

Chapter 1. Overview: Promoting quality early childhood education and care, child development and learning

Research shows that quality early childhood education and care (ECEC) affects children's development and learning. There is consensus that process quality, such as the quality of staff-child interactions and developmental activities, is the primary driver of gains in children's development through ECEC. This report builds on a cross-national literature review examining the relations between structural indicators, such as child-staff ratios, and process quality in settings for children aged 3 to 5, aged 0 to 2, including family daycare settings. It also provides insights from a new meta-analysis of the linkages between quality and child learning and development. This overview chapter describes how ECEC provision has expanded and emphasises the importance of better understanding and defining ECEC quality. It highlights key findings and explains their linkages to policy levers such as standards and governance; workforce development and working conditions; data and monitoring.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Introduction

The effects of quality early childhood education and care (ECEC) on children's development and learning have been well established in the literature, and there is a general consensus that process quality is the primary driver of children's development in ECEC (Melhuish et al., 2015^[1]). The OECD *Starting Strong* reports (Organisation for Economic Co-operation and Development (OECD, 2001^[2]; 2006^[3]; 2011^[4]; 2015^[5]; 2017b^[6]) and other international research point out that high-quality ECEC is beneficial for children's early development and their subsequent school performance in various domains, such as language use and emerging academic skills, early literacy and numeracy, and socio-emotional skills (Burchinal, 2016^[7]; Cappella, Aber and Kim, 2016^[8]; Melhuish et al., 2015^[1]; Yoshikawa and Kabay, 2015^[9]). The OECD's Programme for International Student Assessment (PISA) study suggests that 15-year-old students who attended early childhood education for less than one year are 3.1 times more likely than students who attended for one year or more to perform below the baseline level of proficiency in science (this decreases to 2.3 times after accounting for socio-economic status), see Figure 1.1 (OECD, 2017a^[10]).

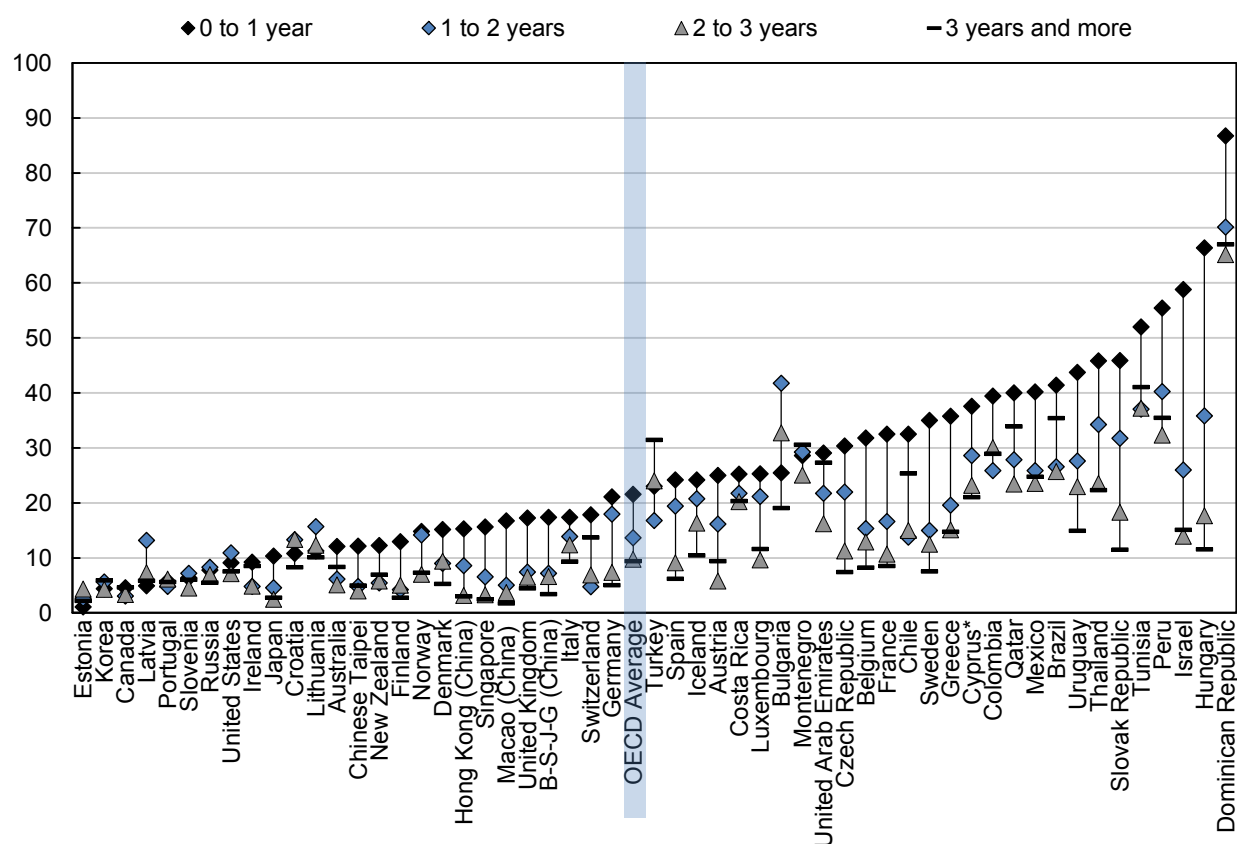
Benefits of high-quality ECEC also extend to health and well-being, for example by helping instil healthy habits of eating and physical activity (OECD, 2014^[11]). Evidence is growing that high-quality ECEC services also help support children's outcomes later in life, including in labour market participation, reduction of poverty, increased inter-generational social mobility and social integration (Sammons et al., 2008^[12]; Sylva et al., 2004^[13]).

An early learning environment that provides young children with opportunities to engage in developmentally appropriate, stimulating, and language-rich activities and social interactions can compensate for the risks for children from disadvantaged backgrounds of falling behind or not reaching their full developmental potential (Arnold and Doctoroff, 2003^[14]; Heckman, 2006^[15]). Such research highlights the long-term benefits of investments in ECEC programmes.

Policy makers face complex decisions in spending on ECEC, and need to consider trade-offs between structural investments and investments that improve the quality of the interactions between ECEC staff and children. Such demands require that policy makers be informed of the evidence base so that they can examine how a variety of policy options apply to their context or jurisdiction.

However, the focus of current research is often too narrow, examining only one aspect of quality, or being limited to programme- or national-level conclusions. These two aspects have received considerable criticism from the research and policy-making community. Prior research on structural characteristics of ECEC settings has been dominated by a focus on the so-called "iron triangle" characteristics (i.e. child-staff ratio, group size and teachers' pre-service qualifications; (Slot, 2017^[16]). To date, the vast majority of studies investigating associations between structural characteristics and process quality focused on only one indicator of process quality: the quality of teacher-child interactions. The research has also largely overlooked many other aspects of process quality, such as child-to-child (peer) interactions.

Figure 1.1. Proportion of low performers among 15-year-old pupils according to the numbers of years spent in early childhood education (PISA 2015)



Notes: Countries and economies are ranked in ascending order of the percentage of low-performing students who did not attend early childhood education (ISCED 0) or attended for “less than one year”. Low performers may be able to use basic or everyday scientific knowledge to recognise or identify aspects of familiar or simple scientific phenomena. However, they also often confuse key features of a scientific investigation, apply incorrect scientific information and mix personal beliefs with scientific facts in support of a decision.

* Note by Turkey: The information in this document with reference to “Cyprus” relates to the southern part of the island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the “Cyprus issue”.

Note by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

Source: (OECD, 2017a_[10])

Researchers have also pointed out that examining quality in a programme or a country gives an incomplete picture of the wide scope of quality experiences and indicators. Arguably, most countries have quality regulations and monitoring systems that limit the potential diversity in staff and structure characteristics, and the range of staff practices.

An additional limitation of the literature available is that it relies predominantly on studies conducted in the United States, and examines mostly centre-based settings for children aged 3 to 5, whereas systematic research on indicators of quality in ECEC across types of settings and with a global focus is still very limited.

Process quality matters

This report confirms that process quality is a powerful predictor of children's development and learning. The evidence shows that children have higher levels of emerging literacy and numeracy skills, as well as better behavioural and social skills, in ECEC settings with more positive staff-child interactions, or staff providing higher quality or more exposure to developmental and educational activities. Better outcomes for children are also observed when there are fewer negative staff-child interactions. Associations between staff-child interactions and children's development and learning did not differ significantly for children from predominantly disadvantaged backgrounds, compared to a more mixed or balanced group of children.

The report also shows that a few common structural quality indicators, such as child-staff ratios, pre-service qualifications, staff participation in in-service training, and the existence of quality monitoring and rating improvement systems all influence staff-child interactions (see Table 1.1). The evidence is less clear for group sizes and the years of work experience of staff.

Finally, the report documents very limited direct effects of such structural indicators on children's development and learning in the studies available. There is evidence for the benefits of in-service training for child development and learning, but the links of other structural characteristics to child development and learning are unclear or have not been examined in the literature. This means, for example, that despite changes in staff-child interactions linked to structural quality changes, no relationship was detected between child-staff ratios and children's early literacy and numeracy.

A possible reason for these apparently inconsistent findings could be that structural characteristics of ECEC provision are primarily *indirectly* related to child development and learning, influencing child development through process quality. Since many other factors, such as the children's home-learning environment, also affect children's early development, direct effects may not be likely in some cases.

Measurement may also play a role. For instance, the strongest linkages between staff-child interactions and child development are found in examining staff practices geared to specific developmental domains (e.g. emergent literacy and numeracy) and evaluations of children's development in precisely those areas. Indeed, research on curricula and their linkages to staff practices and child development is unbalanced and insufficient.

Another explanation is that structural features are interrelated, and that only by looking at combinations of structural indicators can we better understand how structural features promote development and learning. Contextual factors also need to be taken into consideration to increase understanding of the mechanisms at play between structure, process and child development. Finally, there may be optimal combinations or levels at which some of the most commonly utilised structural levers, such as qualifications, ratios and group size, have an impact on process quality and children's development, but the research is still focused on estimating the benefits on a one-to-one relationship.

Table 1.1 summarises the indicators for which a considerable number of studies are available, with ample geographic representation, and combined analysis from the

literature review and meta-analysis, where available. The results of this report suggest that policy makers can leverage structural regulations to encourage high-quality staff-child interactions. For instance, staff should be well-trained to encourage children's development, and should enjoy good working conditions. Monitoring systems can be harnessed for quality improvements.

Table 1.1. Influence of structural characteristics on staff-child interactions and child development and learning for well-documented policy levers

Structural characteristics	Association with	
	Staff-child interactions	Child development and learning
Lower child-staff ratio	Positive	Evidence unclear
Smaller group size	Evidence unclear	m
Higher pre-service qualifications	Positive	Evidence unclear
Participation in in-service training/ professional development	Positive	Positive
Years of work experience	Evidence unclear	m
Presence of accountability/Quality monitoring and rating improvement systems (QRIS)	Positive/neutral	Evidence unclear

Note: "m" signifies missing, i.e. indicating that sufficiently reliable evidence is not available.

Looking at geographical differences, several patterns can be observed. Links between staff-child ratios and interactions between staff and children were not found to vary according to the geographical location. But while US studies showed negative associations between staff-child interactions and children's behavioural skills, those linkages were overall positive in studies conducted outside the United States.

Other mechanisms, such as the funding of provisions or staff salaries, are also examined in this report, but the evidence for them is limited by the number of available studies and/or country representation. The report shows that children can develop literacy, numeracy, behavioural and social skills more effectively when staff engage in quality developmental activities with children. In turn, these staff practices and engagement with children may depend on team collaboration, and benefit from improved working conditions and well-being. Licensing for family day care, when regulated with pre-service qualifications, can be a tool to ensure better interactions for children. Separate class- or playrooms for disadvantaged, immigrant or bilingual children are associated with risks for equity and quality in ECEC. Lastly, the location of ECEC centres within schools may be associated with differences in staff's engagement with children.

This chapter first introduces the methods and scope of this report, provides a brief overview on access to ECEC, then moves on to describe the importance of definition of quality, including arguments for analysing the quality of centres for children aged 0 to 2, and for family daycare settings. It ends by explaining the policy levers guiding the structure of this report.

Scope and evidence base of this report

The overarching goal of this report is to review the current cross-national conceptual and empirical knowledge base of the relationship between ECEC structure and process quality, and links between quality and child development, learning and well-being.

The report summarises the conclusions of a literature review that examines how the structural and process aspects of ECEC quality are interrelated in settings for children aged 0 to 5, with a distinction between centres for younger children (under 3 years old), centres for older children (3 to 5 years old), and family daycare settings when appropriate (Slot, 2017_[16]). The review had an explicit cross-national focus, and includes a review of the “grey” literature (i.e. national and international reports, unpublished studies, recent evidence).

The literature review also looks at the preliminary evidence from two more recent approaches to the research on ECEC quality, which partially overcome the limitations of prior research that examine only one aspect of quality (Slot, 2017_[16]). The first approach explores how structural characteristics may be *indirectly* related to child development and learning, influencing child development through process quality. The evidence from this new approach has so far only taken into consideration staff-child ratios, staff qualifications and group, class- or playroom composition. The second approach looks at models of policy implementation, to examine how different structural features jointly influence staff-child interactions. This approach illustrates better the policy context of these associations, where decisions are made in tandem and/or respect previous policy. The available evidence looking at these approaches is summarised in this report, but is limited mostly to the United States, and involves only a small number of studies.

Further details of the literature review method are available in Annex B.

To complement the literature review, a meta-analysis of the association between aspects of quality, with a specific focus on studies examining process quality, and associations with child development and learning, provides an updated empirical evidence base for the conceptual knowledge (von Suchodoletz et al., 2017_[17]). The meta-analysis examines two additional aspects: *i*) the differential effects of ECEC quality for children from disadvantaged families, compared to more diverse groups of children; *ii*) the geographical differences in associations (US versus non-US). This piece of research was limited to centre-based settings for children ages 3 to 5 to allow for the analysis to be conducted in less than a year.

The meta-analysis included the full coding of 44 studies. Twenty-one of the studies reported research from the United States. Of the remaining studies, 16 reported research from different European countries (Germany [6], Netherlands [2], Portugal [3] and 1 study each from Flemish Community of Belgium, Finland, Ireland, Spain, and the United Kingdom) and 7 research studies from other countries (Australia [3], Chile [2], China [1] and Tanzania [1]).

Of the independent samples included in the meta-analysis (i.e. excluding overlapping datasets by retaining only the largest sample size), the total sample size of the studies coded was 3 110 ECEC staff (i.e. lead teachers) and 16 386 children, from 1 977 ECEC centres. Sample sizes ranged from 92 to 2 938 children, and from 16 to 694 ECEC staff. When reported ($n=26$), the samples were representative at the state/regional level, where the data was collected for most studies ($n=22$). Additional studies reported that the study population was representative at the national level ($n=1$) (Slot, Boom, et al., 2017) or at the local level ($n=3$) (Bowne et al., 2016a; Cadima et al., 2016; Phillips et al., 2009). All of the studies that included child data had similar numbers of boys and girls (43% to 53% girls). The children’s age was, on average, 66 months (ranging from 37 months to 180 months; $SD=36.9$). Where this was reported, the majority of ECEC staff was female (95% to 100%) and, on average, 37 years old ($SD=4.80$).

Further details of the meta-analysis method are available in Annex C.

Across the two studies, very limited literature was found on aspects of child well-being which limited the scope of examined child outcomes to development and learning.

Most OECD countries now offer universal access to at least a year of early childhood education and care, but its quality remains a concern

Reflecting on the important role of ECEC services in providing all children with the skills they need to be successful in school, and helping disadvantaged children to catch up, many countries have increased their financial support for ECEC programmes in recent years (OECD, 2017a_[10]; Vargas-Barón, 2015_[18]). This may either imply the expansion of universal provision for all children or reflect targeted measures that may specifically seek to enrol children from disadvantaged backgrounds – or a combination of both. Such approaches will also influence the composition of group, class- or playrooms.

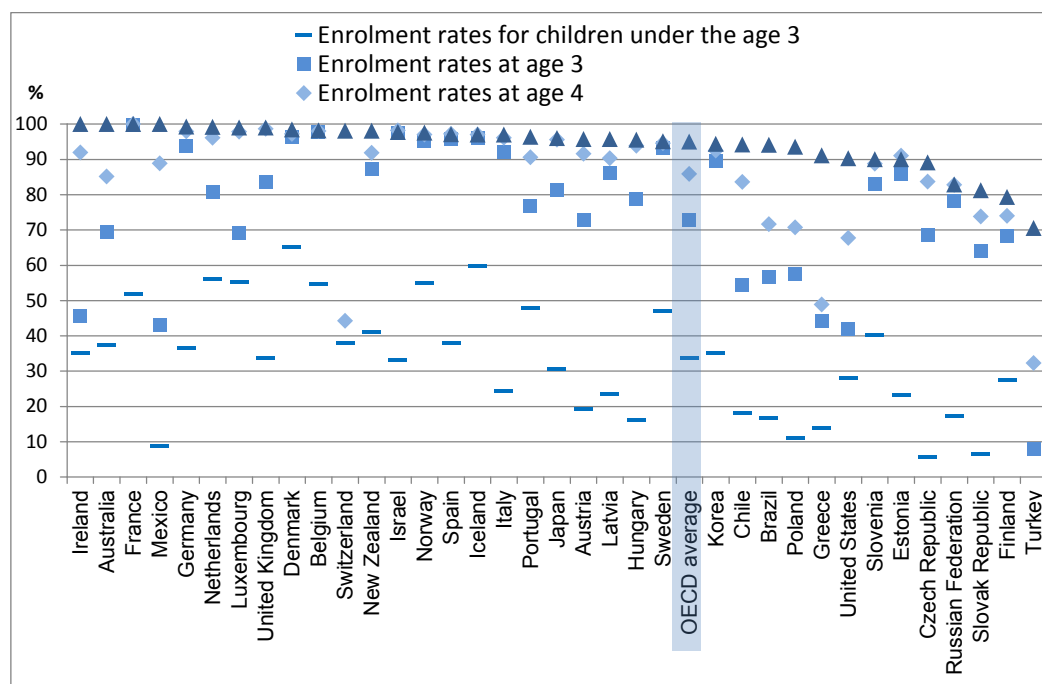
In consequence, universal or quasi-universal access to at least one year of ECEC is now a reality in most countries (Figure 1.2), which constitutes significant progress towards the Sustainable Development Goals education targets. In most countries, more than 90% of children are already enrolled in pre-primary education (or in primary education in some countries) at age 5. These countries are already close or have reached the SDGs target recommendation for universal participation in organised learning one year before official primary-school entry age. High enrolment rates are also observed for lower age groups. Among 4-year-olds, 90% or more are already enrolled in pre-primary (or primary education) in two-thirds of the 37 countries where data are available (OECD, 2017).

The increase in access has been made possible, in part, by the extension of legal entitlements of a place for younger children, and efforts to ensure free access for the older age group (e.g. aged 3 to 5). However, there are major differences across countries in the age groups covered by legal entitlements to a place in ECEC. For instance, some countries, such as Norway and Germany, cover ages 1 to 5, while others, such as the Czech Republic and Portugal, only guarantee children a place for one or two years before entering primary school.

Similarly, the time per week covered by the legal entitlements to a place in ECEC also differs greatly across countries and jurisdictions. For example, Norway grants universal access to 41 hours of ECEC, and French pre-primary schools provide 24 hours, Austria provides between 16 and 20 hours for the year before entering primary school, and Scotland (United Kingdom) provides only 16 hours for 3-4 year-olds (OECD, 2015_[5]).

The legal entitlement to a place in ECEC is not a guarantee of free access, especially for younger children. Both variables are independent. In pre-primary education (ISCED 02), most countries provide free access to ECEC to all children for at least the year before entering primary school. However, exceptions include Japan, Norway and Slovenia, where free access to the last year of ECEC is provided, but only on a needs basis. In Slovenia, around 3% of all children aged from 11 months to 5 years have free access to ECEC. In other countries, free access to ECEC is common, but the number of years and the number of hours covered varies significantly.

Figure 1.2. Enrolment rates in early childhood education and primary education, by age (2014)



Note: Children under the age of 3 are enrolled in formal childcare (ISCED 0 and other registered ECEC services); children at ages 4 and 5 can already be enrolled in primary education in a small group of countries. This figure combines data on formal childcare from the OECD Family Database, OECD, Paris, <http://www.oecd.org/els/family/database.htm> and on ECEC and primary settings covered by the ISCED classification from OECD (2016), *Education at a Glance 2016: OECD Indicators*, ensuring a consistent reference year. For more recent data on enrolment in ISCED 0 and ISCED 1 provision, please refer to OECD (2017), *Education at a Glance 2017: OECD Indicators*.

Source: (OECD, 2017^[19]; 2016^[20])

In many developmental areas, brain sensitivity peaks before the age of 3, including emotional control, social skills, language and numeracy (Gambaro, Stewart and Waldfogel, 2014^[21]; Naudeau et al., 2011^[22]). To support child development and equity, but also because of concerns about the obstacle to mothers' participation in the labour force, increasing effort has been made to provide places in ECEC to children well before the age of 3 in many countries. Data from the OECD Family Database shows that participation rates of children under the age of 3 have increased from 29% in 2006 to almost 35% in 2014 (OECD, 2017). This is also reflected in Figure 1.2.

Many countries also offer regulated family daycare, particularly in Europe (Eurydice Network, 2009^[23]; OECD, 2006^[24]). Family daycare settings refer to licensed home-based ECEC for children aged 0 to 2¹. Creating family daycare places can be a fast way to meet demands for more places with a relatively limited investment (as compared to the creation of new centres), and provide children with an environment more similar to their own home. These settings may or may not have an educational function or be part of the regular ECEC system.

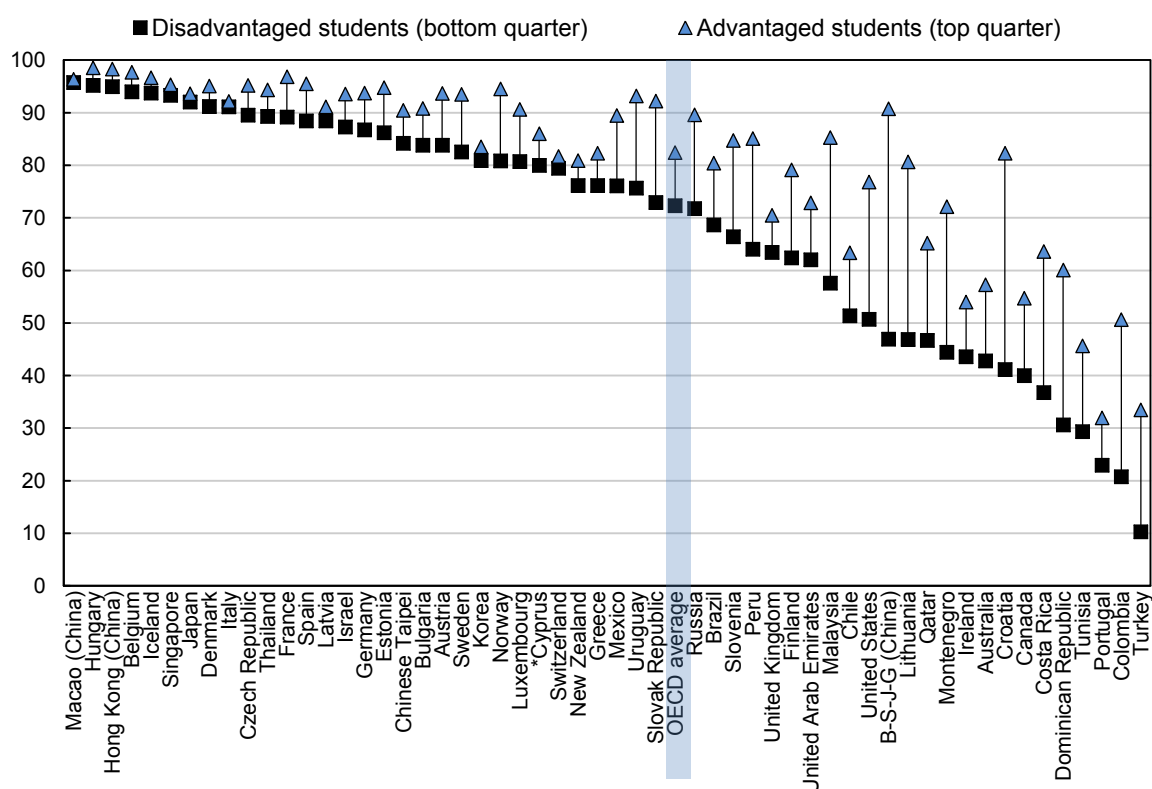
Coverage of family daycare settings varies considerably across countries. In Belgium, Denmark, Germany, France, Finland, the United Kingdom and Iceland regulated family daycare settings represent a significant proportion of ECEC, in particular for younger

children. In Denmark, around 40% of 1-year-olds are enrolled in regulated family daycare, whereas in France, the participation rates for the 0 to 3 age group apply to about 30% of children (European Commission, 2014^[25]). In Iceland, 31% of children under 2 years old are enrolled in family daycare. In the Netherlands, about 9% of 2 and 3 year-old children are enrolled in family daycare (OECD, 2016^[26]).

In addition to variations in types of provision, great disparities in enrolment persist. The children who need it the most are less likely to have access to ECEC (Eurydice Network, 2009^[23]; OECD, 2017a^[10]) (see Figure 1.3). Furthermore, children from disadvantaged socio-economic backgrounds have a higher chance of attending low-quality settings (Leu and Schelle, 2009^[27]; Stewart and Waldfogel, 2017^[28]; Vandenbroeck et al., 2018^[29]; Zachrisson et al., 2013^[30]).

The lower quality of settings with a large percentage of immigrant or bilingual children might reflect the barriers to access and the added risk experienced overall by disadvantaged families (Eurydice Network, 2009^[23]) and ethnic minority or multilingual families in specific locations (Stewart and Waldfogel, 2017^[28]). A further explanation that has been suggested is that working with disadvantaged children is more challenging and that additional resources might be needed to counteract these challenges to raise process quality (Pianta et al., 2005^[31]).

Figure 1.3. Percentage of 15-year-old students who attended early childhood education (ISCED 0) for two years and more, by socio-economic background (PISA 2015)



Note: Countries and economies are ranked in descending order of the percentage of socio-economically disadvantaged students who had attended early childhood school for two years and more.

Source: (OECD, 2017e^[32])

The importance and definition of quality

A growing body of research suggests that the magnitude of the benefits for children will depend on the level of quality of ECEC services, and that low-quality ECEC can be associated with no benefits or even with detrimental effects on children's development and learning (Britto, Yoshikawa and Boller, 2011^[33]; Howes et al., 2008^[34]). With mounting pressure to prepare ever more affordable places in ECEC, in a sector that is often highly decentralised, simultaneously raising quality can be a daunting task – particularly when public budgets are being tightened. However, even defining quality in ECEC remains a challenge for researchers and policy makers seeking to enhance quality (La Paro et al., 2012^[35]).

Definitions of ECEC quality often distinguish between structural characteristics and process quality (Howes et al., 2008^[34]; Pianta et al., 2005^[31]; Slot et al., 2017a^[36]; Sylva et al., 2006^[37]; Thomason and La Paro, 2009^[38]); for a review see (Slot et al., 2017a^[36]). “Quality standards” are often understood as “regulations”, while there is an emerging trend to extend the scope to more dimensions, such as process quality. Quality standards may also include “quality beyond regulations”. To inform and influence policy and the general public about the wider definition of the ECEC quality, the concept needs to be better understood and supported.

Structural characteristics are conceptualised as more distal indicators of ECEC quality that refer to the infrastructure, i.e. the available physical, human, and material resources. Structural characteristics are often aspects of the ECEC system that have traditionally been more easy to regulate, such as child-staff ratio, group size and staff training/education (Barros et al., 2016^[39]; Howes et al., 2008^[34]; Slot et al., 2015^[40]; Thomason and La Paro, 2009^[38]). Measurement of structural aspects can often be implemented with a survey or interview at the classroom, setting or system level.

Process quality concerns the more proximal processes of children's everyday experience and involves the social, emotional, physical and instructional aspects of their interactions with staff and other children (peer interactions) while being involved in play, activities or routines (Anders, 2015^[41]; Barros et al., 2016^[39]; Ghazvini and Mullis, 2010^[42]; Howes et al., 2008^[34]; Pianta et al., 2005^[31]; Slot et al., 2015^[40])

Staff-child interactions in particular usually include the dimensions of:

- emotional climate, including physical and emotional care and support
- instructional quality or pedagogical practices, including the strategies and activities staff employ to engage children in learning and development, and how to scaffold children's learning
- organisation of group routines and management of children's behaviour (Hamre et al., 2014^[43]).

Additional aspects of process quality include the quality of children's interactions with space and materials (Hamre et al., 2014^[43]; Mashburn et al., 2008^[44]; Slot et al., 2017a^[36]; Slot, 2017^[16]). Interactions among children, among staff and with parents are also paramount in the environment for learning and well-being that children experience. Parental involvement in children's learning and development begins at birth, by providing guidance, developing habits, imparting values, supporting learning experiences and sharing expectations (OECD, 2017b^[6]). Children with involved parents tend to do better in reading and numeracy, have positive social and emotional social skills, and be more motivated to learn (OECD, 2017b^[6]). In addition, supportive relationships that generate

healthy attachments positively affect children's understanding and regulation of emotions, as well as their feelings of security and taste for exploration and learning (OECD, 2015^[5]).

The Programme for International Student Assessment (PISA) and many other studies show that children whose parents engage in activities such as reading, writing words, telling stories and singing songs not only tend to achieve better reading and numeracy skills, but are also more motivated to learn (Scottish Government, 2016^[45]; OECD, 2011^[4]; Sylva, Siraj-Blatchford and Taggart, 2003^[46]; van Voorhis et al., 2013^[47]). Differences in developmental outcomes by gender and socio-economic background begin early in life, before children start primary school (Bradbury et al., 2011^[48]; Feinstein, 2003^[49]; Sylva et al., 2004^[13]). The role of parents, ECEC staff and school teachers in identifying children's individual need for support is thus vital. However, these aspects are often under-researched, and in this report, the scope of process quality is limited by the available literature. The OECD's ongoing project on Quality beyond Regulations in ECEC, to which this report contributes, will extend the scope of analysis to those additional aspects of process quality.

For this report, the meta-analysis composes three specific indicators of process quality. To capture two different features of staff-child interactions, it uses a global score of staff-child interactions, and an aggregate score of staff-child interactions, including the staff's positive emotional, instructional, and organisation interactions with children, generally based on a set of domain-specific scores reported in the studies. Process quality was operationalised as staff-child interactions in all but 7 studies, and most commonly assessed through observational measures (breakdown of measures per study coded are detailed in Appendix C). Of the 44 studies coded, in 23 studies, a global score of the measure was used to describe the quality of staff-child interactions. In addition, 18 studies focused on positive interactions (i.e. warmth, responsiveness, emotional climate), 4 studies on negative interactions (i.e. conflict, permissiveness, negative climate), 10 studies on instructional interactions (i.e. general instructional support and cognitive stimulation but not content-specific instruction), and 8 studies on organisation/management of routines/chaos.

It also uses an aggregate score of the exposure and/or quality of developmental and educational activities. Fifteen studies focused on developmental and educational activity indicators of process quality, which were assessed using observational ($n=13$) and self-report measures ($n=2$, see Appendix C for detailed breakdown of measures per study coded). Despite the variety of measures, all studies focused on educational activities, i.e. early literacy or early numeracy activities.

Most of the studies reported information regarding the reliability of the process quality measures included, and the reliability reported was acceptable to excellent for staff-child interactions and developmental and educational activities. Although peer interactions were considered a priority for the literature search in the literature review and meta-analysis, studies of peer interactions as an indicator of process quality were scarce, and often limited to findings from studies conducted in the United States (von Suchodoletz et al., 2017^[17]). Some more recent conceptualisations of ECEC quality may include parent and community engagement as potential structural and process mechanisms for quality, but these were considered beyond the scope of the literature review and meta-analysis, and thus of this report.

Measurement of process quality generally involves the use of a standardised observational protocol, and may also include an interview with staff and/or leaders. The protocol tends to be complex, time-intensive and require specialised training (Box 1.1).

Only a few of measures have been used consistently across jurisdictions and countries. The rigorous adaptation of measures to other countries allows for a more direct comparison of the level of process quality observed in different contexts. However, levels of quality reported in the studies cannot be considered as representative for the quality in each particular country or region.

Comprehensive process quality measures, such as the environmental rating scales, are the most commonly used observational instruments hence allowing for international comparison. A recent meta-analysis of 72 studies from 23 countries focusing on ECEC for children aged zero to five demonstrated that the average level of comprehensive process quality as measured by the environmental rating scales, was mediocre with a score of almost 4 on a 7-point rating scale (Vermeer et al., 2016_[50]). However, significant differences were found between studies, i.e. studies from Australia reported the highest average scores (i.e. at 5), while studies from Bangladesh, the Netherlands Antilles, and South Korea reported the lowest scores (i.e. below 3). Quality was generally observed to be higher in studies from North America than in studies from Europe, South America, and Asia, but the variation was also larger in North America compared to Europe and Asia.

More specific measures of process quality looking at staff-child interactions, such as the Classroom Assessment Scoring System (CLASS), are also increasingly being adapted to different countries and across different age ranges. A preliminary overview (see Annex Table 1.A.1) reveals a consistent pattern of mid-to-high range scores in the CLASS for emotionally and organisationally supportive classroom interactions, and low to lowest range scores for instructional support across all age ranges and types of provision (Slot, 2017_[16]).

Overall, the findings for the preschool age (with the CLASS Pre-K) show medium to medium-high quality for emotional support in studies from all countries. Instructional support, or support for learning, is in the low range and lowest for the majority of studies and only reported in the mid-range in studies from Finland, the Netherlands, and Portugal. Although the number of studies involving infant and toddler classrooms is rather limited, the results reveal a similar pattern as for the preschool age. However, for all subdomains of staff-child interactions (emotional, organisational and instructional support), the variation observed within countries is roughly equal to the variation between countries, indicating that the quality of staff-child interactions is only partially determined by country-wide characteristics or national policies.

Box 1.1. Commonly used measures to assess ECEC process quality.

Instruments that assess process quality are divided into global quality measures (e.g. Environment Rating Scales, or ERS), and instruments that focus explicitly or exclusively on the quality of interactions between staff and the children (e.g. the Classroom Assessment Scoring System, or CLASS). Most instruments are age-specific (Infant and Toddler Environment Rating Scale, or ITERS, for infant and toddler classrooms, versus Early Childhood Education Rating Scale, or ECERS, for preschool classrooms), and have had multiple reviews and adaptations to different contexts (e.g. ITERS versus ITERS-R). A few instruments distinguish between different subdomains of process quality (e.g. the CLASS distinguishes between emotional support, classroom management and instructional support).

Global quality measures

Environment Rating Scales (ERS): These observational tools evaluate the overall quality in ECEC, encompassing a wide range of quality aspects based on the following subscales: space and furnishing, personal care routines, language reasoning, activities, interaction, programme structure, and parents and staff.

Different versions have been developed for infant and toddler classrooms (ITERS-R; (Harms, Cryer and Clifford, 1990_[51])), preschool classrooms (ECERS-R; (Harms, Clifford and Cryer, 1998_[52])), family daycare (Family Child Care Environment Rating Scale, or FCCRS, or FCCERS-Revised; (Harms, Cryer and Clifford, 2007_[53])). In addition, an extension of the Early Child Care Environment Rating Scale (ECERS) was developed by (Sylva, Siraj and Taggart, 2003_[54]) ECERS-E) to capture aspects of the curriculum with a focus on literacy, math, science and diversity.

Quality of interactions

Caregiver Interaction Scales (CIS; (Arnett, 1989_[55])). The CIS measures teachers' sensitivity, harshness, detachment and permissiveness in the interactions with children.

Classroom Assessment Scoring System (CLASS). The CLASS evaluates emotional, behavioural and instructional aspects of the teacher's interactions with children and the way the teacher encourages interactions with materials and peers. There are several different age versions available for infant classrooms (CLASS Infant; (Hamre et al., 2014_[43])) for toddler classrooms (CLASS Toddler; (La Paro et al., 2012_[35])), and for preschool classrooms (CLASS Pre-K; (Pianta, La Paro and Hamre, 2008_[56])).

Observational Record of the Caregiving Environment (ORCE); (NICHD Early Child Care Research Network, 1996_[57]). The ORCE measures caregiver-child interactions, with a few items addressing language and cognition.

Early Literacy and Language Classroom Observation (ELLCO; (Smith, Dickinson and Sangeorge, 2002_[58])). The ELLCO measure focuses on classroom interactions, but also has a more domain-specific focus on emerging literacy activities.

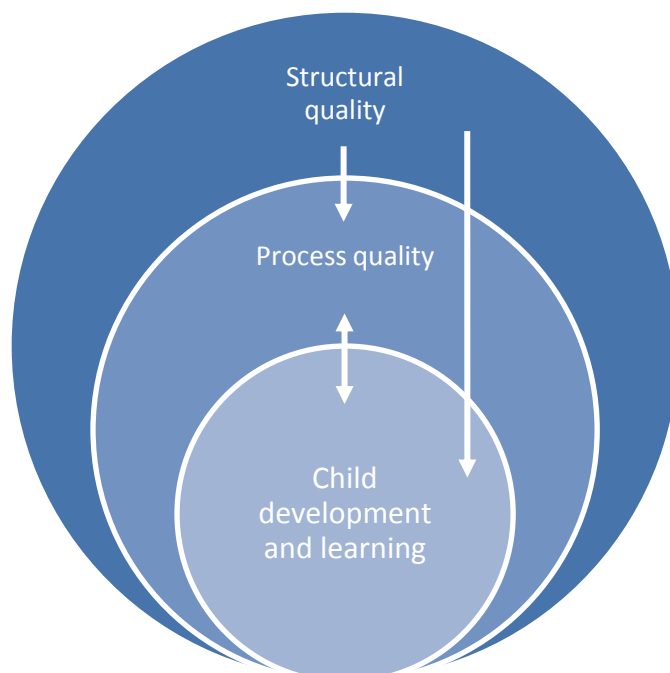
Student-Teacher-Relationship Scale (STRS; (Pianta, 2001_[59])). The STRS is self-report measure of closeness and conflict in student-teacher interactions for preschool and kindergarten classrooms.

Reflecting this trend, the (European Commission, 2014_[25]) describes quality as a multidimensional, complex construct that includes the structure of ECEC provision, processes and practices in ECEC settings, and outcomes from ECEC provision. Conceptualisations cover global aspects (such as a warm climate or child-appropriate behaviour) and domain-specific stimulation, in learning areas such as literacy, emerging mathematics and science (Anders, 2015_[41]). Essential to a multidimensional understanding of quality is the provision of a learning environment in which young children can engage in developmentally appropriate, stimulating and language-rich activities that offer opportunities for play and exploration, for use of language, for higher-order thinking and problem solving, and for social interactions (European Commission, 2014_[25]; OECD, 2017b_[6]). Consequently, to improve quality in ECEC, it is essential to define quality dimensions and their key indicators beyond the indicators that are traditionally regulated.

Processes and relationships in ECEC are crucial for quality

Structural features are considered to be important preconditions for process quality, and to some degree for child development and learning (Vandell et al., 2010_[60]). Despite the strong theoretical assumption that structural staff and classroom features affect children's development through process quality (see Figure 1.4), the empirical evidence supporting this notion is weak (Melhuish et al., 2015_[1]). For exceptions see: (Connor et al., 2005_[61]; Melhuish et al., 2015_[1]; NICHD Early Child Care Research Network, 2002_[62]; Slot et al., 2017b_[63]).

Figure 1.4. Conceptual and analytical model for the relationship between ECEC structural quality, process quality, and child development and learning



Source: Adapted from (Slot, 2017_[16])

Relations between structural and process quality in ECEC settings have been extensively studied, with mixed and inconsistent findings (Pianta et al., 2005_[31]). One explanation is that structural characteristics may be more indirectly related to child outcomes by providing the foundation for process quality as the primary mechanism for children's development and learning. However, studies directly testing indirect effects of structural quality on children's development and learning are limited and, so far, show a mixed pattern of associations (Anders, 2015_[41]).

Despite such findings, structural factors have been prioritised as a key strategy for improving the quality of ECEC programmes and ultimately children's development and learning (Early et al., 2007_[64]). For example, in many countries, raising staff qualification requirements is the quality improvement strategy of choice (Early et al., 2007_[64]). Structural standards are relatively easy to set and observe – both by inspectors and parents (e.g. space per child, number of adults in a class- or playroom). Regulating effective professional development, for instance, is a much more complex endeavour.

Linkages between structural and staff-child interactions also matter for the youngest children

Many countries have regulations to address the specificity of provision for children under the age of 3 (OECD, 2006_[24]). As a consequence, structural conditions for centres for children under the age of 3 differ in many respects from centre provisions for children aged 3 to 6. For example, group sizes or the child-to-staff ratio tend to be lower (Barros et al., 2016_[39]; Jamison et al., 2014_[65]; Slot et al., 2015_[40]; Vogel et al., 2015a_[66]; 2015b_[67]).

Despite these regulations, the quality of the interactions and of the environment provided in centres has been reported to be lower for infants and toddlers than for pre-schoolers (Fenech, Sweller and Harrison, 2010_[68]; Helmerhorst et al., 2014_[69]; Lahti et al., 2015_[70]; Fukkink et al., 2013_[71]). In particular, centres with mixed age groups serving children from birth until age 3 years appear to offer lower quality (Slot et al., 2017c_[72]).

There is also some evidence that the quality of the materials, activities, and environment may be lower in centres for infants as compared to those for toddlers (Hulpia et al., 2016_[73]), whereas basic safety and organisation and the quality of (language) interactions may be higher for infants than for toddlers (King et al., 2016_[74]). For example, research shows that support for children's development, well-being and learning is comparatively lower for infants (Fukkink et al., 2013_[71]), as well as emotionally supportive interactions (Helmerhorst et al., 2014_[69]).

These concerns also apply to family daycare settings, which are an important part of provision for the youngest children in many countries. The minimum requirements defined for licensed family daycare services vary widely across countries. Regulations usually require that providers meet minimum health, safety and nutrition standards, and also minimum educational requirements for caregivers. Some countries distinguish between registered family daycare providers, which often involve minimal to no monitoring or supervision, and licensed family daycare providers, which involve monitoring to a certain extent. In this report, family daycare settings refer only to the publicly regulated ECEC settings for children aged 0 to 2.

Family daycare settings differ in many respects from centres. Family daycare providers typically work alone (Porter et al., 2010b_[75]). Group sizes and child-staff ratios tend to be lower than in centres (e.g. (Burchinal, Howes and Kontos, 2002_[76]; Coley et al., 2016_[77];

Hulpia et al., 2016^[73]; OECD, 2006^[24]); but there is considerable variation across countries (Boogaard, Bollen and Dijkers, 2014^[78])

Staff educational qualifications also tend to be lower for family day care providers than for staff working in centres. Moreover, family daycare providers tend to have fewer opportunities for professional development (e.g. (Boogaard, Bollen and Dijkers, 2014^[78]; Fuligni et al., 2009^[79]). An overview by the OECD (2006) showed that the requirements for licensed family daycare care tend to be lower than for centre-based ECEC.

The quality of the interactions and of the environment provided in family daycare settings has generally been reported to be lower in comparison to centres. In a recent review, the environment in family daycare settings was described as varying from inadequate (Elicker et al., 2005^[80]; Fuller et al., 2004^[81]; Peisner-Feinberg et al., 2000^[82]) to good (Paulsell et al., 2008^[83]; Shivers, 2006^[84]), and overall quality in family daycare appeared comparably lower than quality in centre-based care (Coley et al., 2016^[77]; Elicker et al., 2005^[80]; Fuller et al., 2004^[81]; Lahti et al., 2015^[70]). Specifically, the provision of learning activities was rated lower (Coley et al., 2016^[77]; Fuller et al., 2004^[81]), whereas no differences were found for the quality of interactions (Fuller et al., 2004^[81]).

Taken together, the literature indicates that quality of family daycare varies considerably. Although some structural characteristics are beneficial, such as a small group size and small child-staff ratios, other features can be less favourable, such as staff's lower educational qualifications, lack of professional development and other support and resources. Moreover, more empirical evidence is needed to enhance our understanding of which characteristics of family daycare contribute to higher process quality; and which have an impact on children's well-being, development and learning (Susman-Stillman and Banghart, 2011^[85]).

Links between staff-child interactions and children's development and learning

The research evidence appears more consistent concerning the positive effects of staff-child interactions on child development and learning. During the early childhood years, social interactions between children and their social context influence children's developmental trajectories (Bronfenbrenner and Morris, 2006^[86]; Rimm-Kaufman and Wanless, 2012^[87]). In ECEC settings, sustained positive interactions between staff and children provide an important proximal context that may facilitate opportunities for children's development and learning (Bronfenbrenner and Morris, 2006^[86]). There is extensive evidence that high-quality staff-child interactions account for individual differences in children's behavioural, social-emotional and academic outcomes, highlighting the importance of the quality of staff-child interactions for the effectiveness of ECEC services (e.g. (Cadima et al., 2016^[88]; Cappella, Aber and Kim, 2016^[8]; Hamre and Pianta, 2005^[89]; Mashburn et al., 2008^[44])).

However, the associations between staff-child interactions and early child cognitive and socio-emotional skills and competencies are inconsistent in size (e.g. in Latin America, Europe and the United States (Araujo et al., 2016^[90]; Leyva et al., 2015^[91]; Mashburn et al., 2008^[44]; Pakarinen et al., 2010^[92]). Although these relationships may vary from one domain of development to another, few studies show strong and consistent associations between the commonly studied dimensions (e.g. emotional climate, instructional quality and classroom organisation) and any domain of early childhood skills. In response, more specific instructional measures have been developed that attempt to capture quality of interactions that are specific to such skills as numeracy development or vocabulary development (Bowne, Yoshikawa and Snow, 2016^[93]; Clements and Sarama, 2014^[94]).

These, again, largely show relatively small associations with those specific child developmental domains.

In the meta-analysis, data on children's development and learning was most commonly assessed using standardised performance tests ($n=21$) and ECEC staff/parent ratings ($n=8$). Two studies used self-report measures. Available child data were grouped into emerging academic skills (early numeracy and literacy) and social and behavioural skills (behaviour regulation, executive function, behavioural problems and social competence). Common measures of emerging academic skills included the Peabody Picture Vocabulary Test (PPVT), the Woodcock-Johnson Tests of Cognitive Ability, and ECEC staff or parent rating scales, to assess social and behavioural competencies.

Information regarding the measures' reliability was limited. Only 17 studies reported reliability of the information, with alpha coefficients ranging between 0.72 and 0.98. However, in the majority of cases where reliability was not reported, studies used well-established and validated measures.

Linking research to policy levers for improving early childhood education and care quality

To help translate research findings into concrete policy actions, the Starting Strong III Quality Toolbox, and, building on the former, the European Union (EU) Proposal for Key Principles of a Quality Framework for Early Childhood Education and Care, set out to define policy levers to provide guidance on improving ECEC quality. In collaboration with ECEC experts and policy makers, the ECEC Network of the OECD, and the ECEC Thematic Working Group of the European Union, proposed to create a common understanding of quality as a multidimensional, complex construct that includes the structure of ECEC provision, processes and practices in ECEC settings, and outcomes from ECEC provision.

In this report, evidence is presented and analysed under a proposed thematic frame for quality that proposes to add on to the Starting Strong III Quality Toolbox in areas with strong and new findings, while examining the relevance of each policy lever in light of its association with process indicators, such as the quality of the staff-child interactions and staff quality or exposure to developmental and educational activities, as well as aspects of child development and learning, such as emergent academic and socio-emotional skills. In comparison to the Starting Strong III Quality Toolbox, two policy levers – curriculum and pedagogy, and parent/guardian and community engagement – were not included. Curriculum and pedagogy were found to be rarely and inconsistently addressed in the empirical literature. Parent/guardian and community engagement was considered beyond the scope of the literature review and meta-analysis. Table 1.2 presents a brief summary of indicators considered in this report for each policy lever and chapter.

Chapter 2 considers aspects of standards and governance, namely the setting of staff-child ratios and group sizes as minimum standards, the financing of ECEC services, the physical location of the centre, the intensity of the service, class or playroom composition, and the effects of licensing and certification.

Chapter 3 examines workforce development and working conditions, namely pre-service qualifications and in-service training of staff, years of work experience; working conditions (i.e. salaries), staff well-being and organisational climate.

Chapter 4 considers monitoring and data on quality, specifically Quality Rating Information Systems (QRIS).

Finally, Chapter 5 concludes with an overview of key insights and avenues for further research.

Table 1.2. Structural and process indicators examined in this report for each policy theme

Target areas of policy levers to improve quality	System/structural indicators, i.e. the aspects of ECEC that are traditionally regulated and function as preconditions of proxy of process quality	Process/interaction indicators, i.e. the child's day-to-day experience
Standards, and governance (Chapter 2)	Minimum standards (e.g. staff-child ratios, group sizes); financing of ECEC services (whether public/ non-profit or private); physical location of the centre, intensity of the service, registering or licensing of services, class- or playroom composition	Overall staff-child interactions, staff emotional, instructional, and organisation interactions with the children
Workforce development and working conditions (Chapter 3)	Pre-service qualifications of staff; in-service training of staff; years of work experience; working conditions (i.e. salaries); staff well-being, organisational climate, networking	Overall staff-child interactions, staff emotional, instructional, and organisation interactions with the children Developmental and educational activities
Monitoring and data on quality (Chapter 4)	Monitoring systems and tools (QRIS)	Overall staff-child interactions, staff emotional, instructional, and organisation interactions with the children

Annex 1.A. Variation in Early Childhood Education and Care staff-child interactions across studies and age ranges

Annex Table 1.A.1. Variation in scores for emotionally, organisationally and instructionally supportive classroom interactions across studies and age ranges

Assessment of interactions using the Classroom Assessment Scoring System

Country	Reference	N	Sample	Age range	Domain	Mean	SD
Australia	Tayler et al. 2013	254	Two states	Preschool	Emotional support	5.13	.92
					Classroom organisation	4.60	.92
					Instructional support	2.07	.76
Flemish Comm. (Belgium)	Hulpia et al. 2016	167	Stratified random sample	Infant	Relational climate	5.11	.80
					Teacher sensitivity	4.86	1.02
					Facilitated exploration	3.33	1.14
					Early language support	2.97	1.22
					Emotional and behavioural support	5.22	.84
Chile	Leyva et al., 2015	91	At-risk, 4 municipalities in Santiago	Preschool	Engaged support for learning	2.66	.88
					Emotional support	4.65	.54
					Classroom organisation	4.29	.63
China	Hu et al.2016b	180	Stratified, random sample	Preschool	Instructional support	1.75	.55
					Emotional support	5.03	.69
					Classroom organisation	4.80	.81
Denmark	Slot et al. 2017a, under review	402	Purposive sample at-risk children,	Preschool	Instructional support	2.12	.61
					Emotional support	5.85	.42
					Classroom organisation	5.69	.47
Germany	Stuck, Kammermeyer and Roux,2016	61	One state	Preschool	Instructional support	2.45	.55
					Emotional support	5.88	.57
					Classroom organisation	6.15	.61
Germany	Von Suchodoletz et al.,2014	63	One state	Preschool	Instructional support	1.61	.49
					Emotional support	5.32	.75
					Classroom organisation	4.82	1.02
Finland	Pakarinen et al. 2010	49	Semi-rural and urban sample	Preschool	Instructional support	2.47	.78
					Emotional support	5.54	.69
					Classroom organisation	5.34	.66
					Instructional support	3.97	.92

Country	Reference	N	Sample	Age range	Domain	Mean	SD
Netherlands	Slot et al., 2017b	269	Semi-rural and urban sample	Toddler	Emotional and behavioural support	5.37	1.02
					Engaged support for learning	3.29	1.28
Netherlands	Veen and Leseman, 2015	133	Semi-rural and urban sample	Preschool	Emotional support	5.34	.73
					Classroom organisation	5.03	.85
					Instructional support	3.27	.89
Poland	Wyslowska et al., 2017	30		Toddler	Emotional and behavioural support	5.79	.86
		30			Engaged support for learning	2.84	1.02
Portugal	Barros et al., 2016	90	Metropolitan area Porto	Infant	Relational climate	4.62	.76
					Teacher sensitivity	4.20	.88
					Facilitated exploration	2.58	.75
					Early language support	2.62	.76
	Cadima, Leal and Burchinal, 2010	64	Metropolitan area Porto	Preschool	Emotional support	4.60	.88
					Classroom organisation	4.11	.90
					Instructional support	3.04	1.13
Spain	Sandstrom, 2012	25	Random sample in one city	Preschool	Emotional support	4.79	.63
					Classroom organisation	4.32	.67
					Instructional support	2.16	.49
Switzerland	Perren, Frei and Hermann, 2016	35	Different ECEC settings	Toddler	Emotional and behavioural support	5.44	.76
					Engaged support for learning	3.23	1.07
US	Jamison et al. 2014	30	One state	Infant	Relational climate	5.07	.98
					Teacher sensitivity	5.13	.93
					Facilitated exploration	4.02	1.08
					Early language support	3.89	1.02
	La Paro, Williamson and Hatfield, 2014	101	One state	Toddler	Emotional and behavioural support	4.82	.99
					Engaged support for learning	2.83	1.07
	Hamre et al., 2013	4035	Multi- state and multi-sample	Preschool	Emotional support	5.23	.88
					Classroom organisation	4.66	.93
					Instructional support	2.58	.88

Note: The studies reported in this table show considerable variation in sample size and geographical spread within countries. However, reported levels of quality cannot be considered as representative for the quality in each particular country or region where the study took place.

Source: (Slot, 2017_[16])

Notes

1. Family daycare settings may also apply to older children before compulsory school starts or for after-school care. However, those settings are not considered in this report.

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