The causal impact of breakfast club provision on academic attainment

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Abstract

This paper investigates the impact of universal free breakfast provision for relatively disadvantaged schools on students’ academic attainment using a randomised controlled trial, finding a meaningful and significant positive impact. The large scale – 106 schools – and ‘real-world’ implementation setting allow us to estimate externally valid effects of the intervention. Using rich administrative data on pupil test scores linked to survey data on a wide range of potential mechanisms, we find that universal breakfast provision has a positive impact on pupil attainment of over 10% of a standard deviation after one year, equivalent to around two months’ expected pupil progress. The most likely mechanism for this marked increase is improvement in the classroom environment, which affects all pupils through positive peer effects, although increased learning time may also play a role. The improvements are generally as strong or stronger for pupils who were already eating breakfast at baseline, suggesting that the content and/or context of the school breakfast is an important element of the intervention.

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1. Introduction

Motivated by the links between nutrition and cognition established in the biological literature, school leaders and education policymakers are turning to programmes that alleviate pupil hunger to improve academic outcomes, pupil behaviour, and attendance, particularly among students from disadvantaged backgrounds.

While studies in developing countries consistently find that school feeding programmes have positive effects on academic achievement and health, there is less evidence for their efficacy and cost-effectiveness in richer countries with much lower rates of severe malnutrition. Progress has been made in evaluating existing programmes using quasi-experimental methods (e.g. Frisvold, 2015), but much of the existing evidence is based on studies suffering from methodological issues such as absent control groups (Grantham-McGregor, 2005). Studies that do use a randomised controlled trial design tend to focus on non-academic outcomes (such as pupil health or eating behaviour), and there is often insufficient data to evaluate the relative strength of the potential mechanisms through which breakfast provision can operate.

In this paper, we use evidence from a large-scale randomised controlled trial in England to evaluate the impact on pupil test scores of providing universal free school breakfasts in schools with a relatively disadvantaged pupil intake. The large number of participants – 106 schools – and ‘real-world’ implementation setting allow us to capture the effects of the intervention when operating at a realistic scale. To our knowledge, our paper is also the first study to collect detailed data on the costs actually incurred by the programme administrator and by individual schools.

Using rich administrative data on pupil test scores linked to survey data on a wide range of potential mechanisms, we find that universal breakfast provision has a positive impact on pupil attainment of over 10% of a standard deviation after one year, equivalent to around two months’ expected pupil progress. The most likely mechanism for this marked increase is improvement in the classroom environment, although increased learning time may also play a role.

As a result of the intervention, students in treatment schools were 15 percentage points more likely to eat breakfast at school, and three percentage points more likely to eat breakfast overall. This suggests that school breakfast eating, not just breakfast eating itself, played a major role in driving our results. This could reflect the content of the breakfast, such as healthier food options, or the context, including the timing of the meal and the social environment in which the food was served.

The average cost of the intervention was £23.72 per eligible pupil per year (£7,418.32 for an average-sized intervention school in our sample), although there was substantial heterogeneity in the reported costs of delivering the intervention in each school. This
compares favourably with other interventions that have had a similar effect on academic outcomes, such as the universal provision of Free School Meals, which cost around £223 per pupil per year (Brown et al., 2012).

2. Background

School nutrition and in particular school breakfasts have been a focus for policymakers in both developing and more affluent countries. Recent interventions include higher nutritional standards for the U.S. School Breakfast Program; government-funded expansion of the KickStart school breakfast programme in New Zealand; and the English Department for Education’s 2013 commitment to provide breakfast clubs in schools where at least 35 per cent of pupils are eligible for Free School Meals (FSM), a measure of disadvantage.

The nutrition literature offers evidence of several direct links between breakfast consumption and pupil learning. First, in children with poor nutrition, school feeding programmes can help compensate over time for deficiencies in key nutrients that would otherwise harm children’s school performance. For example, deficiencies in B-vitamins such as thiamine and choline have been linked to decreased concentration and cognitive performance (Fernstrom, 2000; Chenoweth, 2007), while even the very early stages of iron deficiency can impair cognition (Pollitt, 1993). Interventions to replace these nutrients in deficient children have been shown to improve cognitive performance (Agaoglu et al., 2007).

While the attenuation of nutrient deficiencies need not occur through a breakfast programme, the nutrition literature also suggests that morning feeding could have additional benefits for learning. During the overnight fast, the body’s levels of glucose (the most readily available fuel for the brain) drop. Breakfast restores the level of this easily-accessible fuel. The effects are particularly strong for children, whose bodies use glucose at a faster rate than adults (Sprague and Arbeláez, 2011), and for tasks requiring sustained attention or perseverance (Benton et al., 1987). Breakfast foods that lead to smaller, more sustained increases in blood sugar (such as those rich in fibre or protein) are associated with better cognitive performance, particularly over the course of the morning several hours after breakfast consumption (e.g. Mahoney et al., 2005; Wesnes et al., 2003; and Fischer et al., 2002).

Consistent with these biological predictions, evidence from developing countries strongly suggests that school breakfast programmes can raise academic attainment and improve children’s health, with particularly strong effects for stunted or malnourished children (e.g.

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1 Although it prefers glucose when sufficiently available, the brain can also run on ketones during periods of limited glucose supply. Some studies have found long-term benefits of ketogenic diets or eating schedules such as intermittent fasting (e.g. Gasior et al., 2008; Hallböök et al., 2011). However, the effects in children are less well studied.
Jacoby et al. (1996), Powell et al. (1998), Simeon (1998), and Cueto and Chinen (2008)). For example, Powell et al. (1998) employ a within-school randomised study design to find that provision of a school breakfast for pupils in grades 2-5 (age 6 to 9) in Jamaica improves nutritional status, school attendance, and achievement in arithmetic. Jacoby et al. (1996) find positive short-term impacts on students’ attendance, as well as improvements in performance on a vocabulary test for stunted children, following a breakfast intervention in five Peruvian schools.

In the U.S., where the School Breakfast Programme (SBP) has been running since 1966, some evidence suggests that breakfast programmes can be an effective intervention in a country with far lower rates of acute malnutrition (albeit unusually high levels of food insecurity for the developed world (OECD, 2014)). An evaluation of Minnesota’s three-year universal school breakfast pilot found that students exposed to the intervention tended to improve their percentile rank on standardised tests written at age 11, relative to their rank three years earlier (Minnesota Department of Children, Families, and Learning, 1998). Massachusetts’ expansion of its SBP led to improved test scores and lower rates of absence and tardiness among low-income elementary school children aged 8 to 11 (Meyers et al., 1989).

Unfortunately, much of this evidence is based on studies with methodological flaws such as inappropriate or absent control groups. More recently, some progress has been made in using quasi-experimental methods to evaluate school breakfast programmes in the U.S. more robustly. Leos-Urbel et al. (2013) conclude that universal, free provision in New York City increased breakfast take-up through mechanisms other than price, but had few effects on academic outcomes. Bhattacharya et al. (2006) exploit the lack of SBP provision outside of term time in a difference-in-difference strategy, finding that the programme improves nutrition but does not increase overall breakfast consumption. This finding is echoed by Frisvold (2015), who uses variation in state mandates for school-level participation in the SBP to evaluate the impact of offering the programme. He concludes that the availability of a breakfast programme increases student attainment in math by around 0.3 standard deviations. Based on the mechanisms considered, Frisvold concludes that the effect is mostly mediated by influencing the content of students’ breakfasts.

While evaluations of the SBP tend to report positive effects of breakfast provision on academic outcomes, evidence from other developed countries is less conclusive. Ni Mhurchu et al. (2013) evaluate a one-year cluster randomised trial involving 14 relatively disadvantaged schools in New Zealand. They find no significant impacts of breakfast on school attendance rates or academic attainment (but do find a significant decrease in pupil-reported hunger). In an English RCT, Shemilt et al. (2004) find that breakfast provision reduces absences and improves student concentration (though it also worsens conduct), but it is not known whether these effects feed through to attainment as they do not analyse academic data. Murphy et al. (2010) use an experimental design to evaluate the effects of free
school breakfasts in Wales, finding positive effects for pupil diet, with more ‘healthy’ breakfast items consumed, but no effect on memory or behaviour.

Our evaluation provides evidence from a large-scale randomised controlled trial on the impact of breakfast club provision on a range of pupil outcomes, focusing on relatively disadvantaged schools in England. The outcomes are chosen to show the direct effect of breakfast club provision on academic attainment and the mechanisms through which any effect occurs. These findings are particularly relevant for England and the UK, but of interest internationally given the limited existing evidence from randomised controlled trials.

3. Model

Based on the existing literature, there are multiple mechanisms through which the provision of a universal free breakfast club could impact pupil attainment. This is illustrated in the following model, where $Y_{it}$ denotes attainment for pupil $i$ in year $t$:

$$Y_{it} = f(Y_{i(t-1)}, Q_{it}, E_{it}, L_{it})$$

$$L_{it} = f(L_{it}, H_{it})$$

$$E_{it} = f(E_{it}, E_{i}, H_{it})$$

$$Q_{it} = f(E_{it}, Q_{i}, L_{it})$$

$Y_{i(t-1)}$ denotes attainment for pupil $i$ in the previous period, consistent with a model of accumulating human capital. $L_{it}$ is the learning time for pupil $i$ in year $t$, under the assumption that the length of schooling affects human capital accumulation. In turn, $L_{it}$ is also affected by the attendance habits of peers ($L_{it}$) and health of pupil $i$ in year $t$ ($H_{it}$). Pupil $i$’s effort in year $t$, $E_{it}$, is comprised of a fixed component ($E_{i}$), the effort of the classroom ($E_{it}$), and the health of pupil $i$ in year $t$ ($H_{it}$), which affects the productivity of learning. Individual effort and classroom effort can be interpreted as general productivity parameters, including improving behaviour and concentration in the classroom.

$Q_{it}$ denotes the effectiveness of the classroom teacher of pupil $i$ in year $t$, which is in turn comprised of a fixed component of teacher quality ($Q_{i}$), a component that is influenced by the effort of the classroom ($E_{it}$), and the attendance behaviours of the class ($L_{it}$). The last term captures both the disruption introduced by frequent late arrivals in class and the effect of multiple absences, which can undermine teachers’ efforts to scaffold learning at a similar rate for the whole class.

The provision of a universal free breakfast club affects pupil attainment through multiple channels. First, decreasing pupil hunger may affect the productivity of time in the classroom, both through the direct effect ($E_{it}$) and health ($H_{it}$) of pupil $i$, and through the
productivity of the classroom environment ($E_{it}$). The intervention’s effect on the health of pupil $i$ could be positive (e.g., reduced nutrient deficiencies) or negative (e.g., pupils are less well-rested because they arrive earlier at school).

Improved nutrition and decreased hunger may also increase time in school through increased health (and correspondingly fewer illness-related absences), which may have a positive multiplier effect on other children in the classroom through peer effects ($L_{it}$). In addition, before-school delivery of the breakfast programme could improve punctuality and increase total learning time by incentivising earlier arrival and reducing the complexity of the morning routine for parents and pupils.

Teacher effectiveness ($Q_{it}$) is influenced not only by a fixed component of teacher quality, but the effort and attendance of pupils in the classroom. This can be thought of more generally as the classroom environment, which affects the productivity of the teacher’s effort and motivation to provide such effort. The model makes clear that pupil attainment is affected by individual and group effort, both of which can be influenced by the provision of a breakfast club. Hungry and possibly more disruptive children have the potential to reduce pupil attainment for the whole class, while breakfast club provision may alleviate this.

Head teachers in participating schools referred to each of these mechanisms in their motivations for joining the trial, wanting to jointly address the problems of pupil hunger, low attendance and punctuality, and poor behaviour. They also anticipated that a breakfast club would promote a welcoming community ethos within the school and that it would support parents by providing early childcare and reducing the stress of the morning routine.

Our intervention (discussed in detail below) estimates the reduced form effect of provision of a universal free breakfast club on pupil attainment, but allows exploration of each potential mechanism outlined above.

4. Intervention

This section describes the randomised controlled trial used to quantify the impact of breakfast club provision on pupil attainment and associated mechanisms. There were two eligibility criteria for school participation: a disadvantage criterion requiring at least 35 per cent of pupils to be eligible for Free School Meals (or 50 per cent of students eligible in the last six years), and a limited provision criterion requiring schools to have no existing breakfast provision (or very limited ad hoc provision attended by fewer than six per cent of pupils). Although 1,765 schools meeting the disadvantage criterion were identified, most of these already offered some form of breakfast provision and so were ineligible. Of the 374 eligible schools, 106 agreed to the terms of the intervention and were enrolled in the trial.
The 106 participating schools were randomly assigned within strata to the treatment or control group, which each had 53 schools. Strata were defined according to three characteristics drawn from the publicly-available school census and performance tables: infant school status (i.e. teaches only children ages 4-7); prior school-level average attainment above median in the sample; and share of pupils with English as an Additional Language (EAL) above median in the sample.

Treatment schools received support from Magic Breakfast, a charity that supports breakfast clubs in disadvantaged schools, to establish a universal, free, before-school breakfast club in the academic year 2014/15. This support included the provision of free food (as much as required, ordered by the school); £300 in capital funding to defray set-up costs; and ongoing advice from a Magic Breakfast liaison about establishing and maintaining breakfast club delivery. Food items provided included cereals, wheat biscuits, porridge, bagels, and juice. Schools were responsible for providing the breakfast club environment, preparing the breakfast foods, procuring sundry items (such as milk or spreads), and arranging for staff or volunteers to set up and supervise the breakfast club.

In order to minimise attrition, the evaluation employed a wait-list design. Control group schools who completed the follow-up survey at the end of the intervention academic year received two years of support to establish their own breakfast clubs, beginning in academic year 2015/16. Following a ‘business as usual’ control condition, control schools were permitted to establish their own breakfast initiatives during the intervention year. Around 40 per cent of control schools who responded to the follow-up survey did so, in most cases establishing a free offer. In addition, around 90 per cent of schools in the control group that responded to the follow-up survey also held a breakfast club for Year 6 pupils during the week of testing for national exams. Although both of these activities are in keeping with the ‘business as usual’ control condition, the relatively high prevalence of breakfast clubs in control schools and the very high levels of breakfast provision during the Key Stage 2 tests may attenuate the observed differences in outcomes between intervention and control schools.²

There was limited fidelity to the agreed intervention. Overall, just one-third of schools that responded to the follow-up head teacher survey established a free, universal, before-school

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² As control schools were not surveyed about their motivations for establishing breakfast provision during the intervention, it is not possible to determine the extent to which this was driven by a specific reaction to the intervention, such as compensatory rivalry (Cook and Campbell, 1979), as opposed to a general trend also common to schools not involved in this RCT. In the former case, the control group activity cannot be considered ‘business as usual’ as it has been induced by the RCT evaluation method itself, and the estimates presented here will be downward-biased (Sianesi, 2015).
breakfast club as intended. The resulting estimates from the intervention are therefore an intention-to-treat.

Treatment and control schools are well balanced in observable characteristics, with significant differences by treatment status on just two of the 27 observable school-level indicators, which relate to the urban status of the schools. This is shown in Figure 1. Although randomisation occurred within strata defined by school-level characteristics, the right panel of Figure 1 shows that the sample is also fairly well-balanced on pupil-level traits; out of 19 pupil-level characteristics, there are no significant differences at the 5% level.

In accordance with the eligibility criteria, participating schools have a more disadvantaged pupil intake than the average school in England. For example, 43 per cent of pupils are currently receiving FSM in the median school in our sample, compared to 15 per cent of all pupils nationally (DfE, 2015). This is similar to the Community Eligibility Provision threshold in the U.S., where schools with more than 40 per cent of pupils eligible for Free or Reduced Price meals are able to offer universal free breakfasts and lunches (Hewins, 2016). This relative disadvantage is also reflected in the neighbourhoods of schools in our trial; 82 per cent of participating schools are located in the 30 per cent most deprived neighbourhoods. Nevertheless, the median school in our sample was rated as having a ‘Good’ level of effectiveness by the Office for Standards in Education (Ofsted), and just two schools were rated as ‘Inadequate’.

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3 Around one quarter of the 42 treatment group schools that responded to the follow-up head teacher survey had breakfast club provision during the school day (including during the registration period), rather than or in addition to before-school breakfast. Of schools in the intervention group that provided breakfast before the school day as intended, 57 per cent made access both universal and free.

4 Ofsted is the non-ministerial department tasked with inspecting and regulating education services. Schools receive semi-regular inspections, where they are rated on a four-point scale from ‘Outstanding’ to ‘Inadequate’ across domains including leadership, teaching, and overall effectiveness.
Characteristics are standardised to have mean zero and standard deviation one. Differences are computed as the mean in the treatment group less the mean in the control group. Pupil-level variables account for clustering within schools. ‘Religiously affiliated’ includes Church of England and Catholic schools. Ofsted ratings are the most recent available at 2014. Urbanicity is derived from six-point DEFRA scale (‘Rural’ = bottom three tiers, ‘Urban’ = top tier). Average point score and value-added measure are for the previous cohort. Seven infant schools that do not serve pupils at KS2 are excluded. Lower deprivation rank = more deprivation. Lower deprivation score = less deprivation. Absences and late arrivals are measured on the cohort of interest in the 2013/14 school year.

### Baseline Balance Tests

#### School characteristics

- Indicators
  - Religiously affiliated
  - Community School
  - Academy
  - Voluntary or Foundation School
  - Ofsted - Outstanding
  - Ofsted - Good
  - Ofsted - Satisfactory
  - Ofsted - Inadequate
  - Ofsted - Missing
  - School in urban area
  - School in semi-urban area
  - School in rural area
  - Pupils badly behaved
  - Motivation - Improve health
  - Motivation - Reduce hunger
  - Some breakfast provision

- Continuous
  - Number of pupils
  - % Free School Meals
  - % English as Additional Language
  - Maths - % below grade level
  - Maths - % above grade level
  - Reading - % below grade level
  - Reading - % above grade level
  - KS2 Average Point Score
  - KS2 Overall Value-Added Measure
  - Local Deprivation Rank
  - Local Deprivation Score

- Pupil characteristics

- Indicators
  - Female
  - FSM - Currently eligible
  - FSM - Ever eligible
  - SEN - Any recorded
  - English as Additional Language
  - Ethnicity - White
  - Ethnicity - Black
  - Ethnicity - Asian
  - Ethnicity - Mixed
  - Ate breakfast today
  - Ate breakfast at school
  - Hungry at start of day
  - FSP - Good level of development

- Continuous
  - Total Absences
  - Authorised Absences
  - Unauthorised Absences
  - Late Arrivals
  - Reading Score at KS1
  - Maths Score at KS1

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Figure 1: Normalised differences between treatment and control groups at baseline
5. Data

We draw on both the detailed administrative data on pupils’ attendance and academic results in England available in the National Pupil Database (NPD) and on survey data collected by the researchers at baseline (roughly September 2014) and follow-up (roughly June 2015). These are described in turn below, and survey questions are given in full in Online Appendix A.

The NPD contains the results of both teacher- and externally-marked assessments for all pupils in state-funded schools in England. The NPD also has some pupil demographics (including sex, ethnicity, English as an Additional Language status, and eligibility for free school meals) and information on the number of half-day absences per school year, broken down into authorised (e.g. for illness or medical appointments) and unauthorised (e.g. for truancy) absence counts.

We also collected survey data from pupils, teachers, and head teachers at both baseline and follow-up. Pupils were asked, “Did you have breakfast today?” and “Did you have breakfast at school today?” They were also asked to describe or draw the foods they had eaten that morning. The surveys were completed on paper and inputted manually before being linked to the NPD.

At baseline and follow-up, teachers were sent a link to a Google Forms survey measuring the typical level of pupil concentration and behaviour. These surveys included questions such as, “I lose quite a lot of time because of students interrupting the lesson” (multiple choice response with a four-point scale ranging from ‘Strongly disagree’ to ‘Strongly agree’) and “Please give the percentage of your class that are usually ready to learn at the start of the first lesson of the day” (multiple-choice response with banded percentages).

Head teachers were surveyed at baseline about their motivations for joining the trial. Unlike the other surveys, which were completed at the start of the 2014/15 school year in early autumn, the head teacher baseline surveys were completed in June 2014. Completion of the survey was a precondition for participation in the trial. At follow-up, head teachers of control schools were asked about whether a breakfast club had been established and the format of that club. Head teachers in treatment schools were asked about the implementation of the breakfast offer in their school, including format, coverage, banded average attendance at the breakfast club, and detailed questions about cost and staffing requirements. The cost of the intervention in the absence of the trial conditions is presented with the aid of the order sheets from intervention schools during two representative weeks of the intervention (weeks of 2nd and 9th March 2015) as well as information on the regular retail prices of each of the food items.

5 The bandings were: 0-10%, 10-20%, 20-40%, 40-60%, 60-80%, 80-90%, and 90-100%.
The primary outcome measures are national assessments in English and maths taken by all pupils in state-funded schools in England. These assessments are held at the end of each Key Stage (KS) in primary schools, when children are in Year 2 (age 6/7, KS1) and Year 6 (age 10/11, KS2). At KS1, grades are awarded by teachers. At KS2, pupils sit tests in English and maths, which are nationally set and externally marked. Our primary outcomes of interest are average scores in English and maths at KS1 and KS2.

We standardise each outcome within the sample to have a mean of 0 and a standard deviation of 1.

In order to evaluate the importance of the different mechanisms to influence attainment, we use data collected from the surveys and analyse absence data from the NPD. At the pupil level, we analyse total, authorised, and unauthorised absences; breakfast consumption (not necessarily at school); and take-up of the school breakfast offer. At the classroom level, we use factor analysis to define indices of pupil concentration and behaviour. The ordinal alpha reliability alpha scores are 0.892 for the behaviour index and 0.891 for the concentration index (Zumbo, Gadermann, and Zeisser, 2007).

In order to maximise analytical power, and to minimise potential bias from non-response, we allow the sample to differ by outcome. The sample of interest is students in treatment and control schools in Year 2 and Year 6 in the academic year 2014/2015. The effective sample size for academic outcomes is 4,586 pupils in KS1 and 3,907 pupils in KS2 (8,493 in total). This sample includes all students assessed in a treatment or control school in the NPD (those that did not change schools mid-year) with non-missing demographic characteristics (gender, whether ever registered for free school meals, whether any special educational need, whether a non-native English speaker, and major ethnic group) and a full set of academic outcomes (test scores and teacher assessments).

The Department for Education (DfE) matched this sample to the pupil surveys based on pupil name, date of birth, and an administrative reference code. Not all pupils are matched to their survey(s), due to non-response by some schools, pupil absence on the day of the survey, and insufficient or incorrect information to enable the link. In total, 6,834 pupil NPD records were successfully matched to at least one survey response (at baseline or follow-up). When analysing pupil survey responses, the sample is restricted to the pupils that responded to the baseline and follow-up survey and with both surveys linked to the NPD. This leads to a sample of 3,379 (2,019 in Year 2 and 1,359 in Year 6). In addition, some students did not respond to all questions, so there is some variation in the sample size by outcome.

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*At KS1 English is comprised of two separate assessments in reading and writing. Teacher-assessed levels of achievement are converted to an equivalent points scale using published guidance (DfE, 2015b).*
Absence and punctuality were assessed with NPD data, so the sample is based on the main academic analysis sample. However, the analysis sample is restricted to those with absence observed in the previous academic year. Finally, the sample for classroom behaviour and concentration is teachers who responded to both the baseline and follow-up surveys.

6. Empirical Strategy

As schools were allocated randomly to the treatment and control group, in expectation the average characteristics of each group of schools should be identical except for the provision of the breakfast club. As illustrated in Section 4, schools are generally well-balanced on observable characteristics. Despite this, our preferred specifications use linear and non-linear regression analysis to control for pupil and school characteristics that may differ across the groups in order to increase power and remove omitted variable bias from unbalanced observable characteristics. For each outcome variable and mechanism $Y_{it}$ outlined above, we estimate a reduced form of the model outlined in section 3:

$$Y_{it} = \alpha + \beta T_{it} + \gamma X_{it} + \epsilon_{it}$$

Where $T_{it}$ is equal to one if pupil $i$ is assessed in a treatment school with breakfast club provision in year $t$, and equal to zero otherwise. For continuous dependent variables the coefficient of interest, $\beta$, is the difference in the standardised outcome between treatment and control groups, on average, conditional on a vector of pupil and school characteristics that may differ across the two groups ($X_{it}$). The effect size is computed through ordinary least squares (OLS) regression for all outcomes except the two relating to pupil breakfast consumption, for which the effect size is the average marginal effect following a logistic regression. For outcomes which are measured at the pupil level, OLS is run at the pupil level, controlling for randomisation strata, the relevant baseline measure, pupil demographics, and school characteristics.\(^7\)

It is likely that the unobservable characteristics of pupils and teachers will be correlated within schools. We have taken this clustering into account using robust standard errors (clustered sandwich estimator), which allows observations within schools to be correlated.

\(^7\) Relevant baseline measures differ by the sample and outcome. They include indicators for a good level of development at Foundation Stage (age 5) [for KS1 students]; indicators for bands of average attainment at KS1 [for KS2 students]; baseline breakfast consumption and hunger [for pupil survey outcomes]; baseline behaviour and concentration measures [for teacher survey outcomes]; number of absences in the previous academic year [for attendance outcomes]; and number of late arrivals in the previous academic year [for punctuality outcomes].
7. Results

*Academic attainment*

Breakfast club provision has positive, statistically significant impact on pupil attainment at KS1. The estimated effect of over 10% of a standard deviation is equivalent to about two months’ expected progress. The effect size at KS2 is slightly smaller and not statistically significant. These effect sizes for formally assessed academic attainment are similar in magnitude to previous evaluations in more developed countries. For example, using a non-experimental research design for a U.S. population of roughly the same age, Frisvold (2015) finds that a binding state mandate for school breakfast provision increases attainment in maths by around 9% of a standard deviation and reading by around 12% of a standard deviation. Imberman and Kugler (2014) find that a breakfast in classroom (BIC) model (which increases take-up relative to a before-school offer) increased achievement in maths by 9% of a standard deviation and reading achievement by 6% of a standard deviation. On the other hand, Corcocan et al. (2016) find no evidence of academic improvements due to the introduction of BIC in New York City, although the estimation strategy relies on school fixed effects to account for non-random selection into the program.

The teacher assessments used as outcomes at KS1 have the potential to be affected by teachers’ knowledge of the intervention or to conflate improvements in mechanisms (e.g. pupil behaviour) with improvements in attainment. They are also less finely-scored than the externally-marked tests. It is therefore possible that the effect of the intervention at KS1 is upwardly-biased due to the nature of the assessment. At KS2, English and maths are assessed both by external tests (which we have used as our main outcome measure) and by teacher assessment. We find that the intervention has similar effects on the results under each assessment regime at KS2, which suggests that teachers’ judgments are a reliable measure of attainment in this context.8

*Mechanisms*

This section explores the mechanisms through which provision of a universal free breakfast club increases pupil attainment after one year.

*i. Breakfast consumption*

Increasing breakfast consumption is a necessary condition for breakfast club provision to influence academic attainment through the channels illustrated in section 3. Table 2 shows that intervention increased breakfast consumption at school by around 15 percentage points, while breakfast consumption overall increased only marginally, by around three percentage points. This suggests that breakfast club provision is most likely to move breakfast

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8 Results available from the authors on request.
consumption from home to school, even in relatively disadvantaged populations, which is consistent with evidence for Wales (Murphy et al., 2010).

Any direct effect from breakfast consumption on pupil attainment is therefore likely to be due to changing the content and context of breakfast, rather than whether or not any breakfast is consumed. For example, eating closer to the time of morning lessons might attenuate the decline in cognitive function over the course of the morning (Vaisman et al., 1996). In addition, the nutritional content of school breakfasts is likely to be higher for this population, which would also impact cognitive performance and health (Mahoney et al., 2005; Fischer et al., 2002). In treatment schools, the proportion of students eating breakfast at school at follow-up who reported eating at least one healthy food increased from 70 per cent at baseline to 86 per cent at follow-up, while the share of healthy breakfasts among treatment-school pupils eating at home remained the same.

**Table 1: Breakfast club provision on academic outcomes**

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<tbody>
<tr>
<td></td>
<td>KS1</td>
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</table>

*** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses (clustered at school level).
Outcomes are standardised to have mean zero and standard deviation one.
Regressions control for randomisation strata; prior attainment at Foundation Stage Profile (whether at a good level of development) or KS1 (fewer than 11 points/no level; 11-14.99 points/below grade level; 15-16.99 points/at grade level; and 17+ points/above grade level); demographics (sex, ever FSM, ethnic group, SEN, EAL); and pre-intervention school characteristics (Ofsted rating, IMD rank, urban status, number of students).

**ii. Learning time**

The evidence shown in Table 2 suggests that learning time (L_{it}) increased slightly in treatment schools. The intervention led to small reductions in unauthorised late arrivals and absences, equivalent to around 0.15 fewer late arrivals per pupil per academic year (though not significant) and 0.88 fewer half-days of absence per pupil per academic year. There were larger falls in authorised absences (which includes absence due to illness) than unauthorised
absences, which is consistent with improving health ($H_{it}$) increasing total learning time. The magnitude is around 1.37 half-days of absence per pupil per academic year. In addition to increasing learning time, this effect may be large enough to influence the learning environment of the classroom and therefore teacher effectiveness.

These findings suggest that the effect of the intervention may have been partly mediated by reduced authorised absences, potentially due to improved health. Improved punctuality appears to have played less of a role. This is in line with evidence from Shemilt et al. (2004), who also found small improvements in attendance from the trial of a breakfast club programme.

iii. Pupil effort

In addition to increasing the amount of time pupils spend in the classroom, the intervention might have improved the productivity of that learning time ($E_{it}$). These effects could operate both at the individual level (if a student is better able to concentrate because they are not hungry, for example, denoted $E_{it}$ in section 3) and at the classroom level (if a more pleasant learning environment helps students indirectly by reducing distractions and disruptions, denoted $E_{it}$ in section 3, or increasing teacher effectiveness, denoted $Q_{it}$ in section 3).

These mechanisms were assessed through an online survey of classroom teachers, asking about students’ disruptiveness and focus. The breakfast club intervention had a large positive effect on student behaviour and concentration in their classrooms, as reported by teachers. Classrooms in treatment schools scored 0.48 standard deviations higher on the behaviour index. The results for pupil concentration were even larger, with classrooms in intervention schools scoring 0.65 standard deviations higher.

For one measure of concentration (the proportion of pupils ready to learn), teachers were asked to rate their class both in the morning and after lunch. Consistent with the interpretation that the improvement in concentration was a result of the breakfast provision, the effect size of the intervention was around 0.2 standard deviations larger on morning readiness than reported afternoon readiness.\(^9\)

These findings are consistent with findings from the head teacher survey. Almost 80 per cent of head teachers in treatment schools who responded to the follow-up survey reported that pupil behaviour had improved since implementing the breakfast club, and 88 per cent felt that pupil concentration levels had risen. No head teachers reported a worsening in either metric. The findings are also consistent with evidence from an earlier RCT in England (Shemilt et al., 2004), and provide strong evidence that complementarities between pupils’ effort may contribute to the effectiveness of the intervention.

\(^9\) Results available from authors on request.
Table 2: Breakfast club provision on mechanisms to affect academic attainment

<table>
<thead>
<tr>
<th></th>
<th>(1) Ate breakfast</th>
<th>(2) Ate breakfast at school</th>
<th>(3) Total Absences</th>
<th>(4) Authorised Absences</th>
<th>(5) Unauthorised Absences</th>
<th>(6) Late arrivals</th>
<th>(7) Behaviour Index</th>
<th>(8) Concentration Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>0.032** (0.016)</td>
<td>0.146*** (0.036)</td>
<td>-0.884* (0.533)</td>
<td>-1.367*** (0.461)</td>
<td>0.454 (0.347)</td>
<td>-0.147 (0.096)</td>
<td>0.476*** (0.157)</td>
<td>0.654*** (0.158)</td>
</tr>
<tr>
<td>Observations</td>
<td>3,373</td>
<td>3,323</td>
<td>8,085</td>
<td>8,085</td>
<td>8,085</td>
<td>8,085</td>
<td>234</td>
<td>234</td>
</tr>
<tr>
<td>R²</td>
<td>N/A</td>
<td>N/A</td>
<td>0.309</td>
<td>0.244</td>
<td>0.240</td>
<td>0.277</td>
<td>0.307</td>
<td>0.336</td>
</tr>
<tr>
<td>Pseudo R²</td>
<td>0.067</td>
<td>0.094</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Control N</td>
<td>1,531</td>
<td>1,488</td>
<td>3,755</td>
<td>3,755</td>
<td>3,755</td>
<td>3,755</td>
<td>114</td>
<td>114</td>
</tr>
<tr>
<td>Treatment N</td>
<td>1,842</td>
<td>1,835</td>
<td>4,330</td>
<td>4,330</td>
<td>4,330</td>
<td>4,330</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>School N</td>
<td>71</td>
<td>70</td>
<td>106</td>
<td>106</td>
<td>106</td>
<td>106</td>
<td>86</td>
<td>86</td>
</tr>
</tbody>
</table>

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses (clustered at school level).

Reported effect sizes for binary dependent variables ('ate breakfast' and 'ate breakfast at school') are average marginal effects following logistic regression.

Outcome variables for pupil absence are measured in half-days. Total absences is the number of half-day sessions missed during the 2014/15 academic year. Authorised reasons for absence include illness, medical appointments, religious observances, study leave, traveller absence, agreed family holiday, and pupil exclusion. Unauthorised reasons for absence include unauthorised family holidays and late arrivals. Late arrivals measure those unauthorised absences caused by the student’s tardy arrival, measured in half-day sessions.

Outcome variables for behaviour and concentration indices are standardised averages of the questions from the teacher survey, constructed using maximum likelihood factor analysis. The behaviour index depends on four questions about waiting for quiet, pleasant learning environment, lost time, and disruptive noise. The concentration index is based on four questions about good and poor concentration in the morning and readiness to learn at the start of the day and after lunch. The behaviour and concentration indices are standardised to have mean zero and standard deviation one.

Regressions control for randomisation strata; prior absence record (2013/14); demographics (sex, ever FSM, ethnic group, SEN, EAL); pre-intervention school characteristics (Ofsted rating, IMD rank, urban status, number of students).


Sub-group analysis

This section presents the impact of the intervention for particular groups of pupils. In particular, we explore whether the increases in academic attainment act to reduce inequalities. Subgroups are defined by whether or not the pupil is eligible for FSM, has high or low prior attainment, or reports eating breakfast or not at baseline. Table 3 shows that the intervention does not reduce inequalities between pupils of different types. The intervention is more effective for those not eligible for FSM than those eligible for FSM at KS1 and significantly so at KS2. It is also significantly less effective for those with low prior attainment at KS2, and less effective (though not significantly so) for those that ate breakfast at baseline relative to those that did not in KS1.

There are several possible explanations for this: students from more advantaged groups could be more likely to take up the breakfast club offer or to benefit from positive externalities when the classroom learning environment improves. In addition, students from non-FSM families close to the low-income eligibility threshold could benefit from the free breakfast offer while many of the potential benefits to FSM students have already been realised through universal free lunchtime meals. This hypothesis is supported by the much smaller disparity between FSM and non-FSM students at KS1, where all students receive free school lunches.

The finding that students who reported eating breakfast at the baseline benefited more from the intervention at KS1 supports the hypothesis that much of the effect of the intervention came through the specific context of eating a nutritious breakfast among peers and staff at school, rather than changes along the extensive margin of breakfast consumption.

Table 4 shows that the findings of the sub-group analysis are unlikely to be driven by differential take-up of the school breakfast offer, though overall consumption of breakfast may play a role. Treatment increased both overall and school breakfast consumption among students who are not eligible for FSM by around 10 percentage points. For FSM students, however, treatment had a negligible (and negative) effect on overall breakfast consumption rates, but increased the probability of eating breakfast at school by around 17 percentage points. Similarly, treatment had similar effects on the breakfast consumption of students who had and had not reported eating breakfast at baseline, but much stronger effects on school breakfast consumption for those with no baseline breakfast.

In both cases, the groups that gain more academically from treatment are less likely to have been induced to eat breakfast at school as a result of the intervention. This suggests that at least part of the benefit of the intervention was due to spillovers between pupils, such as an improved learning environment benefitting all pupils. An alternative explanation consistent with the findings in Table 4 is that the intervention was particularly effective at moving non-FSM students who were not eating breakfast into school breakfast consumption, while in the
Table 3: Academic outcomes subgroup analysis

**Panel A: Key Stage 1**

<table>
<thead>
<tr>
<th></th>
<th>(1) FSM Not FSM</th>
<th>(2) Low Attainment</th>
<th>(3) Not Low Attainment</th>
<th>(4) No breakfast at baseline</th>
<th>(5) Breakfast at baseline</th>
<th>(6) Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>0.103*</td>
<td>0.132**</td>
<td>0.106</td>
<td>0.117**</td>
<td>0.027</td>
<td>0.111*</td>
</tr>
<tr>
<td></td>
<td>(0.058)</td>
<td>(0.060)</td>
<td>(0.070)</td>
<td>(0.051)</td>
<td>(0.131)</td>
<td>(0.061)</td>
</tr>
<tr>
<td>Observations</td>
<td>2,295</td>
<td>2,050</td>
<td>2,460</td>
<td>1,885</td>
<td>255</td>
<td>2,815</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.414</td>
<td>0.380</td>
<td>0.244</td>
<td>0.076</td>
<td>0.427</td>
<td>0.407</td>
</tr>
<tr>
<td>Control N</td>
<td>1084</td>
<td>912</td>
<td>1162</td>
<td>834</td>
<td>99</td>
<td>1164</td>
</tr>
<tr>
<td>Treatment N</td>
<td>1211</td>
<td>1138</td>
<td>1298</td>
<td>1051</td>
<td>156</td>
<td>1651</td>
</tr>
<tr>
<td>School N</td>
<td>101</td>
<td>102</td>
<td>101</td>
<td>102</td>
<td>73</td>
<td>84</td>
</tr>
<tr>
<td>P-value (difference)</td>
<td>0.559</td>
<td>0.858</td>
<td>0.449</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Panel B: Key Stage 2**

<table>
<thead>
<tr>
<th></th>
<th>(1) FSM Not FSM</th>
<th>(2) Low Attainment</th>
<th>(3) Not Low Attainment</th>
<th>(4) No breakfast at baseline</th>
<th>(5) Breakfast at baseline</th>
<th>(6) Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>0.047</td>
<td>0.231***</td>
<td>-0.121</td>
<td>0.165**</td>
<td>0.009</td>
<td>-0.037</td>
</tr>
<tr>
<td></td>
<td>(0.080)</td>
<td>(0.081)</td>
<td>(0.134)</td>
<td>(0.063)</td>
<td>(0.152)</td>
<td>(0.074)</td>
</tr>
<tr>
<td>Observations</td>
<td>2,364</td>
<td>1,543</td>
<td>896</td>
<td>3,011</td>
<td>233</td>
<td>2,226</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.425</td>
<td>0.455</td>
<td>0.355</td>
<td>0.407</td>
<td>0.483</td>
<td>0.474</td>
</tr>
<tr>
<td>Control N</td>
<td>1158</td>
<td>699</td>
<td>442</td>
<td>1415</td>
<td>108</td>
<td>934</td>
</tr>
<tr>
<td>Treatment N</td>
<td>1206</td>
<td>844</td>
<td>454</td>
<td>1596</td>
<td>125</td>
<td>1292</td>
</tr>
<tr>
<td>School N</td>
<td>98</td>
<td>98</td>
<td>96</td>
<td>98</td>
<td>67</td>
<td>78</td>
</tr>
<tr>
<td>P-value (difference)</td>
<td>0.004 ***</td>
<td>0.004 ***</td>
<td>0.726</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses (clustered at school level).

Outcome variables are standardised to have mean zero and standard deviation one. The KS1 score is an average of teacher-assessed levels in reading, writing, and maths. The KS2 score is an average of fine point test scores in English and maths.

Regressions control for randomisation strata; Foundation Stage Profile development (KS1 regressions only); banded KS1 attainment (KS2 regressions only); demographics (sex, ever FSM, ethnic group, SEN, EAL); and pre-intervention school characteristics (Ofsted rating, IMD rank, urban status, number of students).
Table 4: Breakfast consumption and hunger subgroup analysis

Panel A: Ate breakfast

<table>
<thead>
<tr>
<th></th>
<th>(1) FSM</th>
<th>(2) Not FSM</th>
<th>(3) Low Attainment</th>
<th>(4) Not Low Attainment</th>
<th>(5) No breakfast at baseline</th>
<th>(6) Breakfast at baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>-0.006</td>
<td>0.094***</td>
<td>0.025</td>
<td>0.038*</td>
<td>0.026</td>
<td>0.029*</td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
<td>(0.025)</td>
<td>(0.020)</td>
<td>(0.022)</td>
<td>(0.054)</td>
<td>(0.015)</td>
</tr>
<tr>
<td>Observations</td>
<td>1,842</td>
<td>1,439</td>
<td>1,387</td>
<td>1,907</td>
<td>286</td>
<td>3,000</td>
</tr>
<tr>
<td>Pseudo-R²</td>
<td>0.068</td>
<td>0.096</td>
<td>0.089</td>
<td>0.081</td>
<td>0.064</td>
<td>0.048</td>
</tr>
<tr>
<td>Control N</td>
<td>897</td>
<td>584</td>
<td>618</td>
<td>876</td>
<td>127</td>
<td>1,363</td>
</tr>
<tr>
<td>Treatment N</td>
<td>945</td>
<td>855</td>
<td>769</td>
<td>1,031</td>
<td>159</td>
<td>1,637</td>
</tr>
<tr>
<td>School N</td>
<td>71</td>
<td>69</td>
<td>71</td>
<td>70</td>
<td>62</td>
<td>71</td>
</tr>
<tr>
<td>P-value (difference)</td>
<td>0.002***</td>
<td>0.664</td>
<td></td>
<td></td>
<td>0.958</td>
<td></td>
</tr>
</tbody>
</table>

Panel B: Ate breakfast at school

<table>
<thead>
<tr>
<th></th>
<th>(1) FSM</th>
<th>(2) Not FSM</th>
<th>(3) Low Attainment</th>
<th>(4) Not Low Attainment</th>
<th>(5) No breakfast at baseline</th>
<th>(6) Breakfast at baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>0.180***</td>
<td>0.103**</td>
<td>0.166***</td>
<td>0.140***</td>
<td>0.371***</td>
<td>0.138***</td>
</tr>
<tr>
<td></td>
<td>(0.039)</td>
<td>(0.040)</td>
<td>(0.043)</td>
<td>(0.037)</td>
<td>(0.062)</td>
<td>(0.035)</td>
</tr>
<tr>
<td>Observations</td>
<td>1,808</td>
<td>1,437</td>
<td>1,363</td>
<td>1,882</td>
<td>267</td>
<td>2,951</td>
</tr>
<tr>
<td>Pseudo-R²</td>
<td>0.125</td>
<td>0.087</td>
<td>0.089</td>
<td>0.116</td>
<td>0.324</td>
<td>0.092</td>
</tr>
<tr>
<td>Control N</td>
<td>868</td>
<td>584</td>
<td>599</td>
<td>853</td>
<td>118</td>
<td>1,321</td>
</tr>
<tr>
<td>Treatment N</td>
<td>940</td>
<td>853</td>
<td>764</td>
<td>1,029</td>
<td>149</td>
<td>1,630</td>
</tr>
<tr>
<td>School N</td>
<td>70</td>
<td>69</td>
<td>70</td>
<td>69</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>P-value (difference)</td>
<td>0.030**</td>
<td>0.489</td>
<td></td>
<td></td>
<td>0.000***</td>
<td></td>
</tr>
</tbody>
</table>

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses (clustered at school level).

Reported effect sizes are average marginal effects following logistic regression.

Regressions control for randomisation strata; average of baseline responses to the pupil survey (with breakfast eating and breakfast at school reversed); demographics (sex, ever FSM, ethnic group, SEN, EAL); and pre-intervention school characteristics (Ofsted rating, IMD rank, urban status, number of students).
FSM subgroup it was used more as a substitute for home breakfast. In this case, average attainment for less advantaged groups may be depressed by those students that remain less likely to consume breakfast overall, despite the larger impact on breakfast consumption at school for these groups.

Table 4 also shows that the intervention’s effect on overall and school breakfast consumption was relatively similar for students with low prior attainment and those who had reached the expected level of development or above in previous years. This suggests that sorting into school breakfasts was driven by socioeconomic, rather than academic, metrics. For example, some head teachers reported targeting students perceived to be in disadvantaged or food insecure households.

7. Cost

This section calculates the average cost per pupil per year across schools in the treatment group to provide an indication of the cost-effectiveness of the trial. The costs reported assume that schools established their breakfast clubs outside the conditions of the intervention, and so incurred all upfront and ongoing costs.

Table 5 shows the average annual per-pupil cost was £23.72, of which the majority – £19.49 – is classified as ongoing expenditure. Costs for staff-time are calculated by imputing the average wage for the member(s) of staff responsible for supervising the breakfast club in each school. These based on publicly-available data on average hourly wage by four-digit SOC code, derived from the Annual Survey of Hours and Earnings (a large-scale survey earnings in the UK). Appendix A shows the type of staff and volunteer supervision used by our sample of schools, and the average wage imputed for each staff type.

Almost all schools used teaching assistants for supervision. On average, treatment schools used two hours of teaching staff time per eligible pupil over the academic year (668 hours for an average-sized school). Schools relied on a variety of other staff to deliver the intervention, including pastoral staff, office staff, and volunteers. There was considerable heterogeneity both in the types of staff and volunteers that schools used to supervise the breakfast club and in the arrangements for compensating these workers.

Low take-up of the breakfast club offer contributes to the very low per-pupil cost and supervision time estimates. In line with the intent to treat nature of the intervention, which involved universal breakfast provision, costs and supervision hours per pupil have been averaged over all pupils in the school. Both of the major categories of cost – food supplies and staffing time – are expected to increase with attendance at the breakfast club, which means that schools wishing to promote universal take-up (rather than just a universal offer) may face higher costs than the figures reported here.
Table 5: Average cost over the academic year, per pupil

<table>
<thead>
<tr>
<th>Cost type</th>
<th>Average per eligible pupil</th>
<th>Average per treated pupil</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lower bound</td>
<td>Upper bound</td>
</tr>
<tr>
<td>Upfront</td>
<td>£4.23</td>
<td>£12.62</td>
</tr>
<tr>
<td>Ongoing</td>
<td>£19.49</td>
<td>£60.42</td>
</tr>
<tr>
<td>Total</td>
<td>£23.72</td>
<td>£73.04</td>
</tr>
</tbody>
</table>

Note: The figures presented are the mean of schools’ per-pupil cost. This is calculated for eligible pupils, i.e. all pupils in the school.

Costs per eligible pupil are based on the 40 treatment schools whose head teachers responded to the follow-up survey and whose food costs were reported by Magic Breakfast.

Estimates for cost per treated pupil are derived in two ways: as bounds (based on 37 head teachers’ banded estimates of average attendance at the breakfast club), and as a point estimate (based on take-up rates constructed from the follow-up pupil survey).

In the five schools in this sample with no response to the pupil survey at follow-up, take-up rates were imputed based on randomisation strata, Ofsted rating, IMD 2010 rank, urban/rural status, and number of pupils.

Upfront costs include furniture, improvements to the physical environment, catering facilities, resources, staff training, and ‘other’. Ongoing costs include food provided by Magic Breakfast during the intervention, additional food purchased by the school, and the imputed monetary costs of staff time.

Although the exact number of pupils taking up the breakfast offer at each school is not known, Table 5 uses two approaches to estimate the cost per treated pupil. First, we use lower and upper bounds of the number of pupils attending the breakfast club each day (derived from banded head teacher estimates) to calculate bounds for the annual cost and supervision requirements per pupil attending the breakfast club. These estimates of the number of students actually treated give cost bounds of £73.04 to £457.57 per treated pupil per year, and supervision hour bounds of 10.3 and 63.6 hours per treated pupil per year.

Second, we use the pupil survey responses to compute a breakfast club take-up rate among survey responders in Years 2 and 6. We assume that these take-up rates are constant across the school year and across grades within the school to compute a point estimate of cost per treated pupil of £164.35 per year. However, it should be noted that these assumptions are unlikely to hold with precision; this cost estimate should therefore be interpreted with caution.
8. Sensitivity analysis

The overall implications of our findings are clear – school breakfast provision improves pupil attainment, behaviour, concentration, and attendance in disadvantaged schools. This section discusses and explores potential caveats to these findings.

Non-response bias

Overall, the proportion of students observed in the NPD who were successfully linked to a completed pupil survey fell from 71 per cent at baseline to 57 per cent at follow-up. Although the completion rates for each survey are similar among KS1 and KS2 students, KS2 students were substantially less likely to complete both surveys and therefore be included in the analysis sample for pupil outcomes (34 per cent versus 42 per cent at KS1). If this non-response is non-random, the results of the pupil survey analysis reported in Table 2 may be biased. Table 6 suggests that this may be a concern; relative to the overall analysis sample for academic outcomes, limiting the sample to students with valid baseline and follow-up surveys has a moderate positive effect on the estimated effect of the intervention on academic outcomes at KS1, but a large negative effect at KS2. Additional analysis suggests that the students who did not complete the surveys had worse academic results on average, indicating that our pupil survey results might be based on a subset of pupils who are less able and less sensitive to the intervention.

Ramadan

During the academic year 2014/15, Ramadan – the Muslim month of fasting – overlapped with the testing period for KS2. During this period, people participating in the fast do not eat or drink between sunrise and sunset each day. Twenty-three students in our trial indicated on their follow-up surveys that they had not eaten breakfast for religious reasons, but the true number affected is likely to have been higher since pupils were not asked about fasting directly. The timing was common to the treatment and control schools, so the randomisation into treatment and control groups ensures that the proportion of affected students should be balanced on average between the two groups. However, there is no guarantee that fasting is balanced for our trial (which is just a single draw from the set of possible randomisations). Indeed, the lack of balance on ethnicity suggests that this could be problematic.
Table 6: Breakfast club provision on academic outcomes: Sensitivity analysis excluding schools with mention of Ramadan

<table>
<thead>
<tr>
<th></th>
<th>(1) KS1: Analysis sample</th>
<th>(2) KS1: Has survey</th>
<th>(3) KS1: No Ramadan</th>
<th>(4) KS2: Analysis sample</th>
<th>(5) KS2: Has survey</th>
<th>(6) KS2: No Ramadan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>0.137***</td>
<td>0.153**</td>
<td>0.089</td>
<td>0.114</td>
<td>-0.026</td>
<td>0.122</td>
</tr>
<tr>
<td>(0.050)</td>
<td>(0.063)</td>
<td>(0.061)</td>
<td>(0.074)</td>
<td>(0.091)</td>
<td>(0.087)</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>4,586</td>
<td>2,027</td>
<td>3,415</td>
<td>3,907</td>
<td>1,363</td>
<td>2,729</td>
</tr>
<tr>
<td>R-squared</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control N</td>
<td>0.402</td>
<td>0.407</td>
<td>0.402</td>
<td>0.433</td>
<td>0.484</td>
<td>0.439</td>
</tr>
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<td>Treatment N</td>
<td>2473</td>
<td>1175</td>
<td>2159</td>
<td>2050</td>
<td>678</td>
<td>1612</td>
</tr>
<tr>
<td>School N</td>
<td>102</td>
<td>64</td>
<td>80</td>
<td>98</td>
<td>53</td>
<td>75</td>
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</tbody>
</table>

*** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses (clustered at school level).
‘Has survey’ sample is restricted to pupils with linked responses to baseline and follow-up surveys.
‘No Ramadan’ sample excludes schools where any student mentioned Ramadan or fasting in their pupil survey.
Outcomes are standardised to have mean zero and standard deviation one.
Regressions control for randomisation strata; prior attainment at Foundation Stage Profile (whether at a good level of development) or KS1 (fewer than 11 points/no level; 11-14.99 points/below grade level; 15-16.99 points/at grade level; and 17+ points/above grade level); demographics (sex, ever FSM, ethnic group, SEN, EAL); and pre-intervention school characteristics (Ofsted rating, IMD rank, urban status, number of students).

Table 6 shows the results from a sensitivity analysis that excludes schools where any pupil mentioned fasting or Ramadan in their survey. This is a crude way to control for the impact of fasting since it relies on students to spontaneously mention their fast and then excludes all students in that school from the analysis; however, we believe that excluding entire schools is the most appropriate feasible choice, since there could be cultural similarities between families attending the same school that could influence decisions about when children should begin to observe the fast. Table 6 indicates that the effect of breakfast club provision is not significantly different in the subset of schools where no student mentioned Ramadan from the effect in all schools in our analysis.

9. Conclusion
A universal breakfast club intervention was introduced to participating schools in the context of concerns about pupils arriving at school hungry and the impact that this may have on their wellbeing, behaviour and experiences in the classroom. The introduction of school breakfast provision was seen by staff as a way to tackle a number of pre-existing problems, including pupil hunger, classroom behaviour, attendance, and punctuality.
Evidence from a randomised controlled trial shows that the intervention had positive effects on students’ academic achievement equivalent to around two months’ expected progress on most assessments (or equivalently over 10% of a standard deviation). These gains, particularly at age 7, are comparable in magnitude to the effects found in an evaluation of universal free school meal provision, which led to the national roll-out of this policy (Brown et al., 2012), and previous non-experimental evaluations of the School Breakfast Program and Breakfast In Classroom program in the U.S. For example, Frisvold (2015) finds that a binding state mandate for school breakfast provision increases attainment in maths by around 9% of a standard deviation and reading by around 12% of a standard deviation. Imberman and Kugler (2014) find that a Breakfast In Classroom model (which increases take-up relative to a before school offer) increases achievement in maths by 9% of a standard deviation and reading achievement by 6% of a standard deviation.

There are multiple mechanisms through which this effect occurred. First, breakfast consumption at school increased, although breakfast consumption overall increased only marginally. This suggests that it was the school context (which was typically more social), timing of the meal (later in the day), or school food (which was potentially more nutritious) that contributed to the improvement in attainment, rather than the extensive margin of whether or not breakfast was eaten.

Second, there were large improvements in teacher-reported levels of concentration and behaviour in the classroom. This means that the classroom environment improved for teachers, and presumably pupils, which may have been beneficial for learning. This mechanism also provides a channel through which the intervention could have affected even children not taking up the breakfast club offer. Indeed, we find evidence that the intervention was more effective in increasing academic attainment for less disadvantaged pupils, despite smaller effects on school-breakfast take-up. This is consistent with positive spillovers between pupils in the classroom, due to the improved learning environment.

Finally, attendance and punctuality recorded in administrative data improved slightly, which could be a result of improved health (fewer days of sickness) and a greater incentive to arrive at school on time, respectively. An increase in time in school for pupils, and reduced class disruption due to lateness and absence, might have therefore also played a role in improving outcomes. These findings are also largely broadly consistent with evidence from Wales, where an early randomised controlled trial found that absences reduced and concentration improved as a result of a national breakfast club programme introduced in 2013, although there is mixed evidence in the U.S. context.

These effects occurred in the context of relatively high (pupil-reported) baseline breakfast consumption, relatively low take-up of the school breakfast club offer, and relatively poor fidelity to the intended model of breakfast club delivery (universal, free, and before-school). They were also realised through relatively small resource inputs – the average school’s
breakfast club cost just £23.72 per eligible pupil over the course of the academic year, including compensation for 3.1 hours of labour time per pupil per year.

These results are relevant to policy-makers and school leaders world-wide who are interested in the potential for school food policies to improve academic attainment in relatively disadvantaged communities, particularly in more developed countries with higher baseline nutrition and a more limited evidence base for school nutrition programmes. Although further research is needed to better understand the optimal model of breakfast club delivery and the relative importance of cumulative and day-of nutrition for test performance, results are clear that academic attainment and the classroom environment improved as a result of the intervention.

The results are also relevant to the academic community interested in understanding the role of nutrition in human capital formation. Complex biological channels can affect cognition directly, but they also have indirect effects through non-cognitive skills and through the peer effects in learning. An expansion of school food policy in England and elsewhere to include universal breakfast club provision for disadvantaged schools would be a cost-effective way to improve pupils’ concentration and attainment.
References


### Table A1: Average hour requirements over the academic year, per eligible pupil

<table>
<thead>
<tr>
<th>Staff type</th>
<th>Average hours</th>
<th>Imputed wage</th>
<th>Average cost</th>
<th># of users</th>
<th>Average hours for users</th>
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<tbody>
<tr>
<td><strong>Teaching staff</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Teachers</td>
<td>0.33</td>
<td>£20.92</td>
<td>£6.32</td>
<td>13</td>
<td>1.01</td>
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<td>Teaching assistants</td>
<td>1.70</td>
<td>£9.15</td>
<td>£3.63</td>
<td>35</td>
<td>1.95</td>
</tr>
<tr>
<td><strong>Support staff</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catering staff</td>
<td>0.07</td>
<td>£7.24</td>
<td>£1.33</td>
<td>5</td>
<td>0.54</td>
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<td>Caretaking staff</td>
<td>0.20</td>
<td>£10.01</td>
<td>£0.11</td>
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<td>2.04</td>
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<td>£13.03</td>
<td>£1.08</td>
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<td>£10.87</td>
<td>£0.50</td>
<td>9</td>
<td>0.3</td>
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<td><strong>Other staff/helpers</strong></td>
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<td></td>
<td></td>
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<tr>
<td>Volunteers</td>
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<td>Unknown</td>
<td>Unknown</td>
<td>10</td>
<td>1.95</td>
</tr>
<tr>
<td>Other</td>
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<td>4</td>
<td>0.52</td>
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<tr>
<td><strong>Total</strong></td>
<td>3.13</td>
<td>N/A</td>
<td>£5.63</td>
<td>39</td>
<td>3.21</td>
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</table>

**Note:** The figures presented are the mean of schools’ per-pupil hour requirements. This is calculated for eligible pupils, i.e. all pupils in the school. Hours among users refer to the average hours only of schools using that type of staff. Hours may not add precisely due to rounding. Hours for users will not add since the hours for each type of staff are averaged over a different set of schools. Although 40 schools were included in the analysis sample, one school gave implausibly high values for its hour usages and so has been excluded from this analysis.
Online Appendix A: Survey Questions
This appendix presents the questions included on the surveys of pupils, teachers, and head teachers at baseline and follow-up.

I. Pupil survey (baseline and follow-up)

- **Name:**
- **Year group:**

(Class teacher to complete)
- Child's birthday - d/m/y:
- Child's full name:
- Child's UPN:

- Did you have breakfast today?
  - Yes
  - No

- Did you have breakfast at school today?
  - Yes
  - No

- Did you like what you had for breakfast today or not?
  - Yes I liked it
  - It was OK
  - No, I didn't like it

Turn over!
Did you feel hungry when you started your first lesson this morning, or not?

☐ Yes
☐ No
☐ Can’t remember

What will you eat at lunchtime?

☐ A packed lunch
☐ A school lunch
☐ Nothing

I ate________________________________
____________________________________

What did you eat for breakfast?

Write and draw a picture
II. Baseline teacher survey

1. What is the name of your school?
   Text response:

2. What is your email address?
   Text response:

3. What local authority is your school in?
   Text response:

4. How long have you worked at your school?
   a. Less than one year
   b. One to two years
   c. Two to five years
   d. Five to ten years
   e. More than ten years

5. What national curriculum Year Group do you teach?
   a. Year 2
   b. Year 6
   c. Mixed (including Year 2)
   d. Mixed (including Year 6)

6. Does your class have streaming (grouping children by general ability)?
   a. Yes
   b. No

7. Does your class have setting (grouping by subject-specific ability) for English?
   a. Yes
   b. No

8. Does your class have setting (grouping by subject-specific ability) for maths?
   a. Yes
   b. No

9. When the first lesson begins, I have to wait quite a long time for students to quiet down.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree
10. Students in this class take care to create a pleasant learning atmosphere.
   a. Strongly disagree  c. Agree
   b. Disagree            d. Strongly agree

11. I lose quite a lot of time because of students interrupting the lesson.
   a. Strongly disagree  c. Agree
   b. Disagree            d. Strongly agree

12. There is much disruptive noise in this classroom
   a. Strongly disagree  c. Agree
   b. Disagree            d. Strongly agree

13. Thinking about the first lesson your class had today, what percentage of children in
    your class do you think had a **poor** level of concentration?
   a. 0-10%                 e. 60-80%
   b. 10-20%                f. 80-90%
   c. 20-40%                g. 90-100%
   d. 40-60%

14. Thinking about the first lesson your class had today, what percentage of children in
    your class do you think had a **good** level of concentration?
   a. 0-10%                 e. 60-80%
   b. 10-20%                f. 80-90%
   c. 20-40%                g. 90-100%
   d. 40-60%

15. Please give the percentage of your class that are usually ready to learn at the start of
    the first lesson of the day
   a. 0-10%                 e. 60-80%
   b. 10-20%                f. 80-90%
   c. 20-40%                g. 90-100%
   d. 40-60%

16. Please give the percentage of your class that are usually ready to learn at the start of
    the first lesson after lunch
   a. 0-10%                 e. 60-80%
   b. 10-20%                f. 80-90%
   c. 20-40%                g. 90-100%
   d. 40-60%
III. Follow-up teacher survey (for those responding at baseline)

1. What is the name of your school?
   Text response:

2. What is your email address?
   Text response:

3. What local authority is your school in?
   Text response:

4. What national curriculum Year Group do you teach?
   a. Year 2
   b. Year 6
   c. Mixed (including Year 2)
   d. Mixed (including Year 6)

5. When the first lesson begins, I have to wait quite a long time for students to quiet down.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

6. Students in this class take care to create a pleasant learning atmosphere.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

7. I lose quite a lot of time because of students interrupting the lesson.
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

8. There is much disruptive noise in this classroom
   a. Strongly disagree
   b. Disagree
   c. Agree
   d. Strongly agree

9. Thinking about the first lesson your class had today, what percentage of children in your class do you think had a poor level of concentration?
   a. 0-10%
   b. 10-20%
   c. 20-40%
   d. 40-60%
   e. 60-80%
   f. 80-90%
   g. 90-100%
10. Thinking about the first lesson your class had today, what percentage of children in your class do you think had a good level of concentration?
   a. 0-10%       e. 60-80%
   b. 10-20%      f. 80-90%
   c. 20-40%      g. 90-100%
   d. 40-60%

11. Please give the percentage of your class that are usually ready to learn at the start of the first lesson of the day
   a. 0-10%       e. 60-80%
   b. 10-20%      f. 80-90%
   c. 20-40%      g. 90-100%
   d. 40-60%

12. Please give the percentage of your class that are usually ready to learn at the start of the first lesson after lunch
   a. 0-10%       e. 60-80%
   b. 10-20%      f. 80-90%
   c. 20-40%      g. 90-100%
   d. 40-60%
IV. Baseline head teacher survey

1. What is the name of your school?
Text response:

2. What local authority is your school in?
Text response:

3. How long have you worked at this school?
   a. Less than one year
   b. One to two years
   c. Two to five years
   d. Five to ten years
   e. More than ten years

4. What is your role in your school?
   a. Head teacher
   b. Deputy head teacher
   c. Assistant head teacher
   d. Early years coordinator
   e. Key stage coordinator
   f. Special educational needs coordinator
   g. Other (please specify)

5. How many classes does your school have for Year 2 pupils?
Text response:

6. How many classes does your school have for Year 6 pupils?
Text response:

7. Please give the email addresses of the Year 2 class teachers this academic year
Text response:

8. Please give the email addresses of the Year 6 class teachers next academic year
Text response:

9. What model of breakfast club provision would you prefer for your school?
   a. Universal provision before school
   b. Targeted free provision before school

10. What are your reasons for signing up to the Magic Breakfast pilot?
    a. Address problem of pupil hunger in the school
    b. Improve cohesion in the school
    c. Reduce inequality in the school
    d. Improve pupil concentration
11. What is your main reason for signing up to the Magic Breakfast pilot?

a. Address problem of pupil hunger in the school
b. Improve cohesion in the school
c. Reduce inequality in the school
d. Improve pupil concentration
e. Improve pupil health and wellbeing
f. Improve academic attainment
g. Other (please specify)

12. Would your current facilities be able to accommodate universal breakfast provision before school?

a. Yes
b. No

13. What is the current capacity of the school dining area?

Text response:

14. Does your school currently offer ad hoc breakfast provision?

a. Yes
b. No

15. If the school has some ad hoc breakfast provision, how many pupils access this on a usual day?

Text response:

16. Has your school had a breakfast club in the past which has closed down within the last 12 months?

a. Yes
b. No

17. Thinking about all the behaviour you encounter around school, how many pupils do you find generally badly behaved and / or difficult to deal with?

a. All / almost all
d. Few
b. Most
e. None / almost none
c. Some
18. In your experience, when is indiscipline most likely to occur in your school?

a. Before the school day begins
b. During morning classes
c. Morning break
d. Lunchtime
e. During afternoon classes
f. Afternoon break
g. After the end of the school day
V. Follow-up head teacher survey (control schools)

1. Please confirm your e-mail address.
   Text response:

2. What is the name of your school?
   Text response:

3. What local authority is your school in?
   Text response:

4. Thinking about all the behaviour you have encountered around the school over the last term, how many pupils do you find generally badly behaved and / or difficult to deal with?
   a. All / almost all
   b. Most
   c. Some
   d. Few
   e. None / almost none

5. In your experience, when has indiscipline been most likely to occur in your school over the last term?
   a. Before the school day begins
   b. During morning classes
   c. Morning break
   d. Lunchtime
   e. During afternoon classes
   f. Afternoon break
   g. After the end of the school day

6. Has your school started offering any breakfast provision in the last 12 months?
   a. Yes
   b. No

7. What type of provision have you started offering?
   Text response:

8. Was breakfast offered to all Year 6 students at school during this year’s SATs week?
   a. Yes
   b. No

9. Is this the first year you have offered breakfast to Year 6 students during SATs week, or have you also done so in previous years?
   a. First year
   b. Done previously
VI. Follow-up head teacher survey (intervention schools)

1. Please confirm your e-mail address.
   Text response:

2. What is the name of your school?
   Text response:

3. What local authority is your school in?
   Text response:

4. Does your school usually offer food BEFORE the school day as part of the Magic Breakfast pilot?
   a. Yes
   b. No

5. Where is this provision delivered?
   a. In classrooms
   b. Somewhere else, e.g. dining hall

6. Please specify where this provision is delivered:
   Text response:

7. Which children can take advantage of this provision?
   a. All children
   b. All children but with a limit on numbers
   c. Targeted children only (e.g. those eligible for free school meals)

8. Which children are defined as "targeted" in terms of eligibility for breakfast provision before the school day.
   Text response

9. How many children on average per day would you estimate take advantage of this type of provision?
   a. 0-20 pupils on average per day
   b. 21-50 pupils on average per day
   c. More than 50 pupils on average per day

10. Which of the following best describes the charging policy for this element of your provision?
    a. Free to all children
    b. Free to targeted children with a charge for other children
    c. Free breakfast for all children but a charge for other facilities (e.g. childcare, activities)
    d. Free breakfast to targeted children but a charge for other facilities
    e. Other (text response)

11. Which children are defined as "targeted" in terms of your charging policy for breakfast before the school day.
    Text response

12. Does your school usually offer food DURING THE SCHOOL DAY (e.g. at registration or break-time) as part of the Magic Breakfast pilot?
13. Where is this provision delivered?
   a. In classrooms
   b. Somewhere else, e.g. dining hall

14. Please specify where this provision is delivered:
   Text response:

15. Which children can take advantage of this provision?
   a. All children
   b. All children but with a limit on numbers
   c. Targeted children only (e.g. those eligible for free school meals)

16. Which children are defined as "targeted" in terms of eligibility for breakfast provision during the school day?
   Text response

17. How many children on average per day would you estimate take advantage of this type of provision?
   a. 0-20 pupils on average per day
   b. 21-50 pupils on average per day
   c. More than 50 pupils on average per day

18. Which of the following best describes the charging policy for this element of your provision?
   a. Free to all children
   b. Free to targeted children with a charge for other children
   c. Free breakfast for all children but a charge for other facilities (e.g. childcare, activities)
   d. Free breakfast to targeted children but a charge for other facilities
   e. Other (text response)

19. Which children are defined as "targeted" in terms of your charging policy for breakfast during the school day?
   Text response

20. Before the Magic Breakfast pilot could be implemented, did the school have to make any changes, in terms of the following? Please select all that apply.
   a. Improvements to the physical environment where breakfasts will be received
   b. Increase the number of staff / adjust staff hours to cover breakfast delivery
   c. Training of staff
   d. Buying new furniture
   e. Improvement to catering facilities
   f. Improvement to food storage facilities
   g. Accessing additional funding
   h. Other (please specify)

21. Did you have to spend additional money on FURNITURE in order to successfully deliver the breakfast club?
   a. Yes
   b. No
22. Please estimate approximately how much you spent on furniture in order to successfully deliver the breakfast club.
   Text response

23. Did you have to spend additional money on IMPROVEMENTS TO THE PHYSICAL ENVIRONMENT, e.g. buying new curtains or painting a room, in order to successfully deliver the breakfast club?
   a. Yes
   b. No

24. Please estimate approximately how much you spent on improvements to the physical environment in order to successfully deliver the breakfast club.
   Text response

25. Did you have to spend additional money on CATERING FACILITIES, e.g. buying a freezer to store the food, in order to successfully deliver the breakfast club?
   a. Yes
   b. No

26. Please estimate approximately how much you spent on catering facilities in order to successfully deliver the breakfast club.
   Text response

27. Did you have to spend additional money on RESOURCES, e.g. plates/bowls, cutlery, activities, etc., in order to successfully deliver the breakfast club?
   a. Yes
   b. No

28. Please estimate approximately how much you spent on resources in order to successfully deliver the breakfast club.
   Text response

29. Did you have to spend additional money on STAFF RECRUITMENT AND TRAINING in order to successfully deliver the breakfast club?
   a. Yes
   b. No

30. Please estimate approximately how much you spent on staff recruitment and training in order to successfully deliver the breakfast club.
   Text response

31. Did you have to spend additional money on INCREASES IN STAFF TIME in order to successfully deliver the breakfast club?
   a. Yes
   b. No

32. Please estimate approximately how much you spent on increases in staff time in order to successfully deliver the breakfast club.
   Text response

33. Did you have to spend money on ADDITIONAL FOOD/DRINKS DURING BREAKFAST PROVISION in order to successfully deliver the breakfast club?
   a. Yes
   b. No

34. Please estimate approximately how much you spent on additional food/drinks during breakfast provision in order to successfully deliver the breakfast club.
   Text response
35. Did you have to spend additional money on something that has not previously been asked about in the questions concerning additional expenditure, in order to successfully deliver the breakfast club?
   a. Yes
   b. No

36. Please estimate approximately how much you spent on things that were not covered in the questions regarding additional expenditure, in order to successfully deliver the breakfast club.
   Text response

37. Is your breakfast club staffed/supervised by any CATERING STAFF?
   a. Yes
   b. No

38. Please give the total number of hours spent staffing/supervising the club by catering staff.
   Text response

39. Is your breakfast club staffed/supervised by any TEACHING ASSISTANTS?
   a. Yes
   b. No

40. Please give the total number of hours spent staffing/supervising the club by teaching assistants.
   Text response

41. Is your breakfast club staffed/supervised by any TEACHERS?
   a. Yes
   b. No

42. Please give the total number of hours spent staffing/supervising the breakfast club by teachers.
   Text response

43. Is your breakfast club staffed/supervised by any PASTORAL STAFF, e.g. learning mentors, family support workers?
   a. Yes
   b. No

44. Please give the total number of hours spent staffing/supervising the breakfast club by pastoral staff.
   Text response

45. Is your breakfast club staffed/supervised by any OFFICE STAFF, e.g. business managers?
   a. Yes
   b. No

46. Please give the total number of hours spent staffing/supervising the breakfast club by office staff.
   Text response

47. Is your breakfast club staffed/supervised by any CARETAKING or MAINTENANCE STAFF?
   a. Yes
   b. No

48. Please give the total number of hours spent staffing/supervising the breakfast club by caretaking or maintenance staff.
49. Is your breakfast club staffed/supervised by any VOLUNTEERS?
   a. Yes
   b. No

50. Please give the total number of hours spent staffing/supervising the breakfast club by volunteers.

51. Is your breakfast club staffed/supervised by ANY OTHER TYPE OF STAFF not previously mentioned in the questions about staffing/supervision?
   a. Yes
   b. No

52. Please give the total number of hours spent staffing/supervising the breakfast club by any other type of staff not previously mentioned in the questions about staffing/supervision.

53. Some aspects of delivering breakfast clubs in schools can be more challenging than others. How well do you think the following aspects of delivery have worked in practice in your school during the Magic Breakfast pilot? [Monitoring and managing the supply and demand for breakfasts]
   a. Very well
   b. Quite well
   c. Not very well
   d. Not well at all
   e. Not sure
   f. Not applicable

54. Some aspects of delivering breakfast clubs in schools can be more challenging than others. How well do you think the following aspects of delivery have worked in practice in your school during the Magic Breakfast pilot? [Delivering breakfast: preparing and serving food]
   a. Very well
   b. Quite well
   c. Not very well
   d. Not well at all
   e. Not sure
   f. Not applicable

55. Some aspects of delivering breakfast clubs in schools can be more challenging than others. How well do you think the following aspects of delivery have worked in practice in your school during the Magic Breakfast pilot? [Providing a suitable, safe and welcoming environment where the breakfast takes place]
   a. Very well
   b. Quite well
   c. Not very well
   d. Not well at all
   e. Not sure
   f. Not applicable

56. Some aspects of delivering breakfast clubs in schools can be more challenging than others. How well do you think the following aspects of delivery have worked in practice in your school during the Magic Breakfast pilot? [Supervision of children]
   a. Very well
   b. Quite well
   c. Not very well
   d. Not well at all
   e. Not sure
   f. Not applicable

57. Some aspects of delivering breakfast clubs in schools can be more challenging than others. How well do you think the following aspects of delivery have worked in practice in your school during the Magic Breakfast pilot? [Clearing up after breakfast club]
58. Some aspects of delivering breakfast clubs in schools can be more challenging than others. How well do you think the following aspects of delivery have worked in practice in your school during the Magic Breakfast pilot? [Developing a sustainable breakfast club for the next academic year]
   a. Very well
   b. Quite well
   c. Not very well
   d. Not well at all
   e. Not sure
   f. Not applicable

59. How successfully do you think the following aspects of engagement and buy-in have been achieved in your school during the Magic Breakfast pilot? [Informing and engaging children about breakfast provision]
   a. Very successfully
   b. Quite successfully
   c. Not very successfully
   d. Not at all successfully
   e. Not sure
   f. Not applicable

60. How successfully do you think the following aspects of engagement and buy-in have been achieved in your school during the Magic Breakfast pilot? [Informing and engaging parents about breakfast]
   a. Very successfully
   b. Quite successfully
   c. Not very successfully
   d. Not at all successfully
   e. Not sure
   f. Not applicable

61. How successfully do you think the following aspects of engagement and buy-in have been achieved in your school during the Magic Breakfast pilot? [Targeting those children who need breakfast the most]
   a. Very successfully
   b. Quite successfully
   c. Not very successfully
   d. Not at all successfully
   e. Not sure
   f. Not applicable

62. How successfully do you think the following aspects of engagement and buy-in have been achieved in your school during the Magic Breakfast pilot? [Gaining buy-in from staff as to the importance of providing free breakfast provision]
   a. Very successfully
   b. Quite successfully
   c. Not very successfully
   d. Not at all successfully
   e. Not sure
   f. Not applicable

63. Thinking about all the behaviour you have encountered around the school over the last term, how many pupils do you find generally badly behaved and/or difficult to deal with?
   a. All / almost all
   b. Most
   c. Some
   d. Few
   e. None / almost none

64. In your experience, when has indiscipline been most likely to occur in your school over the last term?
   a. Before the school day begins
   b. During morning classes
   c. Morning break
   d. Lunchtime
   e. During afternoon classes
65. Since the Magic Breakfast pilot started, what do you think has happened to the following aspects of school life? [Pupil behaviour]
   a. Improved a lot
d. Got a little worse
   b. Improved a bit
e. Got a lot worse
c. Stayed the same
f. Not sure

66. Since the Magic Breakfast pilot started, what do you think has happened to the following aspects of school life? [Pupil concentration]
   a. Improved a lot
d. Got a little worse
   b. Improved a bit
e. Got a lot worse
c. Stayed the same
f. Not sure

67. Since the Magic Breakfast pilot started, what do you think has happened to the following aspects of school life? [Pupil attainment]
   a. Improved a lot
d. Got a little worse
   b. Improved a bit
e. Got a lot worse
c. Stayed the same
f. Not sure

68. Since the Magic Breakfast pilot started, what do you think has happened to the following aspects of school life? [Pupil attendance]
   a. Improved a lot
d. Got a little worse
   b. Improved a bit
e. Got a lot worse
c. Stayed the same
f. Not sure

69. Since the Magic Breakfast pilot started, what do you think has happened to the following aspects of school life? [Pupil cohesion / collegiality]
   a. Improved a lot
d. Got a little worse
   b. Improved a bit
e. Got a lot worse
c. Stayed the same
f. Not sure

70. Since the Magic Breakfast pilot started, what do you think has happened to the following aspects of school life? [The school facilities (e.g. catering facilities or dining area)]
   a. Improved a lot
d. Got a little worse
   b. Improved a bit
e. Got a lot worse
c. Stayed the same
f. Not sure

71. Since the Magic Breakfast pilot started, what do you think has happened to the following aspects of school life? [Other (if no other aspect is relevant, please select 'Not sure')]  
   a. Improved a lot
d. Got a little worse
   b. Improved a bit
e. Got a lot worse
c. Stayed the same
f. Not sure

72. If you selected a response other than 'Not sure' against 'Other' in the above question, please specify the aspect of school life that you have responded about.
73. Text response
74. How likely is it that the school will continue with free breakfast provision once the support from Magic Breakfast ends?
   a. Very likely  
   b. Quite likely  
   c. Neither likely nor unlikely  
   d. Quite unlikely  
   e. Very unlikely  
   f. Not sure

75. Would the school change any aspects of breakfast club delivery next year?
   a. Yes  
   b. No  
   c. Not sure

76. Please specify the aspect(s) of breakfast club delivery that you would change.
   Text response

77. In your view, what aspects, if any, do schools most need advice and support on to make set-up and implementation of breakfast clubs successful? Please select all that apply.
   a. Developing menus to provide nutritious and appealing food that is practical and affordable to deliver  
   b. Catering facilities  
   c. Sourcing food  
   d. Monitoring and managing the supply and demand for breakfasts  
   e. Staffing  
   f. Preparing and delivering the breakfasts  
   g. Providing a suitable, safe, welcoming environment where breakfast takes place  
   h. Supervising children  
   i. Informing and engaging children about breakfast provision  
   j. Informing and engaging parents about breakfast provision  
   k. Encouraging attendance at the club by difficult to reach and vulnerable children  
   l. Thinking through different models of offering food and which would fit best with the school’s situation  
   m. Deciding on a charging policy and evaluating the implications of that decision  
   n. None of these

78. Was breakfast offered to all Year 6 students at school during this year's SATs week?
   a. Yes  
   b. No

79. Is this the first year you have offered breakfast to Year 6 students during SATs week, or have you also done so in previous years?
   a. First year  
   b. Done previously