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Abstract

The International Early Learning and Child Well-being Study puts a spotlight on how children are faring at 5 years-of-age. Children's early well-being and learning are primary determinants of their later outcomes in schooling and in adulthood. Yet children's development during their early years remains one of the most neglected areas of international research in education. As a consequence, the international evidence countries can draw on to inform their policy approaches for children's early learning is sparse. The International Early Learning and Child Well-being Study has been developed and designed to fill this gap. Education systems that prioritise evidence on children's actual needs and who learn from other countries' achievements and challenges will be more successful in giving every child a strong early start, thereby building more successful and equitable systems.

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Introduction

The International Early Learning and Child Well-being Study (IELS) was initiated by OECD countries interested in having valid, reliable and comparative data on children's early development. These countries wished to have a better understanding of the impacts of their increased investments in early childhood education and care (ECEC) and a means of learning from other countries' efforts and successes in early years policies. IELS provides a common framework for countries to achieve this.

This Assessment Framework reflects collaboration with participating and interested countries, to develop a study that meets their research and policy needs. The framework sets out the rationale for the study. It outlines evidence from a range of longitudinal studies on how children's early skills develop and the areas of early learning that are most predictive of later educational success, well-being and other positive outcomes. It also explains the overall design of the study, including the assessment methodology and the contextual information that is collected.

Starting behind in the early years means staying behind – for individual children and for education systems as a whole. A child's development in the first few years of life significantly predicts his or her later success in education and ongoing levels of happiness and well-being. Early development and learning are consistently linked with education attainment in school and in adulthood, physical and mental health, social outcomes, employment, earnings, socio-economic status, civic engagement and self-reported happiness.

The skills children develop in early childhood are important for their immediate well-being and for their success in later childhood, adolescence and in adulthood. All aspects of children's early development and well-being matter. However, some areas of early development are more predictive of children's later outcomes than others. There is also a significant degree of overlap across some early skills, meaning children with well-developed skills in one area are highly likely to have well-developed skills in closely related areas. Thus, it is not necessary to measure every aspects of development to accurately gauge how well children are faring.

At the same time, there is no single early learning domain that can accurately predict children's later outcomes. Rather, it is a set of early capabilities that support children's positive, holistic development and well-being. It is the combination of skills that matters. In particular, early cognitive skills (especially emergent literacy and emergent numeracy), self-regulation and social-emotional skills as a group are key in shaping a range of later outcomes. Learning is a continuous interaction between cognitive, self-regulation and social-emotional skills. Development progression is unlikely to occur in the absence of this interaction. While there is overlap across these three key learning areas, each also has an independent effect on later outcomes. Thus, each of these three areas of skill development is necessary but not sufficient to predict later outcomes.

The context of children's day-to-day lives within their families and communities influences their experiences and outcomes during childhood and adulthood. These contextual factors include the socio-economic status and other characteristics of the child and his/her family. Children thrive in caring families, where they feel safe and where they are supported to learn about themselves and their social, cultural and physical environments. The day-to-day interactions and activities between young children and their parents and other family members foster their well-being and their emerging cognitive and social-emotional skills.

Young children also learn in settings beyond their immediate home, including in their wider family network, their neighbourhood community, in ECEC settings and in school. High quality ECEC can be beneficial for all children. For children without strong home learning environments, however, ECEC in particular may be their only chance to develop the key foundational skills they need. Children from even the most impoverished homes progress positively when they have sustained access to high quality and responsive learning environments.

The most effective investment governments can make to enhance education and later life outcomes is to provide high quality support to children and their families during the crucial early years. However, the provision of early childhood education and care does not guarantee a sound start for every child, as quality and impacts vary. A challenge for education systems is in meaningfully measuring quality in ECEC settings, especially in a way that is reliable and comparable across diverse contexts. Reducing children's learning delays in early schooling is still possible, but is challenging for most schooling systems. Seeking to ameliorate individual or systemic learning issues at even later ages is more difficult and more costly than doing so earlier.

IELS is designed for children at 5 years-of-age. A common age rather than a particular stage of education was chosen to enable comparability across countries. There is now near-universal participation in some form of formal educational setting at 5 years-of-age in most OECD countries. While some countries have not yet achieved universal ECEC participation at this age, most are getting closer due to increasing rates of ECEC participation and younger ages of entry into schooling.

Participating children complete direct assessments on tablets, with one-to-one support from trained study administrators. The children listen to developmentally appropriate stories and engage in play-like activities by touching or moving items on the screen. No reading or writing is involved. The process is simple and intuitive and no prior experience with tablets or other digital devices is needed to successfully complete the assessment.

The children's parents and the teacher or ECEC staff member who knows them best provide information on each child, to triangulate the information from the direct assessments, as well as to gauge children's development across a broader set of domains than is possible solely through a direct assessment. In addition, parents provide contextual information on the characteristics of their child, the family and home environment, and the child's ECEC history.

As for other international large-scale comparative surveys, IELS includes distinctive consecutive phases, comprising an item trial, a field trial and a main study. The study is also subject to a set of technical standards applicable to large-scale education surveys. These standards provide assurance on the reliability of the data collection and analysis. In addition, quality assurance is provided through national and international quality monitoring processes at key points.

The study meets countries' need for valid, reliable and comparable information on children's early development. The design is comprehensive and, as an over-riding priority, creates positive experiences for the children, parents and teachers who participate in the study.

1. Early development: a powerful lever for educational success and well-being

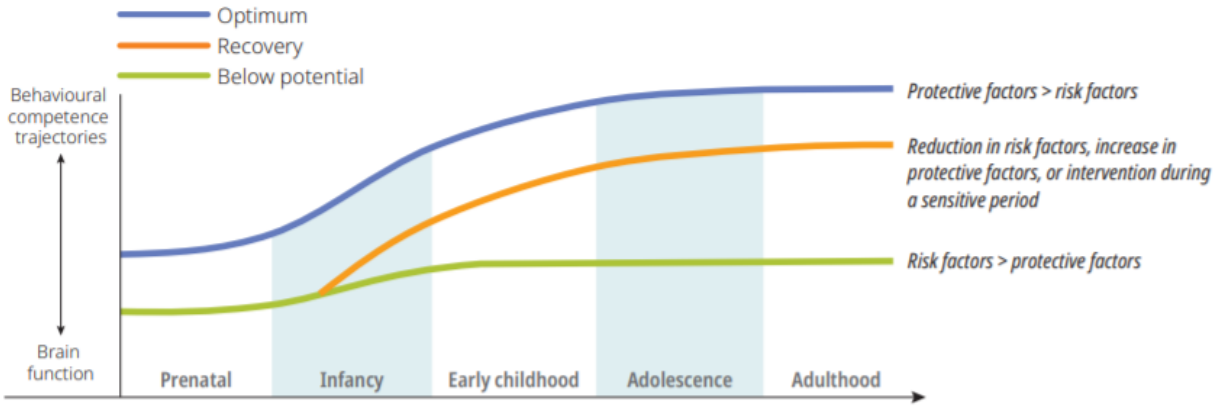
1.1. The early years: a window of opportunity and risk

The first five years of every child's life are a period of great opportunity, but also one of risk. The cognitive and social-emotional skills that children develop in these early years have long-lasting impacts on their later outcomes throughout schooling and adulthood. While the quality of schooling also matters, strong early learning accelerates later development whereas a poor start inhibits it.

The window for positive early learning closes when children are around seven years old, due to a sharp decrease in brain malleability at this point (Stiles and Jernigan, 2010[1]). Protective factors that support children's development during this phase include regular, warm, stimulating interactions with their parents and other caregivers whereas risk factors that impede development include exposure to stresses, such as violence in the home and poor nutrition.

Children who experience supportive early learning environments develop rapidly, establishing a sound base for ongoing learning and achievement. Children who do not have a good start, however, can still be assisted through well-targeted, early interventions that increase the balance of protective factors over risk factors. Thus, interventions for at-risk children are most effective during the early childhood years when the brain is most malleable, enabling development to accelerate and shaping children's long-term ability to learn, as illustrated in Figure 1.1.

Figure 1.1. Risk and protective factors affect development trajectories



Source: Adapted from (Walker et al., 2011[2]) Early Childhood Benefits Adult Competence and Reduces Violent Behaviour.

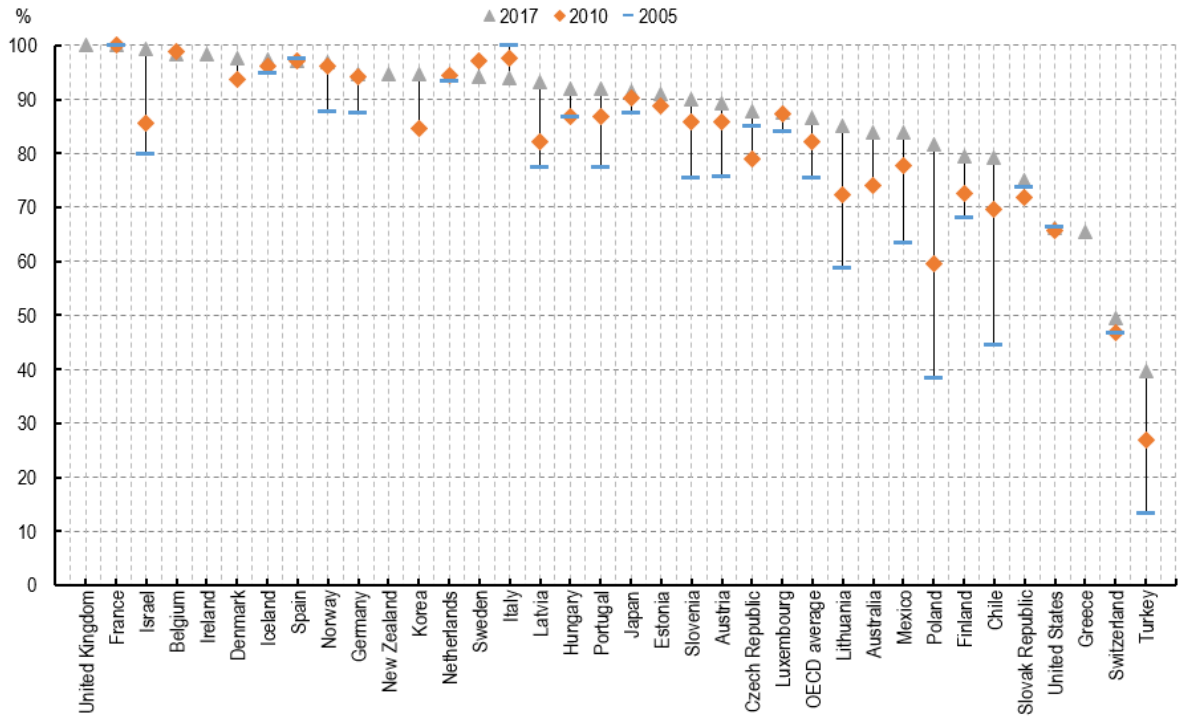
If children have not developed core foundation skills at seven years-of-age, they are likely to struggle to progress well at school and are more likely to have social and behavioural difficulties in adolescence and in adulthood. Seeking to ameliorate a poor start at older ages is complex, challenging and costly, with limited success rates (Heckman, 2006[3]). At a system level, the proportion of children who have poor early development constrains the extent to which any education system can achieve success for these children and perform well as a whole.

Countries are increasingly focusing on early years policies as a means of raising overall educational performance and mitigating disadvantage. Many countries have increased ECEC participation rates, as shown in Figure 1.2 and have increased their overall investments in early years policies. The expected benefits for children, however, are not always apparent. Despite this, early learning remains one of the most neglected areas of educational research, especially in an international context. As a consequence, there is little international evidence on how to improve early years policies and achieve better and more equitable results for children.

There are many factors that may affect whether early childhood education is delivering positive outcomes for all children. These include the quality and responsiveness of ECEC provision, whether such provision focuses on the skills children need to develop most in the early years, and the timeliness and continuity of provision. At a system level, there is much that countries can learn from each other about how to ensure effective early years policies for all children.

Figure 1.2. Change in enrolment rates of children aged 3 to 5 years (2005, 2010 and 2017)

Early childhood education (ISCED-0) and primary education



Source: (OECD, 2019[4]). OECD Education at a Glance *OECD Indicators*, https://dx.doi.org/10.1787/f8d7880d-en.

The remainder of this section addresses the:

- impacts of children's early years on their well-being, education and later outcomes
- benefits of giving all children a strong early start and the risks of not doing so
- value of international data on children's early learning and well-being
- purpose of the International Early Learning and Child Well-being Study

- relationship of this study with other OECD education studies.

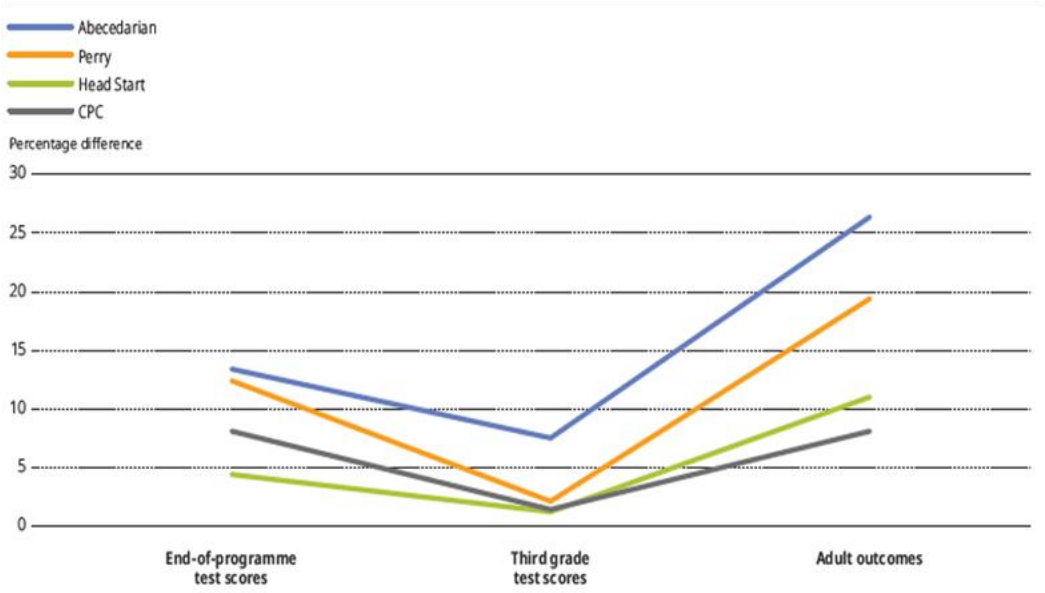
1.2. A strong predictor of later outcomes

Children's early learning and well-being have a direct and enduring impact on their later educational attainment, socio-economic status, health, well-being and civic engagement. An increasing body of longitudinal evidence[1] has tracked children from pre-school and through schooling into adulthood, consistently finding a significant relationship between their early experiences and later outcomes. The benefits of strong early learning are clearly evident at school entry, at the end of compulsory schooling and in adulthood. Children who do not develop critical early skills such as emergent literacy or self-regulation, however, face enormous challenges in achieving well at school and in having positive outcomes during adulthood.

An argument against early years investment has been that early skills fadeout in primary school. This is true, yet longitudinal studies demonstrate that the impact of positive early learning re-emerges later in schooling and continues into adulthood, as shown in Figure 1.3. In fact, children's test scores at the age of five better predict adult outcomes than those in primary school. Thus, strong early learning acts as a foundation or reserve capacity that, once consolidated during in early schooling, then provides a protective and fertile base for greater skill development during the remaining school years and into adolescence and adulthood (Staudinger and Baltes, 1993[5]).

[1] The key longitudinal studies that informed the rationale and approach of the International Early Learning and Child Well-being Study are set out in Annex A.

Figure 1.3. Predicted percentage effects on adult earnings of early childhood programmes, based on test scores versus adult outcomes



Note: Adult earnings effects are shown as predicted average percentage increase in earnings due to the programme, compared to expected earnings if the person had not participated in the programme. CPC refers to Chicago Child-Parent Center Program.
Source: (Bartik, 2014[6]), From Preschool to Prosperity: The Economic Payoff to Early Childhood Education, W.E. Upjohn Institute

As part of a virtuous, upward spiral, higher educational achievement and attainment are associated with better employment outcomes and earnings, as well as with better physical and mental health. Higher early skills are also associated with reduced criminality activity in adolescence and adulthood, especially among males, which is linked to more positive employment outcomes and higher lifetime earnings (Heckman and Karapukula, 2019[7]).

The size of early learning effects on adult outcomes is significant. The four longitudinal studies represented in Figure 1.3 found effect sizes on adult earnings ranging from 10% to 25%.

1.2.1. Early learning supports children's well-being and happiness

There is no trade-off between early learning and children's happiness or indeed from a child's perspective, between learning and play. Happy, healthy children are active and curious, and enjoy the natural processes of learning. These processes occur through interactions with family and other caregivers, and through different types of play. Through these experiences children learn about and actively explore their world, as they also develop their language and other cognitive skills, social-emotional skills, and physical skills.

As well as developing emergent literacy skills, interactions with others help children learn to express their feelings and preferences, listen to others, share, self-regulate their emotions, solve problems, pay attention and concentrate. Children who develop this holistic set of skills are happier than children who have not been able to do so. These early skills influence how well children get along with others and how able they are to make friends. Children's skills also influence the extent to which adults engage with them, further affecting their sense of connectedness and well-being, and their continuing skill development.

1.2.2. Better outcomes throughout schooling

Emergent literacy and emergent numeracy are positively associated with later educational achievement. Self-regulation, visual-motor skills and agreeableness in early childhood also predict later outcomes in schooling. These early skills are evident in the skills students demonstrate at the end of primary school and at the end of secondary school, including in higher rates of school completion (Shuey and Kankaraš, 2018[8]).

Strong early learning translates into higher levels of skills at later ages because "skills beget skills" (Cunha and Heckman, 2009[9]). Early progress enables children to take greater advantage of further learning opportunities inside and outside school than children without such a positive start. Children with strong early skills elicit additional learning opportunities from their parents, teachers and environment, by asking questions or taking the initiative to engage in new activities.

A strong early start has also been found to reduce the risk among some children of developing learning difficulties prior to starting school, thus reducing the need for special education support or placements, or remedial education during schooling ((Sylva et al., 2004[10]); (Chetty, 2011[11])).

Children with poor emergent literacy skills can appear to do well in the first year or two of school. However, these children understand fewer words per interaction, focus primarily on commands and tend to interact less with adults than children with better language skills. After two years of primary school, children with weaker early literacy skills increasingly struggle, particularly in reading, and often face a downward spiral from this point (Shuey and Kankaraš, 2018[8]).

Early self-regulation is also critical to later educational achievement, even after controlling for early literacy and numeracy skills (Duncan et al., 2007[12]). Aspects of self-regulation such as attentiveness and task persistence among children starting school are positively associated with achievement in reading and mathematics throughout primary school (Li-Grining et al., 2010[13]).

Early self-regulation also relates positively to teachers' perceptions of children's abilities and thus their expectations of them (Neuenschwander et al., 2012[14]). Self-regulation appears to be particularly important for boys and for children from low-income or at-risk families in predicting later education outcomes (Washbrook, Propper and Sayal, 2013[15]).

1.2.3. Higher educational attainment following school

Early capabilities such as emergent literacy, numeracy, self-regulation, agreeableness, visual-motor skills, and prosocial behaviour in early childhood are all positively associated with educational attainment in adulthood. Even after adjusting for early cognitive ability, both self-regulation and early agreeableness have been found to be associated with higher academic attainment. Indeed, early self-regulation has been found to be a stronger predictor of degree completion by the age of 25 than early reading or maths scores (McClelland et al., 2013[16]).

In addition to the attainment of degrees and other qualifications, early skills have been found to be predictive of adult literacy and numeracy skills, as indicated by test scores at different ages during adulthood. For example, children's persistence in completing a task as four-year-olds significantly predicted their reading and mathematics test scores at the age of 21 (McClelland et al., 2013[16]).

1.2.4. Stronger employment and socio-economic outcomes

Strong early cognitive skills, self-regulation skills and social well-being have clear positive associations with employment, income and socio-economic status in adulthood. 5 year-olds with stronger verbal skills are more likely as adults to be employed, earn a higher income and own their own home than children with weaker verbal skills. Similar associations have been found for early numeracy and visual-motor skills (Schoon et al., 2015[17]).

Better early self-regulation is linked to a lower likelihood of unemployment, welfare dependence, including social housing, and higher income levels in adulthood ((Moffitt et al., 2011[18]); (Fergusson, Boden and Horwood, 2013[19])).

In addition, early social competence is associated with better work competence, as well as predicting entrepreneurial status, continuity of entrepreneurial activity and earnings (Schoon et al., 2015[17]).

Adults who succeed in moving out of poverty they experienced as children generally displayed higher cognitive skills in their early years than those from similar circumstances who remained in poverty as adults. Furthermore, adults who achieved social mobility due to enhanced early learning have been found to provide more positive home environments for their own children (Heckman and Karapukula, 2019[7]).

Early cognitive skills appear to be a stronger predictor of adult earnings for women than for men, although in a negative rather than positive direction. Women who had low early cognitive skills face larger wage penalties in the labour market than men who had similarly low levels of early cognitive skills (Parsons et al., 2011[20]).

1.2.5. Better mental and physical health

Early cognitive skills, self-regulation, emotional health and social skills are all associated with better mental health in adulthood. Children with better receptive language skills as 5 year-olds are more likely to have positive mental health outcomes in adulthood, including a lower likelihood of depression, anxiety and psychological distress. Better self-regulation and visual-motor skills at age five are also associated with lower malaise in adulthood. Conversely, poor early self-regulation is associated with later psychological disorders, particularly for men (Schoon et al., 2015[17]).

Physical health in adulthood is also found to relate to children's early development and skills. Early cognitive abilities, self-regulation, visual-motor skills, agreeableness, and conscientiousness are all linked with adult physical health. This includes better self-reported health, better eating habits and lower likelihoods of obesity, smoking and substance abuse (Schoon et al., 2015[17]).

1.2.6. Better citizens

Strong language skills, self-regulation, trust and empathy in early childhood predict a lower likelihood of involvement in crime and delinquency in adulthood. Aspects of social well-being, particularly prosocial behaviours, are also linked to a lower likelihood of crime and delinquency later in life.

Conversely, children who demonstrate a lack of empathy and trust during their early years are more likely to demonstrate antisocial and delinquent behaviours later in adolescence, and also face greater risk of adult psychopathology (Fontaine et al., 2011[21]). Poor early self-regulation and a lack of prosocial behaviours are related to violent offending in particular, and the likelihood and number of criminal offences in adulthood (Fergusson, Boden and Horwood, 2013[19]).

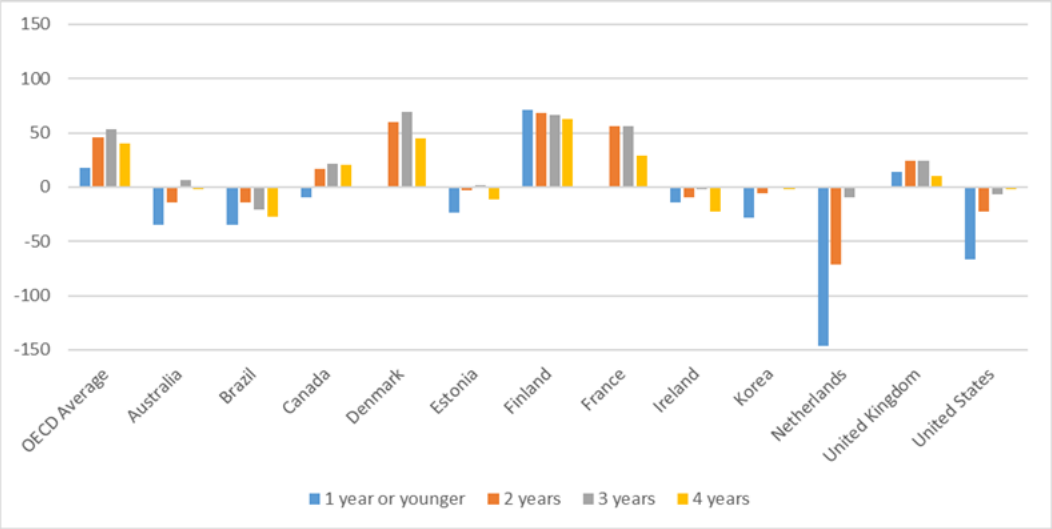
1.3. Early childhood education and care can enhance early skill development, but it is not guaranteed

ECEC often serves multiple functions. In many countries, it is used as a tool to increase women's labour market participation, help families to reconcile work and family responsibilities, confront demographic challenges such as decreasing fertility rates and aging populations, and maintain high employment rates among the population.

More recently, however, governments have increasingly seen ECEC as a means to support children's early development and mitigate inequity across different groups within society. Thus, policy makers have made greater investments in early childhood programmes as a means to build children's cognitive and social-emotional skills. Some of these efforts have especially targeted children from disadvantaged or immigrant backgrounds, to combat the linguistic and economic disadvantages that could otherwise hinder their development and integration. As such, ECEC is regarded by many as a critical policy measure that can promote equity, support holistic and continuous development and improve children's well-being.

Results from the Programme for International Student Assessment (PISA) 2018, however, show highly variable effects from students' ECEC participation across countries. Even after taking into account differences in socio-economic background, the effects of participating in early childhood education on students' academic achievement at age 15 differ substantially across countries (Figure 1.4). Some education systems show very positive benefits for students who have attended ECEC whereas in others the impact appears to be neutral or even negative.

Figure 1.4. Relationship between age of participation in early childhood education programmes and students' reading scores at age 15 across countries, controlling for socio-economic status, 2018



Note: Impact of participation represents score-point difference in reading performance between students who reported having attended pre-school and those who did not. Differences in reading scores take into account students' socio-economic profiles.
Source: OECD (2018[22]) PISA 2018 Database, http://www.oecd.org/pisa/data/2018database/ (accessed on 26 January 2020).

Research findings vary on whether the provision of ECEC is more or less beneficial for disadvantaged children in comparison with advantaged children, or whether the effects are comparable. The notion of "dynamic complementarity" suggests that children benefit most from ECEC when they enter programmes with relatively high levels of cognitive and social-emotional skills (Aizer, 2012[23]). Nonetheless, it is clear that the quality of provision is of paramount importance for disadvantaged children, with high quality, targeted early investments making a significant difference for disadvantaged children's outcomes (Heckman, 2014[24]). Disadvantaged children have been found to benefit most from high quality childcare when they start at the earliest ages (0-3 years), and when the provision is in association with home visiting programmes (Melhuish, 2004[25]).

The positive effects of seemingly high quality ECEC have been found to diminish in systems where provision has expanded (Duncan et al., 2007[12]). A number of factors can influence the impacts of ECEC provision, but it is clear that quality can vary, including over time.

Despite growing interest from policy makers on how to use ECEC for the benefit of children, there is little system-level information to help policy makers or education leaders to do so with any level of confidence. The relationship between children's development and structural aspects of ECEC provision, such as group size, has been found to be weak. Even factors such as teachers' qualifications do not always show a clear relationship with children's outcomes. While process quality[2] is undoubtedly key, there is little evidence about what forms of participation, provision and pedagogical approaches work best for different groups of children.

1.4. Catching-up during early schooling is possible but is challenging

High quality early schooling can partly compensate for children's limited learning and development in their early years. While the learning that occurs prior to school entry is more predictive of later outcomes than learning during the first year or two in school, the initial years of schooling can still alter children's later learning trajectories.

Very high quality teaching in the first year or two of school can result in children making rapid progress in a range of early learning domains. Early schooling has been found to be especially effective in ameliorating poor mathematical skills on school entry. Nonetheless, most children who have weak early skills do not entirely catch up with their peers who had stronger skills prior to starting school (Sylva et al., 2008[26]).

High quality early schooling is essential for children from disadvantaged backgrounds in order for them to do well later in school, even if they have had a strong early start. In contrast, strong early skills appear to provide a protective buffer against mediocre quality early schooling for advantaged children. Thus, positive outcomes in the earliest years do not entirely eliminate the vulnerability of disadvantage or remove the likelihood of increasing equity gaps during schooling.

1.5. Paying attention to the early years reaps large benefits for governments

Achieving effective levels of cognitive and social-emotional skills is more important than ever before, not only for individuals, but also for ensuring cohesive families, communities and societies. As the value of these skills increases across countries, the outlook for people

[2] Process quality refers to the quality of pedagogical interactions between ECEC staff and children, the quality of communications between staff and parents, and the quality of interactions among children, as well as the quality of interaction of children with space and material (OECD, 2017[29]).

with poor skills becomes a greater concern. Without the means for all citizens to develop the skills they need to fully participate in society, inequity and the by-products of inequity grow.

Inequality has increased across many countries over past decades. The economic recovery following the financial crisis in 2008 exacerbated this. Top and upper middle-income groups recovered much of the lost ground whereas those in the bottom income levels remained well below pre-crisis levels (OECD, 2016[27]). The economic aftermath of the COVID-19 pandemic is predicted to further extenuate these inequalities (OECD, 2020[28]).

The populations of OECD countries are becoming increasingly heterogeneous as a result of migration. For example, the share of the foreign-born population in OECD countries increased from 6% to 9% over the last two decades. Integrating young immigrant children into their new communities is of key importance for social and economic cohesion and education is a primary means for achieving this (OECD, 2017[29]).

The evidence is overwhelming. ***Starting behind means staying behind.*** When children's early learning is not strong before they start school and continues to be weak in the first two years of school, the outlook for these children is bleak. This group of children is likely to continue to attend school, at least until the end of primary school, but many will not develop the basic academic skills they need to achieve positive outcomes during adulthood. Some will struggle to participate fully in society or experience positive levels of well-being. This is a particular concern in countries or regions where rates of inequality and deprivation are already high and growing.

Children's well-being and rights to learn are recognised by the 1959 United Nations Convention of the Rights of the Child. The Convention notes the responsibilities of governments, families and communities to help realise children's rights and promote their well-being (United Nations, 1959[30]).

Governments can do much to promote early learning and child well-being in early childhood. Policies that support families with young children range across the provision of parental leave, ensuring access to adequate housing in safe environments, and rules on migration and family reunification. The most direct policy levers available to governments for strengthening early learning, however, are in the realm of ECEC as well as parenting programmes and other direct supports for families with young children.

The Sustainable Development Goals recognise the importance of early development and learning, stating that children should have access to organised learning at least one year before starting school (United Nations, 2015[31]).

Despite the potential for enhancing outcomes through early years policies, some governments know very little about the impact of these policies. Reliable, valid and comparable data on children's early learning and well-being is the only means to gauge how well children are faring and what is most needed to improve children's early experiences and outcomes. Such data, however, is not yet available to most policy makers.

Information on the early learning outcomes of specific groups of children is needed, to ensure the needs of all children are met. Aggregate indicators can mask significant or growing inequities across different groups of children. In some countries, children from disadvantaged backgrounds have more limited access to ECEC than other children and they access lower quality provision that is less responsive or tailored to their needs than provision for more advantaged children. In addition, the design and delivery of ECEC is not always well-aligned to the cultural and linguistic needs of children and families from minority populations, such as Indigenous communities. Despite these known inequities, the

development and learning needs of different groups of children are not always transparent, including as they enter early schooling.

Evidence on learning outcomes also needs to be regularly updated to enable policies to respond to the actual needs of new cohorts of children and to assess the overall impacts of policy parameters. Social and economic changes can have rapid and dramatic implications for children and their families. What was true for children born in 2015 is not necessarily true for children born three years later in 2018. Economic recession, natural disasters, pandemics and political unrest can all change the day-to-day lived experiences of children, their families and communities. The impacts of such events are not always clearly or evenly distributed, necessitating timely access to disaggregated data.

The lack of a comparative measure of children's early learning and well-being also means countries are not able to see what is possible to achieve for children. Thus, countries are not able to learn from each other on how to improve the effectiveness, equity and efficiency of their early learning systems.

> *"Differences in politics, culture, and many other things mean that a policy that works well in one country often does not work well in another. But this does not mean that everything is situational and culture-bound, making it impossible for one nation to learn anything useful from another. It turns out that certain broad strategies and principles underlie the world's most successful systems, strategies and principles that are more likely to be found in the top performers than elsewhere, not in isolation, but in harness, together, working in harmony. These principles can be used by other nations to build their own harmonious systems, different in their details, but no less powerful and effective." Marc Tucker (Kagan, 2018: ix[32])*

1.6. The International Early Learning and Child Well-being Study promotes positive child outcomes

The International Early Learning and Child Well-being Study (IELS) has been developed to inform countries' efforts to improve children's early learning and well-being. To achieve this goal, the study has been designed in conjunction with participating and interested countries, to ensure the approach responds well to their policy needs. The fundamental objective of the study is to provide countries with reliable, valid and comparable data they can use to benchmark and monitor the performance of their systems in giving all children a strong early start. Thus, the overarching intent of IELS is to support countries to improve children's early learning experiences, to better foster early development and overall child well-being.

Education systems with a larger proportion of children with poor early development are limited in the extent they can achieve success for these children and can perform well overall, as a system. Ensuring as many children as possible develop well in their early years provides system-level benefits for society as a whole, as well as improving outcomes for individual children and their families.

IELS has been developed to help countries identify possible improvements to enhance children's early years experiences and outcomes. International comparative data helps policy makers, education leaders and practitioners, and parents to see what can be achieved for children in the early years. This includes key system goals such as mitigating disadvantage and ensuring children are well-positioned to succeed in school. Thus, IELS provides countries with a common language and framework to learn from each other, to improve the relative effectiveness and equity of their approaches and systems.

IELS also provides countries with insights on what is needed in early primary school. Much can still be done to enhance 5 year-olds' cognitive and social-emotional development, but this will depend on the extent to which early schooling is oriented towards children's actual development needs and can effectively meet them.

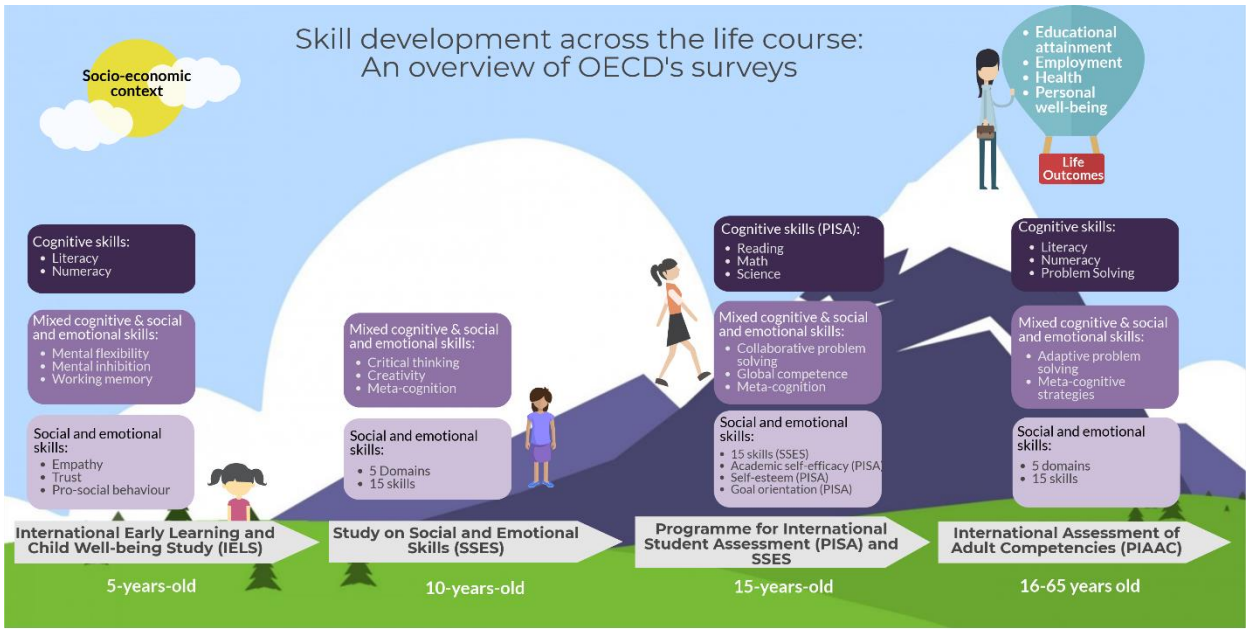
1.7. The study is aligned with other OECD education studies

Existing OECD education studies largely focus on skill acquisition at the end of compulsory schooling and adulthood, i.e. PISA and the Programme for the International Assessment of Adult Competencies (PIAAC). In combination with these studies, IELS enables countries to see the value-add of their education systems. The relative gains in learning between 5 and 15 years-of-age provides a system-level indication of effectiveness, of both performance and equity. For example, a comparison of cohort data from IELS and PISA can show which schooling systems add greatest value, including in mitigating disadvantage.

While IELS, as explained later in Section 4, includes a balanced focus across children's cognitive and social-emotional skills, this balance is increasingly being adopted by PISA and PIAAC. Each of the three studies includes comprehensive, age-appropriate assessments of literacy and numeracy, enabling cohort analysis on these two key cognitive skills. PISA and PIAAC now also offer countries the option of including social-emotional domains in the assessment. Thus, countries that include these measures alongside participation in IELS will be able to track cohorts in these skills as well.

The newly implemented OECD Study on Social and Emotional Skills includes indirect assessments of students' social-emotional skills at ages 10 and 15 years-of-age. The social-emotional skills included in this study have a high overlap with those assessed in IELS, such as curiosity, empathy, trust and self-control. A diagrammatic summary of OECD education surveys is provided in Figure 1.5.

Figure 1.5. Cognitive and social-emotional skills assessed in OECD education surveys



By collecting valid, reliable and comparable data on key skills across the life course, countries will increase their understanding of the strengths and weaknesses of their systems. In this way, system-level priorities for improvement are better informed and can be monitored over time.

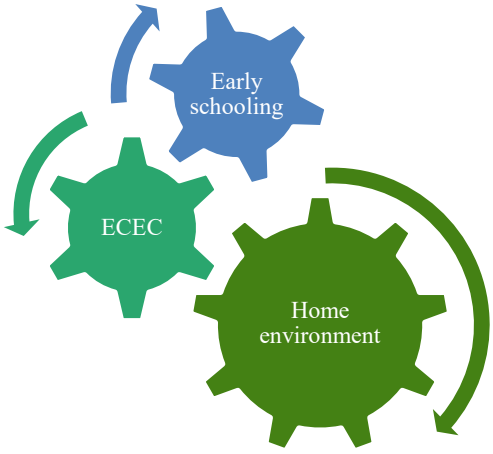
2. How early learning develops

Human development is highly complex and cannot be distilled into simple dichotomies such as the classical "nature versus nurture" debate as individuals and contexts mutually influence one another (Overton, 2015[33]). In other words, children's individual characteristics (i.e. biological or inherited features) constantly interact with the characteristics of their surroundings (e.g. their home and other learning environments). Thus, while skills may be heritable to varying extents, the environments that children experience influence the ways in which they develop particular skills and also their potential for learning new skills (Kovas et al., 2007[34]).

Recent research in neuroscience and brain development shows that the brain develops rapidly during children's early years. As they grow, these learning capacities slow down and the amount of effort it takes to learn new skills increases. High brain malleability early in life means that young children are especially sensitive to external stimuli, such as the types of interactions they have with their parents and other caregivers. Brain development is sequential and cumulative, so frequent and ongoing positive interactions lead to a virtuous cycle of skills acquisition.

The extraordinary plasticity of children's brains, however, cannot ensure that a sufficient rate of early development and learning actually occurs. Children's learning and continuing development depends on a nurturing and stimulating environment, particularly that provided by their families, which can be supported by ECEC, other early interventions, and early schooling, as set out in Figure 2.1.

Figure 2.1. Drivers of children's early learning



Early learning and children's well-being are inter-related and mutually reinforcing. Children develop through the day-to-day interactions and activities they have with their parents and other family members, which fosters both their well-being and their emerging cognitive and social-emotional skills. This early holistic development can be further supported through ECEC and in early schooling.

2.1. Children's early experiences influence their development and well-being

The context of children's day-to-day lives within their families and communities influences their experiences and outcomes during childhood and adulthood. These contextual factors

include the socio-economic status and other characteristics of the family and whether the child has experienced traumatic or adverse experiences during his or her childhood. Bronfenbrenner (1979) pointed to the need to conceptualise child development as part of an ecological system that includes everyday practices in families, other aspects of parental involvement with their children, and the engagement of families and children with their wider community.

Socio-economic status has a pervasive influence on children's later outcomes. Growing up in a low socio-economic family is one of the most significant risk factors for poor development throughout childhood and into adulthood, across a range of domains. These risks commence before children are born, resulting from the overall health of their mother, her age and the quality of care available to her. Children from low socio-economic status households have a higher likelihood of low birthweight, ongoing poor health, low educational attainment, and greater risks in adulthood of unemployment, criminal behaviour and reduced well-being.

Gaps in learning between children from high and low socio-economic status families emerge early. Significant development disparities have been found among infants at 18 months of age. By 24 months, these development disparities have been found to be equivalent to 6 months of development (Fernald, 2013[35]).

Socio-economic status also affects gender-related development outcomes. For example, among children from high socio-economic families, boys often have stronger early numeracy skills than girls, whereas this is not the case for children from low socio-economic families. In the latter, girls frequently outperform boys in early literacy, a difference which is not found among children in high socio-economic families (Cobb-Clark, 2015[36])

While definitions of socio-economic status differ across studies, household income, parental occupation, mother's education levels and housing conditions have been consistently linked to children's outcomes. Mother's education levels, for example, have been shown to have a greater impact on children's outcomes than children's participation in ECEC, potentially being indicative of the quality of the home learning environment (Geddes, 2010[37]).

Maternal mental health has also been linked to children's development, especially in the development of social-emotional skills, highlighting the importance of a stable and consistent relationship with a parent that can be undermined if the parent experiences health problems.

Children from families or communities who experience discrimination, racial violence or other forms of adversity face particular challenges. These are especially acute when adversity is experienced across generations, such as that experienced by many Indigenous peoples in colonised countries. The *Growing Up in New Zealand* study found Maori children experienced an unequal burden of significant co-morbidities in terms of health and development, in addition to disproportionate burdens of socio-economic disadvantage in their early years and throughout their life course (Morton, 2017[38]).

A child's development and well-being is also affected by whether s/he has experienced direct adverse experiences within his or her home environment. Such experiences include sexual or other forms of violence against the child; violence against a parent by the other parent or another adult in the home; physical or emotional neglect; caregiver criminality, substance use/abuse and depression; or death or serious illness of a parent or sibling. *The Longitudinal Studies of Child Abuse and Neglect* (LONGSCAN) in 5 regions of the United States found that the effects of such experiences related to the type and severity of the

experience/s, and the age and resilience of the child at the time the adversity was experienced (Runyan, 1998[39]).

2.2. Strong home environments provide a great start for every child

Children's home environments are the strongest predictors of their early development. As noted above, family socio-economic status, parents' education levels, parenting behaviours and parental well-being all contribute to the home environment children experience and thus to their well-being and early learning outcomes.

The quality of the relationship between a young child and his or her parents or primary caregivers is the most important factor in early development. Frequent, consistent and sensitive interactions create a secure base for the child, promoting attachment, social-emotional well-being and early learning (Burchinal, 2017[40]).

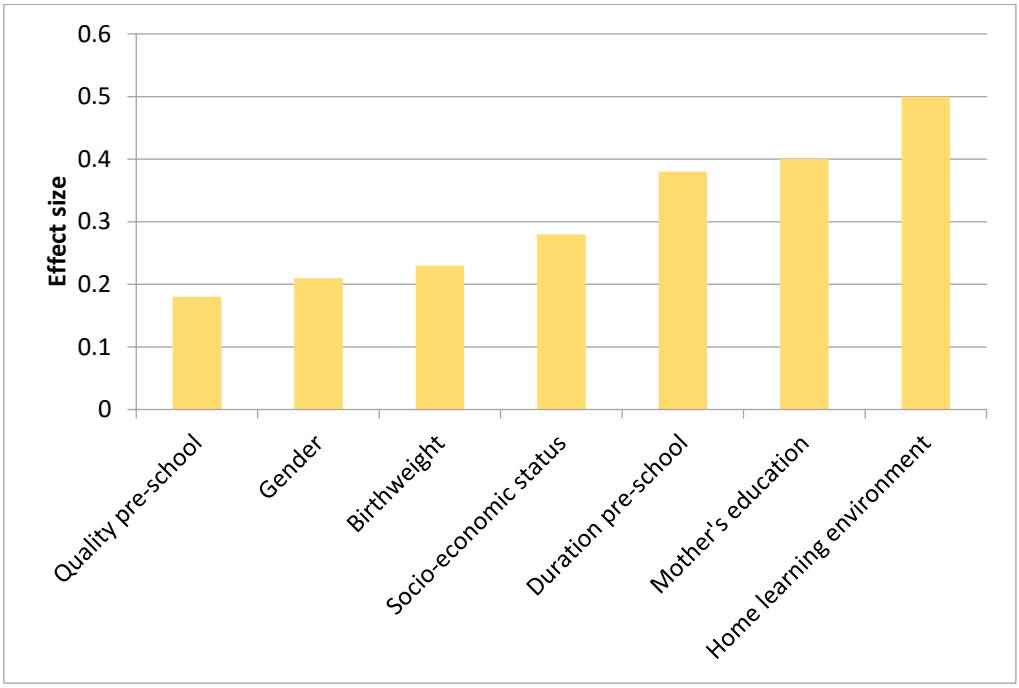
Parents are children's first teachers. The activities they undertake with their children such as reading to them, engaging them in warm and responsive interactions, and the frequent use of complex adult language creates a home learning environment that supports children's development of cognitive skills, self-regulation, social-emotional skills, and their sense of well-being. Parents' early support of their child's autonomy is also associated with positive development, particularly in the child's ability to self-regulate (Bernier, Carlson and Whipple, 2010[41]).

The *Effective Pre-school and Primary Education Project* (EPPE) in the United Kingdom found seven parental activities that are significantly associated with children's later achievement in education. These are:

- frequency of reading from books
- going to the library
- playing with numbers
- painting and drawing
- teaching letters
- teaching numbers, and
- teaching songs, rhymes and poems.

EPPE found the combined effect of these activities on children's development was greater than the effects of parental education or family socio-economic status (Figure 2.2), although the prevalence of these activities correlated positively with both. Positive home learning environments were associated with stronger cognitive development, self-regulation and social-emotional skills. A clear conclusion from the EPPE study is that what parents do with their children is more important than who parents are (Sylva et al., 2004[10]). Thus, efforts to support children's early learning and well-being will be most effective when they involve supporting families to provide home environments their children will thrive in.

Figure 2.2. Impact of contextual factors on children's literacy at age 5



Source: (Melhuish, 2008[42]) "Effects of the Home Learning Environment and Preschool Center Experience upon Literacy and Numeracy Development in Early Primary School", *Journal of Social Issues*, Vol. 64/1.

EPPE's findings on the importance of children's home learning environments are echoed by other longitudinal studies, such as *Growing Up in Ireland* and the *Millennium Cohort Study in Scotland*. Both studies found that parents' active engagement with their children was positively linked to their child's development. These studies also found that children from advantaged families experience more stimulating home learning activities than children from disadvantaged families, including the frequency of being read to and the complexity of children's reading material available to the child at home.

Child-parent attachment and the quality of children's home learning environments can be strengthened through parenting programmes and early child health and well-being initiatives (Heckman and Karapukula, 2019[7]). Programmes such as home visiting can assist families to better understand their young child's development and promote parents' engagement with their child through everyday activities that support the child's development and well-being.

Children's parents also largely determine whether their child participates in ECEC and, if there is a choice, the type of setting the child attends, whether the child participates part-time or full-time, his or her starting age and whether participation is continuous over time and in the same settings. Parents' involvement in their child's ECEC programme is a further factor that can influence children's early development (Lazzari A, 2012[43]).

Higher socio-economic status and parental education in particular have been found to predict children's participation in ECEC, including early entry ECEC (Gilley, 2015[44]). Parenting programmes, as noted above, can additionally help parents to understand the benefits of ECEC and help them to overcome barriers to their child's participation.

2.3. High quality ECEC can benefit all children

ECEC encompasses all arrangements providing care and education for children under compulsory school age. Approaches to ECEC are diverse across countries, including centre, school and home-based settings and public and private provision. Funding arrangements also vary, as do regulatory requirements and pedagogical approaches, including the extent to which ECEC policy frameworks include a deliberate focus on whole child development and well-being (Porticus, 2020[45]).

Participation patterns are also variable, within and across countries. Disadvantaged children are less likely than advantaged children to access high quality services. Common obstacles to participation are cost, availability and organisational arrangements, such as opening hours and enrolment procedures (European Commission, 2014[46]). The latter can particularly deter ethnic minority families or marginal groups (OSCE, 2010[47]).

In some countries, ECEC facilities are unequally distributed across urban and rural areas, and across affluent and poor neighbourhoods, making access difficult for families in poorly served areas. Less visible barriers are low awareness about the benefits of high quality ECEC and/or a lack of trust in ECEC services, especially when provision does not align with a family's cultural childrearing practices (Leseman, 2002[48]).

While the effects of ECEC on children's development and well-being are variable, the evidence from longitudinal studies is clear that high quality ECEC can make a significant positive difference for children's cognitive and social-emotional development. Benefits continue to be visible in academic performance at school, in later employment and earnings, and in health and social outcomes. While most longitudinal evidence is drawn from studies in the United States and the United Kingdom (see Annex A), similar findings have been found in a range of other country contexts, including in France (Bergman, 1996[49]), in Brazil (Barros, 1999[50]) and in India (Chaturvedi et al, 1987[51]).

There is, however, wide variability in effect sizes across and within programmes, as well as across countries (see Figure 1.4). Some studies have found no positive effects of ECEC at all (Driessen, 2004[52]) and others have found negative effects ((Melhuish, 2015[53]) (Gambaro, 2014[54])). Thus, the provision of ECEC does not necessarily mean that children will gain benefits in their development and skills.

Findings are mixed on whether full-time or part-time provision is most beneficial. For example, clear positive impacts of full-time participation have been found in some programmes, such as Head Start and the Abecedarian programme, whereas the EPPE study found that full-time attendance led to no better gains than part-time attendance ((Walters, 2014[55]); (Gilley, 2015[44])).

The EPPE project found that both an earlier age of entry into high quality provision and longer duration of ECEC participation correlated with better gains for children, especially in developing cognitive skills. These gains were most pronounced for disadvantaged children. The study concluded that children who start pre-school from the age of three have a significant advantage over those children who attend only one year of pre-school before entry into primary school (Sylva et al., 2004[10]).

Disadvantaged children have also been found to benefit more when they are in a setting that includes a mix of children from different backgrounds (Sylva et al., 2004[10]). Nonetheless, learning and development gaps between advantaged and disadvantaged children have been found to persist, despite similar ECEC participation (Gilley, 2015[44]). This lends support for targeted early intervention programmes specifically designed to bridge early disparities.

2.3.1. Process quality is key for positive child outcomes

The quality of ECEC is generally described in terms of structural quality and process quality. Structural quality refers to those aspects of the environment that are relatively fixed, such as the physical environment and child-staff ratios, whereas process quality refers to the characteristics of the child's learning experiences, i.e. the quality of interactions with staff and other children (Siraj et al., 2017[56]).

As in the schooling sector, the relationship between structural aspects of ECEC such as class size and children's development has been found to be weak (Mashburn, 2008[57]). Even factors such as teacher qualifications and management and leadership do not always show a clear relationship with children's development ((Bradshaw, 2014[58]); (Gialamas, 2014[59])). Similarly, programmes with the same structural design do not produce the same results. In Head Start, for example, varying results are found in centres that use the same curriculum, the same proportion of educated and certificated staff, and the same class size (Walters, 2014[55]).

Structural factors can be viewed as necessary but not sufficient for supporting positive child outcomes, whereas process quality is the most influential aspect of ECEC on children's subsequent outcomes (Sylva, 2012[60]). Higher process quality is associated with higher levels of emergent literacy and numeracy skills, as well as better behavioural and social skills.

The quality of adult-child interactions stems largely from the capacity of adults to engage deliberately with pedagogy and practices intended to support relationships with children and to extend children's learning, i.e. relational and intentional pedagogies (Siraj, 2018[61]). Thus, high process quality means children are frequently provided with high quality developmental and educational activities.

Process quality is particularly important for children from highly disadvantaged backgrounds. In this context, quality involves sensitivity to, and understanding of, the different needs experienced by individual children and their families. This includes children from culturally and linguistically diverse communities, as well as children who are vulnerable children and those who have specific needs or disabilities. The EPPE study, which assessed the ability of ECEC settings to respond effectively to the needs of diverse groups of children, found that most settings provided a relatively low quality learning environment for such children ((Siraj-Blatchford, 2004[62]); (Tayler, 2014.[63])).

2.3.2. Quality is difficult to measure

Structural variables such as group size, child-staff ratios, and staff education and training are easy to measure and monitor. Measuring process quality is much more challenging as it necessarily involves an element of subjectivity, such as making judgements on the quality of adult/child interactions. Process variables may also vary over a period of time, including in the course of a day or week, and in relation to the age, gender and background of the children in the setting.

Researchers generally use observational rating scales to measure structural and process variables. The most widely used scales are the Environment Rating Scales (ERS), which measure children's access to enriching activities, the level of supportive adult-child interactions, and the safety of the environment ((Siraj et al., 2017[56]); (Burchinal, 2017[40])).

Comparisons of child outcomes with widely used measures of process and structural quality reveal inconsistent and often modest associations. Psychometric issues have been identified with rating scales that may explain these findings, notably interrater reliability standards.

In addition, rating scales appear better able to distinguish between very good and very bad provision but are less able to differentiate the quality of provision in the mid-range, where 70-80% of settings are estimated to be located (Burchinal, 2017[40]).

Quality is also context-specific. High quality provision in one context may not fit well in a different setting or for a different group of children. Successive cohorts of children and their families have different circumstances and needs, meaning provision needs to respond to and meet these needs in order to be effective and high quality in this context. Thus, provision that was deemed to be high quality in an earlier decade may not work as well for more diverse groups of youngsters today. The only reliable way to assess quality and effectiveness is to directly assess children's development gains.

2.4. Early schooling also matters

Children's transitions into early schooling can influence how well their first year or two at school proceeds. A successful transition, along with active parental involvement in their child's learning, both support positive early schooling experiences.

Children's progress in the first year or two of schooling also depends on how well their development needs are diagnosed and responded to. Children who are vulnerable need to be identified early and then provided with targeted and sufficiently intensive interventions matched to their capabilities and interests.

High rates of migration in some countries have resulted in increased diversity of children, families and communities. As a result, it is increasingly necessary for teachers to have the skills to work collaboratively with children and families with different values, cultures, beliefs and languages to their own, in order for the early schooling experiences of these children to be positive (Siraj et al., 2017[56]).

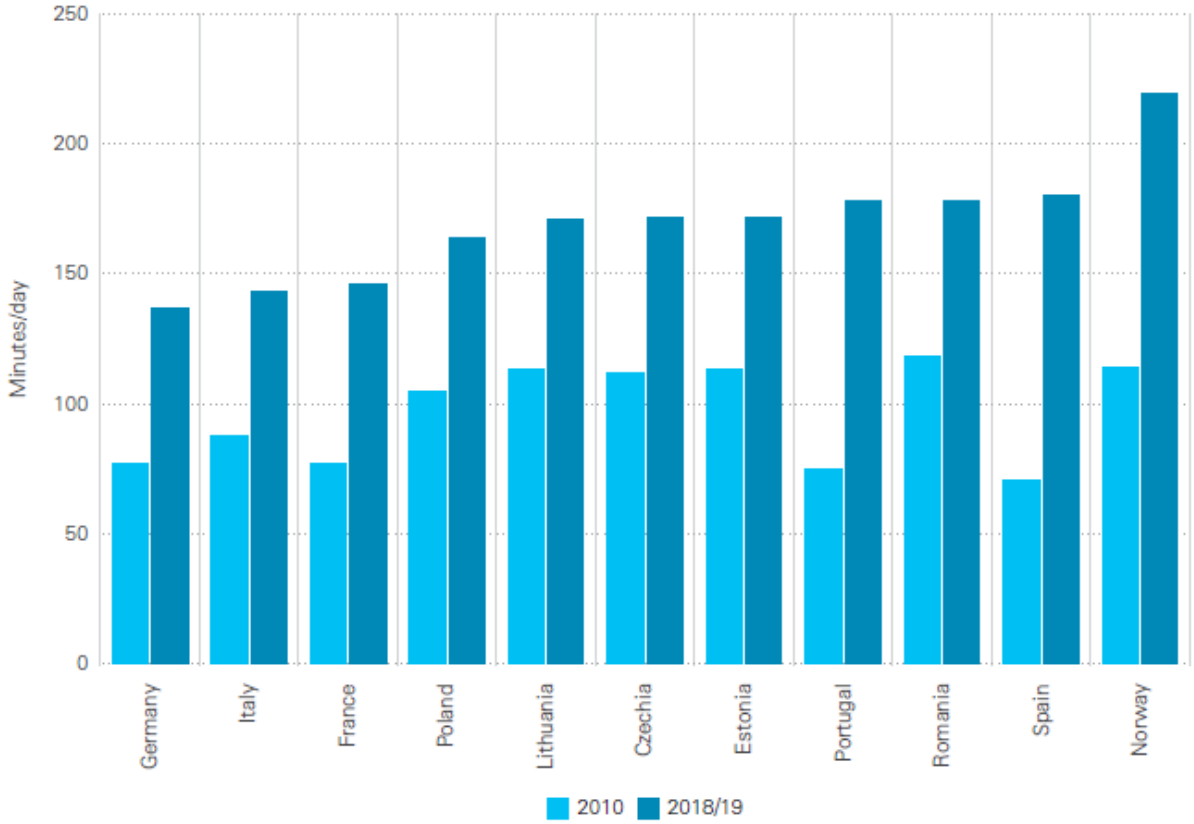
At the same time, there is increasing interest and commitment in some countries for schools to also be more inclusive and responsive to the needs of Indigenous children and their families. This has stimulated new models of community-school partnerships, curriculum and pedagogy, teacher training and student support (OECD, 2017[29]).

If children have not had high quality home learning environments or access to high quality ECEC, the first year or two of schooling may be their last chance to have a positive trajectory in school and beyond. Children without sufficient foundational skills by seven years-of-age will struggle to succeed at school, as well as in adulthood.

2.5. Digital technology plays an increasing role in young children's lives

The amount of time children are spending online is increasing rapidly, as illustrated in Figure 2.3 below. This expansion is due to greater access to digital devices and increases in virtual learning, such as during the Coronavirus pandemic. The evidence on the relationship between the use of new technologies and children's learning and well-being, however, is limited. This is particularly the case for younger children.

Figure 2.3. Average duration of Internet use in minutes per day among 9- to 16-year-olds



Notes: Values have been calculated based on questions about how long children use the Internet a) on a normal weekday, and b) on a weekend or holiday (approximately 1, 000 cases per country). Only children who actively use the Internet were asked to estimate its duration so the increase is not fuelled by increased access to the Internet. For full reports about the surveys see (Livingstone, 2011[64]); (Smahel, 2020[65])).
Source: (Innocenti, 2020[66]) EU Kids Online. Cited in UNICEF Innocenti, 'Worlds of Influence: Understanding what shapes child well-being in rich countries, Innocenti Report Card 16, UNICEF Office of Research.

Any effects of increased usage of digital devices on children are likely to be mediated by a number of factors. These include the duration and frequency of screen time, the nature of the activities children engage with online and the extent to which other activities are being displaced, such as playing with other children and engaging with parents and other family members. While little empirical evidence exists on the effects of digital technologies and children's early learning and well-being, it is a contextual variable that should be better understood and monitored.

3. Holistic early learning matters most for positive child outcomes

The skills children develop in early childhood are important for their immediate well-being and for their later success in childhood and in adulthood. While all aspects of children's early development and well-being matter, some early skills are more predictive of children's later outcomes than others. A set of the most predictive early skills thus provides the most accurate indication of children's likely ongoing development and well-being.

There is also a significant degree of overlap across some early skills, meaning children with well-developed skills in one area are highly likely to have well-developed skills in closely related areas and vice versa. Hence, it is not necessary to measure every aspect of development to gauge how well children are faring.

This section outlines the basis for selecting the early learning domains included in the study: cognitive skills (emergent literacy and emergent numeracy), self-regulation and social-emotional skills.

3.1. Selecting a meaningful and manageable set of early skills for the study

The OECD Secretariat carried out extensive discussions with countries interested in the study to reach consensus on the criteria used to select the early learning domains to be included. These discussions concluded that the domains selected for the study should be:

- Broad rather than narrow, i.e. covering sufficient domains to provide an accurate indication of children's early development and likely later outcomes
- Predictive of children's later trajectories, across a broad set of positive outcomes in adulthood, beyond an exclusive focus on educational achievement
- Related to the learning that develops in early childhood and that can be developed through early years programmes, including in ECEC settings
- Manageable in the time required from children, parents and teachers to participate in the study, and in terms of the cost of developing and implementing the study.

The OECD Secretariat completed a review of evidence and literature with the above criteria as a guide. As part of this review, the Secretariat commissioned the UCL Institute of Education to complete an investigation and analysis of relevant longitudinal data to identify the relationship between children's early development in individual domains through to outcomes in adulthood. The analysis of empirical evidence also considered whether there are specific skills sets that are beneficial for distinct outcomes, such as educational attainment, health or well-being.

Thus, the investigation assessed the evidence on the long-run associations between early social, emotional and cognitive skills (focusing on measures before the age of six) and a range of later outcomes. These later outcomes included educational attainment (assessed at the individual level and reflecting school grades and highest academic achievement), attained socio-economic status and income, mental and physical health and other outcomes reflecting social integration (relationship status, crime, civic engagement). This analysis identified a set of early learning domains that best predict education and other positive outcomes in adulthood.

As noted earlier, many of the most influential longitudinal studies on these topics originated in the United States and in the United Kingdom. These studies provide rich longitudinal data from national and sub-national birth cohort studies, and other long-term panels, which follow individuals from childhood into adult life. Studies using data from across Europe

and Australasia were also included. The investigation additionally included new analysis of the British Cohort Study (BCS) on the long-run benefits and predictive power of early skills, using assessments of 5 year-olds and linking them to outcomes later in life, up to age 42.

The analysis also considered the extent to which associations remain significant after controlling for confounding factors. Such factors include the potential effects of other skills and contextual influences, including birthweight, gender, ethnicity, number of siblings, parental education and employment, family income, social housing tenure, mother's mental health and mother's age (Schoon et al., 2015[17]).

3.2. Early skills that best predict later outcomes

The investigation confirmed the significant role of early skills, measured at or before age five, as predictors of later outcomes. In addition, the analysis identified four key findings:

- Some early skills are more predictive of later life outcomes than others
- Many areas of early development are over-lapping and mutually reinforcing
- Some early learning domains, however, have independent effects, and
- A balanced set of early learning domains best predict positive later outcomes. These are cognitive skills (notably emergent literacy and emergent numeracy), self-regulation and social-emotional skills.

Some early skills are more predictive of children's well-being and later outcomes than other skills. In particular, early oral language skills and self-regulation show very strong relationships with children's later outcomes, especially in relation to educational attainment and later socio-economic status. Social-emotional skills also show consistent relationships with later outcomes, including academic success.

The analysis found that many aspects of early development are inter-related and mutually reinforcing. Development in any one area supports development in related domains, through a process of developmental integration and cross-fertilisation. For example, oral language skills help children to interact well with other children. These interactions build children's prosocial skills and self-regulation, which in turn further strengthens their language skills.

Emergent literacy correlates highly with other cognitive skills, such as visual-motor skills and emergent numeracy. And while all areas of children's development matter, the over-lapping and cumulative nature of early learning means it is not necessary to measure every skill to have an accurate indication of how well a child is developing.

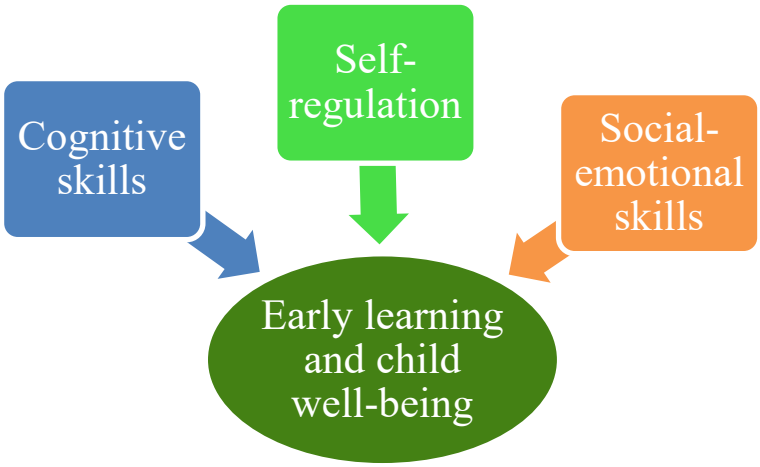
At the same time, some early skills, show independent effects and are less strongly associated with other areas of early development. For example, emotional stability in children's early years has been found to be strongly related to mental health in adulthood. Yet emotional stability has been found to show only weak associations with indicators of cognitive skills, suggesting a considerable degree of independence.

Some areas of early learning overlap with other areas of development and correlate more strongly with specific later outcomes. Emergent numeracy, for example, overlaps significantly with emergent literacy yet shows a stronger correlation with physical health during adulthood than emergent literacy or other domains of early learning.

There is no single domain that can accurately predict children's later outcomes. Rather, it is a set of early capabilities that support children's positive, holistic development and

well-being. It is the combination of skills that matters. In particular, early cognitive skills (especially emergent literacy and emergent numeracy), self-regulation and social-emotional skills are found to shape a range of later outcomes. Learning is a continuous interaction between these three major early learning domains, and development is likely to be impeded in the absence of this interaction. While there is overlap across these domains, each also has an independent effect on later outcomes. Thus, each is necessary but not sufficient to predict a broad set of positive later outcomes. Children who are progressing well in the above three areas have a high likelihood of doing well at school, realising their aspirations, achieving economic independence and living happy, healthy lives.

Figure 3.1. Key areas of early learning



The analysis also found there is no trade-off between strong education outcomes at and beyond school and other positive outcomes in adulthood. Strong education outcomes correlate positively with employment and earnings, mental and physical health, being a good citizen and with self-reported life satisfaction. Thus, there is no need to distinguish between early learning that supports later education outcomes and early learning that supports other outcomes. Strong early foundations position children for success in all areas of their lives.

More specific information on the relationship between each area of learning and development and later outcomes is provided below.

3.3. Emergent literacy and numeracy are critical early cognitive skills

3.3.1 Emergent literacy

Longitudinal research has consistently shown that early literacy skills are strongly predictive of later cognitive and educational outcomes (Duncan et al., 2007[12]). Early literacy skills are also associated with a range of positive social-emotional and economic outcomes throughout people's lives, as well as their overall sense of well-being.

Children's emergent literacy skills are a fundamental determinant of their later success in schooling and beyond. Receptive language skills at age five are associated with competent reading by age 10, as well as education attainment in adolescence and adulthood. Emergent literacy levels predict later employment and earnings, and overall socio-economic status. The development of children's emergent literacy skills is also linked to upward social mobility (Heckman, 2006[3]).

Additionally, early literacy skills are significantly associated with health outcomes. Children with better receptive language skills at age 5 are more likely to have positive physical and mental health outcomes in adulthood (Schoon, 2010[67]) whereas low literacy levels at age 5 are associated (via lower literacy levels in adulthood) with poorer self-rated health and a higher likelihood of unhealthy behaviours, such as smoking, especially amongst men (Sabates, 2012[68]).

Oral language skills also help children to communicate with others, enabling them to express themselves, understand others, and make friends. These skills are therefore integral to children's social-emotional skills and to their sense of connectedness and well-being. Early literacy skills are further associated with the likelihood of being in a committed relationship as an adult, having no or only a small number of children and of participating positively in civic life (Schoon et al., 2015[17]).

The consequences of not addressing gaps in emergent literacy early on are serious. Adequate literacy levels are integral to successful functioning in most societies worldwide, yet approximately one in four (23%) 15-year-old students across OECD countries failed to reach a baseline level of proficiency[3] in reading (OECD, 2019[69]). Similarly, around one in five adults on average across OECD countries have low reading performance (OECD, 2013[70])[4]. These adults have poorer labour market outcomes and poorer self-reported health than their peers with greater proficiency in literacy. They are also more likely to feel they have little impact on the political process and are less likely to report that they trust other people (OECD, 2013[70]).

The roots of poor adult literacy are found in childhood. Children's emergent literacy skills are developed through the natural processes of learning, and through interacting with their parents, other family members and other children. As skills beget skills, children who fall behind early are likely to continue to fall further behind over time ((Kautz et al., 2014[71]); (Rigney, 2010[72])). Measuring children's emergent literacy skills can provide important information about where policy makers, teachers and parents could focus attention and resources in order to promote positive and equitable early literacy development and, in turn, improve children's life chances.

Emergent literacy (also known as oral language skills) comprise those skills required to speak and understand (Honig, 2007[73]). There are several domains of oral language, including the sounds produced while speaking (phonemes), the rules a given language requires to construct sentences (syntax) and the understanding that concepts have meaning (semantics). Receptive language refers to the ability to understand or comprehend spoken language. Expressive language means being able to put thoughts into words and sentences, in a way that makes sense and is grammatically accurate.

In the early years, the most important components of emergent literacy are listening comprehension, vocabulary and phonological awareness. These are more predictive of children's later literacy skills than other literacy-related development, such as the level of reading and writing skills that children have developed at age 5.

Listening comprehension incorporates a range of early literacy skills, such as understanding the explicit and implied meaning of spoken language, including standalone sentences. The ability to infer information from an early age supports ongoing literacy development, including later reading comprehension.

[3] Scoring at or below Proficiency Leave 1 in PISA Reading.

[4] Scoring at or below Proficiency Level 1 in PIAAC Reading.

Vocabulary knowledge is fundamental for comprehension and for successfully communicating with others, which further develops emergent literacy as well as social connectedness. Children who enter school with lower vocabulary tend to hear fewer words per interaction, hear more commands than prompts and questions, and have less interaction with adults. This contributes to the Matthew effect identified by Stanovich, as a downward spiral where early lags in literacy become magnified with reading development (Stanovich, 1986[74]).

Phonological awareness is the ability to detect, manipulate and analyse the auditory aspects of spoken language. It enables children to separate words into sounds and blend sounds into words. Phonological awareness develops through hearing and differentiating words, which are the largest units of sound in a language. Children then progress to hearing units of sound within spoken words such as beginning and end sounds, segmenting words into syllables and recognising rhyming words.

3.3.2 Emergent numeracy

Although emergent numeracy has been subject to less research attention than emergent literacy, longitudinal research has also identified emergent numeracy skills in early childhood as important predictors of later outcomes throughout schooling and into adulthood. Studies have shown that numeracy competence as assessed at school entry is the strongest predictor of later mathematical achievement and strongly predicts achievement in other academic domains (Duncan et al., 2007[12]). Better emergent numeracy skills in childhood are associated with higher socio-economic status in adulthood (Ritchie and Bates, 2013[75]) and with better self-reported health outcomes (OECD, 2016[27]).

On average, 24% of adults in OECD countries fail to develop numeracy skills that go beyond the ability to undertake the most basic numerical operations (OECD, 2016[76]).[5] In most countries, adults with poor information processing skills, including numeracy skills, are less likely to be employed and, when employed, tend to earn lower wages (OECD, 2016[76]). While the cost of innumeracy to individuals and societies is high now, it is likely to grow higher still in an increasingly technological and scientific world (Raghubar and Barnes, 2017[77]). Given its established importance for later outcomes, emergent numeracy is included in IELS.

Early numeracy skills reflect an ability to reason and apply simple numerical concepts. Early numeracy comprises the ability to identify and understand numbers as well as the ability to count, and to perform simple arithmetic operations, such as addition, subtraction, multiplication and division, and to compare numerical magnitudes.

Early numeracy skills that are predictive of later positive outcomes for children are as much about the processes of mathematics as about content. Children at this stage are learning that things can be measured, such as through counting objects and through comparing lengths and weights. At age 5, children are also developing organised ways of thinking about and dealing with mathematical issues. In addition, children in the early years are learning to detect shapes, patterns, sizes, positions and directions, as well as visual-spatial skills, e.g. recognising relationships between visual concepts.

[5] Scoring at or below Proficiency Level 1 in PIAAC Numeracy.

3.4. Early self-regulation is a strong predictor of later outcomes

Self-regulation refers to the mental processes that enable individuals to plan, focus attention, remember instructions and juggle multiple tasks successfully. Early skills in self-regulation enable children to persist in achieving goals and to regulate their behaviour. The latter manifests through inhibiting impulsive behaviours and delaying gratification (Mischel, 1989[78]). Self-regulation skills include both cognitive and social-emotional elements, which interact and build on each other in the process of skill acquisition. As well as achieving tasks, children with strong self-regulation skills are more able to operate effectively in groups than children with poor behavioural regulation.

The development of self-regulation skills in early childhood is associated with a wide range of positive outcomes, independent of cognitive ability. These include higher academic achievement, better labour-market outcomes as adults, including employment levels and earnings, better health outcomes and lower likelihood of involvement in crime ((Duckworth, Quinn and Tsukayama, 2012[79]); (Tangney, Baumeister and Boone, 2004[80])). Several large-scale longitudinal studies from different countries using appropriate control variables have confirmed the role of self-regulation as a significant predictor of these positive later life outcomes.

Self-regulation skills are important for children's transition to and participation in school (Neuenschwander et al., 2012[14]). The start of school can be a time of major change in the physical surroundings and people that children are accustomed to, including other children and teachers. It also presents a new set of learning expectations and routines to follow. Self-regulation skills help children to learn new concepts, manage competing stimuli and engage successfully in classroom activities. These skills also enable children to interact productively with their teachers and peers while managing their own responses (Shonkoff and Phillips, 2000[81]).

Self-regulation skills support children to better integrate information they receive in the classroom. These skills play an important role in academic achievement through late childhood and adolescence ((Best, Miller and Naglieri, 2011[82]); (Duncan et al., 2007[12])). A child's ability to self-regulate is associated with the development of social-emotional, literacy and numeracy skills. For example, working memory (Raghubar, Barnes and Hecht, 2010[83]), inhibition and mental flexibility (Clark, Pritchard and Woodward, 2010[84]) are associated with the development of pre-arithmetic, simple and more complex mathematical skills.

Children with better-developed self-regulation skills in childhood also demonstrate better long-term health outcomes. These include lower rates of obesity in adolescence (Evans, Fuller-Rowell and Doan, 2012[85]) and lower levels of anxiety and depression ((Blair and Peters Razza, 2007[86]); (Buckner, Mezzacappa and Beardslee, 2009[87])). Children and adolescents with more developed self-regulation skills are also less likely to use drugs or receive a criminal conviction ((Duckworth, Tsukayama and May, 2010[88]); (Moffitt et al., 2011[18])).

Early self-regulation appears to be particularly important for low-income and at-risk children in achieving more successful outcomes in later life ((Blair and Raver, 2015[89]); (Nesbitt, 2013[90])).The ability to self-regulate and sustain attention appears to provide a protective factor for these children, mediating the relationship between family socio-economic status and other disadvantages and the children's later academic and wider life outcomes.

The key elements of self-regulation that predict children's later outcomes are referred to as executive function. Executive function is sometimes referred to as a more pure form of

self-regulation (Rothbart, 2011[91]) that can help to support effortful control and modulate reactivity to new stimuli. While executive function includes cognitive elements, as well as social-emotional components, it is distinct from IQ, literacy and (Smithers, 2018[92]).

Executive function includes working memory, inhibitory control and mental flexibility (Jones et al, 2016[93]). Working memory is the ability to store and manipulate or use information in order to complete a task. Inhibitory control represents the ability to overcome strong tendencies to react in a habitual manner, whereas mental flexibility represents the capacity to shift between rules or changing circumstances.

3.5. Social-emotional skills also drive learning and well-being

During the early years, children begin to form close relationships and develop expectations of behaviours for both themselves and others. They learn to control their emotions and actions, to take others' perspectives and to empathise. These skills represent the basic building blocks for later development of more complex social-emotional skills. Of particular importance in the early years are children's empathy, trust in people familiar to them and prosocial behaviour, including the absence of disruptive behaviours.

Early self-control and prosocial behaviour are associated with later educational attainment, socio-economic status, income and unemployment. Social-emotional skills that are learned during childhood are linked to educational achievement even after controlling for early literacy and numeracy (Duncan et al., 2007[12]). Skills such as emotional self-control are strongly associated with educational attainment, socio-economic status and income later in life (Schoon et al., 2015[94]). Furthermore, early prosocial behaviour at the age of 8 has shown to be as important as early cognitive ability in predicting education attainment at the age of 30 (Schoon et al., 2015[94]) as well as in shaping outcomes during adolescence and in adulthood (Caprara et al., 2000[95]).

The development of children's social-emotional skills is inextricably linked to their cognitive development and to their sense of overall well-being. Indeed, developments in neuroscience have shown that the neural circuits involved in the regulation of emotions overlap with those associated with cognitive processing ((Bush, Luu and Posner, 2000[96]); (Davidson et al., 2002[97]); (Posner and Rothbart, 2000[98])). Thus, cognitive development can be impeded when emotions are not well regulated. For instance, children who are not in control of their emotions are more prone to outbursts, inattention and rapid retreats from stressful situations than children who can exert more effective levels of emotional control (Garber and Dodge, 1991[99]).

Early social experiences are linked to emotional development and the construction of critical foundational capacities (Scientific Council on the Developing Child, 2004[100]). Rich social interactions during the early years coupled with secure attachments to parents and responsive caregivers prepare children to develop social-emotional skills during adolescence and adulthood, even if their later environments are not as nurturing. Conversely, children deprived of appropriate sensory, emotional, and social experiences during their early years are more likely to behave disruptively, with detrimental effects on their cognitive development (Shonkoff and Phillips, 2000[81]).

Early social-emotional skills help children to build and maintain close relationships with their parents and other family members, as well as make positive social connections outside the family. Collaboration requires the ability to take the perspective of another, to demonstrate prosocial behaviour, i.e. show kindness, sharing, co-operation and respect for others), agreeableness and empathy. These skills help children to play and to form early friendships with other children. In turn, these social interactions build children's ability to

regulate their emotions and behaviours, their language skills and their sense of well-being. In short, positive children become positive adults (Richards and Huppert, 2011[101]).

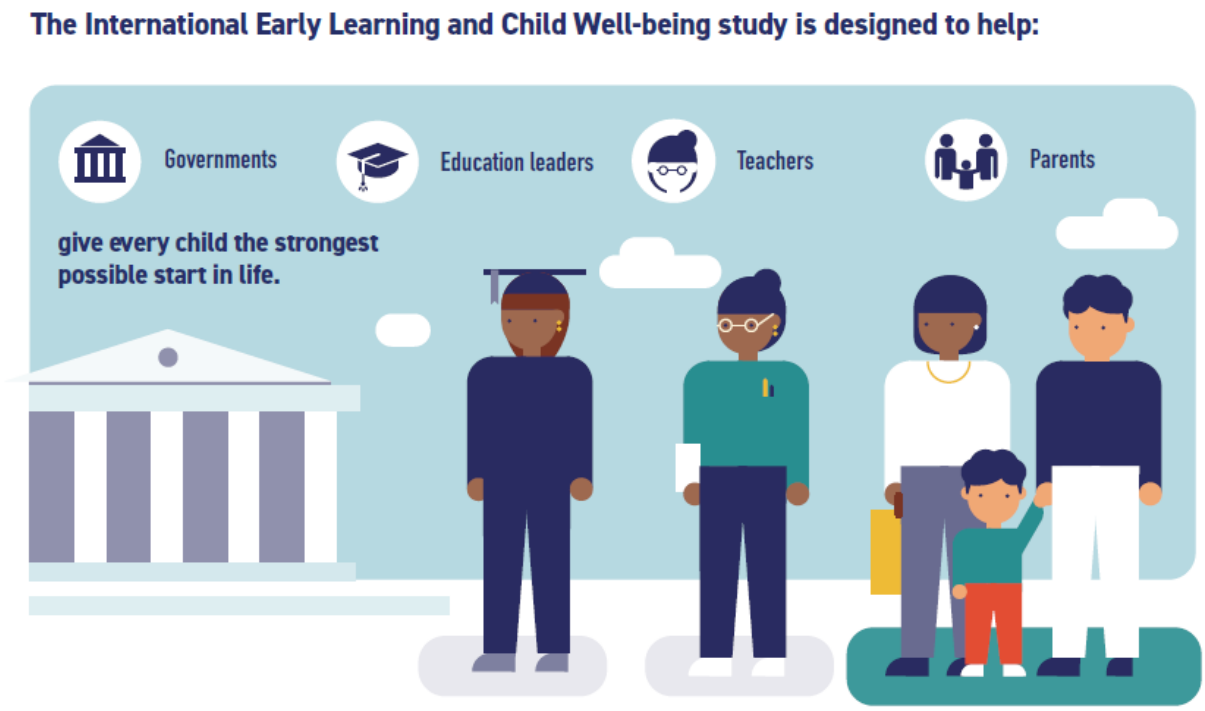
In adulthood, early social-emotional skills are one of the strongest predictors of life satisfaction, general well-being and mental health. Findings from the British Cohort Study and National Child Development Study revealed that children's emotional health was the strongest predictor of adult life satisfaction at all ages, even more than family economic resources, family psychosocial resources and children's cognitive ability (Flèche, Lekfuangfu and Clark, 2019[102]). Furthermore, early emotional well-being is linked with better mental health in later life, whereas emotional difficulties among 5 year-olds are predictors of midlife psychological disorders such as anxiety and depression ((Rutter, Kim-Cohen and Maughan, 2006[103]); (Buchanan, Flouri and Brinke, 2002[104])).

Longitudinal findings also demonstrate that sympathy towards other children and moral reasoning by the age of six are associated with social justice values, such as a belief in treating others fairly and minimising inequalities, at later ages. This association is found when controlling for socio-economic status and cognitive ability (Daniel, 2014[105]).

4. A comprehensive design

The International Early Learning and Child Well-being Study (IELS) has been developed to inform countries' efforts to improve children's early learning and well-being. To achieve this goal, the study was designed in conjunction with participating and interested countries, to ensure the approach responds well to their policy needs. The fundamental objective of the study is to provide countries with reliable, valid and comparable data they can use to benchmark and monitor the performance of their systems in giving all children a strong early start.

Figure 4.1. IELS is designed to help countries to give every child a strong start



This section outlines the key features of the overall design and implementation of the study, including:

- objectives and guiding principles
- the conceptual design of the study
- the target group of children sampled in the study
- the aspects of children's early learning that are assessed
- the contextual information gathered on each child
- how children are assessed
- instrument development and implementation
- adaptations and translations, and
- the technical standards for the study.

4.1. An over-riding focus on children's needs and well-being

The overarching objective of IELS is to support countries to learn from each other in their efforts to improve children's early learning experiences, to better foster their early development and overall well-being (Box 4.1). Children's early learning is a strong determinant of their later success in life, across a range of outcomes. As outlined in previous sections, sound early learning correlates with positive benefits in later educational attainment, employment and earnings, mental and physical health, citizenship, well-being and life satisfaction.

IELS enables countries to understand how well different groups of children are developing, including the significance and nature of differences between girls and boys, socio-economic groups, and children from migrant or linguistically diverse backgrounds.

Box 4.1. Policy and research questions addressed by the study

IELS has been designed to answer the following policy and research questions for each participating country:

- To what extent are children developing the skills they need, for their well-being and ongoing positive outcomes?
- Whether children are developing a sound balance of cognitive and social-emotional skills?
- How much variation is there in children's outcomes?
- The nature and magnitude of differences across groups of children, such as:
  - boys versus girls?
  - children from different socio-economic backgrounds?
  - children from migrant families?
  - children who speak a home language that is different from that spoken in their ECEC centre or school?
- What factors are positively or negatively associated with children's early learning and development?
- How do findings compare across countries and how can this inform efforts to improve outcomes for children?

As noted above, the study was developed in conjunction with countries interested in children's early learning and well-being. As well as setting the objectives for the study, countries agreed on a set of guiding principles to steer the design, development and implementation of the study. These guiding principles were that the study would be:

- *Ethical* - ensuring the well-being of children in the study was paramount in all decisions, including developmentally appropriate assessments
- *Policy relevant* - responding to the policy questions above and enabling changes in policies and practices

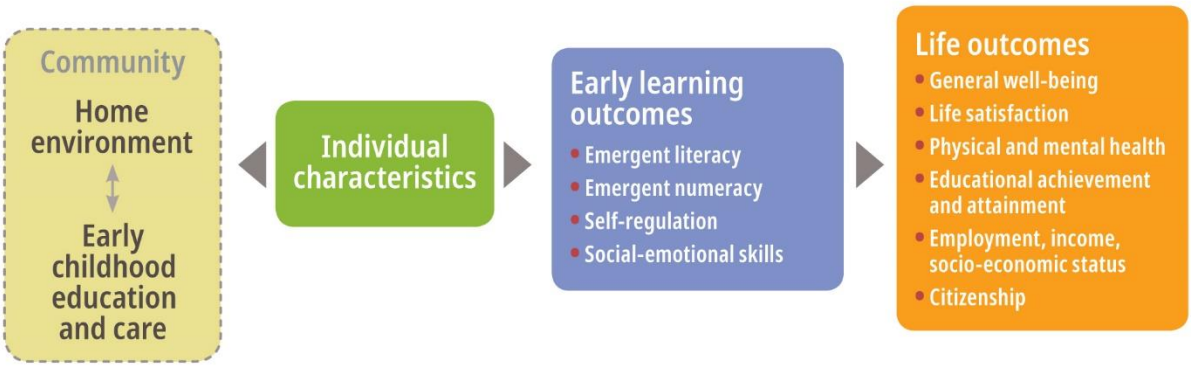
- *Feasible* – being straightforward to implement in a range of country contexts
- *Reliable, valid and comparable* – developing a methodology that is applicable across countries, languages, cultural contexts and over time
- *Efficient* - limiting the burden on parents and teachers, as well as on children
- *Cost effective* – providing an approach that is affordable for a range of countries
- *Sustainable* – establishing strong foundations to enable multiple cycles.

4.2. An evidence-based conceptual design

The study focuses on those aspects of children's early learning that have been found to best predict positive later outcomes, as outlined in the previous section. This core set of early learning encompasses cognitive skills (emergent literacy and emergent numeracy), self-regulation and social-emotional skills.

The study also captures relevant contextual information relating to children's individual characteristics, home environments, and their early childhood education and care experiences. These elements are set out diagrammatically in Figure 4.2.

Figure 4.2. Conceptual framework for the study



Source: (Shuey and Kankaraš, 2018[8]). The Power and Promise of Early Learning, https://doi.org/10.1787/f9b2e53f-en

4.3. A spotlight on 5 year-old children

The children included in the study are 5 years-of-age and in a regulated ECEC setting or school.

The assessments are carried out among children at a common age rather than at a particular stage of education, in order to enable comparability across countries. A stage of education refers to a level or step within an education system, such as the point of entry into school or the last year of ECEC. Stages of education vary across countries and even within countries in some cases. The age of school entry, for example, can vary by as much as three years across education systems. Given that the policy and research questions the study is addressing relate to children's outcomes, from a system perspective, focusing on a common age rather than a common stage gives a better basis for comparison across diverse systems.

There is near-universal participation amongst 5 year-olds in some form of formal education or care setting in most OECD countries. While some countries have not yet achieved

universal participation at this age, most are progressing towards this due to increasing participation rates in ECEC and younger ages of entry into schooling. Participation rates are notably lower among 4 year-olds in many countries. Thus, five years is the earliest age at which most OECD countries can access representative samples in regulated settings.

In addition, five years is often the age when children are about to enter the school system. Comparative assessment information at this point therefore helps countries to gauge the system-level needs of children at school-entry, as well as enabling an estimate of the impact schooling systems are having on children's later educational outcomes, using comparative information from other international studies such as PISA.

Children are assessed in the regulated ECEC centre or school they attend to ensure the assessment is carried out in a setting the child is familiar with and where staff know the child well, in addition to reasons of practicality and cost. Accessing children in formal settings is easier and less costly than locating children and undertaking the assessments in the child's home or in another type of setting.

4.3.1. Representative samples

The population covered by IELS encompasses at least 95% of all 5 year-old children who are in a registered centre or school. Eligible settings must provide educational activities for at least two hours per day and at least 100 days a year.

To achieve nationally representative samples, a two-stage probability design is used. In the first stage, a random sample of ECEC centres or schools is selected in each country. In the second stage, children are randomly selected from the list of children who meet the age requirements within each of the selected settings.

The sample size for the field trial is 30 centres/schools, with 15 children per centre or school. For the main study, 200 centres/schools are sampled, again with 15 children sampled per centre/school. If there are fewer than 15 children at a centre/school, then all children in the target age range are sampled.

4.3.2. Required response rates

The minimum participation rate expected in IELS is 75% of centres/schools and 75% of children across all participating centres/schools. If at least 50% of centres/schools or children participate, but less than 75%, a non-response bias analysis is carried out, as set out in the following table.

Table 4.1. Required response rates in IELS

Centre/school participation in IELS		Child participation after centre/school replacements	Rating
Before replacement	After replacement		
At least 75%	At least 75%	At least 75%	Acceptable
		At least 50%, but less than 75%	Intermediate[1]
At least 50%, but less than 75%	At least 75%	At least 75%	Intermediate[2]
		At least 50%, but less than 75%	Limited[3]
Less than 50%	At least 75%	At least 75%	Limited[2]
		At least 50%, but less than 75%	Insufficient
Less than 75%	Less than 75%	At least 75%	Insufficient
		At least 50%, but less than 75%	Insufficient
Regardless of centre/school participation		Less than 50%	Insufficient

Notes: Children non-response bias analysis (NRBA) needed; 2 – centres NRBA needed; 3 – children & centres NRBA needed.

4.4. Assessing a balanced set of early skills

The early learning domains included in IELS are balanced and comprehensive, reflecting the critical skills children need for their ongoing learning and well-being. As noted earlier, children's learning in different domains is inter-related and mutually reinforcing. Children who are developing well in one area, such as self-regulation, are likely to also be developing in other areas such as emergent literacy and social skills. While all areas of children's development matter, the inter-related and over-lapping nature of early learning domains means it is not necessary to measure every skill to have an accurate indication of how well a child is developing. Nonetheless, some early learning domains are more predictive than others in terms of children's later outcomes and some also have greater independent effects on children's later development than other domains.

The three key aspects of children's early learning selected for the study each have significant effects on children's development trajectories and also have independent effects. These are:

- cognitive skills: emergent literacy and emergent numeracy
- self-regulation, and
- social-emotional skills.

In the early years, emergent literacy is predictive of children's later cognitive and social-emotional development. IELS has therefore focused on key components of emergent literacy, including listening comprehension, vocabulary and phonological awareness.

Key early numeracy skills reflect children's ability to identify and understand numbers, an understanding that things can be counted, measured and compared, and an ability to detect patterns and shapes.

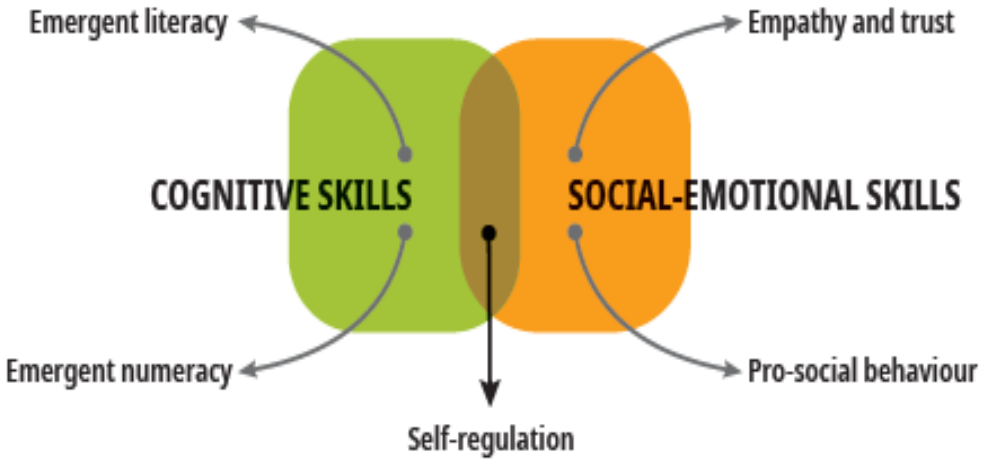
Children's early skills in self-regulation - generally known as executive function - involve remembering and applying information, regulating impulsive behaviours, persisting in tasks and being able to adapt to different rules or circumstances.

Critical early social-emotional skills are those that enable children to form close relationships with others, manage their emotions and actions, and take others' perspectives.

Of particular importance in the early years are children's levels of emergent empathy, trust and prosocial behaviour.

The aspects of children's early learning that are included in the study are set out in Figure 4.3.

Figure 4.3. Children's early learning included in IELS



Source: (OECD, 2020[106]). Early learning and child well-bring. A Study of five-year-olds in England, Estonia and the United States. OECD Publishing, Paris, https://doi.org/10.1787/3990407f-en

Children who are progressing well across the above areas will be well-positioned to form positive relationships with others, succeed in school and experience positive well-being.

More detail on each domain is set out in Section 5.

4.5. Inclusion of contextual information

Contextual information on children's home environments and their ECEC history is critical for understanding how children's skills develop and how they can be better supported, in addition to information on the individual characteristics of each child, as set out below.

4.5.1. The individual characteristics of each child

The study collects information about the individual characteristics of the children participating in the study. This includes their exact ages, gender, any special learning or behavioural needs, and whether they had a low birthweight or had been premature.

4.5.2. Home environment

Children's home environments significantly affect their development and well-being. For this reason, the study collects information from parents on:

- the socio-economic status of the family, i.e. parental occupation, parents' level of education and household income
- household composition, e.g. whether it is a one or two parent household and the number of siblings

- the immigration background of the family[6]
- the language/s spoken in the home
- the activities parents undertake with the children such as reading to them from books and having back-and-forth conversations.

4.5.3. ECEC experiences

The children's parents are also asked about their child's ECEC histories. This covers whether their child attended ECEC, age/s of attendances, the type/s of ECEC the child participated in and whether the child attended for more than or fewer than 20 hours a week.

4.5.4. Use of digital devices

Given the growing prevalence of digital technologies in children's lives, the study collects information from parents on their child's access to digital devices and the frequency of screen time.

4.6. Triangulated assessment

Three sources of information provide a triangulated perspective on each child's learning and development:

- a direct assessment of each child's skills
- feedback from each child's parents on the child's learning, development and behaviour
- feedback from each child's teacher on the child's learning, development and behaviour.

An explanation of each of these three sources of assessment information is provided below.

4.6.1. Play-based assessment

Children complete the direct assessment on tablets, with one-to-one support from a trained study administrator. The children listen to developmentally appropriate stories and engage with cartoon-like characters in these stories. The assessment uses drag-and-drop technology, where children move items on the screen, as well as hot-spot technology, where children tap objects to show their preferred choice when responding. No keyboard is used.

[6] Immigration background is defined as having two parents who were born in a country or an economy other than that in which the child is participating in the study (or one parent if information is only available on one parent).

Figure 4.4. Children are asked to touch who is first in line for the bus



The application, once downloaded, is able to be run offline, and is therefore not dependent on Internet connections.

The process is simple, intuitive and engaging for children. The methodology and activities have been trialled with different groups of children to ensure it is a positive experience for them and that it yields data countries can have confidence in.

Children are able to go at their own pace, such as when moving to a new screen or to a new activity. They also do not need any prior experience with tablets or other digital devices to successfully complete the assessment. The trialling included children who had no previous experience of a tablet or other digital device, and no difficulties were encountered by these children.

Each child in the study is supported on a one-to-one basis by a trained study administrator. The primary role of the study administrators is to ensure the well-being of each child throughout the assessment. The study administrator shows the child how to navigate the tablet and takes him/her through practice exercises at the beginning of the process to confirm the child is ready to start the assessment.

Study administrators remain with the child until s/he has completed the assessment activities. They check that the child is happy to continue at each stage of the assessment process and that s/he takes a break between activities, if s/he wishes to. Study administrators do not guide the child on how to respond to the activities, but do help children if they are unsure what to do next, such as how to move to the next screen.

Each assessment activity takes approximately 15 minutes. Two assessment activities are administered per day, across two days. The two-day format works well for children and little attrition of children occurs across the two days.

The stories and other activities the children engage in during the assessment are interesting, fun and developmentally appropriate for this age group. Two characters – Tom and Mia – guide the children via audio through the activities (Figure 4.5). The names and physical characteristics of these lead characters are adapted to the context of each participating country.

Figure 4.5. Tom and Mia, the lead characters from the children's stories in IELS



There is no reading or writing involved in the direct assessment activities, only visual and audio materials.

As well as being easy to navigate and engaging for children, the digital design of the direct assessment means the results are more accurate than is the case for paper based or observational models of assessment. It also means the assessment process is more efficient to administer than other methods.

4.7. Information from parents and teachers

Each child's parents and the teacher or ECEC staff member who knows him/her best are asked to provide information on the child's learning and development. This enables the study to triangulate the information gathered from the direct assessments and gauge children's development across a broader set of early learning domains than is possible solely through direct assessments.

Parents and teachers provide information on the same skills covered by the direct assessment as well as on a broader set of skills and behaviours. They answer questions on the child's capacity to complete a series of cognitive tasks (assessing emergent literacy and emergent numeracy), as well as the self-regulation and social-emotional skills they observe at home or at the ECEC centre or school the child attends. Parents and teachers are asked to rate the child's development in relation to what the child does or can do and in relation to other children of the same age. The latter recognises that relative ability has implications for children's ongoing development beyond that associated with absolute ability (Elsner, 2015[107]).

4.8. A best practice approach to instrument development and implementation

The development and implementation of IELS 2018 was carried out by an International Consortium, made up of the Australian Council for Educational Research (ACER), the IEA Data Processing and Research Centre (IEA DPC) and cApStAn Linguistic Quality Control.

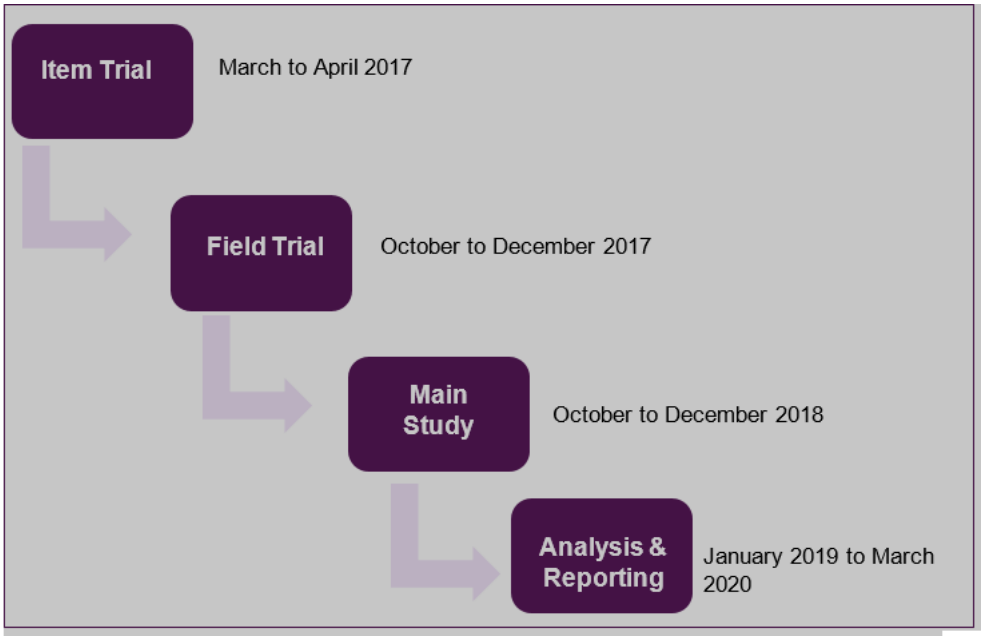
The study is implemented in each participating country by a national study centre set up for this purpose. Each country appoints a national project manager to oversee all aspects of implementation. These include:

- recruiting centres/schools and children to meet sample requirements
- translations

- adaptations, to reflect the context of the country or adding additional questions of particular interest to a participating country
- recruiting and training study administrators
- providing resources for the study, e.g. tablets.

As with many other international large-scale comparative surveys, such as PISA, IELS includes distinctive consecutive study phases: an item trial, a field trial and a main study data collection, in addition to the analysis and reporting phase (Figure 4.6).

Figure 4.6. Overview of the study phases



An item trial is conducted to validate the quality and content of the study instruments[7], especially for newly developed questions and items and for items adapted from other studies. This includes the directly assessed domains and the questionnaires for parents and teachers. The questionnaires are initially administered in focus groups, with a moderator who facilitates discussion on each section and question. The item trial also elicits feedback and comment from study administrators, parents, teachers and participating children. This feedback and the results from the item trial inform the development of instruments for the field trial.

The objective of the field trial is to test all study materials and operational procedures in all participating countries, in preparation for the main study. This includes sampling procedures, national instrument production, study operations, data collection and data entry, in addition to recruitment strategies to achieve high participation rates of centres/schools, parents, children and teachers.

[7] "Instruments" refer to the child's direct assessment material and the questionnaires for parents and teachers.

Results of the field trial are analysed for:

- Differential item functioning
- Distractor behaviour
- Missing data
- Uncovering misprints and/or flaws in translation.

As a result of the field trial, items in all domains are refined for the main study.

As with other OECD studies, standards and procedures are applied to all aspects of the study to ensure the reliability and quality of data collection, analysis and inferences. This includes the design and implementation of the assessment and other instruments; confidentiality and security; sampling of the target population; instrument translations and verifications; technology and infrastructure; response rates; quality assurance and data adjudication. The technical standards are designed to achieve consistency, precision, generalisability and comparability of the data. All participating countries are required to comply with these standards.

4.9. Translations and adaptations reflect country contexts

All study materials are made available to participating countries in English.

Instrument translation standards and verification are in place to ensure national translations are consistent with the international versions of the instruments, while allowing for cultural adaptation where necessary. Translations of study materials such as the Centre/School coordinator manual and Study administrator manual are also required to be consistent with the international English source version.

National versions of all instruments used in the assessment are developed through a double-translation-and-reconciliation procedure. Frist, two independent translators translate the source into the target language. A third person reconciles the two translations and merges them into a single national version.

Once the translations are complete, international verifiers with teaching experience and expertise in linguistic quality control then:

- check that the translation has not affected the meaning of the text
- check the accuracy and comparability of the translation to the international source
- document any omissions and/or additions of information in the translated text compared to the international source
- suggest, if necessary, an alternative translation to improve accuracy and comparability
- verify that all adaptations have been recorded, implemented, and contain the correct information (including English back translations).

The purpose of verification is to ensure that the instruments are functionally equivalent across different cultural contexts.

Participating countries are also able to submit country-specific requests for additional questions to be added to the questionnaires and to adapt part of the material to their national contexts. These are subject to an approval process by the international study centre and the OECD Secretariat.

4.10. Strong quality assurance

National study centres appoint National Quality Assurance Monitors (NQAMs) to review the implementation of the study during the field trial and the main study to ensure compliance with the technical standards for the study. NQAMs visit a random sample of at least 10% of participating centres/schools to check and verify that all study procedures have been correctly followed.

International quality assurance monitoring is also undertaken in each participating country, to review materials and procedures and to document the main study data collection activities. A trained International Quality Assurance Monitor (IQAM), appointed by the international study centre, reviews the administration of the direct assessment through site visits to a sub-sample of participating centres/schools, including interviews with centre/school co-ordinators.

Data submissions by national study centres are monitored closely by the international study centre to verify the completeness and quality of the data received. Data-entry software together with codebooks and supported standardised data-entry procedures are used to detect and reduce systematic or incidental data-entry errors.

4.10.1. Adjudication

Once the main study data collection phase is complete, an adjudication process is implemented by the international study centre in consultation with the OECD Secretariat to determine the extent to which each participating country has met the technical standards for the study. This process considers all information and evidence collected throughout the preparation and implementation of the data collection procedures for all survey areas.

Where standards have been fully met, data is declared fit for use and recommended for full inclusion in the datasets, analyses and reports. Where standards have not been fully met, the results of the adjudication process determines whether:

- some data should be removed for some units, respondents or items
- some rectifying action is warranted, such as re-scoring of items
- additional evidence is needed from national study centres to determine whether non-response bias is evident
- data cannot be endorsed for use in certain types of analyses, and/or
- data cannot be endorsed for inclusion in the analysis and international databases.

Readers who are interested in further information on the technical aspects of IELS should refer to the Technical Report on the study (OECD, 2020[108]).

5. A valid, reliable and comparable assessment of early cognitive and social-emotional development

This section outlines the assessment domains covered by the study: cognitive skills (emergent literacy and emergent numeracy), self-regulation and social-emotional skills. It sets out those aspects of each domain included in the direct assessments, as well as the indirect assessments provided by parents and teachers. A number of illustrative examples of the types of items used in the study are also included.

5.1. Emergent literacy

The study measures key emergent literacy skills for children at age five, which provide a foundation for ongoing literacy development and the development of other key cognitive and social-emotional skills. The three literacy sub-domains included in the study are:

- listening comprehension
- vocabulary
- phonological awareness.

Each is elaborated below.

5.1.1. Listening comprehension

Listening comprehension covers a wide range of oral language skills. The IELS listening comprehension activities are based around the authentic experience of listening to a story while viewing illustrations. The child then responds to questions about the explicit and implied meaning of the story, in addition to interpreting the meaning of standalone sentences with some syntactical complexities.

There are two listening comprehension activities:

- interpreting meaning in a short story
- interpreting meaning in a sentence.

The story-level activity focuses on understanding the meaning of a story of approximately 100 words that is read aloud. A professional voice actor reads the story in a clear and engaging manner. Each "page" of the story has an audio script and a screen illustration. The child does not see the text of the story. The child listens to the audio and views each illustration page-by-page on the tablet.

Once the child has listened to the whole story, s/he moves to the questions. Each question about the story is shown with the relevant illustration and the child can listen to that section of audio again, if s/he wishes to.

Questions about the story address a range of comprehension skills including retrieving explicitly stated information, making interpretations and inferences, and forming a broad understanding of the story. The focus of the activity is on children's ability to comprehend the meaning of the story, rather than their memorisation skills.

The other listening comprehension activity focuses on meaning at the sentence level. The sentence comprehension items ask children to interpret the meaning of a sentence that uses some of the more complex syntax that they would typically encounter. For example, a sentence may list several details and the child is asked to recall one, or the child may need to interpret the meaning of conjunctions such as "but" or "before" in the context of the sentence. The contexts for the sentence comprehension tasks are everyday events.

For both sets of listening comprehension activities, the audio provides the correct answer and two incorrect options. The child listens to each of the options and then selects one. The options are hot spots and are highlighted when selected. The children can change his/her selection if they choose to.

5.1.2. Vocabulary

Understanding the meaning of words is fundamental for comprehension. Silva (2015[109]) identified vocabulary as more important than grammar or short-term memory in supporting the ability of 5 year-old children to make inferences. If children know the meaning of a word, they are far more likely to be able to read it, once they have learned to decode, and to also be able to interpret the specific meaning of the word within the context of text.

Beck (2013[110]) segregate vocabulary into three tiers. Tier 1 words are familiar everyday words that are not conceptually difficult such as "baby" and "happy". Tier 2 words are more complex, but are used regularly and across a variety of contexts such as "admire" and "coincidence". Tier 3 words, are used infrequently and are often limited to specific domains of knowledge and expertise.

The vocabulary items in the study invite children to identify a synonym for a given word. The target word is a less familiar word (Tier 2) and the options are all more familiar words (Tier 1). This means the synonymous match may not be as close as possible because the more familiar words tend to have a broad meaning. The incorrect options were deliberately selected to be clearly incorrect, so the items show that the child understands the general meaning of the less familiar word.

The layout and style of the vocabulary activities are the same as the listening comprehension items.

5.1.3. Phonological awareness

Phonological awareness is an oral skill; it is about hearing the sounds in words. IELS assesses phonological awareness through the children identifying phonemes at the beginning, middle and end of short words. The audio-based tablet delivery allows maximum control over the clear and accurate pronunciation of words and sounds. The words selected for phonological awareness are simple, familiar words.

For the first activity, children are told the first sound of a word and then asked to identify the first sound of the target word. Children hear the instruction and then are asked to select the appropriate sound from three options for each item. A similar process is followed for the other two activities.

The phonological awareness items are standalone items with no link to the story and with no illustrations that might interfere with the auditory nature of phonological awareness skills. Images can distract and complicate the task as the child may associate the image with a different word than the one they are being asked to think about. Images also constrain the words that can be used, by restricting the choice to objects that can be illustrated and are likely to be recognisable.

The phonological awareness items are adapted to suit different languages. Thus, the words for the phonological awareness items are different in each language, but are at similar levels of difficulty.

Table 5.1 Content domain of the IELS emergent literacy direct assessment

Sub-domain	Description	% of items
Listening comprehension	Answer questions about: prominent literal meaning, implied meaning and link information.	35
	Answer questions about the meaning of a sentence with some syntactic complexity.	25
Vocabulary	Select the word that means the same.	25
Phonological awareness	Identify the first, middle and last sounds in words.	15

5.1.4. Indirect assessment on emergent literacy

In addition to directly assessing children's emergent literacy, parents and teachers are also asked to rate each child's expressive and receptive language development, relative to other 5 year-olds. Expressive language is defined as the degree to which the child uses language effectively and can communicate ideas, whereas receptive language is the extent to which the child understands, interprets and listens. Parents and teachers are asked to indicate across a range of emergent literacy skills whether the child's development is above average, average or below average, compared to children of the same age.

5.2. Emergent numeracy

Mathematical thinking begins with the development of an understanding of quantity, in addition to the range of mathematical ideas that children need to develop to engage with the world around them, such as shape and space. Dunphy (2014[111]) argue that "mathematisation fosters mathematical proficiency". Mathematisation involves the processes of reasoning, representing, connecting and communicating to solve problems. Mathematisation is occurring when children work back and forth between abstract mathematics and the real world around them. This occurs, for example, when children use mathematical objects such as numbers or shapes to represent a situation or concept. The IELS emergent numeracy assessment focuses on the child's ability to mathematise through reasoning and problem solving, with most items categorised in this way.

Five sub-domains are included in the IELS emergent numeracy skills framework:

- numbers and counting
- working with numbers
- measurement

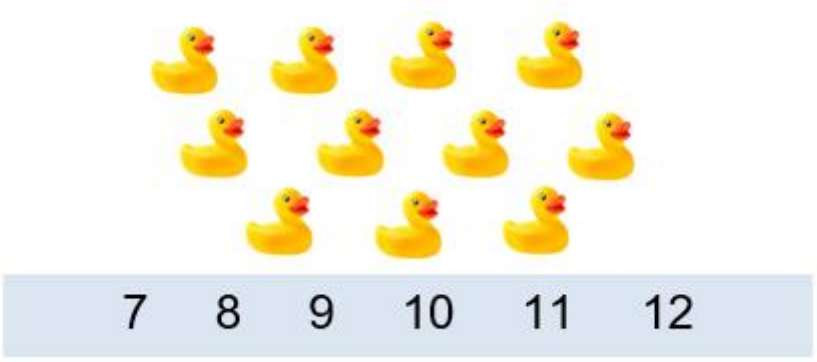
- shape and space
- pattern.

To explain the approach taken in IELS on emergent numeracy, example items are provided below for each sub-domain. These are not the actual items used in the assessment, but each mirrors the style and content of those used.

5.2.1. Numbers and counting

Using interactive hot-spot technology, children are asked to identify digits and numbers up to 20.

Example: The child is asked to touch the number that shows how many ducks there are on the screen.



5.2.2. Working with numbers

For this sub-domain of emergent numeracy, the study uses an interactive drag-and-drop technology to enable the child to solve problems including doubling, halving, informal multiplication (repeated addition) and sharing. The child is asked to reason about how to make each collection equal, and then physically move objects to solve the problem.

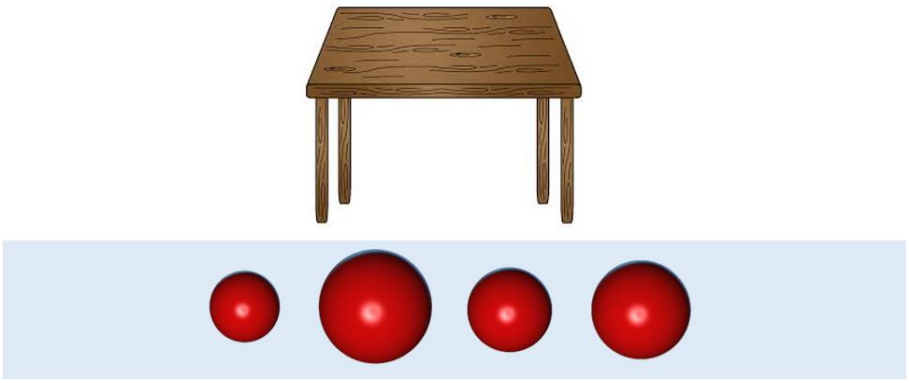
Example: The child is asked to move some grapes so there is an equal number on each plate.



5.2.3. Measurement

Measurement items focus on the ability to use everyday language to compare measures, as well as space, shape and the language of location. The child is asked to physically move objects to solve problems.

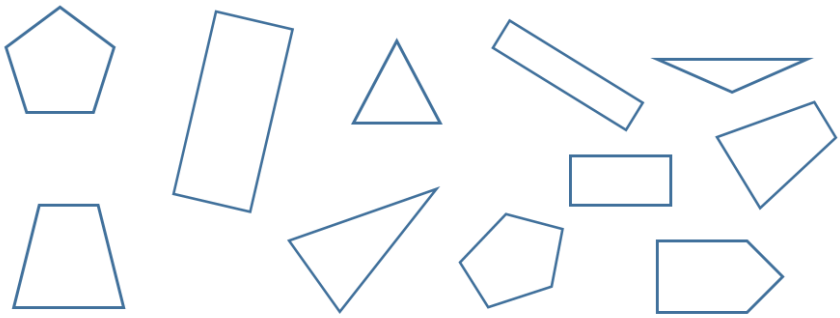
Example: The child is asked to move the largest ball to the top of the table and then move the smallest ball under the table.



5.2.4. Space and shape

This sub-domain assesses children's understanding of common shapes.

Example: The child is asked to touch all the triangles.



5.2.5. Pattern

This sub-domain is concerned with children's ability to recognise and create patterns of shapes or objects. The child is asked to first identify the pattern, reason how to continue it and then physically move objects to solve the problem.

Example: The child is asked to move two more shapes to continue the pattern.

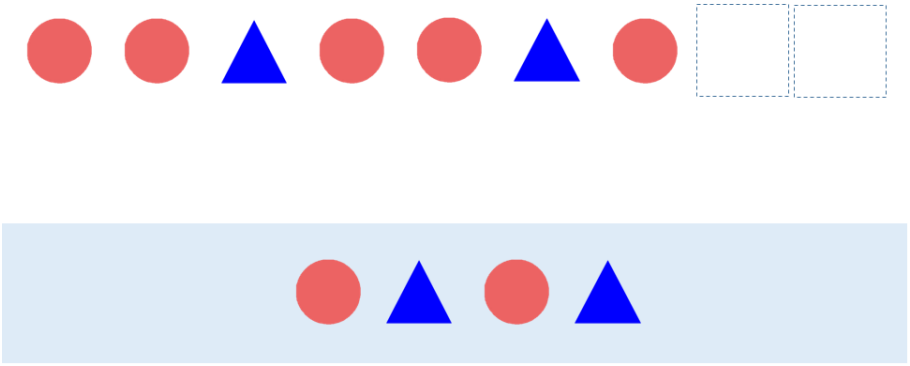


Table 5.2 Content domain of the IELS emergent numeracy assessment

Sub-domain	Description	% of items
Numbers and counting	Identify digits and numbers to 20.	25
	Count from 1 to 20.	
	Compare numbers (e.g. smaller, more, first).	
Working with numbers	Add and subtract in informal number story contexts.	25
	Solve problems including doubling, halving, informal multiplication (repeated addition) and sharing.	
Measurement	Use everyday language to compare measures (e.g. longer, heavier, more).	15
Shape and space	Use names of common shapes and objects and related language (e.g. sides, same shape).	20
	Use language of location (e.g. above, between).	
Pattern	Recognise and create patterns of shapes, objects and numbers.	15

5.2.6. Indirect assessment on emergent numeracy

In addition to directly assessing children's emergent numeracy, parents and teachers are asked to rate each child's numeracy development across a range of indicators. Parents and teachers are asked to indicate, for each question on what the child can do, whether the child's numeracy development is above average, average or below average, relative to other 5 year-olds.

5.3. Self-regulation

Self-regulation is a complex construct that supports purposeful, goal-directed, problem-solving behaviour (Jones et al, 2016[93]). Children's level of working memory, mental flexibility and inhibition have significant implications for their pre-school and school experiences. Working memory reflects a child's ability to remember and perform various tasks. Children with well-developed working memory will be able to follow their teacher's instructions without the need for frequent repetition. Mental flexibility governs children's ability to switch quickly and correctly between tasks, helping them to manage more complex and multiple tasks. Inhibition governs children's ability to regulate impulsive and automatic reactions and switch attention or consciously choose and concentrate on the required tasks.

The IELS self-regulation sub-domains are:

1. **Working memory** – a fundamental cognitive skill that allows information storage for current use and manipulation of stored information for completion of a given task.
2. **Mental flexibility** – the ability to react quickly to changing stimuli or shift between rules according to changing circumstances.
3. **Inhibition** – a skill to overcome strong tendencies to react in a particular way to a certain rule and instead react in a manner contrary to the habitual reaction.

Each sub-domain is presented as a series of games, and is divided into clusters of items of increasing difficulty, with the next cluster only being accessible if the child is managing above a designated level.

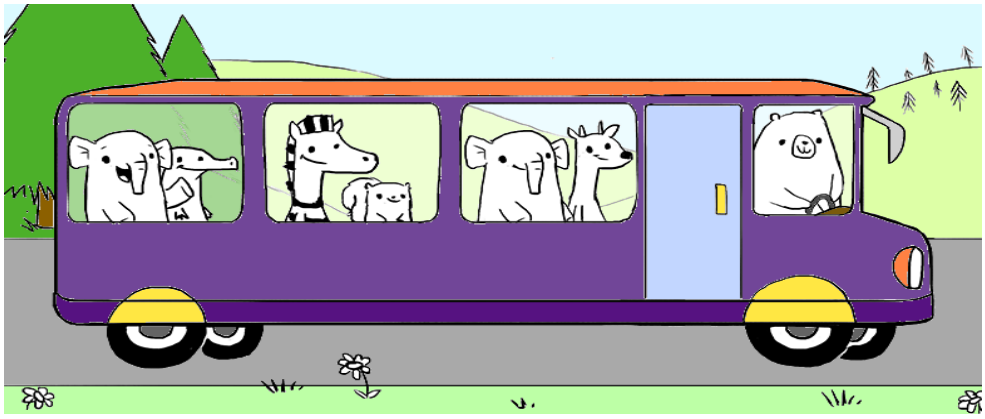
5.3.1. Working memory

This sub-domain assesses a child's ability to store and recall a given amount of information, including the extent to which a child is able to remember relevant details and to use these to respond to questions.

Firstly, the child is asked to remember where a zebra is positioned, such as on the bus illustrated in Figure 5.1. In the next image, the child is asked to touch the place on the bus that the zebra had previously been sitting.

The assessment is divided into several sections, each with increasing levels of difficulty, involving a longer sequence of images to remember the location of the character. Children who do not reach a minimum cut-off within each section do not progress to later sections.

Figure 5.1 Children were asked to remember and recall where the zebra was sitting on the bus



5.3.2. Mental flexibility

This task measures the self-regulation skills responsible for a child's ability to switch between different actions according to a given rule.

Children are first introduced to two distinct animal images. Two buttons are provided to indicate their response and the first rule is established, namely, that they must touch a particular button when each animal appears. The children are then introduced to a second rule, that they must now touch the other button when each animal appears.

In the main body of the assessment, the two animals appear, bounded by a particular shape. If the animal appears bounded by one shape, the child must follow the first rule; if the same animal appears bound by another shape, the child must follow the second rule. The child is asked to respond to a series of images at random, with random shapes and adjust their response according to the changing rules.

The assessment is broken into three sections, each with increasingly higher cut-off scores to progress to the next section.

5.3.3. Inhibition

This task measures children's ability to inhibit their reactions, i.e. to refrain from a previous or learned response.

Children are asked to differentiate between two visually similar images. At the start, a screen with both images is shown. For each item, children are presented with a screen containing two different shapes. One of the images is then flashed on the screen. Children are asked to press one of the shapes when one of the images appears, and the other shape when the other image appears, as quickly as possible. The relative frequency of the appearance of the images is not equal; the ratio is about 4:1. Thus, the child becomes accustomed to this repetition. Their ability to adjust their responses to the corresponding image reflects their ability to inhibit their learned response.

Table 5.3. Content domain of the IELS self-regulation assessment

Sub-domain	Description	% of items
Working memory	Store information and manipulate it.	25
Mental flexibility	Switch between different concepts/rules and think about multiple concepts/rules simultaneously.	20
Inhibition	Override habitual behavioural response.	55

5.3.4. Indirect assessment of self-regulation skills

Information on children's self-regulation development is also collected through questionnaires administered to children's parents and teachers. Parents and teachers are asked to assess each child's overall self-regulation development, defined as whether children are attentive, organised or in control of their actions. Parents and teachers are asked to indicate whether the child is above average, average or below average in relation to other children of the same age.

5.4. Social-emotional skills

Social-emotional skills have been described as the "missing piece" of educational assessment and are known to play an important, but frequently neglected, role in academic success and wider outcomes (Durlak, 2015[112]).

While direct assessments of social-emotional skills are less prevalent than assessments of cognitive skills, especially among younger children, some aspects of early social-emotional development are best assessed directly, such as social-emotional learning relating to emotion knowledge (Denham, 2018[113]). Direct assessments provide results that can be compared across different groups of children and contexts, as well as enabling triangulation with indirect assessments provided by parents and teachers.

The assessment of children's social-emotional skills in IELS uses both direct and indirect assessments. The study measures empathy directly, whereas it measures trust, and prosocial and non-disruptive behaviour indirectly through reports from parents and teachers.

5.4.1. Empathy

Empathy describes the ability to understand and respond to the emotional states of others. It emerges in the early stages of life, long before children develop the skills to describe it. Empathy and lack of it have been described as the most appealing and appalling aspects of human behaviour (Dadds et al, 2008[114]).

The study uses empathy tasks that contrast the emotional states of characters and particular social situations in the stories. This distinction, such as a child who is sad at a birthday party, enables the assessment of whether emotional responses are based solely upon social script knowledge (situation-based) or upon more developed empathy with other people. The basic social scripts known to most children, and used in the stories, include generically happy events: clowns, cookies, playing outdoors. An example of an unhappy social script is eating disliked food.

The study measures two components of empathy. The first component measures emotion identification. This is the ability to identify the emotions of others, an important precursor to developing empathy.

The second component ascertains the extent to which the child's emotional response to the story is concordant or discordant with the emotions experienced by the characters in the story. Children are also asked to describe why they felt that emotion, assessing cognitive attribution. Their response might be self-focused or other-person focused. In the former case, children empathise with another person because they relate the other's experience to themselves; such as thinking "I would not want that to happen to me". In the latter case, the child's response reflects a greater degree of empathy where they have placed themselves into the shoes of the character and understood their emotional response (Strayer, 1993[115]).

Figure 5.2. Children were asked how characters in the IELS stories were feeling



A scenario is relayed to the child through audio visual material and the child is asked to respond to each of the three content components below:

Component 1 – identify how the character feels by selecting one of five emoticons. The emoticons represent the following emotions: happy, sad, afraid, angry and surprised.

Component 2 – identify how they feel when they hear about the character's experience in the story. This screen uses the same emoticons as below.

Component 3 – describe why they feel that way: the child is presented four options based on the below categories:

a) self-focused

b) other-person focused

c) a bit of both a and b

d) an unrelated reason for experiencing an emotion.

Emoticons used for empathy items



Table 5.4. Content domain of the IELS empathy assessment

Sub-domain	Description	% measured items
Emotion identification	Identify from five options how the character feels.	100% (emotion identification domain)
Empathy	Select from five options how you feel yourself.	50% (empathy domain)
Cognitive attribution	Explain why you feel the way you do by selecting from options.	50% (empathy domain)

5.4.2. Trust

Interpersonal trust and the capacity to establish trusting relationships are fundamental to children's social competence, friendships, moral behaviour and academic achievement. Trust also plays a crucial role in individual's well-being, health and longevity.

The IELS trust scales measure the most salient features of trust for 5 year-olds. Parents and teachers are asked to indicate aspects of the child's levels of trust on a five-point scale: 1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always, as set out below in Table 5.5.

Table 5.5. Trust indirect assessment items

Trust items in parent and teacher questionnaires
Approaches familiar adults for comfort when upset.
Is confident around adults.
Requires reassurance from adults.
Is hesitant when making requests.
Greets unfamiliar children in a friendly way.
Is confident with other children.
If anxious in an unfamiliar situation, child is not easily reassured.
Openly approaches familiar adults when she/he needs help.

5.4.3. Prosocial and non-disruptive behaviour

The study uses an extensively modified version of the Adaptive Social Behaviour Inventory (ASBI) (Hogan, 1992[116]). The original ASBI is a 30-item instrument developed as a general measure of social competence for pre-school-aged children, which was designed to capture information on social behaviours that might be expected to be influenced by ECEC settings. The ASBI is widely used because it is a user-friendly screening instrument that is effective (valid and reliable internationally), efficient and cost effective.

The measure provides three different subscales: express, comply and disrupt. The express and comply subscales were combined to form a composite scale of the positive dimensions included in the ASBI measure, giving a measure on prosocial behaviour. The disrupt scales were then used to infer the inverse, that is, a child's level of non-disruptive behaviour. All items are scored using Likert-style response categories: never, rarely, sometimes, often, always.

Although originally designed for use with parents, the ASBI has also been validated for use with teachers, with information from each being moderately correlated. Children may behave differently in the home compared to other settings such as their ECEC centre or at school, so collecting information from both parents and teachers provides a more accurate indication of each child's development and skills.

The prosocial and non-disruptive behaviour items used in IELS are presented in Table 5.6.

Table 5.6. Prosocial and non-disruptive behaviour indirect assessment items

Prosocial
Understands others' feelings, like when they are happy, sad or angry.
Is helpful to other children (e.g. if someone is hurt or upset).
Is emotionally moved by the problems of people in books or stories.
Tries to comfort others when they are upset.
Is curious, likes to explore or try new things.
Considers other people's feelings.
Says nice or friendly things to other children.
Joins in with other children playing.
Is unaware of other people's emotions.
Is friendly towards others.
Disruptive
Dislikes it when asked to play in a different way (e.g. frowns, stamps foot).
Prevents other children from doing their own activities.
Gets upset when you don't give him/her enough attention.
Teases other children.
Fights with other children.

Note: Parents and teachers are asked to indicate whether the child "never", "rarely", "sometimes", "often" or "always" demonstrates the above behaviours.

5.5. A total of 10 dimensions of early learning and child well-being

The study focuses on those aspects of development and learning that are most predictive of children's later education outcomes and wider well-being. These cover key cognitive skills (emergent literacy and emergent numeracy), self-regulation, and social-emotional skills. Across these early learning domains, a total of ten dimensions of children's development and learning are included in the study. IELS is the first OECD education study to include a deliberate balance across cognitive and social-emotional skills.

The study uses direct and indirect measures of children's development. Both parents and the teacher or ECEC staff member who knows the child best provides information on each child's skills. This enables triangulation with the direct assessment and the collection of a broader set of domains than would be possible if only a direct assessment is used.

6. Collecting a broad set of contextual information

Contextual information is a critical part of any study on children's development and learning. Information on contextual variables enables a better understanding of the findings from the study, such as the relative impacts different variables may be having. It also allows for more meaningful comparative analysis across countries.

As outlined in Section 2 on how early learning develops, contextual factors relating to a child's environment and experiences play an important role in a child's development. Children grow, respond and learn in the contexts of their home and other learning environments. Thus, children's development is not the inevitable result of an underlying genetic aptitude (Slee, 2013[117]). IELS has therefore been designed to capture multiple influences on children's learning and well-being.

Contextual influences on early learning outcomes are conceived as either antecedents or processes. Antecedents refer to general background variables that affect learning outcomes, such as the socio-economic status of the family. Process-related variables are those factors that shape early learning more directly, such as the home learning environment. While antecedents can influence processes, processes can moderate the influence of antecedents on outcomes. The approach used in IELS is to collect information on both antecedents and process-related variables.

Many large-scale assessment studies have reported an association between socio-economic status and education outcomes. However, these studies have established that the strength of this association differs across countries (OECD, 2020[118]). It is also clear that interventions in the early years can reduce the strength of these associations, yielding long-term benefits for individuals and their families, and for societies (Heckman, 2010[119]). These interventions include support to families to enrichen the home learning environment and access to high quality early childhood education.

Understanding the extent to which socio-economic status is already affecting children's development at age 5, before or as children commence school, provides countries with insights on the extent of challenge their early learning and schooling systems face to effectively mitigate socio-economic disadvantage. A further measure of the impacts of socio-economic status at a later point in children's schooling enables countries to estimate the extent to which education systems mitigate, are neutral to or exacerbate disadvantage.

Children's first carers and teachers are their families, who have a significant influence on children's development (Sylva et al., 2008[26]). The combined parenting practices that contribute to children's early learning and development are referred to as the home learning environment (HLE). These practices include providing warm and responsive interactions, engaging in back-and-forth conversations and reading to children ((Bradley, 2002[120]); (Niklas et al, 2016[121])). Thus, measures of HLE seek to capture and measure the activities that parents do that promote children's learning and development (Cunha and Heckman, 2009[9]).

High quality ECEC programmes have been linked to enhanced outcomes for children, particularly in literacy, numeracy and executive function ((Early Child Care Research, 2005[122]); (Vandell, 2000[123])). However, there are large variations in the types and quality of provision and in participation patterns among different groups of children.

This section sets out the contextual information collected in IELS, including children's:

- Individual characteristics
- Family background

- Home learning environment
- ECEC experiences.

All contextual information on children in the study is gathered from each child's parents or legal guardians, via online or paper questionnaires.

6.1. Children's individual characteristics

The parent questionnaire collects information on the child's exact date of birth and whether the child is male or female. Recording the exact age of each child at the time of the assessment is important as children's development is very rapid in the early years and significant differences are found between children 12 months and even a few months apart in age. Thus, it is necessary to ensure that any differences that may arise from age can be identified and adjusted for across countries.

Recorded skill differences relating to gender have changed over recent years. These changes relate to particular skill domains and in the relationship between gender and other variables, such as socio-economic factors. Thus, gender continues to be an important dimension in relation to understanding children's skill levels.

Parents are also asked whether the child has ever experienced any of the following issues or difficulties:

- Low birthweight, i.e. less than 5 pounds, 8 ounces or 2,500 grams
- Hearing difficulties, which cannot be corrected by a hearing aid
- Vision difficulties, which cannot be corrected by glasses
- Mobility difficulties
- Learning difficulties, e.g. speech and language delay or intellectual disability
- Social, emotional or behavioural difficulties.

6.2. Family background

The study gathers information on the child's family, including: household composition; migration background; the language/s spoken at home; parents' age, education levels and employment situation; and household income. These factors frequently have a bearing on children's early learning and well-being. For example, parental characteristics such as education levels and employment can influence parents' expectations, and the time and energy they are able to spend with their children.

Three of the above measures are used to establish an index of socio-economic status: parental occupation, parental education and household income.

6.2.1. Household composition

The parent or legal guardian of the child who completes the survey is asked to identify how many people usually live at home with the child, i.e. the home/s where the child mainly lives, including two-household families, where the child alternates his/her time between the homes of both parents.

The questionnaire asks whether the child lives with his/her:

- Mother(s), including stepmother or foster mother

- Father(s), including stepfather or foster father
- Grandparents
- Others, e.g. aunt, uncle, cousin, friend.

A further question on household composition asks the number of siblings the child has, including other children permanently living in the home, such as the children of relatives or step-children. Options range from "none" to "more than four".

6.2.2. Immigration background

Parents are asked to indicate whether the child was born in the country where they now live, i.e. the country in which the study is being implemented. Parents are also asked whether they and the other primary parent/legal guardian of the child were born in the participating country or in another country.

6.2.3. Home language

The parent questionnaire includes questions on the language most often spoken at home by the child and whether this is different from the language spoken at the ECEC centre or school the child attends. Parents are also asked about the language they and the other primary parent/legal guardian most often speak at home.

6.2.4. Parents' age

The child's parents or legal guardians are asked about their ages in the following age bands.

	Parent/guardian 1	Parent/guardian 2
23 years or younger		
24-29 years		
30-34 years		
35-39 years		
40-44 years		
45-49 years		
50 years or older		

6.2.5. Parents' level of education

Parents are also asked about the highest level of formal education they have completed. If data from only one parent is available, then that is taken as the highest level.

	Parent/guardian 1	Parent/guardian 2
ISCED level 1 Primary education of less		
ISCED level 2 Lower secondary education		
ISCED level 3 Upper secondary education		
ISCED level 4 Post-secondary/non-tertiary		
ISCED level 5 Short cycle tertiary education		
ISCED level 6 Bachelor's or equivalent		
ISCED level 7 or 8 Master's or Doctorate or equivalent		

6.2.6. Parents' employment

Parents and legal guardians are asked about their current employment situation, i.e. whether they are:

- Not working
- In volunteer work or other non-paid work, including studying
- In casual or non-regular work
- In regular part-time work, i.e. less than 50% of full-time hours
- In regular part-time work, i.e. between 50% and 90% of full-time hours
- In regular full-time work.

Parents are further asked for the job title of their current or most recent job, and to describe the kind of work they do or did in that job. The higher of the two parental occupations scores is used. Data from one parent is used, if there is only one response.

Each country codes these responses for parental occupation using the ISCO 08 guidelines outlined by the International Labour Office (2012[124]). The codes are then mapped to international socio-economic index of occupational status scores (Ganzeboom, 1992[125]).

6.2.7. Household income

Respondents are also asked to indicate their total annual household income, before tax, within six income bands. This indicator is used as part of the socio-economic status index at a country level but is not used in the international measure of socio-economic status.

6.2.8. The child's home learning environment

Questions on the home learning environment developed for the study were adapted from the model used in the Effective Provision of Pre-School Education Project (Melhuish, 2008[42]) and other studies of early years learning and development (Niklas et al, 2016[121]), with significant input from members of the Technical Advisory Group for the study.

Parents are asked whether and how frequently they engage in informal activities with their children, such as reading books, imaginative play, music and painting, as well as activities focusing more intentionally on numeracy, language and literacy.

The study also collects information on whether children participate in activities outside the home, such as in sporting or other community-based groups. These activities can help children to enhance their social-emotional and self-regulation skills through, for example, learning to co-operate with other children and operate as part of a team. Such interactions with others also provide more opportunities for children to develop their oral language skills. Parents are asked how often in a typical week, over the past 6 weeks, they or another person in the home have engaged in a list of 13 activities, as set out below.

	Never	Less than once a week	1-2 days per week	3-4 days per week	5-7 days per week
Read to your child from a book					
Tell your child a story, not from a book					
Draw pictures or paint					
Have a back-and-forth conversation about how they feel and why they feel that way					
Sing songs, poems or nursery rhymes with your child					
Imaginative or pretend play, e.g. playing the role of a chef or shopkeeper					
Do activities with numbers, counters, measuring or shapes					
Do things outside together like walking, ball games, swimming or bike riding					
Do activities with your child that help him/her learn letters of the alphabet					
Do activities with your child that help him/her learn numbers					

	Never	Less than once a week	1-2 days per week	3-4 days per week	5-7 days per week
Do educational activities on a computer, tablet or smartphone, e.g. use an educational app					
Go to the library					
Take your child to a special or extra-cost activity outside the home, e.g. a sports activity, dance, scouts, swimming lessons, language lessons etc.					

Figure 6.1. Parents are asked about their child's learning opportunities



Access to children's books

Parents are asked how many children's books there are in their home, including from a public or school library, within the following ranges:

- None
- 1 to 10 books
- 11 to 25 books
- 26 to 50 books
- 51 to 100 books
- More than 100 books.

Access to digital devices

Parents are also asked how often their child uses a desktop or laptop computer, tablet device or smartphone. The categories for responding are: never or hardly ever; at least once a month, but not every week; at least once a week, but not every day; and every day.

6.3. Participation in early childhood education and care

The questions relating to children's participation in ECEC were developed specifically for IELS and then tested through the item and field trials. Significant input was provided by the Technical Advisory Group members in finalising the set of questions. The questions focused on the type of ECEC children have participated in, the duration and intensity of that participation, and other forms of care they have also received.

6.3.1. Type of care

Parents are asked whether their child attended any type of ECEC prior to their current setting, whether this is the same or another ECEC centre or a school. If the child has done so, parents are then asked about the types of childcare their child has participated in. The types of ECEC that are listed in this question are adapted to the context of each country, using commonly known terminology for different settings in that country, including supervision and care, ISCED 1 and ISCED 2 settings.

6.3.2. Duration and intensity

For each type of childcare the child has participated in, parents are asked whether the child attended that type of setting before one year of age, or at one year, two years, three years or four-years-of-age.

For each type of setting the child has participated in, at each age, parents are asked to indicate whether the child attended for less than or more than 20 hours a week.

6.3.3. Other forms of care

Parents are asked, in a typical week, whether and how often their child is cared for through other forms of care, as set out in the following table.

	Not at all	1 day per week	More than 1 day per week
A nanny, babysitter or au pair			
Grandparents			
Other relatives or family friends			
Another form of care, such as before or after-care providers			
Playgroup or parenting group			

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Annex A. Key longitudinal studies that informed the rationale and approach of the International Early Learning and Child Well-being Study

Canada

- National Longitudinal Survey of Children and Youth
- Montreal Longitudinal-Experimental Pre-school Study

Europe

- Estonian Longitudinal Study: Intellectual Development of Children
- Individual Development and Adaptation Study, Sweden
- Jyväskylä Longitudinal Study of Personality and Social Development (JYLS), Finland
- Swiss Survey of Children and Youth (COCON)

Australasia

- Christchurch Health and Development Study, New Zealand
- Dunedin Multi-disciplinary Health and Development Study, New Zealand
- Competent Children Study, New Zealand
- Growing Up in New Zealand
- Mater-University of Queensland Study of Pregnancy, Australia

United Kingdom/Ireland

- Avon Longitudinal Study of Parents and Children (ALSPAC)
- British Cohort Study (BCS)
- Growing Up in Ireland
- Medical Research Council National Survey of Health and Development (NSHD)
- Millennium Cohort Study in Scotland
- National Child Development Study (NCDS)
- Twins Early Development Study

United States

- Colorado Adoption Project
- Early Childhood Longitudinal Study – Birth Cohort (ECLS-B)
- Early Childhood Longitudinal Study, Kindergarten Class (ECLS-K)
- Fragile Families and Child Well-being Study
- Fullerton Longitudinal Study
- Hawaii Personality and Health Cohort
- Infant Health and Development Program (IHDP)
- Kauai Longitudinal Study

- The Longitudinal Studies (check) of Child Abuse and Neglect (LONGSCAN) (Edinburgh, pa 12/13)
- The Minnesota Study of Risk and Adaptation from Birth to Adulthood
- National Longitudinal Survey of Youth (NLSY)
- National Institute of Child Health and Human Development Study of Early Child care and Youth Development (NCDS)
- Project Competence Longitudinal Study
- Study of Early Child Care and Youth Development (SECCYD).