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‘Universal’ early education: who benefits? Patterns in take-up of the entitlement to free early education among three-year-olds in England

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"Universal" early education: who benefits? Patterns in take-up of the entitlement to free early education among three-year-olds in England

Abstract

For over a decade, all three-year-olds in England have been entitled to a free part-time early education place. One aim of this policy is to close developmental gaps between higher-income and low-income children. However, the success of the initiative depends on children accessing the places. Using the National Pupil Database, we examine all autumn-born four-year-olds attending in January 2011, and ask whether they started attending when first eligible, in January 2010. One in five children did not access their free place from the beginning, and the proportion is much higher among children from families with persistently low incomes. We also find differences by ethnicity and home language, but these factors explain only a small share of the income gradient. We go on to explore associations between non-take-up and local area factors. In areas with higher child poverty rates, take-up is lower overall, but the gap between low-income and other families smaller. There are also various associations between take-up and local proportions of different provider types (maintained, private, voluntary, Sure Start). In particular, the voluntary sector seems to have more flexibility than maintained provision to offer places in January and more success than private providers in reaching children from lower-income backgrounds. The analysis also highlights how take-up overall is relatively high and the gap by income-level is smaller in areas with more Sure Start provision. This suggests aspects of Sure Start facilitated access among low-income families, and could perhaps be replicated as implementation of the free entitlement continues to be expanded.

Key words: Early education, universal services, disadvantage, poverty.

Introduction

Over the past two decades, early childhood education and care has increasingly been prioritised within the UK policy agenda, with substantial resources allocated to the provision of pre-school education. Two main intentions underpin this policy: facilitation of maternal employment, and early intervention in the lives of 'disadvantaged' children. The approach to the latter has built on the understanding that early education and group care has the potential to make a particular difference to children from households with lower income or less education, meaning a universal policy should be capable of reducing socio-economic disparities (Strategy Unit, 2002; Taggart, 2004).

Funding for a free, part-time early education place for every four-year-old in England was established in 1998, and rolled out to cover all three-year-olds by 2004. With over £2000 now allocated annually to each eligible child, these places have become the central initiative aimed at creating a more equitable start for children in England (Noden and West, 2016). This is especially true given the squeeze since 2010 on funding for other early childhood initiatives, including Sure Start children's centres, as well as reductions in cash benefits for families with young children (Stewart and Obolenskaya, 2015).

Since the initial roll-out of the free places, the policy has developed in two main directions. First, the scope of the offer has increased, with extensions both to the number of hours available, and to the age group of children covered. In 2008 the entitlement rose from 33 to 38 weeks a year, and in 2010 from 12.5 to 15 hours a week. In 2013 free places were extended to two-year-olds with documented disabilities and/or from low-income families. In 2017, there was an additional expansion to 30 funded hours for three- and four-year-olds with working parents.

Second, there have been a number of attempts to improve the quality of provision on offer. The Early Years Foundation Stage Curriculum was introduced in 2008 with the aim of imposing a degree of uniformity of experience in what remains a diverse and fragmented sector. There have also been developments in the qualifications of the workforce, most notably at lower levels, but also in the numbers of graduates (Gambaro, 2017; Tickell, 2011).

Recent research into the universal offer has focused largely on this question of quality, examining disparities between settings and the way this affects children from disadvantaged backgrounds in particular (e.g. Mathers and Smees, 2014; Gambaro et al, 2015). Blanden et al (2016) explore associations between roll out of free places and children's attainment at age 5. They find only small relationships and argue that the relatively low quality of new places may be responsible for their apparently minimal effectiveness.

However, very little attention has been paid by either policymakers or researchers to the question of *take-up* of the free entitlement, and in particular to whether disadvantaged children fully benefit from the offer. Yet in order for the policy of promoting child development through early education to have some measurable impact on low-income children, it is of course necessary that parents are able to participate using their funded hours. In a context where previously it has been argued that even higher-income, 'multiply-advantaged consumers sometimes struggled in their interactions with the [early education] market, their difficulties due to the particular characteristics of childcare services' (Ball and Vincent, 2005) exploring access is crucial. If children do not attend then questions of quality become peripheral. At the same time, if the most disadvantaged three-year-olds are not yet accessing places, extending free hours downward to low-income two-year-olds may be the wrong priority for policy.

In this paper we use linked census data from the National Pupil Database to ask what we know about the extent of take up of the free entitlement, both overall and among children from low-income families. Having established that there is considerable non-take-up of the full offer, with significant variation by income level, we explore two further questions, both important to our ability to reach nuanced policy conclusions. First, how far can differences by family income be explained by other correlated family characteristics, such as ethnicity? Second, do aspects of local provision play a role? For example, is take up among lower-income children higher in local authorities where most places are provided by the state rather than private sector?

Our main focus is on a particular group of children: those born in the autumn of 2006, which entitled them to five terms of early education before starting in a primary school reception class. Taking as our full sample autumn-born children who took up at least two terms, and hence were in attendance in January 2011 (age four) we ask how many of this group took up the full offer and were in attendance in January 2010 (age three). There are several reasons for this focus. One is that it gives us a clear way of identifying a population of children who were entitled to a place in January 2010, offering greater accuracy than measures of take-up based on population census estimates. These are families who were both sufficiently informed and able to take up the offer at age four, making it particularly curious if they nonetheless missed out on their full entitlement. The approach is also of substantive interest because it allows us to explore the *duration* of early education; attending for additional terms has been found to be positively associated with trajectories of progress in early primary school (Strand, 1999; Sylva et al, 2004; and see review in Ulferts and Anders, 2016). Finally, this group of children is entitled to a longer period in state-funded education than other children simply because of the timing of their birth, despite evidence that autumn-born children enjoy a substantial advantage in the education system which accompanies them into adult life (Crawford et al, 2013). A central aim of the paper is to examine how far this longer entitlement for autumn-borns is enjoyed disproportionately by children who are additionally advantaged by their home circumstances.

The free entitlement to early education: how it works

The universal free entitlement to early education in England begins in the term after a child's third birthday: children who turn three between September 1 and December 31 (autumn-borns) can access a free place from January 1 of the following calendar year; children born between January 1 and March 31 (spring-borns) from April 1; and children with birthdays between April 1 and August 31 (summer-borns) from the start of the new academic year on September 1. Since September 2010 children have been entitled to a full-time place in a primary school reception class from the September following their fourth birthday (Stewart, 2013). This means that the length of free universal early education provision depends upon a child's relative age within their school year: autumn-born children can access up to five terms of early education before they enter reception, spring-borns up to four terms, and summer-borns up to three terms.

Free early education can be taken up in a very wide variety of different settings, including maintained nursery schools and primary school nursery classes (collectively referred to in the paper as ‘maintained sector provision’); day nurseries run by the private, local authority or voluntary sector (some of them within Sure Start children’s centres); childminders; and sessional (part-day) providers. There are a number of reasons why children might attend one of these settings rather than another, and these are relevant to thinking about what may drive differences in take-up among different groups. Importantly, the availability of different types of setting varies widely across the country, so parents’ options will depend on where they live. Notably, almost all new places created since 1997 were in private and voluntary sector settings (Stewart, 2013; Blanden et al, 2016). As a result, maintained settings form a significant share of the total only in local authorities that invested in state nursery classes in previous decades; these are largely concentrated in inner cities (Owen and Moss 1989). In the 30% most disadvantaged areas, Sure Start children’s centres were required to provide early education places as part of their broader offer for under-fives until 2011, when this requirement was lifted by the Coalition Government (Stewart and Obolenskaya, 2015). As we see below, Sure Start comprised a tiny fraction of provision overall in our focal year, catering for just 1% of three year olds on average, but made up a much more significant share in some local authorities.

Differences in local availability may interact with different tendencies among some families to attend some types of setting. First, some settings are open for a longer day, charging fees for additional wraparound hours. These are likely to be more attractive to working parents than settings open for the funded hours only. Indeed a child may already be attending a day nursery when they turn three, with the entitlement operating in effect as a reduction in fees. Conversely, children whose parents do not need and/or cannot afford to pay for additional hours may find it hard to access these full-day settings; there is evidence that some providers prioritise children who attend all day and pay fees which top-up government funding for free hours.[1]

In addition, parents may simply have a preference for one type of provision over another. There is some qualitative evidence, for example, that state nursery schools and classes are more trusted by low-income parents than other providers (Bell et al, 2005; Roberts, 2007). Particularly for non-working parents, school may seem like provision aimed at the child, while day nursery may be perceived as ‘childcare’ and not necessary. It is plausible, therefore, that take-up among lower income groups may be higher (or gaps in take-up smaller) where there is greater availability of maintained sector provision.

Finally, some providers may be better placed than others to communicate the existence of free places and their potential benefits, particularly to low-income families. Sure Start children’s centres offer wider services for young children from

[1] http://www.nurseryworld.co.uk/nursery-world/news/1157484/underfunding-chain-restricts-funded-only-15-hour-places

birth onwards, including health clinics and 'stay-and-play' sessions, and also have a specific remit of outreach to disadvantaged groups, which evidence indicates can increase take-up (Mitchell and Meagher-Lundberg, 2017). Parents accessing Sure Start services for their babies and toddlers are likely to get to learn what is available when their child turns three.

Take-up of the free entitlement

The Department for Education publishes annual data detailing the proportion of two-, three- and four-year olds in receipt of funded education, using pupil numbers from the Early Years Census and the Schools Census and population projections based on the 2011 Census. In January 2016 it estimated that 93% of three-year-olds and 97% of four-year-olds were in receipt of funded early education, just slightly up from January 2011, when take-up was estimated at 92% (threes) and 96% (fours) (DfE, 2016). These relatively high and stable take-up rates for both three- and four-year-olds stand in contrast to much lower take-up of the targeted two-year-old offer, estimated at 68% of the eligible population in 2016 (DfE, 2016). However, the accuracy of the figures depends on the reliability of estimates of the eligible population, and the calculations also conflate children from different school cohorts, thus failing to capture differences between children born in different months who fall into different school year-groups, and become eligible for funding at different points within the academic year.

Furthermore, very little is known about how take-up rates of the free entitlement vary for children from different backgrounds. General evidence suggests that low-income children tend to access less formal childcare, even where it is funded. Investigating children in the Millennium Cohort Study who were aged three in 2003-2005, Mathers et al (2007) find that those from low-income families were less likely to be attending group child care. Similarly, Speight and Smith (2010) analysed the 2008 and 2009 waves of the *Childcare and Early Years Survey of Parents*, and concluded that, 'Children from lower-income…families…were less likely to receive early years provision' (p 4). Most recently, the National Audit Office (2016) notes that take-up of funded places is lower in 'more deprived areas' (p 6).

There are a number of gaps in this literature that our study seeks to fill. First, despite evidence of incremental associations between duration of attendance and children's early attainment (Strand, 1999; see also Sylva et al, 2004), no national-level studies have, to our knowledge, explored how duration varies by background. Do lower-income children access as many terms of free early education as their equivalently aged but higher-income peers?

Second, studies that do identify patterns of lower attendance among low-income children have not fully investigated how far these patterns can be explained by correlated pupil-level characteristics such as ethnicity, or home language. This is important because, in the longer term, many groups of children recorded as having English as an additional language in the early years make accelerated progress to close attainment gaps with their peers who speak English only (Strand et al 2014). Similarly, children from a number of ethnic groups who appear to under-attain in early primary school are on an upward trajectory and achieve far higher levels as they progress through education (DfES, 2006). In contrast, the gap between low-income children and their higher-income peers remains stubbornly high until the end of secondary school (Social Mobility Commission, 2017), underpinning the consistent prioritisation of low-income children for intervention and spending. Identifying whether income is in fact the key pupil-level characteristic predicting reduced take-up of early education is therefore essential when establishing whether provision in this period is reaching its key intended beneficiaries.

Third, the existing evidence begs the question as to whether the primary driver of non-attendance lies at the level of the family or whether it may result from the availability of different types of provision. The NAO (2016) notes, for example: 'The Department does not know enough about local markets to know how much… variation is caused by places available and how much by parental demand' (p 17).

In this paper, we expand the existing evidence base on take-up of the universal entitlement by exploring the following questions:

1. Among autumn-born children in England (who are entitled to five terms' funded early education), what are the patterns by key pupil characteristics in take-up of the full duration?
2. Do other pupil characteristics, such as ethnic background and EAL, account for lower levels of access among low-income children?
3. How far do local factors, such as the nature of provision available, account for lower levels of attendance among low-income children?

Data and method

To answer these questions we use recent data from the National Pupil Database (NPD), merging two separate datasets - the Early Years Census for children in non-maintained early education and care, and the Spring Schools Census for children in maintained school nursery classes and nursery schools - to obtain a full census of children in receipt of funded provision in January of a year. Within the NPD, each child is assigned a unique identifier which means she can be tracked from the first January she receives funded early education through her school years, provided she attends compulsory education in the maintained sector.

Our sample comprises 206,756 children born between September and December 2006 (inclusive) who access a funded place in January 2011, and who turned three in autumn 2009. We investigate whether, among these autumn-born children, families were also recorded in the data as taking up their entitlement when it initially applied, in Spring 2010, thereby accessing the full five terms for which children were eligible. We emphasise that our sample includes only children who did attend pre-school for at least two terms, and excludes those who did not access *any* funded early education by the January of their pre-reception year. Implications of this parameter are explored in the discussion section.

Records in the Early Years Census and Schools Census indicate by definition whether a child took up their entitlement, but they do not contain full or reliable indicators of children's family income level, their ethnicity or first language. We therefore link our sample forward to the Spring Schools Censuses for 2012, 2013, and 2014, to construct three key pupil-level variables.

The first is our main independent variable: a proxy for low-income, based on recorded claiming of free school meals (FSM) in children's reception, year one and year two data. Children are eligible for FSM if their parents are claiming income-tested out-of-work benefits. We distinguish between 'never FSM' and 'ever FSM' children, and also indicate persistence of low income with the variables 'once FSM,' 'twice FSM,' and 'thrice FSM'. FSM status is an imperfect proxy for low income, but widely used in educational analysis of administrative data because it is currently the only information on income available at household level. Hobbs and Vignoles (2010) show that children claiming FSM are much more likely than other children to be in the lowest income families. Note, however, that our measure of low income is not contemporaneous to the early education years; as such it can be interpreted as an indicator of whether a child is at risk of low income in later years. Our analysis focuses on the cohort of children that entered year 1 in September 2012 precisely because this was the last cohort before the introduction of universal free school meals for children in reception, year 1 and year 2. This change has rendered indications of low-income in immediately subsequent censuses less reliable and, consequently, data for more recent cohorts less suitable to explore income related differences in early nursery attendance.

Our second and third child-level indicators are based primarily on data for the nursery education years where available, and supplemented by the most proximal data from early primary school where not. An 'ever EAL' indicator specifies that a child was recorded at least once as having a primary home language other than English. An indicator of ethnicity distinguishes between 17 recorded groups.

By combining data from different years we minimize the number of observations with missing information on ethnicity or EAL. The remaining incomplete cases are included in the analyses as a 'missing' category. The dataset contains full contemporaneous information on each child's month of birth and gender, which we use as further controls. The structure of our longitudinal data is represented in Figure 1.

[FIGURE 1 ABOUT HERE]

We can distinguish between maintained sector provision in nursery schools and classes (and a small number of places in local authority day nurseries), and places in the private, voluntary and independent sectors (often known collectively as PVI provision). We can also identify provision based in Sure Start children's centres, which cuts across voluntary sector and private boundaries; as well as children taking up their funded place with a childminder. Our analysis in this paper focuses on four categories of provider: maintained, voluntary, private and Sure Start. Private providers are largely offering full day provision round the year, while the voluntary sector looks more similar to the maintained sector, offering morning or afternoon sessions during school terms only. Our data show that voluntary settings are open for an average 28 hours a week for 40 weeks a year, compared to 41 hours a week for 46 weeks a year for private settings.

Finally, our data contains the geographical identifier of where each child lives. This is the Lower Level Super Output Area (LSOA), a standard geography originally constructed for the 2001 Census. We use LSOA codes to merge into our dataset information on the level of child poverty in the LSOA where the child lives as measured by the 'Index of deprivation affecting children' (IDACI) in 2011. The IDACI captures the percentage of all children in an LSOA who are in families claiming means-tested benefits or whose equivalised income is below 60 percent of the median income before housing costs (DCLG, 2011). In our sample it varies from zero to 99% with a median of 18.3%. Given that LSOAs are nested into Local Authorities, we can use this information to further link our data to 150 Local Authority identifiers. There is a small amount of missing data on location (0.4%); it is coded as such so that cases remain in the data.

All of our results provide descriptive representations of the census data. Some simply cross-tabulate the binary outcome with child or contextual characteristics. Logistic regressions indicate the relationship between one characteristic (for example, FSM) and non-attendance when other characteristics (for example, EAL and ethnicity) are also taken into account.

Where we use regressions, we report marginal means alongside or instead of model coefficients, for ease of interpretation. Marginal means represent the average predicted probability of non-attendance for each given group of children (for example, children who are FSM / not FSM) once the other factors in the model have been controlled for.

Table 1 presents key descriptive statistics on the characteristics of our analytical sample (206,756 children, born in autumn 2006).

[TABLE 1 ABOUT HERE]

Results

Among autumn-born children in England (who are entitled to five terms' free pre-schooling) what are the patterns by key pupil characteristics in take-up of the full duration?

Among the 206,756 autumn-born children attending early education in January 2011, 38,081 (18.4%, almost one in five) did not take up their free hours when they first become eligible in January 2010. This varies by birth month, as may be expected – only 15.5% of children who turned three in September were not attending by the following January, compared to 22.2% of children who had December birthdays (see the final column in Table 1).

There is a clear income gradient in non-attendance: 15.7% of children designated 'never FSM' were not in attendance at January 2010, compared to 27.4% of children recorded as claiming FSM at least once during their first three years of schooling. Children who claimed FSM in all three of these years had the greatest likelihood of non-take-up of the full entitlement: 29% of those who were 'thrice FSM' did not attend for the full five terms.

We also observe an interaction between FSM status and birth month, with a wider spread of take-up rates for younger children, as shown in Figure 2. This may reflect a greater likelihood of higher income children attending nurseries for childcare reasons before their third birthday. In very low-income households, parents are more likely to need to identify and access an available place and enrol their child when she reaches three.

[FIGURE 2 ABOUT HERE]

Having English as an additional language is also strongly associated with non-take-up: 38.6% of EAL children were not present in 2010, compared to 13.9% of children recorded as speaking only English. Finally, there is extensive variation by ethnicity, with White British children least likely not to take up their full five terms (12.7%) and Bangladeshi children most likely (50.8%).

Do other pupil characteristics (ethnic background and EAL) account for lesser levels of access among low-income children?

Given correlations between ethnicity, home language and household income, it is possible that FSM children's lower attendance levels may be partially explained by these associated factors. Table 2 presents key estimates from the first main specification of our logistic regression analysis, examining the relationships between each characteristic and non-attendance, taking the other characteristics into account, as well as month of birth and gender.

[TABLE 2 ABOUT HERE]

Children who claim FSM for any duration in their first years of primary school remain less likely to attend pre-school for their full five terms, even accounting for ethnicity and EAL. These factors are related to non-attendance, with children speaking languages other than English and children of non-White British ethnicities significantly less likely to take up their full entitlement. However, including them in the model attenuates the FSM gradient only very mildly, as can be seen in the first two rows of Table 3, which show predicted probabilities of non-attendance before and after controlling for ethnicity and EAL.

[TABLE 3 ABOUT HERE]

Are there interactions between low income, EAL and ethnicity which help explain non-attendance patterns? We may expect, for example, take-up to be especially low among FSM children who additionally belong to ethnic groups with lower attendance rates. Figure 3 presents key model-predicted probabilities of non-attendance from the previous logistic regression to which we add an interaction between FSM status and language. The estimates point to a much stronger effect of low-income in English-only than in EAL households. Children from EAL households have a relatively high likelihood of non-attendance whatever their income status, although there is a significant difference between never and ever-FSM groups. Among English-only households, income status is much more clearly associated with non-attendance. Thus while there is a wide gap in attendance rates between language groups for children from never-FSM households, this gap narrows considerably if we compare children from persistently poor households. The figure indicates that either having English as an additional language, or being English-speaking and persistently poor, are both strong predictors of non-attendance.

[FIGURE 3 ABOUT HERE]

We revise the model to incorporate an interaction between FSM and ethnicity (with EAL included as a separate factor once more). Figure 4 presents model-predicted probabilities of attendance for an exemplar selection of groups (other groups are omitted for parsimony and clarity; full coefficients and marginal means are available from the authors on request). The figure shows a complicated relationship between attendance at the commencement of the free entitlement, income-level, and ethnic group. Among most ethnic groups, children are more likely to access the full entitlement if they are in the never-FSM group than if they are ever or always in receipt of free school meals. This relationship is not completely linear for all groups (e.g. the Indian and Black Caribbean groups). Yet it is only for Bangladeshi children (shown in Figure 4) and Chinese and Gypsy/Roma/Traveller children (not shown) that FSM status makes little difference. For these groups, which comprise some 2% of the sample in total, ethnicity rather than income status seems the key predictor of non-attendance.

For all other groups, the results suggest that minority ethnic background and FSM eligibility can be seen as additive, both contributing to lower the likelihood of non-attendance. However, it is worth noting that, given the blunt nature of the FSM binary measure, denoted ethnicity may to some extent be proxying more subtle income-gradients, especially within the non-FSM group. It may also be that factors covarying with ethnicity, such as maternal employment, may be the driving factor explaining differences here.

[FIGURE 4 ABOUT HERE]

How far do local factors, such as the nature of provision available, account for lower levels of attendance among low-income children?

Up to this point we have examined children's characteristics, focusing on family's income, ethnicity and language. In this section we examine whether non-attendance may be linked to local area factors. We focus on two geographical levels: the small area (LSOA) and the local authority where the child lives.

The LSOA has a mean of around 1600 people. In cities it roughly captures the area in which a child might be walked to the shops or local playground. By merging into our dataset IDACI (child poverty rates) for the child's LSOA, we get a proxy for the socio-economic context surrounding the child. Descriptive statistics for IDACI by LSOA are shown in Table 4. There are two different reasons this context may be relevant to predicting non-attendance (though our data do not allow us to distinguish between the two). First, the area's IDACI may give us a rough proxy of neighbourhood-specific norms and choices. Second, IDACI and its precursors have been used to target area-based initiatives relevant to young children, such as children's centres and outreach programmes. By including the level of child poverty in the area, we get a more fine-grained measure of what may be available to the child than indicators based at local authority level only.

[TABLE 4 ABOUT HERE]

Local authority data are also important, however, because this is the administrative level at which decisions about early years provision have historically been taken. Local authority decisions in the 1960s and 1970s regarding the establishment of maintained nursery schools and classes have had lasting effects on the shape of available provision in different parts of the country. Local authorities remain responsible for conducting childcare assessments and for determining funding formula which dictate the resources different settings receive to cover the free entitlement, giving them continuing influence over the make-up of local provision (though this influence will be restricted by the introduction of the Early Years Single Funding Formula) (see Noden and West, 2016).

Children from our sample are nested into 150 local authorities (we exclude children from the City of London and the Isle of Man). We construct four indicators measuring the percentage of children from each local authority who receive the entitlement in January 2011 in four different types of settings – school-based, private, voluntary sector and Sure Start providers. Table 4 shows the wide variation across local authorities in the prevalence of different sectors. The make-up of local provision is likely to be important for two main reasons, as noted above. First, the maintained sector seems less flexible than other providers in offering new places mid-academic year (Gambaro et al, 2015), which would push towards higher January non-take-up in areas with more places in the maintained sector. Second, children from low-income backgrounds may be more likely to attend some setting types than others. For reasons discussed earlier, we might expect a larger FSM gap in take-up in areas with fewer places in the maintained sector, less Sure Start, and more private provision.

To investigate this issue, we run two sets of models. In the first set, we examine the relevance of the IDACI of the area where the child lives by extending our logistic regressions to include IDACI, and then to interact IDACI with FSM status. Results are presented in Table 5. We find that children living in higher poverty areas are more likely not to take up a place, even after controlling for their own household characteristics. This suggests the relevance either of local norms, or of the availability of places in the area.

However, when we add the interaction, we find that the negative effect of living in a high poverty area is partially reversed for children who are poor themselves (ever FSM), with the largest effects on children who are persistently poor (three times FSM). Thus while there seems to be less provision overall (or lowered ability to access provision) in these areas, there is relative success in reaching the lowest income children, diminishing the gap between children from different family backgrounds. This could indicate the effectiveness of outreach initiatives in reaching the most disadvantaged children in disadvantaged areas, or it could be that the type of provision available in high poverty areas (e.g. nursery classes and Sure Start centres) are more openly accessible to all. Alternatively (or in addition), it could simply reflect lower levels of private sector provision in high poverty areas, reducing options and therefore take-up among higher-income families. We are able to shed a little more light on these possible explanations with our second set of models.

[TABLE 5 ABOUT HERE]

The second set of models investigates the relevance of the composition of providers within each local authority. We run four separate groups of models in order to explore relationships between take-up and varying percentages of four types of provision: maintained, private, voluntary and Sure Start, controlling in all cases for individual variables and for area IDACI. Once again we interact the key variables of interest with the child's FSM status, to see whether different types of provision have differential apparent effects on take-up for children from different income groups. Table 6 presents the key coefficients of interest from these models, while Table 7 converts coefficients from the interacted models into differences in odds ratios, showing the percentage change in the odds of non-attendance associated with a given percentage point difference in the size of each sector.

First, we test whether a higher presence of maintained nursery schools and classes seems to affect the likelihood of non-take-up. We find that autumn-born children living in a local authority with more maintained sector provision are less likely to take up their entitlement in the January in which they become eligible: coefficients are positive and significant. However, when we include an interaction term with FSM status, around half of this effect disappears for low-income children. Thus a maintained sector that is 5 percentage points larger is associated with odds of non-take-up 5% higher for children who never claim free school meals, but just 2% higher for children who are FSM three times. This suggests that the maintained sector offers less flexibility in providing January places, but is relatively successful at reaching children from low-income backgrounds, reducing inequalities in take-up.

[TABLE 6 ABOUT HERE]

The third and fourth columns of Table 6 and the second panel of Table 7 show associations with a larger private sector. Here coefficients are negative: non-take-up is lower in local authorities where a larger share of children attends private provision. This is as expected: many children attending private nurseries would be using childcare before age three, and would receive the free hours as a reduction in fees as soon as they became eligible. Further, the interactions show that children benefiting from more private sector provision come overwhelmingly from non-low-income families. Thus 5 percentage points more provision in the private sector is associated with 5% lower non-attendance for these children, but only 2.1% for children who claim FSM once in early primary school, and just 0.1% for children who are three times FSM.

In contrast, while a larger voluntary sector is also associated with lower non-take-up overall, the effects are felt much more evenly across our different groups. Having 5 percentage points more provision in the voluntary sector is associated with 8% lower non-attendance for non-FSM children (itself a larger effect than an equivalent change in the private sector for this group), and 6% lower non-attendance for three times FSM children. Thus inequality in non-take-up seems a little higher where the voluntary sector is larger, but there are still considerable positive effects for the lowest income group. These findings may reflect the greater flexibility of the voluntary sector to offer January places compared to the maintained sector, along with higher accessibility to low-income families compared to the private sector (e.g. less likelihood of a requirement to pay fees for additional hours, as many voluntary providers are offering part-day provision only).

Finally, we find that having a higher proportion of provision in Sure Start children's centres in a local authority is related to lower non-take-up overall *and* considerably less inequality. Having a 5 percentage point higher share of provision in Sure Start is associated with 7% less non-take-up for never FSM children, and with a striking 17% reduction for children who will go on to claim free school meals in every year of early primary school. Sure Start children's centres offering early education and care in this period were located in the most disadvantaged areas of a local authority, had a remit to reach more vulnerable children, and offered the additional advantage of having their doors open to families from pregnancy onwards. We cannot say which (if any) of these factors contributed to higher take-up of free early education for children from low-income households in local authorities with more Sure Start provision, but our results suggest there was a significant Sure Start effect.

To complete our analysis, we explore non-linearities in effects by running a set of models using quartiles or quintiles of provision rather than linear variables. Results are represented visually in Figure 5. The four panels show the predicted probabilities of non-attendance by FSM status in local authorities with different percentages of maintained, private, voluntary sector and Sure Start provision, with the share of provision in each sector split into quartiles or quintiles (according to the distribution of each) and interacted with the FSM variable. The results show that most of the increase in non-take-up associated with the maintained sector takes place when that sector increases from 60% to 80% of provision: that is, it occurs when the maintained sector is highly dominant and there are limited alternatives. A higher proportion of private sector provision, meanwhile, has positive associations for non-low-income children until the sector reaches 60% of the total, beyond which there is little gain (for children from very low-income households, these differences in the private sector are of little relevance, as already discussed). In relation to the voluntary sector, the lowest non-attendance is associated with having at least a tenth of provision in this sector: having up to 20% of places in the sector is related to lower non-attendance, compared to less than 10%, and there are also smaller apparent effects as the sector grows beyond this, up to 40%. And for Sure Start, the largest differences – especially for the poorest children – are seen where Sure Start reaches 13% of provision. Overall, the picture suggests the value of a mix of different types of provision in promoting take-up, and particularly the importance of having even a small share in the voluntary sector and in Sure Start children's centres.

Discussion and conclusions

This paper set out to investigate the extent of non-take-up of the full duration of the free entitlement to early education, and in particular to explore disparities in take-up between lower-income and higher-income autumn-born children. Nationally, children who claim free school meals for all three years of early primary school are found to be 13.3 percentage points less likely to attend for the full five terms to which they are entitled than children who never claim FSM. We find that household language and ethnicity are also strongly associated with non-take-up: children who speak English as an additional language are nearly three times more likely not to take up their full five terms as children who speak English at home, and non-take-up is particularly high among children from Chinese (71%), Bangladeshi (51%) and Gypsy/Roma/Traveller (44%) backgrounds. However, language and ethnicity account for very little of the FSM gap. Children from persistently poor White British households are at least as likely to be non-attenders as non-poor children who speak English as an additional language, while within most ethnic groups children who will go on to claim FSM are less likely to use their full entitlement than children not eligible for FSM.

We find that local area factors are significantly associated with take-up, indicating that, if these factors are in fact causal, there may be ways in which local authorities can learn from each other to improve access among disadvantaged children. Controlling for individual variables and for poverty in the local area, a high proportion of maintained sector provision is associated with lower take-up overall, which may reflect limited flexibility to offer places in January in maintained nursery classes. Yet the maintained sector is also associated with lower *inequality* in take-up, suggesting that school places are popular with and generally accessible to low-income families. Given these patterns, authorities may want to consider whether maintained provision can become more flexible with more entry points during the year, and to monitor whether this affects overall inequalities in access. Meanwhile, having at least 10% of places in the voluntary sector appears to allow flexibility, and is related to higher take-up among all children – including the poorest – without the wide inequalities associated with private sector dominance. And having a share of places – even 5-10% – in Sure Start children's centres is associated with both higher take-up and lower inequality. Local authorities where the private sector is very large could consider whether increasing support to voluntary sector providers might plausibly enable more lower income children to access their free hours – although their ability to take such action will be hampered by new funding formula rules. Our findings also add to concerns about the squeeze on Sure Start delivery that has followed local authority funding cuts, and raises questions about the 2011 decision to remove the requirement for Sure Start centres in disadvantaged areas to provide early education - particularly given earlier evidence that this model of provision can be related to improved access for low-income families, and to child development (Sammons et al, 2015).

Controlling for local provision and for local poverty rates explains some but not all of the differences in take-up by free school meal status. The final row of Table 3 (above) shows that the gradient in non-take-up flattens considerably after these controls are introduced, along with the other child-level factors, but that significant disparities between children from different income backgrounds remain. There is still an estimated 8 percentage point difference between children who are 'never FSM,' and those 'always FSM.' This suggests that there is more to be done in identifying and addressing possible barriers to access among low-income families, beyond considering the make-up of local provision as a potential lever.

As always, this study has a number of limitations. Key is our use of future FSM as a proxy for low income. This is the best measure we can construct given the data available, but it is an inexact representation of family income levels at the time of interest. On the other hand, children eligible for free school meals are targeted for intervention throughout their school years. By effectively comparing the pre-school histories of children who were FSM in early primary school to their non-FSM peers, we are adding to the evidence on factors that may be associated with early differences recorded once in compulsory schooling. Of course, FSM provides a crude cut-off point for defining groups of children, but we attempt to address this and add nuance by splitting where possible by the number of times children claim. That we find a linear gradient according to the number of years in which a child claimed

FSM indicates that our findings here may carry beyond the FSM / non-FSM divide, and may apply to low-income children who do not meet the criteria for free school meals but who may in practice be equally or more materially deprived.

This paper looks at full take-up among those children who are eligible to the longest duration of funded hours, and not at ever attending among all children. Whether the patterns we describe here can be extrapolated to families who access no early education is unknown. In future research, we will examine children who are not recorded as accessing funded education until primary school, in order to explore whether the same or different influences appear to be at play.

Finally, the cohort of children analysed in this paper are not the most recent. They were chosen, as explained, as the last available cohort for whom a reasonably reliable longitudinal, gradated proxy of income level can be constructed. One advantage of focussing on these children is that they are the same cohort examined by Blanden et al (2016), who find little association between local levels of take-up and children's FSP scores, with limited evidence that the places narrow gaps between low-income and other children. Our analyses suggest that one explanation for this finding may be the unequal duration of attendance between groups in the terms preceding the immediately pre-school year. Non-attendance at the beginning of their funded entitlement may be diluting the potential effects of the policy on low-income children.

How informative are our results likely to be about the way the entitlement works today? One substantive policy introduced since our cohort were three-year-olds is the roll-out of free places for disadvantaged two-year-olds. This policy may be expected to have increased the number of children taking up the full duration of their three-year-old entitlement, because more children could already be accessing early education at the time they turn three. However, there has been little movement in overall indicators of take-up among three-year-olds since the two-year-old places were introduced (DfE, 2016). This may be because the children most at risk of non-take-up at three are also not taking up their places at two; as of January 2016, take-up for eligible two-year-olds was only 68%. It seems likely, then, that our findings are of continuing relevance.

This is not least because recent policy shifts in England are working in the opposite direction to the two-year-old entitlement, increasing the extent to which subsidies for early education are concentrated disproportionately on children who least need a head start. The new extension of the free entitlement to 30 hours applies to children of working parents only, while age eligibility will follow the same rules as the 15 hours. Thus an autumn-born child in a higher income working family will benefit from five terms at 30 hours compared to three terms at 15 hours for a summer-born child in a family whose parents are unemployed. Without serious attention to this issue, the universal free places, while hailed as a great success in the prevalent policy discourse, look set to play a part in embedding or widening inequalities, in direct contrast to stated policy aims.

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Table 1: Sample characteristics and descriptive statistics

	Proportion of sample	N	Non-attendance rate (%)
Number of times free school meals (FSM) claimed			
Never	76.9	158,222	15.7
Once	5.5	11,360	24.5
Twice	5.9	12,225	27.4
Thrice	11.7	24,058	29.0
Ever (once, twice, or thrice)	23.2	47,643	27.5
Language			
English	77.5	159,560	13.8
Primary home language other than English (EAL)	17.3	35,629	38.5
Missing information	5.2	10,676	19.4
Ethnicity			
Bangladeshi	1.6	3,281	50.8
Gypsy / Roma / Irish Traveller	0.2	400	44.3
Any other ethnic group	1.7	3,482	39.4
Black African	3.6	7,349	37.4
Pakistani	4.2	8,561	36.5
Any other White group	4.6	9,412	34.1
Any other Asian	1.9	3,888	30.6
Any other Black	0.8	1,540	29.6
Chinese	0.4	796	27.1
Indian	2.8	5,747	26.9
Black Caribbean	1.1	2,315	26.1
Any other mixed	1.9	3,830	22.5
White and Black Caribbean	1.4	2,866	22.4
White and Black African	0.7	1,419	22.2
Missing information	2.0	4,061	21.7
White Irish	0.3	541	20.3
White and Asian	1.3	2,584	19.7
White British	69.9	143,793	12.7
Month of birth			
September	25.9	53,294	15.4
October	25.7	52,808	17.0
November	24.4	50,160	19.3
December	24.1	49,603	22.1
Gender			
Girl	48.9	100,665	18.3
Boy	51.1	105,200	18.5
Whole sample	100	205,865	18.4

Notes: sample includes children born in autumn 2006 who were attending early education in January 2011. Non-attendance refers to January 2010. Source: National Pupil Database.

Table 2: Patterns of non-attendance: logistic regression with individual controls only

	Coefficient	Standard error
Number of times free school meals (FSM) claimed		
Never	Ref.	
Once	0.52***	(0.02)
Twice	0.69***	(0.02)
Three times	0.81***	(0.02)
Language		
English	Ref.	
Primary home language other than English (EAL)	0.75***	(0.02)
Missing information	0.36***	(0.03)
Ethnicity		
White British	Ref	
Bangladeshi	1.24***	(0.04)
Indian	0.47***	(0.04)
Any other Asian	0.61***	(0.04)
Pakistani	0.76***	(0.03)
Black African	0.76***	(0.03)
Black Caribbean	0.68***	(0.05)
Any other Black	0.62***	(0.06)
Chinese	0.41***	(0.08)
Any other mixed	0.40***	(0.04)
White and Asian	0.36***	(0.05)
White and Black African	0.38***	(0.07)
White and Black Caribbean	0.50***	(0.05)
Any other ethnic group	0.89***	(0.04)
White Irish	0.60***	(0.11)
Traveller Irish Heritage	1.45***	(0.18)
Any other White	0.84***	(0.03)
Gypsy / Roma	1.29***	(0.13)
Missing information	0.49***	(0.05)
Month of birth		
September	Ref	
October	0.12***	(0.02)
November	0.29***	(0.02)
December	0.45***	(0.02)
Gender		
Boy	Ref	
Girl	-0.022+	(0.01)
Constant	-2.35***	(0.02)
Observations	205,865	

Notes: sample includes children born in autumn 2006 who were attending early education in January 2011. Non-attendance refers to January 2010. Figures are logistic regression coefficients with standard errors in parentheses: $^{+}$ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. Source: National Pupil Database.

Table 3: Predicted probabilities of non-attendance by FSM status, before and after controlling for ethnicity and EAL

	Never FSM	Once FSM	Twice FSM	Always FSM
Predicted probability of not attending, no controls	16	24	27	29
Predicted probability of not attending, after individual controls	16	23	26	28
Predicted probability of not attending, after individual and local controls	17	22	24	25

Note: sample includes children born in autumn 2006 who were attending early education in January 2011. Non-attendance refers to January 2010. Individual controls are EAL, ethnicity, gender and month of birth. Local controls include IDACI and local authority make-up of provision (percentage each of voluntary, private, Sure Start and maintained sector provision). Source: National Pupil Database.

Table 4: IDACI and local authority make-up of provision

	Min	Max	Mean	Median	Standard Deviation
IDACI	0	99.4	22.7	18.3	17.0
Local authority provision					
Maintained	0.2	97.8	46.6	47.5	25.5
Voluntary	0	52.6	14.2	10.5	12.5
Private	2.2	94.3	32.0	29.6	16.6
Sure Start	0	25.8	1.1	0	3.2
All other provision	0	79.7	6.1	4.7	8.5

Note: Figures on IDACI relate to children in the sample (children born in autumn 2006 who were attending early education in January 2011). Figures on Local authority provision refer to the 150 local authorities in which the children in the sample live. ‘All other provision’ includes independent nursery schools and childminders. The local authority in which all other provision comprises 79.7 is a rural authority with a high prevalence of childminders. This is an outlier: the second highest percentage for all other provision is 26.2. All results presented in the paper include this local authority, but robustness checks were run which found excluding this LA makes no difference.

Table 5: Patterns of non-attendance: logistic regression with individual controls and local IDACI

	(1) Without interaction	(2) With interaction
Number of times claimed free school meals (FSM)		
None	Ref.	Ref.
Once FSM	0.36***	0.71***
	(0.02)	(0.05)
Twice FSM	0.49***	0.83***
	(0.02)	(0.05)
Three times FSM	0.55***	1.08***
	(0.02)	(0.04)
IDACI 2011	1.76***	2.22***
	(0.04)	(0.05)
Number of times claimed FSM interacted with IDACI		
Never FSM*IDACI	Ref.	Ref.
Once FSM*IDACI		-1.17***
		(0.14)
Twice FSM*IDACI		-1.10***
		(0.13)
Three times FSM*IDACI		-1.55***
		(0.10)
Constant	-2.68***	-2.78***
	(0.02)	(0.02)
Observations	205,865	205,865

Note: sample includes children born in autumn 2006 who were attending early education in January 2011. Non-attendance refers to January 2010. All regressions also control for individual characteristics (EAL, ethnicity, month of birth and gender). Figures are logistic regression coefficients with standard errors in parentheses: + p < .10, * p < .05, ** p < .01, *** p < .001. Source: National Pupil Database.

Table 6: Patterns of non-attendance: logistic regression with individual control, local IDACI and make-up of provision at local authority level

	Maintained		Private		Voluntary		Sure Start	
	Model 1	Model 2 (interacted)	Model 1	Model 2 (interacted)	Model 1	Model 2 (interacted)	Model 1	Model 2 (interacted)
Number of times FSM								
Never	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Once	0.37***	0.62***	0.36***	0.20***	0.37***	0.29***	0.37***	0.37***
	(0.02)	(0.06)	(0.02)	(0.05)	(0.02)	(0.03)	(0.02)	(0.03)
Twice	0.49***	0.76***	0.49***	0.23***	0.49***	0.45***	0.49***	0.51***
	(0.02)	(0.06)	(0.02)	(0.05)	(0.02)	(0.03)	(0.02)	(0.02)
Thrice	0.54***	0.86***	0.55***	0.29***	0.55***	0.49***	0.56***	0.58***
	(0.02)	(0.04)	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
Maintained provision in LA	0.0080***	0.0095***						
	(0.00)	(0.00)						
Never FSM * Maintained		Ref.						
Once FSM * Maintained		-0.0047***						
		(0.00)						
Twice FSM * Maintained		-0.0050***						
		(0.00)						
Thrice FSM * Maintained		-0.0056***						
		(0.00)						
Private provision in LA			-0.0076***	-0.010***				
			(0.00)	(0.00)				
Never FSM * Private				Ref.				
Once FSM * Private				0.0057***				
				(0.00)				
Twice FSM * Private				0.0092***				
				(0.00)				
Thrice FSM * Private				0.0097***				
				(0.00)				

Voluntary provision in LA					-0.016***	-0.017***		
					(0.00)	(0.00)		
Never FSM * Voluntary						Ref.		
Once FSM * Voluntary						0.0071***		
						(0.00)		
Twice FSM * Voluntary						0.0037+		
						(0.00)		
Thrice FSM * Voluntary						0.0054***		
						(0.00)		
Sure Start in LA							-0.019***	-0.014***
							(0.00)	(0.00)
Never FSM * Sure Start								Ref.
Once FSM * Sure Start								-0.0030
								(0.01)
Twice FSM * Sure Start								-0.015
								(0.01)
Three times FSM * Sure Start								-0.023***
								(0.01)
IDACI 2011	1.41***	1.41***	1.57***	1.58***	1.50***	1.50***	1.77***	1.77***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Constant	-2.96***	-3.04***	-2.38***	-2.31***	-2.38***	-2.36***	-2.66***	-2.66***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Observations	205865	205865	205865	205865	205865	205865	205865	205865

Notes: Models focus in turn on each provider type. The first two columns show results of regressions where the percentage of provision in the maintained sector is the key explanatory variable, without controls for shares in other provider types. The remaining columns do the same for the other three types of provider. The sample includes children born in autumn 2006 who were attending early education in January 2011. Non-attendance refers to January 2010. All regressions also control for individual characteristics (EAL, ethnicity, month of birth and gender) and for the IDACI of the LSOA where the child lives (in levels, without interaction). Figures are logistic regression coefficients, with standard errors in parentheses: + p < .10, * p < .05, ** p < .01, *** p < .001. Source: National Pupil Database

Table 7: Percentage difference in the odds of non-attendance associated with differently sized sectors

Percentage points differences:	Never FSM	Once FSM	Twice FSM	Always FSM
Maintained sector				
One ppt	1.0%	0.5%	0.5%	0.4%
Five ppt	4.9%	2.4%	2.3%	2.0%
Ten ppt	10.0%	4.9%	4.6%	4.0%
Private sector				
One ppt	-1.0%	-0.4%	-0.1%	0.0%
Five ppt	-4.9%	-2.1%	-0.4%	-0.1%
Ten ppt	-9.5%	-4.2%	-0.8%	-0.3%
Voluntary sector				
One ppt	-1.7%	-1.0%	-1.3%	-1.2%
Five ppt	-8.1%	-4.8%	-6.4%	-5.6%
Ten ppt	-15.6%	-9.4%	-12.5%	-11.0%
Sure Start				
One ppt	-1.4%	*-1.7%*	*-2.9%*	-3.6%
Five ppt	-6.8%	*-8.1%*	*-13.5%*	-16.9%
Ten ppt	-13.1%	*-15.6%*	*-25.2%*	-30.9%

Note: Results calculated from regressions presented in Table 6, where each sector is the focus of a separate set of models. Italics indicate differences derived from coefficients denoted non-significant at the 10% level.

Figure 1: Data structure

2010

Early Years Census

Information on: funded attendance at private, voluntary and independent pre-school settings

2010

Schools Census

Information on: funded attendance at school nursery and local authority nursery schools

2011

Early Years Census

Information on: funded attendance at private, voluntary and independent pre-school settings; gender, ethnicity (incomplete), home language (incomplete), month of birth, location (lower super output area)

2011

Schools Census

Information on: attendance at school nursery and local authority nursery schools; gender, ethnicity (incomplete), home language (incomplete), month of birth, location (lower super output area)

2012 - Reception

Schools Census

Information on ethnicity, home language, FSM claiming

2013 – Year 1

Schools Census

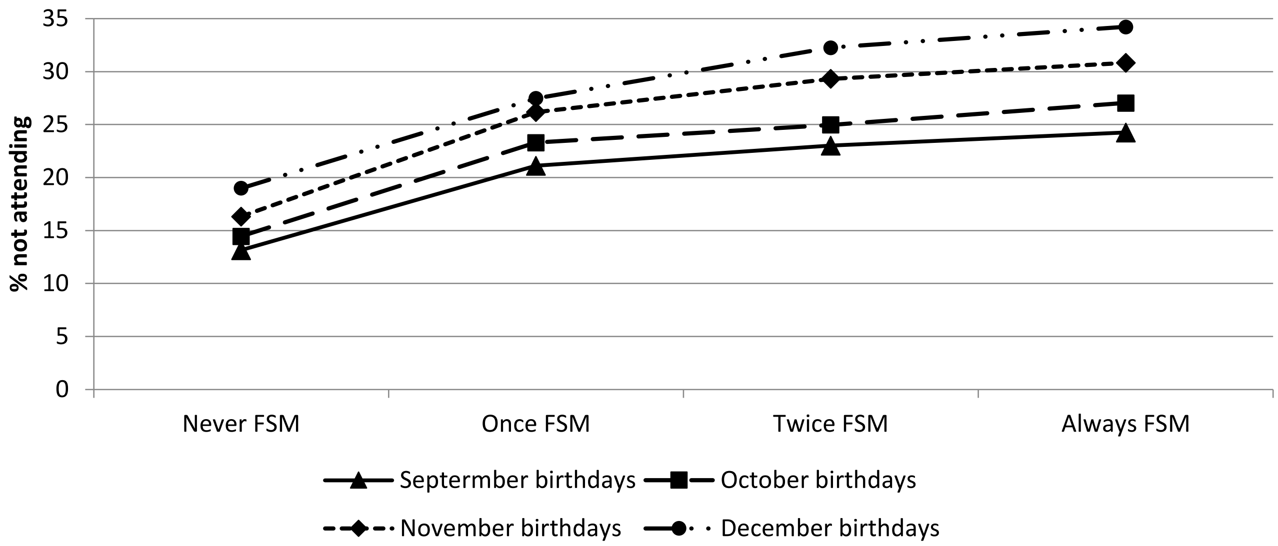
Information on ethnicity, home language, FSM claiming

2014 – Year 2

Schools Census

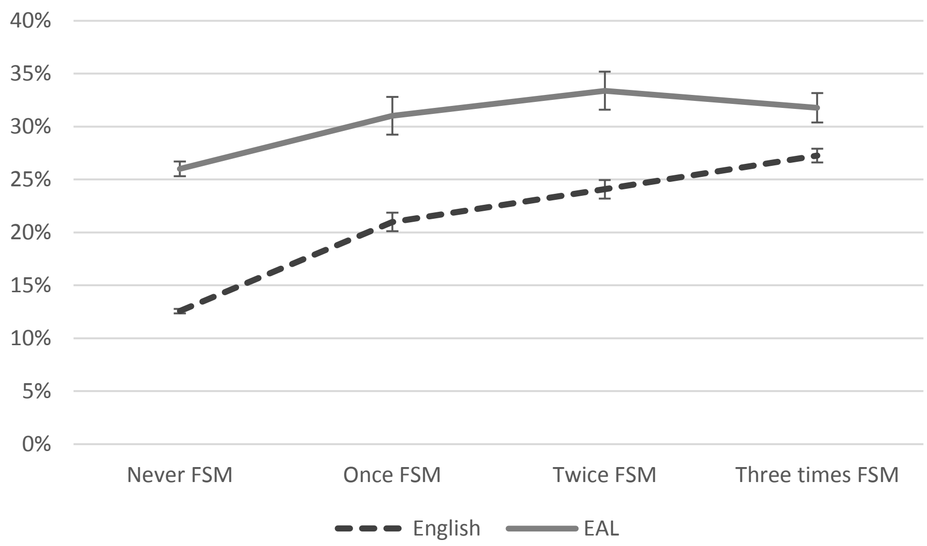
Information on ethnicity, home language, FSM claiming

Figure 2: patterns of non-attendance at commencement of free early education entitlement: percentage of children from each FSM and month of birth group not attending



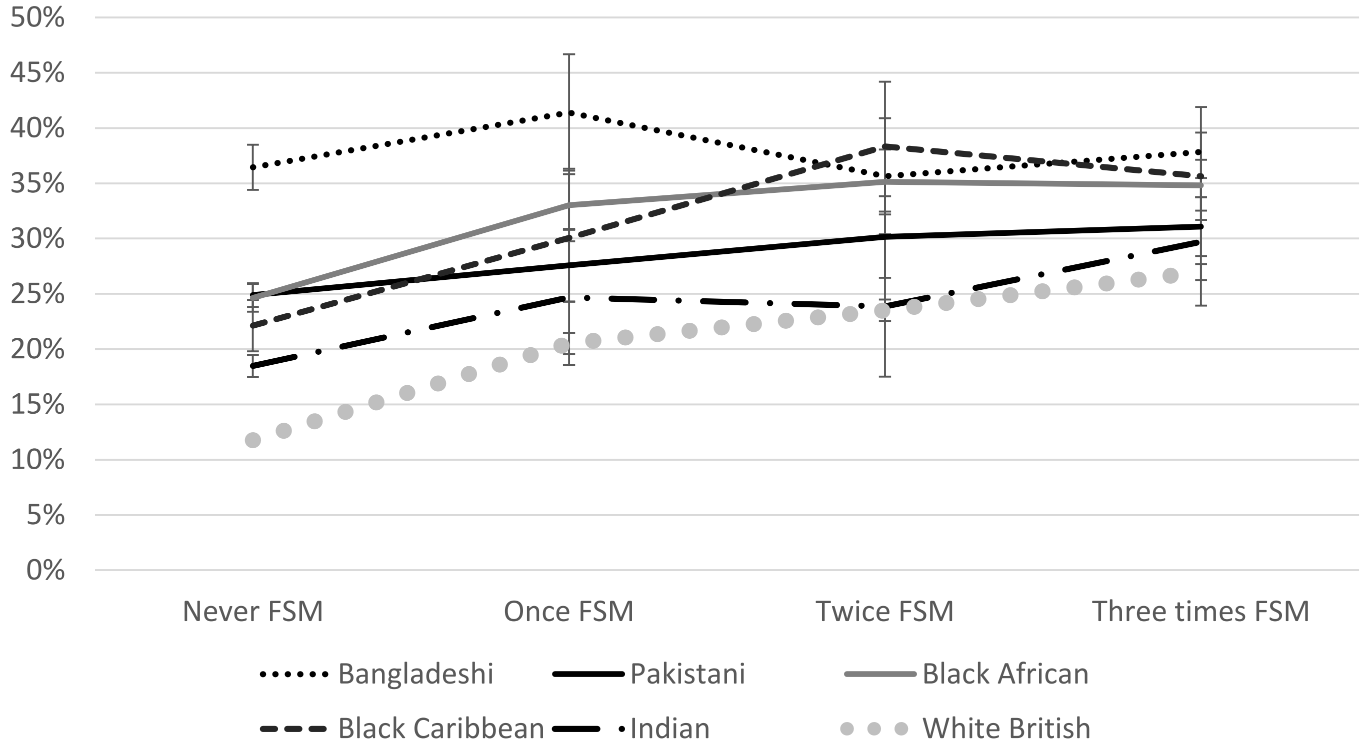
Notes: sample includes children born in autumn 2006 who were attending early education in January 2011. Non-attendance refers to January 2010.

Figure 3: patterns of non-attendance at commencement of free early education entitlement: marginal means from logistic regression estimating relationships between FSM x EAL and non-attendance, taking all other modelled factors into account



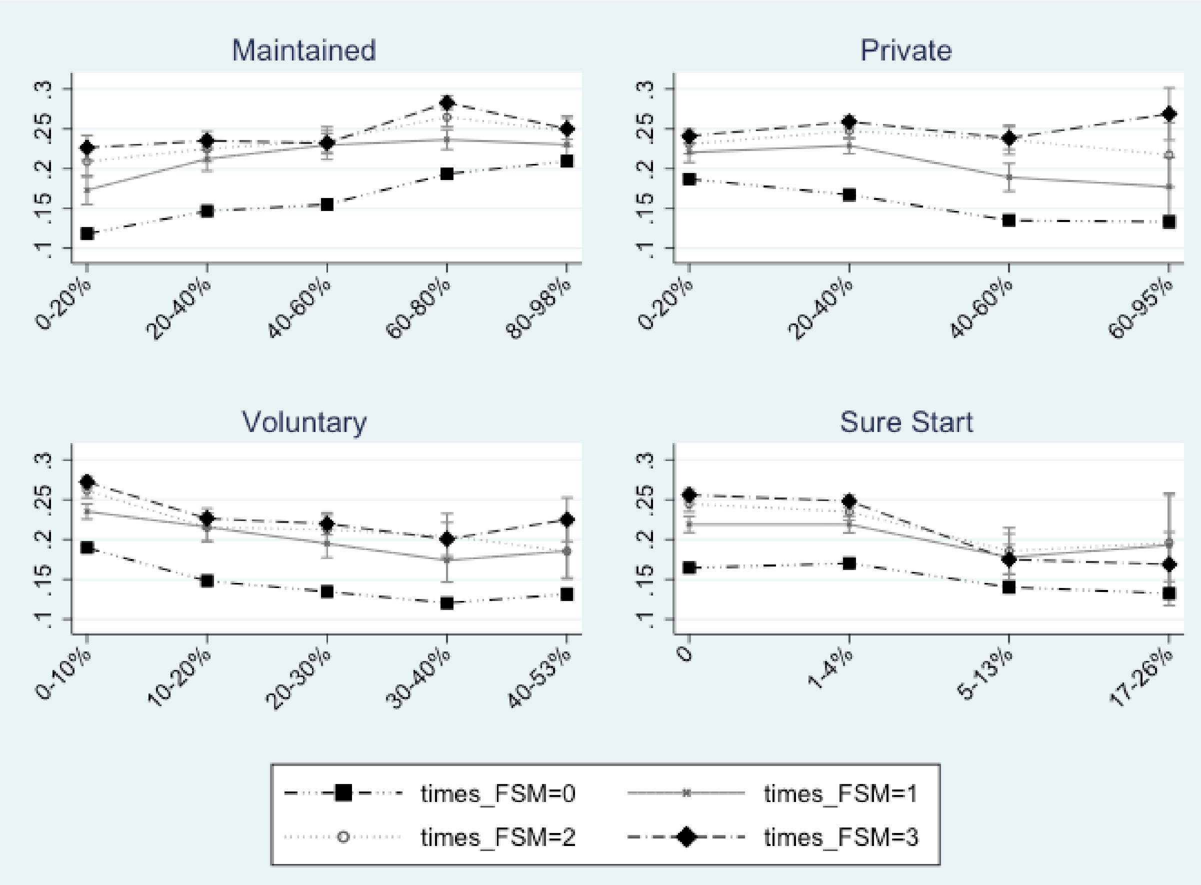
Notes: sample N=205,865 and includes children born in autumn 2006 who were attending early education in January 2011. Non-attendance refers to January 2010. Error bars = 95 CI for marginal mean. Logistic regression controlled for month of birth, gender, ethnic group.

Figure 4: patterns of non-attendance at commencement of free early education entitlement: selected marginal means from logistic regression estimating relationships between FSM x ethnicity and non-attendance, taking all other modelled factors into account



Notes: sample N=205,865 and includes children born in autumn 2006 who were attending early education in January 2011. Non-attendance refers to January 2010. Error bars = 95 CI for marginal mean. Logistic regression controlled for month of birth, gender, ethnic group.

Figure 5: Predicted probability of non-attendance by the share of provision in the local authority in particular sectors



Note: Each panel is based on a separate logistic regression, controlling for individual characteristics (EAL, ethnicity, birth month and gender) and for local IDACI. In each panel, local authorities are split into either quartiles or quintiles according to the prevalence of provision in each sector. Error bars = 95% confidence intervals for the marginal means.