

# The E4Kids study: Assessing the effectiveness of Australian early childhood education and care programs

## Overview of findings at 2016

Final report to the Partner Organisations of the Effective Early Educational Experiences (E4Kids) study.

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Postgraduate Diploma of Teaching (Early Childhood)  
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## Preface



The Effective Early Educational Experiences (E4Kids) study was conceived almost a decade ago, after the release of *Starting Strong II: the OECD Thematic Review of Early Childhood Education and Care (ECEC) provision* (Organisation for Economic Co-operation and Development, 2006). Since then, governments across Australia expanded investments in early childhood provision, both to promote the development of young children and to address women's labour market participation. Since 2007, Australia also transformed its policy approach through the implementation of a National Quality Framework (NQF). The NQF aims to improve educational and developmental outcomes for children through their participation in ECEC programs. Longitudinal evidence on the transformative power of high-quality programs to raise the outcomes of young children, especially of children living in disadvantaged circumstances, was a key driver.

This five-year longitudinal study commenced recruitment and data collection in 2010. E4Kids contributes to the early childhood field internationally, representing one of a few studies to comprehensively assess the impact of participation within everyday ECEC programs on children's learning and development outcomes. E4Kids provides new evidence of the functioning and quality of everyday ECEC programs, and the trajectory of learning and development of the 2,494 Australian E4Kids children and 157 control group participants who participated from age three to four years through to age eight. The ECEC programs experienced by the E4Kids participants were directly observed between 2010 and 2013.

In 2009, the National Early Childhood Development Strategy and the National Partnership Agreement set out a range of ECEC reforms, including increasing the level of structural quality standards, implementing a new National Quality Standard from 2012, and the provision of 15 hours of preschool-kindergarten education to all children (scaling up participation over several years). While the E4Kids longitudinal study cohort represents a point-in-time sample of children experiencing everyday ECEC programs, and while there may be some differences in experiences of children enrolled in programs in 2016, it is also clear from empirical evidence that an educator's pedagogy and practices and the educator-child interaction behaviours are not easy to change.

E4Kids evidence suggests there is real need for a further program of policy reform if all children are to reap benefits from policy investments related to a 'good start in life'. E4Kids describes the functioning of the Australian ECEC market and its impact on the development of different groups of children. The evidence underscores some policy reform directions, interventions and program initiatives that, if pursued, would lead to significant improvements in children's outcomes. There are few social justice issues more vital than building a better life for all children, and a more prosperous nation.

*Catherine Taylor*

## The E4Kids research program

Effective Early Educational Experiences (E4Kids) is a five-year longitudinal study designed to assess the impact of everyday, approved<sup>a</sup> early childhood education and care (ECEC) programs on children's learning and developmental outcomes to age eight. A cluster randomised sample of 2,494 children who attended ECEC programs at three to four years of age were recruited from programs delivered in Victoria and Queensland in 2010. In addition, 157 children who did not access such programmes in 2010 were identified through Commonwealth Government sources and were recruited as a control group to the study. The programme and control groups did not differ significantly in terms of gender, community and family SES or the language spoken at home. The study adopted a multi-level design<sup>1</sup> with parents, centre directors, educators and carers answering questions on children's prior life experiences, demographics, and the children's progress. The nature and organisation of ECEC programs and the schools that children attended were recorded and the quality of adult-child interactions within the programs was directly assessed. Direct testing of children's cognitive abilities and achievements was undertaken over three years, and linked with the children's NAPLAN scores at age eight years.

The E4Kids study provides evidence about everyday ECEC programs in a diverse range of Australian communities, including remote, regional and urban locations. The E4Kids participants were a diverse group, including Indigenous children, and a wide range of children experiencing risk factors that may inhibit optimal developmental progress. The study addresses key components of quality that were distilled from the literature and analyses program quality within and across the Australian subsidised ECEC program types, including long-day care, family day care, kindergarten/preschool, and occasional (or limited hours) day care. The contributions of each of these different programs to children's learning and developmental outcomes was tracked longitudinally, and may be compared to a sample of Australian children who did not access ECEC programs when the study commenced in 2010.

The study had four aims:

- To identify and define quality in ECEC by measuring and assessing the independent contributions of program scope, structure and pedagogical practices;
- To evaluate the independent effects of ECEC programs, at three to four years, on children's learning, cognitive and social development, social inclusion and well-being, by controlling for family background, family learning environment, prior non-parental care, and community;
- To evaluate the independent effects of ECEC programs on family participation, social inclusion and well-being, controlling for family background, home learning environment, prior non-parental care, and community;
- To evaluate investment in ECEC programs by understanding the contribution of program components that add value to child outcomes and to assess, through comparison of relative effectiveness, the returns on those investments to children, families and the community.

<sup>1</sup> For details of the **study design** refer to:

Taylor, C., Cloney, D., Adams, R., Ishimine, K., Thorpe, K., & Nguyen, C. (2016). Assessing the effectiveness of Australian early childhood education and care experiences: study protocol. *BMC Public Health*, 16, 352. doi: <http://10.1186/s12889-016-2985-1>

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a. A children's program offered within an ECEC service that is licensed and in receipt of government subsidy (e.g. for fee discount, or to enable access for a time-specific period to some children for free.)

## Overview of findings

This overview draws together the core and related E4Kids study findings for the period 2010-2016, corresponding with the lodgement of a final report to the Australian Research Council (ARC). The findings summarised in this document have been published in academic journals and through other media including book chapters, public lectures, conference presentations and symposia (see Appendix). Further analyses and the preparation of manuscripts that address the aims of E4Kids and related studies are underway at the time of this report. It is expected that findings will continue to flow from the E4Kids study after the final report to the ARC. A small core team continues to use the dataset, collaborating with key partner agencies on further questions to address through analysis of the collected evidence, and achieving further data linkages to inform early childhood policy developments that are important to the Partner Organisations. (see *Ongoing and future work*, p.26)

To demonstrate that everyday programs are a significant contributor to children's outcomes is a complex challenge. There is an extensive literature from prior international studies concluding that early childhood programs must be of "high-quality" if they are to guarantee positive effects on children's development, and "model" programs (such as the Abecedarian program) continue to be customised and tested for their effectiveness in new communities, including sites across Australia. The idea that there may be program-quality thresholds (a priori standards) that when implemented ensure significant growth in child development outcomes also continues to be theoretically and empirically tested internationally. The E4Kids research program studied, at scale, key quality dimensions of Australian ECEC programs to empirically test the contribution of everyday ECEC programs independent of other family and community factors such as socio-economic status and a child's home learning environment. A core priority was to resolve the question of how much value to children's learning and development is there to be gained from participation in everyday ECEC services.

Implications of the summarised E4Kids research program findings are also included in this text. This is to assist policy makers determine how best to invest in initiatives that can positively influence children's present and future outcomes, and improve children's lives now and over the life course. Promoting the development of human potential and a sense of connection, agency, responsibility and contribution is paramount to children, and to the nation's future.

Overall, the E4Kids findings underscore a need in policy setting for more sensitive consideration of the functioning of the Australian ECEC market and its impact on the development of different groups of children. There

is much potential to address and further investigate some of the key themes that are highlighted within this report, collaborate with communities and continue to research the progress of diverse groups of children, especially those who within this evidence base seem most poorly served by the generalised ECEC services marketplace. Not all children benefit from everyday ECEC provision. Additional program investments and research initiatives should address aspects of program quality that significantly improve children's outcomes, and should deeply engage the communities least well served by everyday programs so that the promise of high-quality early education and care for all can be realised.

The following sections summarise findings related to key themes of interest to the E4Kids research program, including program quality, access, selection and attendance, and the independent effects of programs on children's development. Each theme is more fully addressed in the published papers that are listed as endnotes, and available for further reading, with some papers pertinent to more than one of the themes reviewed.

### Program quality<sup>2</sup>

The E4Kids study verifies the complex nature of ECEC programs and their effects on child development. The study adopted standard scales to measure different dimensions of quality, attesting that ECEC program quality is multidimensional. Different dimensions of program quality had strong positive effects on children's outcomes, and quality dimensions were correlated when assessing the pathway of program quality to child development outcomes. E4Kids separated out the contribution of ECEC programs relative to other child development inputs such as the amount of program children receive within prior-to-school settings, the child's own characteristics, the home learning environment, child and family health, family socio-economic status and characteristics of the community where the child lives and programs are provided.

Because of the multidimensional and co-dependent relationships among the different dimensions of quality, and the differential amounts of program that children receive, E4Kids found no independently verifiable collective level of quality and dosage that assured the production of certain levels of child outcome. However, the findings confirm that certain teaching and learning dimensions within a program make a significant difference to children's achievement outcomes, having controlled for other influences such as home learning environment, child and community characteristics and family SES.

E4Kids makes a unique contribution to the measurement of the ECEC *program process quality* in Australia, focusing systematically on the behaviours of teachers and their interactions with children. This aspect of process quality has been found elsewhere to be of greatest influence on children's learning and development (see for example, Sabol *et al*, 2013). Interactions within the ECEC programs were measured through direct observation in the rooms inhabited by the study children over a three-year period using the Classroom Assessment Scoring System (CLASS). The CLASS enabled scoring on three domains: The Emotional Support for children, the organisation of activities that facilitate children's learning and engagement, and the level of Instructional Support provided by the educators during the play-based program (Figure 1, page 8). Instructional Support refers to support given (during children's free-play, guided play and adult-led activities). Instructional Support includes promoting an understanding of everyday concepts through analysing, creating, and integrating previous knowledge; connecting to the child's real world; having back and forth exchanges with children where scaffolding, giving encouragement and affirmation feature; probing children's thinking and providing information; and modelling language through frequent conversations, open-ended questions, the use of advanced vocabulary and language, repetitions and extensions, and self and parallel talk.

The most significant finding for program quality as a driver of child development was the *quality of adult-child engagements* measured within daily programs. These do make a difference. There are key teacher-child interaction behaviours that characterise high-quality processes and improve child achievement outcomes. The study found *high and moderately high levels of emotional support* being provided within ECEC programs, and *moderate levels of room organisation that facilitates children learning and participation* in a range of stimulating activities, and *low levels of instructional support*. This finding points toward follow-up actions that may have real capacity to close developmental differences, especially associated with children experiencing greater risk and vulnerability, by paying detailed attention to the nature and focus of adult-child interactions during play-based programs.

The everyday ECEC programs observed within long-day care, family day care and preschool/kindergarten settings provided most children with *low levels of the interactions that are known to promote young children's thinking* (conceptual understanding), challenge their ideas and understandings and enrich their language capability. These findings suggest that there is an opportunity to make a substantial difference to children's cognitive development well before school by having early childhood educators further develop skills in *promoting children's learning*. This finding is especially significant to the children living with a range of risk factors, and who are known to benefit most from high-quality early childhood programs. Effort to focus professional learning investments more directly on interactions that promote learning is likely to pay off. The NQF reform activity included the requirement for ECEC services to nominate a Lead Educator for the service. This role offers potential for engaging at service level on

optimal techniques to promote young children's learning. Now, when the ECEC field is developing professionally and is motivated to make a difference to children's learning, the role of 'educator' and 'lead educator' is salient.

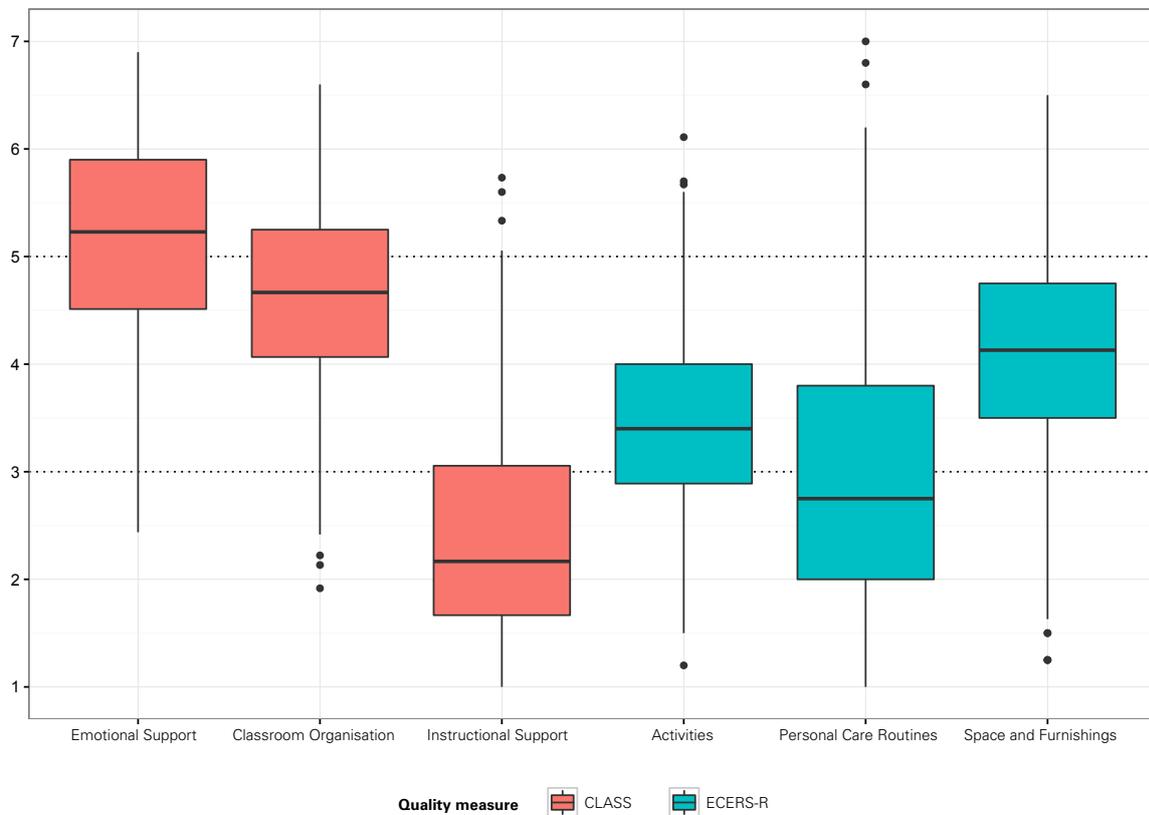
E4Kids evidence suggests, as illustrated above, that certain dimensions of quality align with improving children's cognitive achievement. These findings suggest that if overall quality thresholds such as those established by the Australian NQS system (a generalised service rating) are to accurately *predict* child outcomes then there is a need to measure more specific dimensions of quality within the process of everyday engagements, as well as characterise the general climate, settings and service through the NQS quality areas. For example, within the E4Kids study specific aspects of the Instructional Support that are subsumed within NQS Quality Area 1 (educational program and practice) were the drivers of child achievement outcomes. The current NQS quality ratings may serve usefully to classify and improve the overall quality of services generally, but they cannot guarantee positive achievements for the children who are participating in the programs within specific rooms. There are unique opportunities to conduct experimental research on quality factors and the link to children's outcomes via the NQS rating process, for example by applying complementary, specific probing tools alongside the overall rating tool and by assessing children's development (pre- and post) to learn more about the effect of teaching and learning behaviours on children's development.

In summary, regarding process quality:

1. Most settings were rated as providing children with a high-level of Emotional Support, and the substantial remaining group of settings was found to provide moderate levels of Emotional Support. Examples of providing low levels of Emotional Support were rare.
2. The organisation of activities that facilitated children's learning and engagement was rated as moderate in most rooms, with a minority facilitating children's learning opportunities at higher-levels of quality. There is room to improve room organisation including making clear the expectations for children's participation and engagement, affirming positive child behaviours, maximising learning time through effective materials preparation, routines and transitions, the conduct of activities to facilitate children's interest, attention and engagement, and through opportunities within professional networks and teams to review purpose, practice and what it means to promote young children's learning.
3. A significant finding was the low level, across service types, of teaching behaviours that encourage or promote learning during play activities: no services were scored in the high range, and 87 per cent of services were rated in the low-quality range for the active level of Instructional Support provided to the children within the play environment. At the time of data collection in ECEC rooms (2010 and 2011), kindergarten programs were typically focused on the provision of 'education' through short-duration

programs, usually led by university-trained educators; whereas long-day care and family day care programs catered for a more diverse population, focused on broader imperatives, and were operating full-day programs for children with a broader range of ages.

- Although preschool or kindergarten programs were found to demonstrate significantly more of the kind of educational support for learning that is known to improve achievement outcomes than long-day care or family-day care classrooms; the level of instructional support was still low. Nevertheless, kindergartens and preschools were rated higher on the composite of three CLASS dimensions of quality (Emotional Support, Room Organisation, and Instructional Support) than long-day and family day care settings. Kindergartens and preschools scored higher by about 0.55 on the seven-point scale (nearly three quarters of a standard deviation). This gap is significant: in a related study, improving quality scores by one standard deviation caused up to 0.65 and 1.2 months of growth in children's verbal ability and early mathematical ability respectively. Since the collection of E4Kids ECEC data Australian jurisdictions have increased the supply of kindergarten programs, including kindergarten programs within long-day care settings, nevertheless the E4Kids 2011 data did include a sample of kindergarten programs that were operated within long-day care settings.



**Figure 1:** Distribution of CLASS and ECERS-R scores in ECEC services. [Source: Taylor, C., Ishimine, K., Cloney, D., Cleveland, G., & Thorpe, K. (2013). The quality of early childhood education and care services in Australia. *Australasian Journal of Early Childhood*, 38 (2), 13-21.]

- Across the observed settings within E4Kids, free-play and play based education were the programs observed, with observations made during both mornings and afternoons. Notably, throughout the study all ECEC classrooms within the lowest SES areas were found to consistently be lower in the level of Instructional Support provided to children than those in the highest SES areas by approximately 0.5 standard deviations (see Figure 3, p.13). In a related study, such differences cumulated across pre-kinder and kinder programs and led to children being approximately 3.3 to 4.9 months behind their peers in more advantaged neighbourhoods (on measures of verbal ability). This is in addition to a general effect for family SES causing children from families experiencing low SES characteristics to be, on average, 1.6 months of development behind their peer on the same measure.
- Across all ECEC settings in all locations only one per cent of children experienced 'high-quality' rated Instructional Support within the play environments. This element of interaction quality is most closely associated with cognitive and academic growth.

These E4Kids findings suggest a need to improve the elements of process quality that promote cognitive development. Australian ECEC policy over the past decade has reflected two basic aims that were expressed in the COAG Communique (February 2006): promoting child development and facilitating the workplace engagement of the children's caregivers. Based on the E4Kids findings the child development (particularly cognitive development) aim is still underserved, especially for children facing high levels of disadvantage. Further, an historical division between 'preschool' and 'childcare' is still evident, as noted in the findings above. There is long-standing history in Australia that preschool/ kindergarten programs are associated with *education* and long-day and family day care programs are associated with *childcare*.

There is an opportunity now to re-address system-level policy intent by promoting critical review of the purpose and function of ECEC programs through professional networks, educator development workshops and policy bulletins. No prior Australian study has specifically assessed at scale, the effects of everyday programs on children's learning outcomes, and the E4Kids findings raise questions about the nature of *educational* facilitation within everyday play-based programs, and the role of adults within the settings. At a practical level, the *orientation* of early educators toward their work affects the way educators engage (or not) with children, hence the merit of critical review. It is assuring, and perhaps not surprising that the overall levels of Emotional Support provided to children was high, yet this finding does not overcome the need for concurrent provision of learning support that extends children's conceptual and linguistic understandings and promotes intellectual achievement, especially for children living in disadvantaged circumstances. The E4Kids systematic ratings of the level of Instructional Support within Australian programs are below the quality *thresholds* for Instructional Support that were found to be necessary in large-scale US based studies that achieved positive cognitive effects. Furthermore, the *Early Years Learning Framework* for Australia (2009) asserts the need for intentional teaching within play settings to ensure nationally agreed learning outcomes, and to that end sets the scene for the refinement of pedagogy within early childhood programs, and this is well underway in many services.

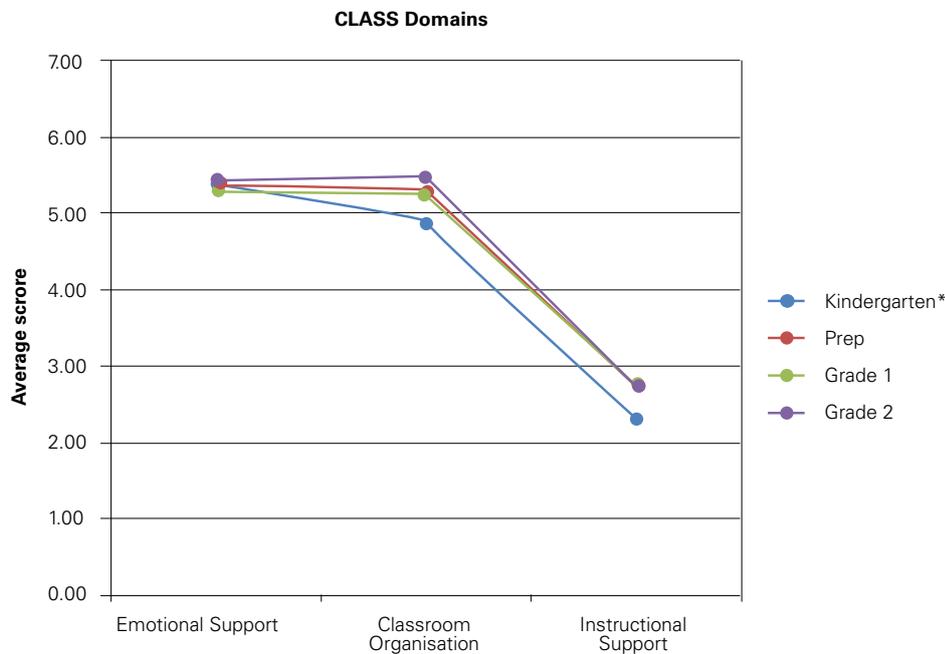
*Room quality and room composition* was also found to matter for children's individual cognitive abilities. In rooms with higher quality Instructional Support and routines and in rooms with greater average intelligence of the children attending, the children showed better outcomes. Children with lower individual intelligence scores are found to

be more affected by room quality and composition in comparison to children with greater individual intelligence who performed well in cognitive tasks independent of the room quality and composition. The proportion of children speaking a language other than English and the average family SES in a room were not significantly associated with child outcomes after the average intelligence within a room was considered. These findings indicate that while all children should receive the support they need, it is especially important for children starting with weaker cognitive abilities. These children are most susceptible to positive room qualities and compositions.

E4Kids also recognised that *structural factors* (including adult-child ratios, teaching qualifications, physical space, personal care/hygiene routines, and materials) have distal effects on the program process. E4Kids collected evidence of these factors using subscales of the ECERS-R and selected survey items. The study has not determined a clear result for the relative, independent contribution of individual structural factors to children's outcomes. However, E4Kids did confirm the association of higher-level *educator/teacher qualifications* with better process quality, and subsequently improved child cognitive outcomes. Settings that had university qualified directors had rooms which scored more highly on all process quality (CLASS) domains, with the settings led by post-graduate qualified directors scoring more highly again. The effects for teachers was less pronounced, however, degree qualified teachers did score more highly on Instructional Support. ECEC classrooms that included more children (e.g., those that use booked hours and therefore include more than one child in each licenced space) scored lower on all CLASS measures.

On other structural factors (see Figure 1) a small percentage (8%) of the services were rated as high quality on the *personal care/hygiene routines*, with 38% rated medium quality and 54% low quality (inadequate). Regarding *physical space and furnishings*, some 19% demonstrated high quality, and the majority (69%) were rated medium quality with few programs (12%) being rated as low quality. Regarding *the activities* provided, 6% of ECEC services were rated high quality, 66% medium quality and 28% were measured as providing low quality activities. This finding may be a signpost for some of the pedagogical issues raised above, regarding the evidence of mostly 'moderate' organisation of activities to facilitate engagement and learning. If the activities available, in themselves, don't provide sufficient challenge to actively engage children's minds there is opportunity for staff to leverage the power of early childhood programs by considering the curriculum content and the challenges available that may actively engage children's interests.

E4Kids also assessed the *process quality of school programs*, including preparatory class and primary grades one and two. Although most observations were conducted in the ECEC/ kindergarten (n= 766) and preparatory (n = 1126) rooms, observations in grade one (n= 515) and grade two programs (n=198) illustrate the relative ratings of process quality across these years. (Figure 2, page 10). All rooms were rated similarly in their provision of Emotional Support, whereas the ECEC and kindergarten rooms scored relatively lower on the organisation of activities for engagement and learning, and in the provision of Instructional Support to children within the program. However, the ECEC and kindergarten rooms were rated significantly higher than school classrooms in the item which assessed 'regard for the child/student's perspective', and significantly lower than school classrooms in the item that assessed the level of concept development within the programs. The overall presence of intentional teaching that focused on the development of children's understanding of concepts and language concepts, in an absolute sense, was still relatively low within the school programs with the lowest presence found to occur in ECEC/kindergarten programs. This finding may also reflect the relatively low scores reported in other countries for this factor; however related studies in Victoria (ongoing) and empirical research conducted in the United States confirms the capacity of further professional training, combined with mentoring and coaching to change the presence of Instructional Support within play and play-based learning activities, and a subsequent significant growth in the children's achievement outcomes.



**Figure 2:** Relative ratings of ECEC/kindergarten, Preparatory, Grade 1 and Grade 2 classes on domains of process quality.

\* Kindergarten includes ECEC programs in long-day care settings, kindergartens and preschools, not including family day care.

The *National Quality Framework* was introduced in 2012 to help to drive continuous quality improvement and consistency across ECEC programs, regardless of whether programs are labelled as 'kindergarten' or 'childcare'. For the policy intent of the NQF to be realised it is important that national ratings of ECEC quality (through the National Quality Standard - NQS) adequately capture interaction quality, given its critical importance to improving child outcomes. By ensuring interaction quality is better measured, governments can be more confident that 'high-rated' programs under the NQS are likely also to make a positive difference to children's achievement outcomes. A small piece of research by the E4Kids study team comparing NQS ratings with CLASS assessments in Victoria suggests that even programs rated as meeting or exceeding the NQS may provide very low levels of Instructional Support, well below the threshold levels needed to shift children's outcomes. A comparison for a 104 ECEC services using the ratings of Quality Area 1 (Educational Program and Practice) and Quality Area 5 (Relationships with Children) and CLASS ratings (Emotional Support, Room Organization and Instructional Support), found that CLASS ratings were consistently lower than the relative NQS ratings, with few settings demonstrating practices rated at the higher levels of process quality. Although not a perfect comparison this finding suggests that further research is warranted. It seems possible for ECEC programs to have, for example, an 'exceeding the standard' and a CLASS rating below the level where it is likely to have an impact on children's learning outcomes. There would be merit in designing specific research that further investigates the relationship between process quality and children's outcomes.

2 For journal papers on the **assessment of quality and the rated quality of ECEC provision** refer to:

- Cloney, D., Cleveland, G., Hattie, J., & Tayler, C. (2015). Variations in the availability and quality of early childhood education and care by socioeconomic status of neighbourhoods. *Early Education and Development*, 27(3), 384-401. doi: 10.1080/10409289.2015.1076674
- Cloney, D., Nguyen, C., Adams, R., Tayler, C., Cleveland, G & Thorpe, K. (2016). Psychometric properties of the Classroom Assessment Scoring System (Pre-K): implications for measuring interaction quality in diverse early childhood settings. *Journal of Applied Measurement*. (Accepted 16/6/2016).
- Cloney, D., Page, J., Tayler, C., Church, A. (2013) Assessing the Quality of Early Childhood Education and Care. *Centre for Community and Child Health, Royal Children's Hospital Policy Brief*, 25, pp. 1-4.
- Davis, E., Eivers, A. & Thorpe, K. (2012). Is quality more important if you're quirky? A review of the literature on differential susceptibility to childcare environments. *Australasian Journal of Early Childhood*, 37(4), 99-106.
- Ishimine, K. & Tayler, C. (2013) Assessing quality in early childhood education and care, *European Journal of Education: Research Development and Policy*, DOI:http://10.1111/ejed.12043
- MGSE & DEECD Research Partnership. (2014). *Comparing ratings of quality in National Quality Standard assessments and the E4Kids study*. Melbourne: MGSE.
- Niklas, F., & Tayler, C. (2016). Room quality and composition in Australian early childhood settings and children's literacy and numeracy abilities. (under revision)
- Sabol, T.J, Soliday Hong, S.L, Pianta, R.C. & Burchinal, M.R. (2013). Can rating children's programs predict children's learning? *Science*, 341, 845-846. 23 August.
- Tayler, C., Ishimine, K., Cloney, D., Cleveland, G., & Thorpe, K. (2013). The quality of early childhood education and care services in Australia. *Australasian Journal of Early Childhood*, 38(2), 13-21.
- Weston, K. & Tayler, C. (2016). A policy frame on early learning and teaching, In J. Page & C. Tayler (Eds.), *Learning and Teaching in the Early Years*, Cambridge University Press. (pp.26-46).

### Program selection, attendance and non-attendance<sup>3</sup>

Unlike schools and unlike many other countries, within Australian ECEC settings parents decide on the timing and amount of their children's attendance. ECEC provision is not compulsory, and operates through a mixed-market economy. The assumptions underpinning this model of systemic provision include that the market responds to family demand for services by providing approved program places in areas of demand, and at levels of quality sought by families in the market.

The E4Kids study analysed the *patterns of children's attendance* and whether those found were likely to be of advantage for children's learning and development. The likelihood of child attendance patterns translating into improved child outcomes, or moderating adverse behavioural effects, is also dependent on the quality of the program attended. The findings from model/high-quality ECEC programs (e.g., Perry/High-Scope, Abecedarian...) are that the greatest positive impact for children from highly disadvantaged backgrounds is when attendance starts early (in the first year of life) and is full-time rather than part-time. The findings from an evaluation of everyday programs in the UK in the EPPE study are that no advantage is accrued for full-time over part-time attendance or for children two years of age or younger. These findings underscore likely differences in effect between model and everyday programs.

*Age of entry:* The E4Kids study found that Australian children's attendance in ECEC programs followed an expected pattern in each of the years before school: it is less common for very young children to attend ECEC settings, and increasingly likely that children take part in ECEC programs as they approach school age. Thus, the proportion of children in formal ECEC settings increases with age; being highest for the year before school and lowest for four years before school. (see Table 1)

Years before school	State location of ECEC	Formal ECEC program usage	%	No formal ECEC program usage	%	Total	%
1 year before school	QLD	649	82.5	113	14.8	762	100
	VIC	545	94.3	33	5.7	578	100
	<b>Total</b>	<b>1,194</b>	<b>89.1</b>	<b>146</b>	<b>10.9</b>	<b>1,340</b>	<b>100</b>
2 years prior to school	QLD	564	71.7	223	28.3	787	100
	VIC	567	81.5	129	18.5	696	100
	<b>Total</b>	<b>1,131</b>	<b>76.2</b>	<b>352</b>	<b>23.8</b>	<b>1,483</b>	<b>100</b>
3 years prior to school	QLD	459	58.4	327	41.6	786	100
	VIC	440	63.1	257	36.9	697	100
	<b>Total</b>	<b>899</b>	<b>60.6</b>	<b>584</b>	<b>39.4</b>	<b>1,483</b>	<b>100</b>
4 years prior to school	QLD	366	46.7	417	53.3	783	100
	VIC	318	46.3	369	53.7	687	100
	<b>Total</b>	<b>684</b>	<b>46.5</b>	<b>786</b>	<b>53.5</b>	<b>1,470</b>	<b>100</b>

NB: Data collected in this study indicate that some informal non-parental care is also common, averaging 63% across the 4 years before school and decreasing as children get older; being 75% 4 years before school reducing to 48% in the year before school.

**Source:** Gilley, T., Tayler, C., Niklas, F. & Cloney, D. S. (2015). Too late and not enough for some children: Early childhood education and care (ECEC) program usage patterns in the years before school in Australia. *International Journal of Child Care and Education Policy*, 9 (9) 1-15. DOI: <http://10.1186/s40723-015-0012-0>

### 3 For journal papers on program selection and attendance, refer to:

Cloney, D., Cleveland, G., Tayler, C., Hattie, J., & Adams, R. (2016). The selection of ECEC programs by Australian families: Quality, availability, usage and family demographics. *Australasian Journal of Early Childhood* 41 (4), 16-27.

Cloney, D., Cleveland, G., Hattie, J. & Tayler, C. (2015). Variations in the availability and quality of early childhood education and care by socioeconomic status. *Early Education and Development*. 27(3), 384-4 DOI:<http://10.1080/1040289.2015.1076674>

Gilley, T., Tayler, C., Niklas, F. & Cloney, D. S. (2015). Too late and not enough for some children: Early childhood education and care (ECEC) program usage patterns in the years before school in Australia. *International Journal of Child Care and Education Policy*, 9 (9), 1-15. DOI: <http://10.1186/s40723-015-0012-0>

**Note:** While Queensland children's kindergarten program participation was relatively low in 2010 (the outset of E4Kids data collection), and has increased significantly since then, it is also noted that Queensland children's scores on NAPLAN tests have increased recently, aligning with the increased access and usage of kinder programs. The improved NAPLAN results cannot be causally attributed to kindergarten participation, yet the association is notable.

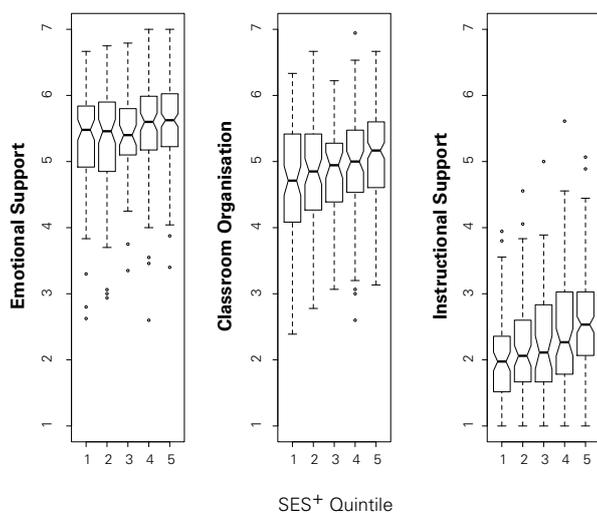
**Dosage:** Younger children are also likely to attend for fewer hours. For example, the average weekly hours of attendance increase from about 10 hours per week four years before school entry to about 25 hours per week in the year before school. Even among those children (E4Kids participants) attending ECEC programs at age three and four years there remains a significant group of children either who did not attend ECEC programs in the formative first three years of life or who attended at a level (under 10 hours per week) which is unlikely to lead to significant developmental growth unless the children experience high-level home learning environments. Of those children attending some hours of ECEC in any given year, just under a quarter (23 per cent) attended for fewer than 10 hours of ECEC three and four years before school with this percentage reducing to just under one-fifth two years before school and fewer than one in 10 children (7 per cent) in the year before school. Both at home and in ECEC settings it is apparent that young children benefit from both consistency and high-quality.

Regarding *selection into, and participation in ECEC programs* across the age-three-to-five period, the E4Kids study found that as children grow older (and move into later programs) they experience relatively higher levels of program quality. This corresponds with the provision of more education-focused programs (in preschool and preparatory) prior to age six (primary year one). This finding also reflected a family SES influence: children from low SES backgrounds were found to experience lower quality programs in their earlier years, and steeper quality gradients as they moved to school.

*Family SES plays an important role in influencing the level of ECEC program quality experienced by Australian children.* It is only the children from low SES backgrounds who happen to live in the highest SES neighbourhoods who experience levels of program quality comparable to their more advantaged peers. Children from low SES families (who stand most to gain) are not sufficiently exposed to quality factors that are likely to make differences to child outcomes.

Families were also found to travel short distances (median = 2.9km) to access ECEC programs, with families living in low-SES areas having more limited choices of program or facing higher transport costs than families in advantaged neighbourhoods. These effects were found when child, family, and community contexts were controlled for; indicating that family SES is a strong predictor of *selection into different levels of ECEC program quality*.

There was a positive relationship between process quality scores and the neighbourhood SES of the service, this relationship being most pronounced for the Classroom Organization and Instructional Support areas (see Figure 3)<sup>b</sup>. In particular, classrooms in the lowest SES areas are consistently lower in Instructional Support quality than those in the most advantaged areas.



**Figure 3:** Distribution of Classroom Assessment Scoring System domain scores by neighbourhood SES. SES = socioeconomic status as measured by the Socioeconomic Index for Areas Index of Relative Socio-economic Advantage and Disadvantage. Note that each quintile is weighted to represent an equal number of children. [Source: Cloney, D., Cleveland, G., Hattie, J. & Tayler, C. (2015). Variations in the availability and quality of early childhood education and care by socioeconomic status. *Early Education and Development*. 27(3), 384-401. DOI: <http://10.1080/10409289.2015.1076674> ]

b. Each box represents the middle 50% of observations. The solid black line in each box indicates the median. When comparing each box, there is strong evidence that the medians are significantly different (at the .05 level) when the notches do not overlap. There is good evidence that in high-SES areas, Instructional Support and Classroom Organization are significantly higher than in low-SES areas. The dotted lines (whiskers) extending out of each box represent the dispersion of the distribution of observations. Values outside this range are considered outliers. For Emotional Support there are some observations relatively far below the median, and for Instructional Support some observations are relatively far above the median. The number outlier observations is low and not of concern for this analysis.

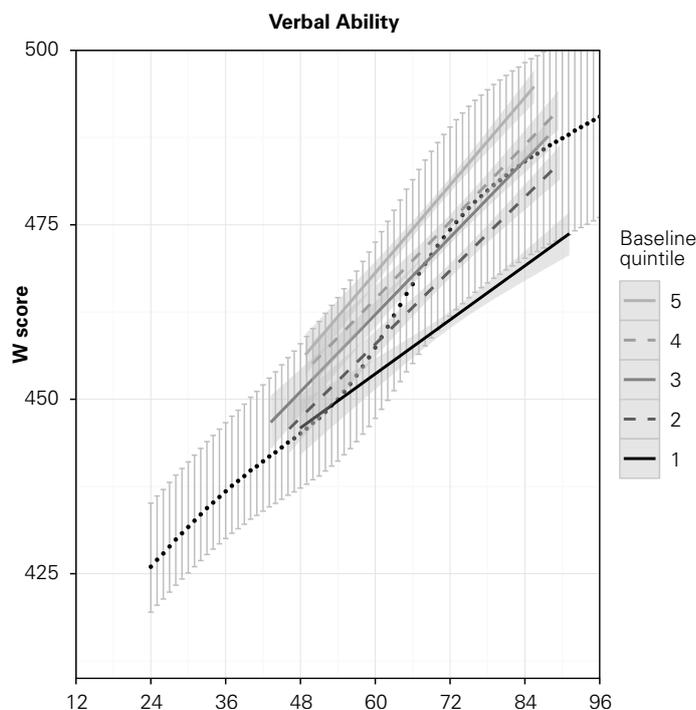
These findings beg detailed policy-to-practice re-consideration within the Australian 'mixed-market' model of provision. The prevalent policy rhetoric is around an ECEC system that enables early intervention and the opportunity for children living in disadvantaged circumstances to 'catch-up' through participation in 'high-quality' ECEC programs. There is a strong justification to prioritise increasing program quality in the least advantaged neighbourhoods, and to pay much higher attention to the programs experienced by toddlers. This is when the quality gap is largest.

There are several *factors that predict more hours of ECEC participation* and these are, in order of the strength of their association, higher family income, having two parents in paid work, having fewer children in a family, lower ratings on the home learning environment, being in receipt of a Health Care Card and having an easier child temperament. However, there were no child or family predictors of using one year versus two years of program before school, although higher parental education predicted the earlier entry of children into ECEC programs three and four years before school, and a home learning environment that was rated low-quality, alongside having both parents in the paid workforce, also predicted earlier ECEC program usage. Raising the quality of interactions encountered in these ECEC settings (see quality findings above) is attractive as a counterbalance to the relatively low-quality home learning environments associated with the use of two years of program before school. In addition, the total hours of attendance of the higher quality kinder programs was predicted by parental education and income as well as by living in a higher quality home learning environment and in a suburb of higher socio-economic status (SEIFA).

In specific relation to kindergarten, there is a notable equity issue that emerged from the E4Kids findings. The predictors of higher hours of kindergarten attendance were family advantage factors – for example employment, and SEIFA (SES). Children from more advantaged households were more likely to receive the benefit of kindergarten programs in the years 2010 and 2011, the time in which the E4Kids cohort was at the expected age for attendance. Three-year-old kindergarten programs (typically two years before school entry) largely remained the preserve of more advantaged families as fees do not usually attract a public subsidy. The E4Kids data reviewed also includes the likelihood of attending four-year-old kindergarten as the population participation rates in Queensland at the time of the first data collection in 2010 was around 30 per cent.

#### Impact of programs on children's learning and development<sup>4</sup>

The ability for ECEC programs to intervene on children's learning and development is important in Australia because of clear evidence of early differences between children. E4Kids shows that differences emerge early (by age three for cognitive outcomes) and persist two years later (see Figure 4<sup>o</sup>).



**Figure 4:** Average relationship between child age and WJIII W score of verbal ability in 2012 with each quintile group conditioned on 2010 (baseline) W score [SOURCE: Tayler C., Cloney, D., & Niklas, F. (2015). A bird in the hand: understanding the trajectories of development of young children and the need for action to improve outcomes. *Australasian Journal of Early Childhood*, 40 (3), 51-60.

For early exposure to process quality that focuses on promoting learning through intentional teaching, there are statistically significant differences between exposure to low vs relatively higher levels of Instructional Support (although the higher levels were still quite low in an absolute sense). For example, for verbal ability, children who experienced higher-quality Instructional Support early were, on average, 5.51W<sup>c</sup> above children who experienced lower levels of Instructional Support at entry to the study (the gap representing five and a half months of development). At the end of the study the difference was 4.85W (five months of development). The differences persisted. In conditional models the effects are smaller as other factors also explain children's growth. After controlling for contextual factors the effect of exposure to one standard deviation higher ECEC program quality (CLASS Instructional Support) on verbal ability was 0.8 to 0.9 months of growth per year. Family SES and community SES both play a significant role in children's verbal ability development. A one SD increase in family SES was associated with 1.6 months of additional growth at the end of the study. Living in higher SES neighbourhoods (relative to the lowest quintile) is related to higher achievement at the end of the study: estimates for all quintiles range between approximately 3.3 (fourth quintile) to 4.9 (fifth) months of growth. Child characteristics are also related to increased development: initial IQ, and temperament (persistence) are related to higher verbal ability at exit from the study. A one SD increase in IQ at entry the study was associated with an additional 7.6 months of growth at exit to the study and a one SD increase in persistence was associated with an additional 1.1 months of development.

Initial analysis of the relationship between ECEC experiences and children's school achievement have been conducted, extending the work published to date. Two latent classes of development trajectories for early cognitive development are estimated: one (starting the study with high levels of verbal ability) represents high achievement, and the other (starting the study at the expected level of ability) average or lower achievement. Belonging to the higher achieving group is associated with significantly higher NAPLAN outcomes. Children who had higher cognitive capabilities in preschool scored, on average, more than 90 points higher on NAPLAN (spelling): this is more than 1.5 standard deviations, and is highly significant. Family SES is the strongest predictor of belonging to the high cognitive capability group; however, ECEC program quality is yet to be considered in the model.

There are also correlations between the Home Learning Environment (HLE) and Grade three NAPLAN scores. Both the direct and indirect HLE indices were examined. There was a small positive correlation between HLE and Grade 3 NAPLAN achievement across all domains. The direct HLE index had a higher correlation with NAPLAN scores than the indirect index (although for Spelling the correlations were essentially the same).

Overall, the study found that everyday ECEC programs deliver small effects for children, and yet small-scale experiments involving younger children in E4Kids related studies, and using specific teaching and learning strategies from model ECE programs, demonstrate large effects. This study found clear evidence of SES achievement gaps in Australia for children from the age of three and four. Differences in children's verbal ability persist while some narrowing is seen for children's early mathematical knowledge. ECEC programs play a small role in contributing to the development of children's cognitive abilities. There is, however, no evidence that ECEC programs acted to narrow SES achievement gaps. Much can be done to reduce the observed differences between children. Well-designed and specific educational programs can positively change the trajectories of children and close gaps in achievement, rather than merely maintaining a standard rate of growth in achievement. In everyday programs, children exposed to higher levels of Instructional Support during play experiences subsequently scored higher on verbal ability and had better early quantitative knowledge.

The E4Kids findings suggest the importance, within ECEC programs, of developing children's language and thinking, especially for those demonstrating low performance: building vocabulary, having language-rich back-and-forth exchanges between adult and child and promoting the expressive aspects of children's language usage. Developmental differences among the study children, in effect, grew larger in the years before school, despite the presence of engagement in the ECEC programs, and not including special interventions. These findings may also relate to insufficient program dosage, insufficient match and specificity in the chosen pedagogy relative to children's needs and interests, or other factors. The causes of these findings cannot be fully verified because of correlations among family SES, program quality, attendance, and participation variables.

c. WJIII tests are scored on a continuous Rasch-like scale (W), The asymmetrical standard deviations (SD) for the age norm for each month of age (within the age range of this study (min = 12 months, max = 68 months) is 8.2 (lower) and 12.2W (upper) for VA and 29.9 (lower) and 21.6W (upper) for AP. The mean change in expected W score for increasing by one month in age is 0.98W for VA and 2.14W for AP.

Regarding specialist subgroups, young bilingual children in the E4Kids sample, for example, started with lower achievement scores in WJIII verbal comprehension and yet the bilingual children who attended more hours of kindergarten program before their transition to school showed greater gains in verbal comprehension in comparison to bilingual children attending fewer hours, or no kindergarten program. No such difference was found for the attendance of bilingual children in other types of ECEC setting. As kindergarten settings, in comparison to other formal ECEC settings, provide a significantly greater program quality, bilingual children seem to benefit most from attending kindergarten programs. This finding also underscores the importance of raising the levels of teaching and learning interaction quality in long-day and family-day care settings.

There are two major challenges to emerge from the study if ECEC programs are to make an independent contribution to improving children's learning and development outcomes. The first is how to improve the quality of programs, the Instructional Support provided to children during play programs, so that all children benefit. The second is how to ensure that children from disadvantaged backgrounds enter programs that demonstrate high-quality teacher-child interactions at an early age, and with a high enough dosage to make a major difference. Interactional quality between educators and children, age of entry into programs and dosage emerge as the key predictors of effects on children in the research literature. It appears that the interactional quality of everyday ECEC programs may generally support children's socio-emotional development yet is not high enough in these Australian settings to make a significant difference to children's cognitive outcomes. Furthermore, the lack of evidence of 'high-quality' learning promotion processes taking place within play settings (the majority, including kindergartens, were rated low-quality on these constructs) was also confounding since the research team could not undertake the detailed testing of dosage effects of high-quality in its absence across the ECEC programs sampled.

Based on study findings, there is a strong case to be made for: (1) specific initiatives to improve the kind of Instructional Support within play settings that children experience directly, and at home: this requires educators and family members to actively interact with children during play, and where relevant engage in intentional teaching, and (2) comprehensive targeted services operating in the least advantaged areas, in the first case for adult-child interaction quality improvement, and (3) to focus on access to and the quality of programs delivered to youngest-aged children from disadvantaged backgrounds. This is far beyond the present policy scope of universal preschool provision for 15 hours per week at age four years. Model interventions can and do make a significant difference to children's linguistic, behavioural and intellectual development outcomes, especially when they are implemented within the first three years of life. These interventions are required if ECEC programs are, in fact, to ensure growth in children's achievement outcomes as a direct result of their participation, rather than a result of other factors such as family SES, home learning environment and a sufficient level of exposure to programs.

4 For journal papers and chapters on the **child outcomes, and impact of programs on child development** refer to:

Brookes, I. & Tayler, C. (2016). Effects of an evidence based intervention on the language development of young Aboriginal children, *Australasian Journal of Early Childhood*, Special Issue. October, 41 (4), 4-15.

Cohrssen, C., Niklas, F., Logan, D., & Tayler, C. (2016) The self-reported academic self-concept of four-year-old children: global and fixed, or nuanced and changing in the year before school? *Australasian Journal of Early Childhood*. 41(3), 4-10.

Tayler, C. & Page, J. (2016). Learning and teaching in the early years, In J. Page & C. Tayler (Eds.), *Learning and Teaching in the Early Years*, Cambridge University Press. (pp.5-25).

Tayler C., Cloney, D., & Niklas, F. (2015). A bird in the hand: understanding the trajectories of development of young children and the need for action to improve outcomes. *Australasian Journal of Early Childhood*, 40 (3), 51-60.

## The E4Kids nested and related studies

### Sleep patterns in early childhood<sup>5</sup>

In 2010-2011 the sleep studies research group at QUT, observing the quality of ECEC in Australia, identified sleep practice as an issue of concern and instigated the formation of the Sleep in Early Childhood Research Group (SECRG) bringing together expertise in sleep science, developmental science and early education policy and practice. The observation study of 2400 preschool children in 30 ECEC services found that 80% were subject to mandated sleep yet only 30% of children slept at any time with evidence of distress and behavioural difficulty for non-sleepers (QUT- IHBI additional contribution to E4Kids to facilitate observation of sleep). The findings raised concerns about opportunity cost for children's learning, health and wellbeing. The studies demonstrated that mandated sleep practices in ECEC served to habituate children's sleep patterning with effect on concurrent and ongoing 24-hour sleep patterning and night sleep duration. Children who were in centres with long mandated sleep times had later bedtimes and poorer quality sleep. Once these children entered school and were constrained by start times and no longer had opportunity to nap they had, on average, 30 minutes less sleep across 24-hours. This is significant; 30 minutes less sleep per day has been linked to risk for obesity while Australian data suggests increased health risks associated with total sleep duration. The survey study of 750 parents (Masters – Sinclair – 2011 E4Kids data) found that 79% preferred that their child not sleep in ECEC citing concern for their children's health and development and disruption to family functioning. The study measuring cortisol levels (stress hormone) of sleepers and non-sleepers who attended ECEC services with either mandated or flexible sleep practice found that non-sleepers experiencing mandated sleep periods had higher levels of cortisol at night bedtime (Financial Markets Foundation for Children- Grant No: 12-213). The imperative for translation of findings into changed policy and practice was published and the Queensland Government commissioned SECRG to develop and trial professional development resource packages for 1) peak provider organisations, 2) Authorised Officers responsible for assessment of quality under the National Quality Standard and 3) to guide a film production for parent audiences (Queensland Department of Education and Training). These studies have developed multimodal training resources (print, podcast, webinar, workshop) that have been trialed on 120 leaders from provider organizations and 80 Authorised Officers with highly positive responses. Ongoing work is examining sleep practices in ECEC for children aged 0-three and sleep problems associated with ECEC attendance.

- 5 For journal papers on **sleep and sleep patterns** refer to:
- Pattinson, C., Staton, S., Smith, S. Sinclair, D, & Thorpe, K. (2014). Emotional climate and behaviour management during sleep-time in early childhood education settings. *Early Childhood Research Quarterly*, 29, 660-668.
- Sinclair, D., Staton, S., Pattinson, C., Smith, S., Marriott, A., & Thorpe, K. (2016.) What parents want: Parent preference regarding sleep for their preschool child when attending Early Care and Education. *Sleep Health*, 2(1), 12-18.
- Staton, S., Marriott, A., Pattinson, C., Smith, S. & Thorpe, K. (2016) Supporting Sleep in Early Care and Education: An assessment of observed sleep-times using a sleep practices optimality index. *Sleep Health*, 2(1), 30-34.
- Staton, S., Smith, S., Pattinson, C. & Thorpe, K. (2016). Mandatory naptimes and group napping trajectories in childcare: An observational study. *Behavioural Sleep Medicine*. 00:1-15, <http://10.1080/15402002.2015.1120199>
- Staton, S., Irvine, S., Pattinson, S., Smith, S. & Thorpe, K. (2015). The sleeping elephant in the room: Practices and policies regarding sleep-rest time in early childhood education and care. *Australasian Journal of Early Childhood*, 40(4), 77-86.
- Staton, S., Smith, S. & Thorpe, K. (2015). "Do I really need a nap? The role of sleep science in informing sleep practices in early childhood education and care settings. *Translational Issues in Psychological Science*, 1(1), 32-44.
- Staton, S., Smith, S., Pattinson, C. & Thorpe, K. on behalf of the Sleep in Early Childhood Research Group. (2015). Mandatory naptimes in childcare and children's night-time sleep. *Journal of Developmental and Behavioral Pediatrics*, 36(4), 235-242.
- Thorpe, K., Staton, S., Sawyer, E., Pattinson, C., Hayden, C. & Smith, S. (2015). Napping, development and health from 0 to 5 years: a systematic review. *Archives of Disease in Childhood*, 0:1-8. DOI: <http://10.1136/archdischild-2014-307241>

## The home learning environment<sup>6</sup>

The 'home learning environment', for the purposes of this research program, was deemed to include all elements of the home environment that are associated with and influence child development. Analyses in the context of the E4Kids study clearly show that children who experience a higher quality home learning environment (HLE), with more frequent positive parent-child-interactions, outperform their peers on a range of linguistic and numerical tasks, demonstrate more behavioural competencies and show greater gains in these competencies over time.

The HLE can be analysed as a global construct, however it is useful to distinguish between a home *numeracy* environment that is closely associated with children's numerical competencies (characteristics include the frequency with which mathematical games are played at home, every day numerical activities in the household, etc.) and a home *literacy* environment that is closely associated with children's verbal competencies (including reading behaviour in the household, the number of books in general, the number of children's books, etc.). Depending on the research question, distinguishing between indirect activities occurring in the home (such as shared reading or playing games with a numerical content) and direct teaching enacted by parents when they explain the meaning of letters and numbers or teach a child to read, may also be helpful.

Differing from other countries, such as Germany, a migration background in Australia is not closely associated with lower rated HLE. However, like most other countries, the HLE is closely associated with the socio-economic status (SES) of a family. Here, families with a greater SES provided higher quality HLEs for their children.

The key aspect of the home literacy environment is shared reading with a child. Our findings indicate that shared reading should start early in a child's life (preferable well before six months of age) as the onset of shared reading proved to be a predictor of children's linguistic outcomes even when having controlled for family background, child age and sex. In addition, high quality shared reading should occur regularly (preferably every day). Dialogic reading strategies that are based upon the premise that children learn to read when they are actively involved in the book reading process rather than passive listeners, was identified as supporting the development of child competencies.

Non-intensive interventions in the family may positively influence the HLE and children's cognitive development. A small and non-intensive intervention had a positive influence on children's outcomes. Providing parents with information about the importance of the HLE and helping them (1) implement the principles of dialogic reading and

(2) the counting principles in everyday interactions with their children, resulted in significant improvement both in the HLE and child cognitive outcomes. In summary:

- The HLE matters: higher quality HLEs support children's cognitive and behavioural competencies and the further development of these competencies.
- Whilst the HLE can be regarded as a global construct, it often makes sense to differentiate between a home numeracy environment and a home literacy environment and between indirect activities and direct teaching done by parents.
- In Australia, the HLE is closely associated with family SES, and to a lesser degree with a migration background.
- Shared book reading with children is a critical element of the home literacy environment. Shared reading should start early in a child's life (preferable well before 6 months of age), should occur regularly (preferable every day) and the quality of book reading is enhanced by the application of dialogic reading strategies.
- Further research is required that includes participants reflecting a wider range of socio-economic and cultural conditions.

### 6 For journal papers and chapters on **home-learning environment** refer to:

Cohrssen, C. & Niklas, F. (2016). Partnering with families to promote learning, In J. Page & C. Tayler (Eds.), *Learning and Teaching in the Early Years*, Cambridge University Press. (pp.90-111).

Niklas, F., Nguyen, C., Cloney, D., Tayler, C. & Adams, R. (2016). Self-report measures of the home learning environment in large scale research: Measurement properties and associations with key developmental outcomes. *Learning Environments Research Journal*, DOI <http://org/10.1007/s10984-016-9206-9>

Niklas, F., Cohrssen, C. & Tayler, C. (2015). Home learning environment and fluid reasoning: A family intervention study with kindergarten children. *Early Childhood Education Journal*, DOI: <http://10.1007/s10643-015-0726-1>

Niklas, F., Cohrssen, C. & Tayler, C. (2015). Improving pre schoolers' numerical abilities by enhancing the home numeracy environment. *Early Education & Development*. 27(3), 372-383. DOI: <http://10.1080/10409289.2015.1076676>

Niklas, F., Tayler, C. & Schneider, W. (2015). Home-based literacy activities and children's cognitive outcomes: A comparison between Australia and Germany. *International Journal of Educational Research*. DOI: <http://org/10.1016/j.ijer.2015.04.001>

## Mathematics teaching and learning<sup>7</sup>

Early childhood educators have long requested guidance with early childhood mathematics pedagogy. A common thread running through early mathematics learning research studies that focus directly on mathematics teaching and learning is the importance of the intentional teaching of mathematical concepts within the context of a play-based, informal curriculum. Changes in early childhood education in Australia reveal a shift that has occurred from an essentially developmental approach, to an emphasis on effective early educational experiences. Every child has a right to the best possible education: this includes supporting children's numeracy skills. The focus on effective early education also reflects the importance of transitions through the stages of learning that characterise early childhood education: the home learning environment, formal early childhood education and the transition to school.

As part of this study program reconceptualisation of an early childhood mathematics university subject took place to equip pre-service teachers with both content knowledge and opportunities to rehearse practical teaching strategies. This re-composition was found to contribute to the knowledge and skills required to teach mathematics in early childhood as well as a growing sense of confidence in ability to do so.

In order to provide opportunities for children to consolidate knowledge and to extend children's thinking, teachers need to determine what it is that children already know. Assessment is a cornerstone of effective teaching and learning, and in an informal curriculum, effective teachers assess the evidence of children's mathematical thinking when it is demonstrated. This may be in what children do, say, draw, write or dance. To assess children's understanding, early childhood educators need to recognise mathematical understandings and know how to plan playful learning experiences that encourage problem solving and extend understanding. Children have been found to learn the most when they attend programs that are delivered by educators who possess mathematics content knowledge, know how to facilitate learning through playful activities, who systematically and purposefully provide children with such learning opportunities and who possess a strong sense of self-efficacy.

In summary:

- Play-based learning does not mean "free play". Play-based learning requires purposeful and systematic observation, assessment, planning and evaluation on the part of teachers.
  - Learning occurs along a continuum, and concept acquisition commences very early in life (in the first year of life). Mathematical thinking is often embedded in what children do as well as what they say. Early childhood educators working with children aged under three years as well as kinder teachers require targeted professional learning to assist them to recognise and respond to mathematics teaching and learning opportunities with accuracy and confidence.
- Increasing resources is not always the answer. Mathematics teaching and learning should be facilitated consistently across the whole curriculum and should include the explicit teaching of mathematical language: "If young children can see and understand 'brontosaurus', they can do the same for 'octagon'" (Lee & Ginsburg, 2009, p. 39).
- 7 For journal papers and chapters on early childhood **mathematics teaching and learning** refer to:
- Cohrssen, C. & Church, A. (2017). Mathematics knowledge in early childhood. Intentional teaching in the third turn. In A. zBateman & A. Church (Eds.) *Children's Knowledge in Interaction. Studies in Conversational Analysis*. Singapore: Springer Singapore. (pp. 73-89).
- Cohrssen, C, Church, A., & Tayler, C. (2016). Play based mathematics activities as a resource for changing educator practice and behaviour, *Sage Open*, April-June, pp1-14. <http://10.1177/2158244016649010>
- Cohrssen, C., Church, A. & Tayler, C. (2014.) Pausing for learning: Responsive engagement in mathematics activities in early childhood settings. *Australasian Journal of Early Childhood*. 39(4) 95-102.
- Cohrssen, C., Church, A., & Tayler, C. (2014). Purposeful pauses: Teacher talk in early childhood mathematics activities. *International Journal of Early Years Education*. DOI: <http://10.1080/09669760.2014.900476>
- Cohrssen, C, Church, A., Ishimine, K. & Tayler, C. (2013). Playing with maths: Facilitating the learning in play-based learning. *Australasian Journal of Early Childhood*. 38(1) 95-99.
- Cohrssen, C., De Quadros-Wander, B., Page, J. & Klarin, S. (2016). Between the big trees: A project-based approach to investigating shape and spatial thinking in a kindergarten program. *Australasian Journal of Early Childhood*. 41,(3).
- Cohrssen C. & Page, J. (2016) Articulating a rights-based argument for mathematics teaching and learning in early childhood education. *Australasian Journal of Early Childhood*. 41(3), 104-108.
- Cohrssen, C. & Tayler, C. (2016). Early childhood mathematics: A pilot study in pre-service teacher education. *Journal of Early Childhood Teacher Education*. 73(1), 25-40. DOI: <http://10.1080/10901027.2015.1131208>
- Cohrssen, C., Tayler, C. & Cloney, D. (2015). Playing with maths: implications for early childhood mathematics teaching from an implementation study in Melbourne, Australia, *Education 3-13*, 43:6, 641-652, DOI: <http://10.1080/03004279.2013.848916>
- Deans, J., & Cohrssen, C. (2015). Young children dancing mathematical thinking. *Australasian Journal of Early Childhood*, 40(3), 61-67.
- Hildenbrand, C., Niklas, F., Cohrssen, C., & Tayler, C. (2015) Children's mathematical and verbal competence in different early education and care programs in Australia, *Journal of Early Childhood Research*. DOI: <http://org/10.1177/1476718X15582096>
- Lee, J., & Ginsburg, H. (2009). Early childhood teachers' misconceptions about mathematics education for young children in the United States. *Australasian Journal of Early Childhood*, 34(4), 37 45

Niklas, F. Cahrssen, C., & Tayler, C. (2016). Parents supporting learning: A non-intensive intervention supporting literacy and numeracy in the home learning environment. *International Journal of Early Years Education*, 24(2), 121-142. DOI: <http://10.1177/1468798415592008>

Niklas, F., Cahrssen, C. & Tayler, C. (2015). Improving pre schoolers' numerical abilities by enhancing the home numeracy environment. *Early Education & Development*. 27(3), 372-383. DOI: <http://10.1080/10409289.2015.1076676>

Pollitt, R., Cahrssen, C., Church, A. & Wright, S. (2015). Thirty one is a lot: Assessing four-year-old children's number knowledge during an open ended activity. *Australasian Journal of Early Childhood*, 40(1), 13-22.

## Reading and early literacy learning<sup>8</sup>

In Australian early childhood programs, the importance of reading to children in order to support their emerging literacy skills receives much emphasis, and includes a focus on both the home environment and the early childhood education and care setting. Book reading presents opportunities for children to recognise the purpose of print, acquire advanced language, engage in back-and-forth conversations through the story, and it supports children learning to read. Dialogic reading strategies include specific interactional phenomena that position the child as the storyteller and the adult as the person who listens, thus encouraging children to be actively, rather than passively, involved in the book-reading event. This has been found to be particularly important within the home learning environments where children's English language skills may be limited by the English language skills of adults in the home causing these children to lag behind their peers in literacy and academic achievement within Australian education settings.

Most families in our core and related studies reported having started to read to their children before they were 15 months old; in many families, this begins within the first few months. Immigrant families and lower socio-economic status families were found to begin shared book reading later. Starting shared book reading before a child reaches six months of age appears to support children's linguistic development as it presents rich opportunities for the demonstration of the purpose of print media, encourages acquisition of new vocabulary and its use in extended conversations, and in general, encourages children to play with language. Children who are read to earlier were found to have stronger rhyming skills, stronger verbal comprehension and marginally stronger concept formation skills. The age at which a child is first read to also predicts the frequency of parent-child reading frequency in the year prior to starting school.

Turning our focus to the influence of different early education and care programs on children's mathematical and verbal competence, it emerged from the data gathered from 1314 children, prior to the introduction of improved educator: child ratios in line with the National Quality Framework, that whilst there was no relationship between children's verbal ability and the type of ECEC program attended, the mathematical competence demonstrated by children who attended only informal care exceeded that of children who either

consistently attended a formal ECEC service or attended a mix of formal and informal care after controlling for a range of child and family characteristics. However, regarding further development in the subsequent year, no differences in learning gains were observed between children who attended different types of ECEC care. These findings support the subsequent improvements made to educator: child ratios, as well as the current prioritisation of numeracy-related professional learning opportunities for early childhood professionals.

On the other hand, we found that in the case of bilingual children, gains in English language verbal abilities were significantly predicted by the total hours that they spent in kindergarten programs but not by all types of programs. In comparing formal ECEC settings, kindergarten programs provided higher quality programs than other formal ECEC settings for these children.

In summary:

- Encouraging early shared book reading between adults and children supports child linguistic development.
- Bilingual children and their families afford unique opportunities to support community participation and inclusion, and more broadly, to support Australia's role in the global community; however, little is currently known about the extent to which children from bi- and multi-lingual households maintain their home languages or on the extent to which early education experiences uphold Australia's language education policy agendas.
- Child age and intelligence proved to be important predictors of both children's initial verbal and numerical performance and the further development of these competencies with older and more intelligent children showing better outcomes. In addition, a child's main language and the frequency with which the child was read to were significant predictors of initial verbal abilities, as well as of the development of these abilities over time. Here, children with English as main language and children who were read to more frequently, showed better English language verbal abilities.

8 For journal papers on **reading and early literacy learning** refer to:

Cahrssen, C., Niklas, F. & Tayler, C. (2016). 'Is that what we do?' Using a conversation analytic approach to highlight the contribution of dialogic reading strategies to educator child interactions during storybook reading in two early childhood settings. *Journal of Early Childhood Literacy*, 16(3), 361-382. DOI: <http://10.1177/1468798415592008>

Hildenbrand, C., Niklas, F., Cahrssen, C., & Tayler, C. (2015) Children's mathematical and verbal competence in different early education and care programs in Australia, *Journal of Early Childhood Research*. DOI: <http://org/10.1177/1476718X15582096>

Niklas, F., Cahrssen, C. & Tayler, C. (2016). The sooner, the better: Early reading to children. *Sage Open*. 1-11. <http://dx.doi.org/10.1177/2158244016672715>

Niklas, F. Cahrssen, C., & Tayler, C. (2016). Parents supporting learning: A non-intensive intervention supporting literacy and numeracy in the home learning environment. *International Journal of Early Years Education*, 24(2), 121-142. DOI: <http://10.1177/1468798415592008>

Niklas, F., Tayler, C., Cohnsen, C. (2016, revision). Bilingual children's language learning in Australian early childhood education and care settings. *Research Papers in Education. Special Issue*. (invited paper)

Niklas, F., Tayler, C. & Schneider, W. (2015). *Home-based literacy activities and children's cognitive outcomes: A comparison between Australia and Germany. International Journal of Educational Research*. DOI: <http://org/10.1016/j.ijer.2015.04.001>

## Risk and vulnerability<sup>9</sup>

Children's cognitive abilities and their behaviour is closely associated with the number of risk factors they experience. For instance, children with disabilities or a difficult temperament or who are read to only infrequently or who experienced several stressful life events or whose parents have a low education or income show more problem behaviour and lower achievement in tests measuring cognitive abilities than children who do not live in the context of one of these risk factors, or who experience only one or two of these risk factors.

Children's abilities and capabilities at age three-four years depend largely on their prior family, community and early children program experiences. Our results indicate that the gap between children with greater or lower cognitive baseline achievements widens over time (during ECEC enrolment) and that baseline abilities depend on a child's home-community SES, their home learning environment, the main language spoken at home and other family and community characteristics. In view of the powerful effects of model programs on children's learning an implication of this finding is for policy and provision effort to be shifted toward working closely with families and local communities, especially in the period (birth to age three) prior to the assessment of abilities and capabilities. Positively changing the trajectories of children at risk has been shown to be achievable, when validated early interventions are implemented with fidelity and with sufficient intensity in the years before school.

9 For journal papers on **risk and vulnerability** refer to:

Brookes, I. & Tayler, C. (2016). Effects of an evidence based intervention on the language development of young Aboriginal children, *Australasian Journal of Early Childhood*, Special Issue. October

Cloney, D., Cleveland, G., Hattie, J. & Tayler, C. (2016). Variations in the availability and quality of early childhood education and care by socioeconomic status. *Early Education and Development*. DOI: <http://10.1080/10409289.2015.1076674>

Niklas, F., Gilley, T. & Tayler, C. (2016). Vulnerability among Australian young children: A multiple risk factor model for cognitive and behavioral outcomes. *Australian Journal of Education*, Issue/pages tbc

Tayler C., Cloney, D., & Niklas, F. (2015). A bird in the hand: understanding the trajectories of development of young children and the need for action to improve outcomes. *Australasian Journal of Early Childhood*, 40 (3), 51-60.

## Measurement development and developmental monitoring<sup>10</sup>

E4Kids generated a new measure (led by APDI Ishimine) – *the Improving Teaching Skills for Early Childhood Education* (ITSECE) instrument. This tool focuses on measuring core aspects of pedagogy within ECEC centres, specifically regarding the use of questioning, explaining and feedback in a play setting. The tool is designed to improve the teaching skills of early childhood education teachers, and is for application to professional development programs that address teaching skills and program quality in play settings. The tool may also be used for research purposes as an observational instrument by a non-participant observer to assess classroom teaching and to improve program quality, teacher training and program evaluation. The ITSECE places an especially strong emphasis on key items found to affect child outcomes within the National Quality Standard (NQS), Quality Area 1. Before using the measure, it is necessary to have participated in a training program conducted by an experienced ITSECE trainer. The ITSECE is currently developed to the field trials stage, with validation and standardization of the tool being a project open to further research either by a doctoral or postdoctoral candidate, in conjunction with Dr Ishimine.

E4Kids researchers also conducted the *first validation study of the CLASS* in Australian ECEC settings. This study constitutes the first scholarly report of the psychometric properties of the CLASS that accounts for repeated-measure design and adopts an analytic approach that utilizes the strengths of both factor analysis and item response modelling. The measurement model reported partitions the variance components within and between-classrooms and produces more reliable factor scores. The research team concluded that the CLASS is robust across national contexts and is a valid tool in international settings, and noted that the domain of Instructional Support also tends to have a lower range of scores in other (international) contexts.

The team also conducted a literature review of wellbeing assessment tools for use in early childhood settings. The review report is listed in the Endnotes for this section and is available through the Victorian Curriculum and Assessment Authority website.

An under-explored area of research is the *early detection of developmental problems* specifically addressing the cultural and linguistic context of young Indigenous children and families. Led by D'Aprano, this research is important for facilitating access to culturally relevant targeted intervention, and maximising its positive effects. Standardised developmental screening tools are known to improve detection rates of developmental problems compared to clinical judgement alone and are widely recommended for use with all children. However, mainstream developmental screening tools are not appropriate for rural and remote-dwelling Australian Aboriginal and Torres Strait Islander children. Furthermore, practitioners in remote settings have little, if any, child health or early childhood development training. Findings from a medical record audit, suggest

that there are gaps in the delivery of developmental monitoring services in remote health services, including the lack of a structured developmental screening tool for use in remote Aboriginal settings. Addressing a number of system-wide factors may facilitate improved delivery of these services.

Within the study, the researchers designed, implemented and evaluated training in early childhood development, and the qualitative findings demonstrated that mode of delivery was effective and valued by participants. The workshop process adopted improved practitioners' skills, knowledge, competence, and confidence to identify and manage developmental difficulties and promote child development, evidenced on self-report and workplace clinical observation. The team demonstrated that practical, culturally appropriate training leads to positive learning outcomes in developmental practice for Aboriginal Health Workers and other remote health practitioners.

Another related study focuses on a *specific Australian adaptation and validation of the Ages and Stages Questionnaire (ASQ-3)*. ASQ-3 is a tool that is widely used in Australia. We compared the culturally adapted ASQ-3 - the ASQ-TRAK - for Australian Aboriginal children to the Bayley Scales of Infant and Toddler Development (Bayley-III), a standardised, professionally administered developmental assessment, to determine the concurrent validity. The early findings suggest strong agreement between the ASQ-TRAK and Bayley-III. The ASQ-TRAK shows promise as a tool that can be used to improve developmental monitoring for remote dwelling Australian Aboriginal children.

In further measurement development work (led by Page), the *Early Literacy Engagement Assessment (ELEA)* tool assesses the emerging literacy of very young Aboriginal and Torres Strait Islander children living in remote and regional locations. The primary phase of this trial is complete, and concurrent validity testing is in progress. The items from ELEA are being assessed against the two relevant scales of the Clinical Evaluation of Language Fundamentals ®-Preschool-2 (CELF) – expressive vocabulary and basic concepts. The results of this study are expected to be forthcoming in late 2017.

In summary:

- The development and validation of measures for use in Australian early childhood settings constitutes important ongoing activity that serves the professional practice and research communities as they seek to provide attuned, specific interventions and responses to the developmental status of very young Australian children.
  - Having measures for young Indigenous children that are culturally relevant and can be administered in first language (and/or English) warrants further and urgent attention.
  - Having measures that test early learning (e.g., language engagement, joint attention) and align with pedagogical practices in early childhood services supports children, families and professionals to be at ease with an assessment process.
  - Developing and validating measures for early childhood educators to assess young children's language within their settings can support educators in their data gathering, and help them to plan for and further assess children's literacy development prior to entering school.
  - It is important to ensure testing enables researchers to establish the effectiveness, validity and reliability of any measure. Trialing has enabled the research teams to review the internal item consistency and cohesion of the particular test, including establishing items are in agreement, measuring a single trait underlying the items, the reliability of separate items, and checking if the items cover the ranges of child ability. It has also been critical to receive feedback on the cultural relevance of the test materials, and the appropriateness of questions for Indigenous children.
  - Engaging Indigenous educators/health professionals and families in any trial is important to ensure cultural understandings and current language context is thoroughly considered, and supports researchers to make adaptations that speak to and better reveal young children's capabilities.
- 10 For journal papers on **measurement development and developmental monitoring** refer to:
- Cloney, D., Nguyen, C., Adams, R., Tayler, C., Cleveland, G & Thorpe, K. (2016). Psychometric properties of the Classroom Assessment Scoring System (Pre-K): implications for measuring interaction quality in diverse early childhood settings. *Journal of Applied Measurement*. (Accepted 16/6/2016).
- D'Aprano et. al., (2016). Challenges in developmental monitoring in remote Aboriginal health services: findings and recommendations for improving practice? *Rural and Remote Health*, 16 (3), 3852-3862.
- D'Aprano, A. Silburn, S., Oberklaid, F., & Tayler, C. (2015). Culturally appropriate training for remote Australian Aboriginal Health Workers: Evaluation of an early child development training intervention. *Journal of Developmental and Behavioural Pediatrics*, 0, 1–9.
- Marbina, L. Mashford-Scott, A., Church, A., & Tayler, C. (2015). *Assessment of wellbeing in early childhood education and care. Literature review*. Melbourne: Victorian Curriculum and Assessment Authority.
- Niklas, F., Nguyen, C., Cloney, D., Tayler, C. & Adams, R. (2016). Self-report measures of the home learning environment in large scale research: Measurement properties and associations with key developmental outcomes. *Learning Environments Research Journal*, DOI <http://org/10.1007/s10984-016-9206-9>
- Ishimine, K. & Tayler, C. (2014). *Improving Teaching Skills for Early Childhood Education*. A tool to review the use of questioning, explaining and feedback with interactions during play. Melbourne: MGSE.
- Simpson, S., D'Aprano, A., Tayler, C, Khoo, S.T., & Highfold, R. (2016). Validation of a culturally adapted developmental screening tool for Australian Aboriginal children: early findings and next steps, *Early Human Development*, 103, 91-9.

## Leadership, professional learning and coaching<sup>11</sup>

Working to raise the quality of adult-child interactions within ECEC programs and in home-learning environments is valuable process activity for maximising young children's learning and development outcomes, and addressing disparities in child outcomes that are linked to disadvantage and marginalization. The type and intensity of adult-child interactions can determine the degree of impact that educators and other adults have on young children's learning and development. Generating evidence that tracks the effectiveness of professional learning on the quality of educator-child interactions over time is key to understanding the active ingredients that drive the process of continuous improvement, and counteracting the prevalence of low quality pedagogical practices in Australian ECEC settings. Leadership, professional learning and coaching studies can shed light on effective steps to positively change interaction behaviours.

The Victorian Advancing Early Learning study (VAEL, 2014-2017) was established in light of the E4Kids findings and upon departmental interest in interventions that can improve child outcomes at an early age. This study tests the effectiveness of a professional learning treatment model that focuses on the quality of educator-child interactions in settings where educators were trained and coached in the use of evidence-based teaching techniques. The study investigates:

- The impact of the professional learning program on educators' ability to change, and sustain improved pedagogical practice over time;
- The impact of ongoing implementation of the specific teaching techniques on young children's learning, and
- The range of strategies that educational leaders employ to improve the quality of pedagogical practices within their services.

The implementation study involves two stages of intervention. 1) An initial treatment year that incorporates a program of professional training for the educational leaders and educators, together with fortnightly interactive coaching to support the implementation of Abecedarian Approach Australia (3a) evidence-based strategies. 2) Up to two sustainability years with a reduction in implementation support by the external coach, and greater emphasis on the designated Educational Leader supporting the educators to continue to implement the teaching and learning strategies, and embedding them throughout their educational programs.

The study to date indicates that increasing the quality of educators' interactions with young children is a complex process that cannot be rushed. It requires timely, targeted and consistent support, management 'buy-in' and a set of 'threshold conditions' for the program to succeed. Furthermore, collaboration on the form of educational leadership, professional learning and coaching is vital to the success of early learning interventions. The professional culture of an ECEC setting counts: some settings are less focused on individual children's personal development and learning, rather they attend to basic health and safety and the supervision of children

- areas that are not unimportant but are insufficient to meet expectations of the NQF. Educational leadership is a key to promoting early education effectiveness and children's learning. Leaders need to establish and create a professional learning community that uses evidence to improve practice and advance children's learning. Targeted professional learning has been found to support educators to gain deeper theoretical, research-based and practical understandings of how children learn, their role in the learning process and what effective instruction looks like in practice.

Coaching and educational leadership characterised by regular, ongoing, individualised support assists the implementation and adaptation of effective practices. This might include observation, modeling, feedback, on-site feedback, reflection and collaborative planning, and monitoring. The VAEL study has enabled a focused analysis of the lived experiences of ECEC educators as they implement new pedagogical practices within their settings, and the support mechanisms that are effective in advancing the quality of their interactions with young children.

The early findings suggest that, in settings offering everyday ECEC programs:

- Investment directed towards a multi-component professional learning program (training, coaching, educational leadership) supports the educators' implementation and alignment of evidence-based teaching strategies within ECEC daily programs, and is effective in improving children's outcomes.
- Professional development investment that ensures an integrated, whole-of-centre approach to professional learning over a sustained period is an effective means of ECEC quality improvement.
- ECEC policy is likely to have greater effect in practice, and leverage child outcomes better, if clear role definitions and position descriptions of the Educational Leader and educators are explicit. Educational leaders who have time allocated to carry out their 'learning leader' role can effectively engage in the development of educators' pedagogical knowledge, add value to the ECEC service, increase team engagement and subsequently improve child outcomes.
- ECEC policy should require 'service management' (the owner or director) to allocate dedicated time to the Educational Leader to support the continuous improvement of the educators' pedagogical practices. Centre management leaders who report annually to their stakeholders on the amount of pedagogical support time offered to individual educators in the service ensure greater transparency, and contribute to increased staff morale and teamwork.
- Investments that include dedicated components of professional learning directed towards building capacity *within* services, and *across local professional networks* ensure ongoing educator capability, and deliver continuous quality improvement.

11 For journal papers and chapters on **leadership, professional learning and coaching** refer to:

Barber, H., Cahrssen, C. & Church, A. (2014) Meeting the Australian National Quality Standards: a case study of the professional learning needs of early childhood educators, *Australasian Journal of Early Childhood*, 39(4), 21-27.

D'Aprano, A. Silburn, S., Oberklaid, F., & Tayler, C. (2015). Culturally appropriate training for remote Australian Aboriginal Health Workers: Evaluation of an early child development training intervention. *Journal of Developmental and Behavioural Pediatrics*, 0, 1–9.

Church, A., Page, J., Wright, S. & Tayler, C. (2016). "Researching for Learning," In Page, J., Tayler, C. (eds.) *Learning and Teaching in the Early Years*. Port Melbourne: Cambridge University Press.

Page, J., Pilsworth, N. (2016). Reflections on the National Reform Agenda for Early Childhood Education and Care and educational leadership: what has been achieved and where to now? *Professional Educator*, 12-15.

Page, J. & Tayler, C. (2016). "Leading for Learning," In Page, J., Tayler, C. (eds.) *Learning and Teaching in the Early Years*. Port Melbourne: Cambridge University Press

Page, J., Tayler, C. (2015). The Victorian Advancing Early Learning (VAEL) Study. *Belonging Early Years Journal*, 4, 2, 37-38.

Pilsworth, N., Page, J., Tayler, C. (2016). Building and Sustaining a Culture of Learning. *Preschool Matters*, Term 1, 14-16.

Tayler, C. (2016). Reforming Australian early childhood education and care provision (2009-2015). *Australasian Journal of Early Childhood*. 41(2), 27-31.

Tayler, C., Page, J., Pilsworth, N. (2015). Building Relationships with Children. *Early Learning Review*, 1-3.



Julie Barton, from the Melbourne Graduate School of Education, with young learners in Wakathuni

## Ongoing and future work

There are significant further opportunities to leverage the E4Kids data and to maximise the investments made over the past six years. Most of this work will be achievable over a further three years, and findings will provide new and better insight in child development in the context of ECEC programs. A core E4Kids team is pursuing further opportunities to fund such crucial work and may seek the support of the current partners. Already, both philanthropic and other competitive grant funds have been deployed to leverage further the findings of the E4Kids core study.

### Data linkage

There is an important opportunity to ensure a pathway to ongoing NAPLAN data linkage at grades five, seven and nine. This linkage would test longer-term effects of ECEC participation. In 2016, child participants in the E4Kids study begin to complete Grade five NAPLAN. As the E4Kids children already have been linked to Grade three NAPLAN data, further linkage can be readily arranged and progressed.

### Social and emotional development

Some descriptive analyses have been undertaken using the E4Kids dataset, but more needs to be done to fully address the question of how Emotional Support and Room Organisation influence social and emotional outcomes, and how child, family and community factors influence children's social and emotional development. There is the opportunity to analyse a range of study data on children's social and emotional development, and the emotional and organisational aspects of interaction quality to assess the impact on social development and emotional wellbeing, and any effects on cognitive development and school achievement. For example, this aligns with the argument for positive education approaches. So far, the full potential of the assessed data is not realised. The topic would also suit post-doctoral or doctoral candidates.

### Health and physical development

Recent Australian research demonstrates that children with an unhealthy BMI are less developmentally ready for school. Children who are obese are more likely than their peers to be developmentally vulnerable even when accounting for other contextual features, like socioeconomic status. By the time children start school, differences in their physical development are associated with their readiness for school and this has implications for their lifelong development.

A significant number of E4Kids children are outside what is considered normal physical development by the time they enter ECEC programs at approximately age three, with approximately four percent considered either thin or

obese. These figures are the subject of ongoing analysis and the preparation of a journal paper on this topic by a core Melbourne team, including additional outcomes (NAPLAN).

In effect, little is known about how the early physical development outcomes of children relate to other areas of development – cognitive, social, emotional, and later school achievement. Recent Australian research suggests school-aged children who are obese suffer worse outcomes at school – can this be predicted even earlier and is there a relation to birth-weight? The E4Kids study has substantial data to interrogate, and under interrogation. This work would suit a doctoral candidate in the multidisciplinary space of health/epidemiology and early childhood education.

### ECEC program quality and longer-term outcomes

There is a substantial opportunity to extend the work in the E4Kids study to examine the role that ECEC quality plays on the development of early social and emotional skills and how they, in turn, influence later, school age outcomes, including academic achievement – something already measured by the study. In addition, the E4Kids data set allows family characteristics and the quality of the home learning environment, among other variables, to be included in these analyses. Furthermore, linkage of ECEC workforce data and E4Kids data can further interrogate the influence of educator qualifications and experience on children's learning and development outcomes.

Although the E4Kids study is formally completing, and funding has been fully expended, there are opportunities open, in the first instance to the Partner Organisations to further leverage investments and the findings to date. Partner Organisations are welcome to liaise further and/or propose questions that are of priority.

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## Appendix: Published papers on E4Kids and the nested and related studies, conference presentations, posters public lectures and symposia

### Published journal papers

1. Barber, H., Cohrssen, C. & Church, A. (2014) Meeting the Australian National Quality Standards: a case study of the professional learning needs of early childhood educators, *Australasian Journal of Early Childhood*, 39(4), 21-27.
2. Brookes, I. & Tayler, C. (2016). Effects of an evidence based intervention on the language development of young Aboriginal children, *Australasian Journal of Early Childhood*, 41 (4), 4-15.
3. Cloney, D., Cleveland, G., Hattie, J. & Tayler, C. (2015). Variations in the availability and quality of early childhood education and care by socioeconomic status. *Early Education and Development*. DOI: <http://10.1080/10409289.2015.1076674>
4. Cloney, D., Cleveland, G., Tayler, C., Hattie, J. & Adams, R. (2016). The selection of ECEC programs by Australian families: a story of quality, availability, usage and family demographics, *Australasian Journal of Early Childhood*, 41 (4), 16-27.
5. Cloney, D., Nguyen, C., Adams, R., Tayler, C., Cleveland, G & Thorpe, K. (In press). *Psychometric properties of the Classroom Assessment Scoring System (Pre-K) implications for measuring interaction quality in diverse early childhood settings*. *Journal of Applied Measurement*. (Accepted 16/6/2016)
6. Cohrssen C. & Page, J. (2016) Articulating a rights based argument for mathematics teaching and learning in early childhood education. *Australasian Journal of Early Childhood*, 41 (3), 104-108.
7. Cohrssen, C, Church, A., & Tayler, C. (2016). Play based mathematics activities as a resource for changing educator practice and behaviour, *Sage Open*, April-June, pp1-14. <http://10.1177/2158244016649010>
8. Cohrssen, C, Church, A., Tayler, C., & Ishimine, K. (2013). Playing with maths. *Australasian Journal of Early Childhood*. 38(1) 95-99.
9. Cohrssen, C. & Tayler, C. (2016) Early childhood mathematics: A pilot study in pre-service teacher education. *Journal of Early Childhood Teacher Education*. 73(1), 25-40. DOI: <http://10.1080/10901027.015.1131208>
10. Cohrssen, C., Church, A. & Tayler, C. (2014.) Pausing for learning: Responsive engagement in mathematics activities in early childhood settings. *Australasian Journal of Early Childhood*. 39(4) 95-102.
11. Cohrssen, C., Church, A., & Tayler, C. (2014). Purposeful pauses: Teacher talk in early childhood mathematics activities. *International Journal of Early Years Education*. DOI: <http://10.1080/09669760.2014.00476>
12. Cohrssen, C., De Quadros-Wander, B., Page, J. & Klarin, S. (2016, in press) Between the big trees: A project-based approach to investigating shape and spatial thinking in a kindergarten program. *Australasian Journal of Early Childhood*, 41(3). (accepted 5 September 2016)
13. Cohrssen, C., Niklas, F. & Tayler, C. (2016). 'Is that what we do?' Using a conversation analytic approach to highlight the contribution of dialogic reading strategies to educator-child interactions during storybook reading in two early childhood settings. *Journal of Early Childhood Literacy*, 16(3), 361-382. DOI: <http://10.1177/1468798415592008>
14. Cohrssen, C., Niklas, F., Logan, D., & Tayler, C. (2016) The self-reported academic self-concept of four-year old children: global and fixed, or nuanced and changing in the year before school? *Australasian Journal of Early Childhood*. 41(3), 4-10.
15. Cohrssen, C., Tayler, C. & Cloney, D. (2015). Playing with maths: implications for early childhood mathematics teaching from an implementation study in Melbourne, Australia, *Education 3-13*, 43:6, 641-652, DOI: <http://10.1080/03004279.2013.848916>
16. Cohrssen, C., Niklas, F. & Tayler, C. (2016). Parents supporting learning: A non-intensive intervention supporting literacy and numeracy in the home learning environment. *International Journal of Early Years Education*. DOI: <http://10.1177/1468798415592008>
17. D'Aprano, A. Silburn, S., Oberklaid, F., & Tayler, C. (2015). *Culturally appropriate training for remote Australian Aboriginal Health Workers: Evaluation of an early child development training intervention*. *Journal of Developmental and Behavioural Pediatrics*, 0, 1-9:
18. D'Aprano et. al., (2016). Challenges in developmental monitoring in remote Aboriginal health services: findings and recommendations for improving practice? *Rural and Remote Health*, 16 (3), 3852-3862.
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27. Niklas, F., Cahrssen, C. & Tayler, C. (2015). Home learning environment and fluid reasoning: A family intervention study with kindergarten children. *Early Childhood Education Journal*, 44(5), 419-427. DOI: <http://dx.doi.org/10.1007/s10643-015-0726-1>
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- Cloney, D. (2016). *What can large-scale, quantitative research tell us about the quality improvement agenda in the early childhood education and care sector?* Victorian Early Childhood Research Consortium. Wednesday 26 July 2016.
- Cloney, D. (2016). *What impact are ECEC programs having on children's development today?* 2016 Gowrie Victoria Annual Conference: demonstrating the flexibility to learn and grow. 12 August 2016.
- Cloney, D. (2016). *What impact are Victorian ECEC programs having on children's development today?* Victorian Department of Education and Training Quality Assessment and Regulation Division Forum. Wednesday 10 August 2016.
- Cloney, D., Cleveland, G., Hattie, J., Tayler, C., & Adams, R. (2016). *The selection of ECEC programs by Australian families: a story of quality, availability, usage and family demographics*. Paper presented at the Australasian Journal of Early Childhood Research Symposium: Whose knowledge is it anyway? Pushing the evidence base in early childhood research, Charles Darwin University, NT, 5 October 2016
- Cohrssen, C., Niklas, F. & Tayler, C. (2016). *Home learning environment and children's concept formation in the year prior to starting school*. Poster presented at the 24. Conference of the ISSBD (International Society for the Study of Behavioural Development) in Vilnius, 10.-14. July 2016.
- Gilley, T., Guyonne Kalb, G., Ryan, C. & Zubrick, S. (2016). *Addressing inequalities in early childhood education: Gaming the system or changing the game?* Panel discussion, 20 October 2016, Melbourne: Brotherhood of St Laurence.
- Simpson, S., D'Aprano, A., Tayler, C., & Highfield, R. (2016). *Validation of the culturally adapted ASQ-TRAK. A developmental screening tool for remote Australian Aboriginal children*. Paper presented to Caring for Country Kids Conference, 17-19 April, Alice Springs,
- Tayler, C. & Cloney, D. (2016). *E4Kids study: Access, quality equity and child achievement*. Presentation to Moreland City Local Government, Coburg City Hall, 5 May 2016 .
- Tayler, C. & Cloney, D. (2016). *The E4Kids study: Direction of findings and report planning*, Presentation to Victorian DET Policy Leaders, 35 Spring Street, East Melbourne, 4 April.
- Tayler, C. (2016). *What does intentional teaching look like in ECEC settings?* Presetnation to the Linking Learning Symposium, Bastow Leadership Institute, 19 May 2016.
- Tayler, C., & Cloney, D. (2016). *CLASS Validation in Australia and the Influence of Instructional Support on Children's Cognitive Development*. Paper presented at the Comparative and International Education Society March 6-10, 2016, Vancouver, BC Canada.

## Conference presentations and posters, public lectures and symposia

### 2016

- Brookes, I. & Tayler, C. (2016): *The effects of an evidence based intervention on the Australian English language development of a vulnerable group of young Aboriginal children*. Paper presented at the Australasian Journal of Early Childhood Research Symposium: Whose knowledge is it anyway? Pushing the evidence base in early childhood research, Charles Darwin University, NT, 5 October 2016
- Cloney, D. (2016). *ECEC program quality in Australia – what do we know about equity?* Best Start – State- wide Forum. Tuesday 21 June 2016.
- Cloney, D. (2016). *Results from the E4Kids study: implications for the quality improvement agenda?* Australian Children's Education and Care Quality Authority National Forum. 15 September 2016.

Weston, K., Tayler, C., Cloney, D., Adams, R., & Gilley, T. (2016). *The E4Kids study: how to design a study that captures the unique Australian ECEC services context and the contribution it makes to children's learning and development*. Paper presented at the Australasian Journal of Early Childhood Research Symposium: Whose knowledge is it anyway? Pushing the evidence base in early childhood research, Charles Darwin University, NT, 5 October 2016.

## 2015

Cloney, D., Cleveland, G., Hattie, J., & Tayler, C. (2015, 20 April). The Availability and Quality of Early Childhood Education and Care (ECEC) Programs in Low Socioeconomic Status (SES) Areas. Paper presented at the American Educational Research Association (AERA) 2015 Annual Meeting: Toward Justice: Culture, Language, and Heritage in Education Research and Praxis., Chicago, Illinois.

Cloney, D., Nguyen, C., Adams, R., Tayler, C., & Cleveland, G. (2015, 17 April). *The Psychometric Properties of the Classroom Assessment Scoring System (CLASS)*. Paper presented at the American Educational Research Association (AERA) Annual Meeting: Toward Justice: Culture, Language, and Heritage in Education Research and Praxis, Chicago, Illinois.

Cloney, D., Nguyen, C., Adams, R., Tayler, C., Cleveland, G., & Thorpe, K. (2015, 14 January). *Measuring Early Childhood Education and Care Classroom Quality: Psychometric Properties of Classrooms Assessment Scoring System*. Paper presented at the Sixth International Conference on Probabilistic Models for Measurement in Education, Psychology, Social Science and Health., Cape Town.

Cohrssen, C., Niklas, F., & Tayler, C. (2015). *Parents leading learning: A non-intensive intervention study to support the home learning environment*. Presentation held at the biennial meeting of the Society for Research in Child Development in Philadelphia, USA, 19.-21. März 2015.

Gilley, T. (2015). *Too late and not enough: some ECEC usage patterns in the years before school in Australia*. Presentation to the Victorian Department of Education and Training, Treasury Place, Melbourne. 19 August, 2015.

Gilley, T. (2015). *Vulnerability among young children*, Presentation to the Victorian Department of Education and Training, Treasury Place, Melbourne. 19 August, 2015.

Nguyen, C., Niklas, F., Cloney, D., Tayler, C. & Adams, R. (2015). *Differential item functioning in measuring Australian home learning environment*. Presentation held at the 6. International Conference on Probabilistic Models for Measurement in Education, Psychology, Social Science and Health in Kapstadt, Südafrika, 12.-14. January 2015.

Niklas, F. (2015). *Early child development in the context of home and ECEC programs in Australia and a comparison to Germany*, Presentation to Victorian Department of Education and Training staff, 2 Treasury Place Melbourne. 29 July 2015.

Niklas, F., Cohrssen, C., & Tayler, C. (2015). *Bilingual children's language learning in Australian kindergarten programs and other forms of formal childcare*. Presentation held at the biennial meeting of the Society for Research in Child Development in Philadelphia, USA, 19.-21. März 2015.

Niklas, F., Cohrssen, C., & Tayler, C. (2015). *Parents leading learning: Supporting the home learning environment*. Presentation held at the Enhancing Language and Literacy Conference of the City of Darebin, Melbourne, Australia, 16. April 2015.

Niklas, F., Cohrssen, C., Tayler, C. & Schneider, W. (2015). *Vorlesen: Je früher, desto besser*. Poster presented at the 15. Fachgruppentagung Pädagogische Psychologie, Kassel, 14.-16. September 2015.

Niklas, F., Nguyen, C., Cloney, D., Tayler, C., & Adams, R. (2015). *Measurement properties of a self report survey on the home learning environment and its associations with key developmental outcomes*. 13th Australian Institute of Family Studies Conference, Melbourne, Families in a rapidly changing world. Melbourne. July 2014:

Pattinson, C., Smith, S., Staton, S., and Thorpe, K. (2015) *Sleep and weight status of Australian children: What are the sleep parameters at play*. Society for Research in Child Development, Philadelphia, April 2015

Staton, S., Hurst, C., Pattinson, C., Smith, S., and Thorpe, K. (2015). *Group Napping Patterns in Relation to Duration of Mandatory Naptimes in Childcare Settings*," SLEEP, Conference of the American Sleep Physicans association, Seattle, June 2015

Staton, S., Pattinson, C., Smith, S., and Thorpe, K. (2015). *Mandatory Naptimes for Preschool Aged Children in Early Childhood Education Settings and Duration of Children's Nighttime Sleep*. Society for Research in Child Development, Philadelphia, April 2015

Tayler, C. (2015). *Early childhood education and parenting in a changing world*, Keynote to the Playgroup Victoria Annual Conference, Thornbury Conference Centre, 1 May 2015.

Tayler, C. (2015). *A bird in the hand: What E4Kids tells about early childhood programs and young children's trajectories from age 3-5*. Symposium presentation to Victorian Department of Education and Training staff, 2 Treasury Place Melbourne. 15 July 2015.

Tayler, C. (2015). *Building high-quality teaching and learning practices: the CLASS tool*. Presentation to Victorian Department of Education staff. University of Melbourne. 28 April 2015

Tayler, C. (2015). *Does Monitoring and teaching babies and toddlers make a difference?* PED talk, Victorian Department of Education, 2 Treasury Place. 7 December 2015

Tayler, C. (2015). *E4Kids and research on teaching and learning B-8*. Invited address to Northern Territory Department of Education Executives, 19 June 2015.

Taylor, C. (2015). *Elevating early childhood learning and development beyond the school boundary*. Invited address to the Queensland Department of Education Principals Conference, Convention Centre, South Bank, 27-28 February 2015.

Taylor, C. Page, J. Pilsworth, N & Pupillo, G. (2015). *The Active Ingredients for Building Learning Relationships with Children*, Early Learning Association of Australia Conference 'Together We Grow'. 29-30 May 2015

Taylor, C. (2015). *Improving child learning and development in the critical early years*. Grand Rounds Public Lecture at Royal Children's Hospital Melbourne. 10 June 2015.

Taylor, C. (2015). *Intentional teaching in the Early Phase: ECEC and EY deepening learning*. Invited symposium address to Northern Territory Department of Education Darwin and regional staff, 18 June 2015.

Taylor, C. (2015). *Leading in early childhood. Which track race? What conditions? What outcomes?* Gowrie Victoria Children in the Driver's Seat Conference. Melbourne Museum 22 September 2015.

Taylor, C. (2015). *Research in teaching and learning in the early years B-8*. Invited address to the Western Australia Catholic Education Research Symposium, Ruislip Street, West Leederville, 5-6 August.

Taylor, C. (2015). *Research in teaching and learning in the early years: Some evidence to provoke local debate*. Invited address. Early Years Conference: Today's Children Tomorrow's Future, Cairns, 10-11 September 2015.

Thorpe, K., Sinclair, D., Staton, S., Pattinson, C., and Smith, S. (2015). *If Given the Opportunity Would You Want Your Child to Sleep in Childcare?*, SLEEP, Conference of the American Sleep Physicians Association, Seattle, June 2015

Thorpe, K., Staton, S., Sawyer, E., Pattinson, C., and Smith, S. (2015). *Napping, Development and Health from 0-5 Years: A Systematic Review*. SLEEP, Conference of the American Sleep Physicians Association, Seattle, June 2015

## 2014

Cloney, D., & Adams, R. (2014). *Development Trajectories of children from low SES backgrounds and the influence of ECEC programs*. International Conference of the Australian Association for Research in Education (AARE) and the New Zealand Association for Research in Education (NZARE). December 2014

Cloney, D., Cleveland, G., Hattie, J., & Taylor, C. (2014). *Variations in the availability and quality of early childhood education and care by socioeconomic status*. International Conference of the Australian Association for Research in Education (AARE) and the New Zealand Association for Research in Education (NZARE), December 2014

Cohrssen, C., & Taylor, C. (2014). *Children learn when educators play with maths: Implications for early childhood mathematics learning from an implementation study*. Poster presented at the 23. Conference of the ISSBD (International Society for the Study of Behavioural Development) in Shanghai, July 2014.

Hildenbrand, C., Niklas, F., Cohrssen, C. & Taylor, C. (2014). *Children's mathematical and verbal competence in early education and care settings in Australia*. Poster presented at the 23. Conference of the ISSBD (International Society for the Study of Behavioural Development) in Shanghai, July 2014.

Niklas, F., Nguyen, C., Cloney, D., Taylor, C. & Adams, R. (2014). *The home learning environment and children's early development in large scale research*. Presentation held at the 13. Conference of the AIFS (Australian Institute of Family Studies) in Melbourne, July/August 2014.

Niklas, F., Taylor, C. & Schneider, W. (2014) *Home-based Literacy Activities and Children's Cognitive Outcomes: A Comparison between Australia and Germany*. Conference of the ISSBD (International Society for the Study of Behavioural Development) in Shanghai, July 2014.

Niklas, F., Taylor, C. & Schneider, W. (2014). *Early familial based literacy interactions and children's cognitive outcomes: A comparison between Australia and Germany*. Poster presented at the 23. Conference of the ISSBD (International Society for the Study of Behavioural Development) in Shanghai, July 2014.

Pollitt, R. & Cohrssen C. (2014). *Assessing four-year-old children's number knowledge in a play-based program*. Early Childhood Management Services Conference, Beyond Tomorrow: inspiring Journeys, Melbourne, Australia, August 2014

Sparling, J. Taylor, C. Page, J & Beckingham, L. *Learning Games in multiple Australian contexts* Symposium held at the Early Childhood Australia National Conference in Melbourne, September 2014

Staton, S., Smith, S., Pattinson, C., and Thorpe, K. (2014). *The relationship between history of childcare and age of cessation of napping in preschool aged children*. SLEEP, Conference of the American Sleep Medicine association USA 2014

Taylor, C & Siraj-Blatchford, I. (2014). *The quality of early childhood education and care programs and associations with child development at entry to school*. Invited Plenary for the ELAA Early Childhood Education Conference, Melbourne. 31 May, 2014:

Taylor, C. (2014). *Leadership – a driving force of program quality improvement in ECEC settings*. Invited address to Griffith University's Queensland Principals Professional Network, Woolloongabba, Brisbane, 15 September 2014

Taylor, C. (2014). *Leading learning in contemporary early education settings: signposts from research, evidence collection and the study of 'method'*, Keynote to QCAA Forum, Brisbane Convention Centre, Brisbane October, 2014.

Taylor, C. (2014). *Making a world of difference – the first 1000 days. Social, family, educational policy and practice: turning to 'method' in early education.* Symposium presentation to joint meeting of Victorian Government Education, Health and Social Services Secretaries and staff, Melbourne. October, 2014.

Taylor, C. (2014). *The quality of learning Birth – 12 Years* Invited address to Linking Learning Ministerial launch and symposium Bastow Institute of Educational Leadership, Melbourne. May.

Taylor, C. (2014). *What counts as quality in early childhood education and care programs?* Keynote to the Australian College of Educators 2014 National Conference. September 2014

Taylor, C., Niklas, F. & Cohrssen, C. (2014). *Leading the change: Increasing the quality of mathematics learning in play-based programs.* Symposium held at the Early Childhood Australia National Conference in Melbourne, September 2014.

Taylor, C. (2014). *Leading learning in contemporary educational settings: the work between a thousand flowers blooming and shared models of teaching.* The Dr Lawrie Shears Public Lecture, The Bastow Institute of Educational Leadership, Melbourne.

Taylor, C. (2014). *A bird in the hand: What E4Kids tells about young children's trajectories of development, the quality of programs and actions that may improve outcomes,* Invited plenary to Early Childhood Australia National Conference 2014; Season of Change. September 2014.

Thorpe, K., Staton, S., Marriott, A., Pattinson, C., and Smith, S. (2014). *Impact of sleep practices in childcare settings on child well-being* SLEEP Conference of the American Sleep Medicine association USA 2014

Thorpe, K., Staton, S., Smith, S., and Pattinson, C. (2014). *Are sleep policies and practices in childcare a cause for concern?* SRCD conference: Connecting policy Practice and Research, Alexandria Old Town, Virginia, USA., 2014

### 2013

Inglis, J., Staton, S., Smith, S., Pattinson, C., and Thorpe, K. (2013). *Napping in preschoolers: Staff beliefs and experiences in early childhood centres.* Sleep Biol Rhythms. Vol. 11, Supplement 2.

Marriott, A., Staton, S., Thorpe, K., Pattinson, C., and Smith, S. (2013) *How do current sleep practices in Early Childhood Education and Care settings reflect current knowledge about good sleep habits and environments?* Sleep Biol Rhythms. Vol. 11, Supplement 2, p15-16.

Neil, E., Staton, S., Smith, S., Pattinson, C., and Thorpe, K. (2013) *Problem nappers: Are they a problem?* Sleep Biol Rhythms. Vol. 11, Supplement 2, p14.

Pattinson, C., Staton, S., Smith, S., Thorpe, K. (2013). *Observing Emotional Climate of Sleep Time in Early Childhood Education and Care Settings: Application of the CLASS.* The Society for Research in Child Development (SRCD), Seattle, USA.

Sinclair, D., Staton, S., Smith, S., Pattinson, C., and Thorpe, K. (2013). *Parental preferences towards daytime sleep for preschool aged children in Early Childhood Education and Care settings.* Sleep Biol Rhythms. Vol. 11, Supplement 2, p13-14.

Staton, S., Pattinson, C., Smith, S., Thorpe, K. (2013). *The effects of child-centred versus compulsory sleep practices in childcare: a salivary cortisol study.* 16th European Conference on Developmental Psychology, Lausanne, Switzerland.

Staton, S., Smith, S., Pattinson, C., and Thorpe, K. (2013). *Group differences in salivary cortisol patterns in relation to sleep practices in childcare.* Sleep Biol Rhythms. Vol. 11, Supplement 2.

Staton, S., Smith, S., Pattinson, C., Thorpe, K. (2013). *Examining the responsiveness of current sleep practices in early childhood education and care settings to children's social, emotional and physical needs.* Infant & Early Childhood Social & Emotional Wellbeing Conference, Canberra, Australia.

Taylor C. & Weston K. (2013). *A comprehensive approach toward excellence in early childhood teaching and learning.* Symposium for OMEP International Conference, Shanghai, China. 8-11 July 2013.

Taylor, C. (2013). *Quality reforms and family day care: combining education and care to support children's learning and development,* Invited address to the Victorian family Day Care Conference, Richmond, May 2013.

Thorpe, K., Staton, S., Pattinson, C., and Smith, S. (2013). *Day-time sleep patterns of Australian Preschool aged children.* Sleep Biol Rhythms. Vol. 11, Supplement 2.

Thorpe, K., Staton, S., Pattinson, C., Smith, S. (2013). *Day-time sleep patterns of Australian Preschool aged children.* Sleep Biol Rhythms. Vol. 11, Supplement 2, p17. DOI: 10.1111/sbr.12028

### 2012

Cleveland, G., Taylor, C. & Cloney, D. (2012). *The Determinants of Interaction Quality in Australian Child Care: A Production-Function Approach.* Presented at joint International Conference of the Australian Association for Research in Education (AARE) and the Asia Pacific Educational Research Association (APERA) 5 December, 2012.

Cleveland, G., Colley, S., Taylor, C. & Cloney, D. (2012). *Economies of Scale and Scope and the Structure of Costs in Australian Early Childhood Services.* Presented at joint International Conference of the Australian Association for Research in Education (AARE) and the Asia Pacific Educational Research Association (APERA) 5 December, 2012.

Cloney, D., Taylor, C., Cleveland, G., Thorpe, K. (2012) *The No-Program Control: Identifying and recruiting a random sample of children who do not participate in early childhood services.* Society for Research on Child Development (SRCD), Developmental Methodology Program, Tampa Florida. February 2012

Cohrssen, C., Tayler, C. & Cloney, D. (2012). *Playing with maths: does implementation dosage affect children's learning outcomes? Preliminary findings and recommendations for future curriculum-based implementation studies in early childhood settings*. Presented at Biennial Australian Implementation Conference 2012. 26, October 2012

Taylor, C. (2012). *E4Kids Findings about the usage patterns and the quality of ECEC programs*. Early Childhood Australia (ECA) National Conference, Perth. October 2012

Taylor, C. (2012). *Usage Pattern in Australian ECEC Programs*, Dean's Public Lecture, November, 2012

## 2011

Staton, S., Thorpe, K., Taylor, C., Dyson, R., & Canning-Ure, A (2011). *Children's social networks and friendship quality across different early childhood education and care setting in Australia*. Presented at 15th European Conference on Developmental Psychology, Bergen Norway, August| 23-27 2011

Taylor, C., Ishimine, K., Thorpe, K., & Cloney, D. (2011). *Teacher-Child Interactions in Early Childhood Education and Care: An Australian Study*. Presented at Society for Research in Child Development (SRDC) 2011 Biennial Meeting; Montreal, Quebec, Canada, March 31 – April 2 2011

Thorpe, K., Staton, S., Bell-Booth, R., Thompson, C., Taylor, C., Cloney, D., Dyson, R., & Canning-Ure, A (2011). *Adaptation of the Friendship Bus Story for Assessment of Social Bridging and Social Inclusion*. Presented at 15th European Conference on Developmental Psychology, Bergen Norway, August 23-27 2011

## Research seminars: University of Melbourne

Bekhus, M. "Optimal care? 9-months fully paid maternal leave, high quality care and associations with Child behaviour at 3 years" May 2010

Bente Jensen - August 2012 "How can we address Early Childhood Education and Care (ECEC) more effectively"

Birch, E. "Indigenous Wisdom for Future Generations" October 2011

Cleveland, G. "Quality in Quebec Child Care Centres: What Matters and How Much?" February 2011

Cleveland, G. "Selection Effects in the E4Kids Longitudinal Study" February 2010

Cleveland, G. "The Determinants of Interaction Quality in Australian Child Care: A Production-Function Approach" December 2012

McGrew, K. "Reflections on 35 Years of Intelligence Testing." September 2010

Mitchell, L. "Lessons from NZ Policy Approaches" November 2012

Siraj-Blatchford, I. "Effective Pedagogy in Primary Schools in English and Maths" October 2012

Siraj-Blatchford, I. "Performing Against the Odds: How working class kids succeed in education." August 2011

## Research bulletins (available in E4Kids website)

E4Kids Research Bulletin Issue 1 - December 2011 (PDF)

E4Kids Research Bulletin Issue 2 - January 2012 (PDF)

E4Kids Research Bulletin Issue 3 - July 2012 (PDF)

E4Kids Research Bulletin Issue 4 - May 2013 (PDF)

E4Kids Research Bulletin Issue 5 - August 2013 (PDF)

E4Kids Research Bulletin Issue 6 - April 2015 (PDF)

## Other dissemination

Filmcast - *Sleep Routines in Childcare need a Rethink, Day Care Decisions* <http://daycaredecisions.com.au/sleep-routines-in-childcare-need-a-rethink/>

SLEEP program for Authorised Officers and ECEC providers: print resources and podcast <http://deta.qld.gov.au/earlychildhood/news/sector-reports/sleep.html>  
Also available through ACECOA

Thorpe, K, Pattinson, C and the Sleep in Early Childhood Research Group (2016). The importance of sleep for preschool children's learning. Implications for practices in early education settings. *Bedrock: National Journal of the Independent Education Union*, May 2016.

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