Early years workforce qualifications and children's outcomes

An analysis using administrative data

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This publication includes analysis of the National Pupil Database (NPD) https://www.gov.uk/government/collections/national-pupil-database The Department for Education is responsible for the collation and management of the NPD and is the Data Controller of NPD data. Any inferences or conclusions derived from the NPD in this publication are the responsibility of the Education Policy Institute and not the Department for Education.

This work was produced using statistical data from ONS. The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. This work uses research datasets which may not exactly reproduce National Statistics aggregates.

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Foreword

The work of the Education Policy Institute is intended to assist policy makers and practitioners to choose the best approaches to raising attainment and closing the large gaps between disadvantaged and vulnerable children and the rest of the pupil population.

Much of the disadvantage gap in attainment at age 16 – up to 40 per cent – is present on entry into the schools system. So closing the gap would seem to require interventions in the home and in early years settings.

However, we need to understand much more about how children's development and life chances can be improved in early years settings, and this is a major priority for EPI research.

This report looks at whether there is a convincing link between the level of qualification of early years staff, and the outcomes which children achieve. Specifically, this research looks at the effect that having a graduate may have in PVI (private, voluntary and independent) settings. Of course, it might still be optimistic to think that one "highly qualified" staff member in a setting with many staff and children could have a significant impact, and further work is needed to understand the impacts of larger numbers of qualified staff and of qualification type.

As ever, we are grateful to those who have both funded and contributed to this report, and we welcome comments on the analysis and conclusions presented here.

Rt. Hon. David Laws,
Executive Chairman, Education Policy Institute

Executive Summary

The first few years of a child's life have a significant impact on their development throughout school and into adulthood. Previous research has shown that intensive high-quality early interventions can have a positive impact on children's development, setting them on the right path to fulfil their life potential.[1] This evidence indicates that early education and care has the potential to promote child development, and reduce the gap in opportunities between disadvantaged children and their wealthier peers, which emerges very early on in a child's life. The people who work in the early years sector are key to the quality of the provision of early education and care. This study is part of a research programme that aims to improve our understanding of the early years workforce in England and the relationship between workforce development and children's outcomes.

The first report in the programme, *The early years workforce in England* (January 2019),[2] provides an overview of the workforce's characteristics, such as demographics and working conditions, and their trends between 2006 and 2018. The second, *Early years workforce development in England. Key ingredients and missed opportunities* (January 2020),[3] identifies the impact, or lack thereof, of key policies from the last decade and considers which elements make for effective policies in improving workforce qualifications. The third study, *Understanding the early years workforce: Qualitative research findings* (February 2020),[4] looks at incentives and barriers to the recruitment, retention and development of qualified early years staff. This final report focuses on the relationship between early years workforce qualifications and children's outcomes, as measured by teacher assessments at age 5 (the Early Years Foundation Stage Profile, EYFSP), and tests at age 7 (Key Stage 1) and 11 (Key Stage 2).

The goal of this study is to improve our understanding of the link between workforce qualifications and children's outcomes among those children who attended early years provision at private, voluntary and independent (PVI) settings. The early years sector in England is complex and heterogeneous. One of its key characteristics is the reliance on a mixed-market system, with a wide variety of providers: maintained nurseries, private preschools, voluntary and independent providers, and childminders. The sector's diversity translates into different funding levels, regulations and, of particular interest to this work programme, different working conditions between the maintained and the PVI sector. Different regulations, accompanied by persistent financial instability, where providers are typically small and run on tight margins, lead to poorer working conditions and, on average, lower qualification levels of staff in the PVI sector. Therefore, we focus our analysis on the children who attend PVI provision, where the qualifications held by staff are more variable compared to those of staff employed in the maintained sector. This affects the majority of early years provision in England, with almost 60 per cent of all three- and four-year olds attending a PVI setting in 2018.

Meanwhile, early education alone is not a silver bullet and must be placed within a background of wider interventions to tackle poverty and improve social mobility. It is in this context that the key findings of this study must be set.

Key findings

- **There is a positive but small association between the presence of degree-qualified staff and children's outcomes as measured at age five by the Early Years Foundation Stage**

Profile. Using a model which controls for a range of children's characteristics we find that having a graduate working at the setting is associated with improved children's outcomes of 2.5 per cent of a standard deviation for the years 2011/2012-2015/2016. This corresponds to 0.3 of an EYFSP point. These results are modest when considering that, for example, the gap in total scores between disadvantaged children and their more affluent peers is 3.6 points with the new profile, while the gap between an autumn-born child and a summer-born child is 4.3 points. In addition, this estimate is likely to represent an upper bound of the associations.

- **We identify differences across the types of degree-level qualifications: the association is consistently larger for qualified teachers (QTS) than for professionals holding the Early Years Professional Status (EYPS).** The impact of having a QTS in the classroom is 3 per cent of a standard deviation, versus only 1.5 per cent for EYPS for the years 2011/2012-2015/2016 (0.3 and 0.15 of an EYFSP point respectively). Again, this positive association is small but it remains consistent across the years and different types of analysis.
- **On the other hand, associations are larger for professionals holding the Early Years Teacher Status (EYTS) compared to staff holding an EYPS (the EYTS replaced the EYPS in September 2013).** During the years 2016-2018, when data on EYTS qualifications is available, the presence of a graduate is associated with an effect size of 2.7 per cent of a standard deviation, which amounts to 2.9 per cent in the case of an EYTS and 2 per cent in the case of an EYPS (respectively 0.3, 0.4 and 0.2 of an EYFSP point). The slightly bigger effect size associated with a staff with EYTS compared to those with EYPS could be explained by some of the key differences between the two qualifications, in particular the fact that the EYTS is more similar to the QTS than the EYPS. For the years 2016-2018, the strongest association though is still found with having a QTS in the classroom, which amounts to 3.6 per cent of a standard deviation (0.4 of an EYFSP point).
- **When looking at the association between staff qualifications and EYFSP subscores, we find that effect sizes were larger for communication and mathematics scores than for social and emotional development.** Having a graduate in the classroom is associated with a difference in the personal, social and emotional development scores of only 1.1 per cent of a standard deviation, but the effect size increases to 2.6 per cent and 2.2 per cent for the communication, language and literacy development, and the mathematical development areas.
- **We find a positive association between attending early years settings with a graduate for more than 15 hours per week and EYFSP scores for children who later on claim free school meals.** The association between staff qualifications and children's outcomes at age five is twice as strong among those children who attended for more than 15 hours per week than among those who were registered for fewer hours. While this strong association could be driven by the link between longer hours at settings and coming from wealthier backgrounds, our analysis shows that the positive association is still present when focusing on the most disadvantaged children and amounts to 3 per cent of a standard deviation (0.3 of an EYFSP point). This finding suggests that opening up the 30 hours of funded childcare to the most disadvantaged children (who are currently excluded) could be beneficial, especially when their setting has a graduate.
- **The positive association between staff qualifications and children's outcomes is sustained over time through KS1 and KS2.** Even after controlling for Early Years Foundation Stage

Profile scores, the association between having a graduate in early years settings, and KS1 and KS2 outcome is very small (less than 0.1 of a KS1 and KS2 points) but the positive sign and the persistence of this effect are important as they suggest that the effect of investments in the early years persists up until at least the age of 11.

Conclusions and policy recommendations

Our goal was to gain a deeper understanding of the importance of staff qualifications, both at degree-level, and at level 2 and level 3, which are key qualifications in the early years sector. With a focus on PVI settings, our analysis finds a generally positive association between a degree-level qualified professional and children's outcomes as measured by teacher assessments at age five, and by tests at ages seven and 11. This association is small but consistent across years and across changes in the EYFSP, which occurred in 2012/2013. This association is also found with respect to KS1 and KS2 scores, challenging claims that the effect of investments in the early years fades out over time.

The effect sizes we obtain are very small, and this is particularly marked when they are compared to the gap in EYFSP scores between disadvantaged children and their wealthier peers. However, this is not, perhaps, unexpected given that children's outcomes at the end of Reception are a function of their experiences in early years, school, and most importantly, at home. Part-time and/or erratic attendance of early years settings, even when of high quality, cannot be expected to offset all of the disadvantages faced by children growing up in poverty. Similarly, we cannot expect a small proportion of highly qualified staff to create systemic change in quality when the majority of the workforce has low qualification levels. Evidence generated through this research programme gives us some insights into where to look to better understand the link between qualifications and children's outcomes. It may be unrealistic to expect the qualification level of a single staff member alone to be strongly associated with children's outcomes when staff working in PVI settings are generally low paid, which could discourage more motivated and better trained people from joining or remaining in the workforce, and have insufficient access to continuing professional development.

Given the current policy developments around the early years workforce in England, our key policy recommendation is as follows:

- The government should undertake pilot studies to investigate the impact of different formulations of staffing composition within a setting, and the possible differential impact of higher qualification levels between staff in leadership position and frontline workers.

Our findings also hint at some degree-level qualifications being more effective than others. We find that associations with children's outcomes, as measured by EYFSP, KS1 and KS2 scores, are stronger when staff have either a QTS or an EYTS. However, the presence of a qualified teacher is not common in PVI settings and the number of people enrolling in EYTS initial teacher training has plummeted. In addition, the positive association between exposure to a graduate and attainment is stronger for disadvantaged children when they attend a setting for more than 15 hours. Recent government policies which have abandoned any commitment to expanding EYTS and which exclude disadvantaged children from receiving the 30 hours funded childcare entitlement could therefore be hindering progress in narrowing the gap in the early years.

In light of these findings and of the other strands of this work programme, we also suggest that:

- The government should undertake a review of early years degrees to assess the differences among types of degree-level qualification, the quality of their theoretical content and the role of the induction system in preparing graduates for work in early years settings. The outcome of such a review should form the basis of a core content for every early years degree and a plan for how to a make strong induction system viable for every graduate.
- The government should consider the costs and benefits of extending the 30 hours entitlement to be universal, and therefore allow disadvantaged children the same opportunity as their wealthier peers to reap the benefits of attending an early years setting for more than just 15 hours per week. In doing so, it should also assess the extent to which the current design of the 30 hours funded childcare policy affects quality and access for disadvantaged children, with the goal of redesigning the system and making it more equitable.

Glossary

In this report, though we aim to avoid using unnecessary jargon, we inevitably use some words and phrases that may not be immediately clear to the reader. We have given definitions of these terms here.

Type of providers	
Private, Voluntary and Independent (PVI) sector	Childcare providers operating in non-domestic premises can be run as private, voluntary or independent settings. This category also includes Local Authority day nurseries, Sure Start/Children's Centres and other providers registered to receive government funding.
Maintained sector	The maintained sector is composed of stand-alone maintained nursery schools, nursery and infant classes in primary schools, state-funded primary and secondary schools with nursery provision, primary converter academies, primary sponsor-led academies and primary free schools.
Childminders and childminding agencies	Childminders provide day-to-day care of children in a domestic setting, and supervise and participate in their play, educational and other activities. Childminders included in the dataset used in this study must be registered with Ofsted and report into the Early Years Census.
Levels of qualifications	
Level 2 qualification	Qualifications at this level can include GCSEs, functional skills in English and maths, a wide array of technical qualifications and apprenticeships. They are usually taken for the first time at the end of Key Stage 4, when a student is aged 16.
Level 3 qualification	Qualifications at this level can include A levels, a wide array of technical qualifications, apprenticeships and, starting in 2020, T Levels. Students must be at least 16 when they enroll in level 3 courses. They are the final qualification level a student is expected to achieve while in mandatory schooling.
Level 4 and 5 qualifications	These include numerous higher-level technical qualifications as well as qualifications that help students bridge into higher education, such as certificates or diplomas of higher education. These are usually taken after the age of 18.
Level 6	Qualifications at this level can include bachelor's degrees, some technical qualifications and apprenticeships. They are usually completed after mandatory schooling.
Full and relevant qualifications	From 1 September 2014 until 31 August 2019, all level 2 early years qualifications are full and relevant if they are: • early years (0 to 5 years) related and appropriate to early years practice • Ofqual-approved and included on their list of regulated qualifications From 1 September 2019, all level 2 qualifications must meet the level 2 early years practitioner criteria. From 1 September 2014, all level 3 qualifications must meet the early years educator criteria. This means that all staff who have registered for a

	qualification since that date can be counted in the EYFS staff:child ratios at level 3 if they hold: • a level 3 early years educator qualification • suitable level 2 literacy and numeracy qualifications.
QTS	Qualified teacher status (QTS) is required in England to work as a teacher in state schools under local authority control and in special education schools. An undergraduate degree and successful completion of a teacher training programme is compulsory for QTS recommendation. One of the main routes to achieving QTS, for those already in possession of a degree, involves undertaking a postgraduate teacher training course, such as the Postgraduate Certificate in Education (PGCE) or a School Direct programme. There are also some undergraduate degree qualifications leading to QTS, such as the Bachelor of Education. In England candidates must also pass professional skills tests. All candidates must have GCSEs at grade C or above in English and maths.
EYPS	Early Years Professional Status (EYPS) is a professional status for practitioners in England at the Early Years Foundation Stage (ages 0 – 5). Introduced in 2007, via the Children's Workforce Development Council, EYPS courses require a degree, and include an assessment in an early years setting – either a placement or within the trainee's own early years workplace. In 2013, the EYPS was replaced by the Early Years Teacher Status (EYTS).
EYTS	Early Years Teacher Status (EYTS), also known as Early Years Initial Teacher Training, is an award for those who wish to become experts in the 0 - 5 age range. There are three training routes available – graduate entry, graduate employment-based and undergraduate – and an assessment only route. The change from EYPS to EYTS came with a change in entry criteria, which require trainees to pass the same tests as QTS trainees (e.g. maths, English and science GCSE at grade C, and the teacher skills test). It also came with a change in standards, which narrowed the focus to more direct teaching and included maths, synthetic phonics and placements in KS1. Finally, many EYT courses are now held in initial teacher training (ITT) departments at Universities, which has brought to a closer alignment with the requirements of QTS.
Apprenticeship	A work-based training system, where apprentices earn a qualification after completing a blended mix of study and work. Apprentices must complete 20% of their training off the job, be paid the Apprenticeship Minimum Wage (£4.15/hr) and pass an end point assessment.
Entitlements to government-funded early education and childcare	
Children aged 2: 15 hours entitlement	In England, since 2013, some two-year-old children are entitled to 15 hours per week of government-funded early education and childcare for 38 weeks per year. Eligibility for the entitlement is based on parents' receipt of benefits (including in-work benefits) or children who are disabled or looked after.
Children aged 3-4: 15 hours universal entitlement	In England, since 2010, all three- and four-year-old children are entitled to 15 hours per week of government-funded early education and childcare for 38 weeks per year.

Children aged 3-4: 30 hours extended entitlement	In England, since 2017, three- and four-year-old children whose parent/s is/are working are entitled to an additional 15 hours per week of government-funded early education and childcare, for a total of 30 hours per week, for 38 weeks per year. Minimum and maximum earning requirements apply.
Assessments and tests	
Early Years Foundation Stage Profile (EYFSP)	The Early Years Foundation Stage Profile gives a description of children's attainment in relation to a range of learning goals. Taken at the end of reception year, it is based on the assessment of an early years practitioner who works with the children - these are primarily based on observing a child's daily activities and events. EYFSP scores are not standardised. However, under the current system local authorities have to moderate assessments against the EYFSP in 25 per cent of settings in their areas to help ensure consistency between schools.
Key Stage 1 (KS1)	Key Stage 1 is the legal term for the two years of schooling in maintained schools normally known as Year 1 and Year 2, when pupils are aged between 5 and 7. At the end of this stage, pupils in England in Year 2 (aged 7 or almost age 7) are normally assessed in English, maths and science. The tests, carried out by the teacher during May, cover English reading, English grammar, punctuation and spelling, and maths.
Key Stage 2 (KS2)	Key Stage 2 is the legal term for the four years of schooling in maintained schools normally known as Year 3, Year 4, Year 5 and Year 6, when the pupils are aged between 7 and 11 years. At the end of this stage, pupils in Year 6 (aged 11 or almost age 11) are tested as part of the national programme of National Curriculum Tests (SATs). These tests cover English and Mathematics and are externally marked, with results for each school being published in performance tables.
Child characteristics	
Free school meals (FSM)	Some school-aged children are eligible for free school meals, paid for by the government. Children are eligible if their parent/s are in receipt of benefits such as Universal Credit.
Special educational needs (SEN)	In England, a child is defined as having special educational needs or a disability if they have a learning difficulty and/or a disability that means they need special health and education support.
English as an additional language (EAL)	Children whose first or primary language is not English but who speak English as an additional language.
Setting characteristics	
Child:staff ratio	The recommended number of children per staff member as set out in the Early Years Foundation Stage framework.
Turnover rate	The percentage of employees leaving a company in a certain period of time (usually per year).

Introduction

This report covers the fourth and final strand of a two-year research programme that aims to improve our understanding of the early years workforce in England and the relationship between workforce development and children's outcomes.

Strand 1 provides an overview of the workforce's key characteristics, such as demographics and working conditions, and their trends between 2006 and 2018.[5] Strand 2 identifies the impact, or lack thereof, of key policies of the last decade and considers which elements make for effective policies in improving workforce qualifications.[6] Strand 3 looks at incentives and barriers to the recruitment, retention and development of qualified early years staff.[7] This last strand investigates possible associations between workforce qualifications and children's outcomes.

The early years of a child's life have a significant impact on their development through their school years and into adulthood. Previous research has shown that intensive high-quality early interventions can have a positive impact on children's development, setting them on the right path to fulfil their life potential. This evidence indicates that early education and care has the potential to promote child development and reduce the gap in opportunities between disadvantaged children and their wealthier peers, which emerges very early on in a child's life.[8]

However, this role cannot be played by early years education in isolation from other important societal changes, such as tackling poverty. Child development must be seen as holistic and encompassing many areas and elements of influence, from mental and physical health to housing, from parental education and income to the quality of the home learning environment, on to a series of investments that builds on the early years stage, and continues into primary and secondary school.[9] This integrated view must be kept in mind as important context for the results of this programme of work and of this report.

As well as accounting for only a portion of children's early experiences, high-quality early education is itself multidimensional, being composed of many distinct but important elements. Evidence has shown that both structural elements of quality, such as staff qualifications and experience, child to staff ratios and classroom sizes, and process elements of quality, such as the structuring of children's activities and the actual interactions between staff and children, have a role to play. Previous evidence makes clear that there is no silver bullet to improve the quality of early education and care, but that a range of different factors appear to matter.[10]

In this report we focus on the relationship between the qualifications held by early years professionals and the outcomes of children who attend PVI settings, as measured by their Early Years Foundation Stage Profile (EYFSP) – a teacher assessment based on observation of children at age five. The focus is on children attending PVI settings because of the much higher variability in workforce qualifications within this segment of the sector. While legislation requires all maintained nursery classes to be led by a qualified teacher, no such requirement is imposed on PVI settings, leading to lower average qualification levels among their staff.

Previous research has shown that workforce skills and knowledge are key to high-quality early years provision.[11] The mechanisms by which qualifications impact quality and children's outcomes are still not fully explained by evidence. We can expect that, holding everything else equal, staff with

knowledge of child development, a strong pedagogical foundation and practical experience gained through a sound induction system will be better placed to support children's needs. However, we know that there is a great deal of variety in the kinds of qualifications that are available to those who work or who wish to go on to work in the early years. Not only do qualifications vary between different 'levels' of qualification, such as the difference between a level 3 qualification (equivalent to A levels or other technical qualifications) and a level 6 (equivalent to degree level). They also vary within these levels, so that one degree may differ considerably from another in its content and the practical experience it provides.[12] This may go part of the way to explaining why some studies have found that workforce qualifications are not always strongly linked to the quality of children's experiences within the setting.

However, the qualification levels of staff are considered one of the key elements of structural quality in early years provision, and one that can be tracked by government in administrative datasets and changed through public policy. They have also been a focus of policy development in England in the last decade. For these reasons, it is important that we improve our understanding of the relationship between qualifications and children outcomes.

The starting point of this report is a study by Blanden et al. (2017), which looked at the relationship between the presence of early years staff qualified at degree-level and the Ofsted ratings of early years settings, and children's outcomes as measured by their EYFSP score. The analysis focused on children who attended PVI settings, where workers qualifications are more variable and the proportion of staff qualified at degree-level is lower than in the maintained sector. This study found that the presence of a graduate in the setting, specifically a qualified teacher, was associated with a very modest increase in children's EYFSP scores at age five and that the same was true of attending a setting with an 'Outstanding' Ofsted rating (rather than a 'Satisfactory' or 'Inadequate' rating). The study also found limited evidence that these indicators of quality (graduate qualifications and Ofsted ratings) mattered more for disadvantaged children than for their peers.[13]

Following the general methodology of this earlier study, we analyse Early Years Census (EYC) data linked with the National Pupil Database (NPD) to investigate the relationship between staff qualifications and children's outcomes with an expanded time series and with additional analysis, described below. Blanden et al.'s (2017) analysis looked at three- and four-year-old children who attended PVI settings between the academic years 2007/2008 and 2009/2010. EYFSP data is now available for children who were in preschool in the school years up to 2017/2018 (i.e. attending reception year in 2018/2019), therefore providing an additional eight years of data to the analysis. This report offers three key improvements on this previous analysis:

1. An update of the analysis with the extra years of data available;
2. An expansion of the analysis to other degree-level qualifications, such as the Early Years Teachers Status (EYTS) for the years 2015/2016-2017/2018, and to qualifications below graduate level, namely level 2 and level 3, for 2017/2018;
3. A continuation of the analysis of the association between the qualifications of the early years workforce and children's outcomes at KS1 (age 7) and KS2 (at age 11) for the first four cohorts of children.

After a discussion of the key elements of the methodology and an overview of children, workforce and settings characteristics, the report will follow these three key areas of analysis. We will then discuss our findings and provide policy recommendations.

Data and Methodology

We use data from the National Pupil Database (NPD), a census of students in the state sector that links all children longitudinally from the time they start Reception to when they leave the school system. The data includes teacher assessments of attainment at age five (EYFSP), and test scores at age seven (KS1) and age 11 (KS2). The NPD can be linked to the Early Years' Census (EYC), which provides information about children who attended a PVI setting before entering Reception. Almost all of the other children in our sample had attended early years provision in the maintained sector, which are early years settings located in primary schools and just under 400 standalone settings (their details are also recorded separately in the NPD, as they enter the state school sector before Reception). We use EYC data from the academic year 2007/2008 through to 2018/2019, thereby capturing almost all children resident in England who were in their preschool years (i.e. three or four years old) between 2007/2008 and 2017/2018.[i] This amounts to more than 6 million children across all types of setting.

All PVI settings that receive funding for providing the free entitlement must complete the EYC (at individual level for children receiving an entitlement and at setting level for all others), and both the EYC and NPD are collected every January. Both censuses collect data at establishment and child level. The establishment-level data in the EYC includes information on the type of setting attended by children and the qualifications of staff working there, such as whether staff have qualified teacher status (QTS), Early Years Professional Status (EYPS) from the academic year 2008/2009 onwards, or Early Years Teacher Status (EYTS) from the academic year 2015/2016. EYPS and EYTS are included in the dataset once they become recognised qualifications. For the academic year 2017/2018 we also have data on staff at early years settings that hold qualification levels that are key for meeting child:staff ratios requirements: staff with a level 2 qualification, staff with a level 3 qualification who are not in a management position and work with children, and staff with a level 3 qualification who are in a management position and work with children. Unfortunately, the data on staff qualifications that we used for this study is not available for 2016/2017; therefore we exclude this year from the analysis.

Child-level data in the EYC that is of interest to our analysis includes: month and year of birth, gender, special educational needs status and hours attended at the setting. The use of the same unique child identifier across both censuses allows us to match children between the datasets. This enables us to: 1) identify children who appear in both datasets in their preschool year – meaning they could be attending more than one type of early years provision – and keep the observation for the setting where they attend for most hours (necessary for less than one per cent of observations); and 2) match preschool children with their school records through the School Census, thus gaining more detailed information on children's and families' background, such as: children's ethnicity, whether they speak English as an additional language (EAL), their eligibility for free school meals (FSM), and the level of deprivation of their area of residence (through data on the Lower Super Output Area where children live). In this report, when discussing results for FSM children, we are therefore referring to children who go on to claim FSM in Reception, the first year when they are eligible. We then use this as a proxy for disadvantage in years prior to them starting YR. The same applies for children who speak English as an additional language. While not all eligible children take-

[i] These children are born between September 2003 and August 2015.

up the free entitlement, our match picks up 95 per cent of all the children who appear in Reception in the Schools' Census in the following year, giving us access to data about their early years education and care experiences.

Attendance to early years settings is riddled with potential selection issues. Both the number of hours and the type of setting a child attends are often linked to the family socio-economic background, which in turns influences parents' preferences and needs. For example, parents' working status and patterns will determine whether the family needs part-time or full-time childcare. Meanwhile, families with a higher income might be able to choose more expensive and, likely higher quality, providers for their children. Therefore, the family's background has an impact on children's development while also increasing the chances that the child attends a setting with higher qualified staff.

In other words, children's characteristics might be associated with the probability of attending a setting with highly qualified staff. We will to some extent control for this by including (primary) school fixed effects, which allow us to compare outcomes for children who attended the same primary school. Children attending the same primary school live reasonably close to each other and we can, therefore, assume they have more similar characteristics than children living in a different area.

However selection issues could remain. If children who would otherwise do better than average within a class are more likely to have attended a nursery with a graduate then this would tend to overstate the graduate effect; on the other hand, if children with more adverse life opportunities within a class are more likely to have attended a setting with a graduate then our effects would be biased downwards. As we explain more in detail on page 30 we will use additional sets of controls, such as information about individual children's characteristics and similar derived measures for their peers to account for these issues as best we can.

Outcome measures

Our main outcome measures are the standardised scores (within cohort) for the EYFSP, KS1 and KS2. We are using these measures of children's outcomes because they are available in the National Pupil Database, allowing us to compare the results of almost all children in each year group. While KS1 and KS2 scores are commonly accepted measures of attainment, and do not present any particular methodological issues, the same is not true for the EYFSP.

A few studies to date have raised concerns about the appropriateness of the EYFSP to measure children's outcomes at age five.[14] In addition, changes to the EYFSP in recent years cause further complications.

One of the criticisms directed at the use of the EYFSP is that the assessment lacks a baseline and is carried out at the end of Reception year, therefore possibly confounding the measure of nursery teaching with Reception teaching. Our solution to this problem is to include (primary) school fixed effects in our regression models. A school fixed effect allows us to compare children who might come from different early years settings but attend the same primary school. This means that we can separate the impact of nursery and school effects, and that our findings on associations between nursery inputs and the EYFSP are only made based on variations between children who attend the same primary school. There would still be problems if the quality and quantity of reception teaching

a pupil receives were somehow correlated with their early years experience, for example if teachers were compensating for different preschool experiences of the children they teach. This is unlikely, but possible, and such an effect could limit our ability to discern differences in children's EYFSP scores that are attributable to their preschool experiences.

Second, the robustness and sensitivity of the EYFSP is sometimes challenged as this measure is not standardised or externally assessed.[ii] The lack of standardisation across schools will once again be mitigated by the inclusion of school fixed effects. Reception teachers are likely to assess their class in a relatively similar way but there might be differences in practices across schools. A comparison between children attending the same Reception class, but different EY settings, will limit the problems caused by differences in EYFSP assessments between schools. There is no doubt that there are concerns about the sensitivity of the EYFSP. Nonetheless, as the Early Intervention Foundation (EIF) write in their assessment of the two-year-old offer, 'it is the government's national measure of children's progress in the early years and it is the first measure of outcomes in the children's school path that is available for every child in England'.[15]

The EYFSP underwent significant revision during the period covered by this study, with a new version being implemented nationally in 2012/2013. In updating the analysis we have accounted for these changes. There are two main differences between the old and the new Profile.

1. The old Profile assessed children against 13 learning goals on a 9-point scale, with a maximum score of 117. Since 2012/2013, teachers assess children's development against 17 areas of development or early learning goals (ELGs), which are grouped into seven domains. Children are assessed as either meeting the level of development expected (score=2) at the end of the reception year, exceeding this (score=3), or not having reached the level (score=1). The total points available under this new Profile is an aggregate of scores across the seventeen goals, ranging from a minimum score of 17 to a maximum of 51. A key consequence of the change from the old to the new Profile is that the distribution of attainment scores between 2011/2012 and 2012/2013 has changed. The Early Intervention Foundation, for example, showed that the distribution has become more clustered, with 19 per cent of all children having the same combined score of 34 the first year the new Profile was in place.[iii] [16]

2. The old Good Level of Development (GLD) was defined as the proportion of children that achieved six or more points across the seven personal, social and emotional development and communication, language and literacy scales and 78 or more points across all 13 scales. The new GLD is defined as the proportion that achieves the expected level in the learning goals of the prime areas of learning and in the specific areas of mathematics and literacy. This means that the way the new GLD is constructed is different and leaves out some of the learning areas that make up the whole profile score. In addition, the definition and content of what is measured within each area of learning, which in turn impacts the relationship between the full profile scores and the GLD indicator, have changed significantly in some cases. Research into a pilot of the new Profile found that almost half of the teachers who answered the questionnaire found it harder to make judgments under the new ELGs for the *numbers* ELGs and a fifth to a quarter said it was more difficult for the

[ii] However, it is moderated (see glossary).
[iii] Reflecting the equivalent of achieving a 2 ('expected') on each of the 17 subscales.

writing, being imaginative and *people and communities* (Ref, 2013).[iv] The pilot study found a big difference between old and new GLD performance: 41 per cent of children were assessed at achieving GLD with the new Profile pilot data versus 64 per cent with the old profile. In addition, gaps by certain characteristics (e.g. gender, eligibility for free school meals, month of birth) were wider in the new GLD than in the old GLD.[17]

In summary, we are aware of the concerns about the (lack of) sensitivity of the EYFSP as a measure of children's outcomes. However, we believe the analysis of the association between workforce qualifications and the EYFSP is important given its availability for the full student population body and its importance in the policy debate. Because of the changes mentioned above, we relied more extensively on the full profile score and on subscores of different areas of development, rather than on the GLD. In addition, to account for any impact on the experience of children attending early years settings of the introduction of (in 2007/2008) and changes to (in 2012/2013) the EYFSP we include a year fixed effect and we split the results into two timeframes, one for the years of the old profile and one for the years of the new profile.

For KS1 and KS2, we only looked into the association of staff qualifications with average total point scores. For KS1, we used the average total point scores that include attainment in Reading, Writing, Maths and Overall Science, a variable directly available in the NPD.[v] For KS2, a variable for the average total point score is directly available on the NPD for the first cohort of children but not afterwards. Therefore, we created a new average total score from the reading, writing and maths attainment scores.

In our analysis we use standardised measures (i.e. with mean zero and variance one) of these outcomes.

[iv] The reasons provided were: too much content in the goals, goals too challenging or the content of the goals not being taught that year.

[v] We also looked into the average total point scores in Reading, Writing and Maths. The results were very similar and in line with those obtained including Overall Science. For the sake of brevity and clarity we keep only one set of results.

Child, workforce and setting characteristics

In this chapter we provide an overview of key summary statistics about the children, workforce and early years settings in our sample. Given the long time series of data we have available, we highlight any significant changes that have happened over time.

Child characteristics

There are over 600,000 children in each cohort, making our total sample size one of over 6 million observations when we work with the entire time series. Table 1 shows child characteristics we can gauge from the School Census dataset matched to the early years setting where they took up the free entitlement through the EYC (around 95 per cent of the total children). The data in Table 1 refers to all children, whether they attended a maintained nursery or a PVI setting. From this we observe that, on average, 16 per cent of children are eligible for free school meals (FSM), 16.4 per cent have English as an additional language (EAL) and 62.1 per cent are of White British ethnicity. Slightly less than five per cent of children have already been judged as having special educational needs and/or a disability in preschool but the proportion increases to almost 10 per cent in Reception year.

Table 1. Three- and four-year-old children's characteristics in the whole sample (2007/2008 – 2017/2018)

Variable	Proportion with these characteristics in matched preschool sample	Observations
Living in least deprived 20% neighbourhoods	20.3%	6,476,131
Living in middle deprived 60% neighbourhoods	60.0%	6,476,131
Living in most deprived 20% neighbourhoods	19.7%	6,476,131
Autumn born*	34.0%	6,493,530
Spring born*	24.3%	6,493,530
Summer born*	41.7%	6,493,530
Male	51.2%	6,493,530
Free school meals	16.0%	6,493,530
English as an additional language	16.4%	6,493,530
Ethnicity		
Bangladeshi	1.3%	6,932,170
Indian	2.5%	6,932,170
Other Asian	1.6%	6,932,170
Pakistani	3.5%	6,932,170
Black African	3.0%	6,932,170
Black Caribbean	0.9%	6,932,170
Black other	0.6%	6,932,170
Chinese	0.4%	6,932,170
Mixed other	1.9%	6,932,170
Mixed white/Asian	1.2%	6,932,170
Mixed white/black African	0.7%	6,932,170
Mixed white/Caribbean	1.3%	6,932,170

N/A	11.5%	6,932,170
Not obtained	0.5%	6,932,170
Other	1.4%	6,932,170
Refused	0.4%	6,932,170
White British	62.1%	6,932,170
White Irish	0.2%	6,932,170
White Irish traveller	0.1%	6,932,170
White other	4.8%	6,932,170
Gipsy/Roma	0.2%	6,932,170
Special education needs (preschool)	4.8%	6,932,126
Special education needs (reception)	9.8%	6,493,530

Note: Table 1 includes data for the year 2016/2017, as the changes in data collection did not affect data about children's characteristics.

** We organise the terms according to the months of eligibility to early years entitlements. This means that in this table: autumn born = Sept 1-Dec 31; spring born = Jan 1-March 31; summer = April 1–August 31st. On the other hand, in statistics by the Department for Education, autumn born = September 1-December 31; spring born = January 1-April 30; summer born = May 1–August 31.*

Over the years, there have been some changes in the population of children attending early years provision and, therefore, in setting composition. For example, the average number of three- and four-year olds at each setting increased from 34.5 in 2007/2008 to 39.3 in 2017/2018. The change is largely driven by the three-year olds, whose average number increased from 24.3 to 28 children per setting, rather than the four-year olds (whose average number only increased from 10.3 to 11.7 children per setting).

We also looked at data related to dosage, i.e. the number of hours a child attends early years provision per week.[vi] We have data on the total number of hours a child is registered to attend a provider per week, which may differ slightly from the number of hours they actually attend. We find that children are registered for on average around 18 hours per week across all settings, and just over 19 hours per week at PVI settings. In our regression analysis described below, we consider dosage in terms of whether children attended for more than the universal entitlement to government-funded early education and care. From 2005, all three- and four-year olds were eligible to access 12.5 hours per week of early education and care for 38 weeks per year (term time). In 2010, the entitlement was increased to 15 hours per week. Because all three- and four-year olds are entitled to access the universal entitlement in their preschool years, we split children into two groups: those who attended for the universal free entitlement of 15 hours only, and those who attended for more than 15 hours per week. The proportion of children attending for more than the 15 hours of the universal free entitlement decreased from around 50 per cent in 2007/2008 to 45 per cent in 2016/2017 but then increased to 59 per cent in 2017/2018, which corresponds to the introduction of the 30 hours funded childcare policy.

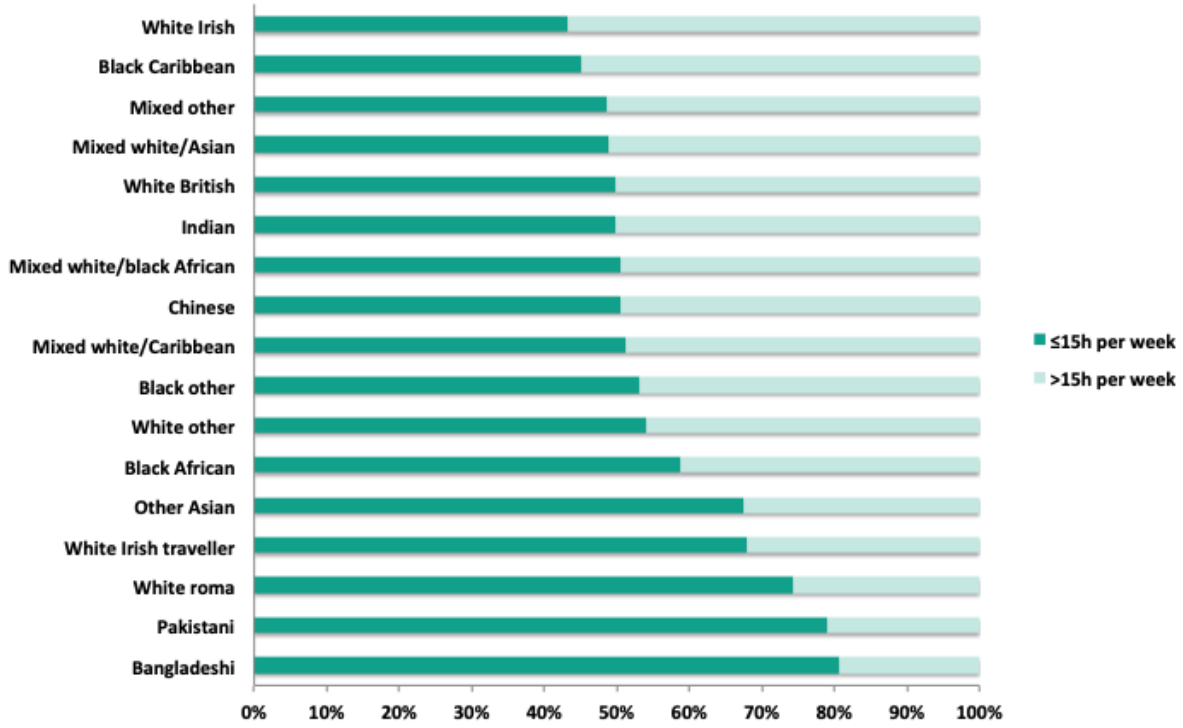
Given the importance of early education and care in closing the attainment gap between disadvantaged children and their wealthier peers, we check whether there was a difference in hours

[vi] We were interested in capturing the impact of the 30 hours entitlement, for which an indicator variable is available since 2017/2018, but very few observations (just over 200,000) had this data available so we could not make use of it. When future years of data are available, this is a variable that will be interesting to monitor.

attended between these two groups of children. We focus on the years around the introduction of the 30 hours funded childcare entitlement. The data shows that while the proportion of non-FSM children attending preschool for more than 15 hours increased from 46 per cent in 2016/2017 to 63 per cent in 2017/2018, the proportion of FSM children attending preschool for more than 15 hours remained relatively stable, at around 22 and 24 per cent respectively. This points to a clear divide between FSM and non-FSM children in accessing early years education beyond the 15 hours entitlement.

For those children who attended early years provision for some funded hours, we look into whether uptake of hours beyond the free universal entitlement of 15 hours per week varies by ethnicity. Figure 1 shows that there is a clear difference in the proportion of children attending for more than 15 hours per week by ethnicity.

Figure 1. Proportion of children attending for some funded hours who are registered for less, or more, than 15 hours per week, by ethnicity



Workforce qualifications and staffing structures

Information about staff is available at the (early years) establishment level, with a distinction usually made between staff present at setting and staff working directly with children. We make use of this distinction creating separate variables for having a graduate 'teaching' (i.e. working with children) and having a graduate 'at the setting' (i.e. present at the setting, whether working in the classroom or not). There are some changes in the data collected over the years and, therefore, inconsistencies over our time series. For example, the total number of teaching staff, which is needed to calculate the number of staff who are working with children in a classroom and at what ratios (of children to staff) settings operate, was discontinued in 2016/2017. This has an impact on how we calculate some of our derived variables (see below) and on our analysis (we break up the timeline to produce the results presented in the next chapter).

Table 2 shows the general trend in the average number of total staff at the establishment and total teaching staff over the years, confirming a slow but steady increase in setting size in terms of both staff and child numbers.

Table 2. Average total staff at early years setting and average total teaching staff (2007/2008-2017/2018)

Year of preschool	Average total staff at setting	Average total teaching staff
2007/2008	11.1	6.9
2008/2009	11.6	7.1
2009/2010	12.0	7.3
2010/2011	12.5	7.5
2011/2012	12.8	7.9
2012/2013	13.3	8.1
2013/2014	13.9	10.2
2014/2015	13.5	10.1
2015/2016	14.0	10.5
2016/2017	13.9	n/a
2017/2018	13.6	n/a

To investigate the relationship between staff qualifications on children's outcomes we create a series of variables that we use as explanatory variables in our regression analysis. These are:

- Graduate teaching = having a staff with either QTS or EYPS in the classroom;[vii]
- Share of graduates teaching out of total teaching staff = proportion of staff in the classroom with a graduate qualification out of total teaching staff;[viii]
- Graduate at the setting = having a staff with either QTS or EYPS at the setting;
- Share of graduate at setting out of total teaching staff = proportion of staff at setting with graduate qualification out of teaching staff;
- QTS = having at least one staff with QTS in the classroom;
- EYPS = having at least one staff with EYPS in the classroom;
- EYTS = having at least one staff with EYTS in the classroom;
- QTS and EYPS teaching = having both a QTS and EYPS working in the classroom;
- QTS and EYPS at setting = having both a QTS and EYPS at setting.

In September 2007 the EYPS teaching standards were introduced and between 2007 and 2011 the Graduate Leader Fund (GLF), a government policy aimed at increasing qualification levels in the PVI sector by helping providers pay higher wages to graduates, was ring-fenced. Previous research has shown that the GLF was key in incentivising PVIs to hire and retain a graduate by enabling them to pay higher wages.[18] NPD data confirms that the graduate presence increased significantly in the

[vii] Note that staff with EYTS are not included in the first four variables. Throughout this report, when we refer to 'graduates' we are referring to staff holding either QTS or EYPS. This is because we wanted to capture the associations between staff with EYTS and children's outcomes separately from the association driven by other graduates, as this was one of the new features of this study.

[viii] The 'share' variables had to be calculated out of the total staff at setting for the years 2015/2016 and 2017/2018 due to the change in variable mentioned above.

following years and that this increase was driven by an increase in the number of professionals with EYPS.

Table 3. Proportion of children with access to a graduate in the classroom

Year of preschool	QTS	EYPS	EYTS	EYPS or EYTS
2007/2008	28.9%	NA	NA	NA
2008/2009	26.2%	13.0%	NA	NA
2009/2010	24.6%	16.9%	NA	NA
2010/2011	25.2%	20.8%	NA	NA
2011/2012	24.6%	26.6%	NA	NA
2012/2013	24.6%	30.2%	NA	NA
2013/2014	26.1%	34.7%	NA	NA
2014/2015	26.7%	35.6%	NA	NA
2015/2016	26.2%	32.1%	10.8%	37.2%
2016/2017*	NA	NA	NA	NA
2017/2018	26.5%	30.1%	14.9%	38.7%

Note: Some qualifications may be overlapping and staff might be reported as being in more than one category.
** The data on staff qualifications used in this study is not available for the academic year 2016/2017*

In September 2013 the EYPS was replaced by the EYTS. The change from EYPS to EYTS came with a change in entry criteria, which require trainees to pass the same tests as QTS trainees (e.g. maths, English and science GCSE at grade C, and the teacher skills test). It also came with a change in standards, which narrowed the focus to more direct teaching and included maths, synthetic phonics and placements in KS1.[19] Finally, many EYT courses are now held in initial teacher training (ITT) departments at Universities, which has brought EYTS to a closer alignment with the requirements of QTS. The policy goal of this change was to increase the status of early years professionals, although it was not accompanied by a real parity with QTS, as staff holding an EYTS are not allowed to lead a class in the maintained sector.

Data on the number of staff with an EYTS who work with three- and four-year olds is available from 2015/2016. On average the proportion of children who attended a setting with at least one staff in the classroom qualified at EYTS level increased from 11 per cent in 2015/2016 to 15 per cent in 2017/2018, but as government dropped the commitment to a graduate-led sector and to change regulations to allow EYTS to lead classes in the maintained sector, registrations to EYT courses have plummeted from 2,300 in 2013/2014 to under 400 in 2019/2020.[20] Looking at how the EYPS and EYTS qualifications interact, we observe that while the proportion of children with access to either a EYPS or an EYTS increases from 37.2 per cent in 2015/2016 to 38.7 per cent in 2017/2018, the proportion with access to an EYPS decreases by 2.1 percentage points while the proportion with access to an EYTS increases by 4.1 percentage points.

Finally, for 2017/2018 we have data on staff with qualifications at level 2, level 3 working in non-managerial position and level 3 in management position. To get a sense of the average staffing structure of an early years setting, we looked at the proportion of staff at these different qualification levels per setting. The average number of staff members was 13.6. Of these workers, 11.5 per cent hold a full and relevant level 2 qualification, 48 per cent a level 3 qualification and who work directly with children, 16 per cent a level 3 qualification and who work in a management

position, and 9 per cent hold a graduate qualification (either QTS, EYPS or EYTS). The data, therefore, allows us to identify the qualification level of just over 85 per cent of the total staff working at a setting.

Setting characteristics

The analysis of children's outcomes will be focused on three- and four-year-old children receiving the free entitlement at a PVI setting rather than a maintained or school-based nursery. This is because it is in the PVI sector where workforce qualifications and other setting characteristics present more variability. This is not an insignificant proportion of children. In fact, over the years the relative importance of PVIs and maintained settings has changed. While on average 52 per cent of three- and four-year-old children (those in the year before they start school) attended a PVI setting in 2007/2008 and 48 per cent a maintained or school-based setting, these proportions changed respectively to 60 per cent and 40 per cent by 2017/2018.

In bringing all this information together, Table 4 shows the characteristics of the settings children attend, both overall and by child characteristics. The first few lines consider the whole sample, assuming that all those in the maintained sector have access to a qualified teacher (a requirement in maintained settings), while the rest of the table considers PVI settings separately, for which more detail is available and where staff qualifications present more variation.

We observe a clear difference in the proportion of children who have access to a graduate at setting level and in the classroom between the sample as a whole and children who attend PVIs: for the population as a whole, the proportions are 72 per cent and 69 per cent, but the proportions decline to 44 per cent and 41 per cent respectively for children attending PVIs. This is explained by both regulatory differences, whereby classes in the maintained sector must be led by a QTS but no such requirement is imposed on PVIs, and by the well-known difficulties PVI settings face in recruiting and retaining graduates.[21]

There are also differences in children's level of access to a graduate depending on children's characteristics. Children eligible for free school meals, who speak English as an additional language or who live in the most deprived areas are all more likely to be taught by a graduate. This points to differences in intake between types of providers, as maintained settings cater disproportionately to more disadvantaged communities. It also indicates a possible selection into settings with a graduate by child's socio-economic background. This is connected to how early years provision has developed in the 1960s and 1970s, when urban centres and former Labour councils were more likely to offer maintained provision and to focus it on disadvantaged children. Therefore, this pattern of intake is more linked with historical disadvantage than to current needs or targeting of support.

Focusing on PVIs only, the relationship between disadvantage and the likelihood of attending a setting with a graduate is less clear. Among children attending PVIs, those from a disadvantaged background are not necessarily more likely to have access to a graduate compared to the sample as a whole: about 39 per cent of children eligible to receive free school meals attend a setting which has a graduate, compared to 44 per cent of all children attending a PVI. Children living in the most deprived neighbourhoods and attending PVIs are also not any more likely to have access to a graduate (44 per cent), while children who speak English as an additional language (EAL) and children classified as having special educational needs (SEND) are slightly more likely to be in a setting with a graduate (45 per cent and 46 per cent respectively).

Table 4. Workforce and setting characteristics by child characteristics (2007/2008-2017/2018)

	All children	FSM	Least deprived 20% of neighbourhoods	Middle deprived 60% of neighbourhoods	Most deprived 20% of neighbourhoods	EAL	SEND
All settings							
Graduate at the setting	72.0%	81.5%	61.2%	70.4%	87.2%	86.3%	85.1%
Graduate teaching	68.8%	79.0%	58.0%	67.3%	84.6%	83.6%	82.9%
Average hours of attendance	18.0	16.4	18.1	17.5	17.8	17.6	17.1
(st. dev.)	(8.2)	(5.37)	(8.92)	(7.86)	(7.14)	(7.11)	(6.47)
PVI settings only							
Graduate at the setting	43.8%	39.4%	43.7%	40.0%	43.7%	45.5%	46.3%
Graduate teaching	40.9%	36.5%	41.0%	37.4%	39.6%	41.9%	43.5%
Share of graduates out of total staff	8.4%	6.9%	7.8%	6.9%	7.0%	7.6%	7.7%
Share of graduates out of teaching staff	31.6%	29.3%	29.8%	29.3%	34.6%	35.8%	30.9%
At least a QTS at setting	28.2%	22.5%	28.4%	23.7%	24.8%	26.4%	28.9%
At least a EYPS at setting	30.1%	28.5%	29.7%	28.7%	32.7%	32.8%	32.7%
At least a EYTS at setting	11.8%	10.6%	11.9%	11.2%	11.3%	11.7%	11.8%
QTS and EYPS teaching	10.3%	8.1%	10.5%	8.6%	9.2%	10.0%	11.0%
QTS and EYPS at setting	9.3%	7.7%	9.4%	7.8%	8.6%	8.9%	10.0%
Average hours of attendance (st. dev.)	19.17 (9.88)	16.57 (6.91)	18.78 (9.84)	18.68 (9.55)	19.94 (10.46)	19.69 (10.33)	17.98 (8.9)
EY provider attached to school	19.2%	23.7%	19.0%	21.0%	18.0%	17.5%	21.8%
Sessional provision	29.3%	31.1%	33.9%	30.6%	21.8%	26.5%	32.4%
Average number of children at setting (st. dev.)	38.5 (22.58)	37.7 (21.51)	37.3 (20.01)	38.0 (21.87)	38.4 (23.72)	41.0 (24.15)	38.3 (21.05)
Child to total staff ratio (st. dev.)	3.9 (3.73)	4.2 (4.2)	3.9 (3.44)	4.0 (3.78)	3.9 (4.49)	4.1 (4.81)	3.8 (3.66)
Child to teaching staff ratio (st. dev.)	5.8 (5.62)	6.0 (6.06)	5.7 (5.51)	5.8 (5.59)	6.2 (6.57)	6.2 (6.84)	5.3 (5.28)

Note: we calculated two measures of ratios. Child to total staff ratio is the number of children per staff present at setting (whether working directly with children or not). This variable could be obtained for the whole time series (2008-2018). Child to teaching staff ratio expresses the number of children per staff working directly in the classroom. This is a more appropriate measure of ratios but because data on total teaching staff was only collected until 2015/2016 this variable could not be calculated for the last two years of our time series. In addition, we cannot adjust for staff working hours. Therefore, neither of these measures is likely to be an accurate measure of the actual ratio of staff to children due to fluctuations over time in the number of children and the number of staff present in a given classroom.

We also look at the difference in the hours children are registered to attend depending on a range of setting- and child-level characteristics. There are differences in the number of hours three- and four-year-old children were registered for at an early years setting between children who later on claim free school meals in Reception (16.57 hours per week) and those who do not (overall average of 19.17 hours), as alluded to in the previous section on children's characteristics. Children with SEND also attend slightly fewer hours than average (17.98 hours per week) while children in the 20 per cent most deprived neighbourhoods attend for slightly more hours than the average (19.94 hours per week).

Finally, we look at other structural features of early years provision in the PVI sector, such as whether children attended a setting attached to a school or offering sessional provision (i.e. not full day provision), as well as the average number of children at a setting and average child to staff ratios. FSM children and children from disadvantaged areas are slightly more likely and less likely respectively to attend sessional care than children in the full sample. Children from most of the relatively disadvantaged groups (i.e. those eligible for FSM, those who speak English as an additional language and those living in the most deprived areas) are likely to experience a slightly worse child to staff ratio (more children per staff) whereas children identified as having special educational needs are in settings with a better ratio on average. However, it is important to keep in mind that our measure of ratio is very crude (see Table 4 note).

In our sample, 25 per cent of children attended private/voluntary day nurseries, nine per cent attended private preschool, less than two per cent private/voluntary nursery schools, 12 per cent voluntary preschool, and just over three per cent other types of provision, such as local authority day nurseries, Sure Start or family centres, and childminders. Information was missing for around four per cent of the children.[ix] Table 5 reports the distribution of different groups of children across types of PVI settings.

Table 5. Settings attended by child characteristics (2007/2008-2017/2018)

Type of setting	FSM children	Least deprived 20% of neighbourhoods	Middle deprived 60% of neighbourhoods	Most deprived 20% of neighbourhoods	EAL children
Maintained nurseries (%)	**64.7**	**26.8**	**45.3**	**72.0**	**69.0**
Total PVIs (%)	**35.3**	**73.2**	**54.8**	**28.0**	**31.0**
Private/voluntary day nursery (%)	15.1	32.7	25.7	14.9	16.2
Private preschool (%)	6.2	13.9	9.6	3.4	4.9
Private/voluntary nursery school (%)	0.7	2.5	1.3	0.6	0.8
Voluntary preschool (%)	8.3	17.8	12.4	4.1	5.2
Other (%)	3.4	3.0	3.4	3.6	2.4

Notes: see Table 4 for description of the full sample. Columns may not round to 100% because for a small proportion of observations for which information on the setting they attended was missing. This is true for at most 4% of some groups of children. The category "other" includes local authority day nurseries, Sure Start or family centres, childminders and childminding networks.

[ix] These figures relate to the whole time series when on average 55 per cent of children attended a PVI setting.

The type of settings attended varies quite considerably by child characteristics. As previously mentioned, maintained nurseries cater more strongly to disadvantaged children and communities. Around 65 per cent of FSM children and 72 per cent of children living in the most deprived areas attended a maintained nursery. As mentioned above, this is more linked to how early years provision has developed over time rather than current needs.

Finally, we look at how workforce qualifications and other setting characteristics vary across different PVIs. Table 6 shows that a much higher proportion of children attending private/voluntary day nurseries and private/voluntary nursery schools have access to a graduate at the setting (48 per cent and 59 per cent respectively) and in the classroom (43 per cent and 55 per cent respectively). At the other end of the spectrum, children in voluntary pre-schools are the least likely to have access to a graduate (29 per cent at the setting and 28 per cent in the classroom). However, this seems to be partially linked to setting size. In fact, differences in the proportion of graduates out of the total staff are not so big, and all within the 6.3 per cent (for private/voluntary day nurseries) and 14.3 per cent range (for private/voluntary nursery schools).

Table 6. Qualifications and setting characteristics, by type of setting (PVIs only, 2007/2008-2017/2018)

	Private/ voluntary day nursery	Private preschool	Private/ voluntary nursery school	Voluntary preschool	Other
Graduate at setting	47.6%	34.9%	58.9%	29.0%	48.5%
Graduate teaching	43.3%	33.7%	55.2%	28.1%	42.3%
Graduate at setting share	6.3%	7.7%	14.3%	6.5%	8.5%
Graduate teaching share	33.5%	27.1%	32.8%	20.9%	36.5%
At least a QTS at setting	27.3%	21.0%	45.2%	17.3%	34.6%
At least an EYPS at setting	36.6%	22.4%	38.7%	18.6%	33.4%
At least an EYTS at setting	13.6%	7.9%	19.8%	7.0%	8.0%
Both a QTS and EYPS teaching	11.3%	5.8%	19.8%	4.5%	13.4%
Both a QTS and EYPS at setting	10.2%	5.1%	17.7%	4.1%	12.8%
Hours attending settings	22.56	14.94	19.10	14.35	19.24
(st. dev.)	(11.55)	(4.87)	(8.81)	(4.59)	(9.97)
EY provider attached to school	11.2%	24.1%	14.0%	30.8%	23.2%
Sessional provision	4.0%	68.1%	32.5%	68.4%	15.6%
Average number of three- and four-year olds at setting	39.54	35.58	43.87	34.60	37.17
(st. dev.)	(21.54)	(16.87)	(29.3)	(16.9)	(36.6)
Average ratio (out of total staff at setting)	3.15	4.70	4.20	4.67	4.08
(st. dev.)	(3.87)	(2.82)	(4.07)	(2.38)	(5.53)
Average ratio (out of total teaching staff)	6.03	5.33	5.75	5.42	5.98
(st. dev.)	(5.99)	(4.68)	(6.02)	(4.68)	(7.11)

Note: Neither of the measures of 'ratio' is likely to be an accurate measure of the actual ratio of staff to children due to fluctuations over time in the number of children and the number of staff present in a given classroom.

PVIs also differ in terms of other structural characteristics. On average, children attend a higher number of hours per week when enrolled in private/voluntary day nurseries (22.5 hours) than in voluntary preschool (14 hours). On the other hand voluntary preschool are more likely to be attached to a school and to offer sessional provision. While we cannot observe parent employment

characteristics, we know that patterns of attendance are linked to maternal work status and access to alternative childcare arrangements that can help manage longer working hours.

In the next section we look at how workforce qualifications' and setting characteristics' measures relate to children's outcomes.

Association between staff qualifications and children's outcomes

In this chapter we present the key findings of our analysis of the association between early years staff qualifications and children's outcomes as measured by EYFSP, KS1 and KS2 scores.

Our outcome measures are standardised scores within each cohort - i.e. with mean zero and standard deviation 1 - at ages five (EYFSP), seven (KS1) and 11 (KS2 - when available). The focus is on three- and four-year-old children who took up the free universal entitlement at PVI settings, where the variation in qualification levels is significant enough to allow for this investigation. While data on staff qualifications is not collected through the School Census, we know that there is much less variation among maintained settings, where the requirement is for each classroom to be lead by a qualified teacher.[22]

To investigate the association between staff qualifications and children's outcomes, we run a regression model which identifies the difference in the outcomes of children who attended settings with staff with degree-level qualifications (defined in a variety of ways, as explained on p. 23) compared to those who attended settings without them. Therefore, the explanatory variables we focus on consist of a series of measures of the qualifications of staff working at the early years settings that children attended. A basic regression model using only staff qualifications to explain children's outcomes would be biased by the fact that children's characteristics might be associated with the probability of attending a setting with highly qualified staff. We can to some extent control for this by including (primary) school fixed effects, which allow us to compare outcomes for children who attended the same primary school. Children attending the same primary school live reasonably close to each other and we can, therefore, assume they have more similar characteristics than children living in a different area.

Selection issues could also bias our results. For example, if children who would otherwise do better than average within a class are more likely to have attended a nursery with a graduate then this would tend to overstate the graduate effect; on the other hand, if children with less favourable life opportunities within a class are more likely to have attended a setting with a graduate then our effects would be biased downwards. To get even closer to isolating the impact of workforce qualifications during their preschool years from other elements, we add two additional sets of controls:

1. Information about individual children's characteristics: gender, month of birth, whether children are later eligible for FSM, the level of deprivation in the area of residence (i.e. the deprivation deciles of residence), ethnicity, and whether English is spoken as an additional language; this information allows us to control for some of children's own characteristics that can have an impact on school attainment.
2. A derived measure for the peers of these children based on the characteristics of the other children who attend the same setting in the same year. This gives us a measure of the composition of the nursery attended at age three and four and, therefore, a proxy of the

relative level of advantage (or disadvantage) of other families using the same early years settings.[x,23]

Therefore, our final specification is:

$$Y_{ijkc} = \alpha + \beta Q_{jc} + \delta X_{ijkc} + \theta \bar{X}_{jc} + \mu_k + \gamma_c + u_{ijkc}$$

where (Y) is the outcomes measure, (Q) is a series of measures of workforce qualifications (as defined in the previous chapter) in setting (j) for child (i) in cohort c who attends school (k); X is a vector of child/family characteristics; $\bar{X}$ represents the mean characteristics of the peers of children in early years settings; μ_k is a primary school fixed effect and γ_c is a cohort dummy.

However, if conditional on all these variables more advantaged children within a school are more likely to attend a nursery with a graduate then this would tend to overstate the graduate effect. Alternatively, if the children from a more disadvantaged background within a class are more likely to attend a setting with a graduate then our effects would be biased downwards.

We run the analysis according to five different models, each building on the previous one:

(1) A model where we control only for the cohort (year dummies)

(2) A model where we add primary school fixed effects (plus school fixed effects)

(3) A model where we add controls for child characteristics, such as gender, month of birth, eligibility for FSM, ethnicity, and whether the child speaks English as a second language (plus child characteristics)

(4) A model where we add controls for settings characteristics, which are the average of child characteristics at the setting calculated excluding the child themselves (plus setting composition)

(5) A model where we add further controls for other settings' inputs, such as whether early years provision was sessional, whether the setting was attached to a primary school, child:staff ratios and group size (plus setting inputs).

Moving from one model to the next and increasing the number of controls allow us to zoom into a more precise assessment of the association between workforce qualifications and children's outcomes. The model with controls for setting composition, which include year dummies, school fixed effects, child characteristics and characteristics of other children attending the setting, is our preferred specification. However, in some cases there is merit to consider a comparison with results obtained from a model with controls for other setting inputs as it includes other structural features of the early years settings. In a way, we could consider the results we obtain from the setting composition model as an upper bound of the association between qualifications and children's outcomes and the results we obtain from model with the extra setting inputs as a lower bound. For clarity's sake, in the rest of the chapter we present findings from the setting composition model, but the full set of results can be found in Annex 1 for appropriate comparison.

[x] The EPPSE study had also found that the strongest compositional variable was the qualification level of the mothers of other children in the classroom.

We split our analysis in three stages: the association with EYFSP scores for the cohorts of children who were in preschool between the years 2007/2008 and 2015/2016; the association with EYFSP scores for the cohorts of children who attended preschool between 2015/2016 and 2017/2018; and the association with EYFSP, KS1 and KS2 scores for children who attended preschool between the years 2007/2008 and 2010/2011. In the rest of the chapter we present findings from our preferred model, the setting composition model.

Association with EYFSP scores (2008-2016)

In the first stage of our analysis we focus on the association between early years professionals' qualifications and EYFSP scores by taking advantage of the longest possible time series of data we have available. We use data for children born between September 2003 and August 2012, who were therefore in preschool in PVI settings between 2007/2008 and 2015/2016.

During this timeframe, the EYFSP was reformed (see Methodology section). Therefore, we break the timeline at the academic year 2011/2012 (children in preschool up until 2010/2011) and as such present two sets of results. The average EYFSP score was 87.44 (st. dev. 16.92) for the old profile and 32.35 (st. dev. 10.40) for the new profile.

We run the five models listed above looking at workforce qualifications defined in multiple ways, namely: whether there is a graduate at the setting; whether there is a graduate in the classroom; the proportion of graduates at setting out of total staff; the proportion of graduates in the classroom out of total staff; whether there is at least a QTS in the classroom; whether there is at least a EYPS in the classroom; and whether there are both a QTS and an EYPS in the classroom.

Table 7 shows the key results for the analysis using the model that includes controls for the setting composition. For children attending a PVI setting, we observe a generally positive association between any of the measures of qualifications we use and EYFSP outcomes.

Table 7. Association of different measure of graduate qualifications on EYFSP scores (2008-2011 and 2012-2016)

Qualification variable	2007/2008-2010/2011	2011/2012-2015/2016
Graduate at setting	0.022**	0.025**
(Std. Error)	(0.003)	(0.002)
Observations	1,095,562	1,659,978
R-sq	0.21	0.133
Graduate teaching	0.021**	0.021**
(Std. Error)	(0.003)	(0.002)
Observations	1,095,586	1,659,978
R-sq	0.21	0.133
Graduate at setting share	0.035**	0.039**
(Std. Error)	(0.005)	(0.004)
Observations	1,095,597	1,659,978
R-sq	0.21	0.133
Graduate teaching share	0.031**	0.033**

(Std. Error)	(0.006)	(0.004)
Observations	1,095,597	1,659,978
R-sq	0.21	0.132
QTS	0.024**	0.030**
(Std. Error)	(0.003)	(0.002)
Observations	1,095,555	1,659,978
R-sq	0.21	0.133
EYPS	0.013**	0.015**
(Std. Error)	(0.004)	(0.002)
Observations	839,225	1,659,978
R-sq	0.222	0.132
Both QTS and EYPS present	0.028**	0.033**
(Std. Error)	(0.005)	(0.003)
Observations	1,031,249	1,659,978
R-sq	0.21	0.133

We detect an effect size of having a graduate in the setting on children's outcomes of 2.2 per cent of standard deviation with the old profile and of 2.5 per cent with the new profile. This corresponds to 0.4 and 0.3 of an EYFSP point respectively. The impact of having a graduate in the classroom, working directly with children, is quite similar, at 2.1 per cent of a standard deviation for both old and new profile. There could be several reasons why the effect sizes of having a graduate in the setting or in the classroom are pretty similar. In many PVIs, particularly the smaller ones, these explanatory variables overlap considerably: staff working in management are often also in the classroom. In addition, a setting leader qualified at degree-level might exert a positive impact on the whole staffing team through their pedagogical leadership, or their decision-making over where and how to allocate resources (e.g. how much to spend on professional development, what type of professional development is needed and what type is most effective).

It is important to note that effect sizes appear slightly bigger when looking at the association between degree-qualified staff as a share of total staff and children outcomes. However, if we consider that among those children and settings where a graduate is present the proportion of staff qualified at degree-level is around 20 per cent, this makes the actual effect size much smaller. Table A1 in Annex A also confirms that in the model that includes other setting inputs, such as ratios and group size (which are related to the share variables), the effect sizes are small than those presented in Table 7. This confirms that the results we obtain using the model with controls for setting composition can be considered an upper bound of the true association, while results obtained using the model that also controls for other setting inputs can be thought of as a lower bound.

The positive association is driven by the presence of a QTS in the classroom, rather than a professional qualified with EYPS. The impact of having a QTS in the classroom is about 2.4 per cent of a standard deviation, versus only 1.3 per cent for EYPS with the old profile (0.4 and 0.2 of a point respectively), and 3 per cent and 1.5 per cent with the new profile (0.3 and 0.15 of a point respectively). These results are small when considering that, for example, the gap in total scores

between disadvantaged children and their more affluent peers is 8.5 points with the old profile and 3.7 points with the new profile. However, this positive association remains consistent across the years and different types of analysis, as we will see below.

Next we look at whether these associations are larger for some groups of children. Table 8a and 8b show associations between total EYFSP scores and qualifications at graduate level for the following subgroups: girls, FSM, EAL, children living in the least deprived quintile and children living in the most deprived quintile.

Table 8a. Association of qualification at graduate level on EYFSP scores by subgroups (2007/2008-2010/2011)

Qualification variable	All children	Girls	FSM	EAL	Living in least deprived quintile	Leaving in most deprived quintile
Graduate at setting	0.022**	0.028**	-0.013	0.015	0.027**	-0.007
(Std. Error)	(0.003)	(0.003)	(0.008)	(0.010)	(0.004)	(0.008)
Observations	1,095,562	531,943	110,259	71,225	315,299	91,498
R-sq	0.21	0.225	0.258	0.282	0.193	0.249
Graduate teaching	0.021**	0.025**	-0.017*	0.015	0.027**	-0.005
(Std. Error)	(0.003)	(0.003)	(0.008)	(0.010)	(0.004)	(0.009)
Observations	1,095,586	531,954	110,259	71,226	315,315	91,498
R-sq	0.21	0.225	0.258	0.282	0.193	0.249
QTS	0.024**	0.027**	-0.023*	0.011	0.028**	-0.011
(Std. Error)	(0.003)	(0.003)	(0.010)	(0.011)	(0.004)	(0.010)
Observations	1,095,555	531,939	110,259	71,220	315,309	91,493
R-sq	0.21	0.225	0.258	0.282	0.193	0.249
EYPS	0.013**	0.019**	-0.003	0.007	0.017**	0.007
(Std. Error)	(0.004)	(0.004)	(0.011)	(0.013)	(0.005)	(0.012)
Observations	839,225	407,447	88,806	58,021	240,595	71,213
R-sq	0.222	0.239	0.277	0.295	0.208	0.268
Both QTS and EYPS present	0.028**	0.033**	-0.008	-0.006	0.024**	0.011
(Std. Error)	(0.005)	(0.006)	(0.017)	(0.018)	(0.007)	(0.017)
Observations	1,031,249	500,658	105,318	67,729	294,322	86,290
R-sq	0.21	0.225	0.260	0.283	0.194	0.251

Table 8b. Association of qualification at graduate level on EYFSP scores by subgroups (2011/2012-2015/2016)

Qualification variable	All children	Girls	FSM	EAL	Living in least deprived quintile	Leaving in most deprived quintile
Graduate at setting	0.025**	0.026**	-0.001	0.018**	0.025**	0.011*
(Std. Error)	(0.002)	(0.002)	(0.004)	(0.005)	(0.003)	(0.005)
Observations	1,659,978	805,183	180,119	169,196	460,020	174,316
R-sq	0.133	0.147	0.180	0.170	0.124	0.167
Graduate teaching	0.021**	0.022**	-0.002	0.015**	0.021**	0.009+
(Std. Error)	(0.002)	(0.002)	(0.004)	(0.005)	(0.003)	(0.005)
Observations	1,659,978	805,183	180,119	169,196	460,020	174,316
R-sq	0.133	0.147	0.180	0.170	0.124	0.167
QTS	0.030**	0.029**	0.012*	0.020**	0.027**	0.016**
(Std. Error)	(0.002)	(0.002)	(0.005)	(0.006)	(0.003)	(0.006)
Observations	1,659,978	805,183	180,119	169,196	460,020	174,316
R-sq	0.133	0.147	0.180	0.170	0.124	0.167
EYPS	0.015**	0.015**	-0.005	0.016**	0.016**	0.006
(Std. Error)	(0.002)	(0.002)	(0.005)	(0.005)	(0.003)	(0.005)
Observations	1,659,978	805,183	180,119	169,196	460,020	174,316
R-sq	0.132	0.147	0.180	0.170	0.124	0.167
Both QTS and EYPS present	0.033**	0.030**	0.016*	0.033**	0.032**	0.018*
(Std. Error)	(0.003)	(0.003)	(0.007)	(0.008)	(0.004)	(0.008)
Observations	1,659,978	805,183	180,119	169,196	460,020	174,316
R-sq	0.133	0.147	0.180	0.170	0.124	0.167

There does not appear to be any stronger association between graduate-level qualifications and EYFSP outcomes for specific subgroups. Those effects that are statistically significant (e.g. for girls and children living in the least deprived neighborhoods) are only slightly bigger than the average effect size for the whole sample. Interestingly, the effect for children eligible for free school meals and pupils with English as second language are either slightly negative or not statistically significant. As in the case of the whole sample of children, when the sign of the association is positive it seems to be driven by having a QTS in the classroom rather than a staff with EYPS.

Previous research has shown that staff qualifications might have a particularly strong impact on specific areas of children's development.[24] Therefore, we looked at the association between having a

graduate and three sets of EYFSP subscores: personal, social and emotional development; communication, language and literacy development; and mathematical development.[xi]

Once again we use standardised scores and we split the time series into two parts, one for years 2008-2011 and the second for 2012-2016. We run the analysis looking at the impact of having a graduate, a QTS or an EYPS in the classroom.

Table 9. Association between having a graduate in the classroom and personal, social and emotional development scores

Qualification variable	2007/2008-2010/2011	2011/2012-2015/2016
Graduate teaching	0.011**	0.012**
(Std. Error)	(0.003)	(0.002)
Observations	1,095,579	1,659,978
R-sq	0.219	0.116
QTS	0.013**	0.018**
(Std. Error)	(0.003)	(0.002)
Observations	1,095,548	1,659,978
R-sq	0.219	0.116
EYPS	0.005	0.008**
(Std. Error)	(0.004)	(0.002)
Observations	839,218	1,659,978
R-sq	0.234	0.116

Table 10. Association between having a graduate in the classroom and communication, language and literacy development scores

Qualification variable	2007/2008-2010/2011	2011/2012-2015/2016
Graduate teaching	0.026**	0.027**
(Std. Error)	(0.003)	(0.002)
Observations	1,095,564	1,659,978
R-sq	0.157	0.097
QTS	0.031**	0.038**
(Std. Error)	(0.003)	(0.002)
Observations	1,095,533	1,659,978
R-sq	0.157	0.097
EYPS	0.017**	0.019**
(Std. Error)	(0.004)	(0.002)
Observations	839,208	1,659,978
R-sq	0.166	0.097

[xi] With the old profile average scores for these areas were 20.9 points for personal, social and emotional development, 26 points for communication, language and literacy development, and 20.4 for mathematical development (out of a total of 27, 36 and 27 respectively). With the new profile, they were 5.8, 9.5 and 3.7 points (out of a total of 9, 15 and 6 respectively).

Table 11. Association between having a graduate in the classroom and mathematical development scores

Qualification variable	2007/2008-2010/2011	2011/2012-2015/2016
Graduate teaching	0.022**	0.025**
(Std. Error)	(0.003)	(0.002)
Observations	1,095,513	1,659,978
R-sq	0.182	0.095
QTS	0.026**	0.036**
(Std. Error)	(0.003)	(0.002)
Observations	1,095,482	1,659,978
R-sq	0.182	0.095
EYPS	0.013**	0.018**
(Std. Error)	(0.004)	(0.002)
Observations	839,164	1,659,978
R-sq	0.194	0.095

Effect sizes are bigger for the communication, language and literacy development, and the mathematical development areas. For example, using the model which controls for setting characteristics, having a graduate in the classroom on personal, social and emotional development scores is associated with a change of the subscores for this area of only 1.1 per cent of standard deviation, whereas the effect size increases to 2.6 per cent and 2.2 per cent for the communication, language and literacy development, and the mathematical development areas. Once again, the presence of a QTS rather than an EYPS has a bigger effect size. Having an EYPS in the classroom has a statistically significant and positive effect of 1.7 per cent of a standard deviation for the communication, language and literacy development and 1.3 per cent for mathematical development versus a 3.1 per cent and 2.6 per cent respectively associated with having a QTS.

Association with EYFSP scores (2016-2018)

Since the year 2015/2016 the NPD contains additional information on staff qualifications and specifically on staff with an EYTS, and with level 2 and level 3 qualifications. Therefore, we run separate analyses for the last three years of data and attempt to isolate the effect on children's outcomes of having a professional with EYTS and of different staffing structures as determined by the proportion of level 2 and level 3 staff. In addition, the introduction of the 30 hours funded childcare entitlement in 2016/2017 prompted us to look into the potential association between hours of attendance and children's outcomes. For these years the average EYFSP score is 32.65 (st. dev. 10.86).

Association between graduate-led workforce and EYFSP scores

Table 12 partially replicates the results of Table 7 showing the relationship between having a graduate in the classroom, either a QTS, an EYPS or an EYTS.

Table 12. Association between graduate qualifications and EYFSP scores (2015/2016-2017/2018)

Qualification variable	2015/2016-2017/2018
Graduate teaching	0.027**
(Std. Error)	(0.002)
Observations	697,663
R-sq	0.149
Graduate teaching share	0.020*
(Std. Error)	(0.008)
Observations	1,043,676
R-sq	0.140
QTS	0.036**
(Std. Error)	(0.003)
Observations	697,663
R-sq	0.150
EYPS	0.020**
(Std. Error)	(0.002)
Observations	697,663
R-sq	0.149
EYTS	0.029**
(Std. Error)	(0.003)
Observations	692,738
R-sq	0.150
Both QTS and EYPS	0.046**
(Std. Error)	(0.004)
Observations	697,663
R-sq	0.149

The association remains positive, just as in the period 2008-2016, and even though it is still driven by the presence of a QTS, we notice that the effect size associated with the presence of an EYTS is bigger than the effect size associated with the presence of an EYPS. For example, using the model with setting composition controls we find the impact of having a graduate to be 2.7 per cent of a standard deviation, which amounts to 3.6 per cent in the case of a QTS in the classroom and 2.9 per cent in the case of an EYTS (respectively 0.3, 0.4 and 0.3 of an EYFSP point). The bigger effect size associated with a staff member with EYTS compared to one with EYPS could be explained by some of the key differences between the two qualifications mentioned in the previous section, in particular the fact that the EYTS is more strongly aligned to the QTS.

Next, we reproduce Table 8 looking at the impact by child subgroups. We observe more results that are positive and statistically significant compared to the analysis for the 2008-2016 timeframe. Interestingly though, while results are positive for all qualification variables in the case of girls and

EAL pupils, we still observe no clear association between workforce qualifications and children's outcomes for FSM children. On the other hand, we now observe a positive association for children living in the most deprived quintile of 4.2 per cent of a standard deviation in the case of a QTS and 4.6 per cent of a standard deviation in the case of an EYTS (0.45 and 0.5 of an EYFSP point).

Table 13. Association between graduate qualifications and EYFSP scores by child subgroups (2015/2016-2017/2018)

Qualification variable	All children	Girls	FSM	EAL	Living in least deprived quintile	Leaving in most deprived quintile
Graduate teaching	0.027**	0.027**	0.010	0.029**	0.023**	0.024**
(Std. Error)	(0.002)	(0.003)	(0.007)	(0.007)	(0.004)	(0.006)
Observations	697,663	337,803	70,219	80,166	185,326	83,536
R-sq	0.149	0.175	0.238	0.207	0.158	0.191
QTS	0.036**	0.033**	0.018*	0.035**	0.027**	0.042**
(Std. Error)	(0.003)	(0.003)	(0.008)	(0.008)	(0.004)	(0.008)
Observations	697,663	337,803	70,219	80,166	185,326	83,536
R-sq	0.150	0.175	0.238	0.207	0.158	0.191
EYPS	0.020**	0.021**	0.006	0.030**	0.019**	0.012
(Std. Error)	(0.002)	(0.003)	(0.007)	(0.007)	(0.004)	(0.007)
Observations	697,663	337,803	70,219	80,166	185,326	83,536
R-sq	0.149	0.175	0.238	0.207	0.158	0.191
EYTS	0.029**	0.026**	-0.010	0.024*	0.022**	0.046**
(Std. Error)	(0.003)	(0.004)	(0.011)	(0.010)	(0.005)	(0.009)
Observations	692,738	335,425	69,756	79,204	184,225	82,840
R-sq	0.150	0.175	0.239	0.208	0.158	0.191

Next, we look again at the relationship between having a graduate and EYFSP subscores for personal, social and emotional development, communication, language and literacy development, and mathematical development.

Table 14. Association between having a graduate in the classroom and EYFSP subscores (2015/2016-2017/2018)

Qualification variable	Personal, social and emotional scores	Communication, language and literacy development	Mathematical development
Graduate teaching	0.017**	0.033**	0.031**
(Std. Error)	(0.002)	(0.003)	(0.003)
Observations	697663	697663	697663
R-sq	0.137	0.112	0.107
QTS	0.024**	0.043**	0.041**
(Std. Error)	(0.003)	(0.003)	(0.003)

Observations	697663	697663	697663
R-sq	0.137	0.112	0.107
EYPS	0.013**	0.024**	0.023**
(Std. Error)	(0.002)	(0.003)	(0.003)
Observations	697663	697663	697663
R-sq	0.136	0.111	0.107
EYTS	0.019**	0.034**	0.031**
(Std. Error)	(0.003)	(0.004)	(0.004)
Observations	692738	692738	692738
R-sq	0.137	0.112	0.107

In line with the results for the years 2007/2008-2015/2016, the association seems more important for the communication, language and literacy development area, and the mathematical development area. In addition, the effect size associated with staff with EYTS is bigger than the one associated with staff with EYPS.

Association between level 2 and level 3 qualifications and EYFSP scores

Since the academic year 2017/2018, the EYC contains additional data on qualification levels, such as:

- the number of staff with a full and relevant level 2 qualification who work with children aged under five (see glossary for a definition of full and relevant);
- the number of staff with a full and relevant level 3 qualification who are not in a management position and work with children aged under five; and
- the number of staff with a full and relevant level 3 qualification who are in a management role and work with children aged under five.

It is important to analyse these qualifications as they are held by the vast majority of the early years workforce in PVI settings. Through these newly introduced variables we try to gain a better understanding of the consequence of staffing structures for children's outcomes. We find that on average 11.5 per cent of the total staff at a setting hold a full and relevant level 2 qualification, 64.5 per cent a level 3 qualification (48.4 per cent working directly with children and 16.1 per cent in a management position) and 9 per cent hold a degree-level qualification either at QTS, EYPS or EYTS level. Through these qualifications we account for 85 per cent of the total staff at a setting but we cannot clarify what qualification level the remaining 15 per cent hold. As a comparison, the 2018 Childcare and Early Years Providers Survey reported that 10.3 per cent of PVI staff were qualified at level 2, and 57.2 per cent at level 3 and 13.2 per cent at level 6 or higher. Of the remaining staff, 11 per cent is accounted for by level 4 and level 5 qualified staff and just over eight per cent hold either a level 1 qualification or no relevant qualification.

In our analysis we add the proportion of staff at a setting with level 2 and level 3 to our preferred specification. Table 15 shows that when looking at the proportion of graduates working in the classroom alongside the proportion of staff qualified at level 2 and level 3, the presence of a graduate shows no significant association with children's outcomes while an increase in the proportions of level 2 and level 3 staff has a negative association with EYFSP scores. At face value it

appears that the positive association with graduates is driven by the fact that settings with more graduates have fewer level 2 and 3 workers, who are negatively associated with children's outcomes compared to those in the baseline group. However, we must be careful in interpreting these results, as the gap in our information on the qualification levels for 15 per cent of the workforce means we cannot ascertain for sure what the baseline level of qualification is.

Table 15. Association between proportion of staff with L2 and L3 qualifications, and EYFSP scores (2017/2018)

Qualification variable	2017/2018
Graduate teaching share	0.002
(Std. Error)	(0.014)
L2 share	-0.057**
(Std. Error)	(0.012)
L3 in non management role share	-0.024**
(Std. Error)	(0.008)
L3 in management role share	-0.109**
(Std. Error)	(0.01)
Observations	345714
R-sq	0.187

We also check whether having a graduate in the classroom affects the association between outcomes and staff with level 2 and 3 qualifications. Table 16 shows some mixed results when accounting for the interaction between the proportion of graduates and the proportion of level 3 staff, either in management role or as frontline workers, but again these results need to be treated with caution for the reasons mentioned above. Importantly, the first part of Table 16 shows that having a graduate present leads to the level 3 staff being more effective, although that is conditional on the level 3 staff working in the classroom rather than in a managerial role.

Table 16. Association between proportion of staff with L3 qualifications and EYFSP scores, accounting for graduate presence

Interaction between graduates and L3 in non management role

Qualification variable	2017/2018
Graduate teaching share	-0.031
(Std. Error)	(0.019)
L3 in non management role share	-0.030**
(Std. Error)	(0.009)
Interaction between graduates and L3 non management role	0.133**
(Std. Error)	(0.050)
L2 share	-0.056**
(Std. Error)	(0.012)
L3 in management role share	-0.108**
(Std. Error)	(0.010)
Observations	345,714
R-sq	0.187

Interaction between graduates and L3 in management role

Qualification variable	2017/2018
Graduate teaching share	0.006
(Std. Error)	(0.017)
L3 in management role share	-0.108**
(Std. Error)	(0.011)
Interaction between graduates and L3 management role	-0.037
(Std. Error)	(0.087)
L2 share	-0.057**
(Std. Error)	(0.012)
L3 in non management role share	-0.024**
(Std. Error)	(0.008)
Observations	345,714
R-sq	0.187

Association between number of hours of attendance and EYFSP scores

Finally, we look into the relationship between qualifications and dosage (the hours a child attends the main early years setting), focusing primarily on the interaction between hours of attendance and having a graduate in the classroom. We focus on the difference between children enrolled at an early years setting for more or less than the 15 hours of the free universal entitlement.

Table 17a. Importance of having a graduate in the classroom controlling for dosage

Qualification variable	**2017/2018**
Graduate teaching	0.021**
(Std. Error)	(0.002)
Child registered for more than 15h/w	0.162**
(Std. Error)	(0.002)
Observations	696,919
R-sq	0.161

Table 17b. Importance of having a graduate in the classroom controlling for dosage including the interaction terms

Qualification variable	**2017/2018**
Graduate teaching	0.013**
(Std. Error)	(0.003)
Child registered for more than 15h/w	0.151**
(Std. Error)	(0.003)
Setting has a graduate and child is registered for more than 15h/w	0.015**
(Std. Error)	(0.004)
Observations	697,663
R-sq	0.159

Table 17 shows that dosage has a strong association with attainment: attending an early years setting for more than 15 hours per week (the universal entitlement) doubles the effect size associated with the presence of a graduate in the classroom with EYFSP scores. However, we need to be careful in interpreting this result as this association could be driven by the link between longer hours at settings and coming from a wealthier background. To check for this, we run the same analysis focusing on children eligible for free school meals. Table 18 shows that the positive association is still present when focusing on the most disadvantaged children. Just as in the previous analysis, there does not appear to be any association between the presence of a graduate in the classroom and EYFSP scores for children that later on are eligible for free school meals. However, this relationship becomes positive when the child also attends for more than 15 hours.

Table 18. Association between having a graduate in the classroom and EYFSP scores controlling for dosage (FSM children only)

Qualification variable	2017/2018
Graduate teaching	0.001
(Std. Error)	(0.007)
FSM child registered for more than 15h/w	0.102**
(Std. Error)	(0.010)
Setting has a graduate and FSM child registered more than 15h/w	0.030*
(Std. Error)	(0.015)
Observations	70,219
R-sq	0.241

Association between qualifications and long-term attainment (2008-2011)

The final part of our analysis focuses on the first four cohorts of children in our sample who were in preschool in the years 2007/2008 through 2010/2011, meaning we can follow their progress through EYFSP, KS1 and KS2.[xii,xiii] During those four years, the average EYFSP scores was 87.74 (st. dev. 16.53), the average KS1 score was 15.76 (st. dev. 3.39), and the average score for KS2 was 29 (st. dev. 4.49) for the first cohort and 102.7 (st. dev. 8.12) for the other three cohorts (see methodology section for changes in KS2).

As Table 19 shows, we find a generally positive association between having a graduate in the classroom and children's outcomes throughout their primary school experience. For example, using the model which includes controls for setting characteristics we find an effect size of 1.9 per cent of a standard deviation on EYFSP scores, 2.5 per cent on KS1 scores and 2.2 per cent on KS2, again with the impact driven by having a QTS in the classroom. These results indicate that the effects, while small, do not fade out.

Table 19. Association between workforce qualifications and EYFSP, KS1 and KS2 scores (2007/2008-2010/2011)

Qualification variable	EYFSP	KS1	KS2
Graduate teaching	0.019**	0.025**	0.022**
(Std. Error)	(0.003)	(0.003)	(0.003)
Observations	1,035,083	1,030,638	1,038,580
R-sq	0.209	0.127	0.124
QTS	0.023**	0.027**	0.025**
(Std. Error)	(0.003)	(0.003)	(0.003)
Observations	1,035,055	1,030,610	1,038,552
R-sq	0.209	0.127	0.124

[xii] We also have data for an extra year but that corresponds to the year when the new EYFSP was introduced. To avoid muddling the analysis we opted for eliminating that year from our analysis for this section.
[xiii] We also created a separate score for KS1 which represents the sum of reading, writing and math scores only but the results were not very different from those obtained for the total KS1 scores.

EYPS	0.012**	0.017**	0.016**
(Std. Error)	(0.004)	(0.004)	(0.004)
Observations	792,331	788,611	794,697
R-sq	0.221	0.132	0.134
Graduate at setting	0.020**	0.027**	0.025**
(Std. Error)	(0.003)	(0.003)	(0.003)
Observations	1,035,061	1,030,616	1,038,559
R-sq	0.209	0.127	0.124

It is also interesting to check if having access to a graduate is associated with greater progress after age five, perhaps because children with higher EYFSP scores are better equipped to learn. To check this we re-run the analysis of the impact on KS1 and KS2 after controlling for EYFSP scores. Table 20 shows that while there is a positive association between graduate presence and outcomes at age 7 (KS1) and 11 (KS2), most of it is explained by EYFSP scores.

Table 20. Association between workforce qualifications and KS1 and KS2 scores after controlling for previous achievement (EYFSP scores)

Qualification variable	**KS1**	**KS2**
Graduate teaching	0.010**	0.009**
(Std. Error)	(0.002)	(0.002)
EYFSP scores	0.804**	0.706**
(Std. Error)	(0.001)	(0.001)
QTS	0.009**	0.009**
(Std. Error)	(0.002)	(0.002)
EYFSP scores	0.804**	0.706**
(Std. Error)	(0.001)	(0.001)
EYPS	0.007**	0.007**
(Std. Error)	(0.003)	(0.003)
EYFSP scores	0.817**	0.719**
(Std. Error)	(0.001)	(0.002)
Graduate at setting	0.011**	0.011**
(Std. Error)	(0.002)	(0.002)
EYFSP scores	0.804**	0.706**
(Std. Error)	(0.001)	(0.001)

This is to be expected, as we know that previous attainment matters. Nevertheless, we still observe a small positive association between having a graduate in early years settings, and KS1 and KS2 outcomes, indicating that there is a very slight additional effect.

Discussion and conclusion

Summary of results

There is evidence that attending early years education and care can have a positive impact on children's outcomes in school and later in life.[25] There is also evidence that differences in the quality of early education experiences, as measured by a range of structural characteristics, such as staff qualifications or the ratio of staff to children, and by the processes involved, such as the quality of pedagogical practices and of adult and child interactions, are associated with differences in its effects on the children who attend.[26] However, few studies seeking to investigate the relationship between the quality of early education and care and children's outcomes have made use of large-scale administrative data, which confers several advantages over smaller data set such as: increased precision of estimates, the ability to detect small effects and the possibility of tracking results over consistent measures of attainment. In this study, we analyse data from the National Pupil Database representing over six million three- and four-year-old children who attended an early years setting between 2007/2008 and 2017/2018 to explore the association between the qualifications held by staff working at early years settings and measures of children's attainment at age five (EYFSP scores), seven (KS1 scores) and 11 (KS2 scores).

We use a series of regression models to compare the outcomes of children who attended Reception class at the same primary school but different early years settings when they were three- and four-years-old. Accounting for a range of children and family characteristics (gender and age within their year group, whether children are later eligible for FSM, the level of deprivation in the area of residence, ethnicity, and whether English is spoken as an additional language), we also control for the average characteristics among their nursery peers.

We find a positive association between having a graduate present at setting and/or in the classroom and children's outcomes as measured by EYFSP scores at age five. The associations we find are small. For instance, in the period 2011/2012-2015/2016 children who attended a setting where at least one degree-qualified member of staff worked directly with children received EYFSP scores just 2.1 per cent of a standard deviation higher than children who attended a setting where no teaching staff were graduates. This is equivalent to 0.4 points on a scale from 17 to 51 where the average is just over 32. Effect sizes are slightly larger in the case of qualified teachers (staff holding a QTS) compared to the case when a staff member with Early Years Professional Status (EYPS) is teaching. We also find a similar effect size associated with a graduate being employed at the setting but not necessarily working directly with children. Effect sizes are only slightly smaller for the earlier period (2007/2008-2010/2011). Importantly, this association is also found with respect to KS1 and KS2 scores, challenging claims that the effect of investments in the early years fades out over time.

In addition, the number of hours a child attended early years settings at age three and four is associated with their outcomes at age five. The association between staff qualifications and children's outcomes at age five is twice as strong among those children who were registered to attend for more than 15 hours per week than among those who were registered for less. While this association could be driven by the link between longer hours at settings and coming from wealthier background, our analysis shows that the positive association is still present when focusing on the most disadvantaged children. While there does not appear to be any association between the

presence of a graduate in the classroom and EYFSP scores for children that later on are eligible for free school meals, this relationship becomes positive when the child also attends for more than 15 hours. These results are only partially in line with the results obtained by the SEED study. This found that children from the 40 per cent most disadvantaged families attending early years setting from before age two (with a mean of ten hours per week) combined with a mean of over twenty hours per week after the age of two had better outcomes on the EYFSP as well as better verbal development during year one. On the other hand, these children also had poorer socio-emotional outcomes in year one. The driver of this effect seems to be more the early start than the average hours of attendance, although the latter still shows a positive impact on verbal ability in year one.[27]

Robustness and interpretation

The effect sizes we find are very small. However, as our research strategy is not based on an experiment or quasi-experiment we cannot be certain that they are picking up the true policy-relevant causal effect. Yet we can think about the possible direction of the bias. For our estimated effects to be underestimates of the impact of qualifications on children's outcomes, it must be the case that highly qualified staff are found in settings that have children who would otherwise do worse than average, holding constant the schools they attend and their own characteristics. Evidence from the other regression models we employed indicates that accounting for school fixed effects reduces the effect size quite markedly, but that child and peer group composition controls have much less impact (Appendix A1). If the correlation between graduates, child background and the variables we cannot observe goes along similar lines, we would expect any remaining bias to be pushing the estimate up. Indeed, when we control for other characteristics of nurseries, the effects reduce even further and it seems unlikely that any remaining bias is obscuring a large positive effect. These results are in line with the original analysis in Blanden et al (2017) and indeed, present a more positive picture than those obtained by Blanden et al (2019), who examine the impact of eligibility for an additional term of free entitlement and find no additional benefit of an extra term spent in a setting with a graduate worker.

An alternative explanation for the small effects we find is that the measures of children's outcomes and staff qualifications we have available are imperfect. The EYFSP itself is a contested measure of children's outcomes at age five, but it is the first account of children's outcomes that is available at census level and it is the government's target for early years development. On the other hand, our measures of staff qualifications at an early years setting are taken once annually from each setting, though they may fluctuate over the course of a year. We cannot check for these fluctuations in the National Pupil Database but previous research has shown that turnover rates for the early years workforce are on average 15 per cent per year, with rates much higher for staff with key qualifications such as level 3.[28]

On balance, the effect sizes we find are positive but small when compared with the gap in EYFSP scores between children who are eligible for FSM and those who are not (around 3.6 points) or between autumn-born and summer-born children (4.3 points). It could be argued that these results are not surprising. It is unrealistic to think that the presence of a graduate at an early years setting attended by children for fewer than 15 hours per week for their preschool years would completely offset the consequences of growing up poverty. Similarly, the potential for an individual with a degree-level qualification to sustain systemic change is inevitably going to be limited given the wider early years labour market context.

Possible explanations of effect sizes

To understand the findings of this analysis and the relatively small effect sizes, it is important to consider the context of the labour market in which early years workers find themselves and how this might impact any associations we see between staff qualifications and children's outcomes.

Pay and working conditions

There are a variety of factors, other than qualification levels, that influence the quality of early years staff, such as: experience, access to continuing professional development, and pay and working conditions. Government regulations on staffing requirements and funding rates that are lower for PVI settings than for maintained nurseries contribute to the heterogeneity of the early years sector. The average pay of staff working in the PVI sector is low both compared to staff working in the maintained sector and relative to other sectors of the economy. The first report of this work programme has highlighted that early years professionals earn on average 40 per cent less than the average female worker, having received a real terms pay cut of five per cent between 2013 and 2018. Further, 45 per cent of staff in the early years workforce claim state benefits or tax credit, more than competing occupations, such as hairdressers and beauticians, as well as the female working population as a whole (34 per cent).[29] The relatively low pay and high levels of financial insecurity associated with working in the early years could deter some the most motivated and highest qualified workers from joining or remaining in the workforce. Further, the wage premium associated with graduate qualifications in the early years is relatively modest. A 2017 survey found that staff with level 6 qualifications are paid around 10 per cent more than staff with a level 4 or 5 qualification, and around 26 per cent more than staff with a level 3 qualification.[30] Instead, the average graduate premium in the UK, i.e. the wage difference between graduates and school leavers, was estimated to be around 35 per cent. The small wage premium reduces incentives for staff to upskill and instead perhaps encourages them to leave the sector for another where there is a greater premium on qualifications.

Staff composition

The data used in this study shows that on average only nine per cent of the staff working in a PVI setting are qualified at degree-level, in contrast to half of the staff in maintained nursery classes, which by legislation must be lead by a qualified teacher. An individual staff member cannot determine the quality of early years provision for the whole setting. It is important to consider the staffing structure of each setting and how teams work together. The majority of staff in PVI settings still have low qualification levels and the instability of the workforce, e.g. high turnover rates, leads to frequent changes in staffing composition. It would be unfair and unreasonable to expect that one person can produce a sizable change in the quality of early years provision of an entire setting.

Variation in the content and quality of qualifications

The content and quality of early years qualifications is likely to matter considerably to the pedagogical practices of staff who gain them. This is suggested for example by the bigger association we found in the case of staff holding a EYTS compared to staff with an EYPS, where we know that the changes between the two qualifications have brought EYTS training more in line with the QTS one. On the other hand, and importantly, QTS training includes a formal induction system in higher education institutes, while this is not the case for EYTS training. A recent study has shown that there

is wide variation across existing early years degrees both in terms of content and link with practical experience, and in terms of employment trajectories.[31] This variation between qualifications suggests that graduates are not a homogeneous group. Therefore, seeking to identify the association between their presence at early years settings and the outcomes of children requires an assessment of the quality of their training as well.

Policy recommendations

Given the current policy developments around the early years workforce in England, our key policy recommendation is as follows:

- The government should undertake pilot studies to investigate the impact of different formulations of staffing composition within a setting, and the possible differential impact of higher qualification levels between staff in leadership position and frontline workers.

Our findings also hint at some degree-level qualifications being more effective than others. We find that associations with children's outcomes, as measured by EYFSP, KS1 and KS2 scores, are stronger when staff have either a QTS or an EYTS. However, the presence of a qualified teacher is not common in PVI settings and the number of people enrolling in EYTS initial teacher training has plummeted. The positive association between exposure to a graduate and attainment is stronger for disadvantaged children when they attend a setting for more than 15 hours. Recent government policies which have abandoned any commitment to expanding EYTS and which exclude disadvantaged children from receiving the 30 hours funded childcare entitlement could therefore be hindering progress in narrowing the gap in the early years.

In light of these findings, and of the other strands of this work programme, we also suggest that:

- The government should undertake a review of early years degrees to assess the differences among types of degree-level qualification, the quality of their theoretical content and the role of the induction system in preparing graduates for work in early years settings. The outcome of such a review should form the basis of a core content for every early years degree and a plan for how to a make a strong induction system viable for every graduate.
- The government should consider the costs and benefits of extending the 30 hours entitlement to be universal, and therefore allow disadvantaged children the same opportunity as their wealthier peers to reap the benefits of attending an early years setting for more than just 15 hours per week. In doing so, it should also assess the extent to which the current design of the 30 hours funded childcare policy affects quality and access for disadvantaged children with the goal of redesigning the system and making it more equitable.

Annex A: Full results

Table A1. Association of different measure of graduate qualifications on EYFSP scores (2008-2022 and 2012-2016)

	2007/2008-2010/2011					2011/2012-2015/2016				
Qualification variable	**Year dummies**	**Plus school fixed effects**	**Plus child Characteristics**	**Plus setting composition**	**Plus other inputs**	**Year dummies**	**Plus school fixed effects**	**Plus child Characteristics**	**Plus setting composition**	**Plus other inputs**
Graduate at setting	0.038**	0.022**	0.022**	0.022**	0.015**	0.032**	0.025**	0.025**	0.025**	0.016**
(Std. Error)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	1,095,802	1,095,562	1,095,562	1,095,562	1,095,562	1,660,200	1,659,978	1,659,978	1,659,978	1,659,978
R-sq	0	0.21	0.21	0.21	0.211	0.001	0.133	0.133	0.133	0.133
Graduate teaching	0.039**	0.021**	0.021**	0.021**	0.016**	0.032**	0.021**	0.021**	0.021**	0.013**
(Std. Error)	(0.006)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	1,095,826	1,095,586	1,095,586	1,095,586	1,095,586	1,660,200	1,659,978	1,659,978	1,659,978	1,659,978
R-sq	0	0.21	0.21	0.21	0.211	0.001	0.133	0.133	0.133	0.133
Graduate at setting share	0.051**	0.035**	0.035**	0.035**	0.025**	0.053**	0.039**	0.039**	0.039**	0.042**
(Std. Error)	(0.009)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	1,095,837	1,095,597	1,095,597	1,095,597	1,095,597	1,660,200	1,659,978	1,659,978	1,659,978	1,659,978
R-sq	0	0.21	0.21	0.21	0.211	0	0.133	0.133	0.133	0.133
Graduate teaching share	0.048**	0.031**	0.031**	0.031**	0.024**	0.053**	0.033**	0.033**	0.033**	0.038**
(Std. Error)	(0.011)	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	1,095,837	1,095,597	1,095,597	1,095,597	1,095,597	1,660,200	1,659,978	1,659,978	1,659,978	1,659,978
R-sq	0	0.21	0.21	0.21	0.211	0	0.132	0.132	0.132	0.133
QTS	0.049**	0.024**	0.024**	0.024**	0.018**	0.055**	0.030**	0.030**	0.030**	0.024**
(Std. Error)	(0.007)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	1,095,795	1,095,555	1,095,555	1,095,555	1,095,555	1,660,200	1,659,978	1,659,978	1,659,978	1,659,978
R-sq	0.001	0.21	0.21	0.21	0.211	0.001	0.133	0.133	0.133	0.133

EYPS	0.01	0.013**	0.013**	0.013**	0.008*	0.015**	0.015**	0.015**	0.015**	0.006**
(Std. Error)	(0.007)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	839,514	839,225	839,225	839,225	839,225	1,660,200	1,659,978	1,659,978	1,659,978	1,659,978
R-sq	0	0.222	0.222	0.222	0.223	0	0.132	0.132	0.132	0.133
Both	0.029**	0.028**	0.028**	0.028**	0.018**	0.054**	0.033**	0.033**	0.033**	0.023**
(Std. Error)	(0.011)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	1,031,507	1,031,249	1,031,249	1,031,249	1,031,249	1,660,200	1,659,978	1,659,978	1,659,978	1,659,978
R-sq	0	0.21	0.21	0.21	0.211	0.001	0.133	0.133	0.133	0.133

Table A2. Association between having a graduate in the classroom and personal, social and emotional development scores

	2007/2008-2010/2011					2011/2012-2015/2016				
Qualification variable	**Year dummies**	**Plus school fixed effects**	**Plus child Characteristics**	**Plus setting composition**	**Plus other inputs**	**Year dummies**	**Plus school fixed effects**	**Plus child Characteristics**	**Plus setting composition**	**Plus other inputs**
Graduate teaching	0.028**	0.011**	0.011**	0.011**	0.008**	0.020**	0.012**	0.012**	0.012**	0.008**
(Std. Error)	(0.006)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	1,095,818	1,095,579	1,095,579	1,095,579	1,095,579	1,660,200	1,659,978	1,659,978	1,659,978	1,659,978
R-sq	0	0.219	0.219	0.219	0.219	0	0.116	0.116	0.116	0.116
QTS	0.037**	0.013**	0.013**	0.013**	0.010**	0.037**	0.018**	0.018**	0.018**	0.014**
(Std. Error)	(0.007)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	1,095,787	1,095,548	1,095,548	1,095,548	1,095,548	1,660,200	1,659,978	1,659,978	1,659,978	1,659,978
R-sq	0	0.219	0.219	0.219	0.219	0.001	0.116	0.116	0.116	0.116
EYPS	0	0.005	0.005	0.005	0.003	0.008*	0.008**	0.008**	0.008**	0.003
(Std. Error)	(0.007)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	839,507	839,218	839,218	839,218	839,218	1,660,200	1,659,978	1,659,978	1,659,978	1,659,978
R-sq	0	0.234	0.234	0.234	0.234	0	0.116	0.116	0.116	0.116

Table A3. Association between having a graduate in the classroom and communication, language and literacy development scores

	2007/2008-2010/2011					2011/2012-2015/2016				
Qualification variable	**Year dummies**	**Plus school fixed effects**	**Plus child Characteristics**	**Plus setting composition**	**Plus other inputs**	**Year dummies**	**Plus school fixed effects**	**Plus child Characteristics**	**Plus setting composition**	**Plus other inputs**
Graduate teaching	0.043**	0.026**	0.026**	0.026**	0.020**	0.036**	0.027**	0.027**	0.027**	0.017**
(Std. Error)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	1,095,804	1,095,564	1,095,564	1,095,564	1,095,564	1,660,200	1,659,978	1,659,978	1,659,978	1,659,978
R-sq	0	0.157	0.157	0.157	0.158	0.001	0.097	0.097	0.097	0.098
QTS	0.054**	0.031**	0.031**	0.031**	0.024**	0.060**	0.038**	0.038**	0.038**	0.030**
(Std. Error)	(0.006)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	1,095,773	1,095,533	1,095,533	1,095,533	1,095,533	1,660,200	1,659,978	1,659,978	1,659,978	1,659,978
R-sq	0.001	0.157	0.157	0.157	0.158	0.001	0.097	0.097	0.097	0.098
EYPS	0.014*	0.017**	0.017**	0.017**	0.010**	0.019**	0.019**	0.019**	0.019**	0.008**
(Std. Error)	(0.006)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	839,497	839,208	839,208	839,208	839,208	1,660,200	1,659,978	1,659,978	1,659,978	1,659,978
R-sq	0	0.166	0.166	0.166	0.167	0	0.097	0.097	0.097	0.098

Table A4. Association between having a graduate in the classroom and mathematical development scores

	2007/2008-2010/2011					2011/2012-2015/2016				
Qualification variable	**Year dummies**	**Plus school fixed effects**	**Plus child Characteristics**	**Plus setting composition**	**Plus other inputs**	**Year dummies**	**Plus school fixed effects**	**Plus child Characteristics**	**Plus setting composition**	**Plus other inputs**
Graduate teaching	0.036**	0.022**	0.022**	0.022**	0.016**	0.034**	0.025**	0.025**	0.025**	0.016**
(Std. Error)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	1,095,754	1,095,513	1,095,513	1,095,513	1,095,513	1,660,200	1,659,978	1,659,978	1,659,978	1,659,978
R-sq	0	0.182	0.182	0.182	0.183	0.001	0.095	0.095	0.095	0.095

QTS	0.045**	0.026**	0.026**	0.026**	0.020**	0.058**	0.036**	0.036**	0.036**	0.028**
(Std. Error)	(0.006)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	1,095,723	1,095,482	1,095,482	1,095,482	1,095,482	1,660,200	1,659,978	1,659,978	1,659,978	1,659,978
R-sq	0	0.182	0.182	0.182	0.183	0.001	0.095	0.095	0.095	0.095
EYPS	0.007	0.013**	0.013**	0.013**	0.006+	0.018**	0.018**	0.018**	0.018**	0.008**
(Std. Error)	(0.006)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	839,455	839,164	839,164	839,164	839,164	1,660,200	1,659,978	1,659,978	1,659,978	1,659,978
R-sq	0	0.194	0.194	0.194	0.195	0	0.095	0.095	0.095	0.095

Table A5. Association between graduate qualifications and EYFSP scores (2015/2016-2017/2018)

Qualification variable	Year dummies	Plus school fixed effects	Plus child Characteristics	Plus setting composition	Plus other inputs
Graduate teaching	0.039**	0.027**	0.027**	0.027**	0.016**
(Std. Error)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	697,954	697,663	697,663	697,663	697,663
R-sq	0.001	0.149	0.149	0.149	0.151
Graduate teaching share	0.079**	0.020*	0.020*	0.020*	0.053**
(Std. Error)	(0.012)	(0.008)	(0.008)	(0.008)	(0.008)
Observations	1,043,877	1,043,676	1,043,676	1,043,676	1,043,676
R-sq	0.000	0.140	0.140	0.140	0.142
QTS	0.066**	0.036**	0.036**	0.036**	0.028**
(Std. Error)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	697,954	697,663	697,663	697,663	697,663
R-sq	0.002	0.150	0.150	0.150	0.151

EYPS	0.018**	0.020**	0.020**	0.020**	0.009**
(Std. Error)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	697,954	697,663	697,663	697,663	697,663
R-sq	0.000	0.149	0.149	0.149	0.151
EYTS	0.034**	0.029**	0.029**	0.029**	0.017**
(Std. Error)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	693,030	692,738	692,738	692,738	692,738
R-sq	0.001	0.150	0.150	0.150	0.152
Both QTS and EYPS	0.070**	0.046**	0.046**	0.046**	0.032**
(Std. Error)	(0.006)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	697,954	697,663	697,663	697,663	697,663
R-sq	0.001	0.149	0.149	0.149	0.151

Table A6. Association between having a graduate in the classroom and personal, social and emotional development scores (2015/2016-2017/2018)

Qualification variable	Year dummies	Plus school fixed effects	Plus child Characteristics	Plus setting composition	Plus other inputs
Graduate teaching	0.027**	0.017**	0.017**	0.017**	0.011**
(Std. Error)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	697954	697663	697663	697663	697663
R-sq	0.001	0.137	0.137	0.137	0.137
QTS	0.048**	0.024**	0.024**	0.024**	0.019**
(Std. Error)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	697954	697663	697663	697663	697663
R-sq	0.001	0.137	0.137	0.137	0.137

EYPS	0.011**	0.013**	0.013**	0.013**	0.006**
(Std. Error)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	697954	697663	697663	697663	697663
R-sq	0.000	0.136	0.136	0.136	0.137
EYTS	0.023**	0.019**	0.019**	0.019**	0.012**
(Std. Error)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	693030	692738	692738	692738	692738
R-sq	0.000	0.137	0.137	0.137	0.138

Table A7. Association between having a graduate in the classroom and communication, language and literacy development scores (2015/2016-2017/2018)

Qualification variable	Year dummies	Plus school fixed effects	Plus child Characteristics	Plus setting composition	Plus other inputs
Graduate teaching	0.044**	0.033**	0.033**	0.033**	0.020**
(Std. Error)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)
Observations	697954	697663	697663	697663	697663
R-sq	0.001	0.112	0.112	0.112	0.114
QTS	0.070**	0.043**	0.043**	0.043**	0.033**
(Std. Error)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	697954	697663	697663	697663	697663
R-sq	0.002	0.112	0.112	0.112	0.114
EYPS	0.023**	0.024**	0.024**	0.024**	0.011**
(Std. Error)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	697954	697663	697663	697663	697663
R-sq	0.000	0.111	0.111	0.111	0.113

EYTS	0.038**	0.034**	0.034**	0.034**	0.020**
(Std. Error)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	693030	692738	692738	692738	692738
R-sq	0.001	0.112	0.112	0.112	0.114

Table A8. Association between having a graduate in the classroom and mathematical development scores (2015/2016-2017/2018)

Qualification variable	Year dummies	Plus school fixed effects	Plus child Characteristics	Plus setting composition	Plus other inputs
Graduate teaching	0.043**	0.031**	0.031**	0.031**	0.018**
(Std. Error)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	697954	697663	697663	697663	697663
R-sq	0.001	0.107	0.107	0.107	0.109
QTS	0.069**	0.041**	0.041**	0.041**	0.030**
(Std. Error)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	697954	697663	697663	697663	697663
R-sq	0.002	0.107	0.107	0.107	0.109
EYPS	0.022**	0.023**	0.023**	0.023**	0.009**
(Std. Error)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	697954	697663	697663	697663	697663
R-sq	0.000	0.107	0.107	0.107	0.109
EYTS	0.037**	0.031**	0.031**	0.031**	0.016**
(Std. Error)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	693030	692738	692738	692738	692738
R-sq	0.000	0.107	0.107	0.107	0.109

Table A9. Association between L2 and L3 qualifications, and EYFSP scores (2017/2018)

Qualification variable	Year dummies	Plus school fixed effects	Plus child Characteristics	Plus setting composition	Plus other inputs
Proportion of graduate teachers	0.050**	0.002	0.002	0.002	0.041**
(Std. Error)	(0.018)	(0.014)	(0.014)	(0.014)	(0.014)
Proportion of L2	-0.112**	-0.057**	-0.057**	-0.057**	-0.062**
(Std. Error)	(0.015)	(0.012)	(0.012)	(0.012)	(0.012)
Proportion of L3 in non management role	-0.077**	-0.024**	-0.024**	-0.024**	-0.035**
(Std. Error)	(0.009)	(0.008)	(0.008)	(0.008)	(0.009)
Proportion of L3 in management role	-0.110**	-0.109**	-0.109**	-0.109**	-0.050**
(Std. Error)	(0.012)	(0.01)	(0.01)	(0.01)	(0.011)
Observations	346143	345714	345714	345714	345714
R-sq	0.001	0.187	0.187	0.187	0.189

Table A10. Association between L3 qualifications (non management role) and EYFSP scores accounting for graduate presence

Qualification variable	Year dummies	Plus school fixed effects	Plus child Characteristics	Plus setting composition	Plus other inputs
Proportion of graduate teachers	-0.006	-0.031+	-0.031+	-0.031+	0.006
(Std. Error)	(0.023)	(0.019)	(0.019)	(0.019)	(0.019)
Proportion of L3 in non management role	-0.086**	-0.030**	-0.030**	-0.030**	-0.042**
(Std. Error)	(0.010)	(0.009)	(0.009)	(0.009)	(0.009)
Interaction with graduates - L3 non management	0.208**	0.133**	0.133**	0.133**	0.139**
(Std. Error)	(0.067)	(0.050)	(0.050)	(0.050)	(0.050)
Proportion of L2	-0.110**	-0.056**	-0.056**	-0.056**	-0.061**
(Std. Error)	(0.015)	(0.012)	(0.012)	(0.012)	(0.012)
Proportion of L3 in management role	-0.107**	-0.108**	-0.108**	-0.108**	-0.049**
(Std. Error)	(0.012)	(0.010)	(0.010)	(0.010)	(0.011)
Observations	346,143	345,714	345,714	345,714	345,714
R-sq	0.001	0.187	0.187	0.187	0.189

Table A11. Association between L3 qualifications (management role) and EYFSP scores accounting for graduate presence

Qualification variable	Year dummies	Plus school fixed effects	Plus child Characteristics	Plus setting composition	Plus other inputs
Proportion of graduate teachers	0.062**	0.006	0.006	0.006	0.058**
(Std. Error)	(0.020)	(0.017)	(0.017)	(0.017)	(0.017)
Proportion of L3 in management role	-0.105**	-0.108**	-0.108**	-0.108**	-0.043**
(Std. Error)	(0.013)	(0.011)	(0.011)	(0.011)	(0.011)
Interaction with graduates - L3 management	-0.126	-0.037	-0.037	-0.037	-0.171+
(Std. Error)	(0.113)	(0.087)	(0.087)	(0.087)	(0.088)
Proportion of L2	-0.113**	-0.057**	-0.057**	-0.057**	-0.063**
(Std. Error)	(0.015)	(0.012)	(0.012)	(0.012)	(0.012)
Proportion of L3 in non management role	-0.077**	-0.024**	-0.024**	-0.024**	-0.036**
(Std. Error)	(0.009)	(0.008)	(0.008)	(0.008)	(0.009)
Observations	346,143	345,714	345,714	345,714	345,714
R-sq	0.001	0.187	0.187	0.187	0.189

Table A12. Importance of having a graduate in the classroom controlling for dosage

Qualification variable	Year dummies	Plus school fixed effects	Plus child Characteristics	Plus setting composition	Plus other inputs
Graduate teaching	0.012**	0.013**	0.013**	0.013**	0.008*
(Std. Error)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Attended more than 15h/w	0.190**	0.151**	0.151**	0.151**	0.147**
(Std. Error)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Setting has a graduate and child attended more than 15h/w	0.029**	0.015**	0.015**	0.015**	0.014**
(Std. Error)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	697,954	697,663	697,663	697,663	697,663
R-sq	0.02	0.159	0.159	0.159	0.16

Table A13. Association between having a graduate in the classroom and EYFSP scores controlling for dosage (FSM children only)

Qualification variable	Year dummies	Plus school fixed effects	Plus child Characteristics	Plus setting composition	Plus other inputs
Graduate teaching	-0.007	0.001	0.001	0.001	-0.004
(Std. Error)	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)
FSM children attended more than 15h/w	0.118**	0.102**	0.102**	0.102**	0.103**
(Std. Error)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)
Setting has a graduate and FSM child attended more than 15h/w	0.041**	0.030*	0.030*	0.030*	0.030*
(Std. Error)	(0.014)	(0.015)	(0.015)	(0.015)	(0.015)
Observations	73,273	70,219	70,219	70,219	70,219
R-sq	0.007	0.241	0.241	0.241	0.242

Table A14. Association between workforce qualifications and EYFSP, KS1 and KS2 scores (2007/2008-2010/2011)

	EYFSP					KS1					KS2				
Qualification variable	**Year dummies**	**Plus school fixed effects**	**Plus child Characteristics**	**Plus setting composition**	**Plus other inputs**	**Year dummies**	**Plus school fixed effects**	**Plus child Characteristics**	**Plus setting composition**	**Plus other inputs**	**Year dummies**	**Plus school fixed effects**	**Plus child Characteristics**	**Plus setting composition**	**Plus other inputs**
Graduate	0.034**	0.019**	0.019**	0.019**	0.014**	0.038**	0.025**	0.025**	0.025**	0.018**	0.044**	0.022**	0.022**	0.022**	0.016**
(Std. Error)	(0.006)	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)
Obs	1,035,337	1,035,083	1,035,083	1,035,083	1,035,083	1,030,897	1,030,638	1,030,638	1,030,638	1,030,638	1,038,844	1,038,580	1,038,580	1,038,580	1,038,580
R-sq	0	0.209	0.209	0.209	0.21	0	0.127	0.127	0.127	0.128	0	0.124	0.124	0.124	0.126
QTS	0.043**	0.023**	0.023**	0.023**	0.017**	0.041**	0.027**	0.027**	0.027**	0.020**	0.044**	0.025**	0.025**	0.025**	0.018**
(Std. Error)	(0.007)	(0.003)	(0.003)	(0.003)	(0.003)	(0.006)	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)
Obs	1,035,309	1,035,055	1,035,055	1,035,055	1,035,055	1,030,869	1,030,610	1,030,610	1,030,610	1,030,610	1,038,816	1,038,552	1,038,552	1,038,552	1,038,552
R-sq	0	0.209	0.209	0.209	0.21	0	0.127	0.127	0.127	0.128	0	0.124	0.124	0.124	0.126
EYPS	0.008	0.012**	0.012**	0.012**	0.006+	0.015**	0.017**	0.017**	0.017**	0.010*	0.030**	0.016**	0.016**	0.016**	0.009*
(Std. Error)	(0.007)	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)	(0.004)	(0.004)	(0.004)	(0.004)
Obs	792,629	792,331	792,331	792,331	792,331	788,912	788,611	788,611	788,611	788,611	794,995	794,697	794,697	794,697	794,697

R-sq	0	0.221	0.221	0.221	0.222	0	0.132	0.132	0.132	0.134	0	0.134	0.134	0.134	0.135
Graduate at setting	0.033**	0.020**	0.020**	0.020**	0.014**	0.038**	0.027**	0.027**	0.027**	0.019**	0.047**	0.025**	0.025**	0.025**	0.017**
(Std. Error)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Obs	1,035,315	1,035,061	1,035,061	1,035,061	1,035,061	1,030,875	1,030,616	1,030,616	1,030,616	1,030,616	1,038,823	1,038,559	1,038,559	1,038,559	1,038,559
R-sq	0	0.209	0.209	0.209	0.21	0	0.127	0.127	0.127	0.128	0.001	0.124	0.124	0.124	0.126

Table A15. Association between workforce qualifications and KS1 and KS2 scores after controlling for previous achievement (EYFSP scores)

	KS1					KS2				
Qualification variable	**Year dummies**	**Plus school fixed effects**	**Plus child Characteristics**	**Plus setting composition**	**Plus other inputs**	**Year dummies**	**Plus school fixed effects**	**Plus child Characteristics**	**Plus setting composition**	**Plus other inputs**
Graduate	0.012**	0.010**	0.010**	0.010**	0.007**	0.022**	0.009**	0.009**	0.009**	0.006**
(Std. Error)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
EYFSP scores	0.759**	0.804**	0.804**	0.804**	0.804**	0.668**	0.706**	0.706**	0.706**	0.706**
(Std. Error)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
QTS	0.009**	0.009**	0.009**	0.009**	0.007**	0.016**	0.009**	0.009**	0.009**	0.006**
(Std. Error)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)
EYFSP scores	0.759**	0.804**	0.804**	0.804**	0.804**	0.668**	0.706**	0.706**	0.706**	0.706**
(Std. Error)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
EYPS	0.009*	0.007**	0.007**	0.007**	0.005+	0.025**	0.007**	0.007**	0.007**	0.004
(Std. Error)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
EYFSP scores	0.763**	0.817**	0.817**	0.817**	0.816**	0.674**	0.719**	0.719**	0.719**	0.719**
(Std. Error)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Graduate at setting	0.013**	0.011**	0.011**	0.011**	0.009**	0.025**	0.011**	0.011**	0.011**	0.008**
(Std. Error)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
EYFSP scores	0.759**	0.804**	0.804**	0.804**	0.804**	0.668**	0.706**	0.706**	0.706**	0.706**
(Std. Error)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)

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