



Basic Maths Premium Pilot

Technical Appendices

February 2024



The Education Endowment Foundation is an independent charity dedicated to breaking the link between family income and education achievement. We support schools, nurseries and colleges to improve teaching and learning for 2 – 19-year-olds through better use of evidence.

We do this by:

- **Summarising evidence.** Reviewing the best available evidence on teaching and learning and presenting in an accessible way.
- **Finding new evidence.** Funding independent evaluations of programmes and approaches that aim to raise the attainment of children and young people from socio-economically disadvantaged backgrounds.
- **Putting evidence to use.** Supporting education practitioners, as well as policymakers and other organisations, to use evidence in ways that improve teaching and learning.

We were set-up in 2011 by the Sutton Trust partnership with Impetus with a founding £125m grant from the Department for Education. In 2022, we were re-endowed with an additional £137m, allowing us to continue our work until at least 2032.

For more information about the EEF or this report please contact:



Education Endowment Foundation
5th Floor, Millbank Tower
21–24 Millbank
SW1P 4QP



info@eefoundation.org.uk



www.educationendowmentfoundation.org.uk

Contents

Appendix A: Memorandum of Understanding	3
Appendix B: Privacy notice.....	7
Appendix C: Initial interviews topic guide.....	11
Appendix D: Follow-up interviews topic guide.....	14
Appendix E: Survey wave 1.....	18
Appendix F: Survey wave 2.....	25
Appendix G: Survey wave 3	28
Appendix H: Summary of deviations from initially planned covariates	34
Appendix I: Additional descriptive results	36
Appendix J: Impact estimation robustness check: two-stage matching.....	46
Appendix K: Exploratory impact estimation	58

Appendix A: Memorandum of Understanding

Subject to Contract: Agreement to participate in the evaluation of the Basic Maths Premium Pilot

This document explains what participation in the trial involves and the roles and responsibilities of each partner.

Aim of the Pilot

The Basic Maths Premium pilot will provide additional funding to educational settings in the most disadvantaged areas of the country to support 16–18-year-old students re-sitting Maths GCSEs. The aim of the evaluation is to assess the impact of different funding structures on student outcomes and to understand how change is achieved.

Basic Maths Premium Pilot

The pilot was developed and is funded by the Department for Education (DfE). The evaluation is funded by the Education Endowment Foundation (EEF). It will test the impact of paying a premium to post-16 providers to support attainment in basic Maths. Additional funding of up to £500 per student will be allocated for the academic year 2018/19 cohort for every student enrolled on a 16 to 19 study programme without prior attainment of a grade 4 or above in GCSE Maths (hereafter referred to as eligible students).

The pilot will test three funding structures, as follows:

1. Additional funding of £500 to be paid upfront for each eligible student starting in September 2018.
2. 50% of the £500 additional funding to be paid upfront for each eligible student in September 2018, followed by 50% of the additional funding to be paid per student who achieves in Maths by Summer 2020.
3. £500 of additional funding to be paid in September 2020 for each eligible student who has achieved in Maths by Summer 2020.

The aims of the pilot are to:

- assess which funding approach is most effective at improving outcomes for students with prior attainment of a Grade 3 or below in GCSE Maths,
- identify how the additional funding is used by institutions, and build evidence of activities that lead to improvements in teaching and learning,
- support some of the most disadvantaged areas of the country with additional funding.

The funding will be available to approximately 800 post-16 educational settings in Category 5 and 6 Achieving Excellence Areas (AEA)¹. These areas have been

identified as some of the most disadvantaged areas in the country. The target cohort is 16–18-year-old students starting their study programmes in September 2018 without a Grade 4 or above in GCSE Maths.

The definition of achievement for the purpose of the pilot is as follows:

- students with prior attainment of a Grade 3 in GCSE Maths will be required to achieve a Grade 4 or above in GCSE Maths, and;
- students with prior attainment of a Grade 2 or below in GCSE Maths will be required to achieve a Grade 4 or above in GCSE Maths, or a Functional Skills Level 2 in Maths.

Institutions can choose how to use the funds to drive improvements in basic Maths attainment. The Department for Education will provide guidance on using the additional funding effectively.

Participation in the pilot is voluntary. Institutions that agree to take part will be allocated to one of the three funding structures through a random allocation process carried out by the external evaluation partner to ensure a statistically robust evaluation.

¹ The Achieving Excellence Areas categories identify areas most in need based on a combination of indicators of current educational performance with indicators which show capacity to improve. Further details available at: <https://www.gov.uk/government/publications/defining-achieving-excellence-areas-methodology>

The Evaluation

The evaluation is being conducted by an independent research team from the National Centre for Social Research (NatCen).

Institutions agreeing to take part will be randomly allocated to one of the three funding structures as this is the best way to find out the effect of the pilot on student outcomes. Institutions will be informed which funding structure they are allocated to within 10 days of agreeing to take part, to allow time for planning.

The evaluation will test the relative effectiveness of the three funding structures referred to above. It will also assess the impact of the additional pilot funding compared to 'business as usual' by analysing outcomes for similar students who attend institutions that are not in the pilot. For this aspect of the evaluation a comparison group of students who are not participating in the pilot will be established, drawn from similar students in institutions in the next-most disadvantaged areas. This will be done through a form of statistical matching where individuals that are most similar to eligible students in participating institutions in the pilot areas (AEA Category 5 and 6) are identified from a large pool of individuals using data available from the National Pupil Database.

All institutions that have agreed to take part in the pilot will receive the additional funding in accordance with the funding structure to which they have been allocated using random assignment. Institutions with only a small number of eligible students will not be required to take part in the various evaluation activities outlined below.

The evaluation timeline is detailed below. The research activities requiring your input are highlighted in bold.

Evaluation activities	Timings
Recruitment of post-16 settings in pilot areas by DfE	May/June 2018
Institutions informed by NatCen of their allocation to one of three funding structures	May/June 2018
Participating institutions inform DfE of students eligible for evaluation , i.e., students starting their first year of post-16 studies in September 2018 who have failed to achieve a GCSE Maths Grade 4 or above at KS4. Institutions provide key personal information for linkage with the NPD	September/October 2018
NatCen establish a comparison group using NPD	November/December 2018
Baseline data collection from NPD and school and college performance tables	November/December 2018
Additional funding for post-16 settings disbursed in pilot areas	September 2018 – July 2020
Short, online survey completed by a lead from each pilot institution – three surveys over the course of the pilot	November/December, 2018, June/July 2019, June/July 2020
Case Study interviews with heads of Maths in 32 institutions (24 pilot and 8 comparison) – telephone interviews to understand decision making in the allocation of funds	Spring 2019
GCSE resit outcome data for both pilot and comparison schools and students collected.	October 2020
Analysis and reporting	Autumn 2020/Spring 2021

Use of Data and adherence to GDPR

The Department for Education (DfE) will be the data controller and the evaluator, NatCen, will be the data processor.

Data will be collected by the Department for Education and the evaluator, NatCen. The pilot will draw on data from the National Pupil Database (NPD) and school and college performance tables. GCSE resit attainment in Maths post-pilot will be taken from the NPD in Autumn 2020 for all eligible students who started their post-16 studies in Autumn 2018. In Autumn 2018, participating schools will need to provide key personal student information for linkage with the NPD.

Comparison group data will also be drawn from the NPD, e.g., GCSE Maths pre- and post-pilot results, but will not involve any transfer of data from the comparison institutions.

Any transfer of personal data between parties will be performed in a secure manner (i.e., using password encrypted files).

On conclusion of the project, the Fischer Family Trust (see <http://www.fft.org.uk/>) will collate and anonymise the data for upload to the UK Data Archive. The archived data will be available in an anonymised form with restricted access for research purposes only.

No other parties will have access to the data collected.

The results of the research will be published. All data will be confidential and stored in line with the Data Protection Act 1998 and the EU General Data Protection Regulation. No names of institutions or students will ever be in the reports. NatCen's information security procedures are externally audited four times a year and mean that we are accredited to ISO27001, ISO20252 and Cyber Essentials Plus. Data is held on a secure network and even within the organisation access is granted only to staff with an obvious need. Our buildings have tight physical controls, and all data is securely deleted as soon as NatCen no longer needs to hold it.

Legal basis for processing the data

- The legal basis for processing personal data for this evaluation is 'public task'². This means that the processing of personal data is necessary for the performance of a task carried out in the public interest or in the exercise of official authority, in this case, the funding of education provision.
 - Special categories of personal data (required for matching analysis) will be processed using the research exemption³. This means that data processing is necessary for research purposes, with appropriate safeguards for protecting the rights and freedoms of the data subjects.
 - Ethical agreement to participate in the pilot will be provided by the head teacher as part of their normal decision-making regarding resources used in their institution.
 - Research participation for students involves the processing of their personal data held by the NPD. Students will not be required to take part in any other data collection activities.
- NatCen will provide text on the project website aimed at students and parents who wish to find out about the pilot.

Responsibilities

The Department for Education (DfE) will:

- Enable institutions to sign-up to the pilot, providing information and responding to queries about the funding.
- Administer the funding via the Education and Skills Funding Agency.
- Collect information about eligible students from institutions.

The project team (NatCen) will:

- Randomly allocate participating institutions to a funding structure and inform institutions of their allocation.
- Carry out the teacher surveys and case studies.
- Collect and analyse the data to estimate the impact of the intervention.
- Publish a report on the findings of the project.
- Provide information about the evaluation and respond to queries about the evaluation.

Institutions will:

² point (e) of paragraph 1 of Article 6 of the GDPR: <https://gdpr-info.eu/art-6-gdpr/>

³ point (j) of paragraph 2 of Article 9 of the GDPR: <https://gdpr-info.eu/art-9-gdpr/>

- Allocate the funds to support students re-sitting Maths GCSE during their 16-18 study programmes.
- Inform students and parents that the institution is participating in the pilot .
- Take part in evaluation activities.
- Complete short interim reports to the DfE on how institutions are funding student support in the pilots.
- Share performance data with DfE and NatCen.
- Provide student level information to enable data linkage with the National Pupil Database.
- Provide contact details for the Head of Maths or another member of staff who will be the main contact for the research.

For further information

Please visit the project website to find out more about the pilot:

<http://www.natcen.ac.uk/taking-part/studies-in-field/maths-premium-pilot>

If you have further queries about the funding, please contact:

basicskills.premium@education.gov.uk

Appendix B: Privacy notice

Evaluation of the Basic Maths Premium Pilot: Privacy Notice

In this privacy notice, we explain the legal basis for data processing, who will have access to participants' personal data, how data will be used, stored and deleted, and who you can contact with a query or a complaint.

Institutions should ensure that all learners eligible for the pilot have seen this privacy notice as part of their enrolment process.

Who NatCen are and what's involved

This evaluation is being carried out by the National Centre for Social Research (NatCen), commissioned by the Education Endowment Foundation (EEF), to evaluate whether the Department for Education's (DfE) Basic Maths Premium (BMP) pilot is effective at improving the pass rate in GCSE Maths (or an equivalent pass in Basic Skills Maths) for students re-sitting these qualifications in post-16 education.

In line with the UK General Data Protection Regulation (GDPR), there are certain things that we want to let you know about how information will be processed in the evaluation of Basic Maths Premium Pilot.

For the purposes of relevant data protection legislation, National Centre for Social Research (NatCen), the research organisation evaluating the pilot, will act as the data controller. The BMP pilot will provide additional funding to educational settings in the most disadvantaged areas of the country to support 16–18-year-old students working towards a maths GCSE.

Purposes of processing the data

The purpose of processing the data is to assess the impact of different funding structures on learner outcomes, to understand how change is achieved and to share this good practice with the post-16 sector. The data requested is required to estimate the impact of the programme, including creating a comparison group to understand what would have happened in the absence of the intervention. This relies on good data on observed characteristics associated with selection into the intervention. The National Pupil Database data is high quality with excellent coverage, which should facilitate the construction of a comparison group. Without this data, the evaluation cannot go ahead.

The data processing will involve:

- Institutions letting DfE know in Autumn 2018 which learners are resitting Maths GCSE and sharing learners' personal details.
- NatCen accessing attainment data from the National Pupil Database and linking this to the learner data shared by institutions.
- Analysing pseudonymised data.
- Archiving data within the Office for National Statistics Secure Research Service

The legal basis for the data processing

The National Centre for Social Research (NatCen) is the data controller for this evaluation.

The legal basis for processing personal data for this evaluation is 'legitimate interest'.⁴ NatCen will process the data for the legitimate purpose of conducting the evaluation of the Basic Maths Premium Pilot. Special categories of personal data (required for matching analysis) will be processed using the research exemption.⁵ This means that data processing is necessary for research purposes, with appropriate safeguards for protecting the rights and freedoms of the data subjects. Ethical agreement to participate in the pilot will be provided by the head teacher as part of their normal decision-making regarding resources used in their institution.

Research participation for learners involves the processing of their personal data held by the NPD. Learners will not be required to take part in any other data collection activities. NatCen has provided text on the project website aimed at learners and parents who wish to find out about the pilot:

<https://natcen.ac.uk/taking-part/studies-in-field/maths-premium-pilot/>

How will the data be used?

The data collected will be used for research purposes only.

Attainment data from the National Pupil Database (NPD) will be used to inform our impact evaluation. All assessment data will be pseudonymised before being analysed.

All data will be treated with the strictest confidence – no school, staff, or children will be identified in any report arising from the research.

The recipients of personal data

NatCen will be the data controller.

NatCen will share results from the evaluation of the Basic Maths Premium pilot (including information from the NPD) with the Department for Education, the EEF's archive manager and, in pseudonymised form, with the Office for National Statistics.

The Department for Education (DfE) is a third party that will benefit from the evaluation report, which will inform them about the effectiveness of the intervention, and details about how the intervention was implemented from qualitative data collection also conducted by NatCen. The report will also be published free of charge on the EEF website, which will be available for policy makers and school leaders to view.

Learner information may be shared with third parties for education, training, employment and well-being related purposes, including for research. This will only take place where the law allows it and the sharing complies with data protection legislation.

Any transfer of data will be made on the basis of an adequacy decision by the European Commission under Article 45 of the GDPR.

Details of further processing or data linkage

On conclusion of the project, NatCen will archive the data with the ONS Secure Research Service. At this stage, the Education Endowment Foundation (funder of this evaluation) will become the data controller. The data will be available in a pseudonymised form with restricted access for research purposes only.

⁴ point (f) of paragraph 1 of Article 6 of the GDPR: <https://gdpr-info.eu/art-6-gdpr/>

⁵ point (j) of paragraph 2 of Article 9 of the GDPR: <https://gdpr-info.eu/art-9-gdpr/>

You can find out more about the EEF at: www.educationendowmentfoundation.org

Data retention period

The data processed for this evaluation will be deleted from NatCen's systems following the data transfer to EEF. Following data transfer, the data will be covered by the EEF's privacy notice. Personal information will be securely destroyed after it is no longer required for the purposes of the study (1 July 2024 at the latest).

Source and Categories of data collected

We will obtain information from the National Pupil Database, which is a publicly accessible source from the Department for Education (DfE).

We will collect the following types of data:

- Ethnicity
- Gender
- Age
- First name
- Last name
- Date of Birth
- Unique Pupil Number (UPN)
- School Name
- School Unique Reference Number (URN)
- School number (LAESTAB)

All individuals' data will be pseudonymized at the point of analysis.

How can I object to my data being processed?

You can object to your personal data being processed at any time, by emailing mathspremium@natcen.ac.uk.

What are your data protection rights?

NatCen would like to make sure you are fully aware of all your data protection rights. Every individual whose data will be processed will be entitled to the following:

The right of access – You have the right to access any data that NatCen collects, by emailing mathspremium@natcen.ac.uk. This can only be applied to data collected by NatCen, such as online survey responses completed by school leaders.

The right of rectification – You have the right to request that NatCen correct any information you believe is inaccurate or complete information you believe is incomplete, by emailing mathspremium@natcen.ac.uk. If the data relates to NPD, NatCen would communicate with DfE to resolve your case since we cannot identify individual data when we receive it.

The right of erasure – You have the right to request that NatCen erase your personal data, by emailing mathspremium@natcen.ac.uk. We would ensure that your data is removed and excluded from the study.

Once data has been aggregated along with other study participants (such that they could no longer be identified), NatCen would be able to remove your raw data but not be able to revise the aggregated data or any tables and reports produced from it.

The right to restrict processing – You have the right to request that NatCen restrict the processing of your personal data, by emailing mathspremium@natcen.ac.uk. If the data relates to NPD, NatCen would communicate with DfE to resolve your case since we cannot identify individual data when we receive it.

The right to data portability – You have the right to request that NatCen transfer the personal data that we have collected to another organisation or directly to you, by emailing mathspremium@natcen.ac.uk. This can only be applied to data collected by NatCen, such as online survey responses completed by school leaders.

Who can I contact with a query or a complaint?

If you have a concern about the way NatCen is collecting or using personal data, we request that you raise your concern with us in the first instance by contacting NatCen's Data Protection Officer at dpo@natcen.ac.uk.

Alternatively, you have the right to lodge a complaint with the Information Commissioner's Office. Their contact details are:

Information Commissioner's Office
Wycliffe House
Water Lane
Wilmslow
Cheshire
SK9 5AF

Telephone: 0303 123 1113

Web: <https://ico.org.uk/concerns/>

Where you have consented to processing your personal data, you can withdraw this consent at any time by emailing mathspremium@natcen.ac.uk. However, once data is analysed it is not possible to withdraw your data from the outputs of research such as published reports.

Contact us

For anything not covered on here, please phone 0800 652 0401 or email mathspremium@natcen.ac.uk. One of our staff will get back to you to answer your query as soon as possible.

Appendix C: Initial interviews topic guide

P13021 Basic Maths Premium Pilot Evaluation

Interview Topic Guide – Head of Maths interviews

NatCen has been commissioned by the Education Endowment Foundation (EEF) to carry out an independent evaluation of the Basic Maths Premium Pilot.

The Basic Maths Premium Pilot has been developed by the Department for Education (DfE). It aims to support students on 16-19 study programmes who are studying towards a GCSE maths grade 4 or above, (or Functional Skills Level 2 depending on their original GCSE results) through providing additional funding to further education providers. The aim of the evaluation is to assess the impact of different funding structures on student outcomes and to understand how change is achieved.

These interviews with Maths leads (8 interviews in each of the three treatment groups and the comparison group) will seek to explore intervention implementation and decision-making processes in greater depth. Topics will include:

- Planning (for pilot institutions): reasons for interest in the pilot, how decisions were made to spend the fund, who was involved, sources consulted.
- Range of support for re-sitters.
- Sources of funding to enable support.
- Impact of the additional funds on standard practice.

The following guide does not contain pre-set questions but rather lists the key themes and sub-themes to be explored with participants. It does not include follow-up questions like 'why', 'when', 'how', etc. as it is assumed that participants' contributions will be fully explored throughout in order to understand the hows and whys.

1. INTRODUCTION

Aim: to remind the participant about the aims of the research, explain how the interview will be conducted and how the data will be used.

Introduction to researcher. Thank you for agreeing to take part.

Introduction to NatCen – independent research organisation, we have been commissioned by the Education Endowment Foundation to conduct an independent evaluation of the Basic Maths Premium Pilot developed by the Department for Education.

Explanation of research – as part of evaluation, we're currently conducting **interviews with Maths leads** in participating institutions, to explore how decisions about the allocation of the Basic Maths Premium funding are made.

The information you provide will be used to write a report that we will share with the Education Endowment Foundation and the Department for Education. All information will be treated confidentially. No individual or organisation will be named in the report and nothing you say will be attributed to you.

We would like to record the interview, so we have an accurate record of what is said.

Recorder is encrypted, and files stored securely in line with General Data Protection Regulation (GDPR).

Only the research team will have access to the recordings.

The interview will last up to 1 hour.

Any questions?

Permission to start recording.

Turn on recorder - obtain verbal consent to participate.

1. PARTICIPANT BACKGROUND

Aim: to 'warm up' participant and to understand their role in the provision of the Basic Maths Premium. [about 5 mins]

- Brief overview of role in the institution
 - Length of service
 - Involvement in the teaching and learning of maths up to Level 2 (GCSE and/or Functional Skills)
- Whether they heard about Basic Maths Premium before we contacted them
- Brief outline of what they know about Basic Maths Premium
- Whether they are aware of funding model their institution has been allocated to
- Brief explanation of role and involvement in Basic Maths Premium pilot

2. BAU AND INTERVENTION ACTIVITIES

Aim: to understand existing provision of support for students sitting maths towards GCSEs or Functional Skills Level 2 and how the Basic Maths Premium fits into this. [about 15 mins]

- Activities and tools currently available to support students taking maths GCSEs/ Functional Skills Level 2 (including those aimed at all students struggling with maths)
 - Activities / tools introduced in 2018/19
 - Activities / tools funded through Basic Maths Premium
 - Activities / tools funded through other sources of maths funding, and which sources
 - Activities / tools available to support students studying towards a maths GCSE/ Functional Skills L2 in the previous year but phased out in 2018/19
- *For main activities / tools* - Whether participation/take-up is mandatory or voluntary
 - If mandatory, how is it enforced and what is the level of compliance?
 - If voluntary, what is the level of participation and what steps are taken to encourage participation?
- Extent to which amount of support and type of activities are tailored to the needs of individual students

3. IMPLEMENTATION

Aim: to investigate the decision-making process around the allocation of Basic Maths Premium funding, including sources of information and challenges experienced. [15-20 mins]

- Who was involved in decision-making about allocation of Basic Maths Premium funding
 - Whether Maths Lead has any say in decisions about allocation of funding for:
 - Teacher time
 - Other expenditures (e.g. teaching and learning tools)
- When decisions were made on how to spend funding attached to Basic Maths Premium

- Whether decisions are made at a single point in time or are ongoing
- Whether decisions are part of usual decision-making process about funding or were made separate to that process
- How easy / quick or difficult / slow was it to allocate Basic Maths Premium funding
 - Explore why (e.g. small / large number of decision-makers; high / low level of consensus among them; timing and/or amount of funding; the institutions already had unfunded plans)
- Reasons for activities / tools introduced
 - What else they considered and why they chose not to introduce these activities / tools
 - Whether funding model informed decisions about activities and resources the funding was spent on
- Sources of information consulted to inform decision-making (e.g. EEF toolkit; DfE BMP webpage)
 - Sources of information perceived as most useful
- Anticipated use of remaining funding
 - On which cohort
 - Activities / tools that are being considered

4. PERCEPTIONS OF INTERVENTION

Aim: to explore participant's understanding of the intervention and their views on how this may be improved. [about 15 mins]

- *If involved in project sign-up* - Reasons for interest in taking part in pilot
- Whether information received about Basic Maths Premium was comprehensive enough
 - Anything they would have liked more information on
- Initial impression of intervention
 - Whether funding is perceived to be sufficient
 - If not, how much is necessary per student?
 - Whether 'payment by results' model is perceived to be fair
 - Whether they think funding should of have been targeted at other groups of students / at addressing other issues
- Any way they think Basic Maths Premium may be improved

5. EXPECTED IMPACTS ON STUDENT OUTCOMES

Aim: to explore participant's expectations about the impact of the Basic Maths Premium on students' outcomes. [about 5 mins]

- What outcomes they expect to be achieved for students through Basic Maths Premium
- Whether they think any group of students is likely to benefit more / less from the intervention (e.g. disadvantaged students or relatively stronger students)
 - Whether they expect funding to benefit some the 2018/2019 or the 2019/2020) more.

6. CLOSE

- Final closing comments – anything else to raise
- Any questions?

End recording

- Thank participant and reaffirm confidentiality and anonymity

Appendix D: Follow-up interviews topic guide

P13021 Basic Maths Premium Pilot Evaluation

Interview Topic Guide – Head of Maths Post-Intervention interviews

NatCen has been commissioned by the Education Endowment Foundation (EEF) to carry out an independent evaluation of the Basic Maths Premium Pilot (BMP).

The BMP has been developed by the Department for Education (DfE). It aims to support students on 16-19 study programmes who are studying towards a GCSE maths grade 4 or above (or Functional Skills Level 2 depending on their original GCSE results), through additional funding for further education providers.

The evaluation aims to assess the impact of different funding structures on student outcomes and to understand how change is achieved.

Post-intervention interviews with Maths leads (four interviews in each of the three treatment groups) will seek to explore participants' views and experiences of the BMP. Discussion topics include:

- Provision in 2019/20 for students resitting maths GCSEs or Functional Skills Level 2
- Activities introduced using BMP funding and decision-making around funding allocation
- Views on the BMP and how this may be improved
- Perceived impact of the BMP on students' outcomes

Interviews will last around **45 minutes**.

The following guide does not contain pre-set questions but rather lists the key themes and sub-themes to be explored with participants. It does not include follow-up questions like 'why', 'when', 'how', etc. as it is assumed that participants' contributions will be fully explored throughout in order to understand the hows and whys.

1. INTRODUCTION

Aim: to remind the participant about the aims of the research, explain how the interview will be conducted and how the data will be used.

Introduction to researcher. Thank you for agreeing to take part.

Introduction to NatCen – independent research organisation.

NatCen are conducting interviews with Maths leads as part of the ongoing independent evaluation of the BMP. The aim of the interview is to understand:

- Support for students resitting maths GCSEs or Functional Skills Level 2
- Activities introduced using Basic Maths Premium funding
- Views on Basic Maths Premium and how this may be improved
- Perceived impact of the Basic Maths Premium on students' outcomes

The information you provide will be used to write a report that we will share with the Education Endowment Foundation and the Department for Education.

All information will be treated confidentially. No individual or organisation will be named in the report and nothing you say will be attributed to you.

We would like to record the interview, so we have an accurate record of what is said – **check this is ok.**

- Recorder is encrypted, and files stored securely in line with General Data Protection Regulation (GDPR).
- Only the research team will have access to the recordings.

The interview will last around **45 minutes**.

Any questions?

Permission to start recording.

Start recording - obtain verbal consent to participate.

2. PARTICIPANT BACKGROUND *[max. 5 mins]*

Aim: to 'warm up' participant and to understand their role in the provision of the Basic Maths Premium.

If interviewee is the **same** as pre-intervention interview:

- Any changes since first interview in **[give overview of what was said in pre-intervention interview - see participant background chart]**:
 - Role in institution
 - Role in BMP pilot

If interviewee is **different** from pre-intervention interview:

Brief overview of role in the institution

- Length of service
- Involvement in the teaching and learning of maths up to Level 2 (GCSE and/or Functional Skills)

Awareness of Basic Maths Premium before we contacted them

Understanding of Basic Maths Premium

Awareness of funding model their institution has been allocated to

Role and involvement in Basic Maths Premium pilot

3. BAU ACTIVITIES *[approx. 10 mins]*

Aim: to understand provision of support over the past academic year (2019/20) for students sitting maths GCSEs or Functional Skills Level 2, apart from those funded through BMP.

Note to interviewer: BAU activities include all activities or tools available in 2019/20, including those aimed at all students struggling with maths, that **are not** funded through BMP.

Any activities / tools introduced in 2019/20 to support students taking maths GCSEs/ Functional Skills Level 2, apart from those funded through BMP

- *If unable to answer:* brief overview of activities / tools available in 2019/20 to support students taking maths GCSEs/ Functional Skills Level 2, apart from those funded through BMP

Anything phased out from 2018/19

For BAU activities/tools available in 2019/20:

How activities were funded (through which sources)

Whether participation/take-up is mandatory or voluntary

- If mandatory, how enforced and level of compliance
- If voluntary, level of participation and steps taken to encourage participation

Extent to which amount of support and type of activities are tailored to the needs of individual students

Impact of COVID-19 on activities and participation

4. INTERVENTION ACTIVITIES & IMPLEMENTATION *[approx. 10 mins]*

Aim: to understand intervention activities introduced using Basic Maths Premium funding and how this was implemented in the institution.

Note to interviewer: Intervention activities include all activities or tools that were available in 2019/20, including those aimed at all students struggling with maths, that **are** funded through BMP.

Any activities / tools introduced in 2019/20 to support students taking maths GCSEs/ Functional Skills Level 2, funded through BMP

- *If unable to answer:* brief overview of activities / tools available in 2019/20 to support students taking maths GCSEs/ Functional Skills Level 2, funded through BMP
- Anything phased out from 2018/19

For BMP funded activities/tools available in 2019/20:

Whether participation/take-up is mandatory or voluntary

- If mandatory, how enforced and level of compliance
- If voluntary, level of participation and steps taken to encourage participation

Extent to which amount of support and type of activities are tailored to the needs of individual students

Impact of COVID-19 on BMP-funded activities and participation

Decision-making process

Reasons for activities / tools introduced

What other activities / tools were considered

- Why they chose not to introduce these activities / tools

Whether funding model informed decisions about activities / tools the funding was spent on

What worked well and less well in decision-making process about BMP funding allocation

Whether any funding left, and anticipated use

- On which cohort
- Activities / tools that are being considered

5. PERCEPTIONS OF INTERVENTION *[approx. 10 mins]*

Aim: to explore participant's retrospective views of the intervention and how this may be improved.

Reflection on intervention

- What worked well / less well
- Whether it met expectations

Suggestions for improving Basic Maths Premium

6. PERCEIVED IMPACTS ON STUDENT OUTCOMES *[approx. 10 mins]*

Aim: to explore participant's perceived impact of the Basic Maths Premium on students' outcomes.

Perceived benefits for students as a result of Basic Maths Premium

- Increased confidence
- Student wellbeing
- Motivation to succeed
- Increased understanding of Maths
- Increased attendance at school / exam attendance
- Achieving GCSE or Functional Skills Level 2

Any groups of students who have benefitted more / less from the intervention

- Disadvantaged students
- Stronger students

Whether funding is expected to benefit the 2018/2019 or 2019/2020 cohort more

- Specific impacts of COVID-19 shut-down

Any other way they think that COVID-19 and school closures may have changed the expected impact on student outcomes

7. CLOSE

Final closing comments / thoughts

End recording

Thank participant and reaffirm confidentiality and anonymity

Any questions?

Reminder of email address for any further queries: mathspremium@natcen.ac.uk

Appendix E: Survey wave 1

Basic Maths Premium Feedback Form

Evaluation of the Basic Maths Premium

Thank you for agreeing to participate in the evaluation of the Basic Maths Premium Pilot.

This short survey will help us gather information on institutional context, the resources in place to improve Maths GCSE re-sit attainment, and use of additional funding. Your answers will provide us with important insights which will help us to better understand the outcome of the evaluation. The information you provide will only be used to inform evaluation and no institution or individual will be named in the evaluation report.

This survey will close on 8th March 2019.

If you have any questions when completing this survey, please contact the NatCen team directly on 0207 549 8575 or email mathspremium@natcen.ac.uk

No.	Question	Response Options	Asked of
1.	What type of establishment is your institution?	<ul style="list-style-type: none"> • FE College • School sixth form • Academy • Other (please specify) 	ALL
2.	Please enter your institution's UKPRN number.		ALL
3.	Please enter the number of 16-19 students in your institution. <i>This number should be the same as that provided in the Autumn ILR R04 or School Census return.</i>		ALL
4.	Please enter the percentage of 16-19 students in your institution who are eligible for Free School Meals. <i>Colleges should provide the percentage of students who previously received FSM at school and are now attending college.</i>		ALL
5.	Please enter the percentage of 16-19 students in your institution who have special educational needs or disabilities (SEND). <i>For this figure, please only include those who have official SEND documentation.</i>		ALL
6.	Please enter the percentage of 16-19 students in your institution who speak English as an additional language (EAL).		ALL

No.	Question	Response Options	Asked of
7.	What was your institution's latest Ofsted rating?	<ul style="list-style-type: none"> • Outstanding • Good • Requires improvement • Inadequate • No Ofsted rating yet 	ALL
8.	In the past 12 months, has your institution received any funding to improve the attainment of students in maths, aside from the Basic Maths Premium?	<ul style="list-style-type: none"> • Yes • No 	ALL
9.	<p>Approximately how much funding, aside from the Basic Maths Premium, has your institution received in the last 12 months to improve the attainment of students in maths at each level of qualification targeted?</p> <ul style="list-style-type: none"> • Entry Level • Level 1 (Level 1 Functional Skills) • Level 2 (GCSEs, Level 2 Functional Skills) • Level 3 (A Levels) • Other 		Those who answered 'yes' to Q8
10.	Please specify the sources(s) of funding and the name of the funding scheme(s).		Those who answered 'yes' to Q8
11.	If you stated that your institution received funding, aside from the Basic Maths Premium, for an 'other' qualification, please specify this qualification here.	<ul style="list-style-type: none"> • Other qualification (please specify) • N/A 	Those who answered 'yes' to Q8
12.	<p>In the last 12 months, what type of resources and activities have been in place in your institution to support students who have yet to achieve a GCSE grade 4 or above in maths, aside from the Basic Maths Premium.</p> <p>Please select all that apply</p>	<ul style="list-style-type: none"> • No resources / activities • Increased teaching staff • Increased support staff • Staff training • Purchasing new teaching tools • Purchasing new initial assessment tools • Unconditional financial incentives to teachers • Conditional financial incentives to teachers • Conditional financial & other incentive to students • Behavioural interventions (prompt texts, values affirmations) • Engagement with parents • Travel allowances for students • Increased mental health / well-being support • Other: please specify 	ALL
13.	<p>Why has your institution not provided resources and activities to support students who have yet to achieve a GCSE grade 4 or above in maths?</p> <p>Please select all that apply.</p>	<ul style="list-style-type: none"> • Lack of funding • Lack of time 	Those who answered 'no resources /

No.	Question	Response Options	Asked of
		<ul style="list-style-type: none"> • Lack of support from teaching staff • Not a strategic priority • Not viewed as necessary • Other (please specify) 	activities' to Q12
14.	To which Basic Maths Premium funding model has your institution been allocated?	<ul style="list-style-type: none"> • Guaranteed payment of £500 per eligible student • Guaranteed payment of £250 per eligible student + £250 per student achieving by 2020 • £500 per student achieving by 2020 • Don't know 	ALL
15.	<p>Please enter the number of students in your institution who are eligible for the funding attached to the Basic Maths Premium pilot.</p> <p><i>Students eligible for this funding are those enrolled on a 16 to 19 study programme for the first time without prior attainment of a GCSE grade 4 or above for the 2018 to 2019 academic year cohort.</i></p>		ALL
16.	<p>Based on your previous experience, how many of the students eligible for the Basic Maths Premium do you think will achieve in Maths GCSE or Functional Skills level 2 this year, based on criteria specified by the DfE? Conditions for achievement are:</p> <ul style="list-style-type: none"> • students with prior attainment of a grade 3 in GCSE maths need to achieve a grade 4 or above in GCSE maths • students with prior attainment of a grade 2 or below in GCSE maths need to achieve a grade 4 or above in GCSE maths, or a Functional Skills Level 2 in maths 		ALL

No.	Question	Response Options	Asked of
17.	When does your institution usually make decisions on spending to inform provisions for the academic year?	<ul style="list-style-type: none"> • Over the summer (July-August) • At the start of the academic year (September-October) • Later in the Autumn term (November-December) • Other (please specify) 	ALL
18.	Has your institution already spent any of the additional funding it expects to receive through the Basic Maths Premium?	<ul style="list-style-type: none"> • Yes • No 	ALL
19.	When did your institution start spending money attached to the Basic Maths Premium?	<ul style="list-style-type: none"> • As soon as it was allocated to a funding model (June 2018) • Over the summer (July-August 2018) • At the start of the academic year (September-October 2018) • Later in the Autumn term (November-December 2018) • After it was notified by DfE of the payment date (mid-December 2018) 	Those who answered 'yes' to Q18
20.	On which of the following groups has your institution spent, or is planning to spend, the Basic Maths Premium (please select all that apply):	<ul style="list-style-type: none"> • Students resitting Maths GCSEs or Functional Skills Level 2 • Students sitting Maths GCSEs or Functional Skills Level 2 for the first time • Any student needing support in Maths • Other (please specify) 	ALL

No.	Question	Response Options	Asked of
21.	<p>As of today, approximately what amount of the Basic Maths Premium funding has your institution already spent on the following items?</p> <p>(Institutions have flexibility over how to spend the additional funding).</p> <p>Please give your answer in £.</p>	<ul style="list-style-type: none"> • Increased teaching staff • Increased support staff • Staff training • Purchasing new teaching tools • Purchasing new initial assessment tools • Unconditional financial incentives to teachers • Conditional financial incentives to teachers • Conditional financial & other incentives to students • Behavioural interventions (prompt texts, values affirmations) • Engagement with parents • Travel allowances for students • Increased mental health / well-being support • Other 	ALL
22.	<p>If you stated that your institution has spent Basic Maths Premium funding on 'other' items, please specify these here.</p>	<ul style="list-style-type: none"> • Other item(s) (please specify) • N/A 	ALL
23.	<p>Has any of the Basic Maths Premium funding not yet been allocated by your institution?</p>	<ul style="list-style-type: none"> • Yes • No 	ALL
24.	<p>As of today, approximately what amount of the Basic Maths Premium funding has not yet been allocated by your institution?</p>		Those who answered 'yes' to Q22
25.	<p>You have stated that some of the Basic Maths Premium funding has not yet been allocated. How does your institution plan to spend the remaining funding?</p> <p>Please select all that apply.</p>	<ul style="list-style-type: none"> • Increased teaching staff • Increased support staff • Staff training • Purchasing new teaching tools • Purchasing new initial assessment tools • Unconditional financial incentives to teachers • Conditional financial incentives to teachers • Conditional financial & other incentive to students • Behavioural interventions (prompt texts, values affirmations) • Engagement with parents • Travel allowances for students • Increased mental health / well-being support • Yet to be decided • Other: please specify 	Those who answered 'yes' to Q22

No.	Question	Response Options	Asked of
26.	You have stated that some of the Basic Maths Premium funding has not yet been allocated. When is the remaining funding likely to be spent?	<ul style="list-style-type: none"> • All of it in the academic year 2018-2019 • Some of it in the academic year 2018-2019 some of it in the 2019-2020 academic year • All of it in the academic year 2019-2020 • Other (please specify) 	Those who answered 'yes' to Q22
27.	To what extent do you agree that the objectives of the Basic Maths Premium were clear when your institution joined the pilot (June 2018)?	<ul style="list-style-type: none"> • Strongly disagree • Disagree • Agree • Strongly agree • Don't know (e.g. I became involved in the pilot after this date) 	ALL
28.	How clear was the amount of Basic Maths Premium funding your institution would be receiving when your institution was allocated to a funding model (July-August 2018)?	<ul style="list-style-type: none"> • Very unclear • Quite unclear • Quite clear • Very clear • Don't know (e.g. I became involved in the pilot after this date) 	ALL
29.	On average, does the funding seem sufficient to improve KS4 Maths resit attainment?	<ul style="list-style-type: none"> • Yes • No 	ALL
30.	How clear was(were) the date(s) of Basic Maths Premium payment(s) when your institution was allocated to a funding model (July-August 2018)?	<ul style="list-style-type: none"> • Very unclear • Quite unclear • Quite clear • Very clear • Don't know 	ALL
31.	<p>To what extent do you agree the criteria for 'achievement' set by the DfE in the payment by results model were clear when your institution joined the pilot (June 2018)?</p> <p>If your institution has not been allocated to a payment by results model, please select N/A.</p>	<ul style="list-style-type: none"> • Very unfair • Quite unfair • Quite fair • Very fair • Don't know 	ALL
32.	How fair do you consider the funding model your institution has been assigned to?	<ul style="list-style-type: none"> • Very unfair • Quite unfair 	ALL

No.	Question	Response Options	Asked of
		<ul style="list-style-type: none"> • Quite fair • Very fair • Don't know 	
33.	To what extent do you agree that the intervention is aligned with the objectives and priorities of your institution?	<ul style="list-style-type: none"> • Strongly disagree • Disagree • Agree • Strongly agree • Don't know 	ALL
34.	<p>How have maths teachers been informed of the resources offered by the Basic Maths Premium?</p> <p>Please select all that apply.</p>	<ul style="list-style-type: none"> • Meeting • Email • Cascaded through Head of Maths • Not yet informed • Other (please specify) 	ALL
35.	Is there anything else you would like to add about your views on the Basic Maths Premium pilot?		ALL
36.	What is your role in the institution?	<ul style="list-style-type: none"> • Principal (or equivalent) • Vice principal / Deputy principal (or equivalent) • Head of Department / Head of Year (or equivalent) • Head of Maths (or equivalent) • Director of Learning / Curriculum Director (or equivalent) • Director of Funding (or equivalent) • Other (please specify) 	ALL
37.	Who contributed to completing this survey?	<ul style="list-style-type: none"> • Managers only • Teachers only • Managers and teachers • Other (please specify) 	ALL

Appendix F: Survey wave 2

Basic Maths Premium Feedback Form

Evaluation of the Basic Maths Premium

Thank you for agreeing to participate in the evaluation of the Basic Maths Premium Pilot.

This short survey will help us gather information regarding your experiences of the pilot and how your institution has gone about allocating Basic Maths Premium funding. Your answers will provide us with important insights which will help us to better understand the outcome of the evaluation. The information you provide will only be used to inform evaluation and no institution or individual will be named in the evaluation report.

This survey will close on 27th November 2019.

If you have any questions when completing this survey, please contact the NatCen team directly on 0207 549 8575 or email mathspremium@natcen.ac.uk

No.	Question	Response Options	Asked of
1.	Please insert the UKPRN provided in the survey invitation email.		ALL
2.	Is your institution part of a Multi-Academy Trust (MAT)?	<ul style="list-style-type: none"> • No • Yes (please specify the name of the MAT) 	ALL
3.	Was the Trust involved in the allocation of Basic Maths Premium funding?	<ul style="list-style-type: none"> • Yes • No • Don't know 	Those who answered 'yes' to Q2
4.	Has the Basic Maths Premium been directly or indirectly used to support low attaining students in other academies in the same Trust?	<ul style="list-style-type: none"> • Yes • No • Don't know 	Those who answered 'yes' to Q2
5.	What amount of the Basic Maths Premium funding did your institution spend in the 2018/19 academic year? Please include staff and non-staff costs.		ALL

No.	Question	Response Options	Asked of
6.	<p>Who in your institution has been involved in deciding how to allocate Basic Maths Premium funding?</p> <p>Please select all that apply.</p>	<ul style="list-style-type: none"> • Head of institution • Head of Maths • Director of Funding/Finance • Other senior leadership • Maths teacher(s) (other than head of maths) • Other (please specify) 	ALL
7.	<p>Which of the following have been used to help your institution decide how to allocate Basic Maths Premium funding?</p> <p>Please select all that apply.</p>	<ul style="list-style-type: none"> • Discussions with internal teacher/practitioners • Discussions with external teachers/practitioner (e.g. members of local Maths Hub or Centre for Excellence) • Discussions with parents • Student feedback • Student assessment/exam data • Department for Education website • EEF toolkit • Other (please specify) • No information sources consulted 	Those who answered 'yes' to Q18
8.	<p>Which of the following have you found most helpful as a basis for deciding how to allocate Basic Maths Premium funding?</p> <p>Please select up to two options.</p>	[Response options selected at Q7]	Those who did not select 'No sources' at Q7
9.	<p>How easy or difficult has the process for allocating Basic Maths Premium funding been?</p>	<ul style="list-style-type: none"> • Very difficult • Quite difficult • Quite easy • Very easy • Don't know 	ALL

No.	Question	Response Options	Asked of
10.	<p>Why has the process of allocating Basic Maths Premium funding been difficult?</p> <p>Please select up to two options.</p>	<ul style="list-style-type: none"> • Unsure of funding amount to be received • Unsure when funding would be received • Lack of educational tools or initiatives available to spend funding on • Lack of information regarding the quality and effectiveness of available educational tools or initiatives • Lack of time to allocate funds • Lack of consensus among school staff about how to allocate the funding • Other (please specify) 	Those who answered 'Very difficult' or 'Quite difficult' at Q9
11.	What is your role in the institution?	<ul style="list-style-type: none"> • Principal (or equivalent) • Vice principal / Deputy principal (or equivalent) • Head of Department / Head of Year (or equivalent) • Head of Maths (or equivalent) • Director of Learning / Curriculum Director (or equivalent) • Director of Funding (or equivalent) • Other (please specify) 	ALL
12.	Who contributed to completing the survey?	<ul style="list-style-type: none"> • Managers only • Teachers only • Managers and teachers • Other (please specify) 	ALL

Appendix G: Survey wave 3

Basic Maths Premium Feedback Form

Introduction

Thank you for taking part in the independent evaluation of the Basic Maths Premium.

This short survey will help us gather information on the allocation and spending of Basic Maths Premium funding at your institution, to better understand the outcomes of the evaluation. The information you provide will only be used to inform the evaluation and no institution or individual will be named in the evaluation report.

When answering questions about the use of Basic Maths Premium funding, please keep in mind that the maximum amount of funding allocated will be equal to the number of eligible students X £500. We have included information on the number of eligible students at your institution and the maximum amount of funding you are eligible for in the invitation email to this survey.

This survey will close on 30th October 2020.

If you have any questions when completing this survey, please contact the NatCen team directly on 0207 549 9564 or email mathspremium@natcen.ac.uk.

No.	Question	Response Options	Asked of
1.	Please insert the UKPRN provided in the survey invitation email.		ALL
2.	Is your institution part of a Multi-Academy Trust (MAT)?	<ul style="list-style-type: none"> • No • Yes (please specify the name of the MAT) • Don't know 	ALL
3.	<p>Please enter the proportion (as a percentage) of 16-19 students in your institution who are eligible for Free School Meals. If you don't know the exact number, please provide an estimate.</p> <p>Colleges should provide the percentage of students who previously received FSM at school and are now attending college.</p>		ALL
4.	<p>Please enter the proportion (as a percentage) of 16-19 students in your institution who have special educational needs or disabilities (SEND).</p> <p>For this figure, please only include those who have official SEND documentation. If you don't know the exact number, please provide an estimate.</p>		ALL
5.	Please enter the proportion (as a percentage) of 16-19 students in your institution who speak English as an additional language (EAL). If you don't know the exact number, please provide an estimate.		ALL

No.	Question	Response Options	Asked of
6.	What was your institution's latest Ofsted rating?	<ul style="list-style-type: none"> • Outstanding • Good • Requires improvement • Inadequate • No Ofsted rating yet • Don't know 	ALL
7.	Thinking about the two previous academic years (2018/19 and 2019/20), has your institution received any funding, apart from the Basic Maths Premium, to improve students' maths attainment?	<ul style="list-style-type: none"> • Yes • No • Don't know 	ALL
8.	How much funding, apart from the Basic Maths Premium, has your institution received over the past two academic years (2018-2020) to improve the attainment of students in maths? Please provide an estimate if you do not know the exact amount.		Those who answered 'yes' to Q7
9.	How was this funding distributed across each maths qualification level? Please provide an estimate, to the nearest pound, if you do not know the exact amount. Please provide an answer for all options below, even if the level of funding was zero.	<ul style="list-style-type: none"> • Entry Level - £x • Level 1 (Level 1 Functional Skills) - £x • Level 2 (GCSEs, Level 2 Functional Skills) - £x • Level 3 (A Levels) - £x • Other, please specify 	Those who answered 'yes' to Q7
10.	<p>For this question, please think only about activities and resources which were not funded by the Basic Maths Premium.</p> <p>Over the 2018-2020 academic years, what activities or resources did you have in place to support students yet to achieve a grade 4 in GCSE maths? Please select all that apply.</p>	<ul style="list-style-type: none"> • Increased teaching staff • Increased support staff • Upskilling staff • Purchasing new teaching tools • Purchasing new initial assessment tools • Unconditional financial incentives to teachers • Conditional financial incentives to teachers • Conditional financial & other incentive to students • Behavioural interventions (prompt texts, values affirmations) • Engagement with parents • Travel allowances for students • Increased mental health / well-being support • No resources / activities (exclusive) • Other: please specify 	ALL
11.	<p>Why hasn't your institution provided resources and activities to support students who have yet to achieve a GCSE grade 4 or above in maths (apart from those funded through the Basic Maths Premium)?</p> <p>Please select all that apply.</p>	<ul style="list-style-type: none"> • Lack of funding • Lack of time • Lack of support from teaching staff • Not a strategic priority • Not viewed as necessary • Activities and resources funded through Basic Maths Premium were sufficient • Other (please specify) 	Those who answered 'no resources / activities' to Q10
12.	Which Basic Maths Premium funding model has your institution been allocated to?	<ul style="list-style-type: none"> • Guaranteed payment of £500 per eligible student • Guaranteed payment of £250 per eligible student + £250 per student achieving GCSE 	ALL

No.	Question	Response Options	Asked of
		maths grade four or functional skills level two by 2020 <ul style="list-style-type: none"> • £500 per student achieving GCSE maths grade four or functional skills level two by 2020 • Don't know 	
13.	Please enter the number of students in your institution who are eligible for the funding attached to the Basic Maths Premium pilot. Students eligible for this funding are those enrolled on a 16 to 19 study programme for the first time without prior attainment of a GCSE grade 4 or above for the 2018 to 2019 academic year cohort.		ALL
14.	Which of the following groups has your institution spent (or is planning to spend) the Basic Maths Premium on (please select all that apply):	<ul style="list-style-type: none"> • Students resitting Maths GCSEs or Functional Skills Level 2 • Students sitting Maths GCSEs or Functional Skills Level 2 for the first time • Any student needing support in Maths • Other (please specify) 	ALL
15.	As of today, approximately what amount of the Basic Maths Premium funding has your institution spent on the following items? If you do not know the exact amount then please provide an estimate (to the nearest pound). Please provide an answer to all options below, even if your spending is zero.	<ul style="list-style-type: none"> • Increased teaching staff • Increased support staff • Upskilling staff • Purchasing new teaching tools • Purchasing new initial assessment tools • Unconditional financial incentives to teachers • Conditional financial incentives to teachers • Conditional financial & other incentive to students • Behavioural interventions (prompt texts, values affirmations) • Engagement with parents • Travel allowances for students • Increased mental health / well-being support • Any other activities / resources to support resitters 	ALL
16.	Has any of your Basic Maths Premium funding not yet been allocated to any activities or resources?	<ul style="list-style-type: none"> • Yes, some funding has not yet been allocated • No, all funding has been allocated • Don't know 	ALL
17.	How much unallocated funding does your institution currently have? If you do not know exactly, an estimate is fine.		Those who answered 'yes' to Q16
18.	You have stated that some of the Basic Maths Premium funding has not yet been allocated. How does your institution plan to spend the remaining funding?	<ul style="list-style-type: none"> • Increased teaching staff • Increased support staff • Upskilling staff 	Those who answered 'yes' to Q16

No.	Question	Response Options	Asked of
	Please select all that apply.	<ul style="list-style-type: none"> • Purchasing new teaching tools • Purchasing new initial assessment tools • Unconditional financial incentives to teachers • Conditional financial incentives to teachers • Conditional financial & other incentive to students • Behavioural interventions (prompt texts, values affirmations) • Engagement with parents • Travel allowances for students • Increased mental health / well-being support • Yet to be decided • Other: please specify 	
19.	You have stated that some of the Basic Maths Premium funding has not yet been allocated. When is the remaining funding likely to be spent?	<ul style="list-style-type: none"> • All of it in the 2020-2021 academic year • Some of it in the 2020-2021 academic year, some of it in the 2021-2022 academic year • All of it in the 2021-2022 academic year • Other (please specify) 	Those who answered 'yes' to Q16
20.	What amount of your Basic Maths Premium funding did your institution spend in the 2019/20 academic year? Please include staff and non-staff costs. If you do not know the exact number, an estimate, to the nearest pound, is fine.		ALL
21.	Thinking about the past two academic years (2018-2020), how many additional contact hours, in maths, have maths GCSE resitters received on average as a result of the Basic Maths Premium each week ? This contact time can be online or face-to-face.	<ul style="list-style-type: none"> • None • 30 minutes • One hour • An hour and a half • Two hours • Two and half hours • Three hours • More than three hours • Don't know 	ALL
22.	Did the lockdown caused by the COVID-19 pandemic change the number of contact hours in maths that you were able to offer students?	<ul style="list-style-type: none"> • Yes - It did change the number of contact hours • No - It did not change the number of contact hours • Don't know 	ALL
23.	What was the average number of contact hours in maths that students received per week, after the COVID lockdown came into force?	<ul style="list-style-type: none"> • None • 30 minutes • One hour • An hour and a half • Two hours • Two and half hours • Three hours • More than three hours • Don't know 	Those who answered 'yes' to Q22
24.	How many additional hours of work did your staff do to deliver the Basic Maths Premium (e.g. to decide how to allocate funding)? An estimate is fine.		

No.	Question	Response Options	Asked of
	Please do not include additional staff time paid for through the Basic Maths Premium.		
25.	Thinking about the hours of work your staff did and the average hourly staff pay, what was the cost to your institution of implementing the Basic Maths Premium? An estimate is fine.		
26.	Do you feel that your maths GCSE resitters or functional skills students have benefited in any of the following ways from the Basic Maths Premium? [Yes/No grid]	<ul style="list-style-type: none"> • Resitters' understanding of maths improved as a result of activities funded by the Basic Maths Premium • Resitters were more motivated in maths as a result of activities funded by the Basic Maths Premium • Resitters were more confident in maths as a result of activities funded by the Basic Maths Premium • Resitters enjoyed maths more as a result of activities funded by the Basic Maths Premium • Resitters' attendance in maths lessons improved as a result of activities funded by the Basic Maths Premium • Resitters' overall wellbeing improved as a result of activities funded by the Basic Maths Premium 	ALL
27.	Which Basic Maths Premium funding model do you think is most effective in helping schools and colleges get the best outcomes for their maths GCSE resitters or functional skills students?	<ul style="list-style-type: none"> • Guaranteed payment of £500 per eligible student • Guaranteed payment of £250 per eligible student + £250 per student achieving GCSE maths grade four or functional skills level two by 2020 • £500 per student achieving GCSE maths grade four or functional skills level two by 2020 • Don't know 	ALL
28.	Why do you believe the funding model you chose in the previous question is the most effective?		ALL
29.	Thinking about the funding model you were allocated to, and when you received your Basic Maths Premium payments, to what extent do you agree or disagree with the following statement: "The timing of Basic Maths Premium payments caused difficulties in implementing the programme."	<ul style="list-style-type: none"> • Strongly agree • Somewhat agree • Neither agree nor disagree • Somewhat disagree • Strongly disagree • Don't know 	ALL
30.	Did you take on more maths resitters than you normally would because of the Basic Maths Premium?	<ul style="list-style-type: none"> • Yes • No • Don't know 	ALL
31.	Do you feel that the Basic Maths Premium had any of the following negative or unintended consequences at your institution? [Yes/No grid]	<ul style="list-style-type: none"> • Class sizes for resitters increased because of the Basic Maths Premium • Money was diverted away from activities not related to maths because of the Basic Maths Premium 	ALL

No.	Question	Response Options	Asked of
		<ul style="list-style-type: none"> • Staff stress increased because of the Basic Maths Premium • Staff workload increased because of the Basic Maths Premium 	
32.	Did your institution target Basic Maths Premium activities at any of the following groups of resitters? (please select all the apply)	<ul style="list-style-type: none"> • Yes – we targeted activities at higher achieving resitters • Yes – we targeted activities at lower achieving resitters • Yes – we targeted activities at middle-achieving resitters • Yes – we targeted activities at resitters eligible for free school meals • Yes – we targeted activities at resitters with special educational needs and disabilities • Yes – we targeted activities at resitters who were underperforming, irrespective of achievement band • Yes – we targeted other groups [specify] • No - we targeted all resitters equally [exclusive] • Don't know [exclusive] 	ALL
33.	Overall, how would you describe your experience with the Basic Maths Premium?	<ul style="list-style-type: none"> • Extremely positive • Somewhat positive • Neither positive nor negative • Somewhat negative • Extremely negative • Don't know 	ALL
34.	Please tell us why you have selected the option you did in the previous question.		ALL
35.	Is there anything else you would like to add about your views on the Basic Maths Premium pilot?		ALL
36.	What is your role in the institution?	<ul style="list-style-type: none"> • Principal (or equivalent) • Vice principal / Deputy principal (or equivalent) • Head of Department / Head of Year (or equivalent) • Head of Maths (or equivalent) • Director of Learning / Curriculum Director (or equivalent) • Director of Funding (or equivalent) • Other (please specify) 	ALL
38.	Who contributed to completing this survey?	<ul style="list-style-type: none"> • Managers only • Teachers only • Managers and teachers • Other (please specify) 	ALL

Appendix H: Summary of deviations from initially planned covariates

As discussed in the *Methods* section of the main report, the covariates used for the impact estimation deviate slightly from those specified in the Study Plan, due to an error in our NPD request. The practical implications of these minor deviations for the final analysis are expected to be negligible and we agreed with EEF that a further NPD request would not be proportionate. For all the covariates originally described in the Study Plan, we have either been able to define the covariates exactly as intended, use an equivalent variable that measures the same thing, or produce a very close proxy.

The deviations are summarised in Appendix Table 1.

Appendix Table 1: Summary of deviations from the initially planned covariates

Covariate		Summary of any deviations from original Study Plan
Achieving Excellence Area covariates	Access to a good secondary school index	Defined as planned
	AEA achievement indicator	Defined as planned
	AEA progress indicator	Defined as planned
	System leader coverage indicator	Defined as planned
	Initial teacher training provider coverage index	Defined as planned
	Quality of leadership indicator	Defined as planned
	Academy sponsor coverage	Defined as planned
Setting-level covariates	Institution size	Defined as planned
	Number of pupils meeting the eligibility criteria for BMP in 2016-17 (i.e. The number of condition of funding students in 2016-17).	Proxy used instead: number of Year 12s in 2018-19 meeting the eligibility criteria for the programme. We could not define this for 2016-17, as the evaluation team only requested the relevant information to reconstruct BMP eligibility for the 2018-19 academic year.
	Proportion of pupils meeting the eligibility criteria for BMP in 2016-17 (e.g. The number of condition of funding students in 2016-17).	Proxy used instead: proportion of Year 12s in 2018-19 meeting the eligibility criteria for the programme. Reasons for this deviation are as per the covariate above.
	Institution type	Equivalent variable used to define this covariate. The Study Plan mentioned defining this covariate using the variable YPMAD_main_inst_type_lookup. This is a default item in the NPD tables. However, we could not locate this variable in the final YPMAD extract that we received. There were, however, other equivalent institution type variables available in our extract. We used KS5_NFTYPE to define this covariate.
	Region	Equivalent variable used to define this covariate. The Study Plan mentioned defining this covariate using the variable YPMAD_Region_A23_main. Although this is a default item in the YPMAD data table, we were unable to locate it in the final extract we received. We instead used an equivalent variable called YPMAD_main_inst_region.
	Institution's proportion of students who were eligible for FSM between ages 10 and 15.	Proxy used instead: institutions proportion of Year 12s in 2018-19 who were eligible for FSM between age 10 and 15. The reason for this deviation is that we did not request YPMAD data to define FSM eligibility for the entire institution, only Year 12s.

Covariate		Summary of any deviations from original Study Plan
	Proportion of pupils achieving Level 2 or more in Maths and English before enrolment	Defined as planned
Pupil-level covariates	Age	Defined as planned
	Gender	Defined as planned
	Ethnicity	Defined as planned
	Eligibility for free school meals	Defined as planned
	Special Education Need status (SEN)	Defined as planned
	Prior attainment at KS2 in English	Defined as planned
	Prior attainment at KS2 in Maths	Defined as planned

Note that the Study Plan also indicated that pupils' condition of funding would be included as an individual-level covariate. This was not added to analyses since the data was restricted to all pupils who were eligible for BMP or would have been eligible for BMP if it was available in their institution. In practice, this means that the analysis sample was already restricted to only condition of funding pupils.

Appendix I: Additional descriptive results

Additional descriptive results: pupil and school characteristics

The tables below present differences in setting and pupil characteristics between the BMP and comparison group, for different sub-samples of interest. Appendix Table 2 and Appendix Table 3 report differences for the BMP group compared to a comparison group that includes AEA Category 3 areas as well as AEA Category 4. Appendix Table 4 through to Appendix Table 9 show the difference between each BMP intervention arm, compared to a comparison group from AEA Category 4 areas.

Appendix Table 2: Institution-level covariate descriptives: pooled BMP intervention group compared to settings in AEA Category 3 and 4.

Covariate		Treatment group				Comparison group				Standardised mean difference
		n	Mean	Standard deviation	# missing	n	Mean	Standard deviation	# missing	
Achieving Excellence Area covariates	Access to a good secondary school index	424	56.92	17.42	0	807	69.32	13.04	0	-0.78
	AEA achievement indicator	424	46.69	2.34	0	807	48.71	1.86	0	-0.90
	AEA progress indicator	424	-0.14	0.16	0	807	-0.02	0.11	0	-0.85
	System leader coverage indicator	424	2842.30	1427.57	0	807	1499.73	789.30	0	1.09
	Initial teacher training provider coverage index	424	39.79	19.23	0	807	43.30	21.42	0	-0.17
	Quality of leadership indicator	424	71.78	14.90	0	807	84.05	10.13	0	-0.92
	Academy sponsor coverage	424	1616.40	1545.13	0	807	641.19	464.66	0	0.90
Other setting-level characteristics	Institution size	424	1999.82	2366.39	0	792	1582.93	2113.98	15	0.19
	Number of Year 12s in 2018-19 meeting eligibility criteria for the programme	424	102.26	200.89	0	807	55.22	159.47	0	0.27
	Percentage of Year 12s in 2018-19 meeting eligibility criteria for the programme	424	27.42	20.51	0	807	24.77	24.60	0	0.11
	Institution type: Academy converter	424	28.77	45.32	0	807	35.81	47.97	0	-0.15
	Institution type: Further education sector	424	25.71	43.75	0	807	14.75	35.48	0	0.28
	Institution type: Academy – sponsor-led	424	20.28	40.26	0	807	12.02	32.54	0	0.23
	Institution type: Other	424	22.41	41.75	0	807	31.60	46.52	0	-0.20
	Institution type: Missing	424	2.83	16.60	0	807	5.82	23.43	0	-0.14
	Region: North East	423	3.55	18.52	1	799	4.51	20.76	8	-0.05
	Region: North West	423	17.73	38.24	1	799	12.52	33.11	8	0.15
	Region: Yorkshire and the Humber	423	13.95	34.69	1	799	9.64	29.53	8	0.14
	Region: East Midlands	423	16.31	36.99	1	799	6.51	24.68	8	0.33
	Region: West Midlands	423	20.09	40.12	1	799	12.27	32.82	8	0.22

Covariate		Treatment group				Comparison group				Standardised mean difference
		n	Mean	Standard deviation	# missing	n	Mean	Standard deviation	# missing	
	Region: East	423	12.06	32.60	1	799	11.26	31.64	8	0.02
	Region: South East	423	14.42	35.17	1	799	16.40	37.05	8	-0.05
	Region: South West	423	1.65	12.77	1	799	19.65	39.76	8	-0.53
	Region: London	423	0.24	4.86	1	799	7.26	25.96	8	-0.33
	Percentage of students who were eligible for FSM between age 10 and 15	424	25.71	15.22	0	807	22.86	19.42	0	0.16
	Percentage of Year 12s in 2018-19 with Level 2+ in Maths and English at KS4 prior to enrolment	424	59.60	26.62	0	807	60.36	33.05	0	-0.02

Notes: The treatment group sample is all BMP settings in AEA Category 5 and 6 areas. The comparison group sample is settings in AEA Category 3 and 4 areas that had at least one pupil meeting the eligibility criteria for BMP. Sources are NPD, ILR and BMP sample file information.

Appendix Table 3: Pupil-level covariate descriptives: pooled BMP intervention group compared to settings in AEA Category 3 and 4.

Covariate		Treatment group				Comparison group				Standardised mean difference
		n	Mean	Standard deviation	# missing	n	Mean	Standard deviation	# missing	
Pupil-level covariates	Age	44,250	16.01	0.07	202	44,561	16.01	0.07	0	0.00
	Gender: Male	44,452	50.82	49.99	0	44,561	50.63	50.00	0	0.00
	Ethnicity: White	43,349	79.76	40.18	1103	43,326	77.30	41.89	1235	0.06
	Ethnicity: Mixed/ multiple	43,349	4.51	20.74	1103	43,326	4.86	21.51	1235	-0.02
	Ethnicity: Asian	43,349	10.77	31.00	1103	43,326	10.62	30.81	1235	0.00
	Ethnicity: Black	43,349	3.97	19.51	1103	43,326	5.70	23.18	1235	-0.08
	Ethnicity: Other	43,349	1.00	9.94	1103	43,326	1.52	12.24	1235	-0.05
	Eligibility for free school meals	44,452	38.29	48.61	0	44,561	35.75	47.93	0	0.05
	Special Education Need status (SEN)	43,667	27.10	44.45	785	43,782	27.42	44.61	779	-0.01
	Prior attainment at KS2 in English	41,559	3.66	0.87	2893	41,414	3.71	0.86	3147	-0.05
Prior attainment at KS2 in Maths	41,557	3.55	0.73	2895	41,407	3.57	0.71	3154	-0.02	

Notes: The treatment group sample consists of all settings and pupils belonging to BMP institutions in AEA Category 5 and 6 areas. At the pupil-level, this sample corresponds to pupils who enrolled in a post-16 study programme in 2018-19 and did not have prior achievement of GCSE Maths in 2017-18. The comparison group sample consists of settings and pupils belonging to institutions in AEA Category 3 and 4 areas that had at least one pupil meeting the eligibility criteria for BMP. Sources are NPD, ILR and BMP sample file information.

Appendix Table 4: Institution-level covariate descriptives: BMP settings in model A compared to comparison group settings in AEA Category 4

Covariate		Treatment group				Comparison group				Standardised mean difference
		n	Mean	Standard deviation	# missing	n	Mean	Standard deviation	# missing	
Achieving Excellence Area covariates	Access to a good secondary school index	136	54.62	18.01	0	422	66.54	13.78	0	-0.76
	AEA achievement indicator	136	46.63	2.61	0	422	48.41	1.96	0	-0.79
	AEA progress indicator	136	-0.15	0.17	0	422	-0.03	0.10	0	-0.87
	System leader coverage indicator	136	3062.03	1555.54	0	422	1707.78	768.54	0	1.16
	Initial teacher training provider coverage index	136	39.39	18.91	0	422	43.42	18.37	0	-0.22
	Quality of leadership indicator	136	69.49	16.73	0	422	81.40	9.52	0	-0.93
	Academy sponsor coverage	136	1669.43	1498.91	0	422	700.00	462.30	0	1.03
Other setting-level characteristics	Institution size	136	2108.77	2411.03	0	414	1620.29	2263.69	8	0.21
	Number of Year 12s in 2018-19 meeting eligibility criteria for the programme	136	110.50	212.42	0	422	60.37	164.44	0	0.28
	Percentage of Year 12s in 2018-19 meeting eligibility criteria for the programme	136	26.24	20.95	0	422	26.28	24.60	0	0.00
	Institution type: Academy converter	136	26.47	44.28	0	422	32.46	46.88	0	-0.13
	Institution type: Further education sector	136	27.21	44.67	0	422	15.17	35.91	0	0.31
	Institution type: Academy – sponsor-led	136	22.06	41.62	0	422	13.74	34.47	0	0.23
	Institution type: Other	136	21.32	41.11	0	422	33.18	47.14	0	-0.26
	Institution type: Missing	136	2.94	16.96	0	422	5.45	22.73	0	-0.12
	Region: North East	135	2.96	17.02	1	416	1.44	11.94	6	0.11
	Region: North West	135	20.00	40.15	1	416	8.41	27.79	6	0.37
	Region: Yorkshire and the Humber	135	16.30	37.07	1	416	18.51	38.88	6	-0.06
	Region: East Midlands	135	15.56	36.38	1	416	4.81	21.42	6	0.41
	Region: West Midlands	135	16.30	37.07	1	416	15.87	36.58	6	0.01
	Region: East	135	13.33	34.12	1	416	12.50	33.11	6	0.03
	Region: South East	135	14.81	35.66	1	416	17.79	38.29	6	-0.08
	Region: South West	135	0.74	8.61	1	416	16.83	37.46	6	-0.48
	Region: London	135	0.00	0.00	1	416	3.85	19.25	6	-0.23
Percentage of students who were eligible for FSM between age 10 and 15	136	25.38	13.73	0	422	24.61	20.09	0	0.04	

Covariate		Treatment group				Comparison group				Standardised mean difference
		n	Mean	Standard deviation	# missing	n	Mean	Standard deviation	# missing	
	Percentage of Year 12s in 2018-19 with Level 2+ in Maths and English at KS4 prior to enrolment	136	62.08	26.27	0	422	57.93	33.01	0	0.13

Notes: The treatment group sample is BMP settings in model A. The comparison group sample is settings in AEA Category 4 areas that had at least one pupil meeting the eligibility criteria for BMP. Sources are NPD, ILR and BMP sample file information.

Appendix Table 5: Pupil-level covariate descriptives: pupils in settings assigned to model A compared to those in comparison settings in AEA Category 4

Covariate		Treatment group				Comparison group				Standardised mean difference
		n	Mean	Standard deviation	# missing	n	Mean	Standard deviation	# missing	
Pupil-level covariates	Age	15,276	16.00	0.07	72	25,476	16.01	0.07	0	0.00
	Gender: Male	15,348	51.82	49.97	0	25,476	51.30	49.98	0	0.01
	Ethnicity: White	14,995	80.98	39.25	353	24,712	74.33	43.68	764	0.16
	Ethnicity: Mixed/ multiple	14,995	3.85	19.25	353	24,712	5.08	21.96	764	-0.06
	Ethnicity: Asian	14,995	9.96	29.95	353	24,712	12.71	33.31	764	-0.09
	Ethnicity: Black	14,995	4.09	19.80	353	24,712	6.30	24.31	764	-0.10
	Ethnicity: Other	14,995	1.11	10.49	353	24,712	1.57	12.43	764	-0.04
	Eligibility for free school meals	15,348	38.90	48.75	0	25,476	37.71	48.47	0	0.02
	Special Education Need status (SEN)	15,091	27.36	44.58	257	24,998	27.42	44.61	478	0.00
	Prior attainment at KS2 in English	14,439	3.68	0.87	909	23,580	3.68	0.87	1896	0.00
Prior attainment at KS2 in Maths	14,437	3.57	0.72	911	23,576	3.56	0.72	1900	0.01	

Notes: The treatment group sample consists of all settings and pupils belonging to BMP institutions in model A. At the pupil-level, this sample corresponds to pupils who enrolled in a post-16 study programme in 2018-19 and did not have prior achievement of GCSE Maths in 2017-18. The comparison group sample consists of settings and pupils belonging to institutions in AEA Category 4 areas that had at least one pupil meeting the eligibility criteria for BMP. Sources are NPD, ILR and BMP sample file information.

Appendix Table 6: Institution-level covariate descriptives: BMP settings in model B compared to comparison group settings in AEA Category 4

Covariate		Treatment group				Comparison group				Standardised mean difference
		n	Mean	Standard deviation	# missing	n	Mean	Standard deviation	# missing	
Achieving Excellence Area covariates	Access to a good secondary school index	141	58.57	17.53	0	422	66.54	13.78	0	-0.52
	AEA achievement indicator	141	46.81	2.07	0	422	48.41	1.96	0	-0.76
	AEA progress indicator	141	-0.13	0.15	0	422	-0.03	0.10	0	-0.80
	System leader coverage indicator	141	2687.38	1312.39	0	422	1707.78	768.54	0	0.96
	Initial teacher training provider coverage index	141	39.55	19.52	0	422	43.42	18.37	0	-0.21
	Quality of leadership indicator	141	73.26	14.22	0	422	81.40	9.52	0	-0.71
	Academy sponsor coverage	141	1576.58	1609.47	0	422	700.00	462.30	0	0.90
Other setting-level characteristics	Institution size	141	1888.31	2321.28	0	414	1620.29	2263.69	8	0.12
	Number of Year 12s in 2018-19 meeting eligibility criteria for the programme	141	97.45	192.33	0	422	60.37	164.44	0	0.22
	Percentage of Year 12s in 2018-19 meeting eligibility criteria for the programme	141	28.52	19.95	0	422	26.28	24.60	0	0.10
	Institution type: Academy converter	141	26.95	44.53	0	422	32.46	46.88	0	-0.12
	Institution type: Further education sector	141	23.40	42.49	0	422	15.17	35.91	0	0.22
	Institution type: Academy – sponsor-led	141	22.70	42.04	0	422	13.74	34.47	0	0.24
	Institution type: Other	141	24.11	42.93	0	422	33.18	47.14	0	-0.20
	Institution type: Missing	141	2.84	16.66	0	422	5.45	22.73	0	-0.12
	Region: North East	141	4.26	20.26	0	416	1.44	11.94	6	0.19
	Region: North West	141	16.31	37.08	0	416	8.41	27.79	6	0.26
	Region: Yorkshire and the Humber	141	7.09	25.76	0	416	18.51	38.88	6	-0.31
	Region: East Midlands	141	14.18	35.01	0	416	4.81	21.42	6	0.36
	Region: West Midlands	141	25.53	43.76	0	416	15.87	36.58	6	0.25
	Region: East	141	13.48	34.27	0	416	12.50	33.11	6	0.03
	Region: South East	141	15.60	36.42	0	416	17.79	38.29	6	-0.06
	Region: South West	141	2.84	16.66	0	416	16.83	37.46	6	-0.41
	Region: London	141	0.71	8.42	0	416	3.85	19.25	6	-0.18
Percentage of students who were eligible for FSM between age 10 and 15	141	26.45	16.22	0	422	24.61	20.09	0	0.10	

Covariate		Treatment group				Comparison group				Standardised mean difference
		n	Mean	Standard deviation	# missing	n	Mean	Standard deviation	# missing	
	Percentage of Year 12s in 2018-19 with Level 2+ in Maths and English at KS4 prior to enrolment	141	56.90	27.16	0	422	57.93	33.01	0	-0.03

Notes: The treatment group sample is BMP settings in model B. The comparison group sample is settings in AEA Category 4 areas that had at least one pupil meeting the eligibility criteria for BMP. Sources are NPD, ILR and BMP sample file information.

Appendix Table 7: Pupil-level covariate descriptives: pupils in settings assigned to model B compared to those in comparison settings in AEA Category 4

Covariate		Treatment group				Comparison group				Standardised mean difference
		n	Mean	Standard deviation	# missing	n	Mean	Standard deviation	# missing	
Pupil-level covariates	Age	14,042	16.01	0.08	61	25,476	16.01	0.07	0	0.01
	Gender: Male	14,103	50.64	50.00	0	25,476	51.30	49.98	0	-0.01
	Ethnicity: White	13,708	81.19	39.08	395	24,712	74.33	43.68	764	0.16
	Ethnicity: Mixed/ multiple	13,708	4.82	21.42	395	24,712	5.08	21.96	764	-0.01
	Ethnicity: Asian	13,708	8.94	28.53	395	24,712	12.71	33.31	764	-0.12
	Ethnicity: Black	13,708	4.33	20.34	395	24,712	6.30	24.31	764	-0.09
	Ethnicity: Other	13,708	0.72	8.47	395	24,712	1.57	12.43	764	-0.08
	Eligibility for free school meals	14,103	38.59	48.68	0	25,476	37.71	48.47	0	0.02
	Special Education Need status (SEN)	13,830	27.16	44.48	273	24,998	27.42	44.61	478	-0.01
	Prior attainment at KS2 in English	13,138	3.66	0.87	965	23,580	3.68	0.87	1896	-0.02
Prior attainment at KS2 in Maths	13,138	3.56	0.73	965	23,576	3.56	0.72	1900	0.00	

Notes: The treatment group sample consists of all settings and pupils belonging to BMP institutions in model B. At the pupil-level, this sample corresponds to pupils who enrolled in a post-16 study programme in 2018-19 and did not have prior achievement of GCSE Maths in 2017-18. The comparison group sample consists of settings and pupils belonging to institutions in AEA Category 4 areas that had at least one pupil meeting the eligibility criteria for BMP. Sources are NPD, ILR and BMP sample file information.

Appendix Table 8: Institution-level covariate descriptives: BMP settings in model C compared to comparison group settings in AEA Category 4

Covariate		Treatment group				Comparison group				Standardised mean difference
		n	Mean	Standard deviation	# missing	n	Mean	Standard deviation	# missing	
Achieving Excellence Area covariates	Access to a good secondary school index	147	57.46	16.64	0	422	66.54	13.78	0	-0.60
	AEA achievement indicator	147	46.65	2.32	0	422	48.41	1.96	0	-0.80
	AEA progress indicator	147	-0.15	0.16	0	422	-0.03	0.10	0	-0.87
	System leader coverage indicator	147	2787.60	1394.40	0	422	1707.78	768.54	0	1.00
	Initial teacher training provider coverage index	147	40.38	19.37	0	422	43.42	18.37	0	-0.16
	Quality of leadership indicator	147	72.49	13.51	0	422	81.40	9.52	0	-0.78
	Academy sponsor coverage	147	1605.54	1533.39	0	422	700.00	462.30	0	0.94
Other setting-level characteristics	Institution size	147	2005.97	2378.86	0	414	1620.29	2263.69	8	0.17
	Number of Year 12s in 2018-19 meeting eligibility criteria for the programme	147	99.26	199.07	0	422	60.37	164.44	0	0.22
	Percentage of Year 12s in 2018-19 meeting eligibility criteria for the programme	147	27.45	20.72	0	422	26.28	24.60	0	0.05
	Institution type: Academy converter	147	32.65	47.05	0	422	32.46	46.88	0	0.00
	Institution type: Further education sector	147	26.53	44.30	0	422	15.17	35.91	0	0.29
	Institution type: Academy – sponsor-led	147	16.33	37.09	0	422	13.74	34.47	0	0.07
	Institution type: Other	147	21.77	41.41	0	422	33.18	47.14	0	-0.25
	Institution type: Missing	147	2.72	16.33	0	422	5.45	22.73	0	-0.13
	Region: North East	147	3.40	18.19	0	416	1.44	11.94	6	0.14
	Region: North West	147	17.01	37.70	0	416	8.41	27.79	6	0.28
	Region: Yorkshire and the Humber	147	18.37	38.85	0	416	18.51	38.88	6	0.00
	Region: East Midlands	147	19.05	39.40	0	416	4.81	21.42	6	0.51
	Region: West Midlands	147	18.37	38.85	0	416	15.87	36.58	6	0.07
	Region: East	147	9.52	29.45	0	416	12.50	33.11	6	-0.09
	Region: South East	147	12.93	33.66	0	416	17.79	38.29	6	-0.13
	Region: South West	147	1.36	11.62	0	416	16.83	37.46	6	-0.46
	Region: London	147	0.00	0.00	0	416	3.85	19.25	6	-0.23
Percentage of students who were eligible for FSM between age 10 and 15	147	25.30	15.60	0	422	24.61	20.09	0	0.04	

Covariate		Treatment group				Comparison group				Standardised mean difference
		n	Mean	Standard deviation	# missing	n	Mean	Standard deviation	# missing	
	Percentage of Year 12s in 2018-19 with Level 2+ in Maths and English at KS4 prior to enrolment	147	59.88	26.36	0	422	57.93	33.01	0	0.06

Notes: The treatment group sample is BMP settings in model C. The comparison group sample is settings in AEA Category 4 areas that had at least one pupil meeting the eligibility criteria for BMP. Sources are NPD, ILR and BMP sample file information.

Appendix Table 9: Pupil-level covariate descriptives: pupils in settings assigned to model C compared to those in comparison settings in AEA Category 4

Covariate		Treatment group				Comparison group				Standardised mean difference
		n	Mean	Standard deviation	# missing	n	Mean	Standard deviation	# missing	
Pupil-level covariates	Age	14,932	16.01	0.07	69	25,476	16.01	0.07	0	0.00
	Gender: Male	15,001	49.96	50.00	0	25,476	51.30	49.98	0	-0.03
	Ethnicity: White	14,646	77.16	41.98	355	24,712	74.33	43.68	764	0.07
	Ethnicity: Mixed/ multiple	14,646	4.88	21.54	355	24,712	5.08	21.96	764	-0.01
	Ethnicity: Asian	14,646	13.32	33.98	355	24,712	12.71	33.31	764	0.02
	Ethnicity: Black	14,646	3.50	18.39	355	24,712	6.30	24.31	764	-0.13
	Ethnicity: Other	14,646	1.14	10.62	355	24,712	1.57	12.43	764	-0.04
	Eligibility for free school meals	15,001	37.38	48.38	0	25,476	37.71	48.47	0	-0.01
	Special Education Need status (SEN)	14,746	26.77	44.28	255	24,998	27.42	44.61	478	-0.01
	Prior attainment at KS2 in English	13,982	3.64	0.88	1019	23,580	3.68	0.87	1896	-0.05
Prior attainment at KS2 in Maths	13,982	3.52	0.74	1019	23,576	3.56	0.72	1900	-0.05	

Notes: The treatment group sample consists of all settings and pupils belonging to BMP institutions in model C. At the pupil-level, this sample corresponds to pupils who enrolled in a post-16 study programme in 2018-19 and did not have prior achievement of GCSE Maths in 2017-18. The comparison group sample consists of settings and pupils belonging to institutions in AEA Category 4 areas that had at least one pupil meeting the eligibility criteria for BMP. Sources are NPD, ILR and BMP sample file information.

Additional descriptive results: maths attainment and exams entered for

Appendix Table 10 and Appendix Table 11 report pupil-level descriptive statistics for variables related to the primary and secondary outcomes of the impact evaluation. Compared to the tables in the main report, these tables show results in respect of a comparison group that includes AEA Category 3 areas as well as AEA Category 4.

Appendix Table 12 presents the percentage of pupils who achieved the required pass by November 2019 within the final sample that was retained in the primary analysis using the doubly robust approach (i.e. after dropping some schools in the BMP intervention group that were found to be insufficiently comparable to the available comparison group to facilitate a well-balanced sample – see details in the *Primary Analysis* section of the main report). This table contains updated parameter values that are included in the revised sample size calculations contained in the *Participant flow including losses and exclusions* section of the main report).

Appendix Table 10: Descriptive statistics relating to Key Stage 4 maths attainment and exams entered for: [intervention group definition = setting-level BMP indicator]. Comparison group includes AEA Category 3 and AEA Category 4 areas.

Variable	Unit	Treatment group				Comparison group				Standardised mean difference
		n	Mean	Standard deviation	# missing	n	Mean	Standard deviation	# missing	
Percentage of pupils achieving the required pass by November 2019	Percentage	44,452	11.98	32.47	0	44,561	13.90	34.59	0	-0.057
Percentage of pupils attaining Grade 3 in previous KS4 Maths attempt (compared to Grades 1, 2 or U)	Percentage	44,452	43.03	49.51	0	44,561	46.62	49.89	0	0.072
Percentage of pupils who entered for a GCSE Maths resit in the 2018-19 academic year, or November 2019	Percentage	44,452	94.83	22.14	0	44,561	95.49	20.75	0	-0.031
Percentage of pupils who entered for a Functional Skills Level 2 exam in the 2018-19 academic year, or November 2019	Percentage	44,452	2.04	14.12	0	44,561	1.90	13.66	0	0.010
Percentage of pupils who <u>only</u> entered for a Functional Skills Level 2 exam in the 2018-19 academic year, or November 2019, and did not also enter for a GCSE	Percentage	44,452	0	0	0	44,561	0.00	0.47	0	-0.007
Percentage of pupils who did not enter for either a GCSE Maths resit or a Functional Skills Level 2 exam in the 2018-19 academic year, or November 2019.	Percentage	44,452	5.17	22.14	0	44,561	4.51	20.74	0	0.031

Notes: (1) The 'setting-level BMP indicator is drawn from BMP sample file information and denotes settings that were part of the BMP pilot. We consider all eligible pupils in these settings to be part of the BMP treatment group. The comparison group in this case corresponds to all pupils in AEA Category 4 and AEA Category 3 areas who met the eligibility criteria for BMP (2) Sources are NPD, ILR and BMP sample file information.

Appendix Table 11: Descriptive statistics relating to Key Stage 4 maths attainment and exams entered for: [intervention group definition = pupil-level BMP indicator]. Comparison group includes AEA Category 3 and AEA Category 4 areas.

BMP group definition	Unit	Treatment group				Comparison group				Standardised mean difference
		n	Mean	Standard deviation	# missing	n	Mean	Standard deviation	# missing	
Percentage of pupils achieving the required pass by November 2019	Percentage	42,237	12.23	32.76	0	46,776	13.58	34.26	0	-0.040
Percentage of pupils attaining Grade 3 in previous KS4 Maths attempt (compared to Grades 1, 2 or U)	Percentage	42,237	43.37	49.56	0	46,776	46.15	49.85	0	-0.056
Percentage of pupils who entered for a GCSE Maths resit in the 2018-19 academic year, or November 2019	Percentage	42,237	95.60	20.52	0	46,776	94.77	22.26	0	0.038
Percentage of pupils who entered for a Functional Skills Level 2 exam in the 2018-19 academic year, or November 2019	Percentage	42,237	1.34	11.51	0	46,776	2.54	15.72	0	-0.086
Percentage of pupils who entered for a Functional Skills Level 2 exam in the 2018-19 academic year, or November 2019, and did not also enter for a GCSE	Percentage	42,237	0	0	0	46,776	0.00	0.46	0	-0.006
Percentage of pupils who did not enter for either a GCSE Maths resit or a Functional Skills Level 2 exam in the 2018-19 academic year, or November 2019.	Percentage	42,237	4.40	20.52	0	46,776	5.23	22.26	0	-0.038

Notes: (1) The 'pupil-level' BMP indicator considers pupils to be part of the treatment group if they are individually flagged as being a BMP beneficiary. The comparison group in this case corresponds to all pupils in AEA Category 3, 4, 5 and 6 areas who met the eligibility criteria for BMP but are not individually flagged as being a BMP beneficiary (2) Sources are NPD, ILR and BMP sample file information. .

Appendix Table 12: Descriptive statistics relating to Key Stage 4 maths attainment: [intervention group definition = setting-level BMP indicator], final analysis sample

Variable	Unit	Treatment group				Comparison group			
		n	Mean	Standard deviation	# missing	n	Mean	Standard deviation	# missing
Percentage of pupils achieving the required pass by November 2019 [full sample]	Percentage	24,234	12.3	32.8	0	23,076	13.3	34.0	0
Percentage of pupils achieving the required pass by November 2019 [FSM pupils only]	Percentage	9,281	8.3	27.6	0	8,827	9.5	29.3	0

Notes: (1) The treatment group sample is all pupils in BMP settings in AEA Category 5 and 6 areas that were retained in the final doubly robust analysis model. The comparison group sample is pupils from eligible settings in AEA Category 4 areas that were retained in the final doubly robust analysis model. (2) The FSM-pupils only figures are based on a restricted sample that includes only pupils reported as ever eligible for Free School Meals in between the ages of 10 and 15 according to the variable YPMAD_EverFSMAge10to15 (and were retained in the final doubly robust analysis model). Sources are NPD, ILR and BMP sample file information.

Appendix J: Impact estimation robustness check: two-stage matching

In this Appendix we describe the two-stage matching approach that we use as a robustness check for RQ1 of the impact evaluation (*RQ1: What is the impact of the different funding models on maths achievement of eligible students in post-16 settings in England compared to business as usual?*)

Using this two-stage matching approach, we have not been able to develop a satisfactory comparison group. As discussed in the main report (see the *Impact evaluation results: Primary analysis* section), we believe that this is due to how BMP was assigned, which extended eligibility to areas of England that are systematically more disadvantaged in terms of Achieving Excellence Area status from non-BMP areas. This means that the available areas from which we can draw a comparison group turn out to be ‘too different’ altogether for matching to successfully identify a similar enough group. In other words, the common support assumption that underpins matching methods is weak in this setting. As a result, the findings from this analysis are not likely to isolate the impact of the BMP funding from other systematic differences between the treatment and comparison groups.

This Appendix elaborates on the findings from executing this robustness check, and the reasons why this analysis was not successful in producing a credible estimate of BMP impact.

First stage: initial institution-level matching model (as per Study Plan)

In line with the Study Plan, the starting point for this analysis was to match institutions using an institution-level dataset containing all BMP institutions together with comparison group settings from AEA Category 4. We carried out this matching with an initial caliper width of 0.1 standard deviations of the propensity score.

Diagnostic tests from this initial model do not satisfy the conditions set out in the Study Plan. The first diagnostic check is to assess covariate balance after matching and check whether matching helps reduce the proportion of covariates with an absolute standardised mean difference of more than 0.1 to fewer than 50%. Appendix Table 13 and Figure 1 show standardised mean differences before and after matching for this model. Note that by ‘matched sample’, here and in all the diagnostic checks that follow, what we mean is the sample all settings included in the sample selected by the matching model (this is the sample on which the individual-level matching would be performed in the next step). Appendix Table 13 shows that for this model, matching makes only minimal improvements to the overall standardised mean differences across all covariates. More than 50% of the covariates remain with an absolute standardised mean difference of >0.1 after matching, which violates the first diagnostic check set out in the Study Plan. We again observe that the greatest differences between the covariates are for the AEA indicators.

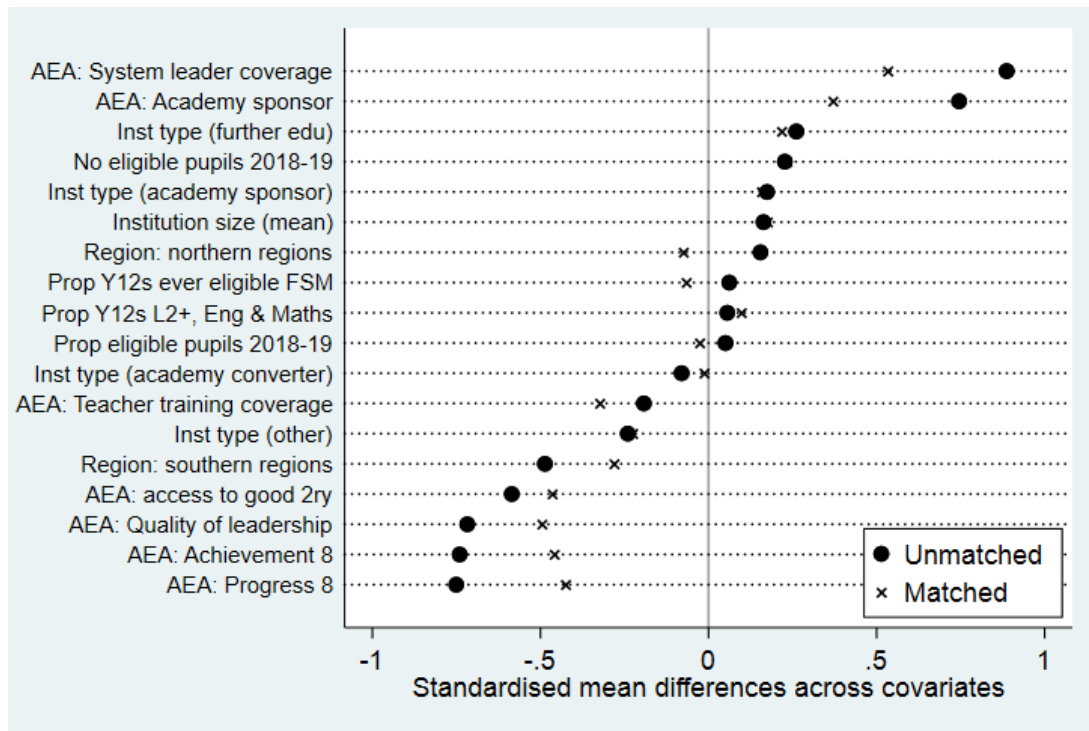
Appendix Table 13: Institution-level matching model 1: standardised mean differences before and after matching

Covariate	Unmatched sample			Matched sample		
	Treated mean	Control mean	Standardised mean difference	Treated mean	Control mean	Standardised mean difference
Institution size mean	1999.82	1620.29	0.16	2028.92	1620.29	0.18
Number of eligible Year 12s in 2018-19	102.26	60.37	0.23	104.32	61.51	0.23
Proportion of eligible Year 12s in 2018-19	27.42	26.28	0.05	25.88	26.49	-0.03
Institution type: Proportion of settings that are academy converters	28.77	32.46	-0.08	32.49	33.09	-0.01
Institution type: proportion of settings belonging to the further education sector	25.71	15.17	0.26	23.63	15.22	0.22
Institution type: Proportion of settings that are academy sponsors	20.28	13.74	0.17	19.83	14.01	0.16
Institution type: Proportion of settings with an ‘other’ institution type	22.41	33.18	-0.24	21.94	32.13	-0.23

Region: Southern regions	16.27	37.91	-0.49	24.47	37.68	-0.28
Region: Northern regions	35.14	27.96	0.15	24.47	27.78	-0.07
Proportion of Year 12s ever eligible for FSM	25.71	24.61	0.06	23.46	24.65	-0.07
Proportion of Year 12s who achieved a Level 2 or higher in maths and English at KS4 prior to enrolment	59.60	57.93	0.06	61.10	58.11	0.10
AEA Access to a good secondary school index	56.92	66.54	-0.59	59.35	66.59	-0.47
AEA Achievement 8 indicator	46.69	48.41	-0.74	47.54	48.41	-0.46
AEA Progress 8 indicator	-0.14	-0.03	-0.75	-0.08	-0.03	-0.43
AEA System leader coverage indicator	2842.30	1707.78	0.89	2215.96	1708.36	0.53
AEA Initial teacher training provider coverage index	39.79	43.42	-0.19	37.48	43.53	-0.32
AEA Quality of leadership indicator	71.78	81.40	-0.72	75.95	81.50	-0.50
AEA Academy sponsor coverage	1616.40	700.00	0.75	911.94	692.44	0.37

Notes: (1) This table reports standardised mean differences before and after matching at the institution level using a range of institution-level and AEA covariates. Propensity scores are derived using a logit model and we then use a radius matching approach (with replacement), with a caliper of 0.1 standard deviations of the propensity score. This table contains institution-level data. Cells shaded in red are those with absolute standardised mean differences >0.1, and those in green are absolute standardised mean difference differences < 0.1. (2) In the unmatched sample, the treatment group contains 424 BMP schools in AEA Categories 5 and 6, and the comparison group consists of 422 settings containing any pupil who would have been eligible for BMP in AEA Category 4. (3) In the matched sample, the treatment group contains 237 BMP settings on support, and the comparison group contains 414 settings selected as a match. (4) Two covariates are omitted as they are perfect linear combinations of other included covariates (and the model includes a constant term). These are Region: East and midlands, and Institution type (missing). (5) The sources are NPD data, ILR data, BMP sample file information.

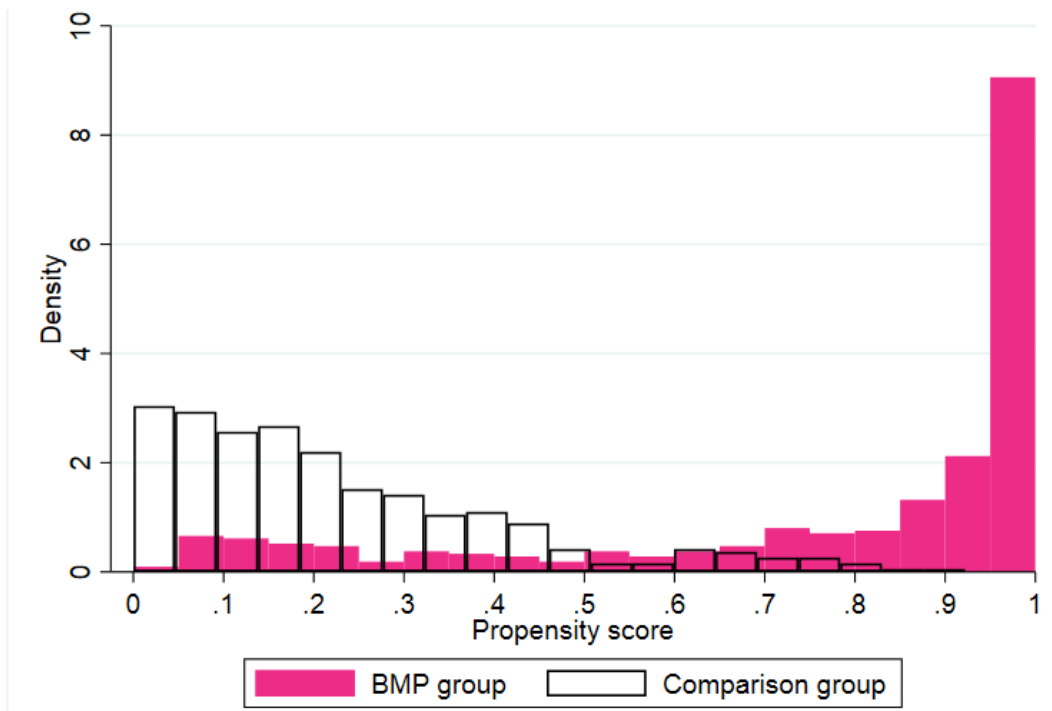
Figure 1: Institution-level matching model 1: standardised mean differences before and after matching



Notes: (1) This figure reports standardised mean differences before and after matching at the institution level using a range of institution-level and AEA covariates. Propensity scores are derived using a logit model and we then use a radius matching approach (with replacement), with a caliper of 0.1 standard deviations of the propensity score. This table contains institution-level data. (2) In the unmatched sample, the treatment group contains 424 BMP schools in AEA Categories 5 and 6, and the comparison group consists of 422 settings containing any pupil who would have been eligible for BMP in AEA Category 4. (3) In the matched sample, the treatment group contains 237 BMP settings on support, and the comparison group contains 414 settings selected as a match. (4) Two covariates are omitted as they are perfect linear combinations of other included covariates (and the model includes a constant term). These are Region: East and midlands, and Institution type (missing). (5) The sources are NPD data, ILR data, BMP sample file information.

The second diagnostic check is to assess levels of overlap in the propensity score distributions between the intervention and comparison groups. Figure 2 shows that the propensity score distributions between the two groups are poorly aligned, and that there are some extreme values on either side. There is a high density of treatment group institutions with propensity scores near 1, and very few comparison settings with propensity scores in this range. Similarly, there is a substantial density of comparison group settings with propensity scores near zero, and few treatment group settings in this range. The overall consequence of this is that there is a limited region of overlap where propensity scores are similar between the two groups of schools. The extent of this disparity is reflected in the large proportion of BMP institutions (n=187) that are found to be off-support due to having insufficient matches within the caliper.

Figure 2: Institution-level matching model 1: propensity score distributions



Notes: The figure shows the distribution of propensity scores from 424 BMP settings and 422 non-BMP settings in AEA Category 4. The propensity score model is based on a logit using all institution-level covariates. We use a radius matching approach (with replacement) with a caliper width of 0.1 standard deviations of the propensity score.

The final diagnostic check is to assess how the pseudo- R^2 associated with the logit model of BMP intervention exposure compares in the raw data compared to the matched sample. If the matching has been successful, we would expect the pseudo- R^2 to fall after matching, and to be ideally close to zero. For this initial model, we observe a modest decrease in the pseudo- R^2 after matching, from 0.49 to 0.31. This means that after restricting to the matched sample, the covariates continue to explain around 31% of variation in BMP eligibility among institutions (meaning that in the matched sample we cannot claim that BMP exposure is orthogonal to covariates; there remain differences between the two groups that are partially explained by the covariates).

The difficulty of the institution-level matching model in improving covariate balance in institution-level covariates is not unexpected. As shown in Table 13 of the main report, institution and area-level characteristics are the source of the greatest underlying imbalance between the BMP and non-BMP groups in the original data. This makes the task of trying to balance these attributes more difficult to achieve. These same challenges also affected the primary weighting analysis presented above, although in that case the issue was slightly less pronounced due to the inclusion of pupil-level covariates within the same specification (which were more similar to begin with, and thus balance more readily).

First stage: Amending the institution-level matching model

In line with the Study Plan, we sought to refine the model to try and improve balance at the institution-level before proceeding. We did this in several steps, documented below.

First, we expanded the available comparison group to include AEA Category 3 (Model 2). This adjustment still fails to produce sufficiently good covariate balance to meet the diagnostic checks set out in the Study Plan. The Study Plan states that if sufficiently good balance is still not achieved after modifying the matching model, analysis should proceed with the exclusion of all treatment institutions outside the common support area. In Models 3 and onwards, we proceeded to reduce the caliper in successive models to make the common support region more restrictive. The width of the caliper determines the maximum distance between propensity scores that is permitted for an observation to be matched. Narrowing the caliper forces the model to be more demanding in the level of balance that will be imposed, successively dropping more dissimilar observations that do not have matches within the threshold until the required level of balance is achieved.

For all these additional models, we have retained the extension to include AEA Category 3 in the comparison group. This is different to the primary analysis model, where we selected a specification that did not include AEA Category 3 as part of the comparison group. The reasoning here is different. For matching models, it is advantageous to have as large a 'pool' of available comparison observations as possible. This gives the model a wide selection from which to identify suitable matches. Crucially, in matching models, those observations that are not selected as matches are discarded altogether. We know that settings in AEA Category 3 areas are on average more dissimilar to those in our BMP intervention group than settings in AEA Category 4. However, for the purposes of matching we do not lose anything by including these settings in the model, because those that are too dissimilar will simply be discarded (and any AEA Category 3 settings that are suitably similar can be included). This is a different rationale for our primary analysis the model, where all observations are retained in the estimation. In the case of the primary analysis, we found that including settings from AEA Category 3 in the estimation worsened the performance of the model because these settings were retained by the weighting model (albeit with lower weights on average than those in AEA Category 4), and this served to worsen overall balance.

Appendix Table 14 reports a summary of the diagnostic results from each model. Notice that as the caliper is reduced, the number of BMP settings found to be off support increases, and the resulting number of settings that are successfully matched falls. Similarly, as the caliper is tightened, the number of comparison group settings found to have sufficiently similar propensity scores to be selected as a match drops too. The successive reduction in sample sizes as the caliper is tightened would have the effect of weakening precision in the final impact estimate. At the same time, we see that the diagnostic results on covariate balance improve as the caliper is tightened and more dissimilar observations are dropped from the estimation. The proportion of covariates that have an absolute standardised mean difference of <0.1 after matching increases, and the pseudo- R^2 after matching drops as the caliper is reduced.

These findings show that it requires a drastic narrowing of the caliper to achieve the extent of institutional-level covariate balance anticipated in the Study Plan. In order to achieve at least 50% of covariates having absolute standardised mean differences of <0.1 after matching, we would need to discard a large proportion of the available sample: retaining only 56 BMP settings for the impact analysis and around 121 matched control settings, drawn from AEA areas 3 and 4. Our judgement that this is an unacceptably high penalty in terms of precision to exchange for minimising bias to the extent envisaged. We instead propose selecting a model that strikes a more equitable trade-off between precision and bias by retaining more of the intervention group sample, in exchange for weaker requirements on the degree of balance in the matched sample. We instead proceed with the model that implements a caliper of 0.01 standard deviations of the propensity score (**Model 3**). This model achieves covariate balance for around 1/3 of the covariates in the model, with a low pseudo- R^2 in the matched sample of 0.17, whilst managing to retain over 100 BMP settings in the treatment group.

Appendix Table 14: Institution-level matching: summary of diagnostic results from different matching specifications

#	Model		Intervention group settings			Comparison group settings			Prop. covariates with absolute standardised mean differences <0.1 after matching	Pseudo-R ² of the logit model for BMP assignment
	Caliper	Comparison group	# with missing values	# off support	# successfully matched	# with missing values	# obs included in matching model	# obs selected as a match		
1	0.1 SD of propensity score	AEA Category 4 only	0	187	237	8	414	414	27.78	Before matching: 0.49 Matched sample: 0.31
2	0.1 SD of propensity score	AEA Categories 3 and 4	0	200	224	15	792	792	22.22	Before matching: 0.58 Matched sample: 0.39
3	0.01 SD of propensity score	AEA Categories 3 and 4	0	307	117	15	792	571	33.33	Before matching: 0.58 Matched sample: 0.17
4	0.0025 SD of propensity score	AEA Categories 3 and 4	0	345	79	15	792	263	33.33	Before matching: 0.58 Matched sample: 0.08
5	0.001 SD of propensity score	AEA Categories 3 and 4	0	368	56	15	792	121	50	Before matching: 0.58 Matched sample: 0.06
6	0.00075 SD of propensity score	AEA Categories 3 and 4	0	377	47	15	792	93	50	Before matching: 0.58 Matched sample: 0.05

Notes: (1) This table reports summary results from matching models carried out at the institution-level, using institution level and AEA covariates. Propensity scores are derived using a logit model and we then use a radius matching approach (with replacement), varying the caliper width with each model. This table refers to institution-level data. (2) The treatment group contains BMP settings in AEA Categories 5 and 6, and the comparison group contains settings from AEA Categories 3 and 4 (depending on the model reported). (3) Two covariates are omitted as they are perfect linear combinations of other included covariates (and the model includes a constant term). These are Region: East and midlands and Institution type (missing). (4) The sources are NPD data, ILR data, BMP sample file information.

First stage: final model diagnostics

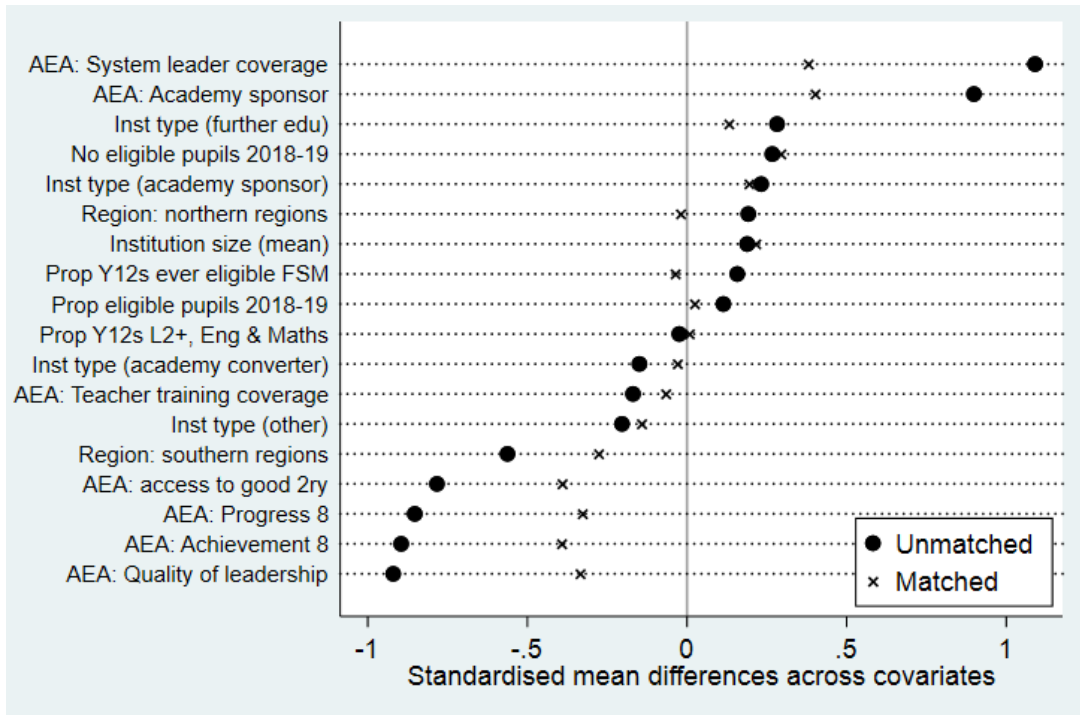
Appendix Table 15, Figure 3 and Figure 4 report diagnostics from the final institution-level matching model selected.

Appendix Table 15: Institution-level matching final model: standardised mean differences before and after matching

Covariate	Unmatched sample			Matched sample		
	Treated mean	Control mean	Standardised mean difference	Treated mean	Control mean	Standardised mean difference
Institution size mean	1999.82	1582.93	0.19	2053.34	1582.93	0.22
Number of eligible Year 12s in 2018-19	102.26	55.22	0.27	105.85	56.24	0.29
Proportion of eligible Year 12s in 2018-19	27.42	24.77	0.11	25.15	24.58	0.02
Institution type: Proportion of settings that are academy converters	28.77	35.81	-0.15	35.04	36.49	-0.03
Institution type: proportion of settings belonging to the further education sector	25.71	14.75	0.28	19.66	14.90	0.13
Institution type: Proportion of settings that are academy sponsors	20.28	12.02	0.23	18.80	12.25	0.19
Institution type: Proportion of settings with an 'other' institution type	22.41	31.60	-0.20	23.93	30.43	-0.14
Region: Southern regions	16.27	42.87	-0.56	29.06	42.68	-0.28
Region: Northern regions	35.14	26.39	0.19	25.64	26.52	-0.02
Proportion of Year 12s ever eligible for FSM	25.71	22.86	0.16	22.28	22.96	-0.04
Proportion of Year 12s who achieved a Level 2 or higher in maths and English at KS4 prior to enrolment	59.60	60.36	-0.02	61.14	60.90	0.01
AEA Access to a good secondary school index	56.92	69.32	-0.78	64.01	69.44	-0.39
AEA Achievement 8 indicator	46.69	48.71	-0.90	48.00	48.71	-0.39
AEA Progress 8 indicator	-0.14	-0.02	-0.85	-0.06	-0.02	-0.33
AEA System leader coverage indicator	2842.30	1499.73	1.09	1812.91	1505.09	0.38
AEA Initial teacher training provider coverage index	39.79	43.30	-0.17	41.90	43.32	-0.07
AEA Quality of leadership indicator	71.78	84.05	-0.92	80.79	84.19	-0.33
AEA Academy sponsor coverage	1616.40	641.19	0.90	828.44	634.29	0.40

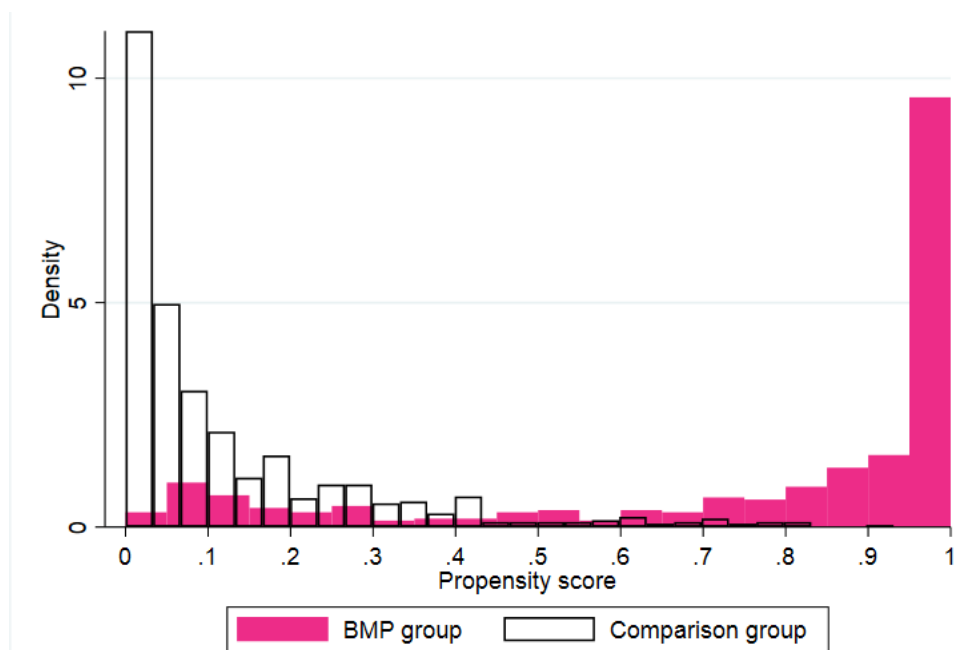
Notes: (1) This table reports standardised mean differences before and after matching at the institution level using a range of institution-level and AEA covariates. Propensity scores are derived using a logit mode and we then use a radius matching approach (with replacement) with a caliper of 0.01 standard deviations of the propensity score. This table contains institution-level data. Cells shaded in red are those with absolute standardised mean differences >0.1, and those in green are absolute standardised mean difference differences < 0.1. (2) In the unmatched sample, the treatment group contains 424 BMP schools in AEA Categories 5 and 6, and the comparison group consists of 807 settings containing any pupil who would have been eligible for BMP in AEA Category 4 and 3. (3) In the matched sample, the treatment group contains 117 BMP settings on support, and the comparison group contains 571 settings selected as a match. (4) Two covariates are omitted as they are perfect linear combinations of other included covariates (and the model includes a constant term). These are Region: East and midlands, and Institution type (missing). (5) The sources are NPD data, ILR data, BMP sample file information.

Figure 3: Institution-level matching final model: standardised mean differences before and after matching



Notes: (1) This figure reports standardised mean differences before and after matching at the institution level using a range of institution-level and AEA covariates. Propensity scores are derived using a logit model and we then use a radius matching approach (with replacement) with a caliper of 0.01 standard deviations of the propensity score. (2) In the unmatched sample, the treatment group contains 424 BMP schools in AEA Categories 5 and 6, and the comparison group consists of 807 settings containing any pupil who would have been eligible for BMP in AEA Category 4 and 3. (3) In the matched sample, the treatment group contains 117 BMP settings on support, and the comparison group contains 571 settings selected as a match. (4) Two covariates are omitted as they are perfect linear combinations of other included covariates (and the model includes a constant term). These are Region: East and midlands, and Institution type (missing). (5) The sources are NPD data, ILR data, BMP sample file information.

Figure 4: Institution-level matching final model: propensity score distributions



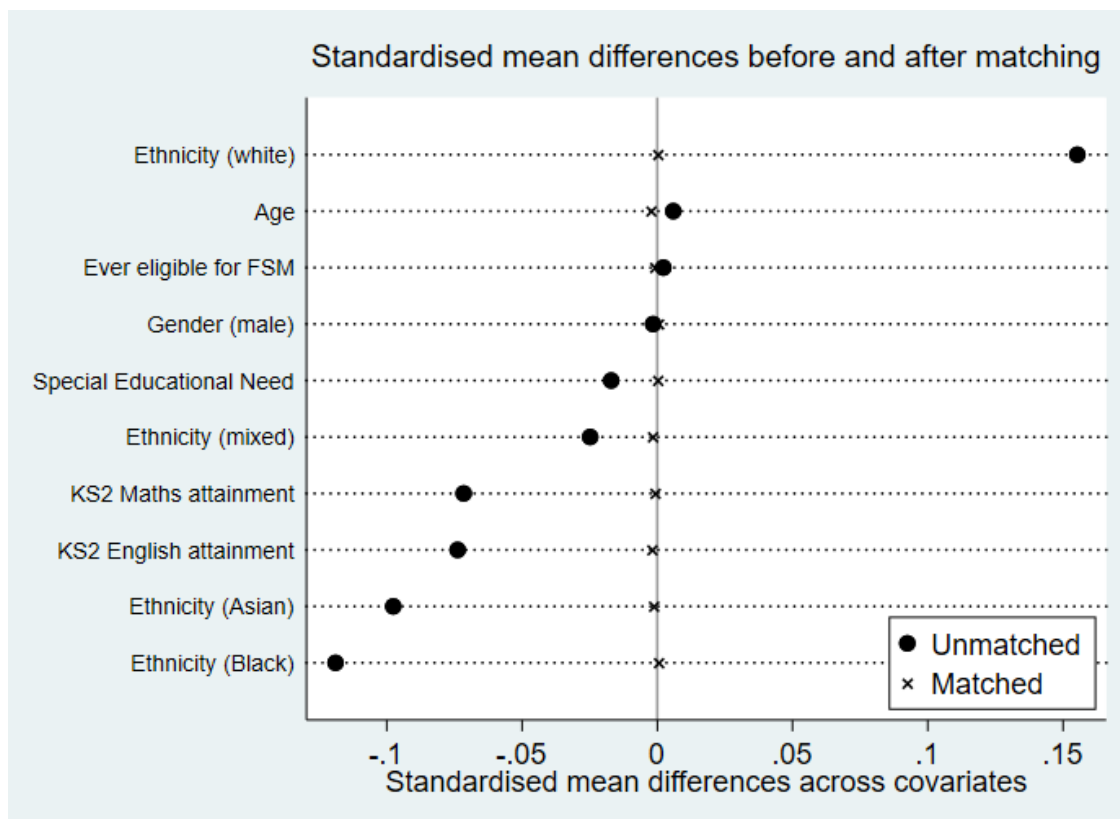
Notes: The figure shows the distribution of propensity scores from 424 BMP settings and 422 non-BMP settings in AEA Category 4. The propensity score model is based on a logit using all institution-level covariates. We use a radius matching approach (with replacement) with a caliper width of 0.01 standard deviations of the propensity score.

Second stage: pupil-level matching

The next step is to carry out matching at the pupil-level, within the settings selected by the institution-level matching model shown above. We also use a radius matching with replacement approach. Here we revert to the initially planned caliper size of 0.1 standard deviations of the propensity score.

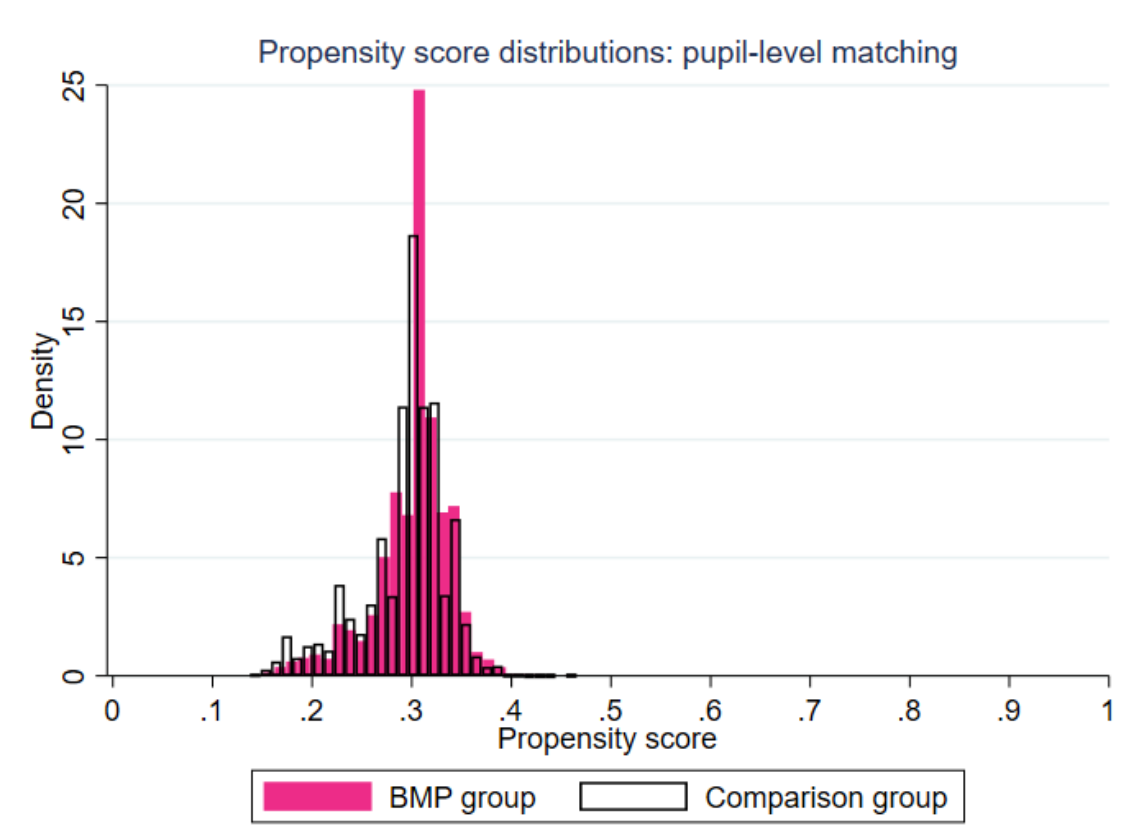
The matching model at the pupil-level is highly effective at producing a sample that is extremely well-balanced in terms of covariates. This is consistent with the already-high levels of similarity in pupil characteristics in the raw (unmatched) samples, as shown above in Table 14 of the main report. Figure 5 reports the standardised mean differences before and after the pupil-level matching, showing that matching successfully reduces absolute standardised mean differences to below 0.1 for all covariates. Figure 6 shows that propensity scores in the BMP and comparison group are extremely well aligned, and the distribution does not contain extreme values. Analogous figures for the estimation using the pupil-level indicator of BMP eligibility are shown in *Appendix K* below.

Figure 5: Pupil-level matching: covariate balance



Notes: (1) This figure reports standardised mean differences before and after pupil-level matching. (2) In the unmatched pupil sample, the treatment group contains 12,726 pupils from 117 BMP schools in AEA Categories 5 and 6, and the comparison group consists of 30,897 pupils from 571 settings containing any pupil who would have been eligible for BMP in AEA Category 4 and 3. (3) In the matched pupil sample, the treatment group contains 11,768 pupils from 116 BMP settings on support, and the comparison group contains 28,127 pupils from 562 settings. (4) Two covariates are omitted as they are perfect linear combinations of other included covariates (and the model includes a constant term). These are Region: East and midlands, and Institution type (missing). (5) The sources are NPD data, ILR data, BMP sample file information.

Figure 6: Pupil-level matching: propensity score distributions



Notes: The figure shows the distribution of propensity scores from 12,726 pupils from 117 BMP schools in AEA Categories 5 and 6, and 30,897 pupils from 571 settings containing any pupil who would have been eligible for BMP in AEA Category 4 and 3. The propensity score model is based on a logit using all pupil-level covariates.

Results

Appendix Table 16 shows that, according to the robustness check, there is a negative and statistically significant impact of the BMP on the propensity of pupils passing maths. The findings show a 1.0 percentage point decrease in the likelihood of passing maths for pupils exposed to the BMP. Appendix Table 17 expresses this result as a risk ratio. This shows that pupils who are part of a BMP setting are 0.923 times as likely (that is, they are less likely) to achieve the required pass in maths.

Appendix Table 16: Robustness check final model: impact estimates

BMP treatment indicator	Coefficient (difference in probability of passing maths)	Standard error	z	P > z	95% confidence interval
Setting-level	-0.010	0.004	-2.89	0.004	(-0.018, -0.003)

Notes: (1) This table reports impact estimates from a two-stage matching model, performed using `teffects psmatch` in Stata with a logit specification for the propensity score model. (2) BMP eligibility is defined at the setting-level, using an indicator drawn from the BMP sample file maintained by the evaluation team to monitor institutions that had signed an MOU and not withdrawn from the trial. This specification includes 11,768 pupils from 116 BMP settings, and 28,127 pupils from 562 non-BMP settings drawn from AEA Categories 3 and 4. (3) The sources are NPD data, ILR data, BMP sample file information.

Appendix Table 17: Robustness check final model: risk ratios

BMP treatment indicator	Risk ratio	95% confidence interval
Setting-level	0.923	(0.872, 0.977)

Notes: (1) This table reports risk ratios from a two-stage matching model, performed using *teffects psmatch* in Stata with a logit specification for the propensity score model. See notes from the above Table.

We do not consider these results to be reliable. The main reason is the difficulty of the matching model in being able to identify a sample of comparison group settings that are similar to BMP settings. As shown in the previous section, we were unable to derive a model specification at the institution-level that satisfied the diagnostic checks set out in our Study Plan. This means that we are not likely to have been able to fully account for differences between BMP and comparison group institutions in our matching estimation. Therefore, our impact estimates are likely to reflect a bias owing to the fact that BMP settings are in areas of greater educational disadvantage which we have not been able to satisfactorily adjust for, leading to lower maths resit results observed. Under this two-stage matching model, the final impact estimates do not actually include any adjustment for setting and area-level differences between the BMP and comparison groups, other than through the selection of the comparison group sample. Setting-level covariates are not included in the final impact estimation model, and the matched sample of settings does not include any additional weighting adjustment according to which settings were more or less similar to others (i.e. we do not down-weight comparison group settings that were less similar to the BMP settings, and selected less often as a match in the first stage). This weakens the ability of this method to fully account for institution-level differences, in contrast to the primary analysis where setting-level covariates are explicitly entered as covariates into the final impact estimation model.

Appendix K: Exploratory impact estimation

In this Appendix we present the results from an additional, exploratory impact analysis that we have conducted using an alternative available definition of BMP exposure.

The impact estimation findings shown in the main report use a measure of BMP exposure defined at the setting-level. This is consistent with the level at which the funding was assigned. In this exploratory analysis, we now repeat the impact estimation using a second available indicator of BMP treatment assignment defined at the pupil-level. This additional pupil-level measure of BMP eligibility was made available by the DfE in the extract of the NPD that the evaluation team used for analysis. This 'pupil'-level measure is similar to the main setting-level definition; the majority of pupils in our sample are associated with the same BMP allocation under both measures. However, there are some minor discrepancies (shown in *Table 7* of the *Participant selection* section of the main report). We have produced this additional, exploratory, analysis to see if there is any variation in the results when compared to the setting-level definition of BMP assignment.

This exploratory analysis uses the same sample of pupils as the main analysis. This time, the treatment group is simply those that were individually flagged as being the beneficiary of BMP funding, rather than all pupils in BMP settings. This Appendix contains findings from repeating the doubly robust estimation, two-stage matching robustness check and retake analysis using this alternative definition of BMP eligibility.

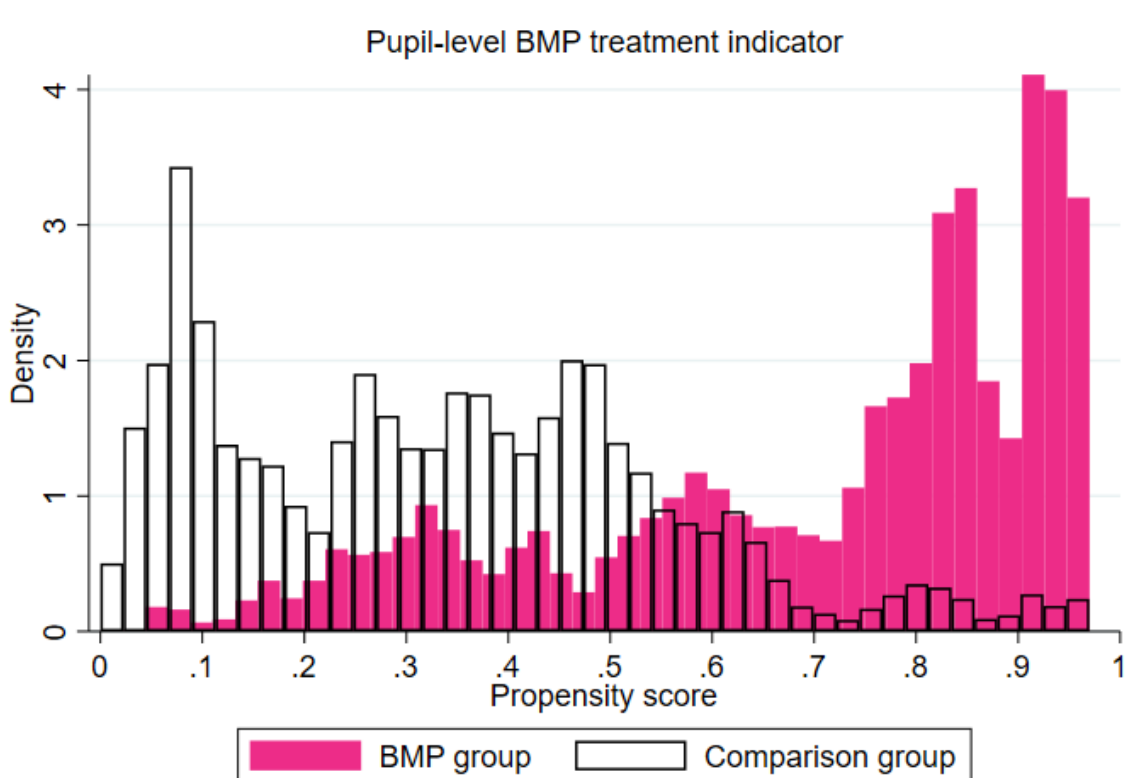
Doubly robust estimation

First, we repeat the doubly robust estimation approach that is used to address RQ1 of the impact evaluation (*RQ1: What is the impact of the different funding models on maths achievement of eligible students in post-16 settings in England compared to business as usual?*). For convenience, we adopt the same model specification for this exploratory analysis as the final doubly robust model described in the main report (that is, trimming observations with propensity scores above 0.97). Please see the *Primary analysis* section of the main report for more details on the analysis specification.

Using the alternative definition of BMP eligibility, we find that this exploratory analysis model in fact performs rather better than the main model. First, there are fewer observations with extreme propensity scores in this model: trimming removes only 15,391 observations from the estimation, rather than 22,618 as in the previous model. This is reflected in Figure 7, which shows that there is a more substantial region of overlap in the distribution of propensity scores across the whole sample than there was in the previous model. Secondly, Appendix Table 18 and Figure 8 show that standardised mean differences in covariates are reduced in this model to a greater extent than in the previous one. Finally, the pseudo- R^2 also drops from 0.34 to 0.05 after weighting, indicating covariates do not have much explanatory power for BMP exposure after the dataset has been weighted.

One reason why this model may be more effective is that defining BMP exposure at the pupil-level slightly blurs the area and institution-level differences between the treatment and comparison group. As shown in Table 7 of the main report (*Participant selection section*), under the pupil-level definition of BMP exposure, the comparison group now contains some pupils from AEA Categories 5 and 6 and the intervention group includes some pupils apparently belonging to AEA Category 4 settings. This lessens the average disparity in area- and institution-level characteristics between the treatment and comparison groups defined by this pupil-level indicator, thereby improving its ability to achieve balance.

Figure 7: Exploratory analysis: propensity score distributions (doubly robust analysis)



Notes: The figure shows the distribution of propensity scores in the pupil data after trimming observations with propensity scores >0.97. The sample covers 29,644 BMP and 24,893 non-BMP pupils. The propensity score model is based on a logit model of pupil-level BMP exposure using all pupil and institution-level covariates. Sources are NPD data, ILR data, BMP sample file information.

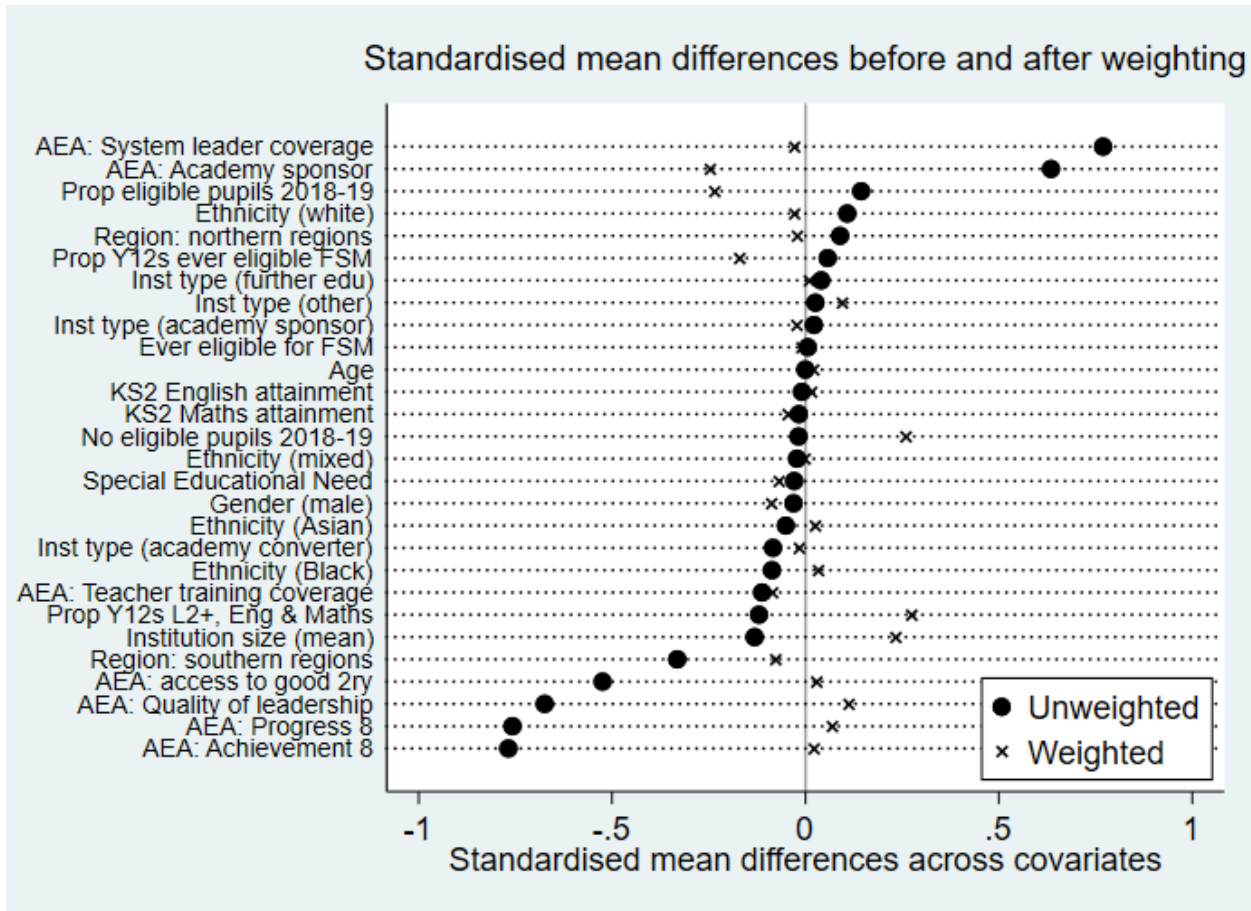
Appendix Table 18: Exploratory analysis: standardised mean differences before and after weighting

Covariate	Unweighted raw sample			Weighted sample		
	Treated mean	Control mean	Standardised mean difference	Control mean	Treated mean	Standardised mean difference
Institution size mean	6197.06	6735.77	-0.13	6210.71	5352.47	0.23
Number of eligible Year 12s in 2018-19	497.29	503.37	-0.02	507.16	426.34	0.26
Proportion of eligible Year 12s in 2018-19	45.06	42.97	0.14	44.29	47.59	-0.24
Institution type: Proportion of settings that are academy converters	3.56	5.28	-0.08	3.71	4.03	-0.02
Institution type: proportion of settings belonging to the further education sector	85.63	84.18	0.04	85.97	85.66	0.01
Institution type: Proportion of settings that are academy sponsors	3.11	2.74	0.02	3.18	3.60	-0.02
Institution type: Proportion of settings with an 'other' institution type	7.32	6.67	0.03	6.73	4.55	0.09
Region: Southern regions	17.51	31.59	-0.33	21.22	24.48	-0.08
Region: Northern regions	37.54	33.26	0.09	36.61	37.65	-0.02
Proportion of Year 12s ever eligible for FSM	31.45	30.85	0.06	30.62	32.64	-0.17
Proportion of Year 12s who achieved a Level 2 or higher in	38.09	40.27	-0.12	38.84	34.10	0.27

Covariate	Unweighted raw sample			Weighted sample		
	Treated mean	Control mean	Standardised mean difference	Control mean	Treated mean	Standardised mean difference
maths and English at KS4 prior to enrolment						
AEA Access to a good secondary school index	57.82	65.96	-0.52	59.02	58.57	0.03
AEA Achievement 8 indicator	46.47	48.12	-0.77	47.06	47.02	0.02
AEA Progress 8 indicator	-0.15	-0.04	-0.76	-0.11	-0.11	0.07
AEA System leader coverage indicator	2566.01	1733.17	0.77	2273.42	2306.64	-0.03
AEA Initial teacher training provider coverage index	40.81	42.79	-0.11	39.44	40.97	-0.09
AEA Quality of leadership indicator	72.52	80.41	-0.67	74.37	73.00	0.11
AEA Academy sponsor coverage	1531.47	824.35	0.64	1255.02	1562.70	-0.25
Age	16.01	16.01	0.00	16.00	16.00	0.02
Gender	50.38	51.93	-0.03	50.89	55.30	-0.09
Ethnicity: White	79.57	75.06	0.11	81.05	82.18	-0.03
Ethnicity: Mixed/ multiple	4.53	5.00	-0.02	4.59	4.63	0.00
Ethnicity: Asian	10.83	12.46	-0.05	9.99	9.25	0.02
Ethnicity: Black	4.07	5.96	-0.09	3.69	3.10	0.03
Eligibility for free school meals	38.19	37.90	0.01	38.30	38.80	-0.01
Special Education Need status (SEN)	26.70	28.00	-0.03	28.10	31.24	-0.07
Prior attainment at KS2 in English	3.67	3.67	-0.01	3.66	3.65	0.01
Prior attainment at KS2 in maths	3.55	3.56	-0.02	3.55	3.58	-0.05

Notes: (1) This table reports standardised mean differences before and after weighting using pupil, institution level and AEA covariates. Propensity scores are derived using a logit model. Cells shaded in red are those with absolute standardised mean differences >0.1, and those in green are absolute standardised mean difference differences < 0.1. (2) The treatment group is comprised of pupils who are individually identified as being recipients of the BMP. The comparison group consists of pupils from AEA Category 4, 5 and 6 areas that were not identified as BMP beneficiaries. The unweighted raw sample describes the entire eligible pupil sample across AEA Category 4,5 and 6 areas, while the weighted sample refers to the estimation sample (including trimming of all observations with propensity scores above 0.97). Overall, the weighted sample contains 29,644 BMP and 24,893 non-BMP pupils (3) Three covariates are omitted as they are perfect linear combinations of other included covariates (and the model includes a constant term). These are Region: East and midlands, Institution type (missing) and Ethnicity: other. (4) The sources are NPD data, ILR data, BMP sample file information.

Figure 8: Exploratory analysis: standardised mean differences before and after weighting



Notes: (1) This figure reports standardised mean differences in covariates before and after weighting. Propensity scores are derived using a logit model. (2) The treatment group is comprised of pupils who are individually identified as being recipients of the BMP. The comparison group consists of pupils from AEA Category 4, 5 and 6 areas that were not identified as BMP beneficiaries. The unweighted raw sample describes the entire eligible pupil sample across AEA Category 4,5 and 6 areas, while the weighted sample refers to the estimation sample (including trimming of all observations with propensity scores above 0.97). Overall, the weighted sample contains 29,644 BMP and 24,893 non-BMP pupils (3) Three covariates are omitted as they are perfect linear combinations of other included covariates (and the model includes a constant term). These are Region: East and midlands, Institution type (missing) and Ethnicity: other. (4) The sources are NPD data, ILR data, BMP sample file information.

Appendix Table 19 shows the impact estimates produced by this model. These findings represent the differences in the probability of achieving the required pass in maths by November 2019, for pupils individually flagged as being 'BMP pupils', and those who are not. We find that, in contrast to the primary analysis results shown in the main report, there appears to be a positive impact of BMP on the outcome when BMP exposure is defined at the pupil-level. Under this model, BMP is associated with a 3-percentage point increase in the likelihood of an individual achieving the required pass in KS4 maths, in resits up to November 2019. Appendix Table 20 reports the same results, expressed as risk ratios. Expressed as a risk ratio, this is an effect size of 1.32. This means that BMP beneficiary pupils were 1.32 times more likely than their non-BMP counterparts to achieve the required pass by November 2019.

It is interesting that the results from the two different ways of defining BMP exposure differ, since the two definitions are in practice relatively similar – with the majority of pupils having the same BMP allocation according to both definitions (as shown in Table 7 of the main report). As shown above, the pupil-level definition of BMP exposure produces a weighting model with relatively better balance diagnostics than the setting-level definition, and also drops fewer observations in the process of trimming observations with extreme propensity scores.

However, we do not consider the positive result associated with the pupil-level indicator of BMP exposure to be strong evidence. First, the fact that there is such close alignment between the two definitions of BMP allocation gives us cause for suspicion. The apparent sensitivity of the results to a relatively small change in the treatment group definition appears to be spurious. Secondly, the BMP exposure variable used for this additional analysis does not

conform to the level at which BMP funding was delivered in practice. BMP was fundamentally a setting-level intervention, and it is therefore most appropriate to analyse it at this level (as our main analysis does). Finally, this positive result on the primary outcome is at odds with other results across the impact evaluation and IPE components, described in the main report.

Appendix Table 19: Exploratory analysis: doubly robust impact estimates

BMP treatment indicator	Coefficient (difference in probability of passing maths)	Standard error	z	P > z 	95% confidence interval
Pupil-level	0.030	0.005	5.58	<0.001	(0.019, 0.040)

Notes: (1) This table reports impact estimates from doubly robust estimation, performed using teffects ipwra in Stata with a logit specification for the treatment and outcomes model. (2) BMP eligibility is defined at the pupil-level, using an indicator added to our NPD data extract by the DfE team. This specification contains 29,644 BMP and 24,893 non-BMP pupils. (3) Standard errors for the setting-level BMP exposure indicator are clustered at the institution-level. (5) The sources are NPD data, ILR data, BMP sample file information.

Appendix Table 20: Exploratory analysis: risk ratio generated from doubly robust analysis

BMP treatment indicator	Risk ratio	95% confidence interval
Pupil-level	1.32	(1.185, 1.478)

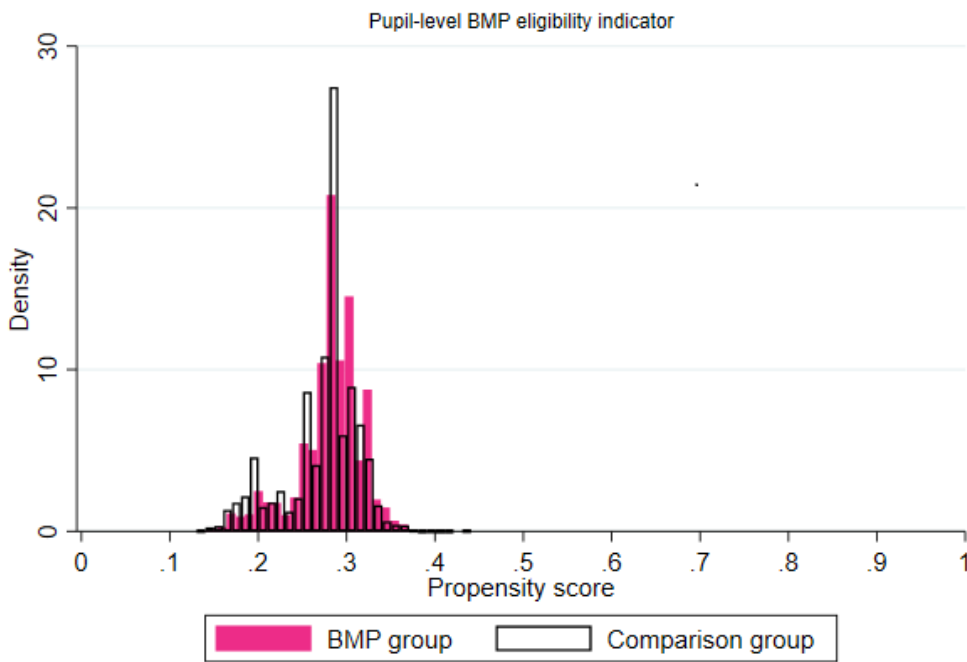
Notes: (1) This table reports impact estimates in the form of risk ratios, from doubly robust estimation, performed using teffects ipwra in Stata with a logit specification for the treatment and outcomes model. (2) Other notes as per the above table.

Two-stage matching

We also repeat the two-stage matching robustness check using the pupil-level measure of BMP eligibility, as an additional piece of exploratory analysis. This is a robustness check for RQ1 of the impact evaluation (*RQ1: What is the impact of the different funding models on maths achievement of eligible students in post-16 settings in England compared to business as usual?*).

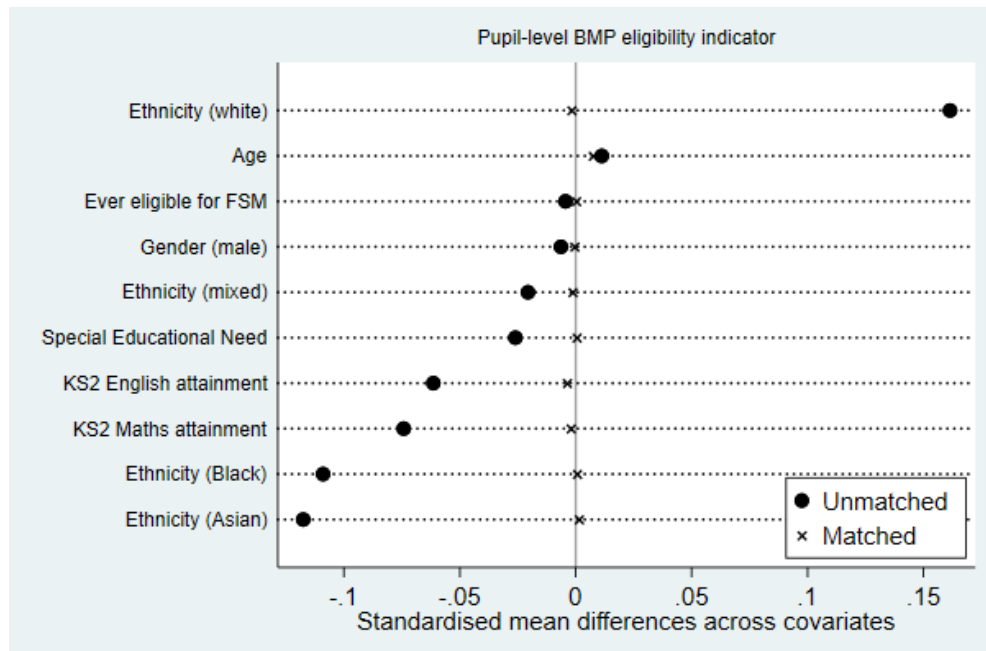
To implement this model, we start with the ‘matched’ institution sample selected by the first stage of matching (described in Appendix J above). We then use the pupil-level definition of BMP eligibility to repeat the matching at the pupil-level and see whether this makes any difference to the findings. Figure 9 and Figure 10 report diagnostic results for this additional model. These results show that the pupil-level matching model is highly effective at identifying a well-balanced sample.

Figure 9: Exploratory analysis: propensity score distributions (pupil-level matching model)



Notes: The figure shows the distribution of propensity scores from 10,996 pupils individually identified as being eligible for BMP, and 28,900 pupils not identified as being eligible for BMP. The sample for this analysis contains the same pupils as those included in the main two-stage matching model that uses the setting-level indicator of BMP exposure. This means it that the analysis sample for this pupil-level matching model has been restricted using results from the first stage matching that was carried out using the setting-level indicator of BMP, which applied a caliper of 0.01 standard deviations of the propensity score and matched over all available settings in AEA Category 3, 4, 5 and 6. The propensity score model is based on a logit using all pupil-level covariates.

Figure 10: Exploratory analysis: Covariate balance (pupil-level matching model)



Notes: (1) This figure reports standardised mean differences before and after pupil-level matching. (2) In the unmatched pupil sample, the treatment group contains 10,996 pupils across AEA Categories 5 and 6 that are individually identified as being exposed to BMP, and 28,900 pupils across AEA Categories 3-6 that are not individually identified as being exposed to BMP. (3) In the matched pupil sample, the treatment group contains 10,996 pupils individually identified as belonging to BMP, and 28,900 pupils that are not. (4) Two covariates are omitted as they are perfect linear combinations of other included covariates (and the model includes a constant term). These are Region: East and midlands, and Institution type (missing). (5) The sources are NPD data, ILR data, BMP sample file information.

The results from repeating the pupil-level matching step of the robustness check with the pupil-level BMP indicators are shown in Appendix Table 21. As with the main robustness check findings, we again observe a negative and statistically significant impact of the BMP on the propensity of pupils passing maths. BMP is associated with a decrease of 1.3 percentage points in the likelihood that pupils who are exposed to BMP achieve the required pass in maths. This coefficient is of a similar magnitude to the main robustness check findings (which show a 1.1 percentage point decrease).

Appendix Table 22 reports this finding as a risk ratio. We find that pupils who are part of a BMP setting are 0.899 times as likely (that is, they are less likely) to achieve the required pass in maths.

Appendix Table 21: Exploratory analysis: two-stage matching impact estimates

BMP treatment indicator	Coefficient (difference in probability of passing maths)	Standard error	z	P > z 	95% confidence interval
Pupil-level	-0.013	0.004	-3.69	<0.001	(-0.021, -0.006)

Notes: (1) This table reports impact estimates from a two-stage matching model, performed using teffects psmatch in Stata with a logit specification for the propensity score model. (2) BMP eligibility is defined at the pupil-level, using an indicator added to our NPD data extract by the DfE team. This specification contains 10,996 BMP and 28,900 non-BMP pupils across AEA Categories 3, 4, 5 and 6. (3) The sources are NPD data, ILR data, BMP sample file information.

Appendix Table 22: Exploratory analysis: risk ratio generated from two-stage matching

BMP treatment indicator	Risk ratio	95% confidence interval
Pupil-level	0.901	(0.850, 0.955)

Notes: (1) This table reports risk ratios from a two-stage matching model, performed using teffects psmatch in Stata with a logit specification for the propensity score model. See notes from the above Table.

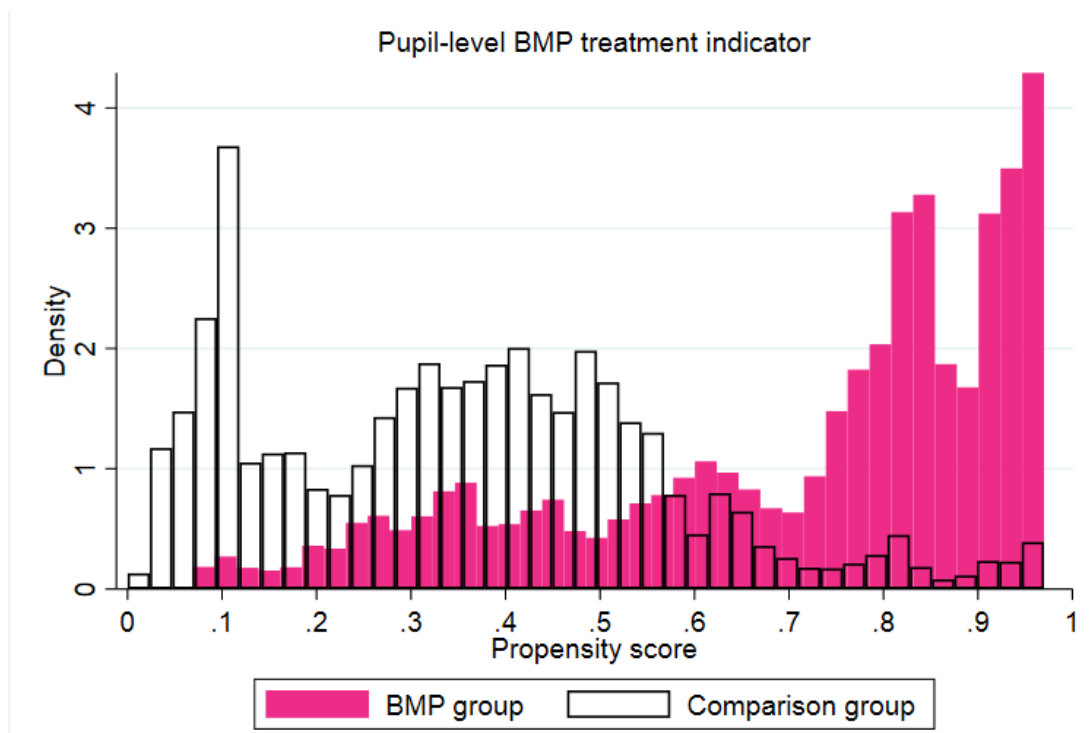
We do not consider the results of the two-stage matching procedure to be reliable, for the same reasons that are discussed above in the *Results* section of Appendix J.

Retake analysis

The final piece of exploratory analysis we have conducted is to repeat the retake analysis that is used to address RQ5 of the impact evaluation (*RQ5: What are the effects of the different funding models on the likelihood of pupils attempting a GCSE maths exam retake, for students with a prior achievement of grade 2 and below?*). This analysis is carried out using the same doubly robust approach as the primary outcome analysis, but with a different key outcome that captures whether a pupil was entered for a GCSE Maths resit exam or not. For convenience, we use the same specification as the main primary analysis (removing observations with propensity scores greater than 0.97). Please see the *Retake analysis* section of the main report for more details.

Figure 11, Appendix Table 23 and Figure 12 report diagnostic results for the retake analysis that is carried out using the individual-level indicator of BMP eligibility.

Figure 11: Exploratory analysis: propensity score distributions (retake analysis)



Notes: The figure shows the distribution of propensity scores among the sample of pupils that achieved a Grade 2 or below in their initial GCSE attempt, after trimming observations with propensity scores >0.97. The sample covers 17,220 pupils individually tagged as being eligible for BMP and 13,328 pupils not individually identified as belonging to BMP across AEA Category Areas 4-6. Propensity scores are based on a logit model of BMP exposure. Sources are NPD data, ILR data, BMP sample file information.

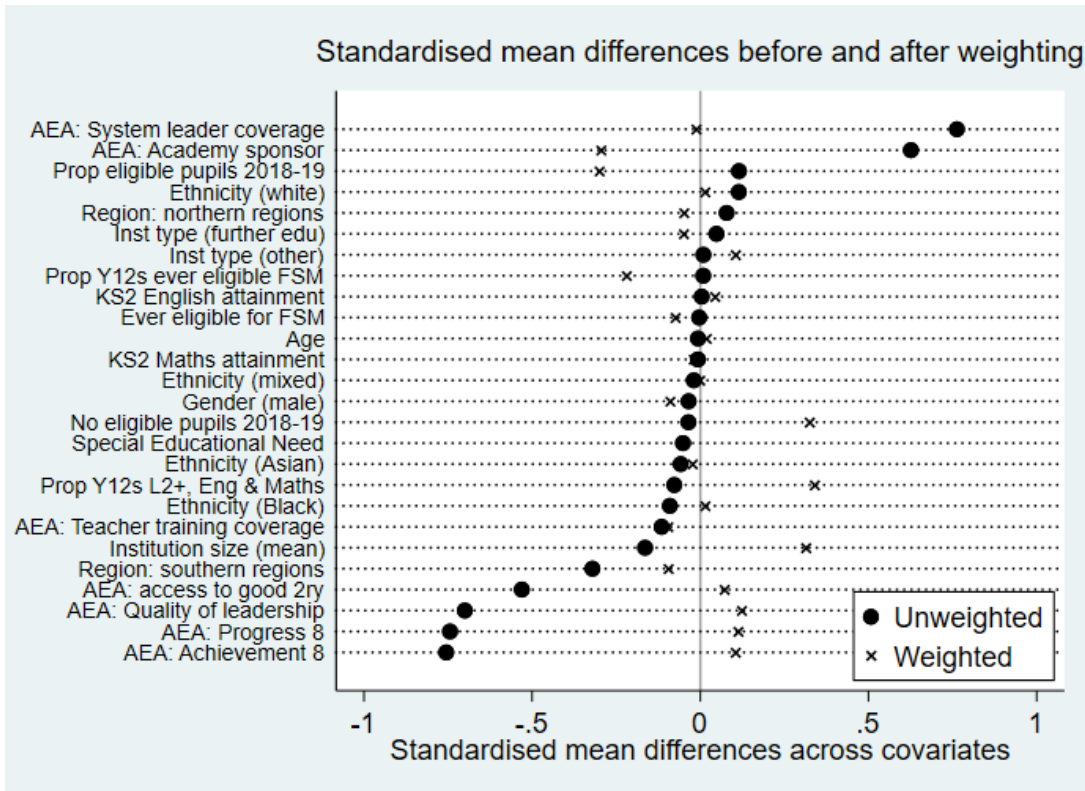
Appendix Table 23: Exploratory analysis: standardised mean differences before and after weighting (retake analysis)

Covariate	Unweighted raw sample			Weighted sample		
	Treated mean	Control mean	Standardised mean difference	Treated mean	Control mean	Standardised mean difference
Institution size mean	6456.74	7126.07	-0.16	6405.89	5280.68	0.31
Number of eligible Year 12s in 2018-19	522.13	533.79	-0.04	528.18	430.58	0.32
Proportion of eligible Year 12s in 2018-19	47.28	45.81	0.11	46.54	50.32	-0.30
Institution type: proportion of settings belonging to the further education sector	88.94	87.39	0.05	89.27	90.76	-0.05
Institution type: Proportion of settings with an 'other' institution type	5.65	5.44	0.01	5.15	3.07	0.10
Region: Southern regions	17.12	30.61	-0.32	20.73	24.72	-0.10
Region: Northern regions	38.06	34.30	0.08	37.24	39.61	-0.05
Proportion of Year 12s ever eligible for FSM	32.55	32.46	0.01	31.83	34.47	-0.22
Proportion of Year 12s who achieved a Level 2 or higher in Maths and English at Key Stage 4 prior to enrolment	35.28	36.50	-0.08	35.99	30.89	0.34
AEA Access to a good secondary school index	57.79	66.00	-0.53	58.83	57.68	0.07

Covariate	Unweighted raw sample			Weighted sample		
	Treated mean	Control mean	Standardised mean difference	Treated mean	Control mean	Standardised mean difference
AEA Achievement 8 indicator	46.431	48.05	-0.76	46.96	46.73	0.10
AEA Progress 8 indicator	-0.15	-0.05	-0.74	-0.11	-0.12	0.11
AEA System leader coverage indicator	2567.65	1742.66	0.76	2272.24	2285.68	-0.01
AEA Initial teacher training provider coverage index	40.88	42.90	-0.12	39.50	41.19	-0.10
AEA Quality of leadership indicator	72.52	80.55	-0.70	74.26	72.77	0.12
AEA Academy sponsor coverage	1520.94	824.09	0.63	1250.90	1617.87	-0.30
Age	16.00	16.01	-0.01	16.00	16.00	0.02
Gender	51.49	53.23	-0.03	51.75	56.23	-0.09
Ethnicity: White	79.22	74.40	0.11	81.08	80.53	0.01
Ethnicity: Mixed/ multiple	4.60	5.01	-0.02	4.58	4.61	0.00
Ethnicity: Asian	10.85	12.73	-0.06	9.85	10.57	-0.02
Ethnicity: Black	4.25	6.27	-0.09	3.82	3.55	0.01
Eligibility for free school meals	42.96	43.13	0.00	43.64	47.34	-0.07
Special Education Need status (SEN)	35.01	37.49	-0.05	37.04	39.57	-0.05
Prior attainment at KS2 in English	3.44	3.44	0.00	3.43	3.39	0.04
Prior attainment at KS2 in Maths	3.32	3.32	-0.01	3.31	3.33	-0.02

Notes: (1) This table reports standardised mean differences before and after weighting using pupil, institution level and AEA covariates. Propensity scores are derived using a logit model. Cells shaded in red are those with absolute standardised mean differences >0.1, and those in green are absolute standardised mean difference differences < 0.1. (2) The sample for this analysis is eligible pupils who received a Grade 2, 1, or U in their previous KS4 Maths attempt in 2017. The treatment group contains pupils individually identified as belonging to BMP, and the comparison group contains pupils who are not, across AEA Category 4-6 areas. (3) The sample sizes before weighting are 23,890 pupils individually identified as belonging to BMP, and 15,232 pupils not individually identified as being exposed to BMP. The sample size after weighting (including trimming) are 17,220 pupils individually tagged as being exposed to BMP, and 13,328 pupils not identified as belonging to BMP. (4) Three covariates are omitted as they are perfect linear combinations of other included covariates (and the model includes a constant term). These are Region: East and midlands, Institution type (missing) and Ethnicity: other. Institution type (Academy converter) and Institution type (Sponsor covariates) are also omitted from this model, since they turn out to perfectly predict attainment of the outcome. (5) The sources are NPD data, ILR data, BMP sample file information.

Figure 12: Exploratory analysis: standardised mean differences before and after weighting (retake analysis)



Notes: (1) This figure reports standardised mean differences in covariates before and after weighting. Propensity scores are derived using a logit model. (2) The sample for this analysis is eligible pupils who received a Grade 2, 1, or U in their previous KS4 Maths attempt in 2017. The treatment group contains pupils individually identified as belonging to BMP, and the comparison group contains pupils who are not, across AEA Category 4-6 areas. (3) The sample sizes before weighting are 23,890 pupils individually identified as belonging to BMP, and 15,232 pupils not individually identified as being exposed to BMP. The sample size after weighting (including trimming) are 17,220 pupils individually tagged as being exposed to BMP, and 13,328 pupils not identified as belonging to BMP. (4) Three covariates are omitted as they are perfect linear combinations of other included covariates (and the model includes a constant term). These are Region: East and midlands, Institution type (missing) and Ethnicity: other. Institution type (Academy converter) and Institution type (Sponsor covariates) are also omitted from this model, since they turn out to perfectly predict attainment of the outcome. (5) The sources are NPD data, ILR data, BMP sample file information

Appendix Table 24 reports the results from re-running the retake analysis with this alternative measure of BMP eligibility. Here, the coefficient represents percentage point units of change in the likelihood of pupils retaking a GCSE. In contrast to the main results shown in our report, using this measure of BMP eligibility we now find an impact of 7 percentage points in the likelihood that pupils retake a GCSE exam (as opposed to taking no exam at all). The same result is expressed as a risk ratio in Appendix Table 25. This shows a risk ratio with a confidence interval that is entirely above 1 (indicating a statistically significant positive impact). The interpretation in this case would be that pupils assigned to BMP are 1.08 times as likely to retake a GCSE exam than their non-BMP counterparts.

For reasons described in the *Doubly robust estimation* sub-section of Appendix K above, we do not consider the results from the additional analysis that defines BMP at the pupil-level to be especially strong. We would caution against placing emphasis on this result, or interpreting it in isolation of the other findings produced by this evaluation and caveats associated with the impact estimation methodology.

Appendix Table 24: Exploratory analysis: retake analysis impact estimates

BMP treatment indicator	Coefficient (ATET)	Standard error	z	P > z	95% confidence interval
Pupil-level	0.07	0.02	3.51	0.00	[0.031, 0.111]

Notes: (1) This table reports impact estimates from doubly robust estimation, performed using *teffects ipwra* in Stata with a logit specification for the treatment and outcomes model. (2) BMP eligibility is defined at the pupil-level, using an indicator added to our NPD data extract by the DfE team. This specification contains 17,220 BMP and 13,328 non-BMP pupils. (3) Standard errors for the setting-level BMP exposure indicator are clustered at the institution-level. (5) The sources are NPD data, ILR data, BMP sample file information.

Appendix Table 25: Exploratory analysis: risk ratios generated from retake analysis

BMP treatment indicator	Risk ratio	95% confidence interval
Pupil-level	1.08	[1.033, 1.129]

Notes: (1) This table reports impact estimates in the form of risk ratios, from doubly robust estimation, performed using *teffects ipwra* in Stata with a logit specification for the treatment and outcomes model. (2) Other notes as per the above table.

Appendix L: Effect size estimation

Appendix Table 26: Effect size estimation

	Risk ratio	Comparison group pass rate	BMP pass rate	d
Whole sample				
All BMP	1.008	0.133	0.134	0.006
Model A	1.025	0.133	0.136	0.017
Model B	0.833	0.133	0.111	-0.126
Model C	1.071	0.133	0.142	0.048
FSM-eligible students				
All BMP	0.991	0.095	0.094	-0.006
Model A	1.040	0.095	0.099	0.026
Model B	0.960	0.095	0.091	-0.027
Model C	0.980	0.095	0.093	-0.014

Effect sizes were calculated from probability outcomes using Cox's Index:⁶

$$d_{cox} = \frac{[\ln\left(\frac{p_t}{1-p_t}\right) - \ln\left(\frac{p_c}{1-p_c}\right)]}{1.65}$$

Where p_t is the probability of occurrence in the treatment group and p_c the probability of occurrence in the comparison group.

⁶ What Works Clearinghouse. (2020). *What Works Clearinghouse Procedures Handbook, Version 4.1*. Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance. Available on the What Works Clearinghouse website at <https://ies.ed.gov/ncee/wwc/handbooks>

You may re-use this document/publication (not including logos) free of charge in any format or medium, under the terms of the Open Government Licence v3.0.

To view this licence, visit <https://nationalarchives.gov.uk/doc/open-government-licence/version/3> or email: psi@nationalarchives.gsi.gov.uk


Where we have identified any third-party copyright information you will need to obtain permission from the copyright holders concerned. The views expressed in this report are the authors' and do not necessarily reflect those of the Department for Education.

This document is available for download at <https://educationendowmentfoundation.org.uk>



The Education Endowment Foundation
5th Floor, Millbank Tower
21–24 Millbank
London
SW1P 4QP

<https://educationendowmentfoundation.org.uk>

 @EducEndowFoundn

 Facebook.com/EducEndowFoundn