Process Quality in Early Childhood Education and Care in Australia: A Systematic Literature Review

Early Childhood Education Journal
https://doi.org/10.1007/s10643-024-01735-4

Process Quality in Early Childhood Education and Care in Australia: A Systematic Literature Review

Nguyen Thi Ngoc Ha[1] · **Melissa Tham**[1] · **Peter Hurley**[1]

Accepted: 22 July 2024

Abstract
This review examines the extant Australian literature on process quality in ECEC, which is understood as children's actual experience within a childcare setting such as interactions between educators and children. A thematic analysis of empirical evidence from the 21 qualified articles reveals key characteristics of ECEC process quality studies, the benefits of process quality to child outcomes, and some factors influencing process quality. The review highlights the increasing interest in ECEC process quality in Australia and that process quality can be linked to children's outcomes in the early years. It also underscores that outdoor environments and educators' attributes such as personal experiences and qualifications stood out as the key supporting factors of process quality. More importantly, the review found that most of the process quality studies in Australia were conducted in metropolitan areas, and there were only two studies focused on children from disadvantaged backgrounds. The paper calls for more actions to combine process quality with equity across types of ECEC services.

Keywords Process quality · Literature review · Systematic review · ECEC · Childcare · Australia

Introduction

The first years of children's lives are important to their later education outcomes (Siraj et al., 2018). The extant research highlights that high-quality ECEC in the form of childcare (Tayler et al., 2016) and preschool (Hall et al., 2013) can have positive impacts on children's academic, cognitive, and social outcomes, contributing to their overall school readiness (Christensen et al., 2022). High-quality ECEC experiences usually involve stimulating, warm, and supportive interactions with educators (Mashburn et al., 2008; Votruba-Drzal et al., 2004). Previous studies also reinforce that children from disadvantaged background gain more from ECEC participation than their more advantaged peers (Cornelissen et al., 2018; Hilferty et al., 2010). However, children whose parents have a low income, human capital, or socioeconomic status (SES) are less likely to access quality ECEC programs (Krapf, 2014; Krieg et al., 2015). As a potential means to combat poverty and social exclusion, quality ECEC services should have provided for all children, especially those from disadvantaged families (Troger & Verwiebe, 2015; Wood et al., 2023).

Despite this, quality is a highly contested notion (Hunkin, 2018) meaning different things to different stakeholders, such as educators, governments, and parents (Cohrssen et al., 2023). To help understand and conceptualise 'quality', Torii et al. (2017) present a three-part model for quality in ECEC that we adopted in this paper. Accordingly, process quality relates to the quality of educator-child interactions within an ECEC setting that can play a key role in shaping the experiences and outcomes of children. Also important are 'structural quality' factors such as qualifications, centre-management, child-educator ratios, and professional development. Lastly, the researchers posit that 'system' factors such as funding and system design are also important. Torii et al. (2017) argue that these three elements are interrelated. Saliently, process quality can be influenced by both structural and system factors; for instance, the number of children that educators are responsible for can influence the amount of time that they have available for interactions. In-service professional development of ECEC educators and

✉ Nguyen Thi Ngoc Ha
ha.nguyen@vu.edu.au

[1] Victoria University, 300 Queen Street, Melbourne, VIC 3000, Australia

Published online: 14 August 2024

teachers can also influence the ways that they interact with children (Egert et al., 2018).

Within ECEC settings, process and structural quality are vital to children's early learning experiences. While structural aspects of ECEC quality have been explored (Harrison et al., 2023; OECD, 2017), less is understood about how process quality impacts children's outcomes. Further work around process quality is of importance given that ECEC has been historically viewed as purely babysitting or caregiving services (Gibbons, 2020; Zhang & Yu, 2017). Internationally, policy efforts have been made to recognise the role of ECEC services by establishing quality standard framework and measures to evaluate curriculum and teaching practices (Bradbury, 2020; OECD, 2017). Australia is no exception. In the country, ECEC sector has struggled to raise the status and gain social recognition (Barnes et al., 2021). 'Low quality' ECEC results often generate negative public sentiment and there is a need to broaden the understanding of process quality, the interpretation of standard measures, and other relating factors (Thorpe et al., 2022). This research gap is addressed in this paper.

Process Quality

The OECD (2017) defines process quality as "what children actually experience in their programme – what happens within a setting, such as interactions between educators and children. It also consists of the relationships with parents, available materials, and professional skills of staff" (2017, p. 29). Published research featuring process quality first appeared in the late 1990s (Kontos & Wilcox-Herzog, 1997). Most of the research is concentrated in the United States (US) (Kontos & Wilcox-Herzog, 1997; Valentino, 2018; Votruba-Drzal et al., 2004). Recently, the OECD has focused on process quality as part of its early childhood series, Starting Strong (OECD, 2017, 2021).

Simultaneously, advances in measuring process quality have occurred over the past 30 years. There are several widely used measurement tools that have process quality at their core, and these measurements can include different components. Some key measures have been shown to be a greater predictor of cognitive development, and research in this area is ongoing (Table 1). Measures have educator and child interactions in common, but also diverge and can measure different components. Some measures feature elements of child development such as 'social and emotional wellbeing', 'physical development', as well as structural quality elements, such as 'adults working together'. It is worth noting that the differences in how process quality is conceptualized across these measures must be taken into consideration when interpreting quality measure results because they can misdirect policy and practice decisions (Thorpe et al., 2022).

Previous studies have shown the positive impacts of process quality on children's achievement outcomes (Hatfield et al., 2016; Hu et al., 2021; Valentino, 2018). For example, Hall et al. (2013) state that pre-school quality makes a difference to the developmental profile of children when they

Table 1 Some key measures of process quality from the academic literature

Measure	Components
The Sustained Shared Thinking and Emotional Well-Being (SSTEW) (Siraj et al., 2023)	Building trust Confidence and independence Social and emotional wellbeing Supporting and extending language and communication Supporting learning and critical thinking Assessing learning and language
Early Childhood Environment Rating Scale-Extension (ECERS-E) (Sylva et al., 2003)	Literacy Maths Science/environment Diversity
Early Childhood Environment Rating Scale-Revised (ECERS-R) (Harms et al., 1998)	Space and furnishing Personal care routines Language and reasoning Activities Social interactions Organisation and routines Adults working together
Movement Environmental Rating Scale (MOVERS) (Archer & Siraj, 2017)	Curriculum, environment and resources for physical development Pedagogy for physical development Supporting physical activity and critical thinking Parents/carers and staff
The Classroom Assessment Scoring System (CLASS) (Pianta et al., 2008)	Emotional Support for children Organisation of activities Instructional Support

enter school in England. The findings are promising: (1) the global quality of pre-school (measured on the ECERS-R) moderates the effects of familial risk such as poverty, (2) the interactions and relationships quality (measured on the Caregiver Interaction Scales (CIS) moderate the effects of child level risk such as low birth weight, and (3) the quality of curricular provision (ECERS-E) moderates the effects of both individual and family risks. Therefore, higher process quality might be considered a protector against family-level risks (Hall et al., 2013).

The academic literature also indicates that the instructional components of process quality appear to enhance children's early development. For example, children's academic skills have been improved when exposed to teaching and learning settings where educators provided detailed feedback (Howes et al., 2008; Mashburn et al., 2008). Children's language and academic skills are improved when educators engage them in multi-turn conversations on certain topics (Justice et al., 2008; Wasik & Hindman, 2011). The teachers' use of 'I wonder…' formulations in their interactions with children is effective in creating a space for agency for children to make decisions regarding their participation in classroom experiences (Houen et al., 2016).

Attending high-quality classrooms in ECEC has been associated with better outcomes for children in terms of cognitive and communication outcomes (Davies et al., 2023) as well as improved social, and behavioural development (Mashburn et al., 2008). The benefits of high-quality ECEC experiences during the early years may continue into primary school (Sylva et al., 2012). For example, the Effective Provision of Preschool Education (EPPE) study in England underscored that process quality in early years makes a difference to children's verbal and mathematics abilities at age seven (Sylva et al., 2004). Similarly, the E4kids in Australia indicated that quality in early years did make a difference to children's verbal and mathematics abilities at age eight (Tayler et al., 2016).

Regulating Quality ECEC in Australia

Quality ECEC has been more prevalent in Australian policy discourse recently. It was stated in the Australian Early Years Strategy (Australian Government, 2023), which is a draft blueprint for the vision of ECEC in Australia that:

> High quality ECEC delivers a triple dividend in Australia… [Q]uality ECEC is associated with stronger developmental outcomes for children when they start school, allow[ing] parents to work, study, train or volunteer… These benefits have a larger economic and wellbeing benefit for Australia – with families able to participate in the economy, and children being given strong foundations for their future learning and growth (p. 25).

In Australia, the federal government subsidises the cost of childcare, while state and territory governments are responsible for delivering ECEC and for the educational outcomes of children more broadly (Department of Education, 2023). ECEC is delivered through a mix of for- and not-for-profit providers via long day care, family day care, outside school hours care, occasional care services and in home care (Sims et al., 2017).

Regulating quality is done at a national level. Australia has a national quality framework known as the National Quality Standard (NQS), which was first implemented in 2012. The Australian Children's Education and Care Quality Authority (ACECQA) is responsible for assessing the quality of ECEC services every two to three years. Assessors from state regulatory authorities assess centres against the following seven quality area standards: (1) Educational program and practice, (2) Relationships with children, (3) Children's health and safety, (4) Physical environment, (5) Staffing arrangements, (6) Collaborative partnerships with families and communities, and (7) Governance and leadership.

Authorised officers observe the educators and children during their normal daily routines, discussing the practices observed and sighting relevant documentation. The officers then complete the rating and send a draft to the service, in order for them to provide feedback on the assessment. Services receiving a higher rating are assessed less often. The period between assessments can thus vary from one to three years (ACECQA, 2024).

ECEC centres are assessed against criteria that make up these seven standards and rated as 'excellent', 'exceeding the NQS', 'meeting the NQS' or 'working towards the NQS'. Poor-performing centres can be rated as 'needing significant improvement' and in these cases, it is stated on the ACECQA website that 'steps are taken' towards improving centre ratings (although there is limited information available as to how this occurs). Under-performing centres rated as 'Significant Improvement required' need to complete a Quality Improvement Plan, whereby they self-assess their performance and plan for future improvements. ECEC centre results are published on 'Starting Blocks', a publicly available website aimed at parents who may be seeking ECEC services for their children. Parents can see which centres are located in their neighbourhood and how they rated to help inform their decision-making, but many parents report that they are unaware of the website and the information presented can be have gaps (ACCC, 2023).

According to the Australian Early Development Census (AEDC, 2021), one in five Australian children start school

'developmentally vulnerable' – that is they are rated as low in one or more domains (language and cognitive skills, communication skills and general knowledge, physical health and wellbeing, social competence, emotional maturity). In response, the ECEC system is undergoing major reforms and development, with policy makers at the national and state/territory levels working to deliver cheaper and more accessible childcare for families as part of a universal system (Productivity Commission, 2023). Government inquiries and researchers have identified a range of inconsistencies when it comes to the quality of centres, as well as the measures used to determine quality through the NQS. For example, the Productivity Commission inquiry into ECEC in Australia, one of several major inquiries into the ECEC system currently underway, suggests that centres that are 'meeting the NQS' should be meeting the needs of children (Productivity Commission, 2023). Recent reports have highlighted that NQS ratings have increased (ACECQA, 2023) and yet, the most recent figures show that the proportion of children who are starting school 'developmentally vulnerable' decreased between 2018 and 2021 (from 55.4 per cent to 54.8 per cent).

Research aim

This review aims to examine the extant Australian literature on process quality in ECEC. Specifically, it identifies key characteristics of ECEC process quality studies in Australia as well as synthesizes existing empirical evidence on the benefits of process quality to child outcomes and factors influencing process quality.

The review addresses three research questions:

- (RQ1) What are key characteristics of ECEC process quality studies, including year of publication, research context, research design, and research participants?
- (RQ2) What are the benefits of process quality to child outcomes?
- (RQ3) What factors influence process quality?

Research Methodology

This review "adheres closely to a set of scientific methods that explicitly aim to limit systematic error (bias)" (Petticrew & Roberts, 2008, p. 9). Specifically, it followed guidelines for conducting a systematic literature review including the PRISMA statement by Page et al. (2021), guidance from Petticrew and Roberts (2008), and Alexander (2020). A four-step procedure (Nguyen et al., 2023; Nguyen, Spittle, Nguyen et al., 2023a, b) was employed: (i) defining inclusion/exclusion criteria, (ii) conducting the literature search, (iii) appraising the studies, and (iv) extracting, synthesizing, and analysing data.

Selection Criteria

We acknowledged that many process quality ECEC studies were in the form of grey literature publications. However, we targeted empirical evidence published in peer-reviewed journal articles only to maintain quality consistency across selected studies. The inclusion and exclusion criteria are detailed in Table 2.

Literature Search

The literature search and identification were conducted from May to September 2023 using three recommended databases for systematic reviews: Scopus, Web of Science, and ProQuest (Gusenbauer & Haddaway, 2020). We did not search on Google Scholar as it was assessed inappropriate for use as the primary search system for systematic reviews (Gusenbauer & Haddaway, 2020).

Search terms used to find potential articles were: "process quality" AND "early childhood" AND "Australia", "classroom quality" AND "early childhood" AND "Australia", "interaction* quality" AND "early childhood" AND "Australia", "emotional support" AND "early childhood" AND "Australia", "instructional support" AND "early childhood" AND "Australia", "classroom organisation" AND "early childhood" AND "Australia", and "classroom management" AND "early childhood" AND "Australia". We targeted to identify journal articles on process quality and thus,

Table 2 Selection criteria

Inclusion	Exclusion
• Research reports on empirical data • Published in peer-reviewed journals • Articles examine process quality in centre-based childcare, kindergarten, and preschool in Australia OR investigate the benefits of process quality for child outcomes and factors influencing process quality.	• Research published in other forms such as book chapters, conference proceedings, theses, handbooks, or reports • Full text articles that could not be retrieved • Articles not published in English

did not include specific terms such as "child outcomes" and "influencing factors" to maximise the search results.

Exclusion criteria were integrated in the literature search. A total of 293 journal articles were found, including 42 from Scopus, 78 from Web of Science, and 173 from ProQuest. Figure 1 presents the literature search and study appraisal procedure.

Study Appraisal

The review team included three researchers. Researcher 1 and 2 worked independently to assess the eligibility and quality of each article. The review team organised meetings to discuss any differences between the two researchers' findings and researcher 3 finalised the article selection (Nguyen et al., 2023; Nguyen, Spittle, Nguyen et al., 2023a, b).

Before assessing the relevance of each search result, we removed 35 duplicate records. Then the title and abstract of each article were skimmed. This activity removed 25 review, policy, and commentary papers; nine educator/teacher professional development papers; and 25 papers that did not focus on ECEC in Australia contexts. The full texts of the 195 remaining articles were downloaded for further assessment.

In this step, abstracts were carefully read, and findings/results section of full-text articles were skimmed to evaluate their ability to address all research questions. Eligibility assessment eliminated 176 articles including 48 that did not target centre-based childcare, kindergarten, and preschool settings; and 126 papers that did not respond to the research questions RQ2 and RQ3 as they focused on topics such as child health issues, emotional support for parents, fatherhood, and educator workload. A total of 21 articles met the eligibility and quality requirements. These articles were qualified for the next step of full-text analysis, as outlined in Table 3.

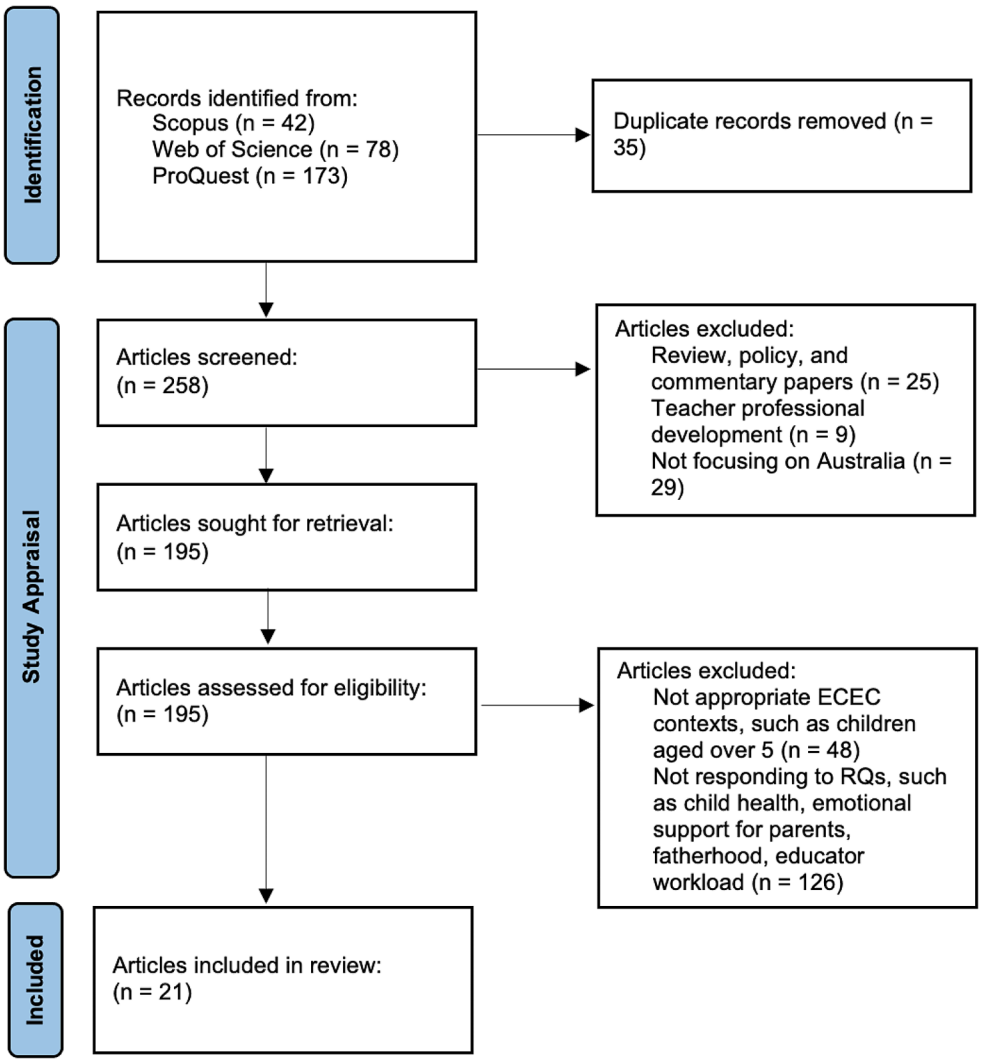

Fig. 1 Article search and appraisal process (adapted from PRISMA flow diagram (page et al., 2021)

Table 3 Qualified article details

ID	Article	State	Research location	Measure	Research design	Research participants	Trial/ Intervention	Longi-tudinal research
A1	Tayler et al. (2013)	Victoria Queensland	Metropolitan Regional Remote	CLASS ECERS-R	Quantitative	2306 children		4 years
A2	El-Choueifati et al. (2014)	NSW		ICL Skills Audit	Multi methods	11 speech-language pathologists 4 ECEC experts		
A3	Cohrssen et al. (2014)	Victoria	Metropolitan	CLASS	Qualitative	5 educators		
A4	Coley et al. (2015)				Quantitative (LSAC data)			
A5	Krieg et al. (2015)	South Australia	Metropolitan	ECERS-R	Quantitative	444 children		1 year
A6	Cheeseman (2017)	NSW			Qualitative	1 infant		
A7	Degotardi et al. (2018)	NSW	Metropolitan	ITERS-R		57 infants		
A8	Howard et al. (2018)	NSW	Metropolitan Regional	ECERS-E SSTEW	Quantitative	666 children		
A9	Tonge et al. (2019)	NSW	Metropolitan	CLASS	Quantitative	110 educators 490 children		
A10	Eadie et al. (2019)	Victoria	Metropolitan Regional Remote	CLASS	Quantitative	181 educators	The Learning Language and Loving It™ program	14 weeks
A11	Quinones and Pursi (2020)	Victoria			Qualitative	12 children 3 educators		
A12	Thorpe et al. (2020)	Victoria Queensland	Metropolitan Regional Remote	CLASS	Quantitative	2306 children		4 years
A13	Blewitt et al. (2021)	Victoria	Metropolitan		Qualitative	30 educators		
A14	Barnes et al. (2021)	Victoria	Metropolitan		Qualitative	29 educators		
A15	Baird and Grace (2021)	NSW	Metropolitan		Mixed methods	18 children		11 months
A16	Kirk et al. (2022)	Western Australia		CLASS	Mixed methods	139 children 7 educators		
A17	Thorpe et al. (2022)	Victoria Queensland	Metropolitan Regional Remote	CLASS	Qualitative	1 field worker 1 ECEC researcher		
A18	Elek et al. (2022)	Victoria		CLASS ICL Skills Audit	Quantitative	223 educators	The Let's Read professional development program	6 months
A19	Rankin et al. (2022)	Victoria Queensland	Metropolitan Regional Remote	CLASS Cognitive development tests	Quantitative	1128 children		
A20	Guarrella et al. (2022)	Northern Territory	Metropolitan Regional	CLASS	Mixed methods	3 educators	The NT Preschool Science Games	5 months
A21	Levickis et al. (2023)	Victoria Queensland	Metropolitan Regional Remote	CLASS	Quantitative	2494 children		1 year

Data Extraction, Synthesis, and Analysis

NVivo (version 12) was used in this step to manage, code, synthesise, and analyse the data (Bazeley & Jackson, 2013), which comprised the 21 qualified articles. General information of all qualified articles (RQ1) including publication year, research methodology, research context, research participants, and sample size was recorded in NVivo as case attributes. This was followed by a deductive thematic analysis of the 21 articles (Creswell & Creswell, 2017). Accordingly, analytical attention was paid to the benefits of process quality on child outcomes (RQ2), and any factors influencing process quality (RQ3) were identified (Creswell & Creswell, 2017). Inductive analysis was also conducted to group similar coded information (nodes) into sub-themes, providing more nuance to the major themes around the two research questions. The frequency (*f*) of case attributes and nodes was also noted as suggested by Nguyen et al. (2023).

Results

RQ1 What are key characteristics of ECEC process quality studies, including year of publication, research context, research design, and research participants?

Year of Publication

The 21 qualified articles were published from 2013 to 2023. Interestingly, more than 50% of the articles ($n=11$) were published between 2020 and 2023, and 25% ($n=5$) in 2022 (Fig. 2).

Research Context

The 21 qualified articles were conducted in five states and one territory in Australia: Victoria, New South Wales, Queensland, Western Australia, South Australia, and the Northern Territory. Of the four states, Victoria was the most common research location ($n=11$), followed by New South Wales ($n=6$), and Queensland ($n=5$). Five articles were associated with the E4Kids longitudinal study which followed almost 2500 children in Victoria and Queensland. There were 15 articles detailing the research location including major cities (such as Melbourne, Sydney, and Brisbane) ($n=15$), regional (such as Shepparton, Victoria) ($n=8$), and remote areas (such as Mt Isa, Queensland) ($n=6$). Only two articles focused on 'children from disadvantaged backgrounds' – the term is defined as children from "areas of severe social disadvantage" (Baird & Grace, 2021, p. 1671), and children from "areas with high community disadvantage and had high rates of vulnerability on the language and cognitive skills domain of the Australian Early Development Census" (Elek et al., 2022, p. 90).

Research Design and Participants

Nearly half of the articles employed a quantitative design ($n=10$). The remaining articles employed qualitative ($n=6$), mixed methods ($n=4$), or multi-methods approaches ($n=1$). A variety of methods was used such as observations, surveys, interviews; but observational methods were predominant ($n=18$). Of the different observational measures used, CLASS was the most popular ($n=10$), followed by ECERS ($n=3$), and the Interaction Communication and Literacy (ICL) Skills Audit ($n=2$). More than 40% of the articles used longitudinal data ($n=9$). Three articles were program evaluations, including the *Let's Read* professional development program (A16), the *Learning Language and Loving It program* (A9), and the *Northern Territory Preschool Science Games* (A18).

Children were participants in most articles ($n=14$). The age of participating children ranged from seven months to five years, but 2–5 years was the most common age range ($n=10$). ECEC educators and teachers participated in approximately 40% of the studies ($n=9$). Only two studies recruited ECEC experts/researchers as participants who

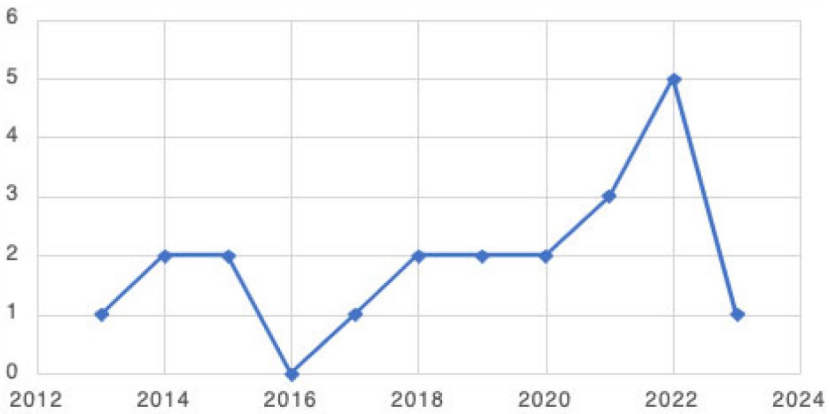

Fig. 2 Articles by year of publication

may provide insights into quality in ECEC. No articles included parents' voices when investigating process quality in Australia.

RQ2 What are the Benefits of Process Quality to Child Outcomes?

Of the 21 articles, 11 examined how process quality influenced child outcomes. These outcomes included cognitive skills ($f=6$), social competence ($f=4$), language and communication skills ($f=3$), and emotional maturity ($f=2$). The review also found that the benefits of process quality for child outcomes are mostly associated with the CLASS emotional support domain ($f=11$), followed by instructional support ($f=3$), and classroom organisation ($f=2$).

Specifically, one study of 1128 Australian children (mean age of five) showed that emotional support from educators enhanced children's cognitive development and verbal comprehension (Rankin et al., 2022). Responsive educator-child relationships demonstrated during whole class and small group activities also supported children's social and emotional development (Quinones & Pursi, 2020). Similarly, Blewitt et al. (2021) observed that children's social and emotional development was enhanced from the close attachment between educators and children because children would feel safer and more confident when being exposed to the social world. Indeed, children participating in Baird and Grace's study (2021) expressed their gratitude for their educators as educators helped them resolve disputes with friends and provided first aid when they were injured.

For infants, Degotardi et al. (2018) found that 'near and clear' educator talk enabled them to learn new words, phonological rules, and the structure of spoken language. Therefore, the organisation of infant classrooms was vital in creating opportunities for children to hear clear audible adult voices. Instructional support was also important to children's outcomes. For example, a study in the Northern Territory reinforced that quality instructional support from educators helped improve pre-school children's ability to develop concepts in science (Guarrella et al., 2022). But it is worth noting that children from less advantaged backgrounds benefitted less from attending in lower quality ECEC than more advantaged children (Krieg et al., 2015).

RQ3 what Factors Influence Process Quality?

The review identified seven factors influencing ECEC process quality in Australia, as explored in 16 of the 21 articles. Some factors were positively associated with increased outcomes, such as educators' qualifications, professional development, and personal experiences ($f=7$), outdoor environment ($f=2$), and intentional teaching ($f=1$). Other factors seemed to be negatively associated with children's outcomes, such as lack of training and guidance for educators ($f=1$), type of ECEC service ($f=1$), and observation measure-related issues ($f=8$) including effects of contextual factor ($f=5$), different results among measures ($f=1$), and examination of new measure ($f=1$).

The studies consistently highlighted links between educator qualifications, process quality, and children's outcomes (Degotardi et al., 2018; Krieg et al., 2015). Specifically, diploma and bachelor-qualified educators performed language promoting strategy significantly higher than certificate-qualified educators (Degotardi et al., 2018). ECEC centres that did not employ bachelor degree educators received low ECERS-R activities scores (Krieg et al., 2015). Educators' experiences also had an impact on children's outcomes as educators who had more years of experience working with children and families reported more diverse strategies to enhance children's social and emotional development (Blewitt et al., 2021). Another factor related to process quality was professional development. For instance, Eadie et al. (2019) examined the Learning Language and Loving It program where educators were provided with training in discipline knowledge and one-on-one coaching sessions. The results were positive: educators who attended the program used new teaching strategies and delivered more instructional support for young children.

The ECEC context and the learning environment also appeared to influence process quality. In Australia, outdoor environment played an important role in children's learning (Kirk et al., 2022; Tonge et al., 2019). As Krieg et al. (2015) noted, higher quality educator-child interactions were observed in centres which allocated more time for outdoor activities. Tonge et al. (2019) also added that the quality of play and child-educator interactions were enhanced by allowing children to move freely between indoor and outdoor settings. As promoted in the NQS, both indoor and outdoor environments offered a rich context for quality interactions of children with educators and peers (Krieg et al., 2015). Another way to enrich the interactions between ECEC educators and children was the employment of purposeful pauses before responding to children or after listening to children's responses during play-based mathematics activities. Such sensitive pausing formed part of intentional teaching and encouraged children to engage in learning individually (Cohrssen et al., 2014).

This review found that observation measures do not appear to fully capture process quality in Australian ECEC contexts. There was a consensus about the disadvantage of the CLASS measure's instructional support domain as it did not capture educator-child interactions in outdoor environments (Kirk et al., 2022; Thorpe et al., 2022; Tonge et al., 2019). While quality interactions in outdoor settings should

be considered, low scores from the CLASS instructional support raised concern about Australian educator deficit. As Thorpe et al. (2022) recommended, adjustment for context should be taken into account to avoid policy and practice misdirection. For instance, policy should aim at supporting educators to meet contextual needs rather than standardising educator professional development. In another study, Thorpe et al. (2020) reported that measuring ECEC quality using the CLASS measure could be biased by the time of assessment as well as the content and formats of observation. For example, while ratings of emotional support decreased then improved at the end of day, that of instructional support and classroom organisation reduced across the day. It is also worth mentioning that different measures may provide different results. Howard et al. (2018) compared ratings on the SSTEW and ECERS-E and found differences between the two scale ratings across child development domains, especially the content knowledge, and learning and development domains. For new observation measures, reliability and validity examination must be taken into account to avoid bias, as suggested by El-Choueifati et al. (2014) when they first introduced the ICL Skills Audit scale. Just before the Early Years Learning Framework for Australia V2.0 (ACECQA, 2022) was released, Blewitt et al. (2021) reported that Australian educators need more training and guidance to translate the Early Years Learning Framework for Australia (ACECQA, 2009) into practice with regard to children's social and emotional development. Such training and guidance would enhance process quality in ECEC in Australian contexts. Another challenge was reported by Barnes et al. (2021) who indicated that ECEC is often regarded as a caregiving service and the lack of societal recognition discouraged educators to provide quality ECEC services. Tayler et al. (2013) also identified that process quality varies systematically across the type of service. More specifically, long day care centres have significantly lower teacher-child interaction quality than kindergartens.

Discussion and Conclusion

This paper examined the extant Australian literature on process quality in ECEC. It specifically addressed three research questions: (i) What are key characteristics of ECEC process quality studies in Australia? (RQ1), (ii) What are benefits of process quality to child outcomes? (RQ2), and (iii) What factors influence process quality? (RQ3). The review highlighted the increasing interest in ECEC process quality in Australia and that process quality does matter to child outcomes in the early years. It also underscored the reciprocal relationship between process and structural quality, as well as the impact of outdoor settings on process quality. The paper called for more actions to combine process quality with equity across types of ECEC services.

First, this review confirmed the increasing interest in process quality as a significant part of quality ECEC in Australia. The literature search showed that more than half of the process quality studies were published between 2020 and 2023, and a quarter in 2022 only. Barnes et al. (2021) offered an interesting argument for the increased interest in process quality in Australia since 2020. During lockdowns and travel restriction periods, parents had their children at home and could closely observe how ECEC educators created daily meaningful learning experiences for their children through caring interactions. The COVID-19 pandemic has lifted societal recognition of process quality and ECEC educators, who have long been viewed as less important than teachers of other educational levels. However, such recognition cannot be sustained if process quality does not bring any benefits to child outcomes. Most process quality studies originating from the US indicate that process quality increases children's cognitive, social, behavioural, emotional, language and communication competence (Hatfield et al., 2016; Valentino, 2018; Votruba-Drzal et al., 2004). Results of this review showed that similar evidence has been found in Australia.

Second, this review emphasized that the benefits of process quality to child outcomes are most associated with the CLASS emotional support domain – or the child-educator interactions, followed by instructional support and classroom management domains. Neurologically, interactions form part of the 'serve and return' mechanism that is crucial for developing children's 'brain architecture' and can occur in parent-child interactions and in ECEC environments through educator-child interactions (Shonkoff et al., 2011). Babies, for example, will make a gesture or 'serve' something into the world that is 'returned' with a sound or action by a caregiver. Children learn about the world through this back-and-forth interaction, and it forms the neurological blueprint for later learning. In the ECEC learning environment, educators extend this serve and return process by promoting rich interactions underpinned by intentional teaching goals (such as teaching children explicit subject matter and promoting each child's capacity for establishing friendships) and developing content knowledge, which improves later outcomes. Significantly, serve and return processes develop children's executive functioning, including working memory, inhibitory control and attention, that are all essential to development (Shonkoff et al., 2011) and school readiness (Fleer et al., 2022). Therefore, it is suggested that child-educator interactions should be placed at the centre of quality ECEC, as the VEYLDF (Department of Education, 2016) states:

> Children's […] learning can be stimulated and extended by the involvement of responsive adults. […] This involves attunement to children, active engagement (by and with children), sustained shared thinking and conversations, and intentional teaching. This approach recognises the centrality of respectful and responsive relationships to children's learning (p. 14).

Third, this review highlighted that process quality is complex. Child development takes place within an 'ecosystem' of overlapping contexts (Bronfenbrenner, 1977) that includes the learning environment, families, neighbourhoods, and the society. It is difficult to disentangle the influence of structural elements and contextual factors on process quality practice. These results reflect the OECD's observation that "in view of enhancing process quality the focus so far has been mostly on improving the structural quality aspects" (OECD, 2018, p. 8). This review found that outdoor environments and educators' attributes such as personal experiences and qualifications stood out as the key supporting factors of process quality. Internationally, while the impact of educator factors has been widely discussed (Degotardi et al., 2016; Manlove et al., 2008), there are fewer mentions about the importance of outdoor settings to educator interactions with children and child development in the published ECEC literature (Ulset et al., 2017).

Fourth, and perhaps the most important finding of this review was that most of the process quality studies in Australia were conducted in metropolitan areas, and there were only two studies focused on children from disadvantaged backgrounds (Baird & Grace, 2021; Elek et al., 2022). Process quality studies seem to involve children from more advantaged backgrounds (Krieg et al., 2015). Disadvantaged children are more likely to start school developmentally vulnerable and they are more likely to have lower achievement over the course of their schooling than advantaged children (Lamb et al., 2020). Equity is a major focus of recent policy developments in Australia and yet, few process quality studies feature research participants who are from disadvantaged backgrounds. A recent Royal Commission that explored ECEC delivery in South Australia called for federal and state governments to commit to a reduction in the rate of developmental vulnerability from 20 per cent to 11 per cent, over the next 20 years. It appears that there has been a mismatch between research and policy literature on process quality, and that children from disadvantaged backgrounds should be prioritised participants in ECEC research.

This research is timely in Australia, as the state and territory governments are currently trying to address some major challenges around ECEC access and provision, with the goal to provide quality ECEC to all children, regardless of where they live. This is not an easy task. Other inquiries into ECEC also highlight that quality centres are not uniformly spread across geographical areas, with higher concentrations of lower rated centres in rural and remote areas and disadvantaged areas (ACCC, 2023). The research literature has also highlighted inconsistencies between the NQS and other academic measures of quality (Siraj et al., 2019). While universal access is on the horizon for all Australian families and quality has been recognised as a central discourse and element of ECEC experiences (Hunkin, 2018), quality cannot be achieved when educators and teachers are leaving the sector and similarly, equality of access cannot be achieved in areas of high staff turnover. Salaries, access to professional development and other important work-related factors are currently being negotiated at the sector level with Fair Work Australia. We support the argument of Eadie et al. (2024) that:

> making the policy decisions and practice changes required to continue to drive quality improvement in ECEC is a complex undertaking… It requires an understanding of the nuances in the research literature regarding which domains of quality are the key drivers of young children's learning and development (p. 3).

This review has limitations due to the search strategy and selection criteria. Relevant studies may have been overlooked as we searched only three popular databases and excluded studies in other forms such as book chapters, conference proceedings, theses, handbooks, and reports. Several implications for future research could be considered from this review. As mentioned, further studies should focus on children with disadvantaged backgrounds, especially those living in regional, rural, and remote regions. Process quality measures are also a potential research area as the review reported observation measures as key challenges in quality ECEC in Australia. Methodologically, quantitative research designs are more common. The employment of qualitative studies with the voices of ECEC experts and policy makers would provide more insights into how process quality has been invested and implemented in Australia.

In conclusion, this paper suggests that process quality is important to children's outcomes, but unsurprisingly, it is related to aspects of structural quality such as qualifications, professional development, and physical environments. We argue that 'quality' in ECEC does not occur in a vacuum, educators and teachers need supportive working conditions where meaningful and positive interactions can be developed. A re-conceptualisation of quality is needed that sees quality as related to the supports and resources provided to educators and teachers that improve the care and learning

conditions in which quality practice can take place, as a means to achieve better outcomes for Australian children.

Author Contribution Nguyen Thi Ngoc Ha: research design, data collection and analysis, writing, review. Melissa Tham: data collection, writing, review. Peter Hurley: research design, review.

Funding Not applicable.
Open Access funding enabled and organized by CAUL and its Member Institutions

Data Availability Not applicable.

Declarations

Ethical Approval Not applicable.

Competing Interests Not applicable.

References

ACCC (2023). *Childcare inquiry: Final report*. https://www.accc.gov.au/inquiries-and-consultations/childcare-inquiry-2023

ACECQA (2024). *Assessment rating process*. https://www.acecqa.gov.au/assessment/assessment-and-rating-process

ACECQA (2009). *The early years learning framework for Australia*. Retrieved from https://www.acecqa.gov.au/sites/default/files/2018-02/belonging_being_and_becoming_the_early_years_learning_framework_for_australia.pdf

ACECQA (2022). *The early years learning framework for Australia V2.0*. Retrieved from https://www.acecqa.gov.au/sites/default/files/2023-01/EYLF-2022-V2.0.pdf

ACECQA (2023). *NQF Snapshot Q3 2023*. https://www.acecqa.gov.au/nqf/snapshots

AEDC (2021). *Findings from the AEDC*. https://www.aedc.gov.au/early-childhood/findings-from-the-aedc

Alexander, P. A. (2020). Methodological guidance paper: The art and science of quality systematic reviews. *Review of Educational Research*, *90*(1), 6–23. https://doi.org/10.3102/0034654319854352

Archer, C., & Siraj, I. (2017). *Movement Environment Rating Scale (MOVERS) for 2-6-year-olds provision: Improving physical development through movement and physical activity*. UCL IOE.

Australian Government (2023). *Early Years Strategy*. Retrieved from https://www.dss.gov.au/families-and-children-programs-services/early-years-strategy#:~:text=The%20draft%20Early%20Years%20Strategy,feedback%20on%20the%20draft%20Strategy

Baird, K., & Grace, R. (2021). Young children's perspectives on their social interactions within early childhood settings. *Early Child Development and Care*, *191*(11), 1669–1683. https://doi.org/10.1080/03004430.2019.1670655

Barnes, M., Quiñones, G., & Berger, E. (2021). Constructions of quality: Australian Childhood Education and Care (ECEC) services during COVID-19. *Teachers and Teaching*. https://doi.org/10.1080/13540602.2021.1979510

Bazeley, P., & Jackson, K. (2013). *Qualitative data analysis with NVivo*. Sage.

Blewitt, C., O'connor, A., Morris, H., Nolan, A., Mousa, A., Green, R., & Skouteris, H. (2021). It's embedded in what we do for every child: A qualitative exploration of early childhood educators' perspectives on supporting children's social and emotional learning. *International Journal of Environmental Research and Public Health*, *18*(4), 1530. https://doi.org/10.3390/ijerph18041530

Bradbury, A. (2020). Datafied at four: The role of data in the 'schoolification'of early childhood education in England. In J. Jarke, & A. Breiter (Eds.), *The datafication of education* (pp. 8–22). Routledge.

Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist*, *32*(7), 513–531. https://doi.org/10.1037/0003-066X.32.7.513

Cheeseman, S. (2017). Narratives of infants' encounters with curriculum: Beyond the curriculum of care. *Contemporary Issues in Early Childhood*, *18*(1), 55–66. https://doi.org/10.1177/1463949117692243

Christensen, D., Taylor, C. L., Hancock, K. J., & Zubrick, S. R. (2022). School readiness is more than the child: A latent class analysis of child, family, school and community aspects of school readiness. *Australian Journal of Social Issues*, *57*(1), 125–143. https://doi.org/10.1002/ajs4.138

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. https://doi.org/10.1177/183693911403900413

Cohrssen, C., de Rosnay, M., Garvis, S., & Neilsen-Hewett, C. (2023). Assessing the quality of early childhood education and care in Australia: Challenges and opportunities. *Frontiers in Education*, *8*, 1147669. https://doi.org/10.3389/feduc.2023.1147669

Coley, R. L., Lombardi, C. M., & Sims, J. (2015). Long-term implications of early education and care programs for Australian children. *Journal of Educational Psychology*, *107*(1), 284. https://doi.org/10.1037/a0037456

Cornelissen, T., Dustmann, C., Raute, A., & Schönberg, U. (2018). Who benefits from universal child care? Estimating marginal returns to early child care attendance. *Journal of Political Economy*, *126*(6), 2356–2409. https://doi.org/10.1086/699979

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage.

Davies, C., Kong, S. P., Hendry, A., Archer, N., McGillion, M., & Gonzalez-Gomez, N. (2023). Sustained benefits of early childhood education and care (ECEC) for young children's development during COVID-19. *Journal of Early Childhood Research*, *22*(2), 238–257. https://doi.org/10.1177/1476718X231213488

Degotardi, S., Torr, J., & Nguyen, N. T. (2016). Infant–toddler educators' language support practices during snack-time. *Australasian Journal of Early Childhood*, *41*(4), 52–62. https://doi.org/10.1177/183693911604100407

Degotardi, S., Han, F., & Torr, J. (2018). Infants' experience with 'near and clear'educator talk: Individual variation and its relationship to indicators of quality. *International Journal of Early Years Education*, *26*(3), 278–294. https://doi.org/10.1080/09669760.2018.1479632

Department of Education (2016). *The Victorian Early Years Learning and Development Framework*. https://www.education.vic.gov.au/Documents/childhood/providers/edcare/veyldframework.pdf

Department of Education (2023). *Early Childhood in Australia*. https://www.education.gov.au/early-childhood

Eadie, P., Stark, H., & Niklas, F. (2019). Quality of interactions by early childhood educators following a language-specific professional learning program. *Early Childhood Education Journal*, *47*, 251–263. https://doi.org/10.1007/s10643-019-00929-5

Eadie, P., Page, J., Levickis, P., Elek, C., Murray, L., Wang, L., & Lloyd-Johnsen, C. (2024). Domains of quality in early childhood education and care: A scoping review of the extent and consistency of the literature. *Educational Review*, *76*(4), 1057–1086. https://doi.org/10.1080/00131911.2022.2077704

Egert, F., Fukkink, R. G., & Eckhardt, A. G. (2018). Impact of in-service professional development programs for early childhood teachers on quality ratings and child outcomes: A meta-analysis. *Review of Educational Research*, *88*(3), 401–433. https://doi.org/10.3102/0034654317751918

El-Choueifati, N., Purcell, A., McCabe, P., Heard, R., & Munro, N. (2014). An initial reliability and validity study of the Interaction, Communication, and literacy skills audit. *International Journal of speech-language Pathology*, *16*(3), 260–272. https://doi.org/10.3109/17549507.2014.882988

Elek, C., Gray, S., West, S., & Goldfeld, S. (2022). Effects of a professional development program on emergent literacy-promoting practices and environments in early childhood education and care. *Early Years*, *42*(1), 88–103. https://doi.org/10.1080/09575146.2021.1898342

Fleer, M., Walker, S., White, A., Veresov, N., & Duhn, I. (2022). Play-worlds as an evidenced-based model of practice for the intentional teaching of executive functions. *Early Years*, *42*(4–5), 572–586. https://doi.org/10.1080/09575146.2020.1835830

Gibbons, A. (2020). The negation of babysitting: Deconstruction and care in early childhood. *Global Studies of Childhood*, *10*(4), 358–367. https://doi.org/10.1177/2043610620978507

Guarrella, C., Cohrssen, C., & van Driel, J. (2022). The quality of teacher–child interactions during the enactment of playful science games in preschool. *Early Education and Development*, *33*(4), 634–654. https://doi.org/10.1080/10409289.2021.1900993

Gusenbauer, M., & Haddaway, N. R. (2020). Which academic search systems are suitable for systematic reviews or meta-analyses? Evaluating retrieval qualities of Google Scholar, PubMed, and 26 other resources. *Research Synthesis Methods*, *11*(2), 181–217. https://doi.org/10.1002/jrsm.1378

Hall, J., Sylva, K., Sammons, P., Melhuish, E., Siraj-Blatchford, I., & Taggart, B. (2013). Can preschool protect young children's cognitive and social development? Variation by center quality and duration of attendance. *School Effectiveness and School Improvement*, *24*(2), 155–176. https://doi.org/10.1080/09243453.2012.749793

Harms, T., Clifford, R. M., & Cryer, D. (1998). *Early childhood environment rating scale*. ERIC.

Harrison, L. J., Waniganayake, M., Brown, J., Andrews, R., Li, H., Hadley, F., & Hatzigianni, M. (2023). Structures and systems influencing quality improvement in Australian early childhood education and care centres. *The Australian Educational Researcher*. https://doi.org/10.1007/s13384-022-00602-8

Hatfield, B. E., Burchinal, M. R., Pianta, R. C., & Sideris, J. (2016). Thresholds in the association between quality of teacher–child interactions and preschool children's school readiness skills. *Early Childhood Research Quarterly*, *36*, 561–571. https://doi.org/10.1016/j.ecresq.2015.09.005

Hilferty, F., Redmond, G., & Katz, I. (2010). The implications of poverty on children's readiness to learn. *Australasian Journal of Early Childhood*, *35*(4), 63–71. https://doi.org/10.1016/j.ecresq.2015.09.005

Houen, S., Danby, S., Farrell, A., & Thorpe, K. (2016). Creating spaces for children's agency:'I wonder… formulations in teacher–child interactions. *International Journal of Early Childhood*, *48*, 259–276. https://doi.org/10.1007/s13158-016-0170-4

Howard, S. J., Siraj, I., Melhuish, E. C., Kingston, D., Neilsen-Hewett, C., De Rosnay, M., & Luu, B. (2018). Measuring interactional quality in pre-school settings: Introduction and validation of the Sustained Shared thinking and emotional wellbeing (SSTEW) scale. *Early Child Development and Care*, *190*(7), 1017–1030. https://doi.org/10.1080/03004430.2018.1511549

Howes, C., Burchinal, M., Pianta, R., Bryant, D., Early, D., Clifford, R., & Barbarin, O. (2008). Ready to learn? Children's pre-academic achievement in pre-kindergarten programs. *Early Childhood Research Quarterly*, *23*(1), 27–50. https://doi.org/10.1016/j.ecresq.2007.05.002

Hu, B. Y., Li, Y., Wang, C., Wu, H., & Vitiello, G. (2021). Preschool teachers' self-efficacy, classroom process quality, and children's social skills: A multilevel mediation analysis. *Early Childhood Research Quarterly*, *55*, 242–251. https://doi.org/10.1016/j.ecresq.2020.12.001

Hunkin, E. (2018). Whose quality? The (mis) uses of quality reform in early childhood and education policy. *Journal of Education Policy*, *33*(4), 443–456. https://doi.org/10.1080/02680939.2017.1352032

Justice, L. M., Mashburn, A., Pence, K. L., & Wiggins, A. (2008). Experimental evaluation of a preschool language curriculum: Influence on children's expressive language skills. *Journal of Speech Language and Hearing Research*, *51*(4), 983–1001. https://doi.org/10.1044/1092-4388(2008/072)

Kirk, G., Knaus, M., & Rogers, S. (2022). An appraisal of the CLASS instrument as an observational measurement tool for evaluation of student and teacher interactions in western Australian classrooms. *Australian Journal of Teacher Education (Online)*, *47*(6), 85–104. https://doi.org/10.14221/ajte.2022v47n6.6

Kontos, S., & Wilcox-Herzog, A. (1997). Influences on children's competence in early childhood classrooms. *Early Childhood Research Quarterly*, *12*(3), 247–262. https://doi.org/10.1016/S0885-2006(97)90002-8

Krapf, S. (2014). Who uses public childcare for 2-year-old children? Coherent family policies and usage patterns in Sweden, Finland and Western Germany. *International Journal of Social Welfare*, *23*(1), 25–40. https://doi.org/10.1111/ijsw.12031

Krieg, S., Curtis, D., Hall, L., & Westenberg, L. (2015). Access, quality and equity in early childhood education and care: A South Australian study. *Australian Journal of Education*, *59*(2), 119–132. https://doi.org/10.1177/0004944115588789

Lamb, S., Huo, S., Walstab, A., Wade, A., Maire, Q., Doecke, E., & Endekov, Z. (2020). *Educational opportunity in Australia 2020: Who succeeds and who misses out*. https://vuir.vu.edu.au/42362/1/educational-opportunity-in-australia-2020.pdf

Levickis, P., Cloney, D., Roy-Vallières, M., & Eadie, P. (2023). Associations of specific indicators of adult–child Interaction Quality and Child Language outcomes: What teaching practices Influence Language? *Early Education and Development*, *35*(4), 647–666. https://doi.org/10.1080/10409289.2023.2193857

Manlove, E. E., Vazquez, A., & Vernon-Feagans, L. (2008). The quality of caregiving in child care: Relations to teacher complexity of thinking and perceived supportiveness of the work environment. *Infant and Child Development: An International Journal of Research and Practice*, *17*(3), 203–222. https://doi.org/10.1002/icd.547

Mashburn, A. J., Pianta, R. C., Hamre, B. K., Downer, J. T., Barbarin, O. A., Bryant, D., & Howes, C. (2008). Measures of classroom quality in prekindergarten and children's development of

academic, language, and social skills. *Child Development*, *79*(3), 732–749. https://doi.org/10.1111/j.1467-8624.2008.01154.x

Nguyen, T. N. H., Hoang, C. H., Knight, E., & Hurley, P. (2023a). What drives international students to choose Australia as their Tertiary Education Destination? A synthesis of empirical evidence. *Journal of International Students*, *13*(4), 146–168. https://doi.org/10.32674/jis.v14i4.5983

Nguyen, T. N. H., Spittle, M., Watt, A., & Van Dyke, N. (2023b). A systematic literature review of micro-credentials in higher education: A non-zero-sum game. *Higher Education Research & Development*, *42*(6), 1527–1548. https://doi.org/10.1080/07294360.2022.2146061

OECD. (2017). *Starting strong: Key OECD indicators on early childhood education and care*. Organisation for Economic Co-operation and Development.

OECD. (2018). *Engaging young children: Lessons from research about quality in early childhood education and care*. OECD.

OECD. (2021). *Starting strong VI: Supporting meaningful interactions in early childhood education and care*. Organisation for Economic Co-operation and Development.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., & Brennan, S. E. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *bmj*, *372*. https://doi.org/10.1136/bmj.n71

Petticrew, M., & Roberts, H. (2008). *Systematic reviews in the social sciences: A practical guide*. Blackwell Publishing.

Pianta, R. C., Paro, L., K. M., & Hamre, B. K. (2008). *Classroom Assessment Scoring System™: Manual K-3*. Paul H Brookes Publishing.

Productivity Commission (2023). *A path to universal early childhood education and care: Draft report*. https://www.pc.gov.au/inquiries/current/childhood/draft

Quinones, G., & Pursi, A. (2020). Playful qualities of toddling style in adult–child interaction. *European Early Childhood Education Research Journal*, *28*(4), 475–489. https://doi.org/10.1080/1350293X.2020.1783923

Rankin, P. S., Staton, S., Potia, A. H., Houen, S., & Thorpe, K. (2022). Emotional quality of early education programs improves language learning: A within-child across context design. *Child Development*, *93*(6), 1680–1697. https://doi.org/10.1111/cdev.13811

Shonkoff, J. P., Duncan, G. J., Fisher, P. A., Magnuson, K., & Raver, C. (2011). *Building the brain's air traffic control system: How early experiences shape the development of executive function*. Harvard Centre for the Developing Child.

Sims, M., Sumsion, J., Mulhearn, G., & Grieshaber, S. (2017). Regulating for quality in Australian early childhood. In N. Klinkhammer, B. Schäfer, D. Harring, & A. Gwinner (Eds.), *Monitoring quality in early childhood education and care: Approaches and experiences from selected countries* (pp. 23–40). German Youth Institute.

Siraj, I., Melhuish, E., Howard, S. J., Neilsen-Hewett, C. M., Kingston, D., de Rosnay, M., & Luu, B. (2018). *Fostering effective early learning (FEEL) study: final report*. NSW Department of Education. https://education.nsw.gov.au/early-childhood-education/whats-happening-in-the-early-childhood-education-sector/data-and-research/feel-study-2018

Siraj, I., Howard, S. J., Kingston, D., Neilsen-Hewett, C., Melhuish, E. C., & Rosnay, M. (2019). Comparing regulatory and non-regulatory indices of early childhood education and care (ECEC) quality in the Australian early childhood sector. *Estudos em Avaliação Educacional*, *30*(75), 958–982. https://doi.org/10.18222/eae.v30i75.6925

Siraj, I., Kingston, D., & Melhuish, E. (2023). *The Sustained Shared thinking and Emotional Well-being (SSTEW) Scale: Supporting process quality in early childhood*. Routledge.

Sylva, K., Siraj-Blatchford, I., & Taggart, B. (2003). *Assessing quality in the early years: Early childhood environment rating scale: Extension (ECERS-E), four curricular subscales*. Trentham Books.

Sylva, K., Melhuish, E., Sammons, P., Siraj-Blatchford, I., & Taggart, B. (2004). *The effective provision of pre-school education (EPPE) project technical paper 12: The final report-effective pre-school education* (0854736034). https://discovery.ucl.ac.uk/id/eprint/10005308/1/eppe12sylva2004effective.pdf

Sylva, K., Melhuish, E., Sammons, P., Siraj-Blatchford, I., & Taggart, B. (2012). *Final report from the Key Stage 3 phase: Influences on students' development from age 11–14*. https://ro.uow.edu.au/sspapers/2542/

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. https://doi.org/10.1177/183693911303800203

Tayler, C., Thorpe, K., Nguyen, C., Adams, R., & Ishimine, K. (2016). *The E4Kids study: Assessing the effectiveness of Australian early childhood education and care programs: Overview of findings at 2016*. The University of Melbourne.

Thorpe, K., Rankin, P., Beatton, T., Houen, S., Sandi, M., Siraj, I., & Staton, S. (2020). The when and what of measuring ECE quality: Analysis of variation in the Classroom Assessment Scoring System (CLASS) across the ECE day. *Early Childhood Research Quarterly*, *53*(4), 274–286. https://doi.org/10.1016/j.ecresq.2020.05.003

Thorpe, K., Houen, S., Rankin, P., Pattinson, C., & Staton, S. (2022). Do the numbers add up? Questioning measurement that places Australian ECEC teaching as 'low quality'. *The Australian Educational Researcher*, *50*, 781–800. https://doi.org/10.1007/s13384-022-00525-4

Tonge, K. L., Jones, R. A., & Okely, A. D. (2019). Quality interactions in early childhood education and care center outdoor environments. *Early Childhood Education Journal*, *47*, 31–41. https://doi.org/10.1007/s10643-018-0913-y

Torii, K., Fox, S., & Cloney, D. (2017). *Quality is key in early childhood education in Australia*. https://research.acer.edu.au/early_childhood_misc/10/

Troger, T., & Verwiebe, R. (2015). The role of education for poverty risks revisited: Couples, employment and profits from work–family policies. *Journal of European Social Policy*, *25*(3), 286–302. https://doi.org/10.1177/0958928715589068

Ulset, V., Vitaro, F., Brendgen, M., Bekkhus, M., & Borge, A. I. (2017). Time spent outdoors during preschool: Links with children's cognitive and behavioral development. *Journal of Environmental Psychology*, *52*, 69–80. https://doi.org/10.1016/j.jenvp.2017.05.007

Valentino, R. (2018). Will public pre-K really close achievement gaps? Gaps in prekindergarten quality between students and across states. *American Educational Research Journal*, *55*(1), 79–116. https://doi.org/10.3102/0002831217732000

Votruba-Drzal, E., Levine Coley, R., & Lindsay Chase-Lansdale, P. (2004). Child care and low-income children's development: Direct and moderated effects. *Child Development*, *75*(1), 296–312. https://doi.org/10.1111/j.1467-8624.2004.00670.x

Wasik, B. A., & Hindman, A. H. (2011). Improving vocabulary and pre-literacy skills of at-risk preschoolers through teacher professional development. *Journal of Educational Psychology*, *103*(2), 455. https://doi.org/10.1037/a0023067

Wood, J., Neels, K., & Maes, J. (2023). A closer look at demand-side explanations for the Matthew effect in formal childcare uptake in Europe and Australia. *Journal of European Social Policy*, *33*(4), 451–468. https://doi.org/10.1177/09589287231186068

Zhang, L., & Yu, S. (2017). I am not a babysitter: A case study of five Chinese mainland early childhood teachers' identity. *Journal of*

Education for Teaching, *43*(1), 117–119. https://doi.org/10.1080/02607476.2016.1182374