Early Learning and Child Well-being in England



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Foreword

It is not always easy for policy makers to make decisions in education that are focused on the future, on what our children need from education. It is easier to rely on what has worked in the past, at least for some children, than to continuously question and try to understand how children are really faring.

England has often been an international leader in education, making decisions based on evidence rather than ideology or convenience. As a result, students in England do relatively well in education at an international level. Nonetheless, England has continued to seek to improve student outcomes through a range of strategies. One such strategy has been an increasing focus on children's early years, influenced by evidence on how best to support children's later learning trajectories and their well-being. This has included measures on the quality of early learning and care services and measures to increase participation by disadvantaged children in such services.

England was one of three OECD countries that have participated in the International Early Learning and Child Well-being Study. The study provides policy makers, education leaders, parents and the wider community with insights on how well five-year-old children in England are faring. The study moves beyond speculation and beliefs, and enables children to show us how they are doing. The findings are enriched by comparisons with children in Estonia and children in the United States.

The study investigated how well five-year-old children were developing across the range of skills they need to be well-positioned to succeed in education and grow up into happy, healthy and responsible citizens. These skills include both early cognitive development and social-emotional development. Children without this balance of skills will struggle to do well in school and in other areas of their lives.

The study highlights early differences between groups of children, such as between boys and girls and between children from advantaged and disadvantaged families. This helps us to see how we can better support children and their families, both in the earliest years and in the first years of schooling. Education systems that orient their priorities from an institutional lens to children's actual needs will have greater success overall and will be better able to achieve improved equity.

Children love to learn, and supportive, caring environments help them to do so. Our job is to ensure we are providing such environments.



Andreas Schleicher

Director for the Directorate for Education and Skills
Special Advisor on Education Policy to the Secretary General

Acknowledgements

The International Early Learning and Child Well-being Study (IELS) was a collaborative effort between participating countries and the OECD Secretariat.

The development of this report was guided by Andreas Schleicher and Yuri Belfali and managed by Rowena Phair. The lead author of the report was Malek Abu-Jawdeh, with chapters contributed by Lauren Kavanagh (Chapter 3) and Javier Suarez-Alvarez (Chapter 5). The publication was edited by Elizabeth Zachary and designed by Fung Kwan Tam. Administrative support was provided by Valentine Bekka and Matthew Gill. Communications support was provided by Rachel Linden.

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Executive summary

What happens early in life lays the foundations for future development. A child's development during the first few years of life predicts their future personal and academic success. The skills they develop during those first few years also form the foundation of general well-being, including how well they will cope with successes and setbacks as adults. Providing a strong start in children's early years is an effective investment to enhance education and later life outcomes. Seeking to improve individual or systemic learning issues at later ages is often less successful and more costly than doing so earlier.

The International Early Learning and Child Well-being Study (IELS) puts a spotlight on how children are faring at age five. The study directly measures key indicators of children's early learning and collects a broad range of development and contextual information from parents and educators. The study does not measure everything. Instead, it focuses on those aspects of development and learning that are predictive of children's later education outcomes and wider well-being. These are: emergent literacy[1] and numeracy, self-regulation,[2] and social-emotional skills.[3] Across these early learning domains, 10 dimensions of children's development and learning were included in the study.

England (United Kingdom) participated in this study with two other OECD countries: Estonia and the United States. Each of these countries recognises children's early years as critical to children's later learning and well-being. Each country participated in this study to enhance the body of international evidence available to policy makers, education leaders and practitioners, and parents to improve children's early learning outcomes. The information from the study provides each country with insights to inform their approaches to children's early years and the first years of schooling.

Five-year-olds in England had stronger emergent numeracy skills than children in the other two countries participating in the study. Children in England had similar emergent literacy, mental flexibility and working memory skills to children in Estonia, which were higher than those of children in the United States. In addition, children in England were reported by educators as being less disruptive than children in Estonia, but as disruptive as children in the United States. Nonetheless, children in England were less able to identify others' emotions than children in Estonia, but were similar to children in the United States.

Socio-economic status was strongly associated with children's early learning outcomes in England. Five-year-olds from disadvantaged homes in England had lower levels of emergent literacy and numeracy, self-regulation and social-emotional skills than children from advantaged homes.[4] The gap in learning outcomes between children in advantaged families and those in disadvantaged families was larger in England than in Estonia, but was not as large as in the United States.

Almost all children in England had participated in early childhood education and care before the age of five and most had done so from the age of three. Most children in Estonia had also participated in early childhood education, but this was not the case for children in the United States. In the United States, children who had attended early childhood education had significantly higher emergent literacy and numeracy scores than children who had not attended, across all socio-economic groups.

The activities that parents undertake with their children were significantly related to children's early learning outcomes. For example, reading to children three to seven days a week was strongly associated with children's emergent literacy. More parents[5] in England read to their children five to seven days a week than in Estonia or the United States. The number of children's books in a child's home was another significant predictor of most cognitive and social-emotional outcomes. Children in England were more likely to have more children's books in their homes than children in the other two countries.

The frequency with which a child used an electronic device was not significantly associated with their emergent numeracy outcomes in England but was related to their emergent literacy and working memory outcomes. Most five-year-olds in England (85%) used an electronic device at least once a week and 39% did so on a daily basis. The regular use of electronic devices was not associated with stronger or poorer skills across most measured outcomes. There were, however, positive correlations with children's ability to recall short visual sequences (working memory) and their emergent literacy.

Emergent literacy and numeracy skills were strongly interrelated, and positively related to self-regulation and social-emotional development. Children with high levels of cognitive skills were more likely to have high levels of social-emotional skills and vice-versa. Children depend on a combination of skills to help them learn to express themselves, understand and interact well with others and increasingly understand the world in which they live.

Notes

1. Emergent literacy refers to the skills children develop that are a precursor to literacy. These are skills in understanding and communicating with others. In this study, there was no assessment of whether children could read or write.
2. Self-regulation refers to the skills children develop to inhibit their impulses and direct their thought processes, enabling them to concentrate, retain information and complete short tasks. These are often referred to as executive function.
3. Social-emotional skills refer to children's abilities to interact well with others and to manage their emotions.
4. Children from an advantaged socio-economic background are those in the top quartile of socio-economic status. Children from a disadvantaged socio-economic background are those in the bottom quartile.
5. Results are representative of the population of parents who participated in the study.

Reader's guide

WHAT IS IELS?

The International Early Learning and Child Well-being Study (IELS) puts a spotlight on how children are faring at five years of age. IELS directly measures key indicators of children's learning, as well as collecting a broad range of development and contextual information from children's parents and teachers.

WHAT ASPECTS OF LEARNING AND DEVELOPMENT DID IELS FOCUS ON?

IELS conceptualises early learning as holistic, involving cognitive and social-emotional skills whose development are interrelated and mutually reinforcing. The study does not measure everything. Instead, it focuses on those aspects of development and learning that are predictive of children's later education outcomes and wider well-being. These are: emergent literacy and emergent numeracy, self-regulation, and social-emotional skills. Across these main early learning domains, 10 dimensions of children's development and learning were included in the study.

WHO PARTICIPATED IN IELS?

Three OECD countries participated in the study: England (United Kingdom), Estonia and the United States. This report uses "England" as shorthand for England (United Kingdom). IELS covered children who were aged between five and six years during the study administration period of October to December 2018 and who were enrolled in a registered school or early childhood education centre. Samples were drawn and weighted to be representative of the target populations in each of the three participating countries. This report uses "five-year-olds" as shorthand for the IELS target population.

Educators and parents also participated in IELS by providing contextual information about children's learning and lives. "Educators" is the term used to describe the teachers or early childhood education and care (ECEC) staff members who responded to staff questionnaires in IELS. The report uses "parents" as shorthand for the parents, guardians or others who completed the IELS parent questionnaire with respect to participating children.

WHAT DOES THIS VOLUME CONTAIN?

The results from IELS are presented in four reports: an international report and an in-depth report on each of the three participating countries. This volume focuses on the findings for England.

A GUIDE TO INTERPRETING FINDINGS IN THIS REPORT

Data underlying the report

IELS results are based on direct and indirect assessments of children's skills in a range of learning domains. IELS scores are not physical units (such as meters or grams). Instead, they are set in relation to the variation in outcomes observed across all children who participated. The metric for all learning scales in IELS is the same. There is theoretically no minimum or maximum score in IELS; rather, the data are scaled to have approximately normal distributions, with the means around 500 and standard deviations around 100. A one-point difference on the IELS scale therefore corresponds to an effect size of 0.01 of a standard deviation and a 10-point difference to an effect size of 0.1. Results are presented for a subgroup of children only when estimates are based on at least 30 children from at least five ECEC centres or schools.

Important contextual information about children's lives and learning was collected from their parents and educators. Some information was collected only from educators, some only from parents, and in some cases, parents and educators both provided perspectives on the same issue (e.g. how well a child is developing in a particular domain). When parent and educator reports are compared in tables or figures in this report, those analyses are based on the subsample of children for whom both parents and educators provided information.

Overall IELS averages

Where cross-country averages are provided in any of the IELS volumes, these averages correspond to the arithmetic mean of the three country estimates.

Statistically significant differences

Unless otherwise stated, a difference reported as statistically significant is significant at the 0.05 level. This means there is a less than 5% probability that the reported difference occurred by chance; a statistical test has been carried out to establish this. Statistically significant differences in this report are denoted by darker tones in figures and by bold font in tables.

Interpreting correlations

A correlation coefficient is a measure of the degree to which two variables tend to move together. The coefficient has a value between plus and minus 1, which indicates the strength and direction of association. If a correlation is positive, it means that as one variable increases, so does the other. If a correlation is negative, it means that as one variable increases, the other decreases. In this report, a correlation coefficient with an absolute value between 0 and 0.19 is interpreted as weak, between 0.20 and 0.49 as moderate, between 0.50 and 0.79 as strong, and between 0.80 and 0.99 as very strong.

Standard deviation

The standard deviation is a measure of the dispersion of a set of data from its mean. The more spread apart the data, the higher the deviation. In a normal distribution, 68% of the scores are within one standard deviation of the mean, 95% within two standard deviations, and 99% within three. As mentioned above, IELS learning scales all have an approximate standard deviation of 100.

Standard error

Scores reported in this volume are population estimates, based on the sample of children selected. However, it is unlikely that the 'true' or population mean is exactly the same as the sample. Some variation or error around estimates is to be expected. Thus, each mean has a standard error, which allows us to estimate how accurately the mean found in our sample reflects the 'true' mean in the population. The 'true' mean score can be found in an interval that is 1.96 standard errors on either side of the obtained mean, 95% of the time.

Rounding figures

As a result of rounding, some figures in tables may not add up exactly to the totals. Totals, averages and differences are calculated on the basis of exact numbers and are rounded only after calculation. Percentages and mean scores are rounded to whole numbers, and standard errors are rounded to two decimal places.

Additional technical information

Readers interested in additional technical detail regarding IELS are directed towards the short technical note at the end of this volume and to the IELS Technical Report (OECD, 2020).

This report uses the OECD StatLinks service, meaning that all tables and figures are assigned a URL leading to an Excel workbook containing the underlying data. These URLs are stable and will remain unchanged over time. In addition, readers of the e-books will be able to click directly on these links, and the workbook will open in a separate window if their Internet browser is open and running.

Abbreviations and acronyms

DfE	Department for Education
ECEC	Early childhood education and care
DipHE	Diploma of Higher Education
EHC	Education, health and care (plans)
EPPE	Effective Provision of Preschool Education project
EPPSE	Effective Pre-school, Primary and Secondary Education project
EYFS	Early Years Foundation Stage
EYFSP	EYFS Profile
EYNFF	Early years national funding formula
EYTS	Early years teacher status
GDP	Gross domestic product
HNC	Higher National Certificate
HND	Higher National Diploma
IELS	International Early Learning and Child Well-being Study
ISCED	International System of Classification of Education
LAs	Local authorities
NVQ	National Vocational Qualifications
Ofsted	Office for Standards in Education, Children's Services and Skills
PIRLS	Progress in International Reading Literacy Study
PISA	Programme for International Student Assessment
PVI	Private, voluntary and independent sector
QTS	Qualified teacher status
SEN	Special educational needs
SES	Socio-economic status
TFR	Total fertility rate
TIMSS	Trends in International Mathematics and Science Study

1

Early learning matters: The International Early Learning and Child Well-being Study

The International Early Learning and Child Well-Being Study puts a spotlight on how children are faring at age five. This chapter presents the rationale for focusing on children's learning and development in the earliest years, and outlines the importance of having reliable evidence on early learning that is comparable across countries. The chapter also provides information on the overall design of the study.

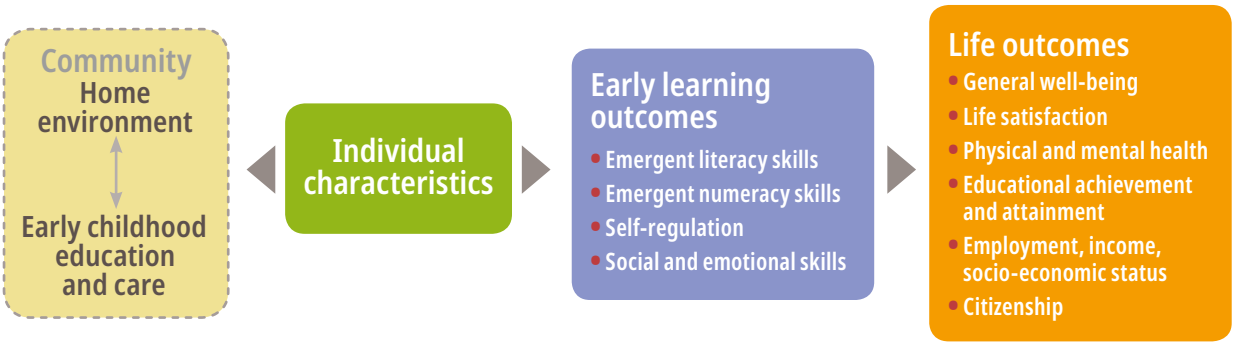
THE EARLY YEARS: A WINDOW OF OPPORTUNITY ... AND RISK

The first five years of a child's life is a period of great opportunity, and great risk. The cognitive and social-emotional skills that children develop in these early years have long-lasting impacts throughout schooling and adulthood. Although the quality of later schooling is important, strong early learning accelerates later development, whereas a poor start inhibits it (Bartik, 2014[1]; Heckman, 2006[2]; Schoon et al., 2015[3]; Sylva et al., 2008[4])

Early learning and child well-being are interrelated and mutually reinforcing. Children thrive in caring families, where they feel safe and happy, 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 children's well-being and their emerging cognitive and social-emotional skills (Melhuish et al., 2008[5]).

Children also learn in settings beyond their immediate home, including in their wider family network, their neighbourhood community, in early childhood education and care (ECEC) settings, and in early schooling. For children without enabling home learning environments, ECEC and early schooling may be their only chance to develop the key skills they need. Children from even the most disadvantaged homes can thrive when they have sustained access to high-quality and responsive learning environments. This early platform of learning enables children to develop the skills they need to succeed in school and in later life (Figure 1.1).

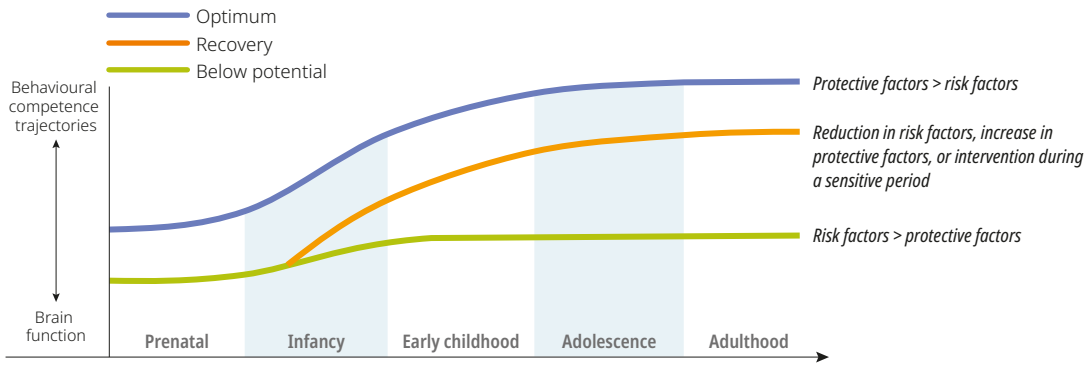
Figure 1.1 **Children's early learning and later life outcomes**



Source: Shuey and Kankaraš (2018[6]), The Power and Promise of Early Learning, https://doi.org/10.1787/f9b2e53f-en.

The window of positive early learning starts to close when children are around seven years old, due to a sharp decrease in brain malleability at this point (World Bank, 2018[7]). Investment in children's early learning enables their development and shapes children's long-term ability to learn (Figure 1.2). If children have not developed core foundation skills by this point, they will struggle to progress well at school, and may also have social and behavioural difficulties in adolescence and in adulthood. Seeking to ameliorate a poor start at older ages is complex, challenging and costly, and yields low success rates (Heckman, 2006[2]). At a system level, the proportion of children with poor early development constrains the extent to which any education system can achieve success for these children and perform well as a whole.

Figure 1.2 **Risk and protective factors affect development trajectories**

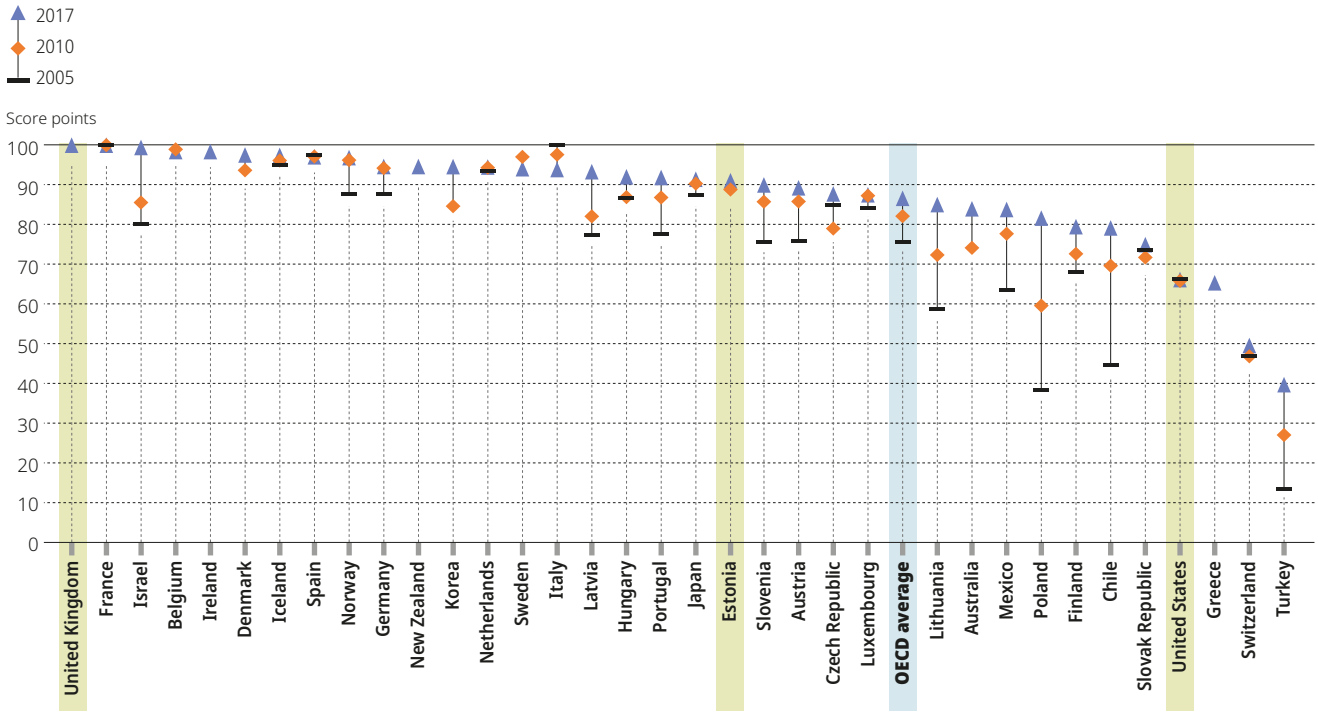


Source: Adapted from Walker et al. (2011[8]), Early Childhood Stimulation Benefits Adult Competence and Reduces Violent Behavior, https://doi.org/10.1542/peds.2010-2231.

Countries are increasingly focusing on early years policies as a means to lift overall educational performance and mitigate disadvantage. Many countries have increased ECEC participation rates and their overall investments in early years policies (Figure 1.3). Yet early learning remains a relatively neglected area of international education research. As a consequence, there is little internationally-based evidence on how to improve early years policies and achieve better results for children.

The promise of early childhood education may not always deliver for some children due to, for example, the quality and responsiveness of provision, the extent to which provision focuses on the types of skill development children need most in the early years, and the timeliness and continuity of provision. At a system level, countries could learn a great deal from each other on how to enhance early learning outcomes for all children, by using a common framework for doing so.

Figure 1.3 **Change in enrolment rates of children aged 3 to 5 years (2005, 2010 and 2017)**



Source: OECD (2019[9]), *Education at a Glance 2019: OECD Indicators*, https://dx.doi.org/10.1787/f8d7880d-en.
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Countries can learn from each other to improve children's early learning outcomes

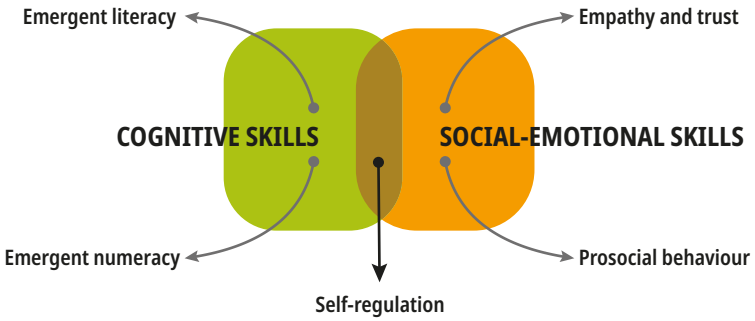
The International Early Learning and Child Well-Being Study (IELS) was designed to help countries assess their children's skills and development, and to understand how these relate to children's early learning experiences and well-being. The study provides countries with comparative data on children's early skills, along with a framework to foster the growing interest in early childhood outcomes. Using this information, countries can better identify factors that promote or hinder children's early learning. The study analyses the associations between children's early skills and elements of their individual characteristics, home learning environments and education experiences.

IELS directly assessed the emergent literacy and numeracy, self-regulation and social- emotional skills of a representative sample of five-year-old children in registered schools and ECEC settings in each participating country. Three countries participated in IELS in 2018: England, Estonia and the United States.

IELS took a holistic approach to understanding a child's early learning development at the age of five (Figure 1.4). It consisted of a play-based direct assessment of children's abilities in emergent literacy, emergent numeracy, self-regulation and empathy. Children were assessed through developmentally appropriate, interactive stories and games on a tablet, supported on a one-to-one basis by trained study administrators. The assessments were carried out in the school or ECEC setting the child was attending. There was no reading or writing involved, and no prior experience of digital devices was needed. In addition, IELS collected information from parents and educators to better understand children's early skills across a wider set of early learning outcomes, including children's prosocial behaviour and levels of trust. The parents of these children as well as the staff member or teacher who knew the child best were asked to participate, to provide a fuller picture of each child.

IELS scores are not physical units (such as meters or grams). Instead, they are set in relation to the variation in outcomes observed across all children who participated. Each of the directly-assessed learning outcomes in IELS was converted to the same metric scale and internationally standardised with approximately normal distributions. There is theoretically no minimum or maximum score in IELS. The results are instead scaled to have approximately normal distributions, with means around 500 and standard deviations around 100. The overall mean of 500 score points represents the standardised mean of all participating countries. In statistical terms, a one-point difference on the IELS scale therefore corresponds to an effect size of 0.01; and a 10-point difference to an effect size of 0.10.

Figure 1.4 **Children's early learning included in IELS**



Source: OECD (2018[10]), Early Learning Matters, https://www.oecd.org/education/school/Early-Learning-Matters-Project-Brochure.pdf.

IELS' holistic approach included information on children's early learning experiences – such as their home learning environment, ECEC experiences and the socio-economic contexts of their families – to identify the relationship of these factors with children's development. Beyond measuring individual learning domains, the study increases our understanding of how children's emergent literacy and numeracy skills relate to self-regulation and social-emotional skills. This provides robust new evidence that will help countries to improve children's early learning outcomes and overall development.

IELS emphasised the well-being of children participating in the study above all else. The activities for the children were engaging and developmentally-appropriate. Participation was voluntary. The trained study administrators - who also liaised with staff in the child's school or centre – were responsible for ensuring that every child that participated in the study was happy to do so and had a positive experience throughout the assessment.

The results from IELS are presented in an international report and in a series of in-depth reports for each of the three participating countries. This volume focuses on the findings for England.

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2

The context of early learning in England

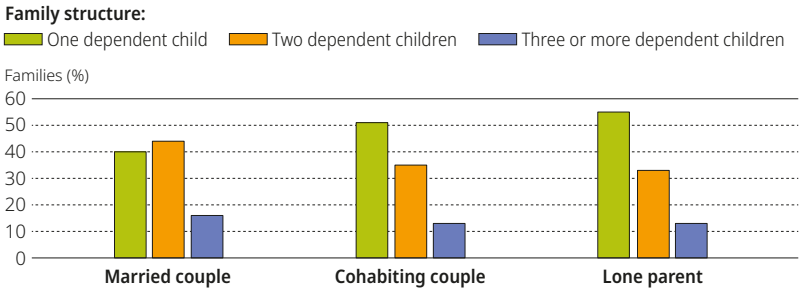
This chapter provides contextual information that helps frame the interpretation of results from the International Early Learning and Child Well-being Study (IELS) in England.[1] It provides demographic information about children and their families, describes the government's strategic intent for early learning, overviews the types of early childhood education and care (ECEC) services available to parents and the levels of participation, and concludes with an overview of major issues and debates related to early learning in England.

PROFILE OF CHILDREN UNDER FIVE AND THEIR FAMILIES IN ENGLAND

A changing population

In 2018, there were about 8 million families – defined as a lone parent or a married, civil partnered or cohabiting couple – with dependent children in England (Carter, 2018[1]). This included about 3.3 million families with a child aged four or under. Families without children were more common than those with children (Knipe, 2017[2]). The proportion of children living in cohabiting couple families has continued to increase over the past decade, while the proportion living in married couple families has fallen. The proportion of children living in single-parent families has not changed significantly during this period.

Figure 2.1 **Percentage of families with dependent children aged between 0 and 4 years, by family structure, United Kingdom**

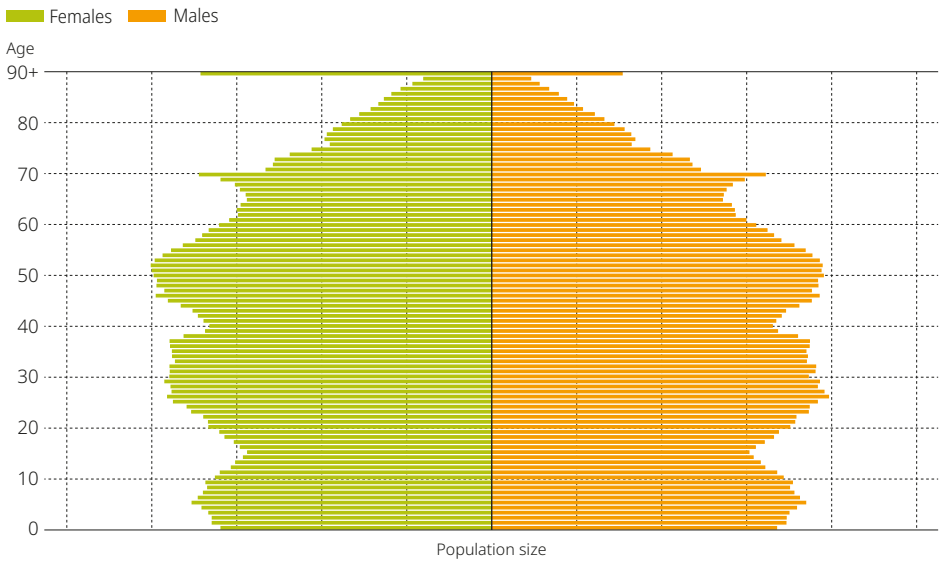


Source: Carter (2018[1]), Families and the labour market, England: 2018, https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/familiesandthelabourmarketengland/2018 (accessed 9 April 2019).

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The total fertility rate[2] (TFR) in England declined for six consecutive years between 2012 and 2018 (Littleboy, 2019[3]). In 2018, the TFR for England was 1.70 children per woman, which was similar to the OECD average (OECD, 2020[4]). The gradual decrease in TFR is consistent with trends across the OECD, as women continue to delay pregnancy and fertility rates among women aged over 40 continue to increase (OECD, 2018[5]). The decrease in fertility rates in England was highest among women aged under 20, followed by women aged between 20 and 24. Women aged 30 to 34 currently have the highest fertility rates. This trend has raised the average age of first-time mothers in England to 30.5 years old.

Figure 2.2 **Distribution of population by age and gender, England**

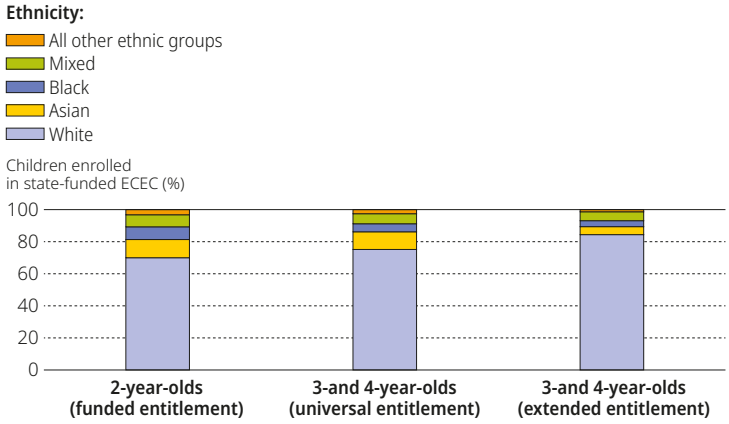


Source: Park (2019[6]), Population estimates for the UK, England and Wales, Scotland and Northern Ireland – Office for National Statistics, https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/latest (accessed on 30 January 2020).

StatLink https://doi.org/10.1787/888934098288

Children under the age of five represent about 6% of the total population in England (Park, 2019[6]). During the 2011 census, over 75% of these children were reported as White, 10% as Asian and about 5% each as Black or Mixed (Office for National Statistics, 2011[7]). These proportions are consistent with the ethnic composition of children enrolled in state-funded ECEC. In 2018, children reported as White represented over 80% of all children under the age of five in state-funded ECEC, children reported as Asian made up about 11% and children reported as Black made up about 7% (Department for Education, 2018[8]). The vast majority of these children live in urban areas. In 2011, under 15% of children between birth and the age of four lived in rural areas (Office for National Statistics, 2011[7]).

Figure 2.3 **Reported ethnicity of children enrolled in state-funded ECEC, England**



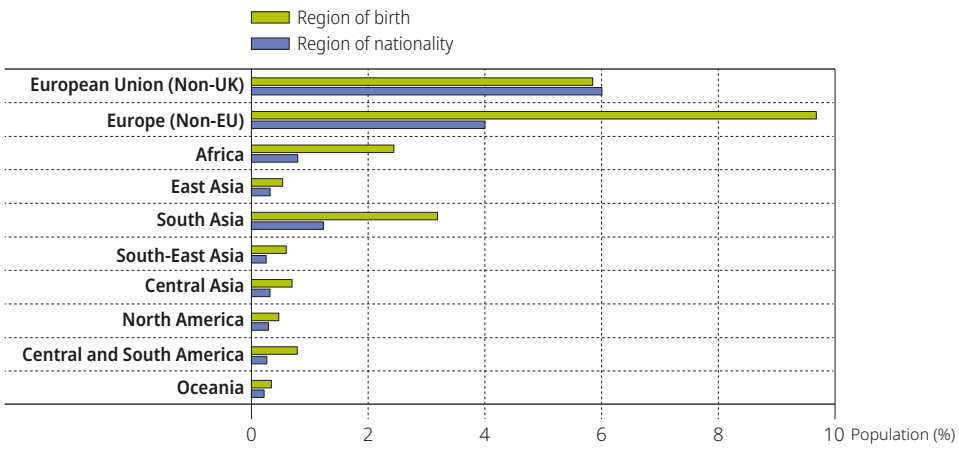
Note: Three- and four-year-olds are entitled to 15 hours a week of state-funded ECEC. Two-year-olds from low-income families are entitled to 15 hours a week. Three- and four-year-olds in low-income families are entitled to an extended 30 hours a week.

Source: Department for Education (2018[8]), Provision for children under 5 years of age in England, January 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/719273/Provision_for_children_under_5_2018_-_text.pdf (accessed on 4 April 2019).

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Despite the decrease in the TFR, England's population continues to grow, though at a slower rate than in the past decade (Blake, 2019[9]). This is due to the combination of births and net migration. The population of England is around 56 million, with the total population in the United Kingdom around 66.4 million (Coates, Tanna and Scott-Allen, 2019[10]). Of the total United Kingdom population in 2017, about 86% were born in the United Kingdom and about 90% were British nationals. A decrease in migration over the past few years has contributed to a slowing in population growth. Net migration to the United Kingdom – which accounts for just over half of the total annual population growth – was around 226 000 in 2019.

Figure 2.4 **Non-British and non-UK-born populations, by region of birth and nationality, United Kingdom**



Source: Blake, A. (2019[9]), Migration Statistics Quarterly Report: February 2019, https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/internationalmigration/bulletins/migrationstatisticsquarterlyreport/february2019 (accessed on 8 April 2019).

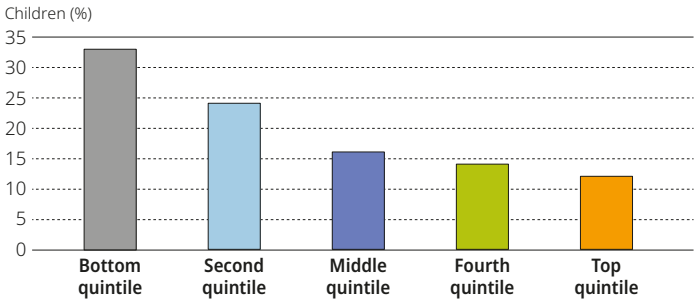
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Consistent with the demographic changes in the general population, about 30% of children in England are exposed to a language other than English in their home by the time they enter primary school (Department for Education, 2019[11]). The share of children exposed to a language other than English at home has steadily increased from about 12% in 2006 (Department for Education, 2019[11]). This is partly because of an increase in the birth rate of children born to non-UK-born mothers. The statutory framework for the early years encourages providers to help children use their home language in play and learning, while giving them opportunities to learn and reach a good standard in English (Department for Education, 2017[12]).

Children living in poverty

Children are more likely than the overall population to be in a low-income household (Department for Work & Pensions, 2019[13]). In 2018, 14 million people in the United Kingdom – about 22% of the total population – were in relatively low-income households, after accounting for housing costs. This included about 4.1 million children – or about 30% of all children. About 1.6 million children – or about 12% of all children – lived in low-income households and material deprivation. Children with a single parent are nearly twice as likely to be in relative poverty when compared with children in two-parent families (Department for Work & Pensions, 2019[13]).

Figure 2.5 **Percentage of children aged four or under, by quintile of disposable household income, England**



Source: Department for Work & Pensions (2019[13]), Households below average income: an analysis of the income distribution 1994/95 to 2017/18, https://www.gov.uk/government/statistics/households-below-average-income-199495-to-201718 (accessed on 6 June 2019).
StatLink https://doi.org/10.1787/888934098345

Income inequality in the United Kingdom remains relatively high (Webber and O'Neill, 2019[14]). The average income of the richest quintile of households – before taxes and benefits – was GBP 88 800 per year in 2018. This was 11.2 times greater than the average income of the poorest quintile, which was GBP 7 900 per year. After accounting for both cash and in-kind benefits and taxes, the ratio between the average income of the top and bottom quintiles of households decreases to less than four to one, although the poorest quintile of households continue to pay the largest proportion of their income on indirect taxes. The United Kingdom's Gini coefficient[3] of 0.34 – compared to the 0.32 average across OECD countries – is below the high in 2009/10. The percentage of individuals in low relative income, however, has risen since 2013/14, when considering before and after housing cost. Incomes for individuals above the 90th percentile have been increasing, while those for individuals below the 23rd percentile have been decreasing (Department for Work & Pensions, 2019[13]).

Parental educational attainment

The majority of adults in England have completed at least upper secondary school[4] (OECD, 2020[15]). Just under half of adults have completed up to upper secondary education, while about a quarter have completed at least a bachelor's degree. Adults with children have a similar average level of educational attainment as the general population.

Table 2.1 **Educational attainment of adults aged 16 to 65 by whether or not they have children, England**

	All adults (%)		Adults with children (%)	
Educational attainment	**Male**	**Female**	**Male**	**Female**
Below upper secondary	14	14	15	15
Upper secondary completed	47	46	48	47
Post-secondary, non-tertiary	11	13	11	14
Bachelor's degree and above	28	27	26	24

Source: Calculated using OECD (2016[16]), *Survey of Adult Skills (PIAAC) – Public data and analysis*, www.oecd.org/skills/piaac/publicdataandanalysis/.
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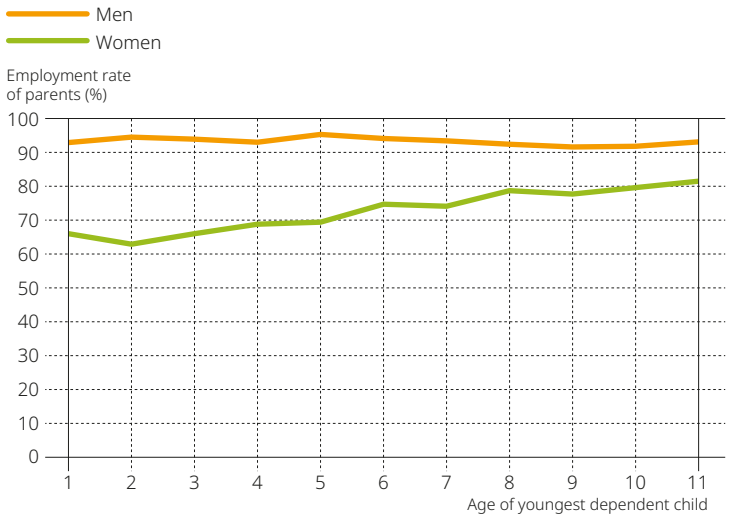
The educational attainment of mothers is a particularly strong predictor of enrolment in ECEC (OECD, 2019[17]). The children of parents in the United Kingdom who have not completed tertiary education[5] are less likely to be enrolled in ECEC programmes (OECD, 2019[17]). These children are also less likely to complete upper secondary school and advance to higher levels of education than those with at least one tertiary-educated parent.

Parental employment

Across OECD countries, having children decreases the probability that mothers will be employed on a full-time basis (OECD, 2016[18]). While the overall employment rate of mothers and fathers has remained higher than that of men and women of similar age without dependent children, half of mothers in England work 30 or more hours in their regular working week compared to almost three-quarters of women without dependent children (Carter, 2018[1]). This is despite mothers having experienced the largest increase in employment rates over the past two decades.

The current employment rate of 74.8% for mothers in England – up from 61.9% in 1996 – is lower than that of fathers, which is at 92.7% (Vizard, 2019[19]). Mothers with a child under five years old are also less likely than men and women with older children or those without children to be employed. The employment rate of mothers with children under five peaks at 69.4% for mothers of children aged four, and increases from 74.7% to 82.3% as the child gets older. For fathers, the employment rate ranges from 90.3% to 92.9%, depending on the age of the child. The employment rate of mothers is partly driven by the costs of childcare negatively affecting maternal labour-market participation (Thévenon, 2013[20]; Carter, 2018[1]).

Figure 2.6 **Employment rates for men and women with dependent children, by age of youngest dependent child, England**



Source: Carter (2018[1]), Families and the labour market, England: 2018, https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/familiesandthelabourmarketengland/2018 (accessed on 9 April 2019).

StatLink https://doi.org/10.1787/888934098383

Statutory maternity leave in the United Kingdom is 52 weeks (Gov.uk, 2019[21]), which is lower than the OECD average of 55.2 weeks (OECD, 2017[22]). Maternity pay in the United Kingdom lasts 39 weeks and amounts to 90% of the average weekly earnings for the first six weeks (Gov.uk, 2019[21]). Mothers are then eligible for the lower amount of between GBP 148.68 and 90% of their average weekly earnings for the next 33 weeks. Up to 50 weeks of leave and up to 37 weeks of pay can be shared between the mother and her partner (Gov.uk, 2019[23]).

STRATEGIES TO STRENGTHEN EARLY LEARNING IN ENGLAND

Statutory entitlements

While education is compulsory for all children between the ages of 5 and 18 in England, the early years have received increased attention over the past 15 years. The Education Act 2002 extended the national curriculum to cover children from the age of three until the end of reception year, when children are five years old. This legislation was later superseded by the Children's Act.

The United Kingdom government's Department for Education (DfE) has overall responsibility for the education system in England. The DfE aims to provide high-quality ECEC services that meet the needs of both parents and children. This involves preparing children for the transition to year one of primary school by prioritising skills that predict success, helping families with the cost

and hours of eligible ECEC provision, and developing the ECEC workforce to increase the quality of ECEC provided (Department for Education, 2016[24]). Policy actions also emphasise the quality of and access to ECEC services by disadvantaged children to improve their life chances and social mobility (Department for Education, 2017[25]).

The Childcare Act 2006 (Childcare Act 2006[26]) requires local authorities (LAs) to provide ECEC services free of charge. The aim of the act is to support LAs in improving the well-being of young children in their area and reducing inequalities. LAs are required to inform parents of the provision of childcare in their area, including funded early years places and how to find them. The Childcare Act also requires LAs to provide sufficient ECEC places so that parents may either work or participate in education or training opportunities that allow them to obtain work. Parents whose income is below a certain level are eligible for extra support to help pay for childcare costs through Working Tax Credit and Universal Credit.

The entitlement to ECEC currently covers two-, three- and four-year-olds at the pre-primary level (ISCED 0[6]). Part-time provision of ECEC is free of charge for disadvantaged children from the age of two, and for all children from the age of three. Children are entitled to attend a primary school reception class full-time from the academic year after their fourth birthday.

The provision of free ECEC is justified by evidence from a number of influential English studies – including the Effective Provision of Preschool Education (EPPE) project (Sylva et al., 2010[27]). These show that the benefits of high-quality early education start as early as two years old (Sylva et al., 2003[28]; Smith et al., 2009[29]). The EPPE project has provided some of the most comprehensive research on the determinants of early learning outcomes.

Table 2.2 **Entitlements to free ECEC in England**

Age	ECEC entitlement	Eligibility
2-year-olds	15 hours free (since September 2013; further extended in 2014)	Low-income families where parents earn GBP 15 400 or less (Universal Credit) or GBP 16 190 or less (Working Tax Credit) Children looked after by the LA Children from families in receipt of specified benefits
3- and 4- year-olds	Universal 15 hours free (since September 2010 – up from 12.5 hours)	All three and four year-old children
3- and 4- year-olds	Extended 30 hours free (since September 2017)	Children of parents/sole parent earning the equivalent of 16 hours a week at (or above) the national minimum or living wage, and each earning less than GBP 100 000 per year

Since 2010, all three- and four-year-old children have been entitled to 570 hours of ECEC per year (the equivalent of 15 hours of free education for 38 weeks a year). This is referred to as the universal funded early education entitlement. All four-year-olds have been entitled to funded early education since 1998. Entitlement for all three-year-olds started in 2004 – initially at 12.5 hours per week for 38 weeks of the year.

Take-up of the programme has been high, with about 95% of three- and four-year-olds attending some form of funded early education in private, voluntary or independent providers or maintained (state-funded) nursery, primary, secondary and special schools. In 2018, there were about 80 000 providers offering 2.8 million registered childcare places between group-based providers, school-based providers and childminders (Department for Education, 2018[30]).

For families where each parent or the sole parent earns the equivalent of the National Minimum Wage or Living Wage (or above) for at least 16 hours a week, the entitlement to ECEC doubled to 1 140 hours per year in 2017 (the equivalent of 30 hours of free education for 38 weeks a year) (Childcare Act 2016[31]). This is referred to as the extended funded early education entitlement.

In addition to the universal entitlement for three- and four-year-olds, two-year-olds living in disadvantaged households – including those looked after by LAs and those from families in receipt of specified benefits – have been entitled to 15 hours of education for 38 weeks a year since 2013 (Secretary of State for Education, 2014[32]). Two-year-olds from low-income families, those with special needs and those who have left LA care have also been eligible for funded ECEC since 2014 (Secretary of State for Education, 2018[33]).

Framework for learning and development

The Early Years Foundation Stage (EYFS) framework – put into law by regulations made under the Childcare Act 2006 and first implemented in 2008 – supports the quality of ECEC delivered in all registered settings. The EYFS sets out the values and goals of the ECEC system and the overall standards that providers must meet for children's learning and development between birth and the compulsory schooling age of five. It also describes the assessment requirements that regulate what practitioners assess and how child progress is discussed with parents (Department for Education, 2017[12]).

The framework sets out the requirements for ECEC in terms of learning and development areas, early learning goals and assessment arrangements. It also sets out the statutory safeguarding and welfare requirements. It applies to all maintained schools, non-maintained schools, independent schools, providers on the Early Years Register and providers registered with an early years childminder agency (Department for Education, 2017[12]).

The EYFS does not impose a particular pedagogical approach. Instead, it describes best practices in ECEC, including guidance for staff on pedagogy. The EYFS recognises the importance of play-based activities and a balance of adult-led and child-initiated activities (Siraj-Blatchford and Manni, 2008[34]; Siraj-Blatchford and Nah, 2014[35]). It requires that learning take place through play-based activities that are a mix of both adult-led and child-initiated activities. Practitioners are also required to consider the individual interests and development of children when planning learning activities.

Practitioners are encouraged to adapt the curriculum to the needs of different children. A non-statutory guidance booklet provides examples of best practice for practitioners and inspectors (Early Education, 2012[36]). The booklet helps professionals implement the EYFS statutory guidelines and informs them on child development and developmental outcomes through the early years.

The EYFS prioritises seven areas of learning that describe the expected level of development for children by the end of reception year (Department for Education, 2017[12]). These are further divided into 17 Early Learning Goals. The EYFS promotes balance between the development of academic and literacy skills, social-emotional development and creative and physical development. The areas of learning consist of three prime areas: 1) communication and language; 2) physical development; and 3) personal, social and emotional development. There are also four specific areas: 1) literacy; 2) mathematics; 3) understanding the world; and 4) expressive arts and design. Providers are required to support children in these areas through activities and experiences.

Table 2.3 **Early Years Foundation Stage framework**

Area of learning and development		Early learning goal
Prime areas of learning	**Communication and language**	1. Listening and attention 2. Understanding 3. Speaking
	Physical development	4. Moving and handling 5. Health and self-care
	Personal, social and emotional development	6. Self-confidence and self-awareness 7. Managing feelings and behaviour 8. Making relationships
Specific areas of learning	**Literacy**	9. Reading 10. Writing
	Mathematics	11. Numbers 12. Shapes, spaces and measures
	Understanding the world	13. People and communities 14. The world 15. Technology
	Expressive arts and design	16. Exploring and using media and materials 17. Being imaginative

The EYFS promotes teaching and learning for children's school readiness and progress through school and life. The three prime areas of learning encompass the key skills children need to develop and learn. They are also the basis for successful learning in the other four specific areas of learning.

The DfE has recently consulted on changing the learning and development requirements in the EYFS. The changes aim to strengthen language development in the early years. The revisions also aim to help reduce the emergent gaps in language and literacy skills between socio-economic groups.

Assessments of child progress

The DfE requires national assessments in the early years to help parents and practitioners better understand a child's progress and future needs. This is supplemented by ongoing formative assessments that involve practitioners observing children to understand their current level of learning. Practitioners can then use this information to customise the child's learning experiences moving forward.

Child assessments on the goals of the EYFS take place at two critical junctures: at two years old and before the child makes the transition to year one of primary school. The second assessment creates an individual EYFS Profile (EYFSP) for every child, which parents and primary school teachers may use to facilitate the transition between reception and year one.

Between the ages of two and three, practitioners review the child's progress and provide parents with a written summary of their child's development in the prime areas of learning. This progress check allows practitioners to understand the learning needs of each of the children in their care. The assessment also allows practitioners to identify children with special educational needs (SEN) so that they may receive appropriate support, after consulting with parents. This allows practitioners to work with parents to access services from other agencies as needed.

The EYFSP is an assessment of children's early learning at the end of reception year. Reception teachers assess whether the child is meeting, exceeding or emerging towards the expected levels of development. They describe the child's abilities in relation to three "characteristics of effective learning": playing and exploring, active learning, and creating and thinking critically. The assessment consists of staff observations, interactions with children and discussions with parents. It provides an overview of a child's ability and their progress against the early learning goals in the EYFS framework. Year one teachers and parents receive the results to support the child's transition to the next phase of their education. The information is also used to create the national EYFSP data set.

Monitoring the quality of provision

England imposes a legal requirement – outlined in the EYFS framework – to monitor the quality of ECEC settings. The Office for Standards in Education, Children's Services and Skills (Ofsted) and inspectorates of independent schools carry out inspections and report on the quality of provision based on the principles and requirements of the EYFS. Quality measures include the EYFSP outcomes and the results of Ofsted inspections.

Ofsted is a non-ministerial government department that inspects registered early years providers and schools – including public providers, independent for-profit and non-profit providers and home-based childcare. Ofsted is independent of the DfE and operates "without fear or favour" (Ofsted, 2017[37]). It reports directly to a parliamentary select committee made up of members of parliament from different political parties.

Settings that wish to provide childcare – including childminder agencies – must register with Ofsted under sections 49 and 50 of the Childcare Act 2006. Once a provider is registered on the Early Years Register, Ofsted carries out regular inspections to evaluate the overall quality and standards of the early years provision – in line with the principles and requirements of the statutory framework for the EYFS. Inspections occur at least once in every inspection cycle.

Newly registered providers on the Early Years Register are usually inspected within 30 months of their registration date. Ofsted considers any information about early years providers that indicates they may be breaching the requirements of the EYFS and takes enforcement action where necessary. Ofsted publishes its inspection reports on the quality and standards of provision at www.gov.uk/ofsted.

Inspections evaluate the overall quality and standards of the early years provision, including the requirements on safeguarding and welfare as well as those on learning and development set out in the EYFS (Ofsted, 2015[38]). Providers are judged on a four-point scale. They are rated as either "outstanding", "good", "requires improvement" or "inadequate". Re-inspections occur within 12 months for providers judged as requiring improvement. For providers judged as inadequate, re-inspections occur within six months. Local Authorities (LAs) also support the improvement of settings through a variety of training schemes.

Inspectors make graded judgements on the following areas using the four-point scale (Ofsted, 2019[39]):

- quality of education
- behaviour and attitudes
- personal development
- leadership and management

As part of the inspection, inspectors use their professional judgement to interpret and apply the criteria set out in part two of the inspection handbook. Inspectors consider some factors that may be particular to the setting they are inspecting. This includes whether they are inspecting a childminder with a small number of children or settings that care only for very young children. In all cases they consider the different ages and stage of development of the children attending.

Ofsted also assesses the quality of pedagogical practices. While Ofsted does not have a preferred teaching method, it has a definition of teaching, which is included in the early years inspection handbook (Ofsted, 2019[39]). Inspectors evaluate the quality of teaching, learning and assessment, as well as their impact on children's learning, development and well-being.

Parenting programmes

The approach that parents adopt to parenting – including the quality of the home learning environment – is a significant predictor of children's life outcomes (Taggart et al., 2015[40]). The quality of parenting affects children's long-term physical, emotional, social and educational outcomes. An authoritative and cultivating parenting style – where parents are responsive to their children's needs, bond with their children early using positive interactions and conversation and set high standards for behaviour and academic aspirations – can contribute to positive outcomes (Doepke and Zilibotti, 2019[41]; Siraj-Blatchford et al., 2011[42]).

Successful parenting programmes tend to focus on parental understanding of child development, raising the confidence of parents in their role, helping both parents become actively involved in their child's development and upbringing, and reducing stress and tension within the family. Parental circumstances, however, can affect the approach taken. Lack of income, stress and mental health issues, among others, can make it more difficult for parents to bond with their children and use positive parenting practices. Targeted parenting programmes – including good home-to-school transition programmes – can help contribute to better outcomes, particularly for children at risk, those with special needs or those for whom English is not a first language (Clarke and Younas, 2017[43]).

The government provides information resources on parenting and the early years. Parents-to-be and new parents have access to digital services through emails, videos and texts that offer advice based on the age of the child (Clarke and Younas, 2017[43]). The DfE also publishes a number of resources – including the "What to Expect, When?" handbook – that focus on the first five years of child development for parents.

LAs – charged with the health and education of children from birth to five – have been able to increase their outreach by coupling dissemination services. Sure Start – a programme targeted at parents and children under the age of five – for example, requires each children's centre to have access to at least one named health visitor. Some LAs also deliver parenting programmes through their children's centres, depending on the local assessment of need and commissioning of services.

EARLY CHILDHOOD EDUCATION AND CARE PROVISION IN ENGLAND

Settings that offer ECEC

The childcare market in England is a mixed economy. While the private, voluntary and independent (PVI) sector provides most government- and parent-funded formal ECEC, state-funded nurseries and early years provision within state-funded schools also provide places for children (Patel, 2019[44]).

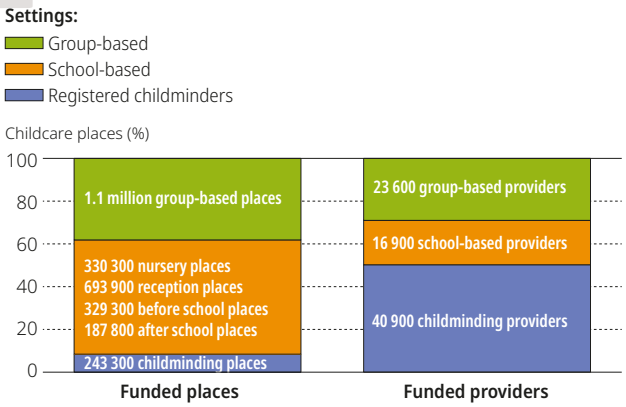
Early years provision in England takes place in a wide variety of settings. PVI settings and childminders can offer both government-funded provision and parent-paid provision (Department for Education (DfE), 2017[45]). PVI settings include day nurseries, independent nursery schools and nursery classes in independent schools, as well as childminders, playgroups, and children's or family centres. These settings are eligible to provide government-funded ECEC if they are registered on the Early Years Register. Maintained nursery schools and nursery classes in maintained primary schools and academies provide government-funded ECEC for two-, three- and four-year-olds. Children are also entitled to start full-time reception class in a maintained primary school from the academic year after their fourth birthday. No entitlement to free provision exists for children below the age of two, although parents may choose to use Tax-Free Childcare or the childcare element of Universal Credit to support the costs of ECEC provision.

By the end of 2018, about 77 000 ECEC providers were registered in England with Ofsted (Patel, 2019[44]). These constituted group-based providers who operate in non-domestic premises, childminders (who usually operate in domestic settings) and school-based providers. School-based providers included about 7 300 schools with reception but no nursery provision, 9 200 providers with reception and nursery provision, and 400 maintained nursery schools.

ECEC providers offer an estimated 2.8 million registered childcare places (Department for Education, 2018[46]). This number has decreased over the years as the number of children in the relevant age range in the overall population has also decreased. Group-based providers currently offer the largest average number of places at 45. School-based nurseries offer about 39 places on average, with reception classes offering 42 places on average. Childminders offer on average 6 places due to the maximum statutory requirements, which explains why childminders constitute the largest share of providers but a relatively lower share of places.

About 430 500 early years staff were employed across group-based or school-based settings and childminders or childminding assistants to provide ECEC services in 2018 (Department for Education, 2018[46]). Group-based providers employ more than half of the early years workforce. Some 30% work in reception and nursery settings and 11% work as childminders or assistants. Some 12% of childminders employ at least one assistant.

Figure 2.7 **Proportion and number of childcare providers that receive government funds, by type of setting, England**



Source: Department for Education (2018[45]), Survey of Childcare and Early Years Providers, England, 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/752919/Survey_of_Childcare_and_Early_Years_Providers_2018_Main_Summary3.pdf (accessed on 15 March 2019).

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ECEC providers can be grouped into three settings: 1) formal in PVI settings; 2) formal in maintained settings; and 3) formal in domestic settings.

Formal PVI settings include those outside the state sector, such as voluntary sector preschools and privately run nurseries. While all formal settings are eligible for government funding, private nurseries are for-profit settings that typically offer the free entitlements. Voluntary sector providers include not-for-profits and social enterprises. They tend to operate out of community or school sites rather than premises they own.

Maintained settings include state nursery and reception classes within state primary schools, and maintained nursery schools. The latter typically operate in areas of greater disadvantage to support ECEC in these areas (Paull and Popov, 2019[47]).

Formal domestic settings include childminders. These make up the largest share of the market in terms of absolute number of providers. A childminder typically works in their own home looking after children for a fee. With the restriction of 3:1 child-to-staff ratio requirements for children under five, however, the share of places with childminders is limited.

Informal domestic settings include relatives, friends or nannies. These are not eligible for government funding (Naumann et al., 2013[48]). Children are also under informal care if looked after by grandparents, neighbours or other home carers. Grandparents remain the largest informal provider of ECEC in England (Department for Education, 2019[49]).

A qualified workforce

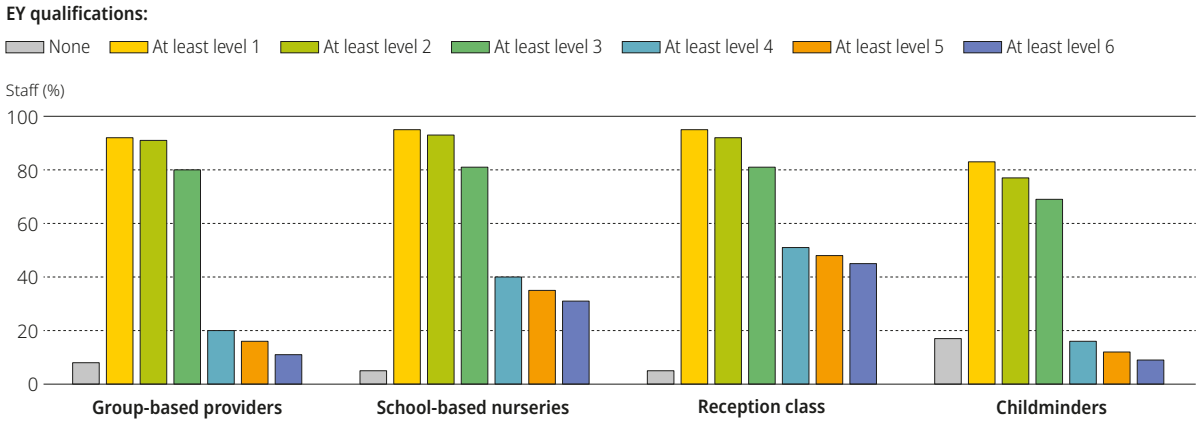
Practitioners need a number of professional competences and skills to offer high-quality learning opportunities to young children (Stuhlman and Pianta, 2009[50]). The statutory EYFS framework sets out the requirements for staff-to-child ratios in early years settings and the qualifications practitioners must hold (Department for Education, 2017[12]). This approach recognises that high-quality pedagogy is linked to both curricula and staff qualifications.

England has continued to raise its staff qualification standards. England requires that ECEC providers meet statutory qualification requirements. In group settings, managers must hold at least a full and relevant level 3 qualification. Half of all other staff must hold at least a full and relevant level 2 qualification. The manager must also have at least two years of experience working in an early years setting or have at least two years of other suitable experience. While there is no requirement for graduates in PVI settings, staff who lead classes in maintained settings are required to have qualified teacher status (QTS) (Department for Education, 2017[12]), which may be either level 6 or 7.

Childminders must also complete training to understand and implement the EYFS before they can register with Ofsted or a childminder agency. Childminders are accountable for the quality of the work of any assistants and must be satisfied that assistants are competent in the areas of work they undertake.

England's average child-to-staff ratio for preschool-aged children is lower than the OECD average, which ranges from 12:1 for pre-primary education and 8:1 for early childhood education (OECD, 2015[51]; OECD, 2017[52]). While there are statutory staffing requirements in England, providers tend to operate with fewer children per staff member than is required. The average child-to-staff ratio for three- and four-year-olds at private and voluntary providers is 6:1, compared to a statutory minimum of 8:1. For three- and four-year-olds at school nurseries, the average is closer to 10:1, while the statutory minimum is 13:1. For two-year-olds, the average child-to-staff ratio is 3:1, and the statutory minimum is 4:1 at private and voluntary providers.

Figure 2.8 **Proportion of staff qualified to different levels, by type of setting, England**



Source: Department for Education (2018[45]), Survey of Childcare and Early Years Providers, England, 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/752919/Survey_of_Childcare_and_Early_Years_Providers_2018_Main_Summary3.pdf (accessed on 15 March 2019).

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Staff-child ratios affect teaching quality and child development (Love et al., 2003[53]). Higher staff-child ratios are especially beneficial for younger children (Sylva et al., 2010[27]). A lower number of children per practitioner makes it possible for staff to pay more individualised attention to each child and allows for more interaction. In England, however, higher staff ratios in settings also serve to partly offset the pay and pension contributions that would be required for staff with higher levels of qualifications.

Training an ECEC workforce

Qualified teacher status (QTS) is required to lead classes in primary school from nursery to year six. Practitioners in England must meet the teachers' standards set out by the DfE in order to be accredited with QTS. The teachers' standards define the minimum level of practice expected of any qualified teacher. While QTS is mandatory for appointment in a maintained school, the majority of teachers in academies also have this qualification.

The DfE defines the minimum requirements for an early years educator qualification. These qualifications set out the minimum knowledge, understanding and skills that an early years practitioner needs to support young children from birth to the age of five. Practitioners need to meet the level 2 and 3 qualifications to be included in the required staffing ratios specified in the EYFS framework.

At level 2, practitioners need to demonstrate proficiency in: 1) knowledge of child development; 2) safeguarding; 3) health and safety; 4) well-being; 5) communication; 6) support in the planning and delivery of activities, purposeful play opportunities and educational programmes; 7) support of children with special educational needs and disabilities; 8) own role and development; and 9) working with others – parents, colleagues and other professionals (Department for Education, 2018[54]). Required competencies at level 3 include: 1) support and promote children's early education and development; 2) plan and provide effective care, teaching and learning that enables children to progress and prepares them for school; 3) make accurate and productive use of assessment; 4) develop effective and informed practice; 5) safeguard and promote the health, safety and welfare of children; and 6) work in partnership with the key person, colleagues, parents and carers or other professionals (Department for Education, 2019[55]).

Most programmes that accredit QTS involve both academic qualification in education and professional accreditation. Completing primary initial teacher training – either via a bachelor of education undergraduate degree (level 6) or a post-graduate certificate of education (level 7) – is the most common graduate route into early years teaching in England.

In addition to the QTS route, professionals working in ECEC in England can qualify with early years teacher status (EYTS). There are three options available to complete early years teacher training that lead to EYTS on successful completion. These include undergraduate entry, graduate entry and graduate employment-based entry. Graduates with prior experience working with children under the age of five are also able to take an assessment to demonstrate that they meet the teachers' standards (early years) without the need to undergo training.

The ECEC workforce in England continues to be predominantly female (98%) (OECD, 2017[56]). While the ratio of female teachers across other OECD countries varies between a limited window of 87% and 99%, the participation of male teachers in ECEC in England is lower than the OECD average. This may be due to the status of the profession, the perceived social roles of men and

women, and the hesitance of certain parents to enrol their children in classes led by men (Warin, 2018[57]). Teacher salaries in England are similar across pre-primary, primary and secondary levels (OECD, 2019[58]). Salary is therefore unlikely to explain differences in the ECEC workforce gender gap.

Financing ECEC provision

The state, private individuals and organisations finance ECEC services in England. Funding of entitlements is a key lever through which the government incentivises provision. Public spending on ECEC is around 0.7% of gross domestic product (GDP), which equates to about GBP 15 billion. Actual spending per enrolled child aged between three and five is about USD 7 500 (in USD PPP),[7] which is close to the OECD average of about USD 8 000 (OECD, 2019[58]).

Entitlements have boosted the demand for places by parents. Two-thirds of parents cite childcare as a critical factor in enabling them to participate in either work or academic study (Department for Education, 2018[30]). Parents tend to keep their children at the same setting based on convenience and the child's familiarity with surroundings and staff (Department for Education, 2015[59]). Entitlements also provide a sustainable source of income for ECEC providers. Providers tend to operate with a mix of age groups – partly for the funding from caring for these different groups (Blainey and Paull, 2017[60]) – preferring children to remain at their setting until they are eligible for a place in a school reception class.

The DfE allocates entitlement funding to LAs so that every three- and four-year-old – as well as eligible two-year-olds – is entitled to a part-time place (the equivalent of 15 hours a week for 38 weeks a year) in an ECEC setting (Agency, 2018[61]). Three- and four-year-olds of working parents are entitled to the equivalent of an additional 15 hours per week (for 38 weeks per year). LAs then allocate funding – in compliance with regulations set by the DfE – to an estimated 70 000 providers who offer the free universal and extended entitlements.

In 2017, the DfE introduced a new LA funding formula for ECEC to improve the distribution of funding. The early years national funding formula (EYNFF) funds three- and four-year-olds, while the two-year-old formula funds ECEC for two-year-olds. In 2019-20, the government aims to allocate around GBP 3.5 billion to these early education entitlements.

The EYNFF for three- and four-year-olds consists of a universal base rate plus factors for additional needs that include measures for deprivation, disability and English as an additional language. The EYNFF also includes an area cost adjustment multiplier to reflect variations in local costs for staff and premises. The funding allocation to an LA is based on the LA's hourly funding rate and the number of entitlement hours taken up by three- and four-year-olds in the LA.

Figure 2.9 **Early years national funding formula for three- and four-year-olds**

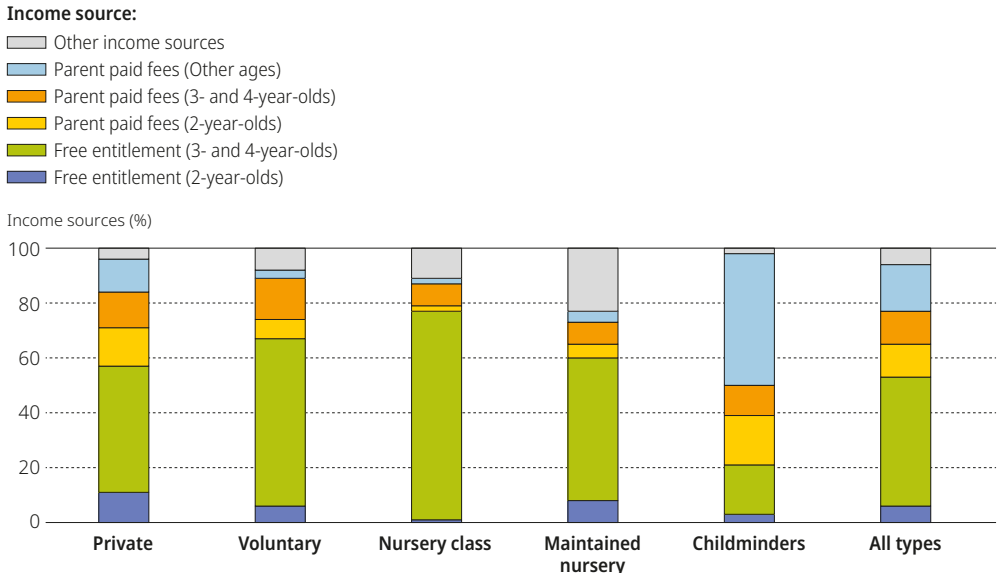


LAs are required to pass at least 95% of the EYNFF budget they receive to ECEC providers. LAs are responsible for setting the funding for individual ECEC providers using a local funding formula. To create a more level playing field, LAs are required to provide a universal base rate to all providers in their local formula. On top of the base rate, additional funding can be paid to providers to reflect local needs through the use of a mandatory supplement for deprivation, and other discretionary supplements for quality, flexibility of provider opening hours, rurality or a sparsity of providers, and providing for English as an additional language. LAs are required to establish a SEN inclusion fund to support early years providers in meeting the needs of individual children with SEN.

The government provides two financing mechanisms in addition to the universal and extended ECEC entitlements: Tax-Free Childcare and the childcare elements of Universal Credit. Tax-Free Childcare is available for 0-12 year-olds. It provides a GBP 2 supplement from the government for every GBP 8 parents pay into an online account – up to a maximum contribution of GBP 2 000 per child per year. The childcare element of Universal Credit reimburses up to 85% of childcare costs based on parental earning from paid work, monthly childcare costs and the number of children in the family.

Settings receive the majority of their income from a mix of parent-paid fees and the free entitlement funding (Paull and Xu, 2019[62]). More than half of the income of all school-based providers comes from the free entitlement, although the exact proportion tends to vary by the type of setting. Private providers tend to receive more than others from parent fees, and maintained settings receive more from other contributions. Childminders receive over three-quarters of their income from parent fees and less than a quarter from free entitlement funding.

Figure 2.10 **Income sources of ECEC settings, by type of setting, England**



Source: Paull and Xu (2019[62]), Early years providers cost study 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/782471/Frontier_-_Childcare_Cost_Study.pdf (accessed on 24 April 2019).

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The mix of funding sources for settings also depends on the age of the child and the number of hours they are enrolled in ECEC (Paull and Xu, 2019[62]). The free entitlement to 15 hours a week for eligible two-year-olds accounts for about one-third of income for centres that cater for that age group. The universal entitlement to 15 hours of childcare for all three- and four-year-olds – and the extended entitlement to 30 hours for eligible children – accounts for more than three-quarters of income for centres that cater for those age groups. Over half of settings also have additional charges for items such as meals, trips and extra activities. These charges average between GBP 0.08 and GBP 0.14 per childcare hour (Paull and Xu, 2019[62]).

The cost of provision is mostly driven by the staffing choices that providers make, and how quickly that can change based on fluctuating demand. Staff costs make up about 80% of overall costs for group-based and school-based providers, although this is lower for childminders and informal settings (Department for Education, 2018[30]). Settings with higher average staff qualifications, lower child-to-staff ratios and smaller group sizes have higher costs. Costs also vary based on occupancy. Hourly costs for ECEC have risen at a faster rate than can be explained by inflation and minimum wage and pension contribution policy changes over the past few years (Paull and Xu, 2019[62]).

PARTICIPATION RATES IN ECEC

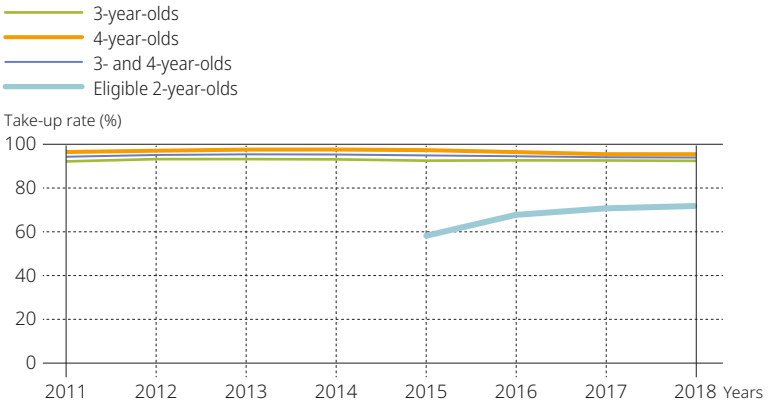
Expanding participation for all children in ECEC

Although participation in ECEC services is voluntary, most children attend some form of full- or part-time setting. Very few children remain at home until the start of compulsory primary education. The age of compulsory primary education begins the term after the child's fifth birthday, but all children are entitled to a place in primary reception class from the term after their fourth birthday. In 2018, 95% of all four-year-olds, 92% of all three-year-olds and 72% of all eligible two-year-olds participated in some form of funded ECEC (Department for Education, 2018[8]). About 76% of eligible children benefitted from the extended 30 hours of ECEC provision.

Most two- and three-year-olds who take up state-funded ECEC provision attend a setting run by private and voluntary providers (Department for Education, 2018[8]). About 82% of two-year-olds with a funded ECEC place attend group-based private and voluntary providers, and an additional 4% are under the care of childminders. About 61% of three-year-olds with a funded ECEC place attend private and voluntary providers, and an additional 4% are under the care of childminders. The share of children attending a maintained nursery or nursery classes in primary schools has decreased slightly over the last few years.

Most three- and four-year-olds who benefit from funded ECEC places attend group-based provision in a nursery class, day nursery or playgroup. Because most children make the transition from ECEC to school reception class at the beginning of the school year in which they turn five, a lower proportion of four-year-olds attend private and voluntary providers. Some 63% of four-year-olds attend reception classes in primary schools, and an additional 13% of four-year-olds attend nursery classes in primary schools.

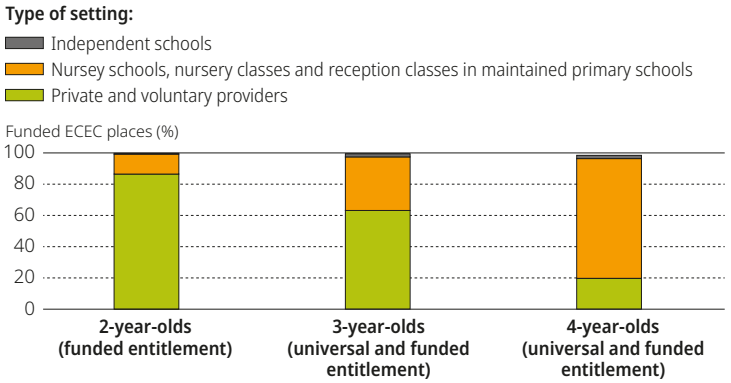
Figure 2.11 **Take-up of state-funded universal early education among 3- and 4-year-olds, and take-up of state-funded early education among eligible 2-year-olds, 2011 to 2018, England**



Source: Department for Education (2018[8]), Provision for children under 5 years of age in England, January 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/719273/Provision_for_children_under_5_2018_-_text.pdf. (accessed on 4 April 2019).

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Figure 2.12 **Funded ECEC places, by type of setting and age of child, England**



Source: Department for Education (2018[8]), Provision for children under 5 years of age in England, January 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/719273/Provision_for_children_under_5_2018_-_text.pdf (accessed on 4 April 2019).

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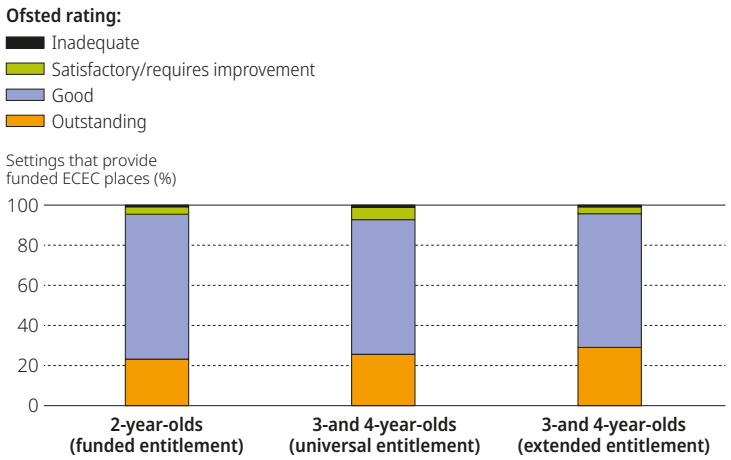
The quality of funded early education settings – as reported by Ofsted – is high (Department for Education, 2018[8]). Only 1% of children benefitting from funded ECEC places attend a setting rated as inadequate. The majority of children attend settings rated as good, and about a quarter attend a setting rated as outstanding.

Children in England receive their entitlement to government-funded ECEC an average of about four days per week, with variation based on age (Department for Education, 2019[49]). This ranges from an average of three days for eligible two-year-olds to four days for three- and four-year-olds who benefit from the universal and extended entitlements. Parents may opt to enrol their children in more than one ECEC setting to cover the days and times for which they needed childcare. About 6% of children attend two or more providers during the week.

The composition of providers in the market and the hours taken up by parents differ between regions and local areas. Even within postcode areas, large differences can exist between the costs of childcare, partly due to the supply mix. Preschool-aged children are also more likely to require full-day care, for which private providers are the most common and usually the most expensive option.

The most common reported parental constraint on using childcare is affordability (Department for Education, 2018[30]). Provider supply, trust or quality appear to be less of an issue. This has implications for access by income level. Some 62% of children aged 0 to 14 living in the least deprived areas receive formal childcare, compared to 44% of children living in the most deprived areas. Most parents who do not use childcare choose to look after their children themselves.

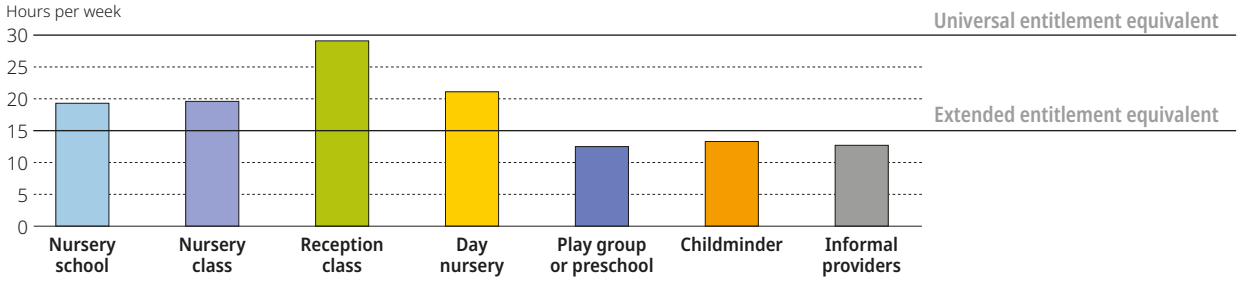
Figure 2.13 **Ofsted ratings of settings that provide funded ECEC places, by age of child**



Source: Department for Education (2018[8]), Provision for children under 5 years of age in England, January 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/719273/Provision_for_children_under_5_2018_-_text.pdf (accessed on 4 April 2019).

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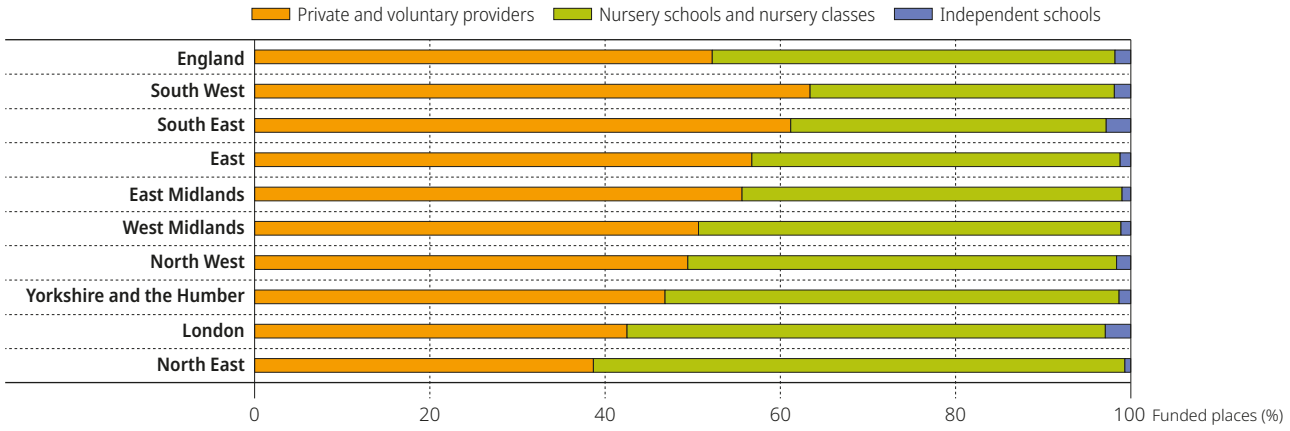
Figure 2.14 **Average number of hours per week children under 5 spent in an ECEC setting, by type of provision, England**



Source: Department for Education (2019[29]), Childcare and Early Years Survey of Parents in England, 2018, https://www.gov.uk/government/consultations/surveys-on-childcare-and-early-years-in-england.

StatLink https://doi.org/10.1787/888934098516

Figure 2.15 **Proportion of funded places, by type of setting and region, England**



Source: Department for Education (2018[8]), Provision for children under 5 years of age in England, January 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/719273/Provision_for_children_under_5_2018_-_text.pdf (accessed on 4 April 2019).

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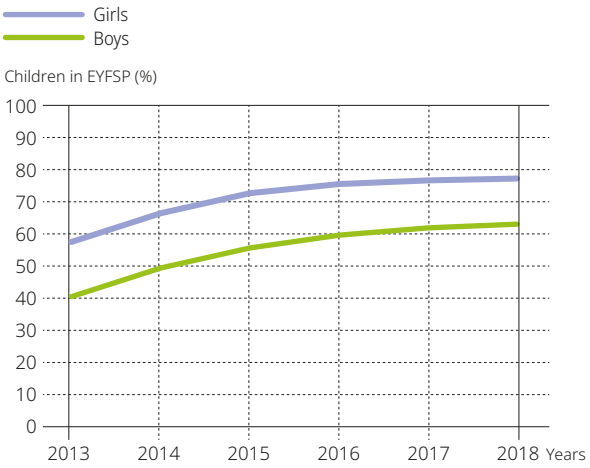
THE QUALITY OF EARLY CHILDHOOD EDUCATION AND CARE SERVICES AND THEIR IMPACT ON LEARNING OUTCOMES

Outcomes across the system

England's national assessments – as well as its participation in international assessments – provide an informative snapshot of learning outcomes at different critical stages. The assessments emphasise England's commitment to measuring pupil progress throughout the education system. In addition to learning outcomes, the assessments gather contextual information about students, teachers, schools and systems that lead to adaptations in teaching methods to improve learning and inform evidence-based policy. Assessments of learning in key subjects – such as language, mathematics or science – are a good proxy for the performance of the education system as a whole. Focusing on the quality of education through measures of learning is also likely to encourage other desirable outcomes.

The share of children with at least the expected level of development in the EYFSP early learning goals has been increasing since 2013 (Department for Education, 2018[63]). At the age of five, about 70% of children in England had achieved at least the expected level of development in 2018 based on practitioner observations. This had increased from about 49% in 2013 and 69% in 2017. While girls continue to score higher than boys, the gender gap in the expected level of development measure has been gradually decreasing each year, with boys improving faster than girls in all key measures.

Figure 2.16 **Percentage of children achieving at least the expected level in the EYFSP, by gender, 2013 to 2018, England**



Source: Department for Education (2018[59]), Early years foundation stage profile results in England, 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/748814/EYFSP_2018_Main_Text.pdf.

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In 2018, 82% of pupils in England passed a national phonics screening check at the end of year one – at about the age of six (Department for Education, 2017[64]). The check consists of students reading aloud 20 words and 20 pseudo-words to their teacher. In 2012, only 58% of children in year one had passed the check. This translates to 163 000 more six-year-olds on track to become fluent readers in 2018 than in 2012. By the end of year two, 92% of children had met the expected standard in 2018 – a 10 percentage point increase between year one and year two.

Year five children – between the ages of nine and ten – in England score significantly higher than the international median on the Progress in International Reading Literacy Study (PIRLS) (McGrane et al., 2017[65]). They also place among the highest performers in Europe. PIRLS provides internationally comparable data on student reading performance after approximately four years of formal primary schooling. As in other participating countries, the performance of students in England varies by the student's home learning environment – measured through factors that include the number of books the student has in their home – as well as their socio-economic status – measured by free-school-meal eligibility. A significant gender gap exists in England, with girls outperforming boys, although the size of the gap is consistent with the international median.

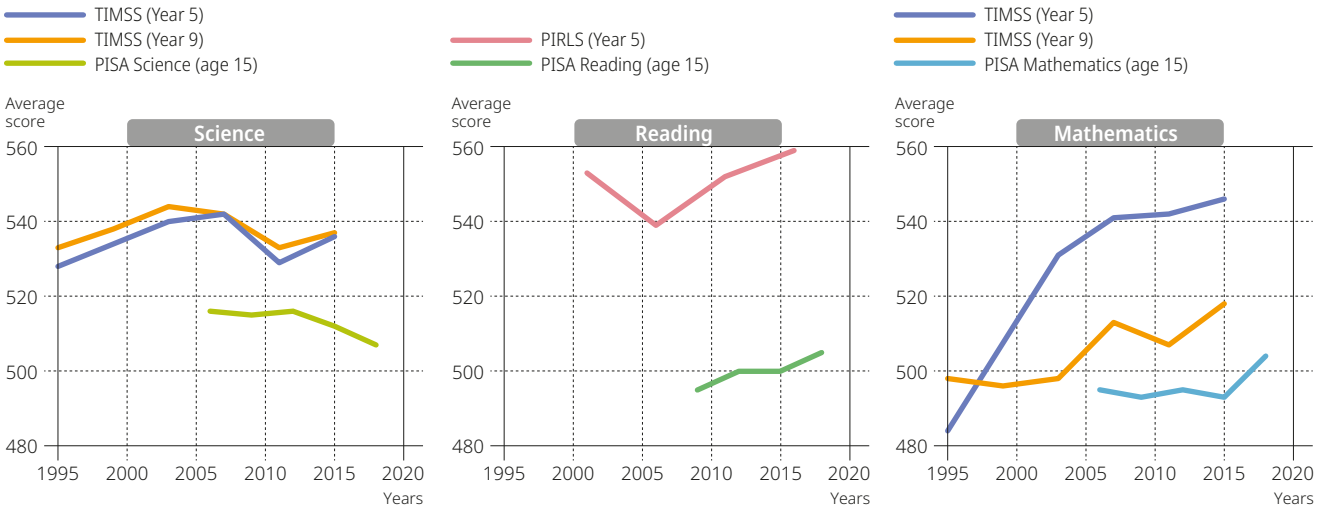
Students in years five and nine in England also scored significantly higher than the international mean in mathematics and science in the 2015 Trends in International Mathematics and Science Study (TIMSS) (Greany et al., 2016[66]). TIMSS provides internationally comparable data on the performance in mathematics and sciences and attitudes of students in year five (between the ages of 9 and 10 years old) and in year nine (between the ages of 13 and 14). England's performance over the last 20 years

has gradually improved in both subjects and across age groups, placing it in the second highest-performing group of countries. However, there continue to be differences in performance by socio-economic status. England has a relatively large performance gap between the average achievement of disadvantaged and advantaged students when compared to similar countries.

At the age of 15, students in England scored above the OECD average in science, reading and mathematics (OECD, 2019[67]). Average scores have changed little since 2006, although mathematics scores did rise between 2015 and 2018. Students in England who attended ECEC for two years or more scored higher on the 2018 PISA tests than their peers, even after accounting for socio-economic background.

There is a large performance gap between the top and bottom 10% of students based on their 2018 PISA outcomes in England (Sizmur et al., 2019[68]). This gap amounts to over eight years of schooling in reading, mathematics and science. This gap is larger than the OECD average in science and similar to the OECD average in reading and mathematics. Large differences in performance also exist across other characteristics, including socio-economic status, ethnicity and migrant background. There is a difference of almost three years of schooling between students in the most and least advantaged socio-economic quartiles. White students are more likely to score higher than their Black or Asian peers. Students from immigrant backgrounds are more likely to score lower than their peers who were born or raised in the United Kingdom. Similarly, there is about a two-year gap across subjects between students in schools rated as outstanding by Ofsted and those rated as inadequate/requiring improvement (Jerrim and Shure, 2016[69]).

Figure 2.17 **Performance of students on international assessments of science, reading and mathematics, 1995 to 2019, England**



Note: Each study's scale is determined independently. Direct comparison across studies and within studies should not be made.
Source: PIRLS International Database, PISA Database, TIMSS International Database.
StatLink https://doi.org/10.1787/888934098573

Home environment and student well-being

The Effective Pre-school, Primary and Secondary Education Project (EPPSE) longitudinal study emphasises the influence that the home environment has on outcomes up to age 16 (Taggart et al., 2015[40]). Parent educational attainment is the strongest predictor of performance in GCSEs, while socio-economic status predicts self-regulation and prosocial behaviour. Disadvantaged families had lower full GCSE grades in English and mathematics, and neighbourhood disadvantage predicted lower GCSE scores and poorer development in self-regulation and prosocial behaviour.

Attending preschool predicts both educational attainment at age 16 and future lifetime gross earnings (Taggart et al., 2015[40]). Attending preschool predicts a higher likelihood of an academic pathway (4+ A/AS levels) and a lower likelihood of opting for a less academic route. Using GCSE scores to predict future lifetime earnings, attending preschool also has an expected return of GBP 26 788 for an individual and GBP 35 993 for an average household (Cattan, Crawford and Dearden, 2014[70]). Children who attend a higher quality preschool setting are expected to earn GBP 12 335 more over their lifetime.

These factors all contribute to the perceived well-being of students as they progress through their education. 15-year-olds in England were less likely to report that they were satisfied with their lives than 15-year-olds across the United Kingdom or across the OECD countries (OECD, 2019[71]). Boys and students from advantaged families were more likely to report being very satisfied with life.

Similarly, while the majority of 15-year-olds in England report feeling that they belong in their school, that share is lower than the OECD average. Children from disadvantaged families are more likely to report feeling that they do not belong than their peers from more advantaged families. Fifteen-year-olds in England are also more likely to report being exposed to bullying than the OECD average, with over a quarter reporting that they have been bullied at least a few times a month. Schools that reported a low incidence of bullying scored 38 points higher in PISA 2015 than schools reporting high levels of bullying (OECD, 2017[72]).

POLICY ISSUES AND DEBATES AROUND EARLY LEARNING

Perpetuating socio-economic disadvantage

The community in which children grow up continues to influence the quality of schools they attend and, ultimately, their life outcomes (Department for Education, 2017[25]). Children from disadvantaged families often enter primary school with large gaps in their cognitive and social-emotional development when compared with their more advantaged peers. For example, 45% of children eligible for free school meals do not have the knowledge, skills and understanding expected for their age by the time they finish reception year (Department for Education, 2018[63]). Among disadvantaged students, 72% meet the expected phonics standard at the end of year one, compared to 85% of all other pupils.

The gap in performance persists – and grows – during the later school years (Melhuish, Gardiner and Morris, 2017[73]). Only about half of all children who had not reached the expected level at the age of 5 went on to achieve the national benchmark in reading, writing and mathematics at the age of 11 (Taggart et al., 2015[40]). Children with poor vocabulary at the age of 5 are also more than twice as likely to be unemployed at the age of 34 (Law et al., 2009[74]).

The gap in performance becomes increasingly hard – and expensive – to close as the child grows older (Cunha et al., 2006[75]; Center on the Developing Child at Harvard University, 2016[76]). On average, disadvantaged children lag the equivalent of 4.3 months of learning behind their more advantaged peers by the end of reception year (at around the age of 5). This gap more than doubles to 9.4 months by the age of 11 and grows to 18.4 months by the age of 16 (Crenna-Jennings, 2018[77]).

Children from disadvantaged families or those with an immigrant background benefit the most from attending quality ECEC (OECD, 2019[17]; Cattan, Crawford and Dearden, 2014[70]). This is especially true for those who lag behind their peers from an early age (Speight et al., 2015[78]). While the benefits of attending ECEC apply to all children, those from disadvantaged families have a lower starting base, are less likely to attend childcare settings and, therefore, have more to gain from ECEC (Melhuish, Gardiner and Morris, 2017[73]). Children also benefit most from classrooms that are a mix of different socio-economic groups, rather than homogenously disadvantaged groups (Melhuish et al., 2008[79]).

Due to the compounding effect of disadvantage, children from disadvantaged families do not receive the same quality of home learning environment as their more advantaged peers (HM Government and National Literacy Trust, 2018[80]). Three-year-old children from disadvantaged families, for example, are 37 percentage points less likely to be read to every day than their most advantaged peers (Department for Education, 2017[25]). The home learning environment is predictive of a child's verbal ability from as early as two or three years old (Melhuish, 2010[81]). Overall, children from the most deprived families are 20 percentage points less likely to meet at least the expected standard in all early learning goals on the EYFSP (Department for Education, 2018[63]). The quality of a child's home learning environment is as important a predictor of early learning outcomes as parental factors such as occupation and education (Sylva et al., 2003[28]).

Children from disadvantaged families perform more poorly than their more advantaged peers from as young as the age of two (Feinstein, 2003[82]), therefore starting ECEC at this age is especially beneficial to their life chances (Melhuish and Gardiner, 2018[83]). Attendance at two years old also allows parents greater flexibility in taking up paid employment.

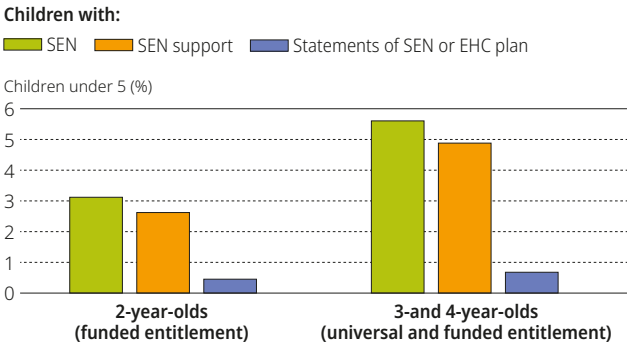
England has committed additional resources to address some of the disparity in the funding of ECEC (Department for Education, 2017[25]). In addition to increasing access through the universal and extended entitlements for three- and four-year-olds, policies include the early years national funding formula, which prioritises increased funding to the areas most in need, and the early years pupil premium, which supports disadvantaged three- and four-year-olds. Disadvantaged two-year-olds are also eligible for 15 hours of free childcare a week. England has also made significant progress in bridging the gap between the quality ratings of ECEC providers in the most and least deprived areas (Ofsted, 2020[84]).

However, children from disadvantaged families are less likely to attend ECEC settings, even when the government funds provision (Speight et al., 2015[78]). Participation at the age of three is almost universal in part-time ECEC, but younger children are more likely to participate if they come from more advantaged families or if their mother completed tertiary education. Similarly, children are more likely to enrol beyond the universal entitlement if they are from families in the wealthier income brackets. This trend is consistent across the OECD (OECD, 2019[17]). This relative under-enrolment of children from disadvantaged families in ECEC services led to about GBP 200 million of allocated funding for two-year-olds going unspent in 2015 (Ofsted, 2016[85]).

Special educational needs

More than 1.27 million school students – about 15% of all those in England – have some form of SEN (Department for Education, 2018[86]). Of those, approximately 253 000 – under 3% – have SEN statements or education, health and care (EHC) plans. The SEN statements and EHC plans are critical and legally binding documents. They detail the type of support the child needs, the outcomes the child will work towards and the setting the child should attend. For students who do receive SEN support, moderate and specific learning difficulties account for about 40% of primary needs, while autistic spectrum disorder accounts for about 28% of primary needs of students with a statement or EHC plan.

Figure 2.18 **Percentage of free ECEC places occupied by children under five with special educational needs, England**



Source: Department for Education (2018[8]), Provision for children under 5 years of age in England, January 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/719273/Provision_for_children_under_5_2018_-_text.pdf (accessed on 4 April 2019).

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In 2016, a new inspection framework was introduced to assess the effectiveness of local areas in undertaking their SEN duties and improving outcomes for children with SEN. Of 68 local areas inspected between 2016 and 2018, 30 areas were required to provide a written statement of action in response to serious concerns (Ofsted, 2018[30]).

The funding mechanism for SEN was changed in 2013. Prior to this reform, SEN funding was allocated as part of the school budget to the LA, which, in consultation with school forums, would then determine individual allocation to schools. As part of the revised formula for funding schools, LAs now have access to funding through a national formula, which accounts for funding for students in specialist SEN provision, historic spending and proxy measures such as population, school attainment and the number of children in bad health. Every LA must now have a SEN inclusion fund to support early years providers in meeting the needs of individual children with SEN (Department for Education, 2018[87]).

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Notes

1. Where data for England are available, these are cited. Data for the United Kingdom are only used in instances where data for England are not available.
2. The total fertility rate in a specific year is defined as the total number of children that would be born to each woman if she were to live to the end of her child-bearing years and give birth to children in alignment with the prevailing age-specific fertility rates.
3. The Gini coefficient is a measure of income or wealth distribution, where 1 corresponds to maximal inequality and 0 represents perfect equality.
4. To compare the skills of adults who have similar qualifications in England with other participating countries, all qualifications are coded to the International Standard Classification of Education (ISCED). Qualifications are then split into three broad categories: 'below upper secondary', 'upper secondary' and 'tertiary'.
5. Population with tertiary education is defined as those having completed the highest level of education, by age group. This includes both theoretical programmes leading to advanced research or high skill professions such as medicine and more vocational programmes leading to the labour market.
6. According to the International Standard Classification of Education (ISCED), ISCED 0 programmes are pre-primary programmes situated in institutional settings that contain an intentional education component, among other criteria. ISCED 01 captures participation by very young children (aged two and under), and ISCED 02 captures participation by slightly older children (aged three to five).
7. Purchasing power parities (PPPs) are the rates of currency conversion that try to equalise the purchasing power of different currencies, by eliminating the differences in price levels between countries. This indicator is measured in terms of national currency per US dollar.

3

Children's emergent literacy and emergent numeracy outcomes in England

This chapter presents findings on the emergent literacy and emergent numeracy of five-year-olds in England. It describes how children's scores in each of these early learning domains relate to their individual characteristics, family backgrounds, home learning environments and early childhood education and care participation.

THE IMPORTANCE OF EARLY LITERACY AND NUMERACY DEVELOPMENT

The literacy and numeracy skills developed in early childhood are important for children's well-being in the present and can be foundational to their future success in life. Decades of longitudinal research have shown that early literacy and numeracy outcomes strongly predict later cognitive and educational outcomes (Duncan et al., 2007[1]). Early literacy and numeracy skills are also associated with a range of social, emotional and economic outcomes throughout life (Reynolds et al., 2002[2]).

Gaps in literacy and numeracy development between children are influenced by their individual characteristics, home environments, and early childhood education and care (ECEC) experiences. These gaps are observable by the time children start school. Once they exist, the gaps become increasingly difficult and costly to close. Early intervention can address this and improve the literacy and numeracy development of children in both the short- and longer-term (Reynolds et al., 2002[2]; Schweinhart, 2013[3]).

Gaps in literacy development require early attention

The consequences of not addressing emergent literacy gaps early are serious. Adequate literacy skills are required to complete everyday and more complex tasks, yet approximately 23% of 15-year-old students on average across OECD countries do not reach a baseline level of proficiency[1] in reading, including 17% of 15-year-olds in England (OECD, 2019[4]). Similarly, 20% of adults on average across OECD countries, have low reading performance,[2] including 16% of adults in England (OECD, 2013[5]). These adults have poorer labour-market outcomes and poorer self-reported health than their peers with higher literacy proficiency. They are also less likely to report that they have trust in others and more likely to feel that they have little impact on the political process (OECD, 2013[5]).

The roots of low adult literacy are found in childhood. As skills beget skills, children who fall behind early in their literacy and language development are likely to fall further behind over time (Kautz et al., 2014[6]; Rigney, 2010[7]). Assessing children's early literacy skills can provide important information on where societies should focus attention and resources in order to promote quality and equity in early literacy development and, in turn, in children's life chances. Assessing emergent literacy skills is an integral part of the International Early Learning and Child Well-being Study (IELS).

Early numeracy outcomes are strong predictors of a range of later outcomes

Although emergent numeracy has been subject to less research attention than emergent literacy, longitudinal research has also identified numeracy ability in early childhood as being important for outcomes throughout schooling and into adulthood. 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[1]). Better numeracy competence in childhood is associated with higher socio-economic status in adulthood (Ritchie and Bates, 2013[8]) and better self-reported health outcomes (Lê-Scherban et al., 2014[9]).

On average, 24% of adults in OECD countries fail to develop numeracy skills that go beyond an ability to undertake the most basic numerical operations (OECD, 2016[10]).[3] In England, this proportion is also 24%. 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[10]). While the cost of innumeracy to individuals and societies is high now, it is likely to grow even higher in an increasingly technological and scientific world (Raghubar and Barnes, 2017[11]).

England was the only country that participated in the OECD Survey of Adult Skills in which the oldest age group (55-65 years) had higher literacy and numeracy proficiency than the youngest age group (16-24 years), after accounting for a range of sociodemographic characteristics. The clear implication is that the skills of adults in England are likely to decline in the coming decades unless action is taken to improve the literacy and numeracy skills of young people (OECD, 2013[5]).

A comprehensive assessment of emergent literacy and numeracy outcomes should consider a range of learning areas predictive of later competence

Literacy and numeracy skills can be broadly categorised as constrained or unconstrained. Constrained skills are those that are finite, such as alphabet knowledge. These are typically easily assessed. Unconstrained skills include aspects of literacy such as vocabulary knowledge and listening comprehension. Unconstrained skills develop over a longer period and draw on constrained skills in their formation (Snow and Matthews, 2016[12]).

A comprehensive assessment of emergent literacy skills should include assessments of both types of skill. While unconstrained emergent literacy skills are generally more challenging to assess, they tend to be more strongly associated with later reading success and were therefore the primary focus of the IELS emergent literacy assessment. The assessment used innovative, play-based methods and was delivered on tablet devices.

IELS assesses a range of constrained and unconstrained emergent literacy and numeracy skills

IELS assessed three skills deemed fundamental to later literacy competence: the unconstrained skills of listening comprehension and vocabulary knowledge, and the constrained skill of phonological awareness. The assessment of listening comprehension in IELS involved two main components: story-level listening comprehension and sentence-level listening comprehension. The former involved children listening to a story and responding to a series of audio-recorded items relating to that story, while the latter involved listening to a series of standalone sentences and responding to a single item about the meaning of each. Each vocabulary item in IELS required children to identify from a range of common everyday word options (Tier 1 words[4]) the synonym of a more complex (Tier 2) word. Phonological awareness items required children to identify the first, middle and final phonemes (sounds) of short words. Print knowledge was not assessed in IELS. There were no reading or writing activities. The focus was instead on the pre-reading literacy and language skills that are predictive of later reading success.[5]

The general principle of focusing on the assessment of unconstrained skills in IELS was also applied to the assessment of emergent numeracy skills. Emergent numeracy was defined in the study as the ability to recognise numbers and to undertake numerical operations and reasoning in mathematics. The emphasis in the assessment was on simple problem solving and the application of concepts and reasoning in the following content areas: numbers and counting, working with numbers, shape and space, measurement, and pattern. As with emergent literacy, the emergent numeracy assessment was delivered on a tablet and involved children engaging with game-like activities. The emergent numeracy assessment used a mixture of drag-and-drop technology, where children moved items around the screen to construct solutions to problems, and hot-spot technology, where children tapped objects to indicate their preferred option when responding to an item.

IELS assesses how the emergent literacy and emergent numeracy outcomes of children relate to their individual characteristics, family backgrounds, home learning environments and early learning experiences

This chapter presents the outcomes of the IELS emergent literacy and emergent numeracy assessments of children in England. In addition to directly assessing children's emergent literacy and numeracy skills, indirect information on children's emergent literacy and numeracy development was collected through questionnaires administered to children's parents and educators, and this information is also presented in this chapter. Where parent and educator reports on aspects of children's development are compared in tables, graphs or text, these comparisons are made with respect to children for whom both parent and educator reports were available. Contextual information about children's lives was also collected through these questionnaires. Any results reported that are based on information collected via an item on the parent questionnaire, then, relate just to the subsample of children whose parents completed the questionnaire and responded to the item in question.

This chapter reports how children's emergent literacy and numeracy skills relate to their individual characteristics, family background characteristics, home learning environments, and ECEC experiences in England. It also considers the relationships between children's emergent literacy and emergent numeracy outcomes and their outcomes in other learning domains assessed in IELS. Similarities and differences between the outcomes of IELS in England and those in the other two countries that participated in IELS, the United States and Estonia, are highlighted throughout. The chapter concludes with a summary and some preliminary conclusions.

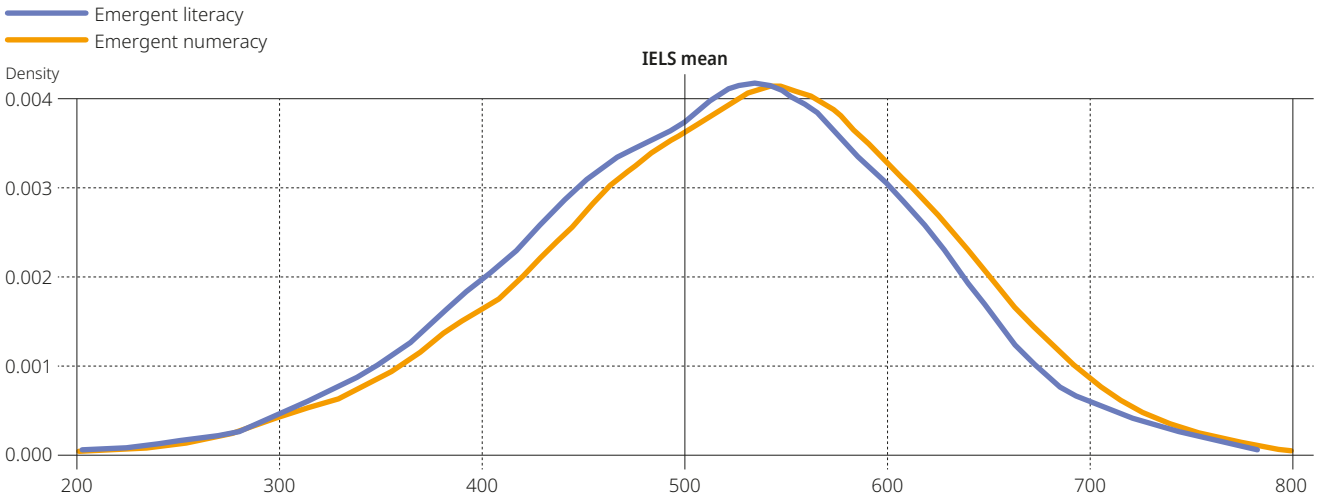
EMERGENT LITERACY AND NUMERACY OUTCOMES IN ENGLAND

Five-year-olds in England have higher emergent literacy and numeracy scores, on average, than the overall IELS averages

The mean score of children in England on the IELS direct assessment of emergent literacy was 515 points, which was significantly higher than that of children in the United States (477), but not significantly different from the mean in Estonia (508). The score of children at the 25th percentile of emergent literacy in England was 452 points (compared to 440 in Estonia and 414 in the United States), and the score of children at the 75th percentile in emergent literacy in England was 584 points (compared to 576 points in Estonia and 541 in the United States).

The mean score of five-year-olds in England on the direct assessment of emergent numeracy was 529 points, which was significantly higher than the mean scores in Estonia (500) and the United States (471). The score of children at the 25th percentile in emergent numeracy in England was 465 points (435 in Estonia and 409 in the United States). The score of children at the 75th percentile was 599 points (567 points in Estonia and 537 in the United States). The distributions of emergent literacy and emergent numeracy scores in England are shown in Figure 3.1.

Figure 3.1 **Distribution of emergent literacy and emergent numeracy scores, England**



Note: Graph produced using the first plausible values. Please refer to the IELS technical report for additional information regarding plausible values.

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Parent and educator evaluations of children's emergent literacy and emergent numeracy development are broadly in line with children's directly assessed early literacy outcomes

Both parents and educators are important sources of information on five-year-olds' emergent literacy and numeracy development. Parents know most about their child's developmental pathway and educators are trained professionals who work with young children on a daily basis. In IELS, both parents and educators were asked to indicate whether they perceived children's language and numeracy development to be less than average (either much less or somewhat less), average, or more than average (either somewhat more or much more).

Just 8% of children had parents who described their receptive language development (defined as the extent to which the child understands, interprets and listens) as being below average. Over half (55%) of children in England had parents who described their development as above average, and 37% had parents who described their development as average. By contrast, one-third (33%) of children were rated as having above average receptive language development by their educators, approximately half (48%) as having average development, and one in five (19%) as having below average development (Table 3.1).

Whether by parents or educators, children evaluated as having below average receptive language development had significantly lower mean emergent literacy scores than those rated as average. Those rated above average had significantly higher mean emergent literacy scores than those rated as average.

Table 3.1 **Receptive language development as reported by parents and educators and emergent literacy scores, England**

	Parents		Educators	
	% of children	Mean score	% of children	Mean score
Below average	8	**431**	19	**449**
Average (reference category)	37	513	48	517
Above average	55	**543**	33	**576**

Note: Mean scores in bold are significantly different from those of children in the "average" category. Estimates in this table relate to the subsample of children for whom both parent and educator ratings were available.

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In England, just 4% of five-year-olds had parents who assessed their expressive language development (the degree to which the child uses language effectively, can communicate ideas, etc.) as below average, compared to 16% as assessed by educators. Most children (70%) were assessed as having above average expressive language development by their parents, compared

to around 35% as assessed by educators. Children rated as having average expressive language development, whether by their parents or educators, had significantly higher mean emergent literacy scores than children rated as below average, and significantly lower mean scores than children rated as above average (Table 3.2).

Table 3.2 **Expressive language development as reported by parents and educators and emergent literacy scores, England**

	Parents		Educators	
	% of children	Mean score	% of children	Mean score
Below average	4	**407**	16	**440**
Average (reference category)	26	503	49	514
Above average	70	**536**	35	**574**

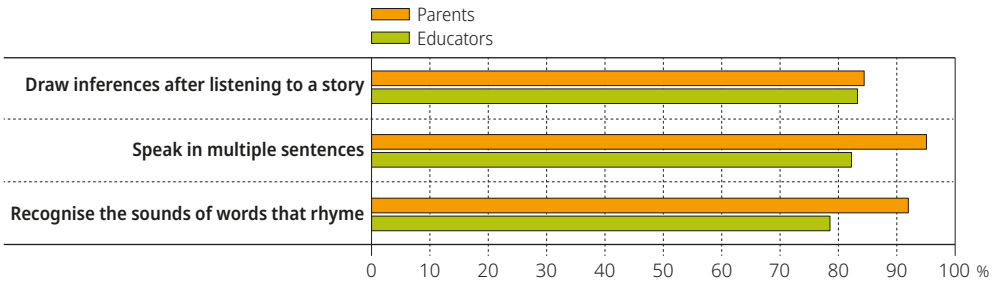
Note: Mean scores in bold are significantly different from those of children in the "average" category. Estimates in this table relate to the subsample of children for whom both parent and educator ratings were available.

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Most five-year-olds in England have mastered key early language skills, according to their parents and educators

In addition to providing overall ratings of children's language development, parents and educators were asked to indicate whether children had mastered each of a number of specific language and literacy-related skills. In England, 84% of children could draw inferences after listening to a story about how a character felt or about what might happen next, according to their parents. Additionally, 95% of children had parents who indicated that their five-year-old could speak in multiple sentences (at least three) to explain something that had happened to him or her. Similarly, 92% of children had parents who indicated that their child could recognise the sounds of words that rhyme.

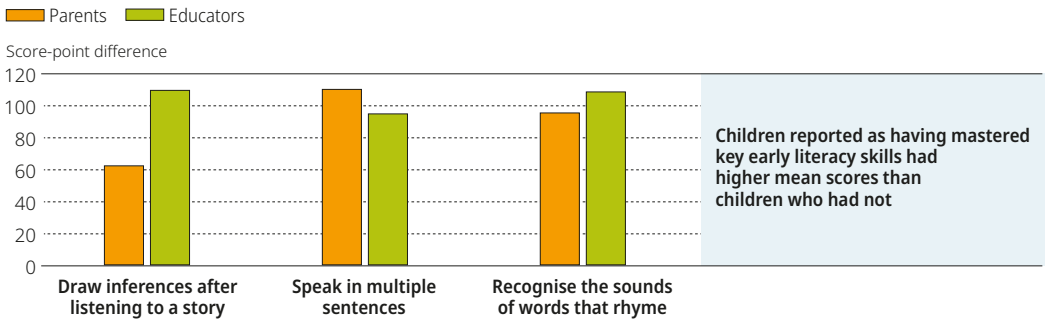
Figure 3.2 **Mastery of key language and literacy-related skills as reported by parents and educators, England**



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Figure 3.3 **Emergent literacy scores by reported mastery of key language and literacy-related skills, England**

Score-point differences between children who have and have not mastered each language skill, according to their parents and educators



Note: All differences between the mean scores of children reported to have mastered and not to have mastered the skill in question are statistically significant.

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Educators were less likely than parents to indicate that children had mastered each skill, as was also the case in Estonia and the United States. The largest gap between educator and parent reports related to the child's ability to recognise rhyming sounds, with 92% of parents indicating that their child could do this, compared to 79% of educators (Figure 3.2). In each case, children who were reported as not having mastered the skill in question had significantly lower mean emergent literacy scores than other children (Figure 3.3), with score-point gaps ranging from 62 to 110 points, depending on the skill and respondent in question.

Parent ratings of children's numeracy development tend to be higher than educator ratings

Parents and educators reported on how they perceived their children's numeracy development relative to the average development of a five-year-old. A higher proportion of children were reported as having below average numeracy development by their educators (17%) than were rated below average by their parents (5%). Children whose numeracy development was rated as average by their parents or by their educators had significantly higher mean emergent numeracy scores than children rated as below average, and significantly lower mean scores than children whose development was rated as above average (Table 3.3).

Table 3.3 **Numeracy development as reported by parents and educators and emergent numeracy scores, England**

	Parents		Educators	
	% of children	Mean score	% of children	Mean score
Below average	5	**408**	17	**436**
Average (reference category)	40	515	49	527
Above average	55	**563**	35	**597**

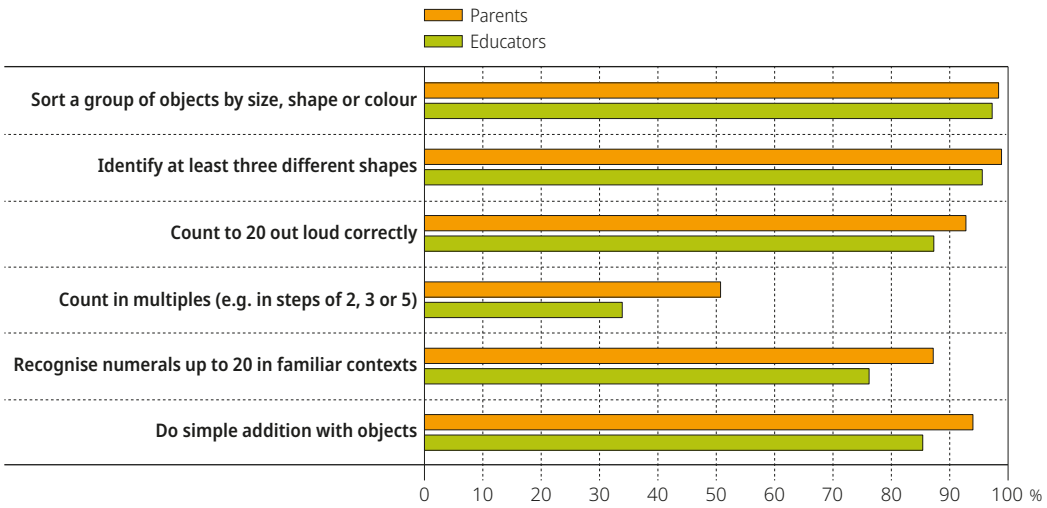
Note: Mean scores in bold are significantly different from those of children in the "average" category. Estimates in this table relate to the subsample of children for whom both parent and educator ratings were available.

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Most five-year-olds in England can sort objects, count up to 20 aloud, recognise numerals up to 20, and do simple addition with objects, according to their parents and educators

Parents and educators were asked to indicate whether each child had mastered a series of numeracy or mathematics-related skills. Children were most likely to be able to identify at least three different shapes (99% according to parents and 95% according to educators) and to sort a group of objects by size, shape or colour (98% and 97%, respectively). Children were least likely to be able to count in multiples according to their parents and educators (51% and 34%, respectively, the largest gap between parent and educator reports). In all cases, parents were more likely than educators to indicate that children had mastered the competency in question (Figure 3.4), as was also the case in Estonia and the United States.

Figure 3.4 **Mastery of key early numeracy skills as reported by parents and educators, England**

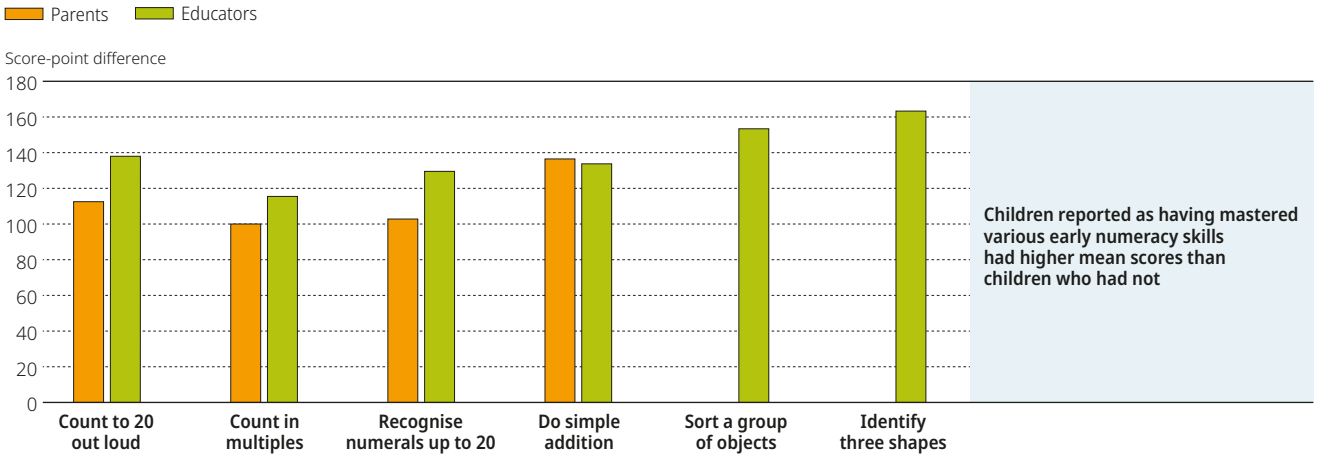


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Children reported as having mastered a particular skill had significantly higher mean emergent numeracy scores than children reported as not having mastered this skill. Score-point gaps ranged from 100 points (between children who could and could not count in multiples, according to their parents) to 163 points (between children who could and could not identify at least three shapes, according to their educators; Figure 3.5).

Figure 3.5 **Emergent numeracy scores by reported mastery of key early numeracy skills, England**

Score-point differences between children who have and have not mastered each early numeracy skill, according to their parents and educators



Note: All differences between the mean scores of children who have and have not mastered the skill in question are statistically significant. The numbers of children who could not sort a group of objects or could not identify at least three shapes, according to their parents, were very low, and so their mean scores are not presented in this figure.

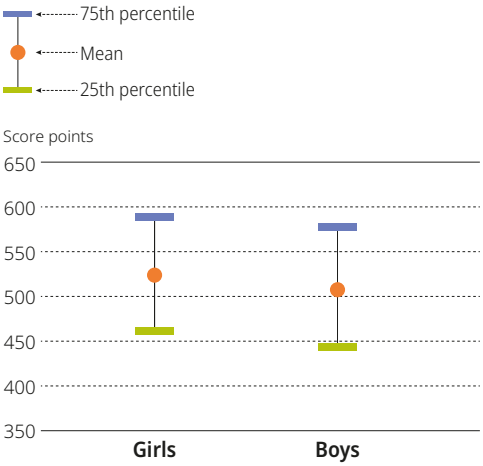
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INDIVIDUAL CHARACTERISTICS AND EMERGENT LITERACY AND NUMERACY OUTCOMES

Girls have higher mean emergent literacy scores than boys, but similar emergent numeracy outcomes in England

In England, the mean score of girls on the emergent literacy assessment was higher than that of boys (Figure 3.6). The 16-point difference was statistically significant. There were also similar gender gaps in favour of girls in the other two participating countries (17 points in the United States and 15 points in Estonia). However, there was no significant difference between the mean emergent numeracy scores of girls and boys in England, or in the United States or Estonia.

Figure 3.6 **Emergent literacy scores by gender, England**



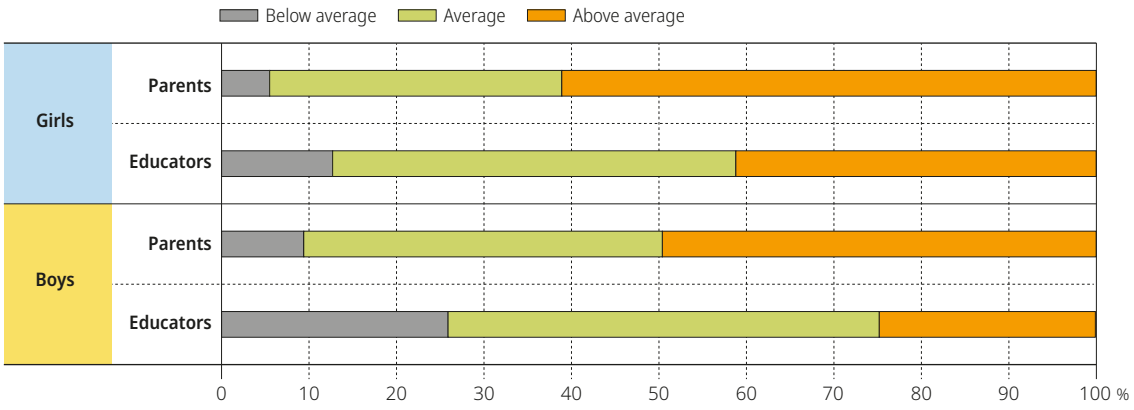
Note: The gender differences in scores at the 25th percentile and at the mean are statistically significant.

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Girls are more likely than boys to have above average receptive and expressive language skills, according to their parents and educators

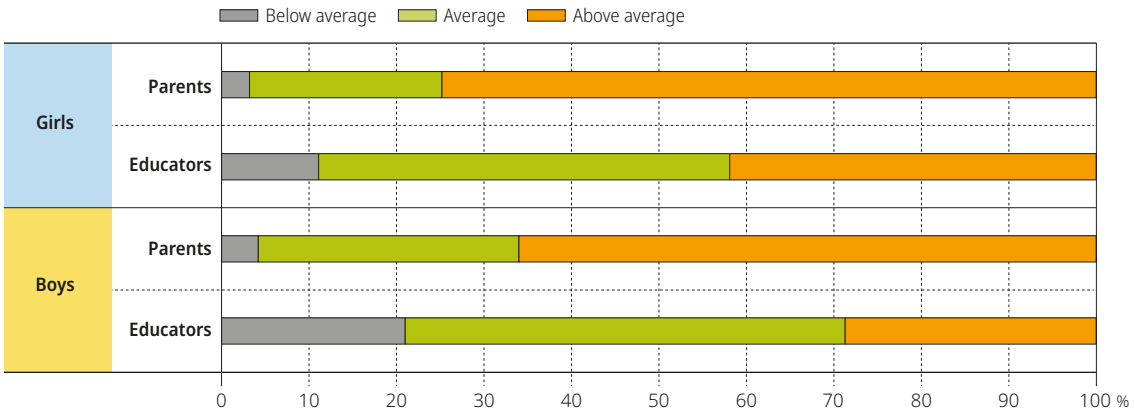
In line with their higher average score on the IELS emergent literacy assessment, a higher proportion of girls than boys in England were evaluated by their parents and educators as having above average receptive and expressive language development. A lower proportion of girls than boys were also rated as having below average language development (Figure 3.7 and Figure 3.8).

Figure 3.7 **Receptive language development as reported by parents and educators by gender, England**



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Figure 3.8 **Expressive language development as reported by parents and educators by gender, England**



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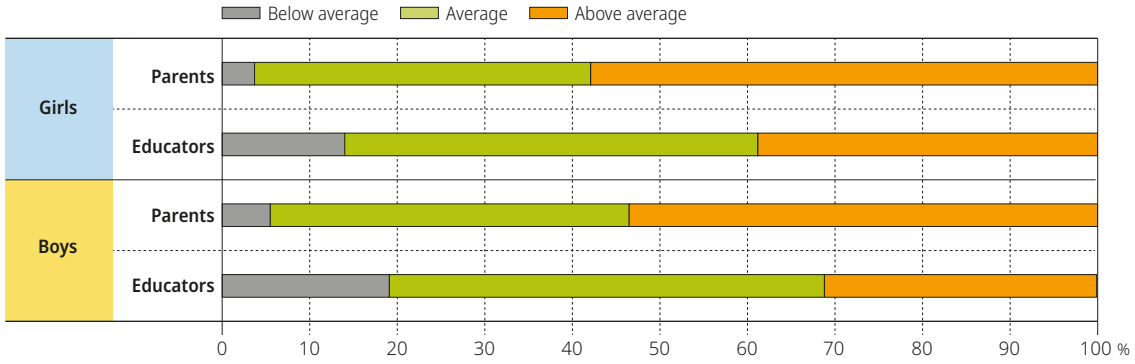
Similar proportions of boys and girls have average numeracy development, according to their parents and educators, but a higher proportion of girls were rated as above average

Roughly equivalent proportions of boys and girls had parents and educators who indicated that their numeracy development was average (Figure 3.9). There was a significant association between gender and educator ratings. Girls were more likely to be rated as above average by their educators and boys more likely to be rated as below average.

Age is positively related to emergent literacy and numeracy development

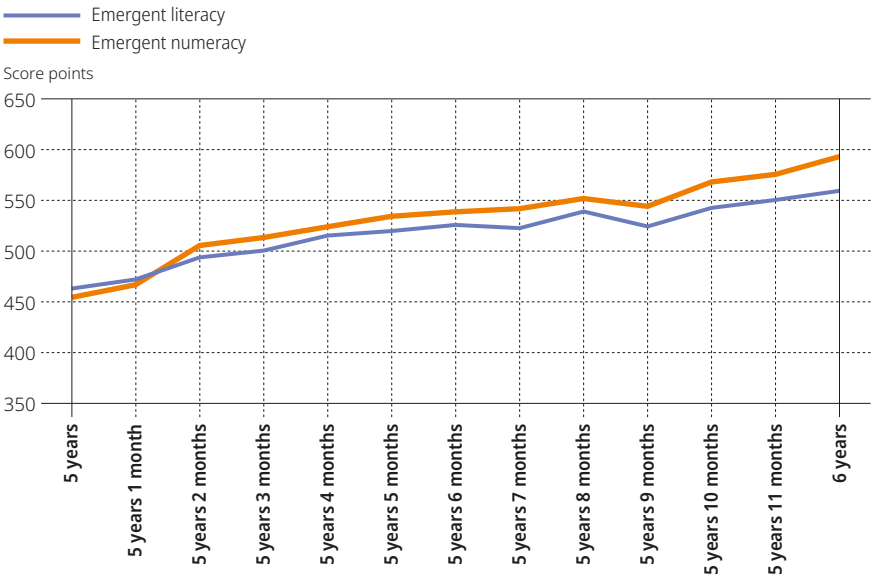
Children's emergent literacy and numeracy skills develop rapidly as they progress through early childhood. There were significant positive correlations between children's age in months and their scores on the IELS emergent literacy and emergent numeracy assessments in all three participating countries. In England, the correlation between age in months and emergent literacy was 0.25, and for emergent numeracy was 0.33. For emergent literacy, the score-point difference between the oldest children (6 years 0 months) in the sample and the youngest (5 years 0 months)[6] was 96 points. For emergent numeracy, the corresponding gap was 139 points (Figure 3.10).

Figure 3.9 **Numeracy development as reported by parents and educators by gender, England**



StatLink https://doi.org/10.1787/888934098820

Figure 3.10 **Emergent literacy and numeracy scores by age of child in months, England**



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Low birth weight or premature birth, learning difficulties, and social, emotional or behavioural difficulties are associated with lower emergent literacy and numeracy scores

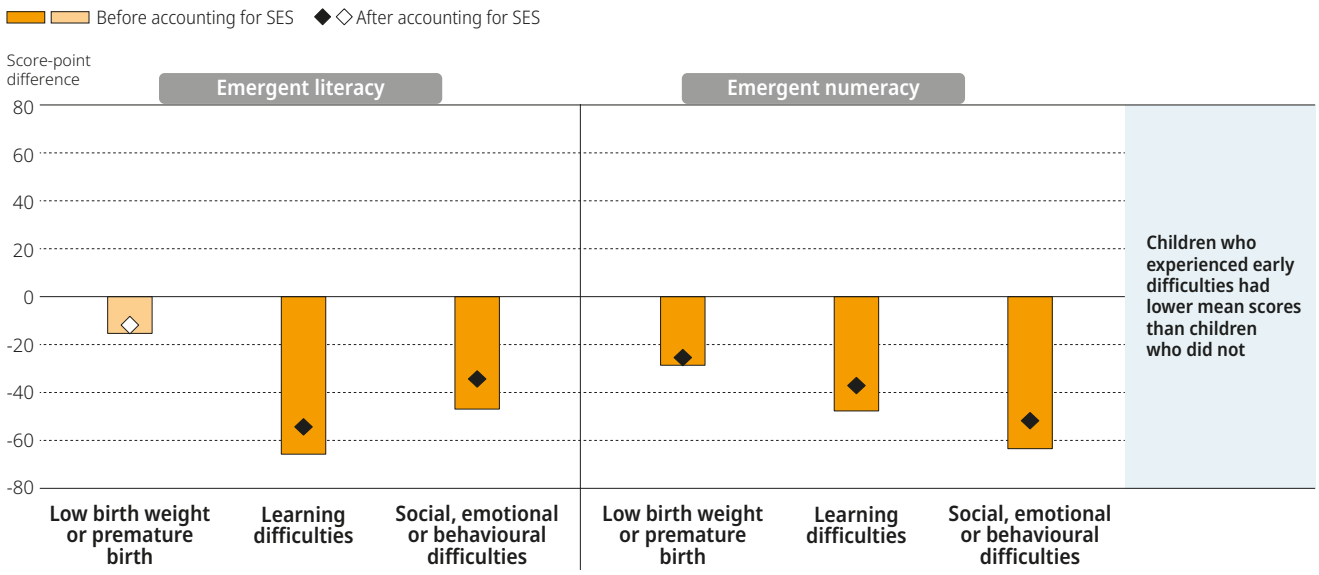
Parents were asked to indicate whether their child had ever experienced a number of potential challenges or difficulties. In England, 11% of children for whom information was available were reported by their parents as having had low weight at birth or premature birth (compared to 10% in the United States and 8% in Estonia).[7] These children had mean emergent numeracy scores that were significantly lower than those of their peers who were not reported as having had a low weight at birth or premature birth. There was no significant difference in mean emergent literacy scores.

Similarly, one in ten children (10%) had experienced learning difficulties (such as speech or language delay, intellectual disability), according to their parents (13% in the United States and 10% in Estonia). These children scored significantly lower in both emergent literacy and emergent numeracy, on average, than other children. Some 8% of children had social, emotional or behavioural difficulties, according to their parents (12% in the United States, 10% in Estonia). Again, these children had significantly lower mean emergent literacy and numeracy scores than other children.

When each of the difficulties were analysed in combination, low birth weight/premature birth was not a significant predictor of emergent literacy but remained a significant predictor of emergent numeracy (Figure 3.11). Learning difficulties were more strongly associated with emergent literacy scores than each of the other early difficulties, while social, emotional and behavioural difficulties were most strongly associated with emergent numeracy scores.

Figure 3.11 **Relative associations between early difficulties and emergent literacy and emergent numeracy scores**

Score-point differences between children who had experienced an early difficulty and those who had not, after accounting for the effects of other early difficulties, and before and after accounting for socio-economic status



Note: Statistically significant differences are shown in a darker tone.

StatLink https://doi.org/10.1787/888934098858

There were statistically significant associations between gender and having learning difficulties or social, emotional or behavioural difficulties in England. Boys were approximately twice as likely as girls to have had learning difficulties (6% of girls and 13% of boys), and were also significantly more likely to have had social, emotional or behavioural difficulties (6.5% of girls and 10% of boys), according to their parents. These gender associations were also present in the United States and Estonia.

There were also statistically significant associations between having experienced each of these early challenges or difficulties and socio-economic status (SES) which, in IELS, was an index comprising household income, parent occupation and parent educational attainment.[8] In England, 17% of children in the lowest SES quartile had learning difficulties, according to their parents, compared to 5% of children in the top SES quartile. Approximately one in four boys (24%) in the lowest SES quartile had learning difficulties, compared to 9% of girls in the same quartile. Additionally, 15% of children in the lowest SES quartile had social, emotional or behavioural difficulties, according to their parents, compared to 5% of children in the top SES quartile. One in five boys (20%) in the lowest SES quartile had social, emotional or behavioural difficulties, compared to 9% of girls in the same quartile. There was no significant association between low birth weight/prematurity and SES in England (such an association was present in the United States, but not in Estonia).

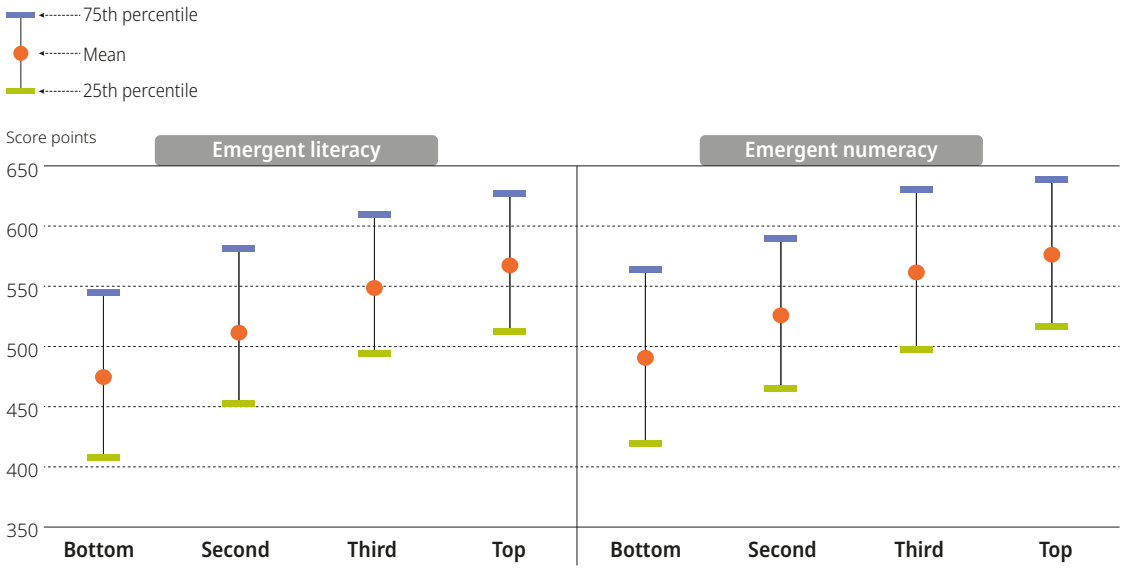
HOME AND FAMILY CHARACTERISTICS AND EMERGENT LITERACY AND NUMERACY OUTCOMES

Socio-economic status is strongly associated with emergent literacy and numeracy scores in England, with children from the top SES quartile scoring much higher, on average, than those from the bottom quartile

Socio-economic status was significantly positively correlated with emergent literacy (r = 0.37) and emergent numeracy (r = 0.34) outcomes in England. For emergent literacy, five-year-olds in the top socio-economic status quartile had a mean score that was significantly higher than the score of children in the bottom socio-economic status quartile, by a margin of 92 points (Figure 3.12). The corresponding gap in emergent numeracy mean scores was 86 points.

The relationships between socio-economic status and literacy and numeracy development were stronger in England than in Estonia. It should be noted that the United Kingdom has more income inequality than Estonia, with Gini coefficients[9] of 0.36 and 0.31, respectively (OECD, 2020[13]). The correlation between emergent literacy and socio-economic status was of similar magnitude in England and the United States (Gini coefficient 0.39). However, the correlation between socio-economic status and emergent numeracy was weaker in England than in the United States. Correlations between emergent literacy and numeracy development and socio-economic status did not differ significantly by gender in England.

Figure 3.12 **Emergent literacy and emergent numeracy scores by socio-economic quartile, England**



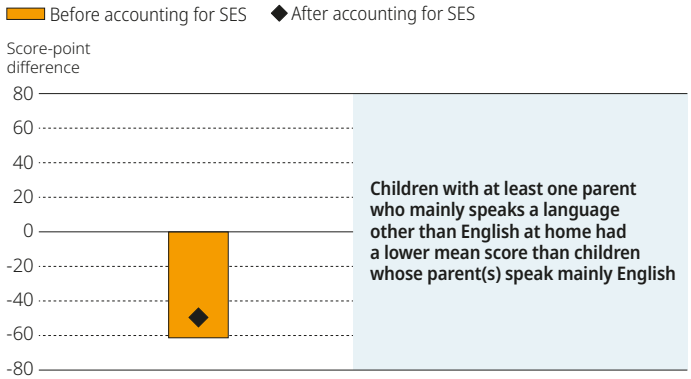
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A home language other than English is associated with lower average emergent literacy and numeracy scores in IELS

In England, 16% of five-year-olds for whom information on home language was available lived in homes where at least one parent mostly spoke a language other than English. These children had significantly lower mean emergent literacy and numeracy scores than other children, after accounting for socio-economic background (Figure 3.13).[10]

Figure 3.13 **Difference in emergent literacy scores by home language, England**

Score-point differences between children with at least one parent who speaks a language other than English at home and those whose parent(s) speak mainly English, before and after accounting for socio-economic status



Note: All differences are statistically significant.

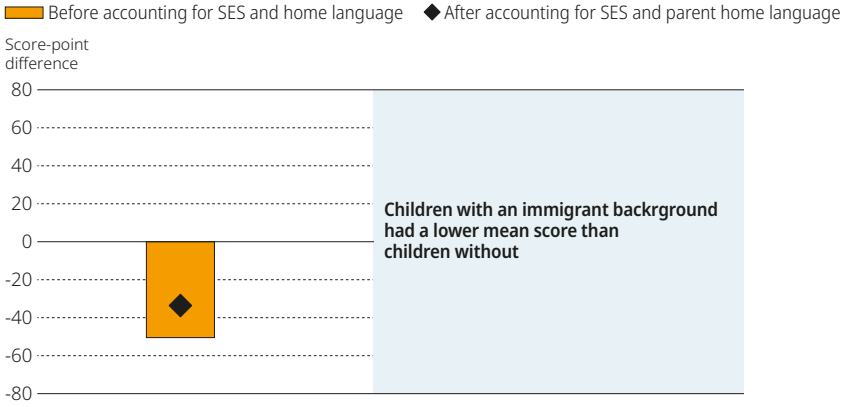
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Children with an immigrant background have a lower mean emergent literacy score than children without an immigrant background, but there is no corresponding difference in emergent numeracy

In England, 18% of children in IELS for whom information was available were identified as having an immigrant background.[11] These children had a significantly lower mean emergent literacy score than children without an immigrant background, by a margin of 55 points. After controlling for socio-economic status and home language (whether at least one parent mainly spoke a language other than English), the gap reduced to 35 points and remained statistically significant. The emergent numeracy skills of children with an immigrant background were not significantly different from those of children without an immigrant background, after accounting for socio-economic status and home language (Figure 3.14).

Figure 3.14 **Difference in emergent literacy scores by immigrant background, England**

Score-point difference between children with and without an immigrant background, before and after accounting for socio-economic status



Note: All differences are statistically significant.

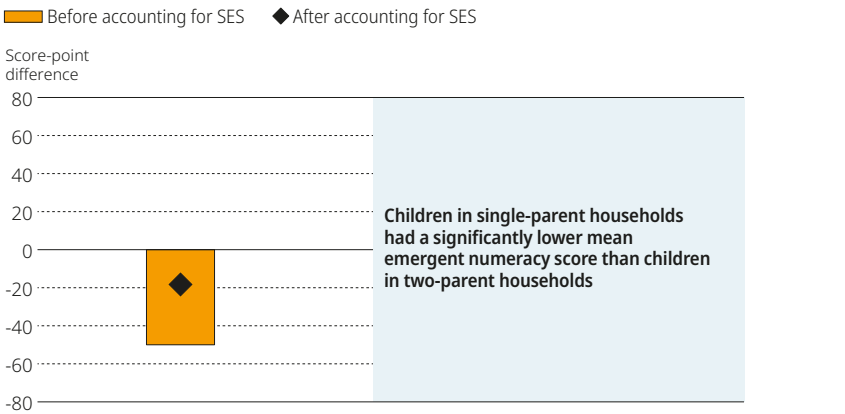
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There is no difference in the mean emergent literacy scores of children from one-parent and those from two-parent households in England, after accounting for socio-economic status

In England, 15% of five-year-olds in IELS for whom information on family structure was available lived in one-parent households. After accounting for the effects[12] of socio-economic status, there was no significant difference between the mean emergent literacy scores of children in one-parent households and those in two-parent households. However, even after accounting for socio-economic status, the mean emergent numeracy score of children in one-parent families was significantly lower than the mean score of children in two-parent families (Figure 3.15).

Figure 3.15 **Difference in emergent numeracy scores by household structure, England**

Score-point difference between children in single-parent and two-parent households, before and after accounting for socio-economic status



Note: All differences are statistically significant.

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Emergent literacy and numeracy outcomes of five-year-olds with no siblings are similar to those of children with one sibling and two siblings, but having four or more siblings is associated with lower emergent literacy and numeracy scores in England, even after accounting for SES

In England, 16% of five-year-olds for whom information was provided had no siblings, 50% had one sibling, 22% had two, 7% had three and 5% had four or more. No information was collected in IELS about the ages or genders of participating children's siblings. The mean emergent literacy and numeracy scores of children with one sibling did not differ significantly from those of children with no siblings or those with two, after accounting for socio-economic status.

Children with three siblings had a significantly lower mean emergent literacy score than those with one, but there was no significant difference in emergent numeracy scores. However, having four or more siblings was associated with lower emergent literacy and numeracy scores in both domains, even after accounting for socio-economic status. A larger number of siblings was also negatively associated with scores in the United States. In Estonia, very few five-year-olds had more than two siblings.

Previous studies have also found negative associations between children's emergent literacy and numeracy outcomes and a greater number of siblings. These negative associations may be attributable to parents having finite amounts of energy, money and time which are diluted as the number of siblings increases (Downey, 2001[14]). Family size was found to be the strongest predictor of parental investment per child in the Avon Longitudinal Study of Parents and Children, even among high-income families (Lawson and Mace, 2009[15]). Findings from the Millennium Cohort Study found that at ages three, five and seven, having two or more siblings instead of just one was associated with a significantly raised risk of having poorer outcomes, particularly for cognitive outcomes, and that the risk increased with each additional sibling (De La Rochebrochard and Joshi, 2013[16]).

Children whose mothers have higher educational attainment achieved higher average emergent literacy and numeracy scores

In England, 14% of children for whom information on parental educational attainment was available had mothers whose highest qualification was lower secondary education, a higher proportion than in the other two countries that participated in IELS. There was a significant relationship between mothers' educational attainment and children's emergent literacy and numeracy development in England (Table 3.4), as was also seen in Estonia and the United States.

In England, 40% of children in the sample had mothers who had completed a bachelor's degree or higher (a similar proportion as in the United States and lower than the 53% in Estonia). These children had significantly higher mean emergent literacy and numeracy scores than children whose mothers had completed less formal education, even after accounting for household income (Figure 3.16).

Table 3.4 **Maternal educational attainment and mean emergent literacy and numeracy scores, England**

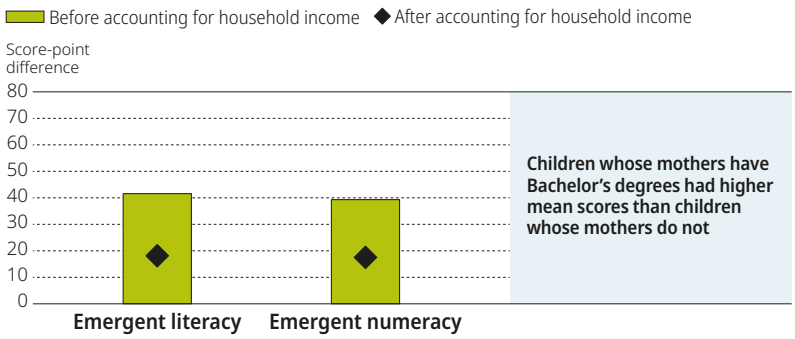
	% of children	Literacy	Numeracy
Completed 5 GCSEs at A*-C, NVQ at level 2, or equivalent (ISCED 2)	14	476	490
Completed AS or A levels, NVQ at level 3, or equivalent (ISCED 3) (Ref)	37	517	530
HNC, HND, NVQ at level 4+, DipHe, foundation degree or equivalent (ISCED 5)	9	540	552
Bachelor's degree (ISCED 6)	29	550	562
Master's degree, doctorate or equivalent (ISCED 7 or 8)	11	566	577

Note: There were too few children whose mothers who did not attend secondary school to meet the reporting criteria for IELS and so their mean scores are not reported in this table. For a full description of the International System of Classification of Education (ISCED) levels, see http://uis.unesco.org/en/topic/international-standard-classification-education-isced. NVQ = National Vocational Qualifications; HNC = Higher National Certificate; HND = Higher National Diploma; DipHE = Diploma of Higher Education.

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Figure 3.16 **Differences in emergent literacy and emergent numeracy scores by mother's educational attainment, England**

Score-point differences between children whose mothers hold at least a bachelor's degree and those whose mothers do not, before and after accounting for household income



Note: All differences are statistically significant.

StatLink https://doi.org/10.1787/888934098972

HOME LEARNING ENVIRONMENT

The home is the first major context in which children learn, develop and grow. A home environment that is supportive of early learning, in terms of both stimulating resources and interactions, is an important determinant of children's emergent literacy and numeracy outcomes (Melhuish et al., 2008[17]). Collecting information on children's home learning environments was an important focus of IELS.

Children from homes with a greater number of children's books have higher average emergent literacy and numeracy scores

Children in homes with more children's books had, on average, higher emergent literacy and emergent numeracy scores than children in homes with fewer books (Table 3.6). In England, 29% of children came from homes with more than 100 children's books, slightly more than the proportion in the United States (26%) and considerably more than the 10% of children in Estonia. Children with ten books or fewer at home had a significantly lower mean emergent literacy than children with more books than this at home. For emergent numeracy, there was no significant difference in the mean scores of children with fewer than ten books at home and those with 11-25 books, but having more children's books than this at home was associated with higher emergent numeracy scores. The gap between the mean literacy scores of children with 10 children's books or fewer at home and those with more than 100 books was approximately 86 points in England after accounting for SES (121 before). In emergent numeracy, the corresponding gap was 68 points after accounting for SES (104 points before).

Table 3.5 **Number of books in the home and emergent literacy and emergent numeracy scores, after accounting for SES, England**

	% of children	Emergent literacy	Emergent numeracy
0-10 (Ref)	9	471	495
11 to 25	12	**497**	513
26 to 50	22	**502**	**524**
51 to 100	28	**539**	**549**
More than 100	29	**557**	**563**

Note: Mean scores in bold are significantly different from those of children in the reference category (children with 0-10 children's books at home).

StatLink https://doi.org/10.1787/888934098991

Children whose parents read books and have back-and-forth conversations with them more frequently have better emergent literacy skills than children whose parents do so less frequently

Figure 3.17 shows the percentage of children whose parents engaged in a range of language and literacy-related activities at home with varying frequency. Reading from a book was the activity most likely to be engaged in most frequently (59% of children were read to on at least five days each week), followed by having a back-and-forth conversation about how the child feels and why they feel that way (53% of children had these conversations with their parents on at least five days each week). Parents in England were more likely to read to their children on at least five days each week than parents in either Estonia or the United States.

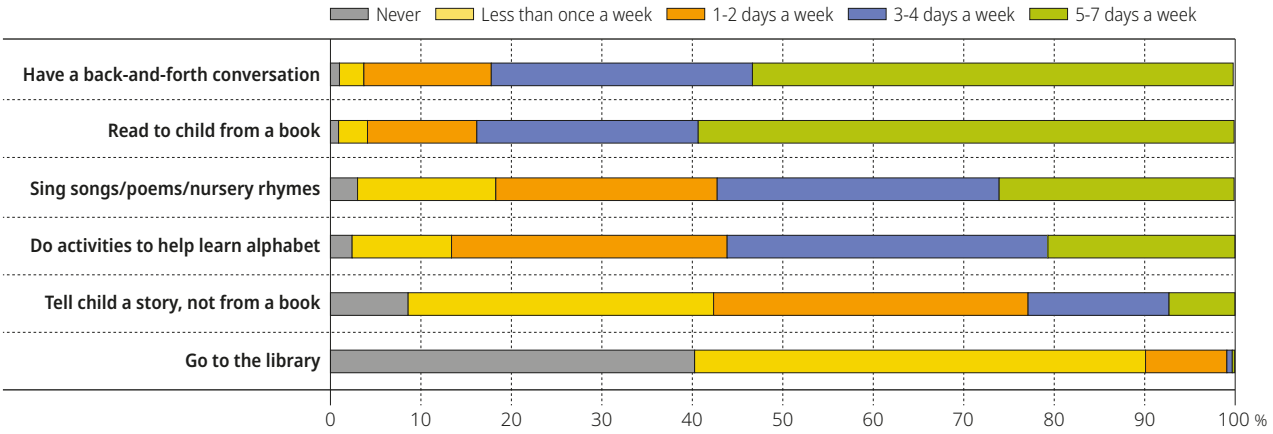
Children whose parents read to them from a book five to seven days a week, and children whose parents had back-and-forth conversations with them five to seven times a week had significantly higher mean emergent literacy scores than children whose parents did so less than once a week (Figure 3.18). These differences were significant before and after accounting for socio-economic status. Frequency of telling children stories (not from a book), frequency of singing songs, nursery rhymes and poems, and frequency of engaging in activities to help the child learn the alphabet were not significantly related to emergent literacy scores (neither alphabet knowledge nor print awareness were assessed in IELS). There were also no significant associations between the frequency of any literacy-related activities at home and children's emergent *numeracy* scores. It is possible that activities such as singing songs, nursery rhymes and poems, and learning the alphabet were less significant for children aged five than for younger children. There is evidence that these are important for younger children's emergent literacy (Sylva et al., 2004[18]).

There were no significant associations between a child's gender and the frequency with which they were read to from a book, told a story (not from a book), taken to the library or had a back-and-forth conversation with a parent about their feelings. There were significant associations between the child's gender and the frequency with which their parents sang songs or nursery rhymes to them and with which they engaged in activities at home with a parent to learn the alphabet. In England, 63% of girls were sung to by their parents at least three times a week, compared with 51% of boys. Additionally, a higher proportion of girls had parents

who frequently engaged in activities aimed at learning the alphabet at home. However, the association was weak and these activities were not significantly associated with children's emergent literacy outcomes. Girls and boys engaged in those home activities significantly associated with emergent literacy scores with similar frequency.

There were statistically significant associations between socio-economic status and frequency of engagement in two literacy-related activities. In England, 35% of children in the bottom SES quartile were read to from a book by a parent five to seven times a week, compared to 79% of children in the top SES quartile. Children in the top SES quartile were somewhat more likely to engage in back-and-forth conversations five to seven times a week (56%) than children in the bottom quartile (49%), although the association was weak.

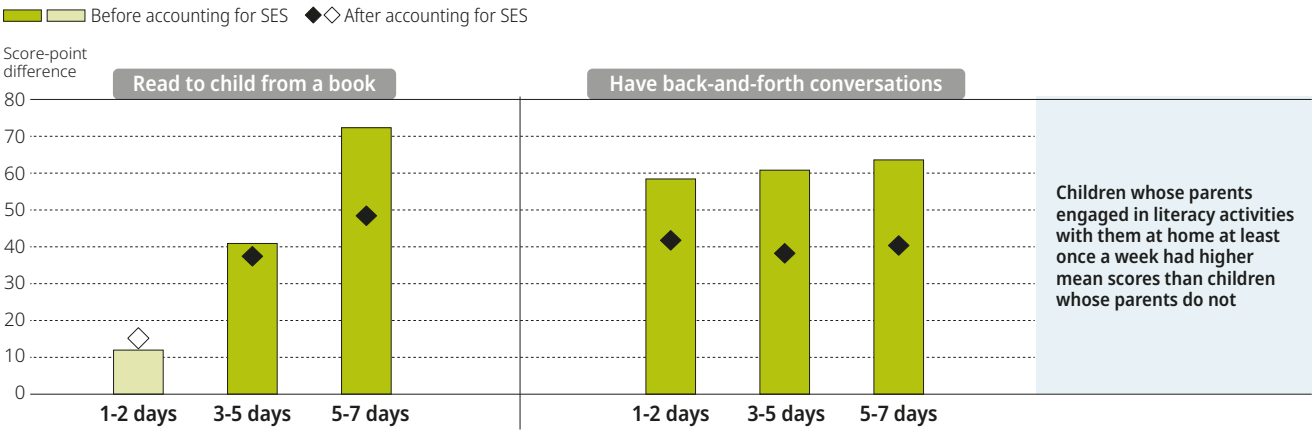
Figure 3.17 **Frequency of engagement in literacy-related activities at home, England**



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Figure 3.18 **Differences in emergent literacy scores by engagement in literacy-related activities at home, England**

Score-point differences between children whose parents engaged in literacy-related activities with them at home at least one day a week and those who did so less often, before and after accounting for socio-economic status



Note: Statistically significant differences are shown in a darker tone.

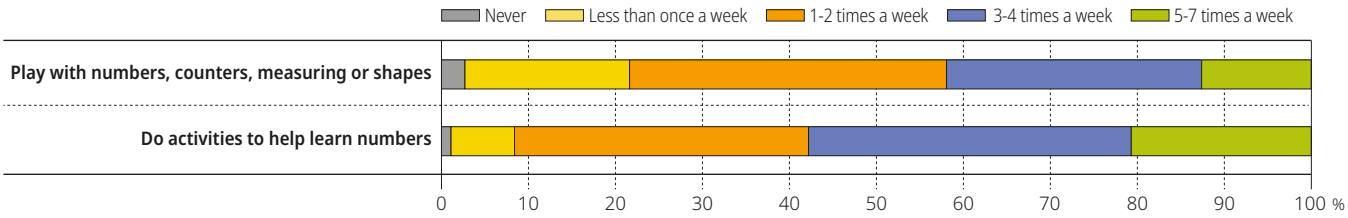
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Most children have parents who engage in numeracy-related activities with them at home on at least one day a week

Figure 3.19 shows the percentage of children whose parents engaged in numeracy-related activities at home with them with varying frequency. Just one in ten children had parents who said they played with numbers, counting, measuring or shapes less than once a week with their child, and just 7% had parents who said they engaged in activities designed to help them learn numbers less than once a week. Children whose parents did activities at home with them to learn numbers on at least five days

each week had a significantly higher mean emergent numeracy score than children whose parents never or hardly ever did such activities (Figure 3.20). There were no significant associations between frequency of these numeracy-related activities at home and children's emergent literacy scores.

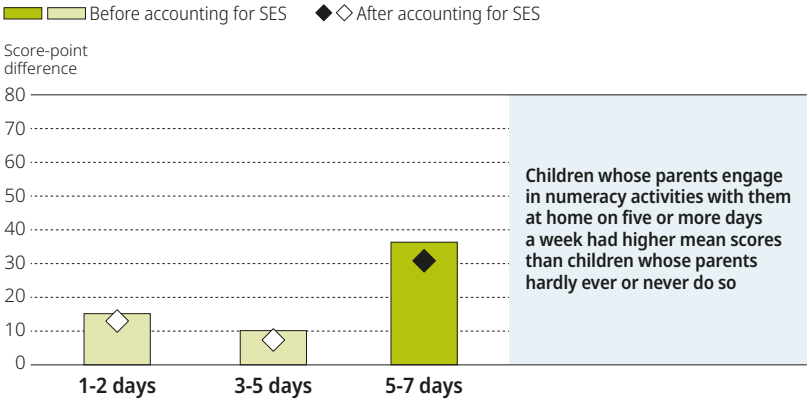
Figure 3.19 **Frequency of engagement in numeracy-related activities at home, England**



StatLink https://doi.org/10.1787/888934099048

Figure 3.20 **Differences in emergent numeracy scores by engagement in numeracy-related activities at home, England**

Score-point differences between children whose parents engaged in numeracy-related activities with them at home at least one day a week and those who did so less often, before and after accounting for socio-economic status



Note: Statistically significant differences are shown in a darker tone.

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There were also no significant associations between a child's gender and the frequency with which their parents engaged in these activities with them at home. In addition, there were no significant associations between frequency of engagement with these activities and socio-economic status.

Children who attend special or extra-cost activities have higher average emergent literacy and numeracy scores than those that do not, even after accounting for socio-economic status

Parents were also asked how often their five-year-old attended a special or extra-cost activity outside of the home (such as a sports activity, dance, scouts, swimming lessons, language lessons). In England, 20% of five-year-olds for whom information was available never participated in such activities, 15% did so less than once a week, 47% did so once or twice a week, 16% did so three to four days a week, and 2% did so on five or more days a week. After accounting for socio-economic status, children who never attended such special or extra-cost activities had mean literacy and numeracy scores that were generally significantly lower than those of children who did attend such activities, with the highest mean associated with attending three to four days a week (Figure 3.21).

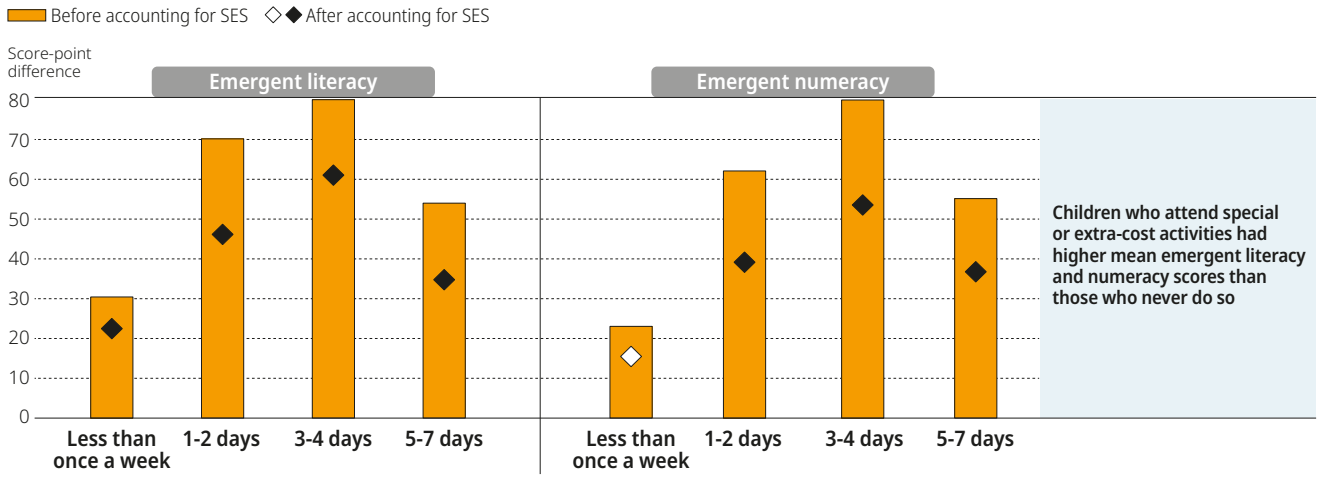
Children whose parents are more strongly involved in their schools have better emergent literacy and numeracy scores, on average, than children whose parents are less involved, even after accounting for socio-economic status

In England, 69% of five-year-olds in the IELS sample had educators who indicated that the child's parents were either moderately or strongly involved in activities taking place at the school, and 31% had parents who were described as not involved or only slightly involved. Examples of activities included school fetes, concerts/plays, parents' evenings and parental workshops. Children whose

parents were described as moderately or strongly involved had a mean emergent literacy score that was 42 points higher than the scores of children with parents described as not involved or only slightly involved. After accounting for socio-economic status, children whose parents were moderately or strongly involved, according to educators, had an advantage of 28 points in emergent literacy, on average, over children whose parents were described as being less involved. This difference was statistically significant. Similarly, children whose parents were reported by educators as being more involved had a significantly higher mean emergent numeracy score, even after accounting for socio-economic status (Figure 3.22).

Figure 3.21 **Differences in emergent literacy and emergent numeracy scores by engagement in special or extra-cost activities outside the home, England**

Score-point differences between children who attend special or paid activities outside the home with varying frequency and those who never or hardly ever do so, before and after accounting for socio-economic status

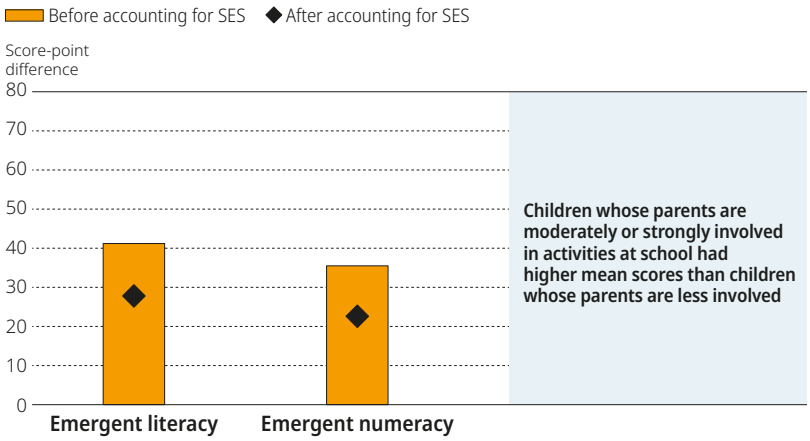


Note: All differences are statistically significant.

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Figure 3.22 **Differences in emergent literacy and emergent numeracy scores by parental involvement in school activities, England**

Score-point differences between children whose parents are moderately or strongly involved in activities at school and those who parents are slightly or not involved, according to their teachers, before and after accounting for socio-economic status



Note: All differences are statistically significant.

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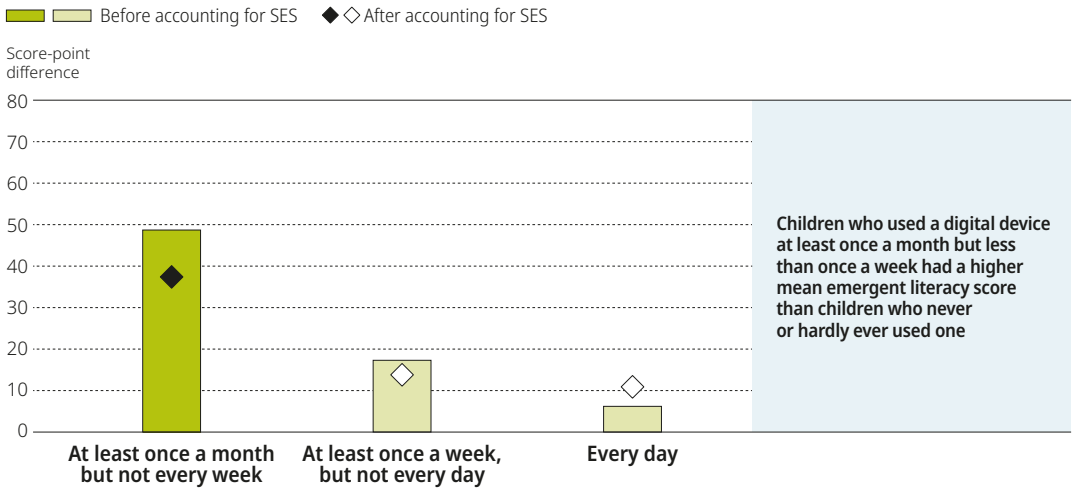
Children who never use digital devices have mean emergent literacy scores that are lower than those of children who use them with moderate frequency but are not different from children who use them more frequently

In England, 39% of five-year-olds in IELS for whom information was available used a desktop or laptop computer, tablet device or smartphone every day, the same proportion as in Estonia and lower than the 49% in the United States. A further 46% used a device at least once a week, while 9% did so at least once a month and 6% never or hardly ever used such devices.

After accounting for socio-economic status, children who never used digital devices had a mean emergent numeracy score that was not significantly different from the mean scores of children who did use them, regardless of frequency of use. However, children who never or hardly ever used devices had a significantly lower mean emergent literacy scores than children who did so at least monthly, but less than weekly (Figure 3.23). There was no significant difference in the mean emergent literacy scores of children who hardly ever or never used devices and those who did so weekly or daily. The same patterns of association between frequency of digital device use and emergent literacy and numeracy outcomes (i.e. no association with numeracy scores, highest mean literacy score among children with moderate digital device use) were also found in the United States. In Estonia, there was no significant difference between the mean scores of children who never used digital devices and those who did so, in either domain.

Figure 3.23 **Differences in emergent literacy scores by use of digital devices, England**

Score-point differences between children who never or hardly ever use digital devices and those who do so more frequently, before and after accounting for socio-economic status



Note: Statistically significant differences are shown in a darker tone.

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ECEC BACKGROUND AND EMERGENT LITERACY AND NUMERACY OUTCOMES

Almost all children in England attend ECEC, with age of first entry not related to emergent literacy and numeracy outcomes at age five

In England, almost all five-year-olds for whom information was available (98%) had attended an ISCED 0[13] ECEC setting in the school year before data were collected. Among these children, 71% first attended before the age of three and 29% first attended at age three or four. Attendance varied by socio-economic status, with children from lower SES backgrounds attending at lower rates than children from higher SES backgrounds at every age from birth to age four.

After accounting for socio-economic status, there was no significant difference in the early emergent literacy and numeracy outcomes of children who first attended ECEC before the age of three and those who first attended later. Children who attended for more than 20 hours at the age of one had a significantly higher mean score in emergent literacy than children who attended for less than 20 hours or who did not attend at age one, after accounting for socio-economic status. However, this was the only significant relationship between intensity of ECEC attendance and scores in either emergent literacy or emergent numeracy.

ASSESSING THE COMBINED EFFECTS OF CHILD, FAMILY AND ECEC CHARACTERISTICS ON EMERGENT LITERACY AND EMERGENT NUMERACY OUTCOMES

Analyses in this chapter have so far looked at relationships between emergent literacy and numeracy outcomes and a series of background characteristics individually, or sometimes after accounting for the effects of a third variable (such as socio-economic status). This section examines the effects of these characteristics in combination. In order to do this, variables that were significantly related to emergent literacy and numeracy outcomes when examined individually were used in two regression models (one for emergent literacy and one for emergent numeracy) to assess how well they explained variation in the outcomes. Variables that were not significant in the models were removed one at a time[14] until all remaining variables were significantly related to the outcome. It should be noted that no causal attribution can be made on the basis of these analyses.

A combination of individual and home background characteristics significantly predict the early literacy outcomes of children in England

Eleven variables were significant predictors in the final model of emergent literacy (Table 3.6). Each month of increasing age was associated with an average increase in emergent literacy scores of 7 points. Girls had an advantage of 11 points over boys, on average, or the equivalent of just under two months of typical emergent literacy development at age five in England. All else being equal, children with an immigrant background had a mean score that was 40 points lower than the scores of other children, or around five and a half months of development. A one standard deviation increase in socio-economic status was associated with an increase of 17 score points in emergent literacy.

Children with learning difficulties, or with social, emotional or behavioural difficulties had scores that were 51 and 31 points lower, on average, than other children, all else being equal. These equate to differences of around seven months and four months in typical emergent literacy development, respectively.

Children with one sibling and children with no siblings did not differ significantly in their mean emergent literacy scores, but having two or three siblings was associated with lower scores, all else being equal.

Children with more than 50 children's books at home had a significantly higher mean emergent literacy score than children with 10 books or fewer at home, when the effects of other variables in the model were accounted for. Holding all other variables in the model constant, children who used digital devices at least monthly (but not weekly) had a mean score that was 35 points higher (or around five months of development), on average, than children who hardly ever or never used such devices and 21 points higher (or around three months of development) than children who used them weekly (but not daily).

Children who never attended special or extra-cost activities outside the home (such as sport, dance, swimming lessons) had significantly lower scores than children who did so on between once and four days a week on average, when all other variables in the model were held constant; the scores of those who never did so and those who did so on more than four days a week did not differ significantly

All else being equal, children with parents who were moderately or strongly involved in activities at school had a mean emergent literacy score that was 21 points higher than children whose parents were not involved or only slightly involved. This equates to approximately three months of typical emergent literacy development at age five in England.

The final model explains 35% of the variance in emergent literacy outcomes of five-year-olds in England.[15]

A combination of individual and home background factors significantly predict children's early numeracy outcomes

Ten explanatory variables were significant in the final model of emergent numeracy (Table 3.7). Each month of increasing age was associated with an average increase of 10 points in emergent numeracy. All else being equal, children who had experienced low birth weight or prematurity had a mean emergent numeracy score that was 26 points lower than other children, or around two and a half months of typical emergent numeracy development at age five in England. Having social, emotional or behavioural difficulties was associated with an average disadvantage of 44 points (or over four months of typical emergent numeracy development), all else being equal, while having learning difficulties was associated with an average disadvantage of 35 points (around three and a half months of development).

Children with 10 children's books or fewer at home had significantly lower mean emergent numeracy scores than children with more than 25 books at home. The gap between the scores of children with 10 children's books or fewer and those with more than 100 books was equivalent to 54 points on the emergent numeracy scale, all else being equal, equating to five months of typical emergent numeracy development in England at age five.

All else being equal, children with four siblings had an emergent numeracy score that was 42 points lower than that of children with no siblings.

In the final model, having parents who were moderately or strongly involved in activities at school was associated with a 20-point advantage in emergent numeracy over having parents who were not involved or only slightly involved, equating to around two months of typical emergent numeracy development.

A one standard deviation increase in socio-economic status was associated with an increase in emergent numeracy score of 17 points.

Children whose parents engaged in activities with them to help them learn numbers had a significantly higher mean score than children whose parents never did so, all else being equal. Children who never attended special or extra-cost activities (such as dance lessons, language lessons, sport) had significantly lower emergent numeracy scores, on average, than children who did so between once and four times a week (Table 3.8), after accounting for all other variables in the model. However, there was no significant difference between the mean score of children who did these activities more than four times a week and those who never did them.

The final model explained 33% of the variance in the emergent numeracy outcomes of five-year-olds in England.

Table 3.6 **Results of the multiple regression model of emergent literacy, England**

VARIABLE	Regression coefficient	Standard error	*p*
Age (months)	7.42	0.64	**0.00**
Boy	-11.17	3.86	**0.00**
Immigrant background	-39.61	7.84	**0.00**
Learning difficulties	-51.08	9.09	**0.00**
Social, emotional or behavioural difficulties	-30.84	11.61	**0.01**
Socio-economic status (standardised)	16.9	2.85	**0.00**
Children's books in the home (reference category: 10 or fewer)			
11 to 25	11.5	13.4	0.39
26 to 50	12.48	12.82	0.33
51 to 100	40.26	11.27	**0.00**
More than 100	56.86	11.57	**0.00**
Number of siblings (reference category: no siblings)			
One	11.68	6.7	0.81
Two	-14.4	7.04	**0.04**
Three	-29.93	9.51	**0.00**
Four	-22.49	14.5	0.12
Moderate or strong parental involvement at school*	21.16	5.91	**0.00**
Information on parental involvement missing	2.54	7.92	0.75
Frequency of using digital devices at home (reference category: at least monthly, but not weekly)			
Hardly ever or never	-34.7	12.29	**0.01**
At least weekly, but not daily	-21.24	8.67	**0.01**
Every day	-14.03	8.76	0.11
Frequency of attending special or extra-cost activities (reference category: never)			
Less than once a week	15.76	8.99	0.08
1-2 days a week	21.5	7.44	**0.00**
3-4 days a week	26.53	9.25	**0.00**
5-7 days a week	12.04	13.78	0.38
Constant**	483.57	16.58	

Note: *p*-values in bold indicate statistical significance.

*Variable has a missing indicator to preserve cases in the dataset.

**The constant is the estimated emergent literacy score of a child in the reference category of each categorical variable, aged 5 years 0 months and with a mean value for socio-economic status.

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RELATIONSHIPS BETWEEN EMERGENT LITERACY AND NUMERACY OUTCOMES AND OUTCOMES IN OTHER LEARNING DOMAINS

Children's early language and numeracy skills are developed at the same time as children are developing a host of other skills, including self-regulation and social-emotional competencies. Development in each of these areas is theorised to be mutually reinforcing. Young children with better language ability, for example, may be better able to engage successfully with their peers in interactions that support their prosocial development. Better prosocial skills may lead to further opportunities to interact with others in ways that support children's vocabulary development and oral comprehension. As IELS assessed a broad range of children's early learning outcomes, it enables relationships between these learning domains at the age of five to be examined.

Table 3.7 **Results of the multiple regression model of emergent numeracy, England**

VARIABLE	Regression coefficient	Standard error	*p*
Age (months)	9.87	0.63	**0.00**
Low birth weight or premature birth	-26.22	6.45	**0.00**
Learning difficulties	-34.99	9.93	**0.00**
Social, emotional or behavioural difficulties	-44.44	11.37	**0.00**
Socio-economic status (standardised)	16.81	2.93	**0.00**
Number of siblings (reference category: no siblings)			
One	-9.53	6.26	0.13
Two	-12.94	7.09	0.07
Three	-7.00	12.44	0.57
Four	-42.19	13.43	**0.00**
Children's books in the home (reference category: 10 or fewer)			
11 to 25	7.45	12.28	0.54
26 to 50	25.81	11.82	**0.03**
51 to 100	43.49	11.63	**0.00**
More than 100	54.40	10.68	**0.00**
Moderate or strong parental involvement at school*	20.09	6.05	**0.00**
Information on parental involvement missing	3.28	8.1	0.69
Frequency of attending special or extra-cost activities (reference category: never)			
Less than once a week	10.41	9.28	0.26
1-2 days a week	21.12	7.87	**0.01**
3-4 days a week	25.09	8.19	**0.00**
5-7 days a week	12.77	13.32	0.34
Frequency of activities at home to learn numbers (reference category: less than once a week)			
1-2 days a week	5.84	9.38	0.53
3-4 days a week	5.15	9.51	0.59
5-7 days a week	24.20	10.08	**0.02**
Constant**	430.66	16.85	

Note: *p*-values in bold indicate statistical significance.

*Variable has a missing indicator to preserve cases in the dataset.

**The constant is the estimated emergent numeracy score of a child in the reference category of each categorical variable, aged 5 years 0 months and with a mean value for socio-economic status.

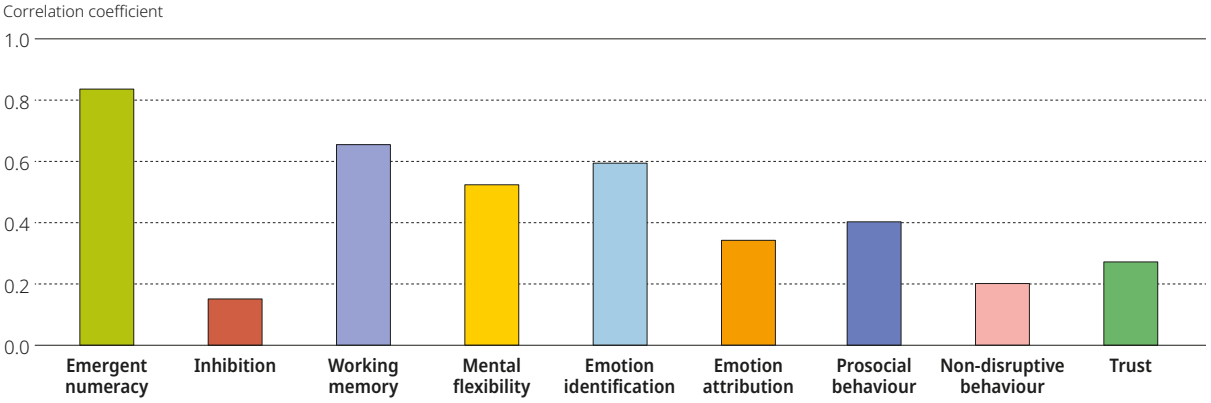
StatLink https://doi.org/10.1787/888934099162

Emergent literacy and emergent numeracy are strongly related to each other, as well as positively related to self-regulation and social-emotional development

Figure 3.24 shows the correlations between emergent literacy scores and scores in other learning domains assessed in IELS in England. Emergent literacy and emergent numeracy were strongly[16] positively correlated (r = 0.83). There were also moderate to strong correlations between emergent literacy and the self-regulation sub-domains of working memory and mental flexibility. Correlations between emergent literacy and most social-emotional sub-domains were weaker (with the exception of emotion identification), although still statistically significant and positive.

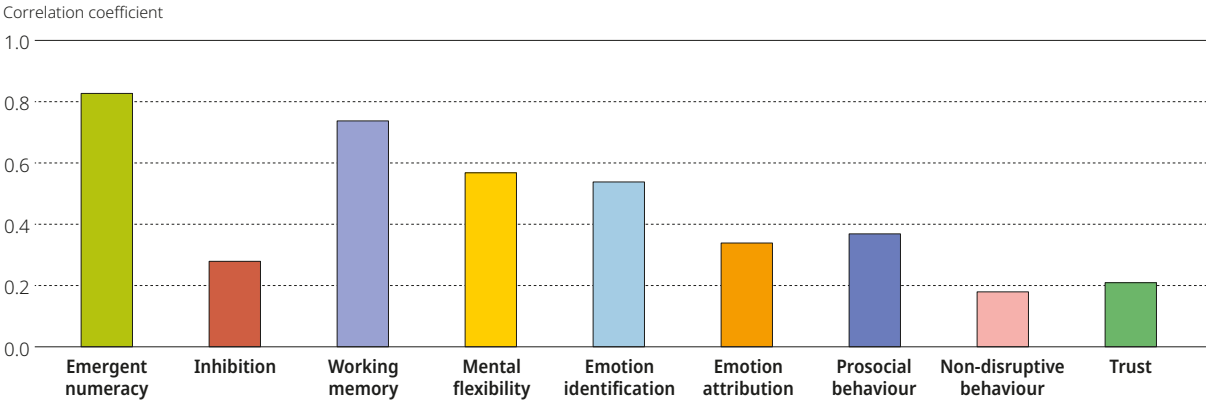
Emergent numeracy scores correlated most strongly with working memory, mental flexibility and emotion identification. Correlations between emergent numeracy and educator assessments of prosocial behaviour, disruptive behaviour and trust were weaker (Figure 3.25).

Figure 3.24 **Correlations between emergent literacy scores and other learning domains, England**



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Figure 3.25 **Correlations between emergent numeracy scores and other learning domains, England**



StatLink https://doi.org/10.1787/888934099200

SUMMARY AND CONCLUSIONS

The mean emergent literacy score of five-year old children in England was significantly higher than the score in the United States and did not differ significantly from the score in Estonia. The mean emergent numeracy score in England was significantly higher than the mean scores of both Estonia and the United States.

Gender differences in emergent literacy and emergent numeracy skills in England were similar in direction and magnitude to those in Estonia and the United States. Five-year-old girls had a higher mean emergent literacy score than five-year-old boys. Girls and boys had similar emergent numeracy scores at age five.

As in other participating countries, very low proportions of children were rated as below average in their language and mathematical development by their parents. A higher proportion of children were rated as having below average development by their educators than by their parents. Girls were more likely than boys to be rated as having above average language and mathematical development.

Children in England were roughly equally likely as children in the United States and Estonia to have been identified by their parents as having had low birth weight or premature birth, learning difficulties, or social, emotional or behavioural difficulties. In all three participating countries, boys were significantly more likely than girls to have experienced learning or social, emotional or behavioural difficulties by the age of five. Children from lower socio-economic backgrounds were significantly more likely to have had learning or social, emotional or behavioural difficulties than those from higher socio-economic backgrounds.

In England, socio-economic status was significantly associated with early literacy and numeracy as assessed in IELS. The association was stronger than in Estonia, where gaps between children based on socio-economic status were much smaller. Gaps in emergent literacy scores between children based on socio-economic status were similar in size in England and the United States, but the gap in emergent numeracy scores was smaller in England than in the United States.

In England, five-year-olds in one-parent and two-parent households did not differ significantly in their early literacy skills, after accounting for socio-economic status, although children in one-parent families had a lower mean emergent numeracy score than children in two-parent families. Children with one sibling had similar emergent literacy and numeracy skills as children with no siblings and those with two siblings. Having four or more siblings was associated with lower emergent literacy and emergent numeracy scores, even after accounting for socio-economic status.

Children with at least one parent at home who primarily spoke a language other than English had significantly lower mean emergent literacy and emergent numeracy scores than other children, after accounting for socio-economic status. Similarly, children from immigrant backgrounds (i.e. having both parents born outside the country, or one parent in the case of one-parent households) had lower mean emergent literacy scores than other children, even after accounting for socio-economic status and home language. There were no significant differences in the early numeracy outcomes of children with and without an immigrant background after accounting for socio-economic status and home language.

Parents' educational attainment was associated with children's emergent literacy and numeracy outcomes in England. Children whose mothers held bachelor's degrees had significantly higher mean emergent literacy and numeracy scores than other children, even after accounting for household income.

A number of parental practices were associated with children's emergent literacy and numeracy scores. Children whose parents read to them several times a week and had back-and-forth conversations with them more frequently had better emergent literacy development as assessed in IELS than children whose parents did so less frequently, after accounting for socio-economic status. Additionally, children whose parents frequently engaged in activities with the child designed to help them learn numbers had higher mean emergent numeracy scores than children whose parents did so less frequently. Finally, children whose parents were described by their educators as more strongly involved in their children's education had better outcomes in both IELS emergent literacy and emergent numeracy, regardless of socio-economic status.

Attending special or extra-cost activities outside the home (e.g. sports, dance lessons, language lessons) was associated with higher scores in both emergent literacy and emergent numeracy, regardless of socio-economic status. Moderate use of digital devices at home was associated with higher literacy scores, after accounting for socio-economic status. The mean scores of children who used these devices every day and those who hardly ever or never used them did not differ significantly from each other, but were lower than those who used them with at least monthly, but not weekly.

In England, almost all children had attended ECEC before starting school. Approximately three in four of these children first attended before the age of three. Children of higher socio-economic backgrounds started attending earlier and for longer than children of lower socio-economic backgrounds. Differences between the emergent literacy and emergent numeracy skills of children who started earlier and those who started later were not significant after accounting for socio-economic background.

When looked at in combination, significant predictors of emergent literacy outcomes in England were:

- a child's age in months
- gender
- immigrant background
- number of children's books at home
- learning difficulties
- social, emotional or behavioural difficulties
- socio-economic status, number of siblings
- frequency of attendance of special or extra-cost activities outside the home
- frequency of using digital devices
- level of parental involvement at school.

Specifically, being older, being a girl, coming from a higher socio-economic background, having more than 50 children's books at home, not having an immigrant background, not having learning difficulties, not having social, emotional or behavioural difficulties, having fewer siblings, having parents with higher levels of school involvement, having more frequent attendance of special or extra-cost activities outside of the home, and having moderate use of digital devices were all associated with higher emergent literacy scores, when these variables were examined in combination.

Predictors of children's outcomes in emergent numeracy were:

- age in months
- low birth weight or premature birth
- learning difficulties
- social, emotional or behavioural difficulties
- number of siblings
- number of children's books at home
- socio-economic status
- parental school involvement
- frequency of attendance at special or extra-cost activities outside of the home
- frequency of engaging in activities at home with parents to learn numbers.

Specifically, being older, having had normal birth weight and not being born prematurely, not having learning difficulties, not having social, emotional or behavioural difficulties, having fewer siblings, having more than 50 children's books at home, more frequently attending special or extra-cost activities, having parents who were more involved in activities at school, and engaging in numeracy activities at home with the greatest frequency were all associated with higher emergent numeracy scores at age five in England.

Predictors common to both emergent literacy and emergent numeracy, then, were age, learning difficulties, social, emotional or behavioural difficulties, number of siblings, number of children's books at home, attendance of special or extra-cost activities, socio-economic status, and level of parental involvement in school activities. Gender, immigrant background, and frequency of use of digital devices were significant in the emergent literacy model only. Low birth weight or premature birth was a significant predictor of emergent numeracy scores, but not of emergent literacy.

The emergent literacy and numeracy skills of five-year-olds in England were also significantly positively related to their social-emotional development and their self-regulation skills, in line with previous research that suggests that these skills are mutually reinforcing. Children's outcomes in these other learning domains are explored in Chapter 4 (on self-regulation) and Chapter 5 (on social-emotional learning).

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Notes

1. Scoring at or below proficiency level 1 in PISA reading.
2. Scoring at or below proficiency level 1 in the Programme for the International Assessment of Adult Competencies (PIAAC) reading.
3. Scoring at or below proficiency level 1 in PIAAC numeracy.
4. Beck, McKeown and Kucan (2013) propose a three-tier model of vocabulary development, where Tier 1 words are common words used in everyday speech (e.g. table, blue), Tier 2 words are high-frequency words that occur across contexts and are more common in written than spoken language (e.g. compare, coincidence). Tier 3 words are low-frequency words used in domain-specific contexts (e.g. thesis, ecosystem).
5. For more information, see the IELS assessment framework (OECD, 2020).
6. To meet the standards for reporting mean scores in IELS, a subgroup of children must contain at least 30 children, and these children must have been sampled from at least five centres or schools. While 41 children in the England sample were aged 4 years 11 months at the time of the assessment, there were too few children of this age to meet the reporting criteria in Estonia and the United States. The mean scores of children aged 4 years 11 months are therefore not considered separately in this analysis.

7. A birth weight lower than 5lbs 5oz/2.5 kg was defined as low.
8. Where educational attainment information was available for two parents, the higher of the two was used.
9. The Gini coefficient is a measure of income or wealth distribution, where 1 corresponds to maximal inequality and 0 represents perfect equality.
10. The IELS assessments were administered only in English in England and children were not screened for English language proficiency before participation.
11. Defined has having two parents who were born in a country other than that in which the child participated in IELS, or one parent if information was only provided for one parent.
12. The term "effect" is used in a statistical sense only. No causal attributions can be made on the basis of IELS data.
13. According to the International Standard Classification of Education (ISCED), ISCED 0 programmes are pre-primary programmes situated in institutional settings and that contain an intentional education component, among other criteria. ISCED 01 captures participation by very young children (aged 0 to 2), and ISCED 02 captures participation by slightly older children (aged 3 to 5).
14. In order of descending *p*-value.
15. The explained variance explained by all the predictors in the model except the missing indicator variable for the parental involvement variable.
16. A correlation coefficient lower than 0.20 is considered relatively weak, between 0.20 and 0.49 is considered moderately strong, between 0.50 and 0.79 is considered strong and greater than 0.8 is considered very strong.

4

Children's self-regulation outcomes in England

This chapter presents findings on the self-regulation outcomes of five-year-olds in England. It describes how children's scores in inhibition, mental flexibility and working memory relate to their individual characteristics, family backgrounds, home learning environments and early childhood education and care participation.

THE IMPORTANCE OF SELF-REGULATION DEVELOPMENT

Self-regulation describes the mental processes that allow individuals to focus attention, remember instructions and handle multiple tasks successfully. These skills allow the brain to filter out distractions, prioritise tasks and control impulses. This ability to manage reactions and impulses is essential for personal and professional success (Diamond, 2013[1]; Eisenberg, Spinrad and Eggum, 2010[2]; McClelland et al., 2015[3]).

The brain functions that make up self-regulation include the capacity to use inhibition, mental flexibility and working memory – among other skills – to manage thoughts and actions (Zelazo, Blair and Willoughby, 2016[4]). Together, these three aspects of self-regulation are referred to as executive function. They describe the ability to direct and sustain short-term attention, inhibit impulse responses, revise initial plans and retrieve rules from memory.

Self-regulation is a strong predictor of later health, education and labour-market outcomes

The development of self-regulation skills in early childhood is associated with a wide range of outcomes later in life. These include facilitating the transition into – and success in – school (Blair and Raver, 2015[5]; Mcclelland et al., 2007[6]; Morrison, Cameron and Mcclelland, 2010[7]), higher academic achievement in adolescence, better labour-market outcomes as adults – including on employment and earnings – and better health outcomes (Duckworth, Quinn and Tsukayama, 2012[8]; Tangney, Baumeister and Boone, 2004[9]).

Self-regulation skills are important for a child's transition to and participation in school (Blair and Peters Razza, 2007[10]; Neuenschwander et al., 2012[11]). The start of school is a time of major change in the physical surroundings and people – including both new children and educators – that children are accustomed to. It also presents a new set of learning expectations and routines to follow (Dockett, 2001[12]). Children must manage competing stimuli to navigate classroom activities. Self-regulation skills facilitate the learning of new concepts and allow children to engage successfully in classroom activities. These skills also allow children to interact productively with their teachers and peers while managing their own responses (Shonkoff, Phillips and Council, 2000[13]).

A child's ability to self-regulate is associated with the development of social-emotional, literacy and numeracy skills (Blair and Peters Razza, 2007[10]). For example, working memory (Raghubar, Barnes and Hecht, 2010[14]), inhibition and mental flexibility (Clark, Pritchard and Woodward, 2010[15]) are associated with the development of pre-arithmetic, simple and more complex mathematical skills. Self-regulation skills also allow 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[16]; Duncan et al., 2007[17]).

Children with more developed self-regulation skills in childhood are more likely to have better long-term health outcomes (Caspi et al., 1998[18]; Daly et al., 2015[19]; Moffitt et al., 2011[20]). This includes lower rates of obesity in adolescence (Evans, Fuller-Rowell and Doan, 2012[21]) and lower levels of anxiety and depression (Blair and Peters Razza, 2007[10]; Buckner, Mezzacappa and Beardslee, 2009[22]). Children and adolescents with more developed self-regulation skills are also less likely to use drugs or receive a criminal conviction (Ayduk et al., 2000[23]; Caspi et al., 1998[18]; Duckworth, Tsukayama and May, 2010[24]; Moffitt et al., 2011[20]).

Children's environments influence their development of self-regulation skills

A combination of genetic and environmental factors shape self-regulation skills (Bridgett et al., 2015[25]; McClelland et al., 2015[3]). Children exposed to poverty, low economic status, abuse or neglect in their home environment are more likely to display deficits in their self-regulation skills than children living in more enabling environments (Noble, Norman and Farah, 2005[26]; Raver, Blair and Willoughby, 2013[27]).

Adverse childhood experiences and toxic stress can significantly impair the self-regulation development of children. Exposure to adverse home environments can limit their opportunities to develop self-regulation skills. Negative early experiences, including multiple and chronic environmental stressors, can cause structural changes in the neural connections of the areas of the brain that control self-regulation (Nelson et al., 2007[28]; McEwen, Nasca and Gray, 2016[29]). Children exposed to cumulative risks are also more likely to have parents who do not provide them with opportunities to practice their self-regulation skills (Wachs, Gurkas and Kontos, 2004[30]; Fuller et al., 2010[31]).

Disparities in socio-economic background are associated with differences in the physical structure and functioning of the parts of the brain that control self-regulation (Hackman and Farah, 2009[32]). The functioning of the prefrontal cortex in children from low socio-economic status backgrounds who are exposed to chronic environmental stressors, for example, is similar to that of individuals with damage to the prefrontal cortex (Kishiyama et al., 2009[33]).

Emotionally positive parenting, an encouraging home environment and high-quality early childhood education and care (ECEC) experiences enable the development of self-regulation skills

Self-regulation skills are malleable. Adverse childhood experiences and toxic stress impede the development of self-regulation skills. Similarly, positive home environments and ECEC experiences promote these skills.

Emotionally positive parent-child relationships enable the development of self-regulation skills across the early years. Parenting styles that include clear and consistent rules and expectations encourage the positive development of self-regulation skills (Blair and Raver, 2012[34]). For example, parenting styles that focus on child autonomy within set limits predict stronger self-regulation in children compared to parenting styles focused on compliance (Bernier, Carlson and Whipple, 2010[35]).

Organised and predictable home environments also provide children with a context to develop their self-regulation skills (McClelland et al., 2018[36]). Interactions between children and their parents facilitate the regulation of emotions and behaviour. These interactions help children understand their emotions and express them more productively. This, in turn, allows children to regulate their responses to distracting stimuli in their environment (Heatherton and Wagner, 2011[37]).

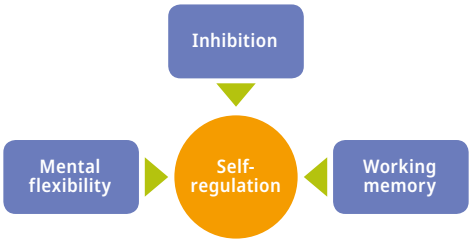
As with the home environment, structured and predictable environments in ECEC centres are important for children's self-regulation, engagement and academic outcomes (Ponitz et al., 2009[38]). Stimulating learning environments and positive interactions with educators and peers enable children to develop self-regulation skills.

The International Early Learning and Child Well-being Study (IELS) defines self-regulation skills as inhibition, mental flexibility and working memory

Although the precise definition of which skills and processes make up self-regulation varies across studies and disciplines (Booth, Hennessy and Doyle, 2018[39]), self-regulation skills are highly integrated and influence one another (Anderson and Reidy, 2012[40]). Completing everyday tasks requires adequate development of all the interdependent parts.

A large body of literature has emphasised a number of key self-regulation skills (Diamond and Lee, 2011[41]; Garon, Bryson and Smith, 2008[42]). These have mostly centred on the influence of inhibition, mental flexibility and working memory skills on later outcomes (McClelland et al., 2010[43]). These three skills together are often referred to as executive function. Executive function skills make up the cognitive component of self-regulation. Chapter 5 of this report will cover children's social-emotional development. Accordingly, IELS defines self-regulation in the direct assessment as: 1) inhibition - the ability to control impulses and reactions; 2) mental flexibility - the ability to shift between rules according to changing circumstances; and 3) working memory – the ability to retain and process information (Figure 4.1).

Figure 4.1 **The three key components of self-regulation in IELS**



IELS measures self-regulation outcomes through developmentally appropriate and engaging activities

IELS explored how children's early learning experiences – including their individual characteristics, home learning environment, ECEC participation and their families' socio-economic contexts – relate to their self-regulation development. Each of the skills that make up self-regulation in IELS were measured using a single task, which was made up of a number of different items. There was, therefore, a separate task to measure inhibition, mental flexibility and working memory (Table 4.1). Audio and engaging illustrations guided the children through the activities on a tablet under the supervision of a study administrator.

Table 4.1 **The three skills assessed in the self-regulation domain**

Content component	Description	Assessment task
Inhibition	Ability to resist impulsive responses based on new information	Stop/go task
Mental flexibility	Ability to shift between rules according to changing circumstances or to apply different rules in different settings	Switching task
Working memory	Ability to store information and manipulate it to complete a given task	Odd-one-out task

Inhibition

The inhibition activity assessed a child's ability to inhibit a learned response in favour of an alternative response. The assessment introduced the child to an image and asked them to touch a button on the screen whenever the image appeared. It then introduced the child to a visually similar image and asked them to touch a different button whenever the new image appeared. In sum, the task required the child to respond differently to each of two very similar images, presented one after another in a pre-determined but unpredictable sequence. Their ability to touch the different button whenever the new image appeared reflected their ability to inhibit their learned response.

Mental flexibility

The mental flexibility activity assessed a child's ability to respond to rules that changed during the activity. The assessment introduced the child to two distinct animals and asked them to touch a different shape on the screen depending on which animal appeared. The assessment then introduced a new rule where the child was asked to touch the alternative shape when each animal appeared. Their ability to adapt to the new inverse rule indicated their mental flexibility.

Working memory

The working memory activity assessed a child's ability to recall short visual sequences. The child was introduced to a visually distinct zebra placed in one of three rows on a bus. The other two rows on the bus were occupied by other animals. The child was then asked to remember in which of the three rows the zebra was seated and touch the corresponding row in a following image. The assessment was divided into several sections of increasing levels of difficulty involving more rows to remember. If the child did not complete the higher difficulty tasks, the assessment automatically proceeded to the next section.

IELS assesses how children's self-regulation abilities relate to their individual characteristics, family backgrounds, home learning environments and early learning experiences

This chapter presents the outcomes of the IELS assessments of the inhibition, mental flexibility and working memory outcomes of children in England. The chapter details how children's self-regulation outcomes relate to their individual characteristics, family backgrounds, home learning environments and early learning experiences.

The self-regulation outcomes of children were measured directly through the assessments. Indirect information on children's self-regulation development was also collected through questionnaires administered to children's parents and educators. Parents and educators were asked to assess each child's overall self-regulation development, defined as whether the child was attentive, organised or in control of their actions.

The chapter presents the results of both the direct assessment of children's inhibition, mental flexibility, and working memory outcomes, as well as how parents and educators perceived children's overall self-regulation development. It highlights similarities and differences between outcomes in England and those in Estonia and the United States. The chapter also considers the relationships between children's self-regulation scores and their scores in other learning domains assessed in IELS.

SELF-REGULATION SKILLS OF FIVE-YEAR-OLDS IN ENGLAND

On average, five-year-olds in England score relatively high on mental flexibility and working memory but are below the other participating countries on inhibition

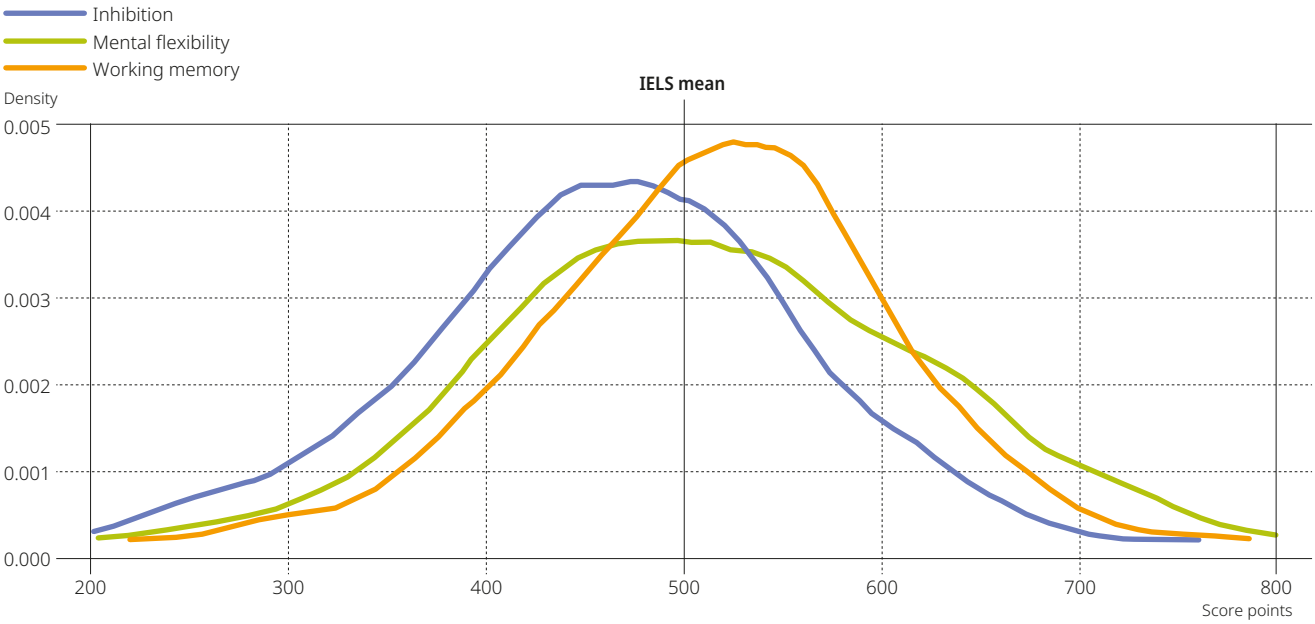
On average, five-year-olds in England scored 13 points above the overall mean of participating countries (500 points) on mental flexibility (513) and 16 points above on working memory (516). They scored 40 points below the overall mean on inhibition (460).

The average inhibition outcomes of children in England were significantly lower than those of children in Estonia and the United States. The average mental flexibility and working memory outcomes of children in England were significantly higher than those of children in the United States and similar to those of children in Estonia.

The spread between the outcomes of the bottom quartile and those of the top quartile of children in England was greater for mental flexibility (148 points) than for inhibition (119 points) or working memory (113 points). The spread in inhibition outcomes was similar for the three countries. The spread in mental flexibility outcomes in England was greater than in the United States and similar to Estonia, meaning that the differences in outcomes between the top and bottom quartiles is greater in England than in the United States. The spread in working memory outcomes was smallest in England, implying that the average gap in outcomes between children in the top and bottom quartiles is smaller in England than in the other two countries.

On inhibition, the majority of five-year-olds in England scored below the overall mean, with the lower tail of the distribution larger than the upper tail (Figure 4.2). There was greater distribution in mental flexibility outcomes. The lower tail of the distribution is smaller than the upper tail, which results in an average score above the overall IELS mean. The distribution of working memory outcomes in England was generally to the right of the overall mean of participating countries, reflecting England's higher average outcomes on working memory at age five.

Figure 4.2 **Distribution of self-regulation scores, England**



Note: Graph produced using the first plausible value only. Please refer to the IELS technical report for additional information regarding plausible values.

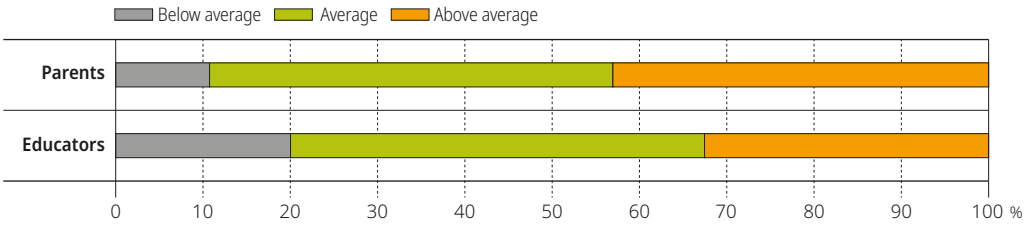
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Parents are more likely than educators to report that their child, or the child they teach, is developing above average self-regulation skills

Parents and educators were asked to comment on a child's overall self-regulation development (e.g. attentiveness, organisation, in control of actions), which differed from self-regulation sub-domains measured by the IELS direct assessments of children. Educators and parents were, on average, equally likely to report a child's overall level of self-regulation development as average (Figure 4.3). Parents, however, were more likely than educators to perceive the self-regulation development of their children as above average and less likely to perceive it as below average.

Educators may have assessed children's self-regulation development differently partly because children behave differently in a home environment than in a classroom environment. Educators may also have more experience assessing the relative level of children's development given that, among other factors, they have more children to compare an individual child to.

Figure 4.3 **Self-regulation development as reported by parents and educators, England**



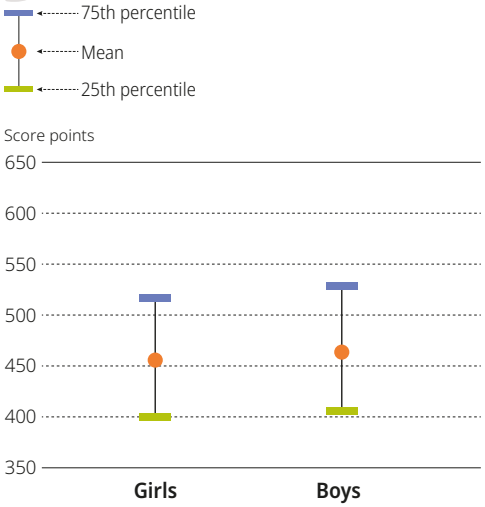
StatLink https://doi.org/10.1787/888934099238

CHILDREN'S INDIVIDUAL CHARACTERISTICS ARE RELATED TO THEIR SELF-REGULATION SKILLS

The inhibition outcomes of boys are higher than those of girls, but there are no significant differences in mental flexibility and working memory outcomes between boys and girls

Children's individual characteristics influence their early skills. In England, the gender gap was statistically significant for inhibition (8 points), with boys scoring higher than girls (Figure 4.4). The difference between boys' and girls' mental flexibility and working memory outcomes was not statistically significant, implying that the development of mental flexibility and working memory skills is at about the same level for both boys and girls at the age of five.

Figure 4.4 **Inhibition scores by gender, England**



Note: The gender differences in scores at the mean and at the 75th percentile are statistically significant.

StatLink https://doi.org/10.1787/888934099257

In Estonia and the United States, the gender gap in inhibition outcomes was the inverse of that observed in England, with girls scoring significantly higher than boys. The working memory outcomes of girls were also significantly higher than those of boys in Estonia and the United States. Similar to England, there were no differences in the mental flexibility outcomes of boys and girls in the United States; however, in Estonia, girls scored significantly higher than boys.

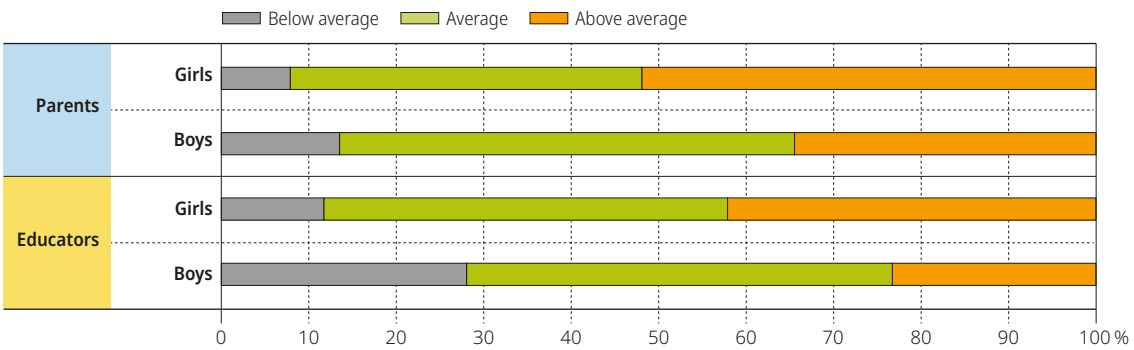
In addition to the differences observed between England and the other two participating countries, the gender gap in inhibition outcomes in England reversed the pattern observed for emergent literacy skills within the country, where the outcomes of girls were significantly higher than those of boys. It also differed from the perceptions of parents and educators, who indicated that girls were more likely to be developing above average self-regulation skills.

Parents and educators perceive girls as more likely than boys to have developed above average self-regulation skills

When asked to report on how they perceived children's overall self-regulation development – rather than the self-regulation sub-domains measured in the direct assessments – both parents and educators in England were more likely to perceive girls rather than boys as developing above average self-regulation skills. On the direct assessment, the inhibition outcomes of boys were higher than those of girls, and there were no significant differences in the mental flexibility and working memory outcomes of boys and girls.

Parents were more likely than educators to perceive their son or daughter as developing above average self-regulation skills (Figure 4.5). Just over 50% of parents perceived their daughter as developing above average self-regulation skills, compared to just over 30% who perceived their son in this way. Parents and educators were also twice as likely to report a boy as developing below average self-regulation skills than a girl.

Figure 4.5 **Self-regulation development as reported by parents and educators, by gender, England**



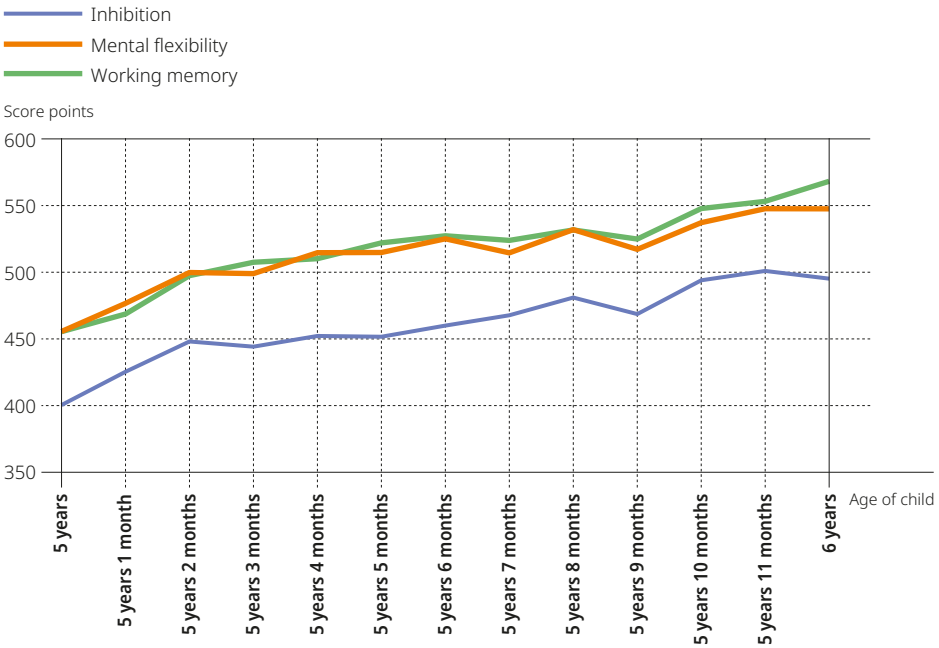
StatLink https://doi.org/10.1787/888934099276

A child's self-regulation outcomes increase between their fifth and sixth birthday

Children's self-regulation skills develop between the ages of five and six. Six-year-old children (aged six years and zero months) scored 95 points higher on inhibition, 92 points higher on mental flexibility and 113 points higher on working memory than five-year-old children (aged five years and zero months) (Figure 4.6). While the average mental flexibility and working memory outcomes of children in England were above the overall mean of participating countries at the age of five years six months, their average development on inhibition was below the overall mean until they were in the final month of their fifth year.

The average difference in the inhibition and mental flexibility outcomes of children between the ages of five years one month and six years were similar across the three countries participating in IELS. The average difference in working memory outcomes between those age groups was similar in both England and the United States, but smaller in Estonia.

Figure 4.6 **Self-regulation scores by age of child in months, England**



StatLink https://doi.org/10.1787/888934099295

Children who have experienced early difficulties have lower average mental flexibility and working memory outcomes than those who have not

IELS asked parents to indicate whether their child had ever experienced a number of potential difficulties that might affect their early learning outcomes. These difficulties included low birth weight[1] or premature birth, learning difficulties[2] and social, emotional or behavioural difficulties. Experiencing learning difficulties, or social, emotional or behavioural difficulties early in life was negatively related to mental flexibility and working memory outcomes at age five. Children who experienced low birth weight or premature birth also had lower working memory scores, on average, than those who had not.

Around 11% of five-year-olds in England were reported by their parents as having had low weight at birth or premature birth. The working memory outcomes of children who had experienced low birth weight or premature birth were significantly lower (26 points) than those of children who had not after accounting for socio-economic status and the experience of the other early difficulties (Figure 4.7). There were no significant gaps in the inhibition or mental flexibility outcomes between these children.

In England, parents reported that about 10% of children had experienced learning difficulties. Children identified by their parents as having experienced learning difficulties had significantly lower mental flexibility (34 points) and working memory (23 points) outcomes than children who had not experienced such difficulties, after accounting for socio-economic status and experience of the other early difficulties (Figure 4.7).

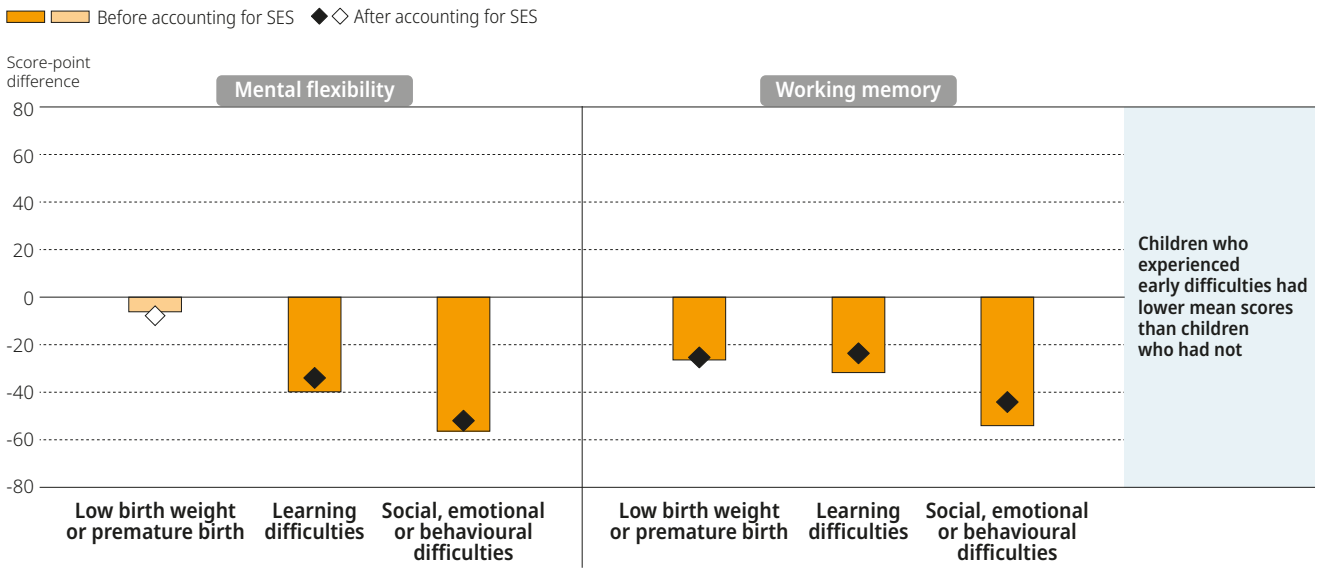
The relationship between having experienced learning difficulties and mental flexibility and working memory outcomes differed depending on the gender of the child. The mental flexibility and working memory outcomes of boys who had experienced learning difficulties were significantly lower than those of boys who had not. There was no difference, however, in the outcomes of girls who had experienced learning difficulties and those who had not.

About 8% of children had experienced social, emotional or behavioural difficulties before the age of five, according to their parents. Children identified by their parents as having experienced social, emotional or behavioural difficulties had significantly lower mental flexibility (49 points) and working memory (44 points) outcomes than children who had not experienced such difficulties, after accounting for socio-economic status and experience of the other early difficulties (Figure 4.7).

The relationship between having experienced social, emotional or behavioural difficulties and mental flexibility outcomes did not depend on the gender of the child. The mental flexibility and working memory outcomes of boys and girls who had experienced these difficulties were significantly lower than the outcomes of those who had not.

Figure 4.7 **Differences in mental flexibility and working memory scores by experience of early difficulties, England**

Score-point differences between children who have and have not experienced an early difficulty, after accounting for the effects of other early difficulties, and before and after accounting for socio-economic status



Note: Statistically significant differences are shown in a darker tone.

StatLink https://doi.org/10.1787/888934099314

CHILDREN'S HOME AND FAMILY BACKGROUNDS ARE RELATED TO THEIR SELF-REGULATION OUTCOMES

A child's parents and primary caregivers play an important role in all of aspects of their upbringing, from determining the context of their home environment to their activities outside the home. The home and family environments that a child grows up in, and their interactions with their parents and environment, shape a child's early learning opportunities and experiences.

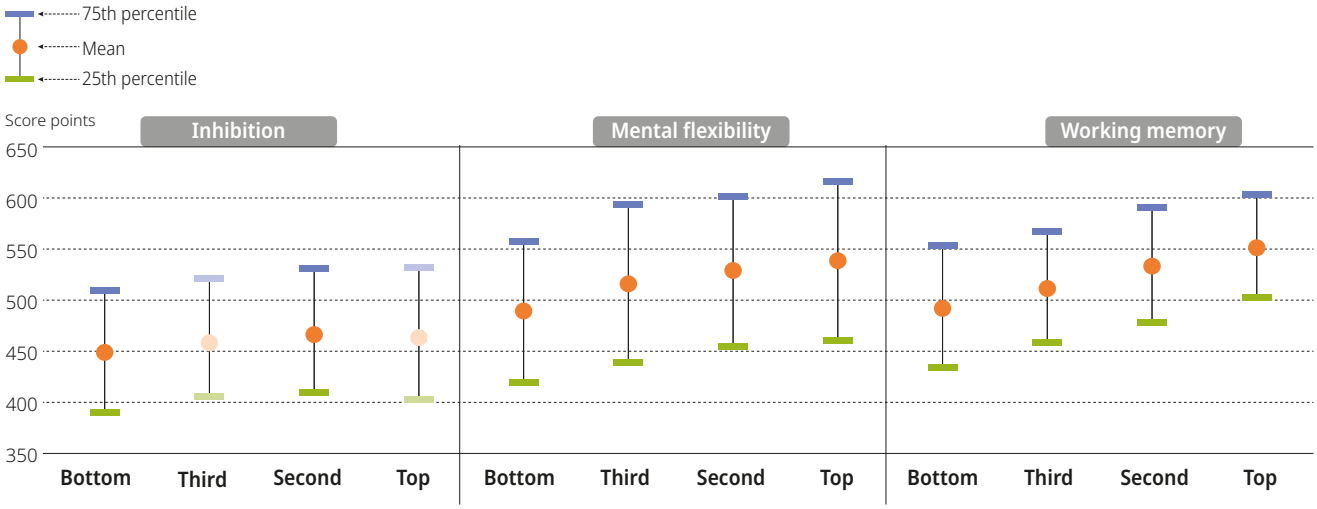
Children's self-regulation outcomes increase with the socio-economic status of their family

Family background and socio-economic status were associated with a child's self-regulation development in England. The combination of household income, parental occupation and parental educational completion – that together create the socio-economic index used in IELS – interact with a child's individual characteristics to influence the development of their self-regulation skills. The children of parents with higher levels of education had higher outcomes. Households with higher economic means are able to spend more money on early learning resources and materials for their children.

The relationship between socio-economic status and child outcomes was most pronounced for mental flexibility and working memory. The mental flexibility outcomes of children from families in the lowest quartile of socio-economic status were significantly lower (49 points) than those of children from the most advantaged quartile of families in England (Figure 4.8). This difference was 59 points for working memory outcomes.

There was a significant difference of about 17 points between the inhibition outcomes of children in the bottom quartile and those in the second quartile (Figure 4.8). However, there was no significant difference in the inhibition outcomes of children in the bottom socio-economic quartile and those in the top, implying that the relationship between socio-economic status and inhibition in England was unclear.

Figure 4.8 **Self-regulation scores by socio-economic quartile of a child's household, England**



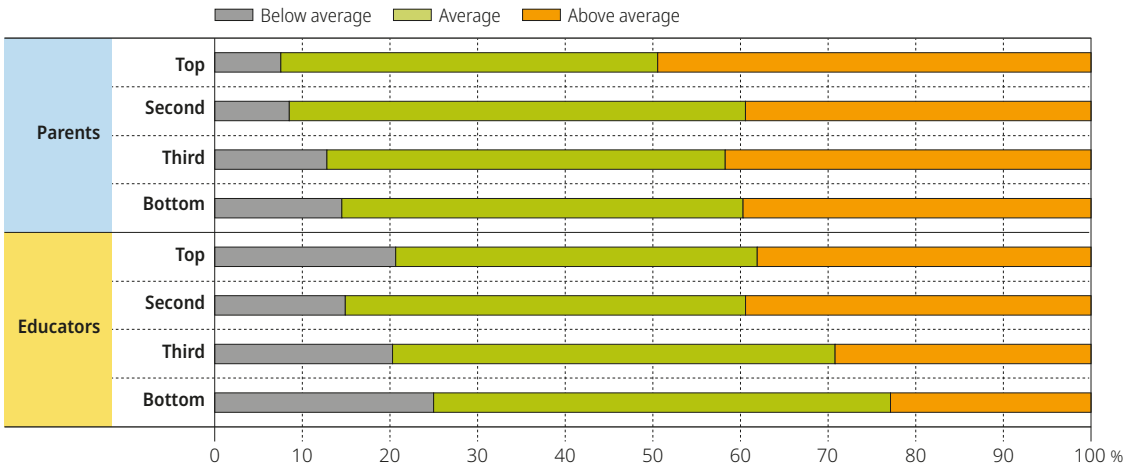
Note: Statistically significant differences from the mean of the bottom quartile are shown in a darker tone.

StatLink https://doi.org/10.1787/888934099333

Parents and educators are more likely to report a child as developing above average self-regulation skills if they are from a family with a higher socio-economic status

Educators and, to a lesser extent, parents, were more likely to perceive children from families with a higher socio-economic status as having above average self-regulation development (Figure 4.9). While parents perceived a gap between the development of children from families in the bottom and top socio-economic quintiles, this gap was smaller than that perceived by educators. The parents of children in the second socio-economic quintile were just as likely as those in the bottom quintile – and less likely than those in the third quartile – to perceive their child as developing above average self-regulation skills, although they were less likely to report their child as developing below average skills.

Figure 4.9 **Self-regulation development as reported by parents and educators, by socio-economic quartile, England**



StatLink https://doi.org/10.1787/888934099352

The language spoken by parents at home is not related to a child's self-regulation outcomes, after accounting for socio-economic status

Before accounting for socio-economic status, the working memory outcomes of children from homes where at least one parent primarily spoke a language other than English were 21 points lower than those of children from homes where both parents (or the single parent) primarily spoke English.

After accounting for socio-economic status, there were no significant differences in the working memory outcomes of children whose parents (or the single parent) both primarily spoke English and those with at least one parent who primarily spoke another language. This implies that the difference between these groups is largely driven by socio-economic factors. Families where one parent primarily spoke a language other than English were more likely to be of a lower socio-economic status than those where both parents primarily spoke English.

Children's immigrant backgrounds are not associated with differences in self-regulation outcomes after accounting for socio-economic status and home language

As with home language, the working memory outcomes of children from immigrant backgrounds[3] differed from those of children whose parents were born in England. While this may be explained through cultural differences, a combination of factors such as differences in primary language, the need to adapt to a new education system and socio-economic differences may play a more predictive role.

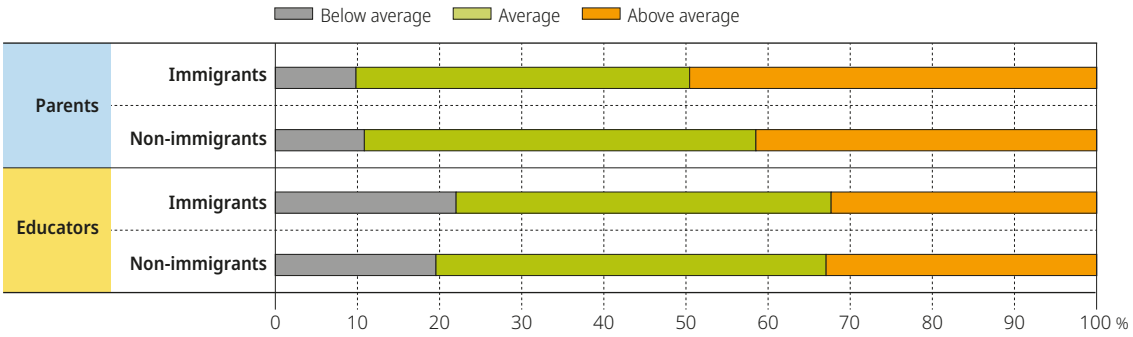
Working memory outcomes were about 18 points lower for children from immigrant backgrounds than they were for the children of parents born in England. There was no significant difference in the development of inhibition and mental flexibility skills between both groups of children.

The difference in working memory outcomes between children from immigrant and non-immigrant backgrounds continued to be significant even after accounting for socio-economic status. However, after accounting for both socio-economic status and home language, the difference in working memory outcomes of the children of immigrant parents was no longer significant. This suggests that socio-economic status as well as the primary language of a child's parents predict the observed differences between children with and without an immigrant background.

Educators do not perceive a difference in the development of self-regulation skills by a child's immigrant background, but immigrant parents are more likely than non-immigrant parents to perceive their child as developing above average skills

Educators, on average, did not perceive differences in children's self-regulation outcomes based on their immigrant background. They are as likely to perceive a child as developing above average, for example, whether or not their parents were born in England (Figure 4.10). Immigrant parents, however, were more likely to perceive their child as developing above average self-regulation skills than parents born in England. Immigrant parents were about as likely as non-immigrant parents to perceive their child as developing below average self-regulation skills.

Figure 4.10 **Self-regulation development as reported by parents and educators, by immigrant background, England**



StatLink https://doi.org/10.1787/888934099371

Mental flexibility and working memory outcomes are higher among the children of mothers who have completed higher levels of education, even after accounting for household income

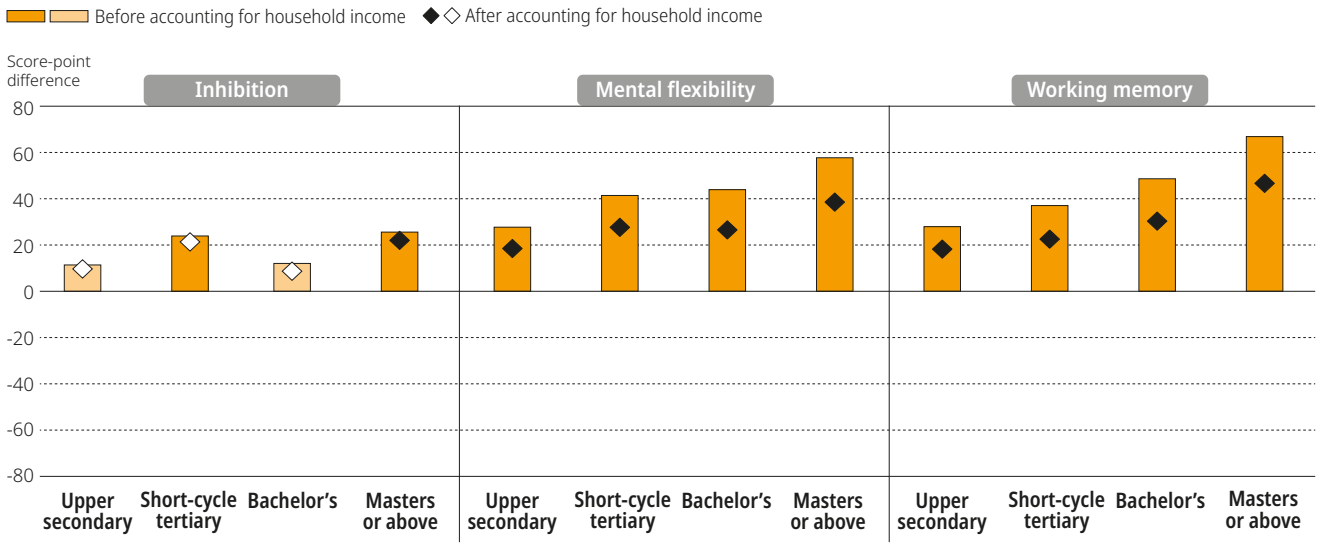
A mother's highest completed education level was associated with her children's early learning outcomes. Mothers with higher levels of education are more likely to spend both more time working and more time with their children than mothers with lower educational attainment, with meaningful impacts on early learning outcomes.

In England, more than one in ten mothers for whom information was available had completed at least a master's degree, about one in three had completed up to a bachelor's degree, and more than one in ten had attended up to secondary school and completed five GCSEs at A* to C. The working memory and mental flexibility outcomes of children whose mothers had completed

any level of education above lower secondary were significantly higher than the outcomes of children whose mothers had only completed up to lower secondary education[4] (Figure 4.11). The inhibition outcomes of children whose mothers had completed either short-cycle tertiary[5] or at least a master's degree were also significantly higher than those of children whose mothers had completed only lower secondary education.

Figure 4.11 **Differences in self-regulation scores by mother's highest level of qualification, England**

Score-point differences between children whose mothers had completed upper secondary education or higher and the children of mothers who had completed only lower secondary education, before and after accounting for household income



Note: Statistically significant differences are shown in a darker tone.

StatLink https://doi.org/10.1787/888934099390

A mother's completion of at least a bachelor's degree was associated with significant differences in the mental flexibility and working memory outcomes of her children after accounting for household income as well. The mental flexibility outcomes of children whose mothers had completed at least a bachelor's degree were 12 points higher than the outcomes of children whose mothers had completed lower than a bachelor's degree. For working memory outcomes, the gap was 18 points. There was no difference in the inhibition outcomes of children whose mothers had or had not completed at least a bachelor's degree, after accounting for household income.

The relationship between maternal education and her child's self-regulation outcomes was different across the three countries. In Estonia, a mother's completion of a bachelor's degree was related to working memory outcomes. In the United States, a mother's completion of a bachelor's degree was related to mental flexibility outcomes. In all three countries, a mother's completion of a bachelor's degree unrelated to inhibition outcomes.

Children in two-parent households have higher mental flexibility scores than children in single-parent households, after accounting for socio-economic status

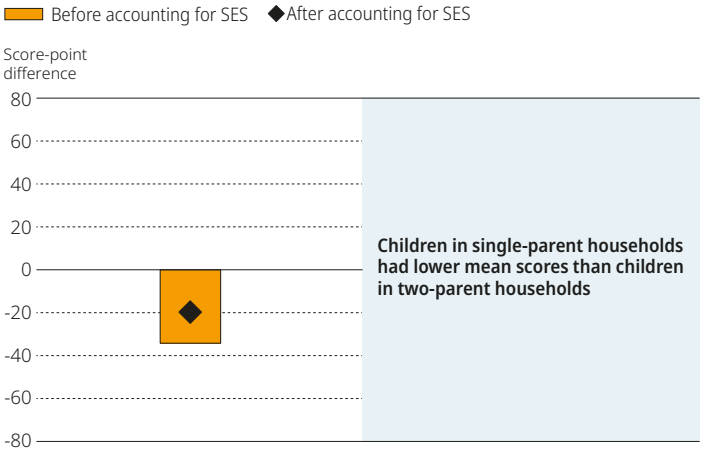
Family structure may affect self-regulation skills in different ways. The presence of two parents in a home may increase the possibility that children interact with more caregivers. It may also facilitate employment opportunities and increase household income.

The mental flexibility outcomes of children in two-parent households were significantly higher than those of children in one-parent households. After accounting for the socio-economic status of a child's household, the gap in mental flexibility outcomes of children in two-parent and single-parent households was 20 points (Figure 4.12). There was no difference in the inhibition and working memory outcomes of children from one-parent and two-parent households, after accounting for socio-economic status.

The association between mental flexibility outcomes and family structure differed depending on the gender of the child. The outcomes of boys living in single-parent homes were 30 points lower than those of boys living in two-parent homes, after accounting for socio-economic status. The mental flexibility outcomes of girls living in single-parent households were similar to those of girls living in two-parent households.

Figure 4.12 **Differences in mental flexibility scores of children in two-parent and single-parent households, England**

Score-point differences between children in single-parent households and those in two-parent households, before and after accounting for socio-economic status



Note: All differences are statistically significant.

StatLink https://doi.org/10.1787/888934099409

The number of siblings a girl has is related to her mental flexibility and working memory outcomes

On average, children's self-regulation outcomes were not related to the number of siblings they had. This implies, for example, that the inhibition outcomes of children with no siblings were identical to those of children with more than four siblings. However, the number of siblings did relate to the self-regulation outcomes of boys and girls differently.

The self-regulation outcomes of girls with two siblings[6] were significantly lower than those of girls with no siblings across all self-regulation domains measured in IELS, after accounting for socio-economic status. The mental flexibility outcomes of girls with three siblings were also significantly lower than those of girls with no siblings.

The average relationship between number of siblings and self-regulation outcomes was different for the three countries participating in IELS. In Estonia, the inhibition outcomes of children with one or two siblings were significantly higher than those of children with no siblings, after accounting for socio-economic status. The working memory outcomes of children with one sibling were significantly higher than the outcomes of those with no siblings. In the United States, the working memory outcomes of children with one or two siblings were higher than those of children with no siblings. A number of factors may explain this variation between countries, including the different cultural importance of siblings and the ease of access to family support services.

CHILDREN'S HOME LEARNING ENVIRONMENTS ARE RELATED TO THEIR SELF-REGULATION DEVELOPMENT

A child's home learning environment and the quality of their interactions with their parents influences early learning outcomes. A child's access to developmentally-appropriate books, toys and activities, and the quality of their interactions with their parents, promotes their opportunities for early learning development.

In the context of this chapter, IELS defines a child's home learning environment as the number of children's books in their home, the frequency with which a child is read to, the frequency with which they are taken to an activity outside of the home and the level of parental involvement in activities taking place at the school. Additionally, parents were asked whether their child used a digital device and, if so, the frequency of that usage.

The number of children's books in the home is predictive of a child's working memory outcomes in England, even after accounting for income or socio-economic status

The number of children's books that a child had access to in their home – including from a public or school library – was a significant predictor of their working memory outcomes. As the number of children's books a child has access to increased, so did their average working memory outcomes.

This relationship held even after accounting for the income or socio-economic status of a child's family. For example, children with access to between 26 and 50 books in their home scored 25 points higher on working memory than children with access to 10 books or fewer outcomes, after accounting for socio-economic status (Figure 4.13).

The number of books a child had access to did not predict their inhibition outcomes, after accounting for socio-economic status. Additionally, only the mental flexibility outcomes of children with over 100 books in the home were significantly higher than those of children with 10 books or fewer after accounting for socio-economic status, implying that there is no clear relationship between access to books and mental flexibility outcomes.

Figure 4.13 **Differences in mental flexibility and working memory scores by number of children's books in the home, England**

Score-point differences between children with access to more than 10 books in the home and those with access to 10 or fewer, before and after accounting for socio-economic status



Note: Statistically significant differences are shown in a darker tone.

StatLink https://doi.org/10.1787/888934099428

The self-regulation outcomes of children who are read to at least once a week are not significantly different from those of children who are read to less often

While being read to was predictive of the development of children's literacy skills, the self-regulation outcomes of children did not increase with the frequency with which they were read to by their parents.

The frequency with which a child is taken to a special or paid activity outside of the home is related to their mental flexibility and working memory outcomes, even after accounting for socio-economic status

Taking a child to a special or paid activity outside of the home – such as a sports club or dance, swimming or language lessons – was positively related to their mental flexibility and working memory scores, even after accounting for socio-economic status. Moderate attendance of an activity – between one and four days a week – was positively related to the mental flexibility outcomes of children, but there were no differences between never attending and almost daily attendance (Figure 4.14).

The working memory outcomes of children increased with the frequency with which they attend an activity. While the mental flexibility outcomes of children who attended an activity almost daily were no different from those that never attended an activity, the working memory outcomes of children who attended an activity almost daily were about 68 points higher than those who never attended.

Going to special activities related differently to boys' and girls' self-regulation scores. Attending a special or paid activity was related to the mental flexibility outcomes of girls but not boys, with girls who attended an activity scoring significantly higher than girls who did not attend an activity. There was no association between attending an activity and the mental flexibility outcomes of boys. Attending an activity at least once or twice a week is associated with higher working memory outcomes for both boys and girls.

Figure 4.14 **Differences in mental flexibility and working memory scores by participation in special or paid activity outside of the home, England**

Score-point differences between children who attend special or paid activities outside the home and those who never or hardly ever do so, before and after accounting for socio-economic status



Note: Statistically significant differences are shown in a darker tone.

StatLink https://doi.org/10.1787/888934099447

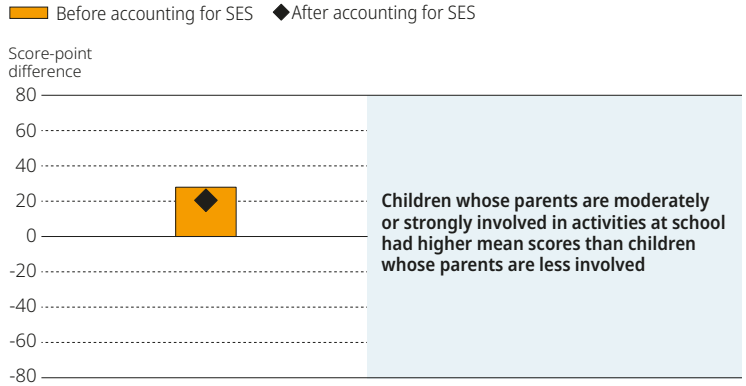
The children of parents perceived by educators as being moderately or strongly involved in activities taking place at the school have higher mental flexibility outcomes

The association between different aspects of the home learning environment and self-regulation outcomes highlights the importance of parental engagement in the development of a child's self-regulation skills. Parental involvement in activities taking place at their child's school,[7] for example, was significantly related to their mental flexibility outcomes.

The mental flexibility outcomes of children whose parents were perceived by educators as slightly or not involved in activities taking place at the school were 21 points below those of children whose parents were perceived as strongly or moderately involved, after controlling for socio-economic status (Figure 4.15). This association was similar for both girls and boys. While there was a similar difference in outcomes by parental involvement for working memory, the relationship was not significant after accounting for socio-economic status.

Figure 4.15 **Mental flexibility scores by parental involvement in school activities, England**

Score-point differences between children whose parents are moderately or strongly involved in activities at school and those whose parents are slightly or not involved, according to their educators, before and after accounting for socio-economic status



Note: All differences are statistically significant.

StatLink https://doi.org/10.1787/888934099466

Five-year-olds who use a digital device at least once a week have higher working memory outcomes than those who hardly ever use one, even after accounting for socio-economic status

While the use of a digital device in and of itself may not influence a child's outcomes, the types of activities that a child engages in while on those devices may enable the development of different skills. The frequency with which a child used a digital device – including a desktop or laptop computer, tablet device or smartphone – was a significant predictor of their working memory outcomes, although there were differences by gender.

The working memory outcomes of children who used a digital device every day (34 points) or at least once a week (39 points) but not every day, were significantly higher than those of children who never or hardly ever used one, even after accounting for socio-economic status (Figure 4.16). The frequency with which a child used a digital device was not significantly related to their inhibition or mental flexibility outcomes.

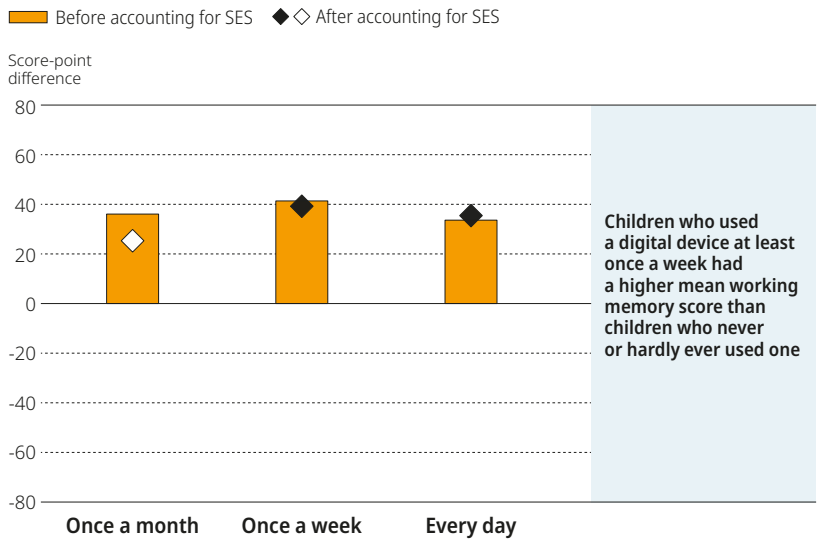
This difference in working memory outcomes was most pronounced for girls. The outcomes of girls who used a device at least once a week were significantly higher than those of girls who never or hardly ever used one. There was a 44-point difference, for example, between the working memory outcomes of girls who used a device once a week but not every day and girls who never or hardly ever used one, after accounting for socio-economic status.

There were no significant differences in the working memory outcomes of boys based on the frequency with which they used a device. The inhibition outcomes of boys who used a device every day, however, were significantly higher than those of boys who never or hardly ever used one.

While moderate digital device use was related to children's working memory scores, there was no significant difference in the outcomes of children who used devices more frequently. The outcomes of children who used a digital device every day were no different to those of children who used them once a week. Similarly, the working memory outcomes of girls who used a device once a month were no different to those of girls who used one every day.

Figure 4.16 **Differences in working memory scores by digital device use, England**

Score-point differences between children who use a digital device once a month or more frequently and those who never use a device, before and after accounting for socio-economic status



Note: Statistically significant differences are shown in a darker tone.

StatLink https://doi.org/10.1787/888934099485

The observed difference in outcomes based on digital device use may be partly attributable to the assessment of a child's self-regulation skills through a tablet-based direct assessment. However, the frequency of use that predicted different self-regulation outcomes differed by participating countries. Using a device every day predicted higher inhibition and mental flexibility outcomes in Estonia, after accounting for socio-economic status. In the United States, using a device at least once a week predicted higher mental flexibility and working memory outcomes. The inconsistency with which digital device use predicted self-regulation outcomes implies that differences are more likely to be specific to a child within a given country, rather than to a tablet-based direct assessment.

CHILDREN'S ECEC ATTENDANCE IS RELATED TO THEIR SELF-REGULATION OUTCOMES AT AGE FIVE

While a child's home learning environment and family background represent two critical factors that influence self-regulation outcomes, access to high-quality ECEC services is associated with positive outcomes in the development of early learning outcomes. In England, almost all five-year-olds in the sample for whom information was available had previously attended an ISCED 0[8] ECEC setting. Among these children, 71% first attended before the age of three and 29% first attended at the ages of three or four.

Although the overall participation rates in ECEC are high in England, the duration and intensity of participation varies. Families with higher incomes and parents with higher levels of completed education, for example, tend to use ECEC services at higher rates than those with lower incomes and lower parental education attainment. Children from households with a higher socio-economic background also tend to be in ECEC earlier and for longer than those from lower socio-economic backgrounds. Overall, however, there is a limited relationship between the intensity of ECEC attendance and a child's self-regulation outcomes.

The self-regulation outcomes of children who first attend an ECEC centre at age three or four are similar to those of children who attend earlier

All three- and four-year-olds in England are entitled to an average of 15 hours a week during term time of state-funded ECEC attendance for 38 weeks a year. The age at which a child first attended an ISCED 01 or ISCED 02 centre was not related to their self-regulation outcomes at the age of five. On average, there was no difference in the self-regulation outcomes of children who first attended a centre before the age of three and those who first attended at the age of three or four. Similarly, the self-regulation outcomes of children who attended a childminder or group- or school-based setting at the age of three were no different from those of children who were cared for by a nanny, au pair, relative or family friend.

This result remained when accounting for the socio-economic status of a child's family. This implies that even when comparing children from families in the bottom or top quartile of socio-economic status, there is no relation between the age at which the child first attended an ECEC setting and their self-regulation outcomes at the age of five.

A child's working memory outcomes, however, differed by the year in which they attended an ECEC setting. The working memory outcomes of children who attended an ECEC setting at age one were significantly higher at the age of five than the outcomes of those who did not attend at age one, after accounting for socio-economic status. The outcomes of children across both sub-domains in the United States also varied by age of attendance, although the differences were not at similar ages.

ASSESSING THE COMBINED EFFECTS OF CHILD, FAMILY AND ECEC CHARACTERISTICS ON SELF-REGULATION SCORES

Analysing how the variables that predict self-regulation outcomes presented in this chapter also relate to one another through a regression model gives insight into which factors contribute most to the observed outcomes. Such results do not provide a causal explanation of which policy levers lead to changes in a child's self-regulation outcomes; however, they do provide a better understanding of which child-, family- and centre-level variables independently predict self-regulation outcomes.

Variables that were significantly related to the self-regulation scores were included in regression models to assess how well they explained variation in the scores. Variables that were not significant in the models were removed one at a time[9] until all remaining variables were significantly related to the outcome.

The results of the regression models also provide an opportunity to quantify score-point differences in terms of months of child development on a given skill. For example, the results of the regression model indicate that children's inhibition scores increase by an average of about 7.5 points a month between the ages of five- and six-years old. This equates to about 88 points for the year between the ages of five- and six-years old. Their mental flexibility scores increase by over 6 points a month – or over 74 points a year – and their working memory scores increase by over 7 points a month – or about 92 points a year. This difference will be used to quantify what a score-point differences imply in terms of months of child self-regulation development.

Inhibition outcomes are related to children's gender, early social, emotional or behavioural difficulties and the socio-economic status of their households

A child's gender significantly predicted their inhibition scores in England (Table 4.2). When accounting for all other factors in the regression model, boys' scores were about 10 points – or the equivalent of under 2 months of development – above those of girls.

Early social, emotional or behavioural difficulties also predicted children's inhibition scores. Five-year-olds who experienced these difficulties earlier in life scored about 27 points below children who had not experienced these difficulties. This equates to about 4 months of inhibition development.

The socio-economic status of a child's family was also a significant predictor of their inhibition scores at age five, with the outcomes of children in the second quartile significantly higher than those of children in the bottom quartile. This difference was an average of over 15 points – or over 2 months of inhibition development.

Table 4.2 **Results of the multiple regression model of inhibition, England**

VARIABLE	Regression coefficient	Standard error	*p*
Child is a boy	10.06	4.26	**0.02**
Age (months)	7.32	0.76	**0.00**
Social, emotional or behavioural difficulties	-26.66	9.28	**0.00**
Socio-economic status quartile (reference group: bottom quartile)			
Third	8.84	7.13	0.22
Second	15.05	6.75	**0.03**
Top	11.93	7.61	0.12
Constant	406.13	6.92	

Note: *p*-values in bold indicate statistical significance.
StatLink https://doi.org/10.1787/888934099504

Mental flexibility outcomes are related to a child's experience of early difficulties, the socio-economic status of their family and the level of parental involvement in school activities

Early difficulties independently predicted children's mental flexibility scores. Five-year-olds who experienced learning difficulties earlier in life scored about 37 points below children who had not experienced these difficulties. This equates to about 6 months of mental flexibility development. Five-year-olds who experienced social, emotional or behavioural difficulties earlier in life scored over 46 points below children who had not experienced these difficulties. This equates to about 8 months of mental flexibility development.

The socio-economic status of a child's family was also a significant predictor of their mental flexibility scores at age five. For example, the average difference in mental flexibility scores between a child in the top socio-economic quartile and that of a child in the bottom quartile was over 36 points. This equates to a gap of about 6 months of development in mental flexibility.

The children of parents perceived by educators as being moderately or strongly involved in activities taking place at the school had higher mental flexibility outcomes. Having parents perceived as moderately or strongly involved in school activities predicted a 23 point increase in mental flexibility outcomes. This equates to under 4 months of mental flexibility development.

Table 4.3 **Results of the multiple regression model of mental flexibility, England**

VARIABLE	Regression coefficient	Standard error	*p*
Age (months)	6.17	0.89	**0.00**
Learning difficulties	-36.62	12.68	**0.00**
Social, emotional or behavioural difficulties	-46.65	12.94	**0.00**
Socio-economic status quartile (reference group: bottom quartile)			
Third	20.88	8.85	**0.02**
Second	29.25	8.23	**0.00**
Top	36.62	8.55	**0.00**
Parental involvement*	23.03	7.09	**0.00**
Information on parental involvement missing	10.33	9.44	0.27
Constant	453.78	8.72	

*Variable has a missing indicator to preserve cases in the dataset.
Note: *p*-values in bold indicate statistical significance.
StatLink https://doi.org/10.1787/888934099523

Working memory outcomes are related to a child's experience of early difficulties, the socio-economic status of their families, their frequency of digital device use and the level of parental involvement in school activities

A range of factors related to a child's individual characteristics, family background and home learning environment predicted working memory outcomes at age five.

The outcomes of children born prematurely or with a low birth weight were about 26 points – or about 3.5 months of development – lower than children who were not. The outcomes of children who had experienced learning difficulties were about 26 points lower than the outcomes of those who had not. This equates to over 3 months of working memory development. Similarly, the outcomes of children who had experienced social, emotional or behavioural difficulties were about 41 points below those of children who had not experienced such difficulties. This equates to over 5 months of working memory development.

The socio-economic status of a child's family was also a significant predictor of their working memory scores at age five. For example, the average difference in working memory scores between a child in the top socio-economic quartile and that of a child in the bottom quartile was over 45.5 points. This equates to a gap of over 6 months of development in working memory. The children of parents perceived as moderately or strongly involved in school activities scored about 14 points higher – or the equivalent of about 2 months of development.

Similarly, the frequency with which a child used a digital device predicted an increase in their working memory scores. For example, the average difference between children who never used a device and those who used one at least once a week was 35 points. This equates to over 4.5 months of working memory development. There was no significant difference in the outcomes of children who used a device more than once a month and those who use a device at least once a month but not every week.

Table 4.4 **Results of the multiple regression model of working memory, England**

VARIABLE	Regression coefficient	Standard error	*p*
Age (months)	7.64	0.69	**0.00**
Low birth weight or premature birth	26.26	6.54	**0.00**
Learning difficulties	-25.72	9.38	**0.01**
Social, emotional or behavioural difficulties	-41.17	9.31	**0.00**
Socio-economic status quartile (reference group: bottom quartile)			
Third	13.42	6.46	**0.04**
Second	31.85	6.59	**0.00**
Top	48.36	6.07	**0.00**
Digital device use (reference group: never or hardly ever)			
At least once a month but not every week	24.54	10.73	**0.02**
At least once a week but not every day	34.87	8.87	**0.00**
Every day	32.21	8.80	**0.00**
Parental involvement*	14.06	5.73	**0.01**
Information on parental involvement missing	4.94	7.60	0.52
Constant	398.68	12.08	

*Variable has a missing indicator to preserve cases in the dataset.

Note: *p*-values in bold indicate statistical significance.

StatLink https://doi.org/10.1787/888934099542

A CHILD'S SELF-REGULATION OUTCOMES ARE RELATED TO THEIR EARLY LITERACY, NUMERACY AND SOCIAL-EMOTIONAL OUTCOMES

A child's self-regulation skills develop at the same time as many other early skills, including literacy, numeracy and social-emotional skills. Learning in one area positively influences learning in other areas. Similarly, gaps in learning in one area negatively influence the development of learning in the other areas.

On a practical level, for example, young children with better literacy skills may be better able to engage successfully with other children in ways that support their prosocial development. Better prosocial skills may lead to more opportunities to interact with other children in ways that are supportive of their vocabulary development and oral comprehension.

IELS can provide insights into how early self-regulation, social-emotional, literacy and numeracy skills relate to each other. Mental flexibility and working memory outcomes were particularly highly correlated with a child's emergent literacy and numeracy and social-emotional outcomes. Mental flexibility and working memory also explained between 22% and 45% of the variation in children's emergent literacy and numeracy outcomes, after controlling for socio-economic status.

Mental flexibility and working memory skills are strongly related to emergent literacy and numeracy skills

The mental flexibility and working memory skills of five-year-olds in England were strongly related[10] to their emergent literacy and numeracy skills (Table 4.5). Children's mental flexibility and working memory skills were also strongly related to each other. The relationship between children's mental flexibility and working memory skills and their ability to successfully identify emotions, attribute emotions or engage in prosocial behaviour was also moderately strong.

Correlations between children's inhibition skills and their other emergent skills were not as strong as the correlations with mental flexibility or working memory (Table 4.5). Inhibition skills were moderately strongly related to their emergent numeracy skills. The relationship with their emergent literacy skills was relatively weak. Children's inhibition skills at age five related moderately strongly to their mental flexibility and working memory skills.

Table 4.5 **Correlations between self-regulation outcomes and other IELS learning domains, England**

	Inhibition	Mental flexibility	Working memory
Mental flexibility	0.39		
Working memory	0.37	0.60	
Literacy	0.15	0.52	0.65
Numeracy	0.28	0.57	0.74
Emotion identification	0.15	0.43	0.45
Emotion attribution	0.06	0.23	0.26
Prosocial behaviour	0.09	0.25	0.27
Trust	0.06	0.12	0.11
Non-disruptive	–	0.15	0.13

Note: Only the coefficients of statistically significant correlations are presented above.

StatLink https://doi.org/10.1787/888934099998

Children's mental flexibility and working memory skills explained a substantial proportion of the variance in their emergent literacy and numeracy skills and emotion identification and attribution, even after accounting for socio-economic status (Table 4.6). In England, a child's mental flexibility outcomes, for example, accounted for 22% of their emergent literacy outcomes and 27% of their emergent numeracy outcomes, after controlling for socio-economic status. Their working memory outcomes explained an even larger portion of the variance in emergent literacy and numeracy outcomes. Children's ability to successfully recall short visual sequences explained about 31% of their emergent literacy outcomes and 45% of their emergent numeracy outcomes.

Table 4.6 **Percentage of the variation in early learning scores explained by socio-economic status and self-regulation outcomes**

	Socio-economic status (%)	Inhibition (%)	Mental flexibility (%)	Working memory (%)
Literacy	13.57	1.78	21.82	30.47
Numeracy	11.5	7.31	26.87	44.8
Emotion identification	2.14	1.95	16.06	16.41
Emotion attribution	2.83		4.15	5.06
Prosocial behaviour	2.92	1.16	5.05	5.59

Note: Only the coefficients of statistically significant correlations are presented above.

StatLink https://doi.org/10.1787/888934100017

SUMMARY AND CONCLUSIONS

The mental flexibility and working memory outcomes of children in England are above the overall IELS mean of participating countries, but their inhibition outcomes are below the mean

The average mental flexibility and working memory outcomes of children in England were significantly higher than those of children in the United States and similar to those of children in Estonia. The average inhibition outcomes of children in England were significantly lower than those of children in Estonia and the United States.

This set of self-regulation skills is predictive of a child's future well-being, including how well they do at school and in non-academic activities where concentration and persistence correlate with success. These results suggest that children in England are less likely than those in the other participating countries to successfully inhibit their automatic responses when presented with a new set of information. However, they are more likely than those in the United States and as likely as those in Estonia to successfully switch between rules and recall short visual sequences.

The inhibition outcomes of boys are higher than those of girls

In England, the average inhibition outcomes of boys were higher than those of girls. Girls and boys had similar mental flexibility and working memory outcomes. The results of the regression analysis also suggest that gender is a strong predictor of inhibition scores at age five – with boys scoring higher than girls – but that it is not significantly related to mental flexibility or working memory.

There was no consistent gender pattern across the three participating countries. A gender gap in favour of girls was most pronounced in Estonia, where the scores for girls were significantly higher than those of boys in each self-regulation subdomain. In the United States, the inhibition and working memory outcomes of girls were higher than those of boys, and there were no gender differences in mental flexibility outcomes.

Children who have experienced difficulties before the age of five have lower average mental flexibility and working memory scores at age five

The mental flexibility and working memory scores of children who had experienced learning or social, emotional or behavioural difficulties before the age of five were significantly lower than those of children who had not, after accounting for socio-economic status and the experience of other difficulties. Experiencing low birth weight was related to lower working memory outcomes at the age of five in England.

Experiencing learning difficulties, or social, emotional or behavioural difficulties before the age of five was also a significant predictor of the mental flexibility and working memory outcomes of five-year-old children after accounting for all factors in the overall regression model.

The socio-economic status of a child's family is associated with their self-regulation outcomes

The self-regulation outcomes of five-year-olds from a household in a higher socio-economic bracket in England were higher than those of children from lower socio-economic backgrounds in mental flexibility and working memory, but the relationship was less clear in children's inhibition. Only children in the second quartile scored significantly higher than children in the bottom quartile on inhibition.

The socio-economic status of a child's family was a significant predictor of self-regulation outcomes in all participating countries – particularly in relation to mental flexibility and working memory – although the impacts varied by country. Estonia had the smallest differences in children's skills based on socio-economic status compared to England and the United States. By understanding how countries mitigate disadvantage best, policy makers and education leaders may be able to implement strategies to achieve outcomes that are more equitable for their children.

A child's home learning environment predicts their mental flexibility and working memory outcomes

A child's home learning environment predicted higher mental flexibility and working memory outcomes. A child's home learning environment did not independently predict their inhibition outcomes.

A child's access to developmentally-appropriate books, and their attendance of special or paid activities outside of school independently predicted their working memory outcomes – as did a child's use of a digital device – even after accounting for all factors in the overall regression model. This implies that children with access to a higher number of children's books – including from a public or school library – and children who are taken to a special or paid activity outside of the home – such as a sports club or dance, swimming and language lessons – are more likely to successfully recall short visual sequences. Parents who were moderately or strongly involved in activities taking place at the school predicted both a child's mental flexibility outcomes.

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Notes

1. A birth weight lower than 5lbs 5oz/2.5 kg was defined as low.
2. These included speech or language delay or intellectual disabilities.
3. Children with a father or mother who were born in a country other than the one in which the child participated in IELS.
4. Up to Year 9.
5. Short-cycle tertiary education corresponds to Higher National Certificate (HNC), Higher National Diploma (HND), National Vocational Qualifications (NVQ) at level 4+, Diploma of Higher Education (DipHe), Foundation degree or equivalent.
6. To meet the standards for reporting mean scores in IELS, a subgroup of children must contain at least 30 children, and these children must have been sampled from at least five centres or schools. The number of girls with more than three siblings did not meet these reporting requirements.
7. Examples of such activities include school fetes, concerts/plays, parent's evenings, and parental workshops.
8. According to the International Standard Classification of Education (ISCED), ISCED 0 programmes are pre-primary programmes situated in institutional settings that contain an intentional education component, among other criteria. ISCED 01 captures participation by very young children (aged two and under), and ISCED 02 captures participation by slightly older children (aged three to five).
9. In order of descending *p*-value.
10. A correlation coefficient lower than 0.20 is considered relatively weak, between 0.20 and 0.49 is considered moderately strong, between 0.50 and 0.79 is considered strong and greater than 0.8 is considered very strong.

5

Children's social-emotional outcomes in England

This chapter presents findings on the social-emotional outcomes of five-year-olds in England. It shows the differences in social-emotional scores across multiple subgroups of children, considering their individual and family characteristics, as well as their home learning environments. This is based on a direct assessment of children's outcomes and reports from the children's parents and educators.

THE IMPORTANCE OF SOCIAL-EMOTIONAL DEVELOPMENT

Children develop their capacity to experience and express emotions starting in early infancy. This happens as they grow physically and cognitively, and as they start to develop their language and problem-solving skills (Thompson, 2001[1]). Recent research in neuroscience has shown that the same neural circuits involved in the regulation of emotions overlap with those associated with cognitive processing (Bush, Luu and Posner, 2000[2]; Davidson et al., 2002[3]; Posner and Rothbart, 2000[4]).

Emotions can support cognitive development when they are well-regulated and can interfere with cognitive development when they are not. For instance, children who do not feel in control of their emotions are more prone to outbursts, inattention and rapid retreats from stressful situations (Garber and Dodge, 1991[5]). Children's beliefs and their neural mechanisms of attention are interrelated components in childhood development (Schroder et al., 2017[6]).

Early social-emotional skills are strong predictors of later health, education, social and labour-market outcomes

The ability to understand emotions is a unique, concurrent predictor of academic success (Leerkes et al., 2008[7]). Early prosocial behaviour at age eight is shown to be as important as early cognitive ability in predicting educational attainment at age 30 (Schoon et al., 2015[8]), and in shaping attainment in adolescence and adulthood (Caprara et al., 2000[9]). Social-emotional skills developed during childhood are linked to educational achievement, even after controlling for early literacy and numeracy skills (Duncan et al., 2007[10]). For example, children's early skills in identifying and responding empathetically to others' emotions have been found to predict concept knowledge and language competence, even after controlling for age, gender and parental income level (Rhoades et al., 2011[11]; Garner and Waajid, 2008[12]).

Underdeveloped emotion identification skills in early adolescence predict increases in fear, decreases in positive emotions and decreases in the quality and quantity of social support. Amongst boys, low emotion identification skills also predict increased feelings of sadness (Ciarrochi, Heaven and Supavadeeprasit, 2008[13]). Early empathy, trust and prosocial behaviours are associated with social justice beliefs and a lower likelihood of involvement in crime and delinquency in adulthood (Schoon et al., 2015[8]). Low empathy is also associated with antisocial and delinquent behaviours and an increased risk of psychopathology as adults (Fontaine et al., 2011[14]). Sympathy and moral reasoning among 6- to 9-year-olds are associated with social justice values at age 12 (Daniel et al., 2014[15]).

Children's emotional health is 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[16]). Early emotional well-being is linked with better mental health in later life, and emotional difficulties at age five are predictors of midlife psychological disorders such as anxiety and depression (Rutter, Kim-Cohen and Maughan, 2006[17]; Buchanan, Flouri and Brinke, 2002[18]).

Box 5.1. Defining social-emotional learning in the International Early Learning and Child Well-Being Study (IELS)

Social-emotional learning is the process through which children and adults acquire and effectively apply the knowledge, attitudes and skills necessary to understand and manage emotions, set and achieve positive goals, feel and show empathy for and towards others, establish and maintain positive relationships, and make responsible decisions (CASEL, 2015[19]; Weissberg et al., 2015[20]).

Social-emotional development is the continuous process of learning social-emotional skills. Similar to emergent literacy and numeracy skills, developing these skills in childhood and throughout adulthood is important for their effect on personal, academic and life outcomes.

Social-emotional skills are individual characteristics that 1) link biological predispositions and environmental factors; 2) are expressed through consistent patterns of thoughts, feelings and behaviours; 3) develop through formal and informal learning experiences; and 4) influence important socio-economic outcomes throughout life (De Fruyt and Wille, 2015[21]). The term is increasingly prevalent in policy discussions that emphasise improving these skills through learning. Other terms such as "21st Century Skills", "non-cognitive skills", "employability skills" and "personality characteristics" often refer to the same concept. For further discussion about their overlaps and differences, see Abrahams et al. (2019[22]) and Kankaraš and Suarez-Alvarez (2019[23]).

IELS provides a direct measure of children's emotion identification and attribution, and an indirect measure of prosocial behaviour, trust and non-disruptive behaviour

Parents and educators responded to survey questions about the child's prosocial behaviour, trust and disruptive behaviours. Children in the study participated in an interactive tablet-based assessment of their empathy skills in a one-on-one setting with a trained study administrator.

Measuring empathy entailed the assessment of two skills: emotion identification and emotion attribution in response to a story about a set of characters. Children responded to hypothetical (story) scenarios, with cartoon-like children in brief vignettes. The empathy measure required the child to identify an emotion using emoticons representing happy, sad, afraid, angry and surprised. The emotion identification scores reflected children's ability to recognise the emotions of others (i.e. how did the story character feel?). The emotion attribution scores reflected the interaction of concordant emotional responses (i.e. when the child's responses matched the emotion of the story character) and his or her own emotion attribution (i.e. how the child felt and why they felt that way in response to the story).

IELS also measured prosocial behaviours, trust and non-disruptive behaviours indirectly through reports from parents and educators. The items for assessing prosocial behaviours and non-disruptive behaviours were based on the Adaptive Social Behaviour Inventory (Hogan, Scott and Bauer, 1992[24]) while those for trust were based on existing frameworks (Baumrind, 1968[25]; Roberts, Strayer and Denham, 2014[26]). Prosocial behaviour was composed of items such as the child "understands others' feelings, such as when they are happy, sad or angry". Disruptive behaviour was composed of items such as the child "fights with other children", which was positively inverted for easier interpretation (i.e. a higher score means less disruptive). Trust was composed of items such as the child "approaches familiar adults for comfort when upset".

This chapter compares educator and parent ratings on children's behaviours related to their social-emotional skills. Parents may have better knowledge of their child in a wider set of situations than educators, while educators have a larger reference group to compare each child with than parents. Children may also behave differently in different environments.

Educators' ratings on children's behaviours were more closely related to the direct assessment of social-emotional skills, and their scores were aggregated into a single score for prosocial behaviours, trust, and non-disruptive behaviours, and scaled together with the results for the other early leaning domains in this study. Educators' indirect assessments are, therefore, internationally standardised with a mean of 500 and a standard deviation of 100.

IELS measures of social-emotional skills are interrelated

An important component of prosocial behaviour and getting along with others is being able to recognise and understand the emotions of others (Strayer, 1987[27]; Strayer, 1993[28]). Both emotion identification and emotion attribution act, therefore, as precursors to engaging in prosocial behaviour in response to another person's emotional state (Hinnant and O'Brien, 2007[29]). At the same time, it is important to note that prosocial behaviour goes one-step further as it also includes the expression of positive social behaviours. For example, the child "tries to comfort others when they are upset".

The central aspect of trust in IELS is the child's expectations that others will be supportive, responsive and kind (Bowlby, 1969[30]). Children develop their first relationships with adults, peers, and friends in early childhood. When these first relationships are consistent, predictable, and responsive to their needs, children are more likely to develop secure attachments that help them to acquire and reinforce their trust in known people and themselves (Bowlby, 1969[30]). It is important to clarify that trust does not imply that children are indiscriminately developing secure attachments, but that they develop trust because of frequent and repeated positive interaction with close adults. Reassuring expressions from caregivers (which nurture a child's secure attachment) can support children to continue to play comfortably, while anxious expressions (which are associated with a child's insecure attachments) might interfere in children's trust and playful interactions and, ultimately, hamper their development (Baldwin and Moses, 1996[31]). Mistrustful children might be overly wary or fearful of peers or adults; a child might be reluctant to engage with others, or be needy and dependent since s/he does not trust others to be responsive and supportive. As shown in this chapter, children's trust is associated with adaptive social behaviour, such as the expression of prosocial and non-disruptive behaviour.

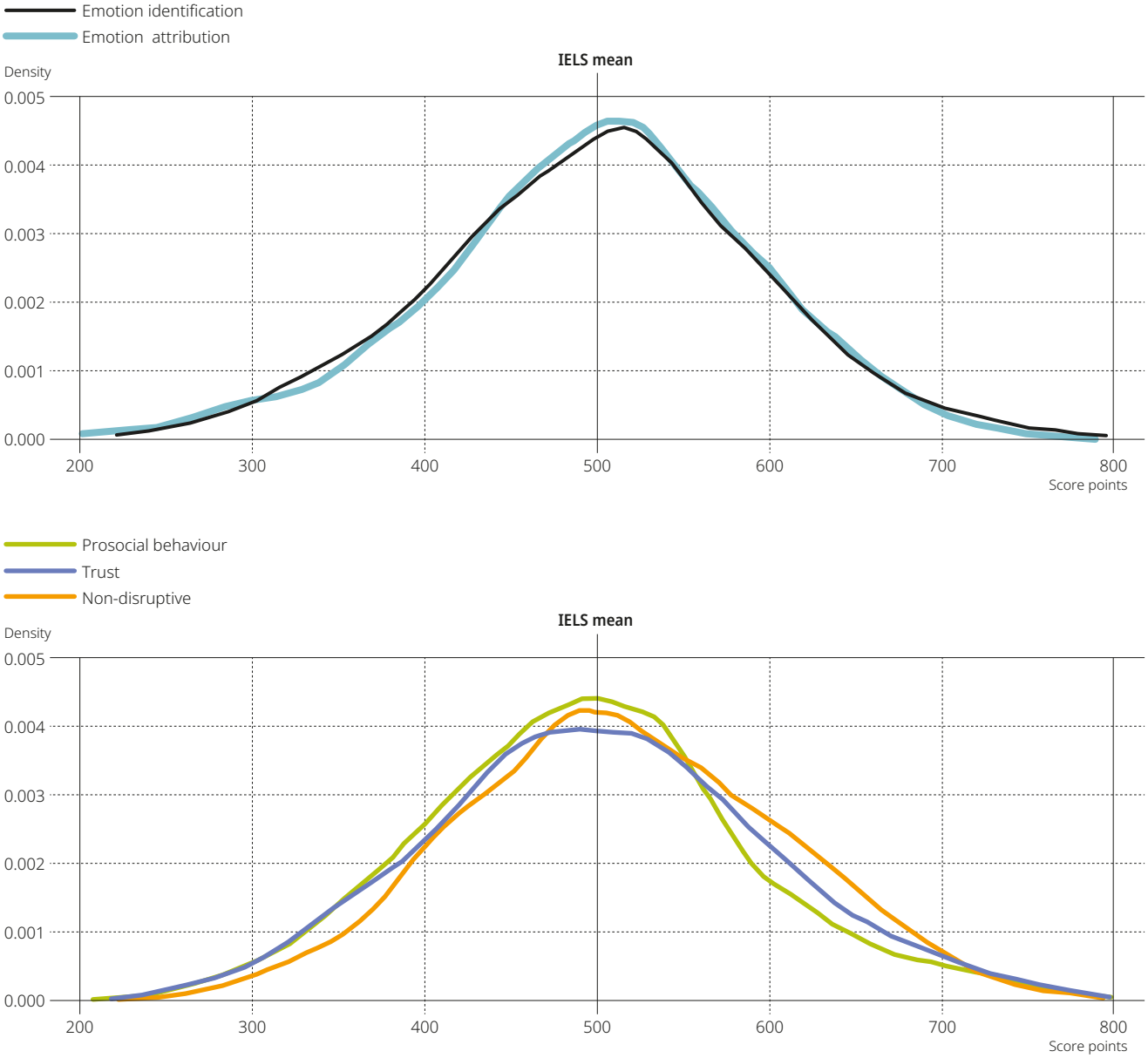
SOCIAL-EMOTIONAL SKILLS OF FIVE-YEAR-OLDS IN ENGLAND

The average five-year-old in England is less able to identify others' emotions than children in Estonia, although they are considered less disruptive by their educators

When presented with a range of stories and situations, children in England were less able to identify others' feelings than children in Estonia, but had similar abilities to children in the United States. The mean for five-year-olds in England on emotion identification was 497 points, which is significantly lower than Estonia (511) and not significantly different from to the United States (493). Children's ability to recognise emotions is a precursor of their ability to feel empathy for others. In emotion attribution, where the score reflects children's own emotions, children in England scored at a similar level to children in the United States and Estonia.

According to educators, children in England had significantly lower prosocial behaviour (495) than children in Estonia (511), but were similar to children in the United States (494). However, educators in England rated children as significantly less disruptive than children in Estonia (515 compared to 470), and the same as children in the United States (515). Educators in the three participating countries rated children's trust at similar levels. The distributions of social-emotional scores in England are shown in Figure 5.1.

Figure 5.1 **Distribution of social-emotional learning scores, England**



Note: Graphs produced using the first plausible value only. Please refer to the IELS technical report for additional information regarding plausible values.

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Social-emotional learning is interrelated in both the direct and the indirect assessments

Table 5.1 shows the association between the social-emotional skills measured in the direct assessment and those measured in the indirect assessment. For the direct assessment of empathy, both emotion identification and emotion attribution were strongly correlated (r=0.61). For the indirect assessments (both educators and parents), the association between trust and non-disruptive behaviour was moderately strong, as was the association between prosocial behaviour and non-disruptive behaviour. The strongest association was between prosocial behaviour and trust. These results were similar to the overall values across participating countries in IELS (in brackets in the table).

The association between the direct assessment of children and educators' indirect assessment is moderately strong. The direct assessment provides children's scores on emotion identification and emotion attribution, while the indirect assessment provides educators' views on children's prosocial behaviour, trust and non-disruptive behaviour. Examples of prosocial behaviour include "the child understands others' feelings" and "tries to comfort others when they are upset". While the first statement is more closely

associated with the tasks presented in the direct assessment, the second statement includes a positive behaviour. Examples of trust include the child "approaches familiar adults for comfort when upset") and examples of disruptive behaviours include the child "fights with other children"). Although these behaviours still relate to the tasks presented in the direct assessment, they are more distal behaviours from emotion identification and emotion attribution than prosocial behaviour.

Educator evaluations of children's prosocial behaviour, trust and non-disruptive behaviour were relatively correlated with IELS direct assessments of children's emotion identification and emotion attribution. On the other hand, the association between educators' and parents' indirect assessments is moderate while the association between parents' ratings and the direct assessment of children's social-emotional skills is weak. As previously mentioned, it is important to highlight that these domains are conceptually overlapped, but not exactly the same.

Table 5.1 **Correlations between the social-emotional skills in each type of assessment, England**

		Direct assessment		Indirect assessment (educators)			Indirect assessment (parents)	
		Emotion identification	Emotion attribution	Prosocial behaviour	Trust	Non-disruptive	Prosocial behaviour	Trust
Direct assessment	Emotion attribution	0.61 (0.57)						
Indirect assessment (educators)	Prosocial behaviour	0.30 (0.25)	0.20 (0.18)					
	Trust	0.16 (0.17)	0.11 (0.13)	0.74 (0.72)				
	Non-disruptive	0.15 (0.12)	0.10 (0.09)	0.55 (0.49)	0.32 (0.21)			
Indirect assessment (parents)	Prosocial behaviour	0.16 (0.14)	0.12 (0.10)	0.25 (0.23)	0.22 (0.20)	0.09 (0.12)		
	Trust	0.13 (0.10)	0.10 (0.07)	0.18 (0.13)	0.29 0.27)	-0.06 (-0.04)	0.81 (0.80)	
	Non-disruptive	0.11 (0.06)	0.12 (0.11)	0.26 (0.22)	0.13 (0.06)	0.30 (0.35)	0.49 (0.47)	0.40 (0.37)

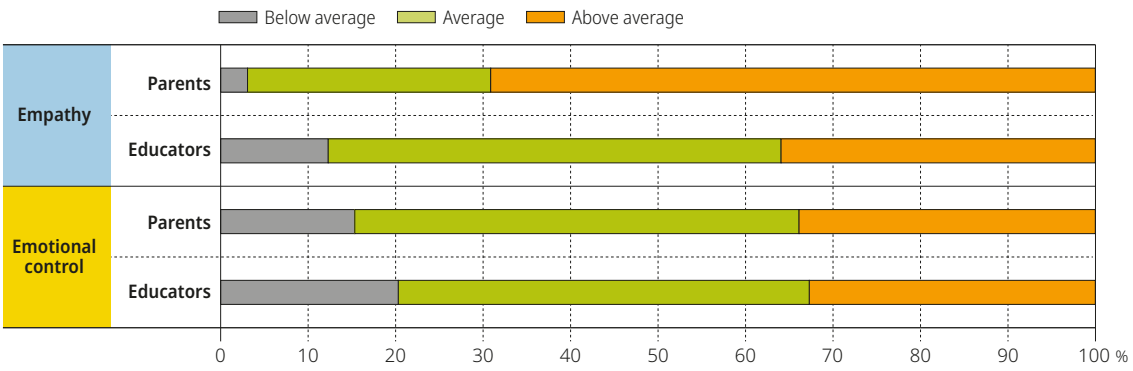
Note: This table shows the correlation coefficients between the social-emotional skills in England (using child weights) and, in brackets, the overall values across participating countries in IELS (using senate weights).

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Parents give more positive ratings of their children's empathy skills than educators but both rate children's emotional control similarly

In addition to the direct assessment of emotion identification and emotion attribution, parents and educators also rated children's development in empathy (e.g. the child is considerate, helpful, caring) and emotional control (e.g. the child controls emotions, waits patiently for something he or she wants). Parents were more likely to rate children's empathy skills as more developed (Figure 5.2). However, both parents and educators rated children's emotional control similarly. Parents in Estonia and the United States also rated children's empathy skills as more developed than did educators.

Figure 5.2 **Social-emotional development as reported by parents and educators, England**



Note: The figure compares the same children as rated by their educators and parents.

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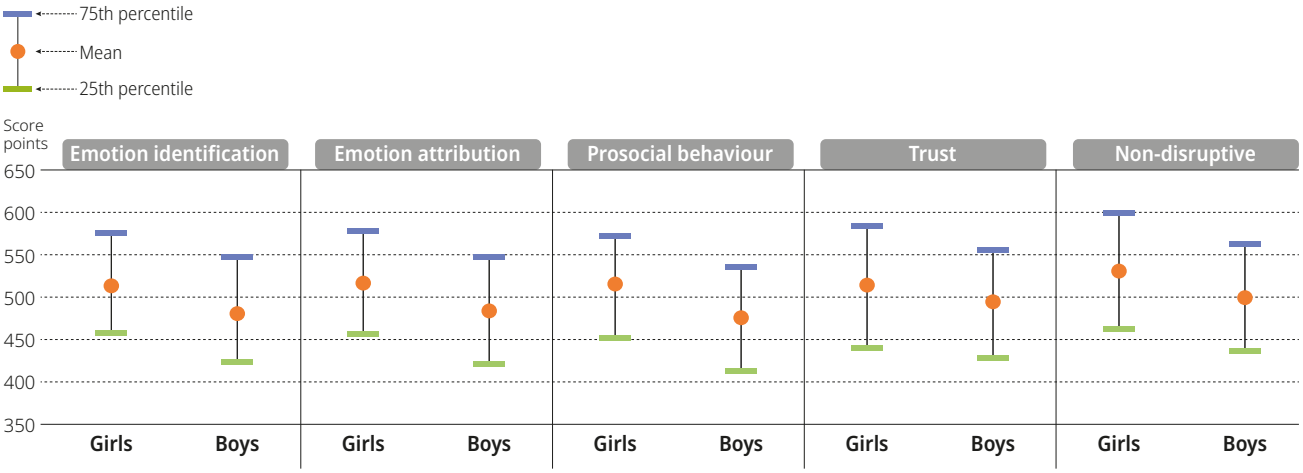
INDIVIDUAL CHARACTERISTICS AND EARLY SOCIAL-EMOTIONAL SKILLS

Girls have better average social-emotional skills than boys

Figure 5.3 shows that, on average, girls had better social-emotional learning outcomes than boys in emotion identification, emotion attribution, prosocial behaviour, trust and non-disruptive behaviour. The differences between boys and girls were statistically significant for the direct and indirect assessments. Educators reported higher gender differences in prosocial behaviour than were found in the direct assessment.

Both parents and educators reported girls as having more developed empathy and emotional control than boys (Figure 5.4). This difference also existed in Estonia and the United States. Parents were also more likely than educators to rate children's empathy skills as better developed regardless of their gender. On average, across social-emotional outcomes, the gender gap in England was greater than in the United States, but similar to that in Estonia.

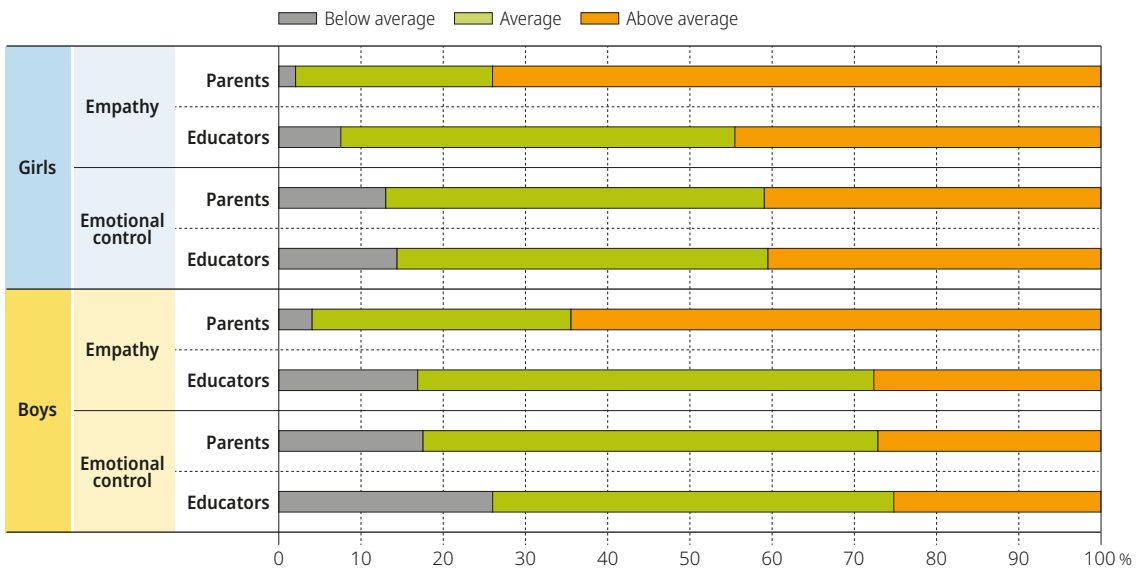
Figure 5.3 **Social-emotional scores by gender, England**



Note: The mean differences are statistically significant.

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Figure 5.4 **Social-emotional development as reported by parents and educators, by gender**



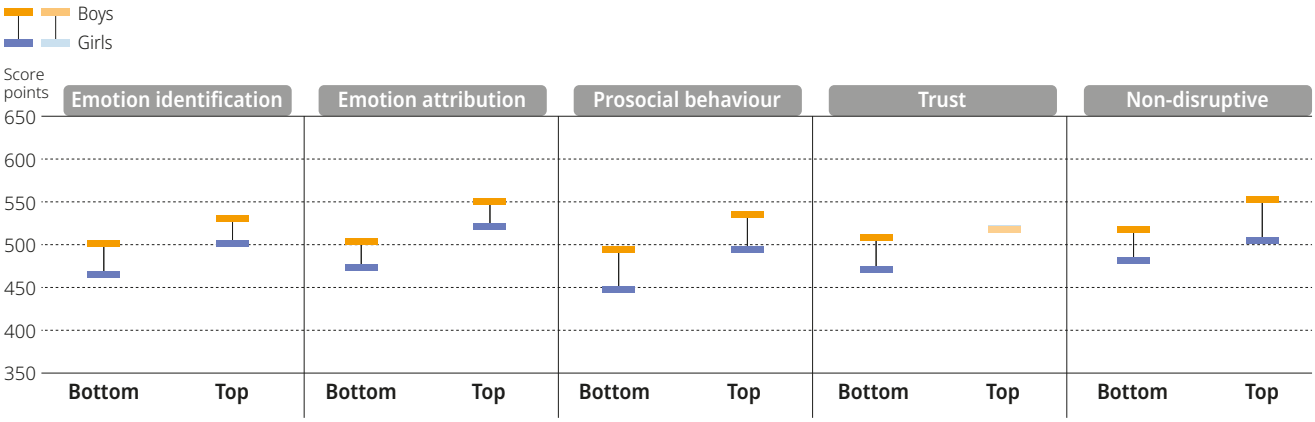
Note: The figure is comparing the same children rated by their educators and parents.

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The gender gap is particularly large in trust among children from the bottom socio-economic status quartile than among those from the top quartile

Figure 5.5 shows the differences between girls and boys by socio-economic status (i.e. top quartile versus bottom quartile). On average, girls had better social-emotional learning outcomes than boys across these subgroups of children, but children from the bottom quartile of socio-economic status had larger gender gaps than were seen among children from the top quartile. For example, in trust, there was a gender gap of 37 points in the bottom quartile, while in the top quartile the difference was not statistically significant. The largest gender gap was in prosocial behaviour for children in the bottom quartile. For non-disruptive behaviour, the gap is indeed higher for the top quartile although the gap in both the top and bottom are statistically significant. Such difference also existed in Estonia and the United States.

Figure 5.5 **Social-emotional scores by socio-economic quartile and gender, England**



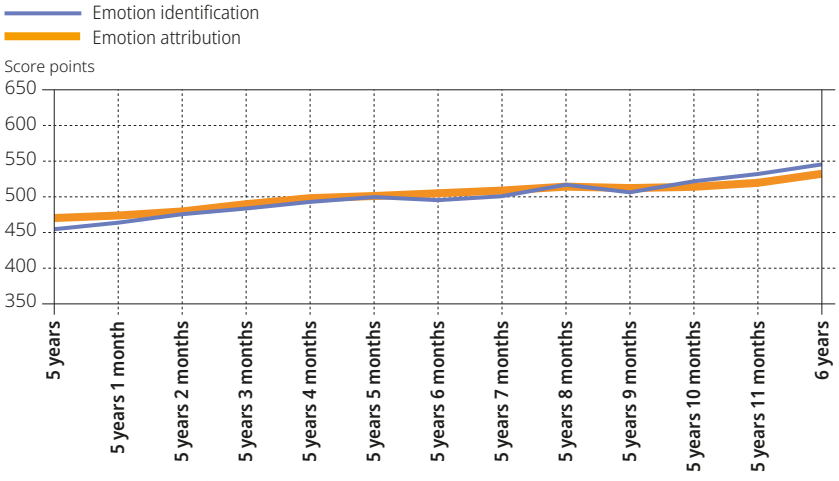
Note: Bottom refers to the bottom quartile of socio-economic-status and top to the top quartile of socio-economic status. Darker-coloured markers indicate that the difference is statistically significant.

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Children's social-emotional learning outcomes increase slightly with age

In England, the average difference between the oldest and youngest children was 91 points for emotion identification (an average of about 6-point gain per month of age) and 62 points for emotion attribution (average of about 5-point gain per month of age). Figure 5.6 shows the social-emotional learning outcomes by children's age in months at the time of assessment. The data indicate a small but significant positive correlation between children's age in months and the direct assessment of their social-emotional learning outcomes. In England, the correlation was 0.24 for emotion identification and 0.17 for emotion attribution. Differences by age were smaller in the indirect assessment: the correlation was significant for prosocial behaviour and not statistically significant for trust and non-disruptive behaviour. The data show similar correlations between age and social-emotional learning outcomes for boys and girls.

Figure 5.6 **Social-emotional scores by age of child in months, England**



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Having social, emotional or behavioural difficulties is more strongly associated with lower social-emotional learning outcomes, especially more disruptive behaviour, than having a low birth weight or having learning difficulties

Parents in IELS provided information on whether their child had experienced low birth weight or premature birth, learning difficulties, or social, emotional or behavioural difficulties. The child's ECEC centre provided information on whether the child had special educational needs.

Parents of 11% of children in England reported that their children had experienced low birth weight (under 5 lb 5 oz/2.5 kg) or premature birth, which was similar to the other two participating countries. Children with learning difficulties (e.g. speech or language delay, intellectual disability) in England represented 10% of children, which was 3 percentage points lower than in the United States and similar to Estonia. Children with emotional difficulties (e.g. social, emotional or behavioural difficulties) represented 8% of children in England, which was approximately 2 percentage points lower than in Estonia and the United States. Children with special educational needs (e.g. cognitive, behavioural or emotional disability) represented 6% of children with parent-level information in England, which was approximately 2 percentage points lower than in Estonia (the United States had no available data).

In England, boys were more likely than girls to be identified by their parents as having learning difficulties (13% of boys and 6% of girls); having social, emotional or behavioural difficulties (10% of boys and 7% of girls); and having special educational needs (8% of boys and 4% of girls). The data showed no significant gender differences in social-emotional learning scores between children with and without these difficulties, after accounting for socio-economic status.[1]

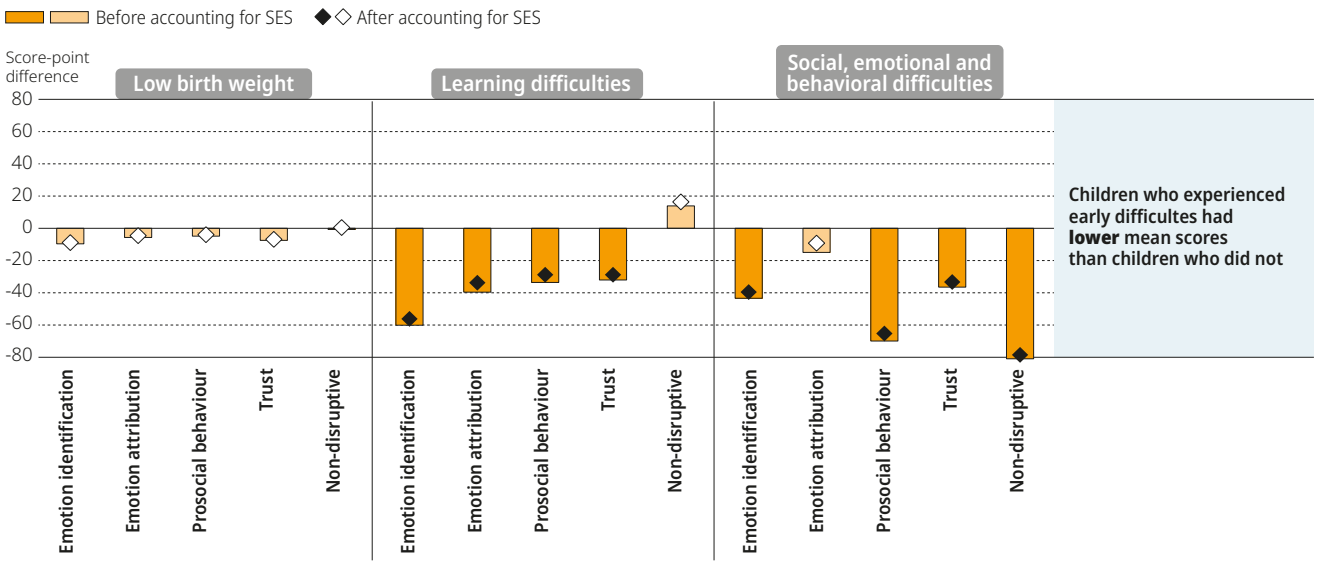
Overall, 16% of children with available parent-level information in England had experienced one of these three challenges, 5% had experienced two and less than 1% had experienced all three. In other words, 78% of parents reported that their child had experienced none of these challenges, which was similar to the percentage in Estonia and the United States.

Children with learning difficulties had significantly lower emotion identification and emotion attribution outcomes, and were rated by their educators as having lower prosocial behaviour and trust, than children without learning difficulties, after controlling for socio-economic status. Children with social, emotional or behavioural difficulties had lower emotion identification, prosocial behaviour and trust, as well as more disruptive behaviour, after controlling for socio-economic status.

When these challenges were analysed together, social, emotional or behavioural difficulties were more highly associated with poorer social-emotional learning outcomes than low birth weight or premature birth, or learning difficulties – except for emotion identification and emotion attribution, where learning difficulties were more highly associated with poorer outcomes (Figure 5.7). Disruptive behaviour was particularly associated with social, emotional or behavioural difficulties. These associations were significant after controlling for socio-economic status.

Figure 5.7 **Relative associations between early difficulties and social-emotional scores, England**

Score-point differences between children who have and have not experienced an early difficulty, after accounting for the effects of other early difficulties, and before and after accounting for socio-economic status



Note: Statistically significant differences are shown in a darker tone.

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Children who had experienced low birth weight or premature birth had similar social-emotional skills to other children regardless of whether birth weight or premature birth was analysed alone, together with other difficulties or before or after accounting for socio-economic background.

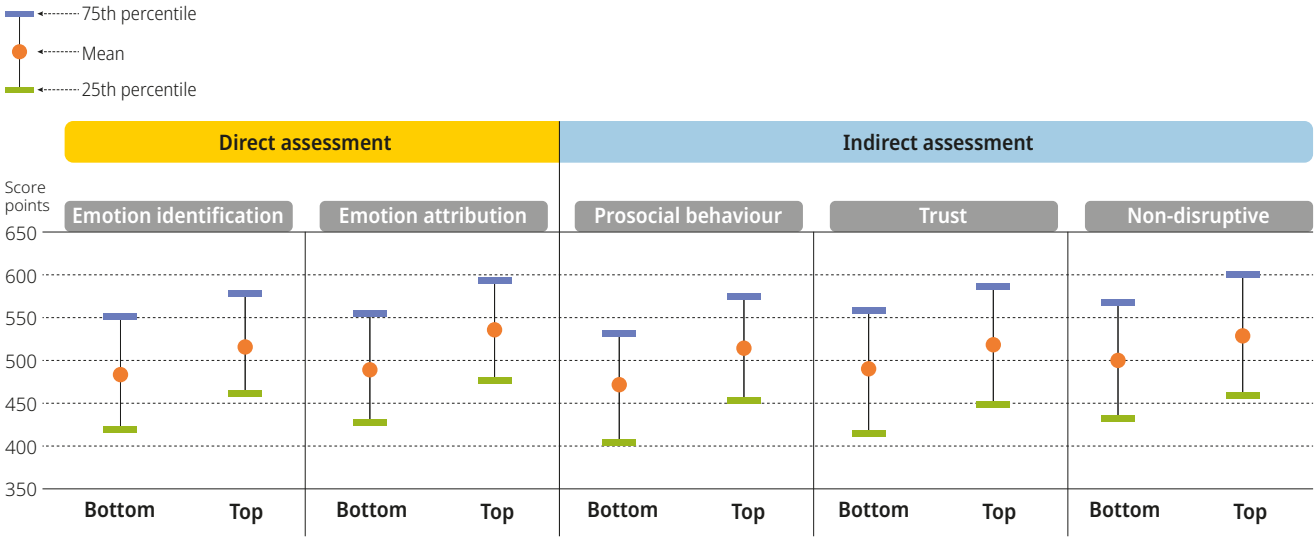
HOME AND FAMILY CHARACTERISTICS AND EARLY SOCIAL-EMOTIONAL SKILLS

Children from advantaged socio-economic backgrounds in England have higher social-emotional learning outcomes

Figure 5.8 shows the difference in social-emotional learning outcomes between children from the top and bottom quartiles of the national socio-economic status (SES) index. IELS defines children from an advantaged socio-economic background as those located in the top quartile of socio-economic status. Children from a disadvantaged socio-economic background are defined as those located in the bottom quartile. The results show that children from advantaged socio-economic backgrounds had significantly higher social-emotional learning outcomes than children from disadvantaged socio-economic backgrounds in both the direct and indirect assessments. The differences in social-emotional outcomes of children in England were relatively similar to those of children in the United States but larger than in Estonia.

The strength of the relationship varied depending on the social-emotional outcome. Emotion attribution showed the greatest difference, and trust the smallest.

Figure 5.8 **Social-emotional scores by socio-economic quartile, England**



Note: The mean differences between bottom and top quartile of socio-economic are statistically significant.

StatLink https://doi.org/10.1787/888934099713

Children whose parents primarily speak a language other than English at home have similar social-emotional outcomes as children whose parents primarily speak English

Around 16% of children in England for whom language information was available lived in homes where at least one parent (or the single parent) mainly spoke a language other than English. This was 4 percentage points lower than in the United States and 10 percentage points higher than the share of parents reported as not speaking the assessment languages of Estonian and Russian at home in Estonia. The results showed no significant differences among children based on home language in England, after controlling for socio-economic status.

Children with an immigrant background in England have similar social-emotional skills to other children, after controlling for socio-economic status and home language

In England, 18% of children for whom relevant information was available had an immigrant background.[2] This was four times higher than children in Estonia and similar to children in the United States. The results from educator assessments showed statistically significant differences in children's prosocial behaviour and trust based on immigrant background, after controlling for socio-economic status. However, these differences were not significant after also controlling for home language.

Maternal education is positively associated with social-emotional learning after accounting for household income

In England, 40% of the mothers for whom information was available had completed tertiary education (i.e. bachelor's degree or master's degree, professional degree or doctorate), which is about 13 percentage points lower than in Estonia and similar to the United States. The social-emotional scores of children whose mothers had completed tertiary education were not significantly different than those of mothers who had not after accounting for household income. However, children of mothers who had completed up to lower secondary education had significantly lower emotion identification, prosocial behaviour, and trust compared to the children of mothers with a higher level of education, after accounting household income.

Children in single-parent households in England have similar social-emotional outcomes as children in two-parent households

In England, 15% of children for whom information was available lived in single-parent households, which was around 3 percentage points more than in Estonia and similar to the United States. The direct and indirect assessments showed that children in two-parent households scored significantly higher than children in single-parent households, although these differences disappeared after controlling for socio-economic status.

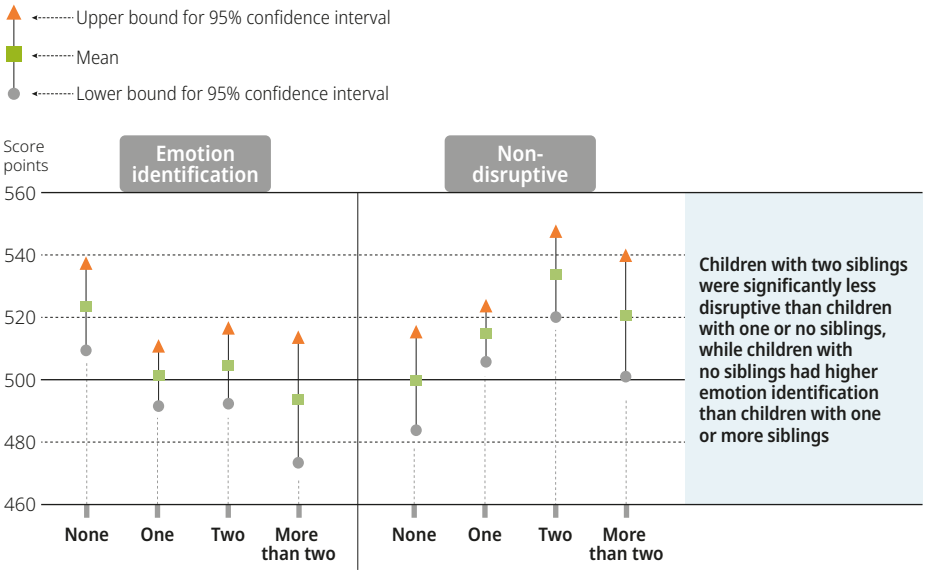
Children with two siblings are less disruptive than children with one or no sibling, but children with no siblings have higher emotion identification than children with one or more siblings

In England, 16% of children participating in IELS had no siblings, 50% had one sibling, 22% had two, 7% had three, 3% had four and around 2% had more than four. Across participating countries, most children had one sibling. On average, 12% of children in England had three or more siblings, compared to 8% in Estonia and 20% in the United States.

Educator reports indicated that children with two siblings were less disruptive than children with one or no siblings (Figure 5.9). In the direct assessment, children with no siblings had higher emotion identification than children with one or more siblings. These differences remained significant after controlling for socio-economic background.

Figure 5.9 **Social-emotional scores by number of siblings, England**

After accounting for socio-economic status



StatLink https://doi.org/10.1787/888934099732

HOME LEARNING ENVIRONMENT AND EARLY SOCIAL-EMOTIONAL SKILLS

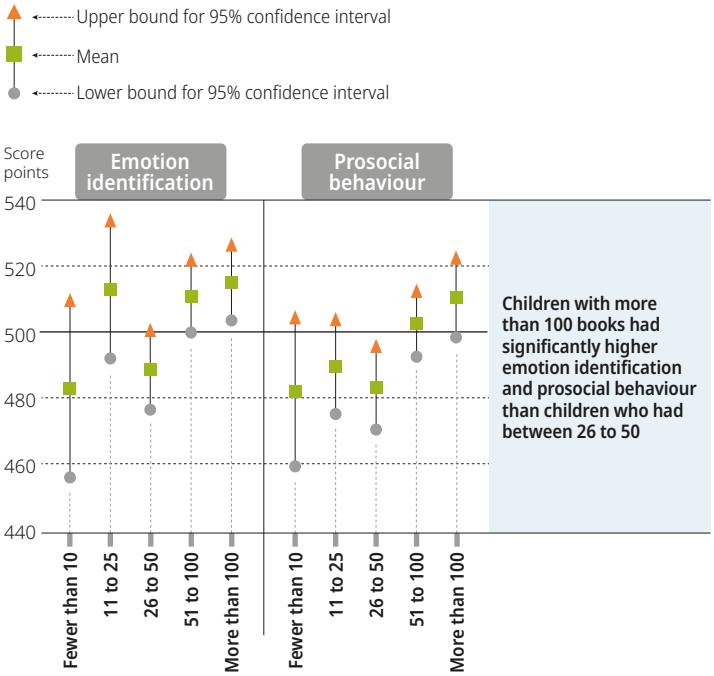
The number of children's books in the home is positively related to children's emotion identification and prosocial behaviour

In England, 9% of children for whom information was available lived in households with access to 10 children's books or fewer, 12% in homes with access to 11-25 books, 22% in homes with access to 26-50 books, 28% in homes with access to 51-100 books and 29% in homes with access to more than 100 children's books. Children in England were, on average, slightly more likely to have more children's books at home than children in the United States, and significantly more likely than children

in Estonia (only 10% of children in Estonia had more than 100 books). Having access to more than 100 children's books at home compared to having under 26 had a positive association with children's emotion identification, after controlling for socio-economic status. Differences were also found between the number of books at home and the indirect assessment. Educators reported significantly higher prosocial behaviour for children from homes with access to more than 100 books than for children from homes with between 26 and 50 books, after accounting for socio-economic status (Figure 5.10). The positive association between having access to a higher number of books at home and social-emotional scores did not significantly differ by gender, after accounting for socio-economic status.

Figure 5.10 **Social-emotional scores by number of children's books in the home, England**

After accounting for socio-economic status



StatLink https://doi.org/10.1787/888934099751

Children who do educational activities on a digital device once or twice a week have higher emotion identification skills than children who do not do such activities

In England, 12% of children never did educational activities on a digital device (e.g. computer, laptop or smartphone) with their parents, 29% did so less than one day a week, 30% did so one or two days a week, 19% did so between three and four days a week and 9% did so between five and seven days a week. The percentage of children in England who did educational activities with their parents on a digital device was lower than in the United States (who mostly did it between one or two days) and higher than in Estonia (who mostly did it less than once a week). Children who did educational activities with their parents on a digital device once or twice a week had better emotion identification skills than children who never did these activities (Figure 5.11). This result remained significant after controlling for socio-economic status.

Parents were as likely to undertake educational activities on a digital device with girls as with boys. In addition, there were no gender differences in the social-emotional learning outcomes from undertaking these activities, after accounting socio-economic status.

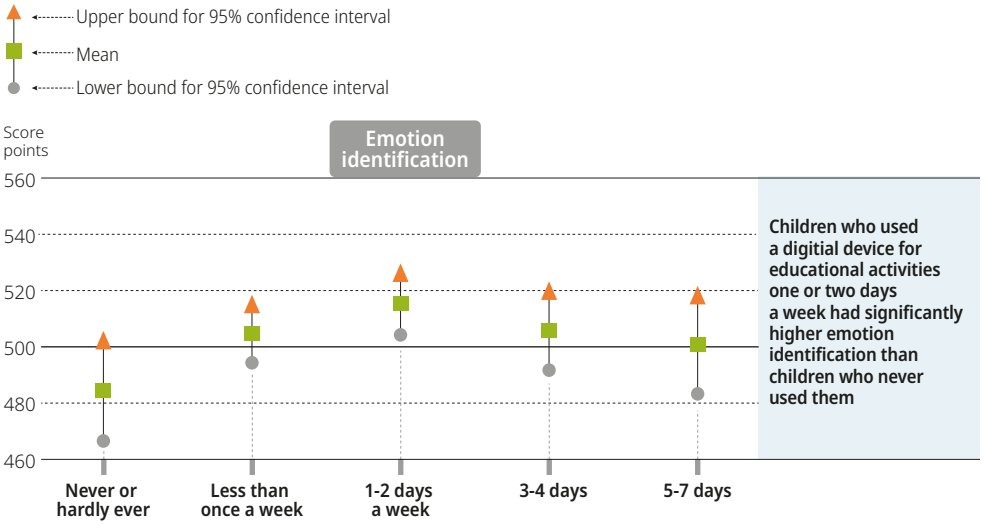
Children who regularly role-play with their parents have higher emotion attribution scores than children who never role-play with their parents

In England, 4% of parents participating in IELS reported never role-playing[3] with their children, 15% did so less than one day a week, 32% did so one or two days a week, 28% did so between three and four days a week and 21% did so between five and seven days a week. Some 50% of parents in England role-played with their child between three and seven days a week, compared to 30% in Estonia and 60% in the United States.

Children who role-played with their parents one or two days a week had better emotion attribution scores than children who never did so (Figure 5.12). This result remained significant after controlling for socio-economic status. The positive association with role-playing with parents did not significantly differ by the child's gender after accounting for socio-economic status.

Figure 5.11 **Social-emotional scores by frequency of using a digital device for educational activities, England**

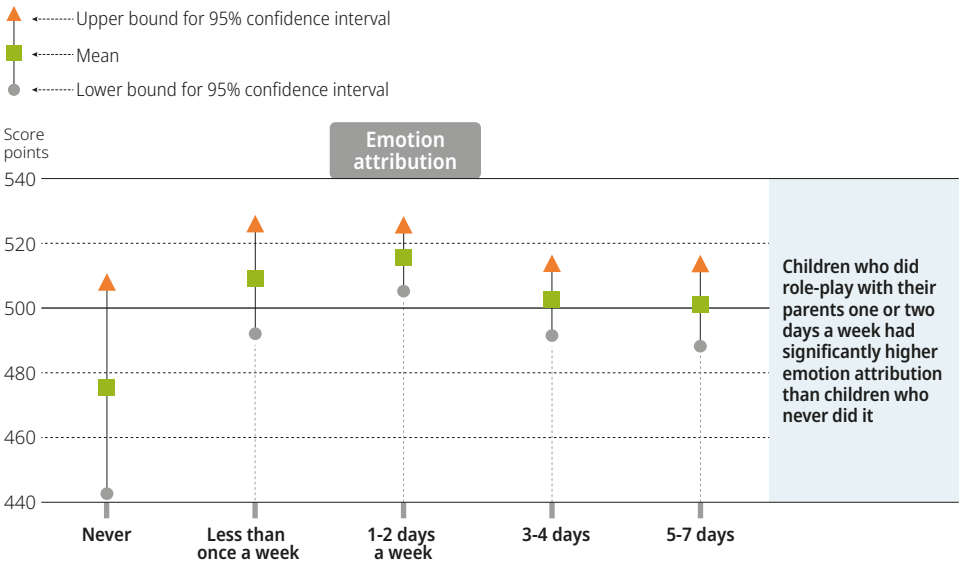
After accounting for socio-economic status



StatLink https://doi.org/10.1787/888934099770

Figure 5.12 **Social-emotional scores by frequency of role-play with parents, England**

After accounting for socio-economic status



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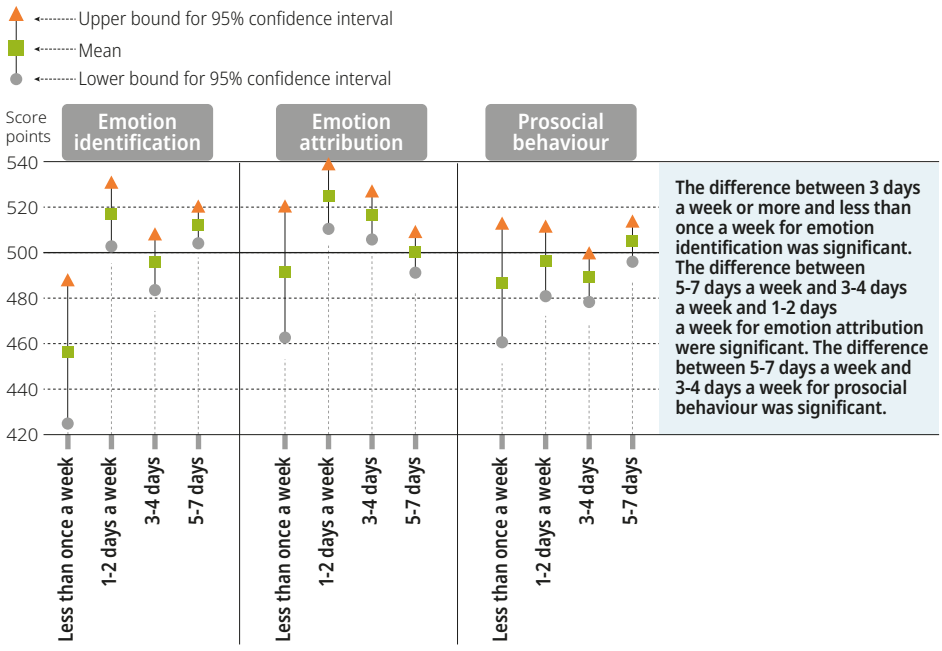
Children whose parents regularly have back-and-forth conversations with them about how they feel are more emphatic and have stronger prosocial behaviour

In England, fewer than 1% of parents reported that they never had back-and-forth conversations with their children about how they feel, 3% did so less than one day a week, 14% did so one or two days a week, 29% did so three or four days a week, and 53% did so between five and seven days a week. These percentages were similar in the United States and Estonia.

The data show that children whose parents regularly had back-and-forth conversations with them about how they feel had higher emotion identification and emotion attribution scores than those who did so less frequently, after accounting for socio-economic status (Figure 5.13). Educators reported higher prosocial skills among those children whose parents had back-and-forth conversations with them between five and seven days a week compared to those who did so less frequently.

Figure 5.13 **Social-emotional scores by frequency of back-and-forth conversations, England**

After accounting for socio-economic status



StatLink https://doi.org/10.1787/888934099808

Children whose parents read to them between five and seven days a week have better emotion identification and prosocial behaviour

In England, 4% of parents for whom information is available read from a book to their child less than once a week, 12% did so one or two days a week, 25% did so three or four days a week, and 59% did so between five and seven days a week. The percentage of parents who read from a book to their child between five and seven days a week was around 17 percentage points lower in the United States and 22 percentage points lower in Estonia.

Children whose parents read to them between five and seven days a week had higher emotion identification and prosocial behaviour than those whose parents read to them only one or two days a week (Figure 5.14). This result remained significant after controlling for socio-economic background.

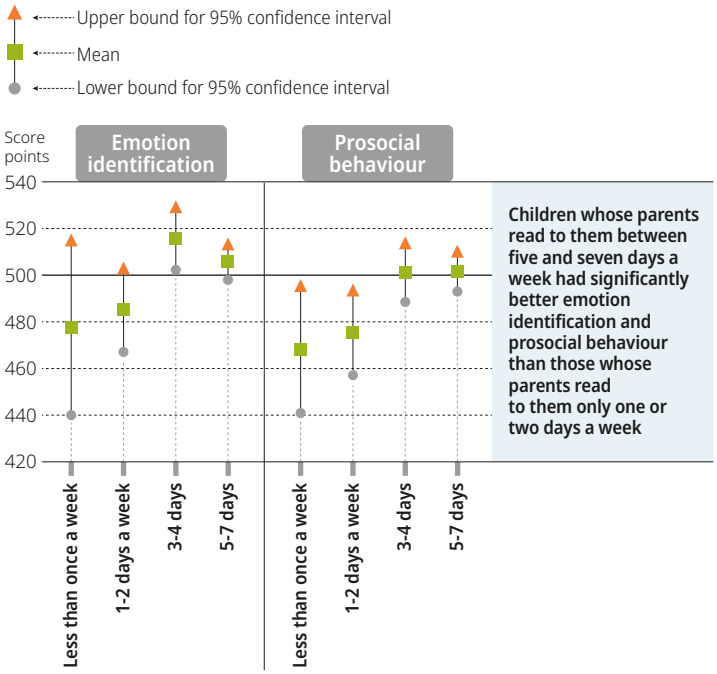
Children who regularly attend special activities outside of the home are more empathetic and have stronger prosocial behaviour and trust, as well as less disruptive behaviour, than those who go once a week or less

In England, 20% of parents never took their child to special activities[4] outside of the home, 15% did so less than once a week, 47% did so one or two days a week, 16% did so three or four days a week, and around 2% did so between five and seven days a week. The percentage of parents who took their child to activities outside of the home between once and twice a week was around 12 percentage points lower in the United States and around 8 percentage points lower in Estonia. Approximately 84% of parents from the top SES quartile in England took their child to special activities outside of the home at least once a week, compared to 42% of parents from the bottom SES quartile.

Children who regularly attended special activities outside of the home one or two days a week had significantly higher emotion identification, emotion attribution and prosocial behaviour scores than those who never did, higher than those who did so less than one day a week in trust, and lower than those who did so between 5-7 days a week in non-disruptive behaviour. (Figure 5.15). While children who attended special activities outside of the home between five and seven days a week had lower emotion attribution scores than those who did so one or two days a week, their educators considered them less disruptive. Parents were as likely to undertake these activities with girls and boys, and the positive association of going to special activities did not significantly differ by gender after accounting for socio-economic status.

Figure 5.14 **Social-emotional scores by frequency of being read to by parents, England**

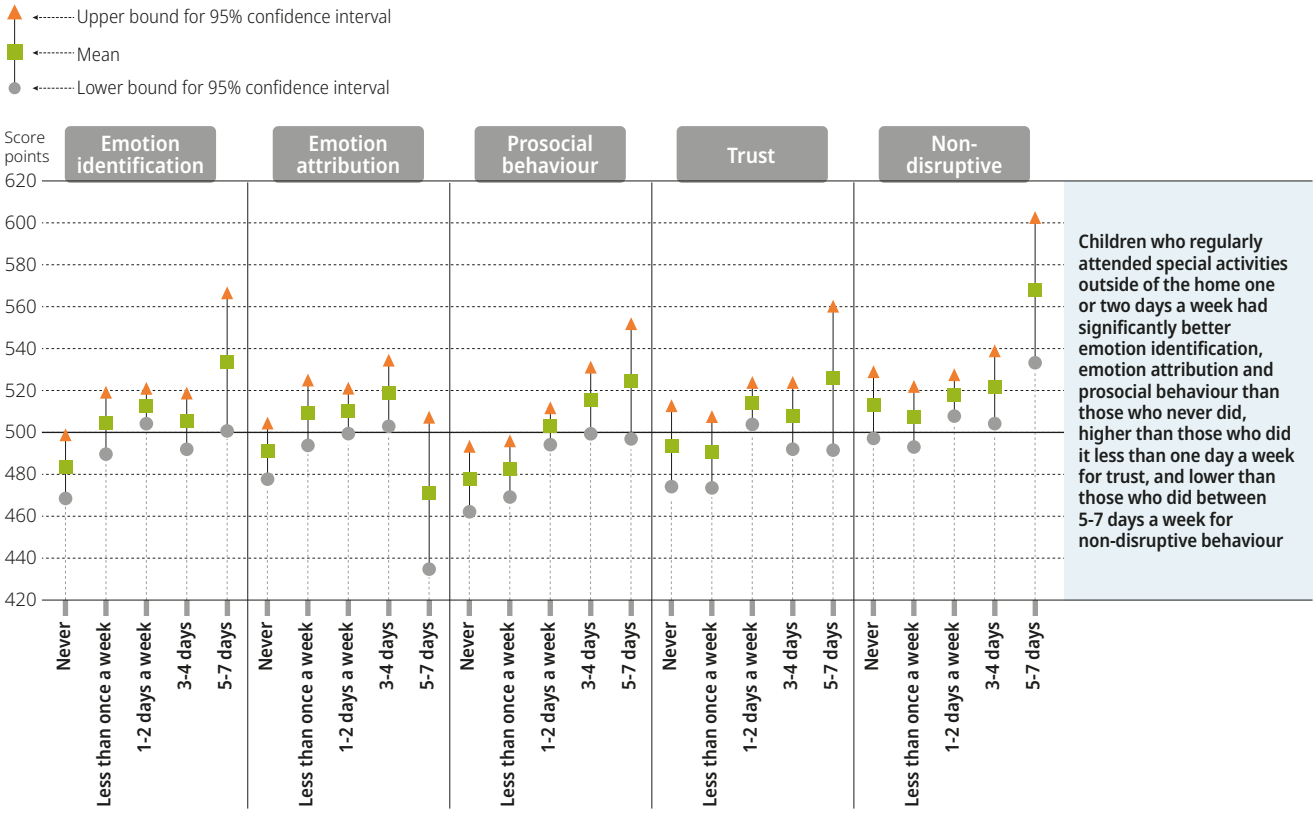
After accounting for socio-economic status



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Figure 5.15 **Social-emotional scores by engagement in special or paid activities outside the home, England**

After accounting for socio-economic status



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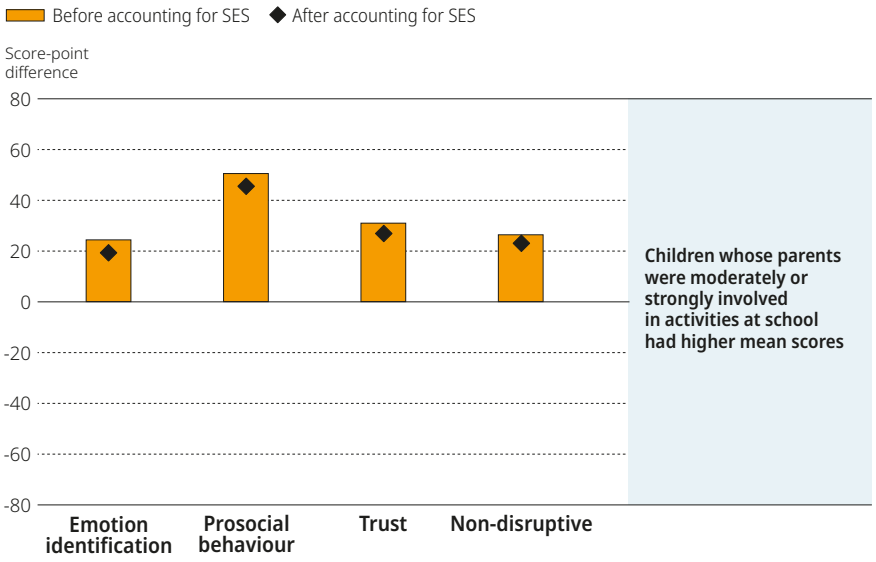
Children whose parents are active in their child's school have better social-emotional learning outcomes

In IELS, educators reported the extent to which parents were involved in their children's school. In England, 69% of parents had a moderate to strong involvement in activities taking place in their child's school, which was higher than in the United States (65%), but lower than in Estonia (80%). Examples of activities include fetes, concerts/plays, parent's evenings, and parental workshops. Figure 5.16 shows the difference in social-emotional learning outcomes between children whose parents had a moderate or strong involvement in the school and those whose parents did not.

Children whose parents had a moderate or strong involvement had better emotion identification, prosocial behaviour and trust, as well as less disruptive behaviour, even after accounting for socio-economic status. The positive relation with parental involvement in the school did not significantly differ by gender, after accounting for socio-economic status. However, unlike Estonia and the United States, educators in England reported the parents of girls as having higher levels of involvement in the school than the parents of boys.

Figure 5.16 **Differences in social-emotional scores by parental involvement in school activities, England**

Score-point differences between children whose parents are moderately or strongly involved in activities at school and those whose parents are slightly or not involved, according to their teachers, before and after accounting for socio-economic status



Notes: All differences are statistically significant.

StatLink https://doi.org/10.1787/888934099865

Children who use digital devices once a month have higher trust than those who use them once a week or every day

In England, 6% of children for whom information was available never or hardly ever used a desktop or laptop computer, tablet device or smartphone, 9% used them at least once a month, 46% used them at least once a week, and 39% used them every day. The percentage of children who used digital devices every day was similar to Estonia, but around 10 percentage points lower than in the United States.

Children who used digital devices at least once a month in England had higher trust according to their educators than those who used them once a week or every day (Figure 5.17). This result remained significant after controlling for socio-economic background. The association of using digital devices did not significantly differ by gender, after accounting for socio-economic status.

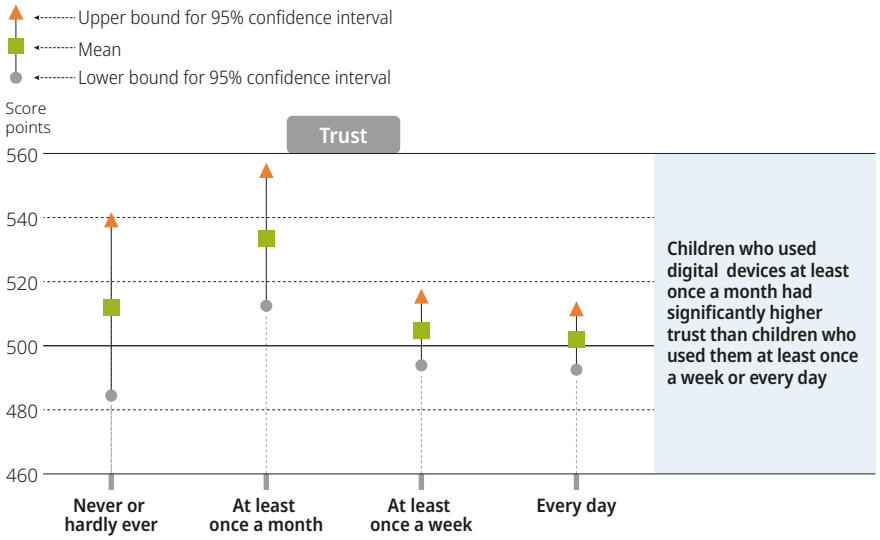
EARLY CHILDHOOD EDUCATION AND CARE AND EARLY SOCIAL-EMOTIONAL SKILLS

ECEC attendance in England is associated with children's trust and non-disruptive behaviour

Overall, IELS data show that children who first attended ECEC when they were under one had higher trust at age five than those who started at age three. However, the association with ECEC attendance significantly differed by gender, after accounting for socio-economic background. Boys who first attended ECEC when they were four years old had no significantly different levels of trust at age five than those who first attended when they were under one. On the other hand, girls who first attended ECEC when they were under one had higher trust at age five than those who first attended when they were three or four (Figure 5.18).

Figure 5.17 **Social-emotional scores by use of digital devices, England**

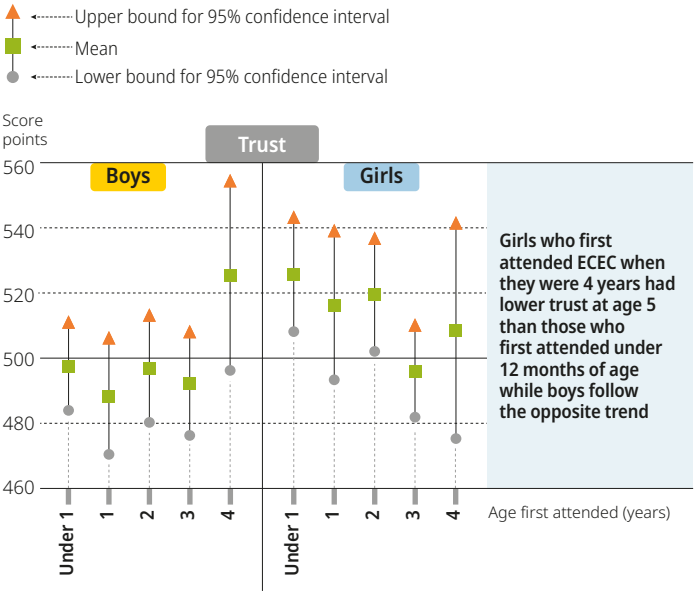
After accounting for socio-economic status



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Figure 5.18 **Social-emotional scores by ECEC attendance and gender, England**

After accounting for socio-economic status



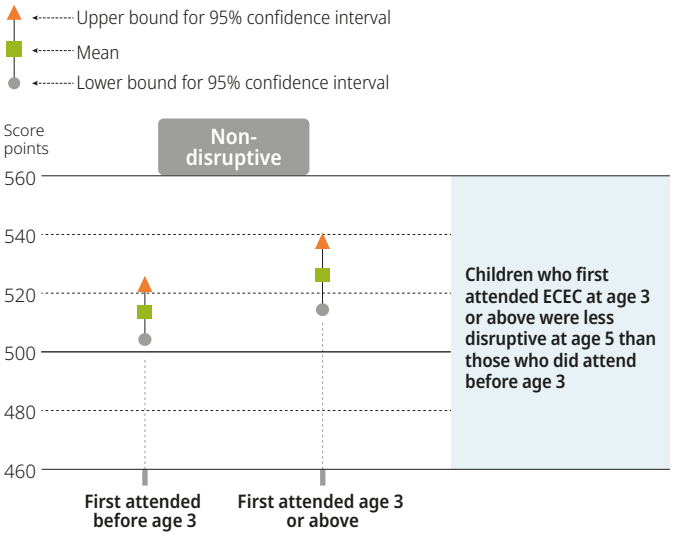
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In IELS, an average of approximately 71% of children first attended ECEC before the age of three and 29% first attended at age three or above. Children who first attended ECEC at age three or above were, on average, half a month older at the assessment date. The data show that children who first attended ECEC at age three or above were less disruptive at age five than those who first attended before the age of three, after controlling for socio-economic background and children's age (Figure 5.19).

In England, 87% of children who first attended an ISCED[5] setting at age four did so for more than 20 hours a week, and 13% did so for less than 20. Some 56% of children attended for more than 20 hours a week at age three, 46% at age two, 51% at age one and 52% at under one year old. However, there were no clear relationships between ECEC intensity (i.e. whether the child attended for more or less than 20 hours) and children's social-emotional scores.

Figure 5.19 **Social-emotional scores by age of first ECEC attendance, England**

After accounting for socio-economic status



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EARLY SOCIAL-EMOTIONAL SKILLS AND EMERGENT LITERACY AND NUMERACY OUTCOMES

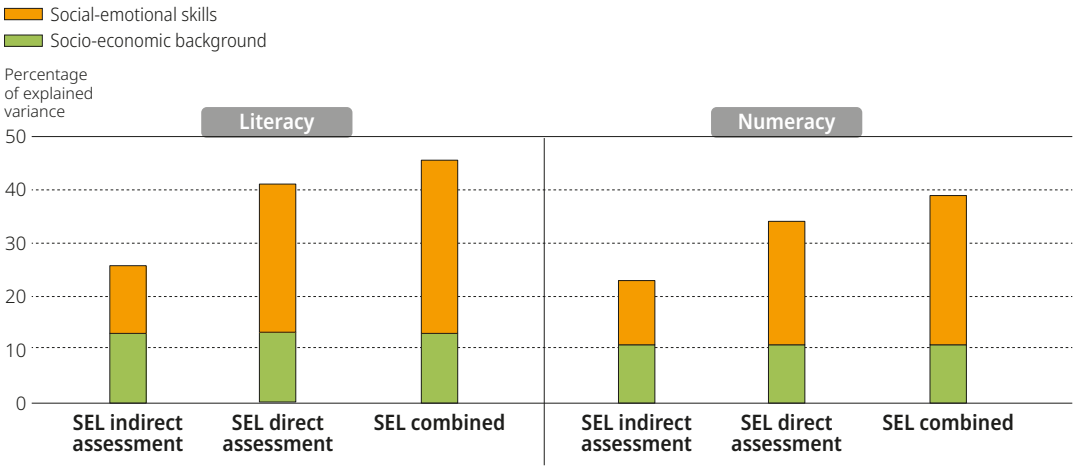
Social-emotional skills are significant predictors of students' academic performance in areas such as mathematics and reading, after accounting for socio-economic status (Suárez-Álvarez, Fernández-Alonso and Muñiz, 2014[32]; Chamorro-Premuzic and Furnham, 2008[33]). Although previous research has typically assessed students attending primary, secondary and higher education, recent evidence from neuroscience supports the theory that emotion and cognition are also interrelated during early infancy development (Bush, Luu and Posner, 2000[2]; Davidson et al., 2002[3]; Posner and Rothbart, 2000[4]).

Figure 5.20 shows the percentage of variation in emergent literacy and numeracy scores explained by social-emotional scores, after accounting for socio-economic status. The first bar presents the percentage of variation in numeracy explained by educators' indirect assessments of children's social-emotional skills (prosocial behaviour, trust and non-disruptive behaviour), after accounting for socio-economic background. The second bar shows the association with the direct assessment of children's social-emotional skills (emotion identification and emotion attribution). The third bar shows the combined effect of the direct and the indirect assessments. While the domains in the second bar were measured using the same assessment method – tablet-based stories and games – the first bar used educator assessments as an independent method. Therefore, the percentages in the first and third bars serve as a proxy of the minimum and maximum variation associated with social-emotional skills, regardless of the assessment method. The data show that social-emotional scores were predictive of emergent literacy and numeracy scores. Children's social-emotional scores, together with socio-economic status, explained between 27% and 46% of the variation in emergent literacy scores in England. After accounting for socio-economic status, emergent social-emotional skills explained between 13% and 33% of emergent literacy scores.

Figure 5.21 shows the percentage of variation in emergent inhibition, mental flexibility and working memory scores (self-regulation skills) explained by social-emotional scores, after accounting for socio-economic status. As in Figure 5.20, the bars represent the different measures of social-emotional skills based on educator reports, direct assessments or the combined effect of both. Children's social-emotional scores, together with socio-economic status, explained between 15% and 26% of the variation in working memory scores in England. Importantly, emergent social-emotional skills explained between 7% and 18% of emergent working memory scores, after accounting for socio-economic status. Despite sharing the same assessment method, the association between inhibition and empathy skills is negligible. Importantly, educators also support the relation between emotion and cognition in the indirect assessment of social-emotional skills through an independent method. Indeed, educators' indirect assessment still explains a significant amount of variation in self-regulation scores after accounting for socio-economic status.

In short, children with higher prosocial behaviour, trust and non-disruptive behaviour, as rated by their educators, had significantly higher emergent literacy, numeracy, working memory, and mental flexibility scores. At the same time, the direct assessment showed that children who were more empathetic also had significantly higher scores in those domains.

Figure 5.20 **Percentage of the variation in emergent literacy and numeracy scores explained by social-emotional scores and socio-economic status, England**

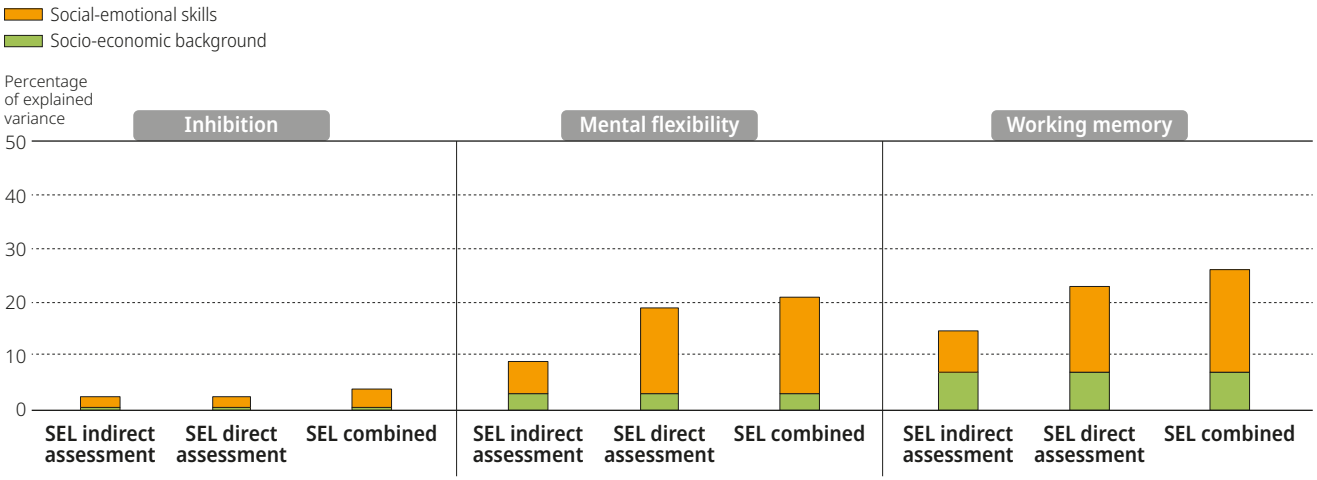


Notes: SEL = social-emotional skills.

The green bar shows the percentage of variation in each IELS outcome explained by socio-economic status. The orange bars show the additional variance explained when social-emotional skills (indirectly assessed, directly assessed or combined direct and indirect) are introduced to a regression model already containing socio-economic status.

StatLink https://doi.org/10.1787/888934099941

Figure 5.21 **Percentage of the variation in self-regulation scores explained by social-emotional scores and socio-economic status, England**



Notes: SEL = social-emotional skills.

The green bar shows the percentage of variation in each IELS outcome explained by socio-economic status. The orange bars show the additional variance explained when social-emotional skills (indirectly assessed, directly assessed or combined direct and indirect) are introduced to a regression model already containing socio-economic status.

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SUMMARY AND CONCLUSIONS

The average five-year-old in England is less able to identify other's emotions than their counterparts in Estonia, although they are considered less disruptive by their educators

The average five-year-old in England was less able to identify the feelings of characters than children in Estonia, and as able as children in the United States. Children's ability to recognise emotions is a precursor for their ability to feel empathy towards others. For emotion attribution, where the score reflects children's own emotions, children in England scored at a similar level to children in the United States and Estonia.

According to educators, children in England had significantly lower prosocial behaviour than children in Estonia, and similar levels to children in the United States. However, educators in England rated children significantly less disruptive than educators in Estonia, and similar to educators in the United States. Educators in the three participating countries rated children as having similar levels of trust.

Parents and educators in England rated children's emotional control similarly (e.g. whether the child waits patiently for something he or she wants). However, parents were more likely to rate children's empathy skills (e.g. whether the child is considerate, helpful, caring) as more developed. This might indicate differences between children's empathy development in an early childhood education and care (ECEC) setting and at home, as well as the different expectations of parents and educators. Children's emotional control, however, is more consistent across contexts. Similar findings are observed in Estonia and the United States.

Children's social-emotional skills are related to their emergent literacy and numeracy and self-regulation scores

Children's social-emotional scores through direct and indirect assessments were excellent predictors of scores in other aspects of the assessment, even after accounting for socio-economic status. In England, children's social-emotional scores accounted for between 13% and 33% of their emergent literacy scores (compared to between 5% and 27% in Estonia and between 13% and 33% in the United States), between 12% and 28% of their numeracy scores (compared to between 6% and 26% in Estonia and between 7% and 22% in the United States), and between 7% and 18% of their working memory scores (compared to between 4% and 11% in Estonia and between 5% and 22% in the United States), after accounting for socio-economic status.

The development of early skills are interrelated. Cognitive skills are a necessary, but not sufficient, condition to foster early social-emotional learning. For example, children need a minimum level of literacy skills to be able to adequately navigate socially; have rich interactions with peers, friends, and parents; and, ultimately, to open the door to higher levels of social-emotional learning. However, having high levels of literacy does not always guarantee high social-emotional skills, and vice-versa.

Relationships between early social-emotional skills and socio-economic background were stronger in England than in Estonia, and similar to the United States

Socio-economic background had a significant relationship with children's social-emotional development in England across all social-emotional skills measured in IELS. Furthermore, relationships between emotion attribution, prosocial behaviour and socio-economic background were significantly stronger than in Estonia, but similar to the United States.

Socio-economic background was associated with the frequency with which children engaged in different activities. Parents from a higher socio-economic background were more likely to read to their child from a book, take their child to special activities outside of the home, have frequent back-and-forth conversations with their child, have access to a higher number of children's books and do role-play with their child than parents from a lower socio-economic background. These home learning activities are associated with higher scores in social-emotional skills. As in Estonia and the United States, educators in England reported increased parental involvement in the child's school by parents from higher socio-economic backgrounds.

Girls, especially those from lower socio-economic households, have higher social-emotional outcomes

On average, girls had higher scores across all social-emotional skills measured in IELS. Educators reported greater gender differences than found in the direct assessment. The differences between boys and girls were statistically significant for both direct and indirect assessments. Furthermore, the gender gap in social-emotional skills, especially trust, was larger among children from the bottom quartile of socio-economic background than among children from the top quartile.

Parents of boys in England were as likely to read to their child from a book, take them to special activities outside of the home, or have back-and-forth conversations with them as parents of girls. However, girls in England had more books at home and engaged in role-play more often with their parents than boys. These differences for role-play activities were similar in Estonia and the United States, but boys and girls in the other two countries had a similar numbers of books. Unlike Estonia and the United States, educators in England reported higher levels of parent involvement in the school by parents of girls than parents of boys.

ECEC attendance in England is associated with children's trust and non-disruptive behaviour

IELS data show that girls who first attended ECEC when they were under one had higher trust at age five than those who first attended when they were three or four years old. IELS data also show that children who first attended ECEC at age three or above were less disruptive at age five than those who attended before three years old. However, there were no clear relationships between ECEC intensity (i.e. whether the child attended for more or less than 20 hours) and children's social-emotional scores.

Home and family learning environments have a positive relationship with children's social-emotional scores

After accounting for socio-economic background, home and family learning environments were powerful predictors of children's social-emotional scores. The following factors were positively related to children's social-emotional scores in England: mother's education, siblings, a high number of children's books at home, moderate use of electronic devices, regular role-playing with their parents, parents who regularly read to their child, going regularly to special activities outside of the home, having regular back-and-forth conversations with their parents about how they feel, and parental involvement in ECEC.

Children who have experienced social, emotional or behavioural difficulties before the age of five have lower social-emotional skills at age five

Parents in IELS provided information on whether their child had a low birth weight or premature birth, learning difficulties, or social, emotional or behavioural difficulties. IELS data show that social, emotional or behavioural difficulties were more highly associated with lower social-emotional learning outcomes than low birth weight/premature birth or learning difficulties, except for emotion identification and emotion attribution, where learning difficulties were more highly associated. Disruptive behaviour was particularly associated with social, emotional or behavioural difficulties, as might be expected. Children with a low birth weight or premature birth had similar social-emotional skills as other children, regardless of whether analysed alone or with other difficulties, and before and after accounting for socio-economic background.

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Notes

1. The low number of children with special educational needs did not allow for a robust analysis by gender.
2. IELS defines immigrant background as having both parents/carers born in a country or economy other than where they participated in IELS.
3. Role-play is defined as imaginative or pretend play such as playing the role of a chef or a shopkeeper.
4. Special activities are defined as a special or paid activity outside of the home such as sports clubs, dance, swimming lessons or language lessons.
5. According to the International Standard Classification of Education (ISCED), ISCED 0 programmes are pre-primary programmes situated in institutional settings that contain an intentional education component, among other criteria. ISCED 01 captures participation by very young children (aged 0 to 2), and ISCED 02 captures participation by slightly older children (aged 3 to 5).

6

Summary and conclusions

This chapter summarises the main findings for England and discusses them in relation to themes such as socio-economic status, the home learning environment and early childhood education and care.

THE PROMISE OF EARLY LEARNING

A child's physical and behavioural systems develop sequentially and cumulatively. What happens early in life sets the foundations for future development. During the first few years of life, children learn at a faster rate than at any other time. They develop the basic literacy, numeracy, self-regulation and social-emotional skills that will guide their future personal and professional achievements (Becker, 2011[1]; Sylva et al., 2010 [2]). These skills also form the foundation of general well-being, including how children will cope with successes and setbacks as adults.

The quality and extent of development during the early years depends on the type of environments provided by a child's family, early childhood education and care (ECEC) systems and the wider community. Children are not born with a fixed skill set; the environment to which they are exposed influences how their skills develop, as well as their capacity to learn new skills (Kovas, et al., 2007[3]).

Children's emergent skills can be developed through practice and reinforcement. They can be strengthened and supported through the contexts in which they spend their time. Quality early learning experiences allow children to explore their own interests and capabilities. Developmentally-appropriate activities based on play and interactions with adults and other children allow children to discover and explore their surroundings as active participants in their own learning.

The International Early Learning and Child Well-being Study (IELS) provides robust new evidence that contributes to understanding children's early learning outcomes and overall development. It provides countries with comparative benchmark data on children's early learning and a framework to foster the growing interest in and commitment to early childhood. It helps countries identify factors that promote or hinder children's learning outcomes. It provides information on the relationship between children's early education experiences, home learning environment and individual characteristics, and their learning outcomes. The study also contributes to understanding how children's emerging literacy, numeracy, self-regulation and social-emotional skills are related.

SUMMARY OF IELS RESULTS IN ENGLAND

Children in England have relatively strong numeracy, literacy, mental flexibility and working memory outcomes

Five-year-old children in England had the strongest emergent numeracy skills among countries participating in IELS, with outcomes significantly higher than the IELS mean of 500 points. England had the largest percentage of children at the highest level of numeracy skills, and the smallest percentage at the lowest level.

Outcomes for emergent literacy, mental flexibility and working memory were also relatively high. The average emergent literacy, mental flexibility and working memory scores of five-year-old children in England were significantly higher than those of children in the United States, and similar to those of children in Estonia.

There is room for improvement in the inhibition and social-emotional outcomes of children in England

Five-year-olds in England were less able to successfully inhibit their automatic responses when presented with a new set of information than children in Estonia or the United States. Inhibition skills are predictive of a child's future well-being, including how well they do at school and in non-academic activities where inhibition and self-control correlate with success. While inhibition outcomes were lowest in England, outcomes in the remaining self-regulation assessments were similar to or slightly higher than the other participating countries. Children in England were more likely than those in the United States, and as likely as those in Estonia, to successfully switch between rules and recall short visual sequences.

Children in England were less likely to exhibit prosocial behaviours and less likely to successfully identify the emotions of characters in stories than children in Estonia, and as likely as those in the United States. Social-emotional learning has implications on children's ability to develop prosocial and other positive social-emotional behaviours, which predict success across a range of factors later in life. Children in England were reported by educators as being less disruptive than children in Estonia, but as disruptive as children in the United States.

A focus on self-regulation and social-emotional skills during the early years may benefit children's emergent literacy and numeracy skills

Improving a child's self-regulation and social-emotional skills also benefits their emergent literacy and numeracy skills. On a practical level, a child's ability to acquire traditional cognitive skills partly depends on their ability to focus attention, work with information, engage in prosocial activities, and learn through listening and watching. To this end, social-emotional and self-regulation skills are positively related to the development of a child's emergent literacy and numeracy skills. The highly interrelated nature of these skills makes it difficult to separate the importance of any one aspect in the overall development and well-being of a child. Children depend on a combination of all these skills to help them as they learn to express themselves, understand new information, take part in group activities and sustain play with other children.

The socio-economic status of a child's household is strongly associated with their early learning outcomes

The combination of household income, parental occupation and parental educational completion – that together create the socio-economic index applied in IELS – predicted the development of a child's emergent literacy and numeracy, self-regulation and social-emotional skills. The children of parents with higher levels of education had higher outcomes on these assessments.

The relationship between the socio-economic status of a child's household and the development of emergent literacy and numeracy skills was stronger in England than in Estonia, despite the fact that the two countries have similar levels of income inequality (Gini coefficients[1] of 0.34 and 0.35, respectively) and universal entitlement to ECEC. The socio-economic status of a child's household was as strongly related to their emergent literacy skills in England and the United States (which has higher income inequality, with a Gini coefficient of 0.42), although the correlation with emergent numeracy was weaker in England than in the United States.

A mother's highest completed education level was also a significant predictor of her children's early learning outcomes. About 40% of children sampled in England had mothers who had completed at least a bachelor's degree. These children had significantly higher mean emergent literacy, numeracy and self-regulation outcomes than the children of mothers who had completed a lower level of formal education, even after accounting for household income.

A child's home learning environment predicts their overall early learning outcomes

Children's home learning environments, which includes activities and interactions both in and outside the home, offer a range of learning opportunities, such as reading together, playing with numbers or shapes, or having back-and-forth conversations. Activities that a child engaged in with their parents, the relationship between a parent and the child, and the home learning resources a child had access to were all related to early learning outcomes. Children provided with a range of different learning opportunities learn to learn for themselves.

A child's home learning environment was related to their early learning outcomes. For example, the number of children's books that a child had access to in their home was a significant predictor of their emergent literacy and numeracy outcomes, as well as their working memory, emotion identification and prosocial outcomes, after accounting for socio-economic status. Similarly, the frequency with which a child was taken to a special or paid activity outside of the home was related to most of their self-regulation and all of their social-emotional outcomes, after accounting for socio-economic status. The children of parents perceived by educators as being moderately or strongly involved in activities taking place at the school also had higher emergent literacy and numeracy, mental flexibility and social-emotional outcomes.

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Note

1. The Gini coefficient is a measure of income or wealth distribution, where 1 corresponds to maximal inequality and 0 represents perfect equality.

ANNEX A

Technical notes

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Technical notes

This technical note provides additional background information on technical aspects relating to the International Early Learning the Child Well-being Study (IELS). It sets out the rationale for the types of assessment used in the study, response rates and other factors influencing the robustness, reliability and comparability of the data. More information on the conceptual and technical aspects of the study can be found in the Assessment Framework and Technical Standards for the study.

Assessment methods

The study used two types of assessment: direct assessment of children's skills through developmentally-appropriate, interactive stories and games delivered on a tablet device and indirect assessment through reports on children's skills from parents and educators. The key benefit of direct assessment is that it provides countries with a common basis for comparing children's early learning. Through careful development, testing and analysis,[1] any cultural or other biases are minimised so that readers can have confidence that the results are comparable across countries. Furthermore, delivery of the assessment through a tablet device enhances the reliability of the results through the avoidance of transcription and coding errors.

The indirect assessment provides benefits in triangulating the results from the direct assessment and in providing a fuller picture of children's development and skills. Parents have knowledge of their child over time and in a range of settings, whereas educators have a comparative group of children at the same age on which to base their assessments. Thus, gaining information from parents as well as from educators provides greater breadth and depth on children's early learning and development while the direct assessment provides a stronger basis for comparability across countries.

Participation rates

A critical factor influencing the reliability of the results from any survey is the response rates, particularly for any form of direct assessment. The quality standard for child participation rates for IELS was set at 75%, meaning this level of participation rate provides confidence that the sample is representative of children at that age in that country. Each participating country exceeded this standard. Teacher response rates were also very high, 90% or higher in each country. While parent response rates were somewhat lower, these were still higher than is generally expected.

Table A.1. **Response rates for IELS, by informant and country**

	Participation rates		
	England (%)	Estonia (%)	United States (%)
Child	94.9	84.1	92.7
Parent	67.5	86.0	71.2
Educator	89.7	94.1	96.4

Note: The participation rates are weighted and based on participating centre/schools and children.

Quality assurance

Standards for administration and assessment procedures – to achieve standardised implementation procedures – were set out in comprehensive manuals, applicable to each participating country. Precise instructions were provided for centre and school co-ordinators and scripts were provided to study administrators, in addition to the provision of mandatory training.

National and International Quality Assurance Monitors (IQAMs) were appointed to attest that the implementation in each country complied with the standards for the study. These Quality Monitors were independent and observed the administration of the assessments in each participating country in order to attest that the required standards were met. Across all quality assurance activities, the observations showed that all three participating countries generally followed the standardized procedures as outlined in the IELS Technical Standards.

Note

1. The types of analysis used for this study included differential item functioning by gender, country, and language, item-level analysis, latent trait-level analysis, and convergent and predictive validity analysis.

Early Learning and Child Well-being in England

The first five years of a child's life is a period of great opportunity, and 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.

This report sets out the findings from the International Early Learning and Child Well-being Study in England. The study assesses children's skills across both cognitive and social-emotional development, and how these relate to children's early learning experiences at home and in early childhood education and care. It is enriched by contextual and assessment information from the children's parents and educators. It provides comparative data on children's early skills with children from Estonia and the United States, who also participated in the study, to better identify factors that promote or hinder children's early learning.

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