing of use/number of years used) over 3 different time horizons (Table 3).

**Table 3:** Categorising ECEC use over the sample period

Time period	Rationale
2013 to 2017 (aged 0 to 4)	Used to explore the total effect of ECEC use at any time before school. Children are typically aged 0 to 4 in this window.
2017, or the year before school (aged 4)	Used to explore the effect of ECEC use within a period where more children can attend preschool programs (instead of or alongside other ECEC program types). Children are typically aged 4 in this window.
2013 to 2016 (aged 0 to 3)	Used to explore the effect of participation in long day care and family day care prior to the year before school. Children are typically aged 0 to 3 in this window.

<sup>20</sup> Noting that the CCMS is not a perfect measure to use in this case because it measures the hours enrolled rather than hours attended.

We used the CCMS and AEDC data to define several ECEC service types throughout this report (Table 4). In both time periods the most used service type was first defined using the CCMS dataset. In the year before school, the most used service was then augmented using the AEDC data by adding in information about whether the child attended a preschool or kindergarten service (in conjunction with another service or in a standalone setting).

**Table 4:** Most used service types

Services used in 2013 to 2016 (Derived from CCMS data)	Services used in 2017 (Derived from CCMS and AEDC data)
Long day care – in cases where the NQS (or CCMS) suggest the child was enrolled in long day care for the most total quarters (or hours) between 2013 and 2016.	Long day care – in cases where the AEDC suggests the child did not attend a preschool program, but the CCMS and/or the AEDC shows they attended a long day care setting.
Family day care – in cases where the NQS (or CCMS) suggest the child was enrolled in family day care for the most total quarters (or hours) between 2013 and 2016.	Long day care and preschool – in cases where the AEDC suggests the child attended a preschool program and the CCMS/ AEDC shows they attended a long day care setting.
Other – in cases where the NQS (or CCMS) suggest the child attended an ECEC service not categorised as above.	Family day care – in cases where the AEDC suggests the child did not attend a preschool program, but the CCMS and/or the AEDC shows they attended a family day care setting.
	Family day care and preschool – in cases where the AEDC suggests the child attended a preschool program and the CCMS/AEDC shows they attended a family day care setting.
	Standalone preschool – in cases where the AEDC suggests the child attended a preschool program and the CCMS/ AEDC shows they did not attend a long day care or family day care setting.
	Other – in cases where the AEDC and CCMS suggest the child attended an ECEC service not categorised as above.

Combining data across a range of datasets into one measure of ‘most used service’ was not straightforward – particularly when the datasets contained inconsistent service types (for example, there were no standalone preschool records in the CCMS) and different measures of hours of use (for example, AEDC measured typical hours of use as a categorical variable while the CCMS had a continuous measure of total hours enrolled per quarter).

The data linkage challenges and strategies are described in the limitations section.



## Key limitations in the data

Although the AEDC dataset closely approximates population-level data, a range of variables are imperfectly measured.

### Missingness of data

The measure of children's participation in preschool programs relies on teacher-/school-response data gathered in the AEDC, and only includes the year before school. This means the dataset does not provide information on enrolment in 3-year-old funded preschool programs, for which children in our sample are likely eligible in some jurisdictions.

Similarly, although comprehensive, the data linkage between the AEDC and other datasets is imperfect, introducing a different type of uncertainty. The AEDC is first linked to the MADIP Person Linkage Spine, which results in 95% of children being matched to other datasets, including Medicare and tax records.

Additional ECEC data are derived from the CCMS and NQS datasets. The CCMS is first linked to Data Over Multiple Occurrences data which can be subsequently linked to MADIP, further reducing the proportion of children with a match. Finally, the NQS data are linked to the AEDC data via the CCMS link. Overall, 70% of our sample is linked to data within the CCMS (noting some children would not appear due to not engaging with the services tracked), and 60% of our sample is linked to data within the NQS.

The dataset does not include quality information for standalone or school-based preschools. This arises because NQS data in MADIP First Five Years is linked via the child's record in the CCMS. The CCMS captures children's enrolment only in services eligible for the CCB up to 2018. Eligible programs included: centre-based and family day care settings, Outside School Hours Care, Occasional Care and In-Home Care. Preschool programs within long day care settings are included in the dataset.<sup>21</sup> Preschool services that are not part of a long day care setting and not eligible for the CCB (such as standalone preschools or school-based preschools) are not found in the CCMS dataset.

Given the NQS is linked to the AEDC via the CCMS, there are almost no records of the quality of standalone preschool programs linked to the AEDC data, with quality of preschools only observed when delivered within a long day care setting or other CCB-approved service. This is a clear limitation because preschool services tend to be rated as higher quality on average, with 57% of standalone preschools exceeding the NQS compared with 25% of long day care and 11.7% of family day care services (ACECQA, 2022).

Although the combination of the AEDC and the CCMS can precisely define the most used type of ECEC service, because of the underlying linkage process, other measures of ECEC service use are much harder to pin down.

We take a complete case analysis approach in this report, but further work should consider the scope to impute the missing data.

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<sup>21</sup> Although they appear in the NQS data, we differentiate long day care settings with a preschool program from other long day care settings via the AEDC dataset. CCMS/NQS data record them as long day care settings and do not specify the presence of a preschool program.



**Table 5:** Missingness rates of key variables for full LBOTE sample

Measure	Missing rate (N = 67,817)
<b>CCMS data</b>	
Hours enrolled per week in 2017	31.7%
<b>NQS data</b>	
Most common quality used	35.7%
<b>Combined ECEC usage data</b>	
Use of ECEC in 2013 to 2016	6.4%
Use of ECEC in 2017	0.4%
<b>Census data</b>	
Parental income	8 to 12%
Education of parents	15.5%
<b>AEDC measures</b>	0 to 5%

### Measurement of some important variables is limited

The AEDC is teacher-reported. Some measures that depend on teacher familiarity with the family – such as whether the child was read to at home or the child’s proficiency in their home language – may vary in reliability. In addition, the high correlation between rating of English proficiency and impairments such as hearing and speech impairments among LBOTE children in the data (see [Figure 1](#)), suggests that teachers may struggle to isolate proficiency. That said, the AEDC is a validated census.

The MADIP First Five Years dataset includes children’s hours *enrolled* in ECEC, but not hours of attendance. This is because the CCB data in CCMS report how many hours of ECEC families expect their child to attend, not actual attendance.

A perennial problem with using the NQS for research purposes is the frequency with which regulatory authorities assess the quality of ECEC centres. Services that meet or exceed the NQS are assessed less frequently than those needing significant improvement or working towards the NQS. Frequency can also vary by state or territory. The varied frequency of assessment is efficient from a regulatory perspective, but limits the usefulness of the NQS in research. For example, the quality rating of a service that has not been recently assessed may differ from the quality of that service at the time a child attends.

Finally, participation in preschool services is wholly identified through the AEDC. Although the way the AEDC collects data on preschool participation allows for a clean identification of whether a child attended a long day care or family day care program with or without a preschool program, in practice there may be some inaccuracies.

For example, the 2018 AEDC instrument asked:

- did the child attend a preschool/kindergarten program in the year before entering full-time school
- in what kind of setting the preschool/kindergarten program was delivered (for example, long day care or standalone preschool)
- has this child been in [any] form of non-parental care on a regular basis in the year before entering full-time school (list includes long day care and family day care).

If answered correctly, these questions would delineate between each of the service types we consider. However, teachers' responses depend on the quality of the information collected from parents, who may not have a nuanced understanding of setting types. Further, the AEDC data dictionary notes:

'9% of children in 2015 were reported as having attended a preschool program on some other basis and separately attending a long day care centre. Children with this pattern of responses in 2015 were recorded as having attended a day care centre where the respondent was unsure about the presence of a preschool program' (AGDE, 2019).

In our analysis, such children may be incorrectly allocated to long day care or family day care as their most used service instead of what may have been long day care with preschool or family day care with preschool. We assume that the effect of such inaccuracy is limited, but care should be taken in interpreting distinctions between long day care settings and long day care settings with a preschool program in our findings.

### **Timing of the measurement of some important variables is limited**

We also note that there were design issues with intermediate outcomes in data collection that incur additional assumptions beyond those typically assigned to between-person regression designs. Specifically, emerging multilingual children were assessed for their English proficiency after ECEC use had occurred. In using this classification, it is assumed that ECEC does not influence the development of English proficiency and that English proficiency does not influence AEDC outcomes. However, given observed associations between ECEC and language and cognitive development, and that English proficiency is indicative of developmental vulnerability on other domains, it is highly likely that the analytical models will include some additional bias from intermediate outcomes that is unavoidable.

### **Data about First Nations children**

First Nations children's participation in ECEC may be under-reported in our data. In 2016, First Nations children were 50% less likely to attend a CCB-approved service than other children (Early Childhood Australia & Secretariat of National Aboriginal and Islander Child Care, 2019). This may reflect in part the alternative funding arrangements (outside the CCB) for some targeted services for First Nations children and families. For example, between 2013 and 2016, Multifunctional Aboriginal Children's Services and services in remote communities were typically funded through Australian Government Budget Based Funding,<sup>22</sup> and were not eligible for the CCB (Early Childhood Australia & Secretariat of National Aboriginal and Islander Child Care, 2019). In addition, important alternatives to ECEC such as the Families as First Teachers (FaFT) program in Northern Territory and New South Wales (Aboriginal FaFT) are funded outside CCB.

<sup>22</sup> These funding arrangements were discontinued in July 2018 and rolled into the new Child Care Subsidy arrangements. However, these new funding arrangements occur after the period of our data.

These issues of under-reporting are most likely to affect data on the participation of First Nations children in remote areas, where:

- First Nations people tend to speak traditional or new languages as their dominant language (AIATSIS & ANU, 2020)
- children are more likely to be considered multilingual or I-EAL/D (Verdon & Mcleod, 2015)
- ECEC services are often non-CCB funded.

Language backgrounds of First Nations children are not necessarily well-recorded and understood by education systems upon school enrolment (Angelo & Hudson, 2020; Steele & Wigglesworth, 2021). This is likely a bigger issue in some jurisdictions or locales than others. For example, Brinkman et al. (2012) found that less than 1% of the national 2009 AEDC sample were both First Nations and classified as EAL/D learners. In the Northern Territory the story is different. The majority (75% to 76%) of First Nations children in the Northern Territory are LBOTE (and live in remote or very remote areas), compared with 19% of First Nations children being LBOTE in other jurisdictions (He et al., 2021).

In the AEDC, language background is teacher-reported, but for First Nations children, the teacher can complete the AvEDI assisted by an Indigenous Cultural Consultant. In some cases, the child's language background is likely to be accurately reported, especially if the school has strong links to the community (Angelo & Hudson, 2020). Indigenous Cultural Consultants likely play an important role in the accurate reporting of the languages of First Nations children.

In general, existing data collection methods about languages spoken by First Nations peoples do not recognise the complexity of language contexts in Australia or reflect the experience of First Nations people (AIATSIS & ANU, 2020). Many commonly used Australian datasets, therefore, are likely to provide incomplete or inaccurate information regarding First Nations languages. Databases such as LSIC (Walter et al., 2017), or survey-based community-level data collections could be better candidates to guide in-depth research for this cohort.

### **Sample selection problems**

There are a few reasons to be concerned about selection effects in the current data. These arise from both the missingness generated through data linkage and the choices made by families in terms of ECEC participation and service use.

The selection of the sample tends to be away from factors of disadvantage. For example, children living in remote areas, who are not read to at home or have emotional problems that affect learning are less likely to be included in either regression sample. This presents a strong rationale for using imputation to predict variables that are missing in the sample.

There is also a selection effect based on the state or territory of residence, with children from Western Australia, Tasmania, the Northern Territory and the Australian Capital Territory less likely to be in either regression sample.

We take a complete-case approach in the analysis, but future research directions should consider the scope for imputation of missing data or use of Weighted Least Squares via Inverse Probability Weighting.

## Summary statistics of our sample

We present some additional summary statistics comparing emerging multilingual children to other LBOTE children excluded from charts within the paper (Table 6).

**Table 6:** Additional comparisons of emerging multilingual children with other LBOTE children

Characteristic	Emerging multilingual (N = 4,243) %	Other LBOTE (N = 63,574) %
First Nations	10.6	4.6
Female	33.4	49.8
EAL/D*	88.2	68.4
Major Cities of Australia	82.3	89.3
Inner Regional Australia	6.1	4.7
Outer Regional Australia	4.4	3.4
Remote Australia	1.9	1.0
New South Wales	34.2	40.1
Victoria	27.1	26.5
Queensland	16.2	13.2
Western Australia	8.7	10.5
South Australia	6.3	5.6
Tasmania	0.5	0.5
Northern Territory	4.9	1.6
Australian Capital Territory	2.2	1.9

Note: \*Variable labelled as 'English as a Second Language' in the AEDC dataset.

Full summary statistics for the 3 samples of emerging multilingual children are presented in [Table 7](#). The substantial differences in parental education and other variables were considered and controlled in regression models.

**Table 7:** Summary statistics of each sample (emerging multilingual children)

Characteristic	Full sample (N = 4,243)	Has complete data (excluding quality measure) (N = 1,026)	Has complete data (including quality measure) (N = 510)
	%	%	%
First Nations: Yes	11.9	3.1	0.7
Female	33.4	31.7	29.0
Generation of immigration: Second gen	50.2	73.7	76.9
Generation of immigration: First gen	13.6	12.0	9.9
No resettlement difficulties*	85.6	87.3	86.0
Australian Capital Territory*	2.4	0.3	0.7
New South Wales	34.5	35.4	43.2
Northern Territory	4.8	2.3	0.7
Queensland	16.0	16.1	16.6
South Australia	6.1	6.3	5.0
Tasmania*	0.3	0.3	0.7
Victoria	26.7	30.0	27.9
Western Australia	9.2	9.1	6.0
Regional area	9.7	7.8	6.9
Remote area	7.5	2.7	0.7
Absent: 6 to 10 days	22.1	24.9	26.2
Absent: More than 10 days	32.4	29.5	23.8
Absent for cultural reason: Yes	30.4	34.8	33.4
Physical disability that affects learning	3.1	2.6	2.8
Physical disability that does not affect learning	1.2	1.2	0.7
Other impairment that affects learning	46.1	48.3	48.8

Characteristic	Full sample (N = 4,243)	Has complete data (excluding quality measure) (N = 1,026)	Has complete data (including quality measure) (N = 510)
	%	%	%
Other impairment that does not affect learning	4.1	5.0	4.4
Emotional/behavioural problems that affect learning	21.2	17.5	17.6
Emotional/behavioural problems that do not affect learning	3.5	3.4	3.7
Read to at home: Somewhat	32.4	37.5	36.0
Read to at home: Yes	27.1	37.9	40.3
Parents involved at school: Somewhat	39.2	37.4	35.1
Parents involved at school: Yes	35.0	44.9	47.9
Highest parental education: Diploma or Certs III/IV	18.3	22.9	20.4
Highest parental education: Bachelor's or above	30.5	46.0	52.1
English proficiency of most proficient parent: Not at all	1.2	0.9	0.7
English proficiency of most proficient parent: Not well	9.3	11.2	8.4
English proficiency of most proficient parent: Well	25.1	34.2	32.4
English proficiency of most proficient parent: Very well	37.7	53.8	58.4
From single parent family	11.8	11.6	12.5
Has problems at home: Yes, affects learning	8.9	6.3	6.5
Has problems at home: Yes, does not affect learning	2.5	1.6	0.7
In multi-year class	14.4	10.8	9.1
Most used ECEC service in 2017: No ECEC used	15.6	12.8	-

Characteristic	Full sample (N = 4,243)	Has complete data (excluding quality measure) (N = 1,026)	Has complete data (including quality measure) (N = 510)
	%	%	%
Most used ECEC service in 2017: Long day care	7.8	7.8	14.6
Most used ECEC service in 2017: Long day care and preschool	32.2	36.7	61.6
Most used ECEC service in 2017: Family day care	5.0	4.8	8.5
Most used ECEC service in 2017: Family day care and preschool	8.3	8.4	14.6
Most used ECEC service in 2017: Other	0.1	0.3	0.7
Most used ECEC service in 2017: Other and preschool	1.1	0.8	0.7
Most used ECEC service in 2017: Preschool	29.6	28.3	-
Most common quality of ECEC: No ECEC used	11.3	9.2	-
Most common quality of ECEC: Significant Improvement Required	0.6	0.7	0.7
Most common quality of ECEC: Working Towards NQS	21.5	21.2	39.3
Most common quality of ECEC: Meeting NQS	17.5	19.9	36.6
Most common quality of ECEC: Exceeding NQS	10.5	12.6	22.9
Most common quality of ECEC: Excellent*	0.1	0.3	0.0
Mean (standard deviation)			
Age when first enrolled in ECEC (years)	3.1 (1.7)	3 (1.6)	2.3 (1.2)
Average hours enrolled in ECEC per week in 2017	24.5 (17.8)	25.2 (16.7)	31.2 (12.9)



Characteristic	Full sample (N = 4,243) %	Has complete data (excluding quality measure) (N = 1,026) %	Has complete data (including quality measure) (N = 510) %
Disposable income (parent 1)	\$24,030.40 (\$29,761.40)	\$28,999.80 (\$32,463.80)	\$32,462.00 (\$34,255.70)
Disposable income (parent 2)	\$23,946.90 (\$33,400.30)	\$25,926.60 (\$31,117.40)	\$28,513.10 (\$32,502.50)
No. of children in household	2.3 (1.2)	2.2 (1.2)	2.1 (1.1)
Median SEFIA score of children in year level	953.9 (135)	974.3 (111.4)	992.1 (84.1)
% of class with LBOTE background	0.5 (0.3)	0.5 (0.3)	0.5 (0.3)
% of year level with LBOTE background	0.5 (0.3)	0.5 (0.3)	0.5 (0.3)
Class size	19.3 (7.1)	19.6 (6.4)	19.7 (6)
Unemployment in local area (%)	8.6 (6.5)	8 (5.2)	7.2 (3.1)
SEIFA of local area	949.2 (129.6)	967.6 (108.1)	983.7 (84.8)

Notes: \*denotes that data have been suppressed based on DataLab clearance rules. These apply to groups with fewer than 10 observations or that account for more than 90% of the observations.

## Analytic approach

First, we explored differences in the characteristics and experiences of LBOTE children within our sample to better understand the demographics of the cohort, patterns of ECEC participation, and identify factors that distinguish emerging multilingual children from other LBOTE children.

Then we ran several regressions to answer the remaining questions (Table 8). The regressions all show relationships, not causation, providing evidence of indicators associated with AEDC outcomes and ECEC participation among LBOTE children (including emerging multilingual children).

**Table 8:** Regression techniques used

Research question	Regression technique
Which characteristics of emerging multilingual children are most strongly associated with their likelihood of participating in ECEC?	Logistic regression with clustered standard errors at the suburb-level to account for variation in ECEC service provision across suburbs. <sup>23</sup>
What characteristics and experiences are most strongly associated with better learning and development outcomes for emerging multilingual children?	Linear regression with clustered standard errors at the teacher-level to account for teacher-level variation in measurement of outcomes.
What patterns of ECEC participation are most strongly associated with better outcomes for emerging multilingual children?	Sensitivity tests included multi-level linear regression with teacher-level random effects to account for teacher-level variation that arises from the structure of the AEDC (for example, a child's English proficiency is assessed by their teacher).

## Regression designs

As much as practical, the independent variables across all the regressions were held to be the same, except for variables that did not make sense to include or for which we had already adequately controlled. For example:

- The number of school absences is not a useful predictor of participation in ECEC.
- Parental labour force participation is proxied well enough by income and so was only included where differences between an 'unemployed' parent and one 'not in the labour force' were pertinent.
- Region of birth was broadly unimportant for the AEDC regressions but was included in the ECEC participation regressions.

## Enablers of learning and development

We ran 5 main regression designs to model the enablers of learning and development for emerging multilingual children. In these models, only children rated as having 'poor' English proficiency (listening) were included. Each design used the 4 AEDC domains (excluding Communication Skills and General Knowledge) and the MSI as the dependent variable.

<sup>23</sup> That is, at the SA3 level.

$$\text{Domain}_i = \beta_0 + \beta_1 ECEC_i + \beta_2 age_i + \beta_3 age_i^2 + \mathbf{x}_i\beta + \varepsilon_i \quad (1.1)$$

Where Domain is the domain or MSI score of the child;  $ECEC_i$  is an indicator that measures whether the child attended any ECEC services in the period 2013 to 2017;  $age_i$  is the age at which the child first attended education services (including children who attended no ECEC, whose age was set to their age in their first year of full-time school);  $\mathbf{x}_i$  are a range of child-level characteristics.

$$\text{Domain}_i = \beta_0 + \beta_1 ECEC_{i,2013-16} + \beta_2 ECEC_{i,2017} + \beta_3 age_i + \beta_4 age_i^2 + \mathbf{x}_i\beta + \varepsilon_i \quad (1.2)$$

Where Domain is the domain or MSI score of the child;  $ECEC_{i,2013-16}$  is an indicator that measures whether the child attended any ECEC services in the period 2013 to 2016;  $ECEC_{i,2017}$  is an indicator that measures whether the child attended any ECEC services in 2017;  $age_i$  is the age at which the child first attended education services (including children who attended no ECEC); and  $\mathbf{x}_i$  are a range of child-level characteristics.

$$\text{Domain}_i = \beta_0 + \beta_1 age_i + \beta_2 age_i^2 + \text{Most used ECEC}_i\beta + \mathbf{x}_i\gamma + \varepsilon_i \quad (1.3)$$

Where Domain is the domain or MSI score of the child;  $age_i$  is the age at which the child first attended education services (including children who attended no ECEC);  $\text{Most used ECEC}_i$  is a series of indicators that measure the most used ECEC service in 2017 (or the year before school); and  $\mathbf{x}_i$  are a range of child-level characteristics.

$$\text{Domain}_i = \beta_0 + \beta_1 ECEC_{i,2017} + \beta_2 age_i + \beta_3 age_i^2 + \beta_4 hours_i + \beta_5 hours_i^2 + \text{Most common quality}_i\beta + \mathbf{x}_i\beta + \varepsilon_i \quad (1.4)$$

Where Domain is the domain or MSI score of the child;  $age_i$  is the age at which the child first attended education services;  $hours$  are the average hours the child was enrolled per week in 2017;  $\text{Most common quality}_i$  are a series of indicators that measure the most common quality of ECEC service used; and  $\mathbf{x}_i$  are a range of child-level characteristics.

$$\text{Domain}_i = \beta_0 + \beta_1 age_i + \beta_2 age_i^2 + \beta_1 hours_i + \beta_2 hours_i^2 + \text{Most used ECEC transition}_i\beta + \mathbf{x}_i\gamma + \varepsilon_i \quad (1.5)$$

Where Domain is the domain or MSI score of the child;  $age_i$  is the age at which the child first attended education services (including children who attended no ECEC);  $hours$  are the average hours the child was enrolled per week in 2017;  $\text{Most used ECEC transition}_i$  is a series of indicators that measure the combination of most used ECEC service in 2013 to 2016 then the most used ECEC service in 2017 (or the year before school); and  $\mathbf{x}_i$  are a range of child-level characteristics.

In each regression, we include children only if they have at least one valid domain score. In all regressions, at least 80% of children have a valid AEDC score, and there are more than 15 children with AEDC scores.

**Table 9:** Number of children with invalid domain scores in regressions for each domain

Definition of emerging bilingual	Language and Cognitive Skills (school-based)	Social skills	Emotional Maturity	Physical Health and Wellbeing
	N (% of regression sample)			
Listening only	14 (1.4%)	< 10 (<1%)	43 (4.2%)	< 10 (<1%)
Speaking or listening	30 (1.5%)	14 (<0.7%)	69 (3.4%)	< 10 (<0.5%)

With the aim to compare and contrast specific results from regressions 1.1 to 1.5, we also ran several regressions that either included:

- children rated as having ‘poor’ English proficiency in listening or spoken English
- only English-proficient LBOTE children.

### Variable inclusion

[Table 10](#) shows all the variables included in these models. These variables have been selected to account for a range of child, family, neighbourhood and school factors that might affect a child’s learning and development.

We used 1:10 and 1:15 rules of thumb to consider whether the degrees of freedom are large enough or whether the models may be overspecified (that is, whether the number of observations was > 10 to 15 times the number of parameters). Regression 1.5 may be overspecified according to these rules of thumb.

We used Variance Inflation Factor (VIF) tests to test for multicollinearity. These tests suggest there is not enough evidence of multicollinearity to drop any variables.

**Table 10:** Additional variables in regressions 1.1 to 1.5

Additional variables included in regressions		
First Nations status	Unemployment rate in local area	Parental labour force status
Gender	Remoteness status	Number of children in household
Generation of immigration	Number of days absent from school	Whether the child was eligible for the CCB
Experience of resettlement difficulties	Whether child was absent for cultural reasons	School's median SEIFA (IRSD) status
State of residence	How often the child was read to at home	% of children who were LBOTE in class
Whether the child had any physical health concerns	How often the child's parents are involved in their schooling	% of children who were LBOTE in year level
Whether the child had any emotional or behavioural health concerns	Parental disposable income (log)	Class size
Whether the child had any other health concerns	Highest educational attainment of either parent	Whether the child was in a multi-year class
SEIFA (IRSD) of local area	English proficiency of most proficient parent	

### Regression results

Table 11 to Table 18 show the effects of ECEC from regressions 1.2 to 1.5. The results for both definitions of emerging multilingual children are reported.

**Table 11:** Primary results from regression 1.2 (Emerging multilingual defined as children who have poor proficiency when listening in English)

Variable	MSI	Language and Cognitive Skills (school-based)	Social Competence	Emotional Maturity	Physical Health and Wellbeing
	Estimated coefficient (standard error)				
Used ECEC 2017	-1.69 (2.09)	0.39 (0.27)	-0.01 (0.23)	-0.09 (0.19)	0.17 (0.21)
Used ECEC 2013 to 2016	2.82 (2.29)	0.65** (0.3)	0.28 (0.26)	0.41* (0.22)	0.53** (0.24)

Variable	MSI	Language and Cognitive Skills (school-based)	Social Competence	Emotional Maturity	Physical Health and Wellbeing
	Estimated coefficient (standard error)				
Age first in education	0.86 (1.55)	-0.16 (0.22)	0.04 (0.18)	0.07 (0.14)	0.07 (0.17)
Age first in education squared	0.01 (0.26)	0.07* (0.04)	0.01 (0.03)	0 (0.02)	0.02 (0.03)
N	1026	1023	1025	1017	1026
R-squared/ Adjusted R-squared	0.337/0.296	0.362/0.322	0.357/0.317	0.372/0.332	0.244/0.198

Notes: \*p = 0.1; \*\*p = 0.05; \*\*\*p = 0.01. Comparison group is 'No ECEC used'. MSI is on a scale of 0 to 100, whereas the other domains are on a scale of 0 to 10. Domain scores cover ratings from about 850 teachers.

**Table 12:** Sensitivity test of regression 1.2 (Emerging multilingual defined as children who have poor proficiency when speaking or listening in English)

Variable	MSI	Language and Cognitive Skills (school-based)	Social Competence	Emotional Maturity	Physical Health and Wellbeing
	Estimated coefficient (standard error)				
Used ECEC 2017	-0.11 (1.46)	0.46*** (0.17)	0.12 (0.15)	-0.09 (0.12)	0.2 (0.13)
Used ECEC 2013 to 2016	1.79 (1.81)	0.53*** (0.19)	0.13 (0.18)	0.19 (0.14)	0.37** (0.15)
Age first in education	0.48 (1.22)	-0.09 (0.14)	-0.08 (0.12)	0.1 (0.1)	-0.07 (0.11)
Age first in education squared	0.06 (0.2)	0.05** (0.02)	0.02 (0.02)	-0.01 (0.02)	0.04** (0.02)
N	2031	2026	2030	2017	2031
R-squared/ Adjusted R-squared	0.294/0.273	0.328/0.307	0.314/0.293	0.326/0.306	0.210/0.186

Notes: \*p = 0.1; \*\*p = 0.05; \*\*\*p = 0.01. Comparison group is 'No ECEC used'. MSI is on a scale of 0 to 100, whereas the other domains are on a scale of 0 to 10. Domain scores cover ratings from about 850 teachers.

**Table 13:** Primary results from regression 1.3

Variable	MSI	Language and Cognitive Skills (school-based)	Social Competence	Emotional Maturity	Physical Health and Wellbeing
	Estimated coefficient (standard error)				
<b>Most-used service in 2017 (relative to 'No ECEC used')</b>					
Long day care	-5.34* (2.81)	0.21 (0.37)	-0.29 (0.31)	-0.3 (0.24)	-0.06 (0.29)
Long day care and preschool	-5.90** (2.43)	0.1 (0.32)	-0.48* (0.27)	-0.49** (0.22)	0.07 (0.25)
Family day care	-5.21* (3.11)	-0.17 (0.44)	-0.31 (0.35)	-0.54* (0.3)	0.07 (0.33)
Family day care and preschool	-3.43 (2.91)	0.07 (0.4)	-0.08 (0.33)	-0.26 (0.27)	-0.08 (0.31)
Preschool	-0.74 (2.07)	0.34 (0.27)	0.08 (0.23)	-0.05 (0.19)	0.07 (0.21)
N	1026	1023	1025	1017	1026
R-squared/ Adjusted R-squared	0.341/0.298	0.360/0.318	0.361/0.320	0.374/0.333	0.241/0.191

Notes: \*p = 0.1; \*\*p = 0.05; \*\*\*p = 0.01. MSI is on a scale of 0 to 100, whereas the other domains are on a scale of 0 to 10. Domain scores cover ratings from about 850 teachers.

**Table 14:** Sensitivity test of regression 1.3 (Emerging multilingual defined as children who have poor proficiency when speaking or listening in English)

Variable	MSI	Language and Cognitive Skills (school-based)	Social Competence	Emotional Maturity	Physical Health and Wellbeing
	Estimated coefficient (standard error)				
<b>Most-used service in 2017 (relative to 'No ECEC used')</b>					
Long day care	-3.33 (2.25)	0.28 (0.25)	-0.19 (0.23)	-0.09 (0.18)	-0.05 (0.2)
Long day care and preschool	-3.36* (1.84)	0.26 (0.22)	-0.25 (0.19)	-0.25 (0.15)	0.09 (0.16)



Variable	MSI	Language and Cognitive Skills (school-based)	Social Competence	Emotional Maturity	Physical Health and Wellbeing
	Estimated coefficient (standard error)				
Family day care	-4.49* (2.47)	-0.09 (0.3)	-0.25 (0.27)	-0.36* (0.22)	-0.06 (0.22)
Family day care and preschool	-2.63 (2.2)	0.23 (0.27)	-0.11 (0.23)	-0.11 (0.18)	-0.05 (0.2)
Preschool	0.8 (1.48)	0.43** (0.17)	0.22 (0.15)	-0.08 (0.12)	0.18 (0.13)
N	2027	2022	2026	2013	2027
R-squared/ Adjusted R-squared	0.298/0.276	0.327/0.305	0.318/0.296	0.328/0.306	0.210/0.184

Notes: \*p = 0.1; \*\*p = 0.05; \*\*\*p = 0.01. MSI is on a scale of 0 to 100 whereas the other domains are on a scale of 0 to 10. Domain scores cover ratings from about 850 teachers. Long day care and preschool includes children who attended a long day care with a preschool program or who attended a long day care as well as a standalone or school-based preschool.

**Table 15:** Primary results from regression 1.4

Variable	MSI	Language and Cognitive Skills (school-based)	Social Competence	Emotional Maturity	Physical Health and Wellbeing
	Estimated coefficient (standard error)				
<b>Most common quality (relative to 'Working Towards NQS')</b>					
Significant improvement required	-7.17 (5.95)	-0.85 (0.83)	-0.68 (0.72)	0.15 (0.54)	-0.32 (0.6)
Meeting NQS	3.30* (1.76)	0.14 (0.24)	0.28 (0.2)	0.09 (0.17)	0.04 (0.17)
Exceeding NQS	1.41 (2.11)	0.08 (0.26)	0.32 (0.22)	0.2 (0.19)	0.33 (0.21)
(Hours enrolled per week in 2017)/100	0 (3.21)	-0.56 (0.43)	0.23 (0.37)	0.42 (0.3)	0.24 (0.35)
(Hours enrolled per week in 2017 squared)/1000	-0.29 (4.68)	0.88 (0.64)	-0.39 (0.55)	-0.64 (0.42)	-0.52 (0.5)

Variable	MSI	Language and Cognitive Skills (school-based)	Social Competence	Emotional Maturity	Physical Health and Wellbeing
	Estimated coefficient (standard error)				
Age first in education	1.55 (2.11)	0.1 (0.29)	0.03 (0.25)	0.13 (0.21)	0.22 (0.25)
Age first in education squared	0.04 (0.4)	0.03 (0.05)	0.04 (0.05)	0 (0.04)	-0.03 (0.05)
N	510	509	510	507	510
R-squared/ Adjusted R-squared	0.379/0.289	0.417/0.331	0.408/0.322	0.427/0.342	0.307/0.205

Notes: \*p = 0.1; \*\*p = 0.05; \*\*\*p = 0.01. 'Excellent' rating has been included as 'Exceeding NQS'. Regressions only include children who attend long day care or family day care. MSI is on a scale of 0 to 100, whereas the other domains are on a scale of 0 to 10. Domain scores cover ratings from about 450 teachers.

**Table 16:** Sensitivity test of regression 1.4 (Emerging multilingual defined as children who have poor proficiency when speaking or listening in English)

Variable	MSI	Language and Cognitive Skills (school-based)	Social Competence	Emotional Maturity	Physical Health and Wellbeing
	Estimated coefficient (standard error)				
<b>Most common quality (relative to 'Working Towards NQS')</b>					
Significant improvement required	-0.42 (6.89)	-0.77 (0.77)	-0.1 (0.71)	0.16 (0.49)	-0.41 (0.5)
Meeting NQS	0.62 (1.52)	-0.15 (0.16)	0.03 (0.16)	0 (0.12)	-0.14 (0.13)
Exceeding NQS	1.55 (1.77)	-0.05 (0.18)	0.24 (0.17)	0.18 (0.14)	0.16 (0.15)
(Hours enrolled per week in 2017)/100	3.38 (2.59)	-0.07 (0.3)	0.41 (0.28)	0.42* (0.23)	0.08 (0.26)
(Hours enrolled per week in 2017 squared)/1000	-6.15 (3.74)	0.21 (0.44)	-0.77* (0.41)	-0.70** (0.33)	-0.29 (0.38)

Variable	MSI	Language and Cognitive Skills (school-based)	Social Competence	Emotional Maturity	Physical Health and Wellbeing
	Estimated coefficient (standard error)				
Age first in education	0.23 (1.71)	0.16 (0.19)	-0.13 (0.17)	0.06 (0.14)	-0.03 (0.16)
Age first in education squared	0.26 (0.32)	0.01 (0.03)	0.06* (0.03)	0.01 (0.03)	0.03 (0.03)
N	926	924	926	922	926
R-squared/ Adjusted R-squared	0.317/0.265	0.359/0.310	0.341/0.290	0.372/0.324	0.232/0.173

Notes: \*p = 0.1; \*\*p = 0.05; \*\*\*p = 0.01. 'Excellent' rating has been included as 'Exceeding NQS'. Regressions only include children who attend long day care or family day care. MSI is on a scale of 0 to 100, whereas the other domains are on a scale of 0 to 10. Domain scores cover ratings from about 450 teachers.

**Table 17:** Primary results from regression 1.5

Variable	MSI	Language and Cognitive Skills (school-based)	Social Competence	Emotional Maturity	Physical Health and Wellbeing
	Estimated coefficient (standard error)				
<b>Most common ECEC pathway (relative to 'No ECEC in either period')</b>					
Dropout	5.38 (4.76)	0.72 (0.6)	0.64 (0.52)	0.72* (0.42)	0.79 (0.49)
No ECEC to family day care	0.57 (5.9)	0.9 (0.75)	0.55 (0.67)	0.17 (0.49)	-0.43 (0.62)
No ECEC to long day care	-3.03 (3.27)	0.41 (0.43)	0.05 (0.35)	-0.14 (0.31)	0.59* (0.32)
No ECEC to preschool	0.48 (2.69)	0.42 (0.34)	0.18 (0.28)	0.09 (0.25)	0.22 (0.27)
Family day care to family day care	-0.22 (4.09)	0.58 (0.56)	0.25 (0.45)	0.09 (0.39)	0.75* (0.42)
Family day care to long day care	1.9 (4.78)	1.11* (0.57)	0.17 (0.52)	-0.06 (0.43)	0.72 (0.47)

Variable	MSI	Language and Cognitive Skills (school-based)	Social Competence	Emotional Maturity	Physical Health and Wellbeing
	Estimated coefficient (standard error)				
Family day care to preschool	11.72** (5.37)	2.59*** (0.59)	1.34** (0.64)	0.52 (0.63)	1.42*** (0.52)
Long day care to family day care	7.4 (5.99)	1.51** (0.61)	0.89 (0.58)	0.76 (0.48)	0.84 (0.59)
Long day care to long day care	-0.89 (3.99)	0.90* (0.5)	0.08 (0.43)	0.17 (0.37)	0.74 * (0.39)
Long day care to preschool	5.4 (4.42)	1.27** (0.56)	0.85* (0.49)	0.91** (0.41)	1.05** (0.43)
N	1026	1023	1025	1017	1026
R-squared/ Adjusted R-squared	0.352/0.305	0.373/0.328	0.372/0.327	0.383/0.339	0.251/0.197

Notes: \*p = 0.1; \*\*p = 0.05; \*\*\*p = 0.01. Dropout is defined as any ECEC between 2013 and 2016 but no ECEC in 2017. MSI is on a scale of 0 to 100, whereas the other domains are on a scale of 0 to 10. Domain scores cover ratings from about 850 teachers. Long day care in 2017 includes children who attended a long day care program in conjunction with a preschool program (either as part of the long day care or in a standalone setting). Preschool refers specifically to children who only attended a standalone or school-based preschool program.

**Table 18:** Sensitivity test of regression 1.5 (Emerging multilingual defined as children who have poor proficiency when speaking or listening in English)

Variable	MSI	Language and Cognitive Skills (school-based)	Social Competence	Emotional Maturity	Physical Health and Wellbeing
	Estimated coefficient (standard error)				
<b>Most common ECEC pathway (relative to 'No ECEC in either period')</b>					
Dropout	1.84 (3.53)	0.39 (0.41)	0.29 (0.37)	0.53* (0.28)	0.11 (0.33)
No ECEC to family day care	0.73 (3.79)	0.61 (0.46)	0.56 (0.41)	0.36 (0.31)	-0.43 (0.37)
No ECEC to long day care	-1.7 (2.52)	0.26 (0.27)	0.01 (0.25)	0.03 (0.21)	0.22 (0.21)
No ECEC to preschool	0.39 (1.85)	0.41* (0.21)	0.23 (0.19)	0.04 (0.16)	0.08 (0.17)

Variable	MSI	Language and Cognitive Skills (school-based)	Social Competence	Emotional Maturity	Physical Health and Wellbeing
	Estimated coefficient (standard error)				
Family day care to family day care	-1.39 (3.18)	0.44 (0.37)	0.06 (0.32)	0.03 (0.26)	0.29 (0.28)
Family day care to long day care	0.25 (3.79)	1.16*** (0.4)	0 (0.37)	0.03 (0.3)	0.38 (0.31)
Family day care to preschool	11.09*** (3.68)	1.45*** (0.38)	1.18*** (0.38)	0.47 (0.31)	0.92*** (0.3)
long day care to family day care	1.41 (4.13)	1.27*** (0.39)	0.12 (0.4)	0.39 (0.32)	0.31 (0.35)
Long day care to long day care	-1.09 (2.94)	0.74** (0.32)	0.03 (0.3)	0.13 (0.24)	0.31 (0.25)
Long day care to preschool	3.16 (3.12)	1.04*** (0.34)	0.49 (0.32)	0.35 (0.25)	0.60** (0.27)
N	2031	2026	2030	2017	2031
R-squared/ Adjusted R-squared	0.302/0.277	0.334/0.311	0.322/0.299	0.331/0.307	0.215/0.187

Notes: \*p = 0.1; \*\*p = 0.05; \*\*\*p = 0.01. Dropout is defined as any ECEC between 2013 and 2016 but no ECEC in 2017. MSI is on a scale of 0 to 100, whereas the other domains are on a scale of 0 to 10. Domain scores cover ratings from about 850 teachers. Long day care in 2017 includes children who attended a long day care program in conjunction with a preschool program (either as part of the long day care or in a standalone setting). Preschool refers specifically to children who only attended a standalone or school-based preschool program.

### Sensitivity tests

We conducted several sensitivity tests, with results robust to different changes to the specification.

We tested a random effect specifications model for the model that included emerging children but found there to be too few children per teacher. Still, results between the single-level and multi-level models were comparable.

For models that included all other LBOTE children, we tested 3 multi-level models:

- the first included teacher-level random intercepts
- the second tested school-level random intercepts alongside teacher-level random intercepts
- the third included only school-level random intercepts.

We also tested 2 further measures of proficiency in regressions that included the entire sample of LBOTE children to see whether the MSI results were sensitive to inclusion of the proficiency instrument as an independent variable. The rationale was that proficiency is one of the 39 instruments that form the MSI itself, which may have outsized implications for MSI scores. The tests suggested that although proficiency is a component of the MSI, it is not a significant enough component to exclude measures of proficiency from the MSI regressions.

The effect of the change in sample that occurred after controlling for age first enrolled in an education service was tested. We also added age at school entry instead of age first enrolled.

Finally, we tested the sensitivity of our results to also including children who had one parent who spoke English as their first language. We found the associations were slightly smaller across most regressions, but the sensitivity test did not change any of the implications.

### Participation patterns in ECEC

This report used one logistic regression design to model the characteristics of LBOTE children who used any ECEC service, to identify characteristics associated with patterns of ECEC use.

$$I(\text{Did not use ECEC})_i = \beta_0 + \beta_1 \text{emerging bilingual} + X_i \beta + \varepsilon_i \quad (2)$$

Where  $I(\text{Did not use ECEC})_i$  is an indicator for whether the child used an ECEC service;  $X_i$  is a range of child-level characteristics, several of which were interacted with whether a child was an emerging multilingual. We clustered the standard errors at the ABS's Statistical Area Level 3 to account for any variation in supply of ECEC by SA3 area.

This regression was run twice, to explore predictors of informal care in the periods: 2017, and between 2013 and 2016.

We used VIF tests to test for multicollinearity. These tests suggest there is not enough evidence of multicollinearity to drop any variables. Further interactions were considered but were excluded based on initial VIF tests.

We used 1:10 and 1:15 rules of thumb to consider whether the degrees of freedom are large enough or whether the models may be overspecified. For these logistic regressions, this entailed considering whether the number of children in informal care > 10 to 15 times the number of parameters.

No regressions would be considered overspecified under these rules.

We present the average marginal effects (AME) for these regressions below. AMEs show the percentage change in the outcome variable from a response category relative to the reference category. The effects of interaction terms have been calculated using AME at representative values. This means the AME for a child who 'is an emerging multilingual' is the average effect for all emerging multilingual children, while the AME for a child who 'is an emerging multilingual (who is in 1st SES quartile (local area))' is the average effect for all emerging multilingual children who are in the 1st SES quintile.

**Table 19:** Predictors of informal care (AME)

Variable	Informal care ages birth to 3 (2013 to 2016)	Informal care in the year before school (2017)	Informal care ages birth to 3 (2013 to 2016)	Informal care in the year before school (2017)
	Definition of emerging multilingual: Listening only		Definition of emerging multilingual: Spoken or listening	
	AME (standard error)			
Is an emerging multilingual (relative to not)	4.42*** (1.47)	3.02*** (0.9)	7.59*** (1.16)	3.3*** (0.83)
<b>SES quintile of local area (relative to quintile '5', most advantaged)</b>				
1st	4.77*** (1.8)	3.22*** (0.9)	4.56** (1.79)	3.1*** (0.9)
2nd	5.42*** (1.21)	3.76*** (0.74)	5.23*** (1.21)	3.63*** (0.74)
3rd	2.62** (1.17)	1.85*** (0.63)	2.53** (1.15)	1.77*** (0.64)
4th	1.89* (0.98)	0.87 (0.64)	1.75* (0.98)	0.79 (0.65)
<b>Remoteness (relative to 'major city')</b>				
Regional	10.16*** (1.98)	0.31 (0.75)	10.17*** (1.99)	0.31 (0.75)
Remote or very remote	25.33*** (5.56)	-1.62 (1.93)	24.73*** (5.63)	-1.5 (1.89)
<b>Has emotional or behavioural challenges (relative to 'no')</b>				
Yes, affects learning	-3.3** (1.51)	-0.86 (1.05)	-2.89* (1.59)	-0.82 (1.11)
Yes, does not affect learning	-1.47 (1.63)	0.54 (1.17)	-1.34 (1.65)	0.73 (1.2)
<b>Is an emerging multilingual (relative to 'not') and who...</b>				
lives in an area in the 1st SES quintile	8.07*** (2.06)	0.63 (1.16)	7.94*** (1.91)	1.33 (1.5)



Variable	Informal care ages birth to 3 (2013 to 2016)	Informal care in the year before school (2017)	Informal care ages birth to 3 (2013 to 2016)	Informal care in the year before school (2017)
	Definition of emerging multilingual: Listening only		Definition of emerging multilingual: Spoken or listening	
	AME (standard error)			
lives in an area in the 2nd SES quintile	1.46 (3.51)	6.07*** (2.23)	3.44 (2.33)	3.35** (1.47)
lives in an area in the 3rd SES quintile	3.02 (2.71)	2.46* (1.46)	7.88*** (2.35)	2.87** (1.29)
lives in an area in the 4th SES quintile	2.47 (2.84)	3.08* (1.57)	8.12*** (2.08)	4.38*** (1.35)
lives in an area in the 5th SES quintile	6.2* (3.2)	4.88* (2.68)	10.53*** (2.96)	6.25*** (1.91)
lives in a regional area	-0.47 (4.52)	5.82** (2.53)	3.94 (3.41)	4.08** (1.88)
lives in a remote area	35.64*** (11.69)	2.59 (4.65)	30.02*** (8.1)	-0.57 (2.98)
has emotional or behavioural challenges that affect learning	1.55 (2.88)	-0.69 (1.83)	2.85 (2.78)	0.53 (1.78)
has emotional or behavioural challenges that do not affect learning	-2.09 (5.56)	1.56 (3.74)	0.49 (4.41)	-0.07 (3.15)
has no emotional or behavioural challenges	4.64*** (1.48)	3.17*** (0.92)	7.87*** (1.18)	3.45*** (0.85)
First Nations (relative to not)	16.72*** (5.37)	-1.01 (1.27)	16.56*** (5.26)	-0.78 (1.29)
Male (relative to female)	-1.98*** (0.5)	-0.41 (0.3)	-2.06*** (0.5)	-0.43 (0.29)

Variable	Informal care ages birth to 3 (2013 to 2016)	Informal care in the year before school (2017)	Informal care ages birth to 3 (2013 to 2016)	Informal care in the year before school (2017)
	Definition of emerging multilingual: Listening only		Definition of emerging multilingual: Spoken or listening	
	AME (standard error)			
Experienced resettlement difficulties (relative to not)	25.51*** (9.74)	7.16 (5.3)	24.79*** (9.49)	6.43 (5.21)
Absent from school for cultural reasons (relative to not)	-2.21*** (0.58)	-0.55 (0.37)	-2.22*** (0.57)	-0.53 (0.38)
Disposable income of parent 1 (log)	-0.24*** (0.03)	-0.09*** (0.02)	-0.23*** (0.03)	-0.09*** (0.02)
Disposable income of parent 2 (log)	-0.29*** (0.03)	-0.09*** (0.02)	-0.28*** (0.03)	-0.08*** (0.02)
Unemployment rate in local area	-0.43 (0.77)	-0.26 (0.35)	-0.35 (0.75)	-0.25 (0.34)
Number of children in household	2.3*** (0.37)	1.51*** (0.18)	2.32*** (0.37)	1.51*** (0.18)
<b>Region of birth (relative to 'Oceania')</b>				
North Africa and Middle East	-2.34 (2.11)	0.44 (0.98)	-2.25 (2.12)	0.49 (0.99)
Sub-Saharan Africa	-10.36*** (3.22)	-3.74*** (1.43)	-10.36*** (3.24)	-3.75*** (1.42)
Americas	13.34*** (4.36)	10.9*** (3.46)	13.15*** (4.33)	11.08*** (3.49)
North-East Asia	-0.91 (1.68)	1.42 (1.35)	-1.42 (1.68)	1.15 (1.34)
South and Central Asia	6.75*** (1.23)	5.58*** (1.06)	6.6*** (1.22)	5.5*** (1.07)
South-East Asia	20.04*** (2.19)	6.49*** (1.4)	20.01*** (2.19)	6.42*** (1.39)
North-West Europe	9.38*** (3.51)	4.42* (2.59)	9.37*** (3.47)	4.36* (2.52)

Variable	Informal care ages birth to 3 (2013 to 2016)	Informal care in the year before school (2017)	Informal care ages birth to 3 (2013 to 2016)	Informal care in the year before school (2017)
	Definition of emerging multilingual: Listening only		Definition of emerging multilingual: Spoken or listening	
	AME (standard error)			
South-East Europe	5.87 (3.78)	9.33*** (2.99)	5.66 (3.75)	9.23*** (3)
<b>State of residence (relative to 'ACT')</b>				
New South Wales	-6.03*** (2.19)	0.3 (1.42)	-6.02*** (2.04)	0.27 (1.34)
Victoria	0.82 (2.39)	-3** (1.4)	0.94 (2.25)	-2.96** (1.32)
Queensland	-2.9 (2.45)	4.32*** (1.58)	-3.06 (2.31)	4.2*** (1.5)
Western Australia	10.87*** (2.61)	-4.35*** (1.45)	10.89*** (2.46)	-4.35*** (1.37)
South Australia	4.5* (2.45)	-3.37** (1.45)	4.48* (2.3)	-3.34** (1.37)
Tasmania	-6.07 (6.3)	-6.7*** (2.15)	-6.09 (6.23)	-6.7*** (2.07)
Northern Territory	3.37 (3.59)	-2.79 (2.57)	3.4 (3.63)	-2.5 (2.57)
<b>Has physical disability (relative to 'no')</b>				
Yes, affects learning	-2.95 (3.75)	-2.27 (1.79)	-3.29 (3.67)	-2.25 (1.77)
Yes, does not affect learning	0.84 (2.79)	2.54 (1.68)	0.65 (2.81)	2.44 (1.64)
<b>Has other impairment (relative to 'no')</b>				
Yes, affects learning	0.4 (1.07)	-0.55 (0.59)	-1.18 (1.08)	-1.01* (0.61)
Yes, does not affect learning	-0.27 (1.02)	-0.95 (0.61)	-0.46 (1.02)	-1 (0.61)

Variable	Informal care ages birth to 3 (2013 to 2016)	Informal care in the year before school (2017)	Informal care ages birth to 3 (2013 to 2016)	Informal care in the year before school (2017)
	Definition of emerging multilingual: Listening only		Definition of emerging multilingual: Spoken or listening	
	AME (standard error)			
<b>Experiences problems at all (relative to 'yes, affects learning')</b>				
No	1.44 (2.89)	-0.64 (1.7)	1.35 (2.8)	-0.63 (1.66)
Yes, does not affect learning	-2.6 (3.85)	-0.53 (2.39)	-2.73 (3.83)	-0.3 (2.37)
<b>Read to at home (relative to 'no')</b>				
Sometimes	2.57* (1.35)	-0.42 (0.84)	2.61* (1.34)	-0.31 (0.81)
Often	2.96* (1.63)	-2.81*** (1.08)	3.32** (1.62)	-2.62** (1.04)
<b>Parents involved with school (relative to 'no')</b>				
Sometimes	3.05** (1.45)	0.07 (0.79)	3.21** (1.45)	0.05 (0.79)
Often	3.81** (1.65)	-0.52 (0.93)	4.1** (1.63)	-0.47 (0.93)
<b>English proficiency of most proficient parent (relative to 'not at all')</b>				
Very well	1.81 (4.15)	1.64 (1.56)	2.37 (4.08)	1.75 (1.56)
Well	1.24 (3.96)	1.4 (1.64)	1.66 (3.89)	1.43 (1.63)
Not well	-0.23 (3.87)	-0.39 (1.5)	-0.01 (3.84)	-0.42 (1.49)
<b>Education of most educated parent (relative to 'Year 12 or below')</b>				
Bachelor's or above	-3.71*** (1.08)	-2.66*** (0.64)	-3.71*** (1.07)	-2.68*** (0.64)
Diploma or Certs III/IV	-1.03 (1)	-0.88 (0.63)	-1.05 (1)	-0.9 (0.63)

Variable	Informal care ages birth to 3 (2013 to 2016)	Informal care in the year before school (2017)	Informal care ages birth to 3 (2013 to 2016)	Informal care in the year before school (2017)
	Definition of emerging multilingual: Listening only		Definition of emerging multilingual: Spoken or listening	
	AME (standard error)			
<b>Employment status of parent 1 (relative to 'Employed full-time')</b>				
Part-time	-1.28* (0.66)	-1.44*** (0.41)	-1.32** (0.66)	-1.43*** (0.4)
Employed, away from work	-0.76 (1.45)	-0.72 (0.86)	-0.73 (1.45)	-0.69 (0.86)
Unemployed	-1.31 (1.06)	0.88 (0.62)	-1.34 (1.06)	0.98 (0.62)
Not in the labour force	8.64*** (1.11)	1.32** (0.55)	8.63*** (1.11)	1.34** (0.56)
<b>Employment status of parent 2 (relative to 'Employed full-time')</b>				
Part-time	0.17 (0.76)	-0.24 (0.47)	0.12 (0.76)	-0.24 (0.47)
Employed, away from work	-2.57* (1.45)	1.18 (0.91)	-2.6* (1.44)	1.02 (0.88)
Unemployed	1.11 (1.1)	-0.35 (0.73)	1.12 (1.1)	-0.32 (0.73)
Not in the labour force	7.53*** (1.1)	1.43** (0.7)	7.5*** (1.09)	1.44** (0.69)
No employment status (single parent)	-13.18*** (0.89)	-2.97*** (0.57)	-13.08*** (0.88)	-2.92*** (0.57)
N	29682	31412	28419	31359

Notes: \*p = 0.1; \*\*p = 0.05; \*\*\*p = 0.01.



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