Department for Education

Adult numeracy randomised controlled trials: Encouraging progression

RCT and implementation and process evaluation

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Executive summary

This report presents findings from a randomised controlled trial (RCT) of a communications intervention that targeted adult learners who had completed a non-qualification-bearing course as part of the Multiply adult numeracy programme. The intervention involved sending tailored letters to these learners. The impact evaluation assessed whether adults who were sent 1 of 2 different letters were more likely to progress to a maths course that could result in a qualification than a control group of Multiply learners who were not sent these letters. Control learners may, or may not, have been encouraged to progress to further courses by teachers, providers and authorities following participation in Multiply. The implementation and process evaluation (IPE) assessed whether recipients recalled receiving the letters and the likelihood that the letters influenced subsequent behaviour.

Key findings

The trial found that neither letter had a statistically significant impact on the overall likelihood of learners starting a maths course that could result in a qualification within 7 months of letter dispatch. Neither letter increased the likelihood of learners starting a qualification-bearing course in any subject. The letters also had no impact on the likelihood of learners starting qualification-bearing maths courses at Level 2 or above.

However, both letters did have a statistically significant impact on learners aged 50 and over, encouraging them to progress to qualification-bearing maths courses. In the control group, around 50 out of 1000 learners aged 50 and over would be expected to progress to a qualification-bearing maths course, compared with approximately 125 learners under the age of 50. When the peer support letter was sent to 1,000 learners aged 50 and over, an additional 29 individuals would be expected to enrol. Similarly, when the urgent letter was sent to 1,000 learners aged 50 and over, an additional 21 individuals would be expected to start a qualification-bearing maths course.

This project has demonstrated that it is possible to send out variations of communications to adult learners to assess whether different types of messaging are effective in influencing subsequent behaviour. The total cost of testing and distributing the letters was approximately £43,700 or around £4 per learner.

Background and rationale

The Adult Numeracy Randomised Controlled Trials were funded through the government's Multiply programme, which ran from April 2022 to March 2025 and provided free numeracy courses for adult learners across England. Funding for the research element was in place until March 2026. The trials aimed to generate robust, high-quality evidence on the impact of specific interventions designed to engage, motivate and teach essential maths skills to

adults, and to understand the feasibility, opportunities and challenges of implementing trials within the adult education sector. The aim was to address evidence gaps and support broader efforts to ensure value for money in adult education. The trials were innovative and experimental and some of the first of their kind within the adult education sector.

As with all RCTs, the interventions were tested to see what difference they made to adult learner outcomes, through identifying, in a statistically robust way, those which show measurable impact when compared to a randomised control group.

In doing so, the trials aimed not only to establish what works for adult numeracy learning, but also to generate valuable learning about how RCTs can be effectively designed and delivered in this diverse sector. This study represents the first systematic attempt to assess the effectiveness of communications to encourage lifelong learning on learners' subsequent enrolment behaviour. In this trial, a randomised experiment was conducted, sending former Multiply participants different versions of letters by post to determine whether these communications encouraged people to enrol in courses leading to qualifications.

Intervention

The trial tested whether 2 different letters encouraged adults who had completed a Multiply course not leading to a qualification to progress to a maths course leading to a qualification. The 2 letters were compared to 'business as usual' (BAU) (a control group made up of Multiply learners who were not sent either letter). The exact nature of BAU was not definitively known, but it likely included encouragement from local providers to attend more courses as well as one-to-one support to apply for a place, with the precise nature of BAU varying between providers. The letters drew on existing research on effective communication, behavioural science and previous 'letter trials' in similar contexts.

Senior officials at DfE developed the 2 letters tested:

- A 'peer support' letter that included a quote from a peer describing how Multiply had made them feel more confident about undertaking further learning with maths content. The letter also encouraged them to sign up for a maths course expected to result in a qualification.
- An 'urgent letter' highlighting the urgency of signing up for a maths course leading to a qualification. This emphasised how improved numeracy skills could enhance career prospects.

Methodology and process

The **primary research questions** were:

- Does the peer support letter increase the likelihood of Multiply learners on non-qualification-bearing maths courses starting a qualification-bearing maths course compared with those receiving BAU?
- Does the urgent letter increase the likelihood of Multiply learners on non-qualification-bearing maths courses starting a qualification-bearing maths course compared with those receiving BAU?

Secondary research questions examined measured whether 1 of the 2 letters was more effective than the other in encouraging former Multiply learners to start a maths course expected to result in a qualification and the impact of the letters on whether the learner started any learning leading to a qualification or whether they started a maths course at Level 2 or above. The trial also included an exploratory analysis to determine whether either of the letters was more effective for particular subgroups of learners.

The Implementation and Process Evaluation (IPE) assessed whether recipients recalled receiving the letters and the likelihood that the letters influenced subsequent behaviour.

Impact evaluation

The impact evaluation involved an RCT where around 16,000 Multiply learners were randomised to 1 of 3 groups, with 2 of the 3 groups sent a letter encouraging them to enrol in a maths course leading to a qualification and the third group used as a control group for comparison.

The effectiveness of the letters was evaluated using a 3-arm RCT. This experimental design tested the impact of each of the 2 letters on learner progression compared with BAU provision for Multiply adult learners. BAU may, or may not, have included activities and/or communications by teachers, providers and local authorities seeking to encourage learners to progress to further courses following participation in Multiply. However, as individuals were randomly assigned to each of the 3 groups, there is no reason to believe that the control group would be any more or less likely than the 2 groups sent letters to receive other encouragement to progress to further learning.

The experiment used data from the Individualised Learner Record (ILR)[1], which enabled the collection of information on outcomes for the vast majority of those randomised. Individuals who started a Multiply course of 2 or more guided learning hours, not expected to result in a qualification, in September or October 2023 and who also had first name, surname, date of birth and address (including postcode) recorded on the ILR were randomised to one of the 3 trial arms in early March 2024. By this point, the vast majority of trial participants were expected to have completed their Multiply course. The letters were dispatched to the 2 intervention arms between 25 and 28 March 2024.

[1] The ILR is an on-going collection of data about learners from training providers in the Further Education (FE) and Skills sector in England.

Primary and secondary outcomes were measured within 7 months of letter dispatch. Before randomisation, the decision was made to allow 7 months between letter dispatch and the cut-off date for observing outcomes, as course enrolment typically peaks at the start of the academic year. The main analysis controlled for the highest level of prior attainment by the learner across all subjects.

At the time of randomisation, 16,672 learners met the eligibility criteria for the trial. However, data linking issues affected 929 learners and missing data necessitated excluding 2,096 learners, resulting in a final analysis sample of 13,647 learners. Of these, 4,546 were sent the peer support letter, 4,528 were sent the urgent letter and 4,573 were in the control group.

Implementation and process evaluation

The IPE assessed the proportion of individuals who were sent one of the 2 letters and recalled receiving it. An online survey was conducted with all those sent a letter who had an email address in the ILR. The survey was dispatched by email around 8 months after letter dispatch, in early December 2024. Approximately 84% of those assigned to the intervention arms had an email address recorded, but only around 6% of those sent the survey link responded to it. Among respondents who did recall receiving the letter, the IPE explored the proportion who opened and read it, and the proportion who believed that the letter positively influenced their decision to enrol in a subsequent course.

Following the trial feasibility assessment in June 2023, the trial protocol was registered on 19 March 2024 and randomisation took place on 21 March. Letters were dispatched to the two intervention arms in w/c 25 March, with the final letters sent out on 28 March 2024. The IPE survey was distributed on 2 December and closed on 20 December 2024. The analysis of outcomes data was conducted between May and September 2025.

Impact findings

Neither the ‘peer support’ letter nor the ‘urgent’ letter had a statistically significant impact on the likelihood that learners started a qualification-bearing maths course within 7 months of letter dispatch compared with BAU. Specifically, the peer support letter increased the likelihood of starting a maths course leading to a qualification by 1.0 percentage point (ppt), while those who were sent the urgent letter were 0.3 ppt less likely to start a maths course leading to a qualification than those who were not sent a letter. However, in both

cases these differences were not statistically significant at the 95% confidence level [2], with p-values of 0.120 and 0.590 respectively[3].

Subgroup analysis

Exploratory subgroup analysis was conducted to determine whether either letter was more effective for particular groups based on their characteristics at the time of letter dispatch. Both the peer support letter and the urgent letter were more effective for learners aged 50 and over than for younger learners and these differences were statistically significant at the 95% confidence level.

The peer support letter increased the likelihood of learners aged 50 and over starting a qualification-bearing maths course by 2.4 ppt compared with younger learners (p-value=0.038), while the urgent letter raised the likelihood by an additional 3.1 ppt for the older age group compared with those under the age of 50 (p-value=0.006). Among every 1,000 learners aged 50 and over doing a non-qualification-bearing maths course, around 50 would be expected to progress to a qualification-bearing maths course, compared with approximately 125 learners under the age of 50.

If 1,000 learners aged 50 and over were sent the peer support letter, an additional 29 individuals in this age group would be expected to start a qualification-bearing maths course. For every 1,000 learners aged 50 and over who were sent the urgent letter, an additional 21 individuals would be expected to start a qualification-bearing maths course.

Analysis of the impact of the letters on other subgroups of learners showed that neither the peer support nor the urgent letter varied in effectiveness by sex, disability status or ethnicity.

Impacts on other outcomes

Neither letter had a statistically significant impact on the likelihood that learners started any qualification-bearing course in the 7 months following letter dispatch. Being sent the peer support letter reduced the likelihood of starting any qualification-bearing course by 0.4 ppt, compared with a negative impact of 1.3 ppt for the urgent letter, although neither of these findings was statistically significant at the 95% confident level (p-values of 0.640 and 0.172 respectively).

The peer support letter increased the likelihood of learners starting a qualification-bearing maths course at Level 2 or above by 0.5 ppt, although this finding was not statistically significant (p-value=0.271). By contrast, the urgent letter reduced the likelihood of starting

[2] When a difference is 'statistically significant at the 95% confidence level', researchers can be 95% certain the difference is real and not just due to chance. The 95% confidence level is widely accepted as the standard threshold for determining statistical significance in research and evaluation.

[3] The p-value is the probability that a result occurred by chance. A small p-value (usually 0.05 or less) suggests the result is 'statistically significant', meaning it is unlikely to have occurred by chance.

a qualification-bearing maths course at Level 2 or above by 0.3 ppt (also not statistically significant, with a p-value of 0.442).

This study sets a precedent as the first systematic test of such approaches with adult maths learners.

Implementation and process findings

The total cost of testing and distributing the 11,114 letters encouraging progression to a qualification-bearing maths course was approximately £44,000 or around £4 per learner. Just over one third of trial participants in the intervention arms who responded to a follow-up email survey recalled receiving one of the 2 letters. More than 4 in 5 who recalled the letter reported opening it, and the vast majority of these then read the letter.

Around half of all survey respondents who recalled receiving 1 of the letters went on to start a further course, but only a small proportion felt that the letter positively influenced their decision to do so. Low response rates to the survey (around 1-in-20 learners in the intervention arms) meant the findings may not be representative of the wider pool of learners who were sent 1 of the letters. Nearly two-thirds of survey respondents did not remember receiving a letter at all. Of those who did recall it, only a handful felt it positively influenced their decision to start further learning. This is consistent with the impact analysis, which found that the letters had no discernible effect on any of the primary or secondary outcomes.

Conclusions and recommendations

The IPE survey found that a high proportion of learners did not recall receiving the letters. This may be because the letters were not received, or because they were received but then forgotten. In either case, the limited recall limits the likely effectiveness of the letters.

A previous DfE trial, intended to motivate young people to apply for university, tested 2 different versions of a peer support letter. Participants were sent either 1 of the 2 letters, or both letters over a period of 6 months and outcomes were compared against a control group which was not sent either letter. This only found a positive impact when trial participants were sent both letters.[4] While that trial had an audience who were not already engaged in the desired activity (unlike in the Encouraging Progression trial, where learners had already completed a Multiply course), the low levels of recall of the letters in the current trial suggest that sending 2, or perhaps more, letters to the intervention arms might have increased the likelihood of detecting a positive impact on the primary outcome.

[4] Sanders, Michael, Raj Chande, and Eliza Selley. 2017. ‘Encouraging People into University’. Research Report 667. Department for Education. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/603737/Encouraging_people_into_university.pdf.

Alternatively, the initial letter could be followed with a reminder sent using a different means of communication, such as a text message.

Past evidence also suggests that the extent to which a letter is tailored to the specific circumstances of the individual has a bearing on its effectiveness. Given the large scale of the trial, the letters were designed to be relevant to all learners who had previously started a non-qualification-bearing Multiply course. Effectiveness might have been increased by targeting the letters at particular subgroups. The letters' apparent positive impact on learners aged 50 and over, compared with those under 50, indicates that they may have been better suited to certain types of learners. Future research could explore the impact of targeting certain sub-groups by investigating motivations and the most common barriers to learning for particular groups. This research could then inform the design of future DfE communications, ensuring they address the most common concerns for certain groups of potential learners.

Existing evidence on the likely impact of the urgent letter was more limited than for the peer support letter. This may explain why the peer support letter was much closer to having a statistically significant impact on outcomes than the urgent letter. Although the urgent letter drew on evidence about the importance of reassuring learners that courses were available without conflicting with their other commitments, more cost-effective methods may exist to convey this information to previous learners. These could include contacting recent learners by email, using the email addresses recorded on the ILR.

To enhance the likelihood that future trials produce robust evidence on impact, DfE should take further steps to ensure providers obtain permanent unique learner numbers (ULNs) for all learners included in the ILR. This could include monitoring providers that supply ILR returns containing learners with temporary ULNs. DfE could also issue targeted reminders to obtain a permanent ULN at the earliest opportunity.

This trial was part of a programme of trials on adult numeracy commissioned by the DfE. Alongside the individual trial reports, DfE has published a programme report on findings related to running RCTs in the adult learning sector, describing the broader learnings for the sector (Mackay et al., 2026).

1. Introduction

This report sets out findings from an impact evaluation and implementation and process evaluation (IPE) of the Encouraging Progression trial. The interventions drew on existing practices to try to encourage previous maths learners to pursue further study by sending them letters through the post. The evaluation was a 3-arm randomised controlled trial (RCT) which compared 2 different strategies to encourage learners to engage in further learning. A total of 16,672 learners were randomised, of which 5,557 were allocated to each treatment group arm and 5,558 to the control group.

1.1. Background and rationale

1.1.1. Background of Multiply

The Adult Numeracy Trials were funded through the government's Multiply programme, which ran from April 2022 to March 2025 and provided free numeracy courses for adult learners across England. Funding for the research element was in place until March 2026. The trials aimed to generate robust, high-quality evidence on the impact of specific interventions designed to engage, motivate and teach essential maths skills to adults, and to understand the feasibility, opportunities and challenges of implementing trials within the adult education sector. The aim was to address evidence gaps and support broader efforts to ensure value for money in adult education. The trials were innovative and experimental and some of the first of their kind within the adult education sector. Details on the other trials conducted can be found at Adult numeracy randomised controlled trials. The overall performance of the Multiply programme was subject to a separate evaluation.

As with all RCTs, the interventions were tested to see what difference they made to adult learner outcomes, through identifying, in a statistically robust way, those which show measurable impact when compared to a randomised control group. In doing so, the trials aimed not only to establish what works for adult numeracy learning, but also to generate valuable learning about how RCTs can be effectively designed and delivered in this diverse sector.

1.1.2. Existing evidence

Despite a statutory entitlement to free english and maths up to Level 2, participation in adult maths courses has been low and declined in the decade prior to Multiply (DfE 2026). This trial sought to contribute evidence on the use of written letters to encourage learners to pursue further study. Existing literature provides mixed findings on how written communications influence decision-making within the education sector, and a review by the DfE Behavioural Insights Unit found no relevant studies specifically looking at adult learners.

Some evidence suggests letters can influence education decisions in related contexts. One cluster RCT (Chadeesingh, Carr and Chande, 2018) found that sending a peer-to-peer letter to headteachers and chairs of governors increased the number of applications to become a National Leader of Education (NLE) compared to standard DfE messaging, but there was no impact on applications or appointments to the Teaching Schools Programme. Another study shows that personalised communications can encourage young people to apply to selective universities when messages come from relatable and reassuring peers (Sanders, Chande and Selley 2017). Those who received personalised messaging in 2 different letters, sent 6 months apart, were more likely to apply to, or accept an offer from, a Russell Group university compared to those who received no letters. However, young people who received only one letter were no more likely to apply than those who did not receive either letter.

Evidence is also varied on what type of messaging content influences behaviour in education settings. Some studies suggest that the flexibility of courses and the potential to fit courses around existing commitments may be one factor in a learners' likelihood of signing up for a course (Warner et al. 2008; Starks and Wilson 2013). Other research suggests that highlighting the potential for improved job prospects can motivate individuals to engage in learning (Barnes et al. 2003) while further research suggests that lack of information on the availability of free courses focused on essential skills can prevent adults from participating in learning (Atkin 2011; Learning and Work Institute 2021).

1.1.3. Rationale

Overall, the evidence suggests some potential for behaviourally-informed communications, but evidence gaps remain on what works for adult learners and written letters specifically. The intervention sought to contribute new evidence by testing whether a written letter can successfully encourage former Multiply learners to pursue further qualification-bearing study. Two different messaging approaches were used, drawing on different strands of evidence:

- **Peer-support letter**: this version included a quote from a peer describing how Multiply had made them feel more confident about undertaking further learning with maths content. It also emphasised the availability of courses that fit around existing commitments. This approach drew on evidence suggesting ease of access to courses which fit with the learner's schedule affects the likelihood of signing up for classes (Warner et al. 2008; Starks and Wilson 2013).
- **Urgent letter:** this version emphasised the urgency of signing up for a qualification-bearing maths course and highlighted the potential to improve job prospects. This approach drew on previous research which has found that the potential to improve employment opportunities can be a motivation to engage in learning (Barnes et al. 2003).

Both letters also addressed the potential barrier of lack of awareness of free nearby courses (Learning and Work Institute, 2021; Atkin, 2010) by reminding recipients of their availability and including a QR code linking to details of local maths courses. The letters can be seen in full in Appendix 2.

In this trial, the effectiveness of sending one letter was tested. Although existing evidence showed positive outcomes from sending 2 letters, in this case all recipients were former Multiply learners, and developers judged that a certain degree of engagement had already taken place. Furthermore, given the novelty of such interventions in the adult education sector, developers agreed that this trial should adopt a simple design. As such, DfE sent one letter to each individual.

Overall, the trial aimed to build on existing evidence from the education sector and test whether 2 behaviourally informed messaging strategies could increase re-engagement with adult numeracy courses.

1.2. Intervention Description: Theory of Change

The letters tested in the Encouraging Progression trial aimed to motivate learners to pursue further numeracy study by sending individuals who had previously taken part in a Multiply course a letter in the post. Learners each received either the ‘peer-support’ letter or the ‘urgent’ letter.

The Theory of Change (ToC) envisaged that financial resource (input) allowed for printing and posting of letters to Multiply learners who had completed (or nearly completed) non-qualification-bearing maths courses of 2 or more Guided Learning Hours (GLH) (activities). It was expected that these letters would motivate learners to pursue further study. For the peer support letter, it was hoped that receiving a relatable letter emphasising the availability of courses that can fit around existing commitments (output) would increase the perceived feasibility of further study and improve learner confidence (change mechanisms), motivating them to enrol in a qualification-bearing maths course – or a qualification-bearing course in any subject (outcomes).

For the urgent letter, it was hoped that receiving a letter emphasising urgency and potential employment benefits would create time-pressured motivation (change mechanism), encouraging learners to take prompt action and enrol in a qualification-bearing maths course – or a qualification-bearing course in any subject (outcomes).

For both letters, it was hoped that receiving a letter communicating the availability of free local courses (output) would reduce information barriers (change mechanism) and increase learners’ ability and intention to enrol in a qualification-bearing maths (or any other) course (outcomes). For both letters, progression was measured in terms of enrolment onto courses at any level as well as those specifically at Level 2 and above. In the long term, it was hoped learners would successfully complete these courses, gaining a

maths qualification within 3 years of starting their first Multiply course (again, qualifications at any level and at Level 2 and above were measured) (outcomes).

Ultimately, it was hoped that increased course enrolment and qualification achievement would contribute to two impacts:

- increased functional numeracy skills across the population;
- positive labour market outcomes including increased earning prospects for Level 2 learners within 6 years; and
- wider social benefits such as ability to support with children's learning and manage personal finances.

This ToC is summarised in Table 1.

Table 1: Logic model for the Encouraging Progression intervention

Situation	Barriers to adult learners' participation in numeracy courses include lack of awareness, lack of understanding about the potential positive impact on job prospects and difficulties fitting courses around existing commitments.	**Aims**	To encourage previous Multiply learners on non-qualification-bearing maths courses of two or more GLH to progress onto a qualification-bearing maths course.

Inputs and activities	Outputs	Change mechanism	Outcomes	Impacts
Inputs • Financial input for printing and distribution costs • Letter templates (one for 'peer support' letter and one for 'urgent' letter) **Activities** • Post letters to learners	• Number of letters sent	• Learners are motivated by reading about a peer learners' positive experience • Learners are motivated by the prospect of achieving a maths qualification • Learners are motivated by a sense of urgency to build on progress they have made so far	**Short term** • Primary outcome: Progression onto (starts) a qualification-bearing maths course at any level • Progression onto (starts) any qualification-bearing course (any subject) • Progression onto (starts) a qualification-bearing maths course at Level 2 or above **Long term** • Increased proportion of learners who achieve any maths qualification within 3 years of starting their first Multiply course • Increased proportion of Multiply learners who achieve a maths qualification at Level 2 or above within 3 years of starting their first Multiply course	• Increase in functional numeracy skills across the population • Positive labour market outcomes: increased earning prospects for L2 learners within 6 years • Wider social and economic benefits such as support for children's learning and ability to manage personal finances

Evidence assessment	This intervention was informed by evidence of behavioural influence through written communications in the education sector, and draws on existing practice. No studies were found looking at the effect of written letters to encourage adult learners to pursue further study.

Assumptions	• Learners will open and understand the letters they receive • The ILR data will be comprehensive, accurate and up to date • There are courses available for learners to move onto	**Possible unintended consequences**	• Learners who had a negative experience of their first Multiply course are further put off engaging in further study when they receive this prompt • The urgent letter may inadvertently make learners feel anxious about their progress, or feel they are falling behind, potentially reducing motivation • If the letter feels too generic or irrelevant, it may reduce likelihood of further engagement with DfE or local providers

1.3. Intervention Description[5]

Name

Encouraging Progression

Why: Rationale, theory and/or goal of essential elements of the intervention

This intervention aimed to encourage former Multiply learners who were expected to have completed a non-qualification-bearing maths course to sign up to a qualification-bearing Multiply course by sending individual learners a written letter. The theory was that messaging informed by behavioural insights would influence learners to enrol in a course, which would give them a qualification in maths, improving their career progression and earning potential.

See the sections on the intervention background and ToC for more detail.

Who: Recipients of the intervention

Recipients were former Multiply course learners, who were identified from the Individualised Learner Record (ILR)[6]. Specifically, recipients comprised learners who had completed a Multiply non-qualification-bearing maths course between September and October 2023 (see Appendix 6, for the full list of learning aims which made learners eligible for the trial). Multiply non-qualification-bearing courses varied in length, from 2 to more than 30 hours, but most participants completed their course within 3 months of the start. Indeed, 95% of non-qualification-bearing courses lasted 13 weeks or less and 99% lasted 26 weeks or less. Therefore, the vast majority of trial participants were expected to have completed their Multiply non-qualification-bearing maths course by the time the letters were dispatched in March 2024.

What: Physical or informational materials used in the intervention

Physical materials included 2 different letters sent to separate groups of learners. Each letter was designed to encourage learners to sign up to further study.

[5] This intervention description draws on the EEF adapted Template for Intervention Description and Replication (TIDieR).

[6] The ILR is an on-going collection of data about learners from training providers in the Further Education (FE) and Skills sector in England

What: Procedures, activities and/or processes used in the intervention

The intervention entailed posting one of 2 letters to former Multiply learners.

Who: Intervention providers/implementers

DfE Behavioural Insights Unit led the development of the 2 letters, while Ipsos dispatched the letters to learners on behalf of DfE.

How: Mode of delivery

Ipsos sent letters to individuals' postal addresses, as recorded in the ILR.

Where: Location of the intervention

England

When and how much: duration and dosage of the intervention

A single letter was sent to learners in late March 2024.

Tailoring: Adaption of the intervention

Each letter was personalised with the learner's name.

Modifications: Changes to the planned intervention

There were no modifications to the planned intervention

Strategies to maximise effective implementation

Fidelity was assessed through a short IPE survey distributed to those allocated to each of the two intervention groups who had an email address recorded on the ILR (84% of the total). The survey explored whether respondents recalled receiving the letter and whether they remembered opening it and reading it. Results are included in IPE findings.

Evidence of implementation variability

Results are included in IPE findings. The response rate to the survey was low (5.5%), making it difficult to assess fidelity.

1.4. Evaluation overview

This RCT gathered evidence on the effectiveness of the Encouraging Progression letters.

A 3-arm RCT tested the 2 letters against Business as Usual (BAU), whereby DfE does not systematically engage in activities to encourage Multiply learners to progress onto other courses. With a BAU control, it was possible to assess whether sending either letter increased the likelihood of progression to a qualification-bearing maths course compared with current practice, although those in the control group may have received encouragement from other sources, including teachers, providers and local authorities.

The focus of the impact evaluation was on testing whether the intervention achieved its intended effects. It drew on ILR data to determine whether recipients of either letter or those assigned to the control group, i.e. receiving BAU, were more likely to sign up for a further qualification-bearing maths course within 7 months of dispatch of the letter. In BAU, Multiply learners did not receive either letter.

An implementation and process evaluation (IPE) explored the likelihood that trial participants assigned to the intervention arms received the letter as intended. Where they did recall receiving the letter, the IPE provided information on the extent to which the intervention group believed that their decision-making on whether to engage in further learning was affected by the letter.

DfE commissioned Learning and Work Institute (L&W) to run this evaluation.

1.5. Research questions

1.5.1. Impact evaluation

Primary research questions:

- Does the peer support letter increase the likelihood of Multiply learners on non-qualification-bearing maths courses starting a qualification-bearing maths course compared with those receiving BAU?
- Does the urgent letter increase the likelihood of Multiply learners on non-qualification-bearing maths courses starting a qualification-bearing maths course compared with those receiving BAU?

Secondary, exploratory research questions:

- Are there differences in the likelihood of Multiply learners on non-qualification-bearing maths courses starting a qualification-bearing maths course depending on whether they receive the peer support letter or the urgent letter?

- Does either type of letter increase the likelihood of Multiply learners on non-qualification-bearing maths courses starting a qualification-bearing maths course compared with those receiving BAU?
- Does the impact of either letter vary between different subgroups of learners: between men and women, those under the age of 50 and those over the age of 50, those with health problems and those without, and between those from Black or Minority Ethnic backgrounds and those from White backgrounds?
- Does either letter have an impact on the secondary outcome of starting any qualification-bearing course compared with those receiving BAU?
- Are there differences in the likelihood of Multiply learners on non-qualification-bearing maths courses starting any qualification-bearing course depending on whether they receive the peer support letter or the urgent letter?
- Does either letter increase the likelihood of Multiply learners on non-qualification-bearing maths courses starting a qualification-bearing maths course at Level 2 or above compared with those receiving BAU?
- Are there differences in the likelihood of Multiply learners on non-qualification-bearing maths courses starting a qualification-bearing maths course at Level 2 or above depending on whether they receive the peer support letter or the urgent letter?

1.5.2. Implementation and process evaluation

The IPE research questions are set out below.

- For those sent the **peer support letter**:
    - What proportion of those who were sent the peer support letter and responded to the IPE survey remembered receiving it?
    - What proportion of survey respondents who recalled receiving the peer support letter remembered opening it?
    - What proportion of survey respondents who recalled receiving and opening the peer support letter remembered reading it?
    - What proportion of survey respondents who remembered receiving the peer support letter and started a further course felt the letter had a positive influence on their decision?
- For those sent the **urgent letter**:
    - What proportion of those who were sent the urgent letter and responded to the IPE survey remembered receiving it?
    - What proportion of survey respondents who recalled receiving the urgent letter remembered opening it?

    - What proportion of survey respondents who recalled receiving and opening the urgent letter remembered reading it?
    - What proportion of survey respondents who remembered receiving the urgent letter and had started a further course felt the letter had a positive influence on their decision?
- Comparing the effectiveness of the letters:
    - Were survey respondents who were sent the peer support letter more likely to remember receiving it than those who were sent the urgent letter?
    - Were survey respondents who remembered receiving the peer support letter and started a further course more likely to feel the letter had a positive influence on their decision than those who remembered receiving the urgent letter and started a further course?

1.6. Reading the report

This report outlines the evaluation methodology, findings from both the impact evaluation and IPE and provides conclusions and recommendations. A glossary of technical terms can be found in Appendix 1.

Further details of the letters used in the trial, eligibility criteria, randomisation, survey data collection and costs can be found in the appendices (Appendices 2 – 8).

2. Methods

2.1. Impact evaluation

2.1.1. Trial design

Key features of the trial design are summarised in Table 2, as outlined in the Trial Protocol[7]. The trial had 3 arms so that the impact of each of the 2 letters on the primary and secondary outcomes could be tested against BAU. BAU may, or may not, have included activities by teachers, providers and local authorities seeking to encourage learners to progress to further courses following participation in Multiply. Where activities did occur, they may have included elements similar to those in the letters being tested in the trial. However, there was no formal co-ordination of these activities by DfE.

Table 2: Trial design

Category	Description
Trial name	Adult Numeracy Randomised Controlled Trials: Encouraging Progression
Project title	Encouraging progression of Multiply learners to qualification-bearing courses using targeted letters – a 3-arm Randomised Controlled Trial (RCT)
Developer	Department for Education (DfE)
Geography	England
Delivery	DfE/Ipsos
Evaluator	Learning and Work Institute (L&W)
Principal investigator(s)	Dr Helen Gray
Evaluation plan author(s)	Dr Helen Gray
Trial design, including number of arms	3-arm, individual-level trial **Treatment arm (1): Urgent letter sent** **Treatment arm (2): Peer support letter sent** **Control arm: neither letter sent** (learners may have received other encouragement to progress to further learning)
Trial type	Effectiveness design

[7] The trial protocol can be found here: OSF | Encouraging Progression of Multiply learners to qualification-bearing courses using targeted letters - a three arm randomised control trial

Category	Description
Trial population	Multiply learners who started substantive (2+ guided learning hours) non-qualification-bearing Multiply Maths courses in England in September or October 2023
Unit of randomisation	Individual learner
Number of recruits/learners	16,672 randomised and 13,647 in the analysis sample
Stratification variables	None
Primary outcome: Variable & timing	Starting a qualification-bearing maths or numeracy learning aim at any level within 7 months of letter dispatch.
Primary outcome: Measure (instrument, scale, source)	Binary measure which takes the value of 1 where the trial participant starts a learning aim[8] corresponding to a qualification-bearing maths course (LearnAimRefTitle) with the start date (LEARNSTARTDATE) within 7 months of letter dispatch, and zero otherwise.
Secondary outcomes: Variable & timing	Starting any qualification-bearing learning aim within 7 months of letter dispatch. Starting a qualification-bearing maths or numeracy learning aim at Level 2 or above within 7 months of letter dispatch.
Secondary outcomes: Measure (instrument, scale, source)	Binary measure which takes the value of 1 where the trial participant starts any qualification-bearing learning aim (based on D_RegAim and LEARNSTARTDATE) within 7 months of letter dispatch, and zero otherwise. Binary measure which takes the value of 1 where the trial participant starts a learning aim corresponding to a qualification-bearing maths course (LearnAimRefTitle) at Level 2 or above (NotionalNVQLevel) with the start date (LEARNSTARTDATE) within 7 months of letter dispatch, and zero otherwise
Baseline for primary outcome: Variable & timing	Level of prior attainment

[8] The ILR records participation in learning aims. A single course may consist of multiple learning aims.

Category	Description
Baseline for primary outcome: Measure (instrument, scale, source)	5-item (0-4) ordinal measure derived from PRIORLEVEL (the highest level of prior attainment) from the ILR, coded to the following categories: No qualifications; Entry level; Level 1; Level 2; Level 3 or above.
Baseline for secondary outcomes: Variable & timing	Level of prior attainment
Baseline for secondary outcomes: Measure (instrument, scale, source)	5-item (0-4) ordinal measure derived from PRIORLEVEL (the highest level of prior attainment) from the ILR, coded to the following categories: No qualifications; Entry level; Level 1; Level 2; Level 3 or above.

All individuals who started a non-qualification bearing Multiply course of 2 or more guided learning hours in September or October 2023 were eligible for the trial, provided they had an address in England recorded on the ILR. The eligible population would reflect any inherent differences between areas in the likelihood of starting a non-qualification bearing Multiply course. However, as learners were randomly allocated to each trial arm there is no reason to believe that any geographic differences in participation in learning would bias the impact estimates. This assumes there were no substantial differences between areas in the likelihood of starting a non-qualification-bearing Multiply course compared with the likelihood of starting a subsequent qualification-bearing learning aim.

The study used individual-level randomisation for practical reasons. The vast majority of participants were expected to have completed their Multiply course when the letter was dispatched and were therefore no longer likely to be in contact with providers. Multiply courses were not of uniform length, so some trial participants may have still been attending courses when letters were dispatched. Some may also have been in contact with those allocated to different trial arms. However, as noted in Who: Recipients of the intervention, 95% of non-qualification-bearing courses lasted 3 months or less, so were likely to be completed more than 2 months before the letters were dispatched.

There was a risk of contamination if those assigned to the control group become aware that others had received letters encouraging them to progress to another maths course. This could have influenced the behaviour of the control group in 2 ways. First, if those who received the letters showed them to individuals in the control group, this might have increased the likelihood of the control group signing up for another course. This would underestimate the impact of the letters, as outcomes for the control group could have been inflated by direct exposure to the intervention. Second, if the control group believed others had been selected to receive a letter based on ability, this might have affected their confidence. They might become less likely to enrol for another course than if they were

unaware of the letters. This could have depressed outcomes for the control group and to resulted in the impact of the letter being overestimated.

Both scenarios were unlikely, given that the vast majority of Multiply participants would have completed their course several months before letter dispatch. However, contamination cannot by entirely ruled out, given the possibility that some individuals might stay in touch after the end of their course.

The primary outcome of interest was whether the letters encouraged Multiply learners on non-qualification-bearing maths courses to progress to a qualification-bearing maths course. The trial also assessed 2 secondary outcomes. It assessed whether the letters resulted in those who had previously taken part in non-qualification-bearing Multiply courses deciding to undertake further qualification-bearing learning, irrespective of whether the course was maths-related. It also assessed whether the letters encouraged Multiply learners to progress to a qualification-bearing maths course at Level 2 or above.

The analysis controlled for prior attainment at the time of randomisation. Prior attainment data was known to be inconsistently recorded on the ILR over time for some learners. Nevertheless, this was the best available option to capture differences between individuals that were likely to affect the outcomes of participation. For example, learners who gained qualifications at Level 2 or above in the past might have higher levels of confidence about starting a qualification-bearing course than those with no previous qualifications. Section 2.1.3 on ‘Outcome measures’ provides more detail on each of the proposed outcome measures.

Variations from protocol

At the time of drafting the protocol, the intention was to control for prior attainment at the time of starting the Multiply course that made the individual eligible for the trial. However, the ILR data were structured in separate extracts containing learner data, information on participation in learning and prior attainment. This structure meant it was not possible to determine each learner’s level of prior attainment at the time they started the Multiply course.

Furthermore, there was a lag of around 6 months between starting the original Multiply course and dispatch of the letter encouraging progression to a qualification-bearing course. During this period, trial participants could potentially obtain additional qualifications before randomisation. Therefore, the decision was made to measure baseline attainment from the date of randomisation (21 March 2024), rather than the date of starting the Multiply course. This approach ensured consistency in when prior attainment was observed for all trial participants.

2.1.2. Recruitment

Trial participants were individuals who took part in a non-qualification-bearing Multiply course of 2 or more Guided Learning Hours starting in September or October 2023. The sample frame for the trial was the ILR. DfE supplied an extract containing all Multiply and Adult Education Budget[9] maths learners.

From this extract, the evaluation team selected learners who met the eligibility criteria for inclusion in the trial. Selection was based on course title (LearnAimRefTitle – see list in Appendix 6 Eligibility criteria for the trial and learning aims used in construction of the primary outcome), the number of guided learning hours, and the date of starting the Multiply course (LearnStartDate).

The L_RUI field indicates whether a learner should not be contacted. This field was used to exclude individuals who had died or suffered severe illness by the time of randomisation. It also excluded anyone else recorded as not to be contacted.

The evaluation team cleaned any duplicate cases from the sample. Where a learner started more than 1 Multiply course within the relevant date range, the most recent record was selected.[10] All learners with first name, surname, date of birth and address (including postcode) were randomised.

2.1.3. Sample size

At the time the protocol was drafted, approximately 4,500 learners were expected to be eligible for the trial. This estimate was based on analysis of the ILR conducted in early June 2023. This analysis suggested that around 4,500 individuals would meet the criteria to be part of the trial had randomisation occurred at that particular point in time.

However, as the protocol noted, numbers were expected to increase as delivery of the Multiply programme became more established. The expectation was that the eligible population would have risen by the start of the trial. In practice, 16,672 learners met the eligibility criteria at the time of randomisation and were randomised accordingly. The randomisation allocated 5,557 individuals to each treatment group arm and 5,558 to the control group.

At the time of randomisation, 929 eligible learners did not have a permanent unique learner number (ULN). Learners with temporary ULNs may have been less likely to have taken part in previous learning. Nevertheless, these learners were included in the trial to ensure the findings were representative of all Multiply participants. The expectation was

[9] This was renamed the Adult Skills Fund in August 2024.

[10] Where the learner started more than 1 Multiply learning aim on the most recent qualifying date, the record with the highest aim sequence number was selected. If the learner was recorded as starting learning aims with the same highest aim sequence number with more than 1 provider on that date, the learning aim started with the provider with the lowest UKPRN was selected.

that permanent ULNs would become available for all participants on the 2023/24 full academic year version of the ILR (SN14). However, a permanent ULN could only be identified for 50% of these learners in SN14. Therefore, all 929 learners with a temporary ULN at the time of the randomisation were removed from the final analysis sample. This decision was necessary because individuals who went on to further learning were potentially more likely to receive a permanent ULN than those who did not start another course. This could have introduced bias into the results.

Furthermore, learners without the baseline measure of prior attainment were excluded from the analysis sample. Prior attainment was missing for 12% of learners allocated to the peer support letter group, 13% in the urgent letter group and 12% in the control group.

These exclusions reduced the final analysis sample from the original randomised groups. After these exclusions, the final analysis sample consisted of 13,647 learners, of which 4,546 received the peer support letter, 4,528 received the urgent letter and 4,573 were in the control group.

Table 3 reports the minimum detectable effect sizes (MDES) at 3 stages: the expected sample sizes when the protocol was developed, at randomisation, and for the final analysis sample.11 The MDES for the analysis sample is based on calculations for the urgent letter, as this had the smallest number of participants among the trial arms.

As the number of learners eligible for the trial was much higher than expected when the protocol was developed, the MDES at the time of randomisation was 0.05 standard deviations - much smaller than the 0.09 standard deviations expected when the trial was designed. However, the correlation between prior attainment and the primary outcome measure in the analysis sample was lower than expected (0.04 compared with the 0.3 expected when the trial was designed). As a result, the MDES for the analysis sample was 0.06 standard deviations for the urgent letter group, which was the smaller of the trial arms.

Table 3: Sample size calculations

Item	Protocol	Randomisation	Analysis
Minimum Detectable Effect Size (MDES)	0.09 standard deviations	0.05 standard deviations	0.06 standard deviations
Pre-test / Post-test correlations	0.3	0.3	0.04
Alpha	0.05	0.05	0.05

[11] The MDES reported in Table 3 were calculated using PowerUpR v1.1.0, available at: https://powerupr.shinyapps.io/index/.

Item	Protocol	Randomisation	Analysis
Power	0.8	0.8	0.8
1-sided or 2-sided?	2-sided	2-sided	2-sided
Number of learners Intervention 1 – peer support	1,500	5,557	4,546
Number of learners Intervention 2 – urgent	1,500	5,557	4,528
Number of learners Control	1,500	5,558	4,573
Total number of learners	3,000 for a single intervention arm and control group; 4,500 for both intervention arms and the control group	11,115 for a single intervention arm and control group; 16,672 for both intervention arms and the control group	9,101 for the smallest intervention arm and the control group; 13,647 for both intervention arms and the control group

2.1.4. Outcome measures

Primary outcome

The primary outcome was a binary measure which recorded whether the trial participant had started a maths course expected to result in a qualification within 7 months of the date when letters were sent to those allocated to either of the treatment arms. This measure was derived from the following fields recorded on the ILR:

- LearnAimRefTitle – the learning aim was a qualification-bearing maths course included in the list which appeared in Appendix 2 Table 6 in the trial protocol and reproduced in Appendix 6 in this evaluation report.
- LearnStartDate – the course will start within 7 months (212 days) of the last date of dispatch of the letter to the intervention group.

The primary outcome was measured at the level of the individual learner and coded as follows:

- 1 if the trial participant started a qualification-bearing maths course between 29 March 2024 and 26 October 2024.
- 0 if the trial participant was not observed to start a qualification-bearing maths course between 29 March 2024 and 26 October 2024.

Secondary outcome

The trial examined 2 secondary outcomes:

- whether the learner started any qualification-bearing course within 7 months of letter dispatch,
- whether the learner started a qualification-bearing maths course at Level 2 or above within 7 months of letter dispatch.

The first secondary outcome was a binary measure coded to 1 if the trial participant started a qualification-bearing course in any subject, between 29 March 2024 and 26 October 2024 and 0 otherwise. This was determined by examining the LearnStartDate field on the ILR and D_RegAim which records whether the learning aim is qualification-bearing or non-qualification-bearing.

The other short-term secondary outcome was also a binary measure, coded to 1 if the individual started a qualification-bearing maths course at Level 2 or above (as recorded on the NotionalNVQLevel field or LearnAimRefTitle) between 29 March 2024 and 26 October 2024 and 0 otherwise.

Baseline measures

Individuals aged 19 or over who did not already hold a Level 2 maths qualification were eligible for a Multiply course. Prior numeracy levels among Multiply learners were expected to be at the lower end of the attainment range. This meant prior levels of attainment were likely to be similar for all participants. Therefore, there was limited value in controlling for pre-trial qualifications in maths specifically. Instead, the analysis used the highest level of prior attainment across all subjects was used as the baseline measure of pre-trial performance.

The measure of prior attainment was taken from the PriorLevel field recorded on the ILR. This field records the highest level of academic and vocational qualifications attained by the individual at the time of randomisation in any subject. The categories ranged from ‘No qualifications’ to ‘Level 7 and above’ (equivalent to postgraduate degrees). For analysis purposes, this measure was collapsed into a 5-item scale with the following categories:

- No qualifications
- Entry level
- Level 1

- Level 2
- Level 3 or above.

2.1.5. Randomisation

Those eligible for the trial were sorted in ascending order by the anonymised learner ULN. Stata was used to generate a unique random number for each learner and individuals were then sorted in ascending order by this random number. A sort order variable was then derived to allocate participants to groups. Individuals in the lowest third of the distribution were allocated to group A. Those in the middle third were assigned to group B. Those in the top third were assigned to group C. The randomisation took place at the same point in time for all trial participants. The seed used to generate the random numbers for allocating individuals to groups was saved and is shown in Appendix 5 Stata syntax.

After allocating trial participants to 3 groups at random, information on group assignment was sent to Ipsos who then allocated each of the 3 groups to a trial arm using a second randomisation process. First, they sorted the 3 groups in order from group A to group C. Next, Stata was used to generate a unique random number for each group. The group with the lowest random number became the control group. The group with the middle random number was sent the peer support letter. The group with the highest random number was sent the urgent letter. Table 4 shows which trial arm was allocated to which treatment group.

Those eligible for the trial were randomised on 21 March 2024 and letters were sent to those allocated to the intervention arms in week commencing 25 March 2024. March was chosen for letter dispatch to reduce the risk of any 'fresh start effect' resulting in an upward bias in outcomes for the intervention groups at the start of the New Year (Dai, Milkman, and Riis 2014).

Analysts at L&W conducted a preliminary analysis for the primary outcome whilst blind to trial arm allocation. They knew only whether learners were in Group A, B or C. After documenting the findings of this analysis, Ipsos revealed which group received each of the letters and which was assigned to the control group.

Table 4: Trial arm and group allocation

Trial arm	Letter
Group A	Urgent
Group B	Peer support
Group C	None (Control group)

2.1.6. Data analysis

Primary analysis

The definitive analysis for this trial was on an intention-to-treat (ITT) basis. The primary outcome was derived from administrative data at the individual level and the analysis controlled for prior attainment in a regression model to increase statistical power and improve the precision of the impact estimate. The primary outcome measure is a binary variable. Therefore, the impact estimate is presented as a percentage point change in the likelihood of individuals starting a qualification-bearing maths course when assigned to a particular trial arm.

The main analysis estimated the impact of either letter on the primary outcome for individuals compared with BAU using the following equation:

$$Y_{it} = \beta_0 + \beta_1 Treat_i + \beta_2 Q_{it-1} + \varepsilon_i \quad (1)$$

where Y_{it} is the primary outcome measure for individual *i*, Q_{it-1} is their baseline measure of prior attainment and ε_i is the error term. $Treat_i$ is the treatment indicator coded 1 for individuals in the focal intervention arm and 0 for individuals in the control group.

Equation (1) is used to estimate the effect of the peer support letter where $Treat_i$ is coded to 1 for individuals sent the peer support letter and 0 for the control group. Likewise, this equation is used to estimate the impact of the urgent letter, with the treatment indicator coded 1 for individuals sent the urgent letter and 0 for the control group. In the final version of the model the treatment indicator is coded to 1 for learners sent either the peer support letter or the urgent letter and 0 to those in the control group.

The analysis explores whether impact estimates are statistically significant at the 5% level or better. The results report 95% confidence intervals alongside p-values and standard errors.

Secondary analysis

The secondary outcome measures were also both binary outcomes, observed at the individual level. Therefore, the approach to the analysis was similar to that for the primary outcome. The regression analysis controlled for prior attainment, and effect sizes were calculated as percentage point changes. As with the primary outcome, 95% confidence intervals are reported alongside p-values and standard errors and the analysis indicates whether the impact estimates are statistically significant at the 5% level or better.

The analysis of primary and secondary outcomes estimated the impact of each of the letters against the BAU control and calculated the relative impact of the peer support letter compared with the urgent letter. It also compared the impact of receiving either letter against BAU following the approach set out in the previous section.

Analysis in the presence of non-compliance

It was not possible to assess compliance with the intervention, as there was no way of knowing whether participants received the letter as intended. The impact of the letters was assessed on an intention-to-treat basis only.

Missing data analysis

As an administrative data source, the ILR should provide a near census of all adults who have taken part in Multiply courses. The ILR serves as both the source of information on trial participants at baseline and the means to observe outcomes. This dual function reduces concerns about missing data. When studies rely on baseline and outcome surveys, they often experience non-response and attrition. However, using administrative data avoids these issues.

Nevertheless, the analysis reports the number and percentage of trial participants with missing information on the following measures:

- Sex (SEX)
- Age in years at date of randomisation (DATEOFBIRTH)
- Ethnicity (ETHNICITY)
- Whether the learner has learning difficulties, disabilities or health problems (LLDDHEALTHPROB)
- Prior attainment (PRIORLEVEL)
- Whether resident in the top quintile of most deprived areas. This will be based on the Index of Multiple Deprivation (IMD), recorded on the ONS Postcode Directory and matched to the ILR data using L_CURRENTPCODE.

Prior attainment was missing for more than 5% of trial participants. As this measure was ordinal, the analysis used a probit regression to investigate patterns in the missing data. The approach assessed whether missing prior attainment was associated with other baseline variables listed above. The equation used to explore whether prior attainment was more likely to be missing for those with particular baseline characteristics was as follows:

$$m_{it-1} = \beta_0 + \beta_1 X_{1t-1} + \beta_2 X_{2t-1} + \ldots + \beta_{it-1} + \epsilon_i \qquad (2)$$

Where m_{it-1} is coded to 1 if information on the individual's prior attainment is missing at baseline (referred to as time *t-1*) and 0 otherwise; β_1 to β_i represent the set of covariates used in the model. These covariates include sex, ethnicity, disability status and being resident in the top quintile of most deprived areas, all constructed as a series of binary variables. Age in years is included as a continuous variable. All other terms are as set out in equation (1).

Baseline attainment was imputed in cases where it was missing using a minimum of 30 imputations. This imputation enabled sensitivity testing to determine whether the main findings from the primary analysis were robust when including imputed prior attainment. The analysis addresses potential variance issues by reporting confidence intervals based on robust standard errors to account for the possibility that variance for trial participants with certain unobserved characteristics may be greater than for those with complete data across all variables in the analysis.

For characteristics other than prior attainment that were unobserved for more than 5% of the sample, a missing value dummy was added to the main analysis. This allowed the analysis to estimate impacts on the primary outcome whilst retaining these cases. The approach explored whether the main findings were sensitive to the inclusion of only individuals with observed baseline characteristics. This provides insight into the generalisability of the trial findings to the wider population of Multiply learners.

Most Multiply learners on non-qualification-bearing courses were expected to appear in the ILR. However, some learners might not appear in ILR extracts following randomisation. When this occurred, the analysis assumed they did not take part in any further learning. These learners were therefore coded as 0 on the primary and secondary outcome measures. The analysis treated these as genuine non-participants rather than as missing from the ILR in error.

Sub-group analysis

Exploratory subgroup analyses were conducted on the primary outcomes to assess whether the impact of the peer support and urgent letters varied between different groups of learners:

- Sex: compared men and women. The measure of sex was taken from the baseline ILR data and used the SEX field.
- Age: compared learners under the age of 50 with those aged 50 and over. A binary variable was constructed using learner's age in years when they started their Multiply course. Age was derived from the LEARNSTARTDATE and DATEOFBIRTH fields in the ILR.
- Health status: compared learners with a learning difficulty, disability or health problem with those without health problems. The measure came from the LLDDHEALTHPROB field in the ILR.
- Ethnicity: compared learners from ethnic minority groups with those who are white. A binary measure was constructed from the ETHNICITY field in the ILR.

For the subgroup analysis by sex, the analysis interacted a binary indicator of whether a participant was female with the treatment indicator for either of the 2 intervention arms. The interaction term captures the differential impact of the letter on the primary outcome for women relative to men. A similar approach was used for the subgroup analysis by age,

disability status and ethnicity. The analysis used the same measure of prior attainment as the main analysis of primary and secondary outcomes. The equation to be estimated in the subgroup analysis was as follows:

$$Y_{it} = \beta_0 + \beta_1 Treat_i + \beta_2 Q_{it-1} + \beta_3 Sub_i + \beta_4 (Treat_i \times Sub_i) + \varepsilon_i \quad (3)$$

where Sub_i indicates whether the individual was in the subgroup, coded as 0 or 1 and all other terms are as set out in equation (1). $Treat_i \times Sub_i$ captures the interaction between being treated and being in a particular subgroup. This term therefore reflects any difference in the impact of the treatment on the subgroup coded as 1 compared with the subgroup coded as 0.

Estimation of effect sizes

At the time of drafting the protocol, a standardised measure was developed to enable comparison of findings across the adult numeracy trials, which used different outcome measures. Cohen's h was selected to convert the estimated impacts into a comparable effect size (Cohen, 1988), accounting for the binary nature of the primary and secondary outcome measures. This measure expresses the estimated impact of the intervention as a proportion of the pooled within-groups standard deviation.

However, the planned cross-trial comparison did not take place. The other adult numeracy trials were pilot RCTs and therefore underpowered to detect effects on their primary and secondary outcomes, making meaningful comparisons impossible. Nevertheless, Cohen's h is still reported here for completeness. The equation used to calculate Cohen's h is as follows:

$$h = 2\sqrt{p_t} - 2\sqrt{p_c} \quad (4)$$

where p_t is the probability of the treatment group attaining the primary outcome and p_c is the probability of the control group attaining the primary outcome.

Cohen's h is reported for the primary and secondary outcomes and 95% confidence intervals are also reported using the following formula:

$$CI_h = h \pm 1.96\sqrt{\frac{1}{n_t} + \frac{1}{n_c}} \quad (5)$$

Variations from protocol

After publication of the trial protocol, it was decided to report Hedges' g for the other adult numeracy trials and so this is also calculated for the Encouraging Progression trial. First Cohen's d was calculated after applying an arcsine transformation ($2sin^{-1}$) to the probability of the treatment and control groups achieving the primary outcome. The equation used to calculate Cohen's d was as follows:

$$d = \frac{p_t - p_c}{s_{pooled}} \quad (6)$$

Where s_{pooled} is the pooled within groups standard deviation calculated as:

$$s_{pooled} = \sqrt{\frac{s_t^2(n_t-1)+s_c^2(n_c-1)}{n_t+n_c-2}} \quad (7)$$

and s_t= the unconditional standard deviation for the treatment group; s_c= the unconditional standard deviation for the control group; n_t= the sample size for the treatment group and n_t= the sample size for the control group. Hedges' g was then calculated as:

$$g = d\left(1 - \left(\frac{3}{4(n_t+n_c-2)-1}\right)\right) \quad (8)$$

The confidence intervals were calculated as:

$$CI_g = g \pm 1.96\sqrt{\left(\left(\frac{n_t+n_c}{n_t n_c}\right) + \left(\frac{d^2}{2(n_t+n_c)}\right)\right)\left(1 - \left(\frac{3}{4(n_1+n_2-2)-1}\right)\right)^2} \quad (9)$$

As with Cohen's h, Hedge's g was calculated for both primary and secondary outcomes. When comparing findings between trials, interventions with a larger effect size on the standardised measure have a greater impact.

Imbalance at baseline

The analysis examined whether any of the trial arms differed on characteristics likely to be related to outcomes at baseline. Such differences could potentially be expected to bias the impact estimates. The following baseline characteristics were used to assess the balance between trial arms:

- Sex (SEX)
- Age in years at date of randomisation (DATEOFBIRTH)
- Ethnicity (ETHNICITY)
- Whether the learner has learning difficulties, disabilities or health problems (LLDDHEALTHPROB)
- Prior attainment (PRIORLEVEL)
- Whether resident in the top quintile of most deprived areas. Again, this was based on the IMD, recorded on the ONS Postcode Directory and matched to the ILR data using L_CURRENTPCODE.

The assessment of imbalance reported absolute standardised differences between each of the intervention and control groups on these characteristics.

Any differences which were greater than 10% are highlighted as indicating imbalance between the intervention and control groups on that particular measure (Austin, 2009).[12] This analysis indicates whether the randomisation was successful in ensuring that each of the intervention arms has similar characteristics to the control group prior to letter dispatch. This assessment helps determine whether outcomes for the control group provide a credible estimate of what the intervention arms would have experienced without being sent a letter. When there are sizeable and statistically significant differences in baseline characteristics between the intervention arms and control group, this reduces confidence that the impact estimates reflect the true impact of the letters. If such differences existed, the intention was to:

- Test whether the findings from the main analysis of the primary outcome remained robust when including the full range of characteristics listed above.
- Test whether the findings from the main analysis of the primary outcome remained robust when including only those characteristics that showed statistically significant differences between each intervention arm and the control arm.

This approach would show how varying the model specification affects the likelihood of detecting any impact from the letters.

For the continuous baseline variable (age), the equation used to calculate the absolute standardised difference was as follows:

$$asd = \frac{\left(\underline{X_t} - \underline{X_c}\right)}{\sqrt{\frac{s_t^2 + s_c^2}{2}}} \quad (10)$$

Where $\underline{X_t}$ and $\underline{X_c}$ denote the sample mean of the baseline variable for each intervention arm and control group respectively and s_t^2 and s_c^2 are the respective sample variances.

For the categorical baseline variables, the equation used to calculate the absolute standardised difference was:

$$asd = \frac{\widehat{p_t} - \widehat{p_c}}{\sqrt{\frac{\widehat{p_t}(1-\widehat{p_t}) + \widehat{p_c}(1-\widehat{p_c})}{2}}} \quad (11)$$

Where $\widehat{p_t}$ and $\widehat{p_c}$ represent the proportion or mean of binary baseline variable in each of the treatment and control arms respectively.

Variations from protocol

At the time of drafting the protocol, the intention was to use baseline characteristics from the ILR record that made the individual eligible for the trial. However, in practice,

[12] Austin (2009) notes there is no agreed consensus on what constitutes a sizeable standardized difference between treatment and control groups, but a standardised difference of 10 has been proposed as suggesting that there is 'meaningful imbalance in the baseline covariate' (Austin, 2009, p. 3090).

information was split across different data extracts, which meant it was not possible to determine the level of prior attainment at the time of starting the Multiply course that qualified learners for the trial. Additionally, there was time for trial participants to obtain additional qualifications between starting their Multiply course and randomisation. Therefore, all baseline measures were derived from ILR records available at the time of randomisation.

Most characteristics were expected to be time-invariant, but for those that were not (specifically age, disability status, prior attainment and residence in the top quintile of most deprived areas), there was no reason to believe that observing characteristics at randomisation rather than at the time of becoming eligible for the trial would have any systematic impact on outcomes.

2.1.7. Limitations

As the impact analysis was solely based on analysis of the ILR, there was a heavy reliance on this being comprehensive, accurate and up to date in order to observe outcomes for all trial participants. Any systematic differences in recording for particular subgroups of participants could undermine the robustness of the analysis. As some learners only had a temporary ULN at the time of randomisation, this created a potential risk that outcomes might not be observed for those who were least likely to have participated in prior learning. Also, it was only possible to estimate the impact of the letters on short-term outcomes for trial participants within the time available for analysis and reporting. For example, it was necessary to focus on whether individuals started a qualification-bearing maths course, rather than whether they actually attained a qualification.

2.2. Implementation and process evaluation

The Implementation and Process Evaluation (IPE) assessed the proportion of individuals allocated to the intervention arms who recalled receiving the letters. The assessment took place around 8 months after letter dispatch. For those who recalled receiving the letter, the IPE explored multiple aspects of engagement: the proportion who opened the letter, the proportion who read it, and whether recipients believed the letter positively influenced their decision to start a subsequent course.

2.2.1. Data collection methods

Objectives and administration of the survey

Trial participants randomly assigned to each of the 2 intervention arms were surveyed approximately 8 months after letter dispatch. The purpose was to gauge whether the letters influenced learners to start another course.

The IPE survey was administered by Ipsos UK as a short email survey, using email addresses recorded for Multiply learners on the ILR. Email administration was more cost-effective than a postal survey, making it feasible to send the survey to all those assigned to the intervention arms who had a recorded email. Of the 11,114 trial participants in the 2 intervention arms who were sent letters, email addresses were recorded for 84% of the sample. The IPE survey was therefore distributed to 9,353 learners. The proportion with an email address was similar across both intervention arms (85% of those who were sent the peer support letter and 84% of those who were sent the urgent letter). However, only 5.5% of those sent the email link completed the survey, a total of 510 respondents.

Respondents in the intervention arms were asked whether they remembered receiving the letter. Those who recalled the letter were asked whether they opened it. Those who reported opening the letter were then asked whether they read it and, if so, whether they believed the letter positively influenced their decision to participate in further learning.

There are multiple reasons why those in the intervention arms might not have recalled receiving the letter, including:

- The contact details recorded on the ILR were wrong.
- The letter was not delivered.
- The letter was delivered to the wrong address.
- The letter was not opened.
- The letter was not read.
- The recipient had forgotten receiving or reading the letter.

The IPE survey could not determine why some participants in the intervention arms did not recall receiving the letter. However, for those who did have some recollection of receiving the letter, it was possible to explore their engagement with it. The survey asked whether they opened and read the letter, and whether they believed it influenced their subsequent behaviour.

The survey was administered by email to increase the likelihood of reaching anyone who had not received the letter due to an incorrect address being recorded in the ILR. The survey was conducted 8 months after letter dispatch to avoid influencing the intervention groups' decision to take part in further learning. If the survey had been distributed earlier, there was a risk it could have reminded trial participants of the contents of the letter which might have led them to sign up for further learning. This could have increased the likelihood of signing up for another course compared with what would have happened if they had received the initial letter only without the IPE survey acting as a reminder. Therefore, the survey was administered after the point when the primary and secondary outcomes were observed.

Questionnaire design and fieldwork

The questionnaire for the IPE survey was drafted by L&W and reviewed by Ipsos UK. Following revisions, the final draft was agreed. A copy of the questionnaire can be found in Appendix 4.

Fieldwork started on 2 December 2024 and ended on 20 December 2024. Two email reminders were sent to boost response rates.

2.2.2. Analysis

The IPE survey responses are reported for each of the intervention arms to address the research questions outlined above. When research questions involve a comparison between intervention arms, the statistical significance of any apparent differences is reported. The analysis focuses on differences that are statistically significant at the 5% level or better. Non-response rates are also reported. These include non-response to the survey overall, as well as to individual survey items.

Survey weights were not applied for several reasons. Firstly, the experimental design with random assignment provided the primary framework for causal inference, with randomisation addressing the selection bias that weights typically correct for. Secondly, learners were unaware of their participation in the trial given that the impact analysis used administrative data. Permissions were therefore not in place to link survey data to ILR records, which would have been necessary to enable weighting by demographic characteristics. Finally, with only a 5.5% response rate, the survey responses may already not be representative of all letter recipients. In this situation, applying weights would have increased statistical uncertainty and made the results less reliable, without materially improving representativeness. The survey results presented in the IPE findings should therefore be considered indicative rather than definitive.

2.2.3. Variation from protocol

The protocol stated an intention to distribute the IPE survey approximately 7 months after dispatch of the peer support and urgent letters. As the final letters were dispatched on 28 March 2024, the IPE survey was originally scheduled for distribution at the end of October 2024. However, as noted above, it was important to ensure that the IPE survey did not influence outcomes for trial participants by acting as a reminder about the letter. It was therefore decided to distribute the survey at a slightly later point. The IPE survey was launched on 2 December 2024, approximately 8 months after letter dispatch.

2.2.4. Limitations

The IPE survey had inherent limitations. It was dependent on participant recall and was also subject to potential non-response bias. Due to these limitations, it was not possible to

assess compliance or fidelity with the treatment in terms of whether participants actually received or read the letters.

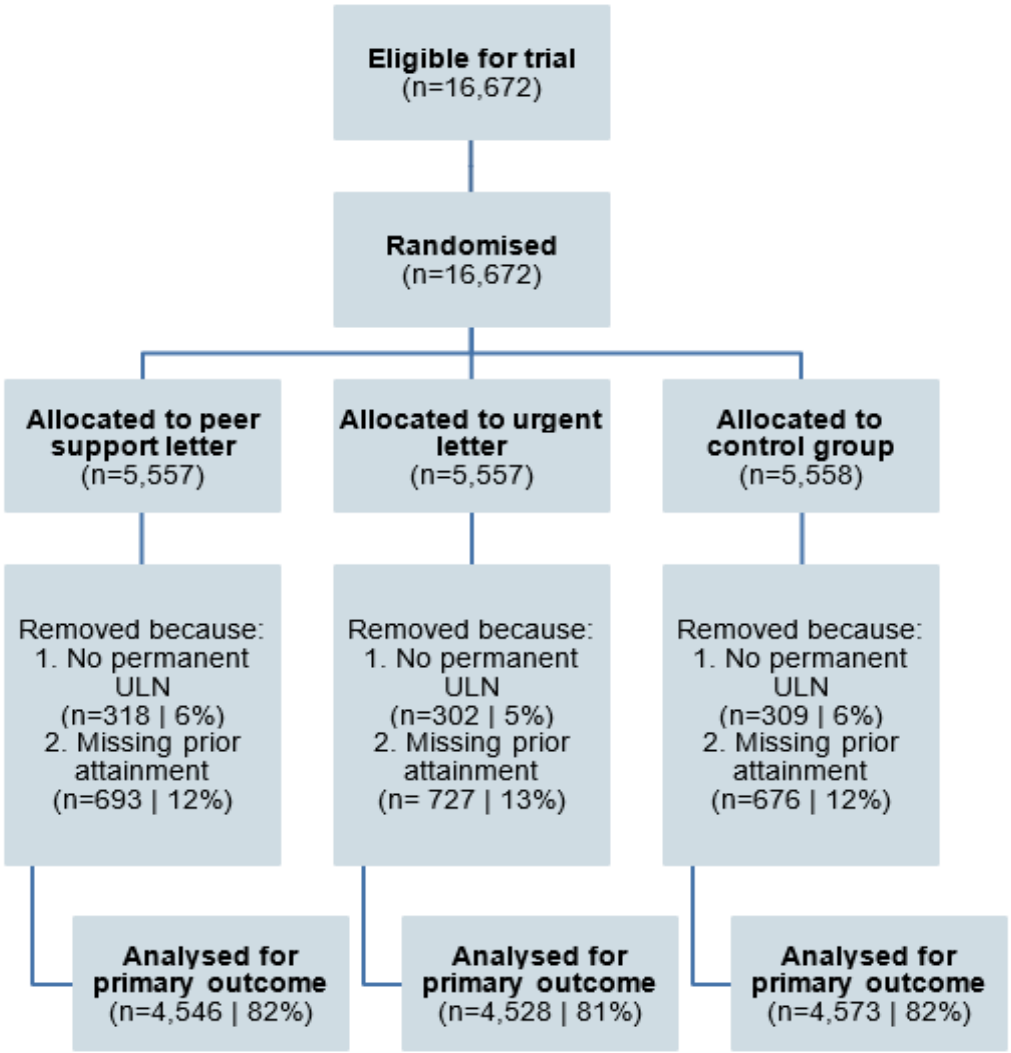
3. Impact evaluation results

3.1. Participants and attrition

Figure 1 shows the numbers of learners in the trial at each stage from randomisation onwards, following CONSORT report standards.[13]

16,672 learners were eligible for trial and randomised to be sent the peer support letter (n = 5,557), the urgent letter (n = 5,557) or neither letter i.e. the control group (n = 5,558). Some learners were subsequently removed due to not having a permanent ULN or missing information on prior attainment. In total, 13,647 learners' data were analysed (peer support letter, n = 4,546; urgent letter, n = 4,528; control, n = 4,573).

Figure 1: CONSORT participant flow diagram (3 arms)



Source: Individualised Learner Record. Base: All 16,672 trial participants.

[13] CONSORT (Consolidated Standards of Reporting Trials) is an internationally recognised framework for reporting randomised controlled trials. The CONSORT flow diagram shows the progress of all participants through the trial, including enrolment, allocation, intervention, and analysis stages.

3.1.1. Randomisation sample

Table 5 reports the baseline characteristics of the learners randomised to the intervention and control groups. It also shows the number of cases where information on a particular characteristic was missing. Section 3.2 Balance at baseline assesses whether any observed differences in the composition of the trial arms were likely to bias the impact estimates. Therefore, this section does not comment on the magnitude of any apparent differences.

More than 2-thirds of learners randomised to the trial were female, with this percentage remaining similar across all 3 arms. Women comprised 69% of the group sent the peer support letter, 68% of those sent the urgent letter and 70% of the control group. Sex was recorded for all trial participants.

Around 2-fifths of all learners randomised to the trial were from an ethnic minority background. Again, this percentage remained similar across all 3 arms, ranging from 40% to 42% However, information on ethnicity was missing for 10% of those randomised, with this ranging from 10% of those sent the peer support letter to 11% of those sent the urgent letter.

Just over one-quarter of trial participants who were randomised had a learning difficulty, disability or health problem. This percentage ranged from 26% to 27% depending on trial arm. For around 1 in 20 trial participants, information on learning difficulties, disabilities or health problems was missing (an average of 4.7% across all arms).

Just over one-third of trial participants lived in the top quintile of most deprived areas (based on the IMD), with this percentage standing at 35% across all trial arms. As learners were only eligible for randomisation if they had a postcode recorded, deprivation level was only missing in a very small number of cases (5 individuals or fewer in each trial arm).[14]

Those aged 35-49 years made up the largest proportion of trial participants, ranging from 38% of those sent the urgent letter to 39% of the control group. A little over one-quarter of trial participants were aged 50 or over (26% of the control group and 27% of those sent the urgent and peer letters). Just over one-fifth were aged 25 to 34 years. Those aged 16 to 24 years made up about one-eighth of trial participants across all 3 trial arms. Age was observed for all trial participants.

Of all the baseline characteristics considered, prior attainment was most likely to be missing. Prior attainment was not recorded for around 1 in 7 of those randomised (15%).[15]

[14] The deprivation level could not be matched on to the randomisation dataset in cases where the postcode recorded on the ILR was not found on the ONS postcode look-up or the individual was living outside of England by the time of randomisation.

[15] The number and percentage of those randomised who were missing information on prior attainment is higher here than in Figure 1 because Figure 1 first excludes those with a temporary ULN, whereas Table 5 reports the total number of cases where prior attainment was missing from the full randomisation sample. As prior attainment was recorded for some of those with a temporary ULN, the total number of those

Learners with no qualifications made up around one-quarter of all trial participants (between 24% and 25% of each trial arm). Those with entry level qualifications made up around 1 in 5 of the total (ranging from 19% to 20%). Additionally, for around 1 in 8 trial participants their highest qualification was at Level 1 (12% across all arms) and for a further 1 in 8 their highest qualification was at Level 2 (between 12% and 13%). Finally, around 1 in 6 trial participants held qualifications at Level 3 or above, accounting for 16% of the randomisation sample. In summary, the trial arms appeared similar across the range of baseline characteristics considered for randomised learners.

Table 5: Baseline characteristics of groups as randomised

Characteristic	Peer support letter %	Urgent letter %	Control %	Peer support letter Number Missing	Urgent letter Number Missing	Control Number Missing
Female	69	68	70	0	0	0
Ethnic minority groups	42	40	42	556	584	570
Ill health/Disability	26	27	27	266	276	245
IMD top quintile	35	35	35	3	5	4
Age: 16 to 24	12	12	12	0	0	0
Age: 25 to 34	22	22	22	0	0	0
Age: 35 to 49	39	38	39	0	0	0
Age: 50+	27	27	26	0	0	0
Prior Attainment: No qualification	25	24	25	833	886	813
Prior Attainment: Entry level	19	19	20	833	886	813
Prior Attainment: Level 1	12	12	12	833	886	813

randomised who were missing information on prior attainment was greater than after selecting the subset of the randomisation sample with a permanent ULN.

Characteristic	Peer support letter %	Urgent letter %	Control %	Peer support letter Number Missing	Urgent letter Number Missing	Control Number Missing
Prior Attainment: Level 2	12	13	13	833	886	813
Prior Attainment: Level 3 or above	16	16	16	833	886	813

Base: 5,557 for the group sent the peer support letter, 5,557 for the group sent the urgent letter and 5,558 for the control group.

Source: Individualised Learner Record.

3.1.2. Analysis sample

Table 6 reports the baseline characteristics of the learners in the intervention and control groups for the sample included in the main analysis. The analysis sample included learners who had a permanent ULN at the time of randomisation as well as data on prior attainment. Where the permanent ULN or information on prior attainment was missing, it was necessary to exclude the learner from the analysis sample.

As with those randomised to the Encouraging Progression trial, around two-thirds of the analysis sample were female (ranging from 68% to 69% depending on trial arm). Information on the ethnicity of learners in the analysis sample was only missing for around 1 in 13 learners (8%), a lower proportion than for all trial participants randomised (10%). The percentage of learners from an ethnic minority background was between 44% and 45%, depending on the trial arm, similar to the proportions in the randomisation sample.

Like the randomisation sample, just over one-quarter of the analysis sample had a learning difficulty, disability or health problem (ranging from 27% to 28%, depending on trial arm). Again, the proportion of cases where this information was not recorded was lower for the analysis sample compared with those randomised (2.6% and 4.7% respectively). Just over 1 in 3 learners in the analysis sample were residents in the top quintile of most deprived areas, ranging from between 36% to 37% depending on trial arm. These proportions were similar to those for the sample of randomised trial participants.

The age distribution of the learners in the analysis sample was also similar to that for the randomisation sample. Those aged 35-49 made up the largest proportion of the analysis sample at between 38% and 39%. Around one-quarter of the analysis sample were aged 50 and over. Those aged 25 to 34 were a slightly lower proportion of the total. Once again, only around 1 in 8 learners in the analysis sample were aged 16-24, similar to the proportion of all trial participants.

Prior attainment was also skewed towards lower levels of prior qualifications in the analysis sample across all 3 trial arms, but with a greater proportion of learners with no or lower-level qualifications compared with all randomised trial participants. Learners with no qualifications made up between 28% and 30% of the analysis sample across trial arms, while 23% had only had entry level qualifications. Like the randomisation sample, a similar proportion of the analysis sample were qualified to either Level 1 or Level 2, ranging from 14% to 15% for Level 1 and 14% to 16% for Level 2. Across all trial arms, around 1 in 5 learners had a qualification at Level 3 or above (19%).

Table 6: Baseline characteristics of groups as analysed

Characteristic	Peer support letter %	Urgent letter %	Control %	Peer support letter Number Missing	Urgent letter Number Missing	Control Number Missing
Female	68	68	69	0	0	0
Ethnic minority groups	45	44	45	335	356	360
Ill health/Disability	27	28	27	117	121	117
IMD top quintile	37	36	37	1	4	4
Age: 16 to 24	13	13	13	0	0	0
Age: 25 to 34	23	22	23	0	0	0
Age: 35 to 49	38	39	39	0	0	0
Age: 50+	26	26	25	0	0	0
Prior Attainment: No qualification	30	28	29	0	0	0
Prior Attainment: Entry level	23	23	23	0	0	0
Prior Attainment: Level 1	14	14	15	0	0	0
Prior Attainment: Level 2	14	16	15	0	0	0
Prior Attainment: Level 3 or above	19	19	19	0	0	0

Base: 4,546 for the group sent the peer support letter, 4,528 for the group sent the urgent letter and 4,573 for the control group.

Source: Individualised Learner Record.

3.2. Balance at baseline

The absolute standardised difference between the baseline characteristics of each intervention arm and the control group was calculated to determine whether the

randomisation was successful in ensuring that each of the intervention arms had similar characteristics to the control group prior to letter dispatch. As noted earlier, an absolute standardised difference of 10 or more is interpreted as indicating imbalance at baseline (Austin, 2009). The analysis showed that all absolute standardised differences for both the randomisation sample and the analysis sample were below 10, indicating that the treated and control trial arms were similar in terms of observed characteristics at baseline. The full results are reported in Appendix 7.

3.3. Outcomes and analysis

3.3.1. Primary outcome analysis

Table 7 shows that, from the analysis sample, just over 1 in 10 (11% or 490) of the learners who were sent the peer support letter started a qualification-bearing maths course between 29 March 2024 and 26 October 2024, compared with 9% (427) of those who were sent the urgent letter and 10% (447) of learners in the control group.

Table 7: Achievement of the primary outcome by trial arm

Item	Peer support	Urgent	Control	Total
Number of learners achieving primary outcome of starting a qualification-bearing maths course within 7 months of letter dispatch	490	427	447	1,364
Number in the analysis sample	4,528	4,546	4,573	13,647
Percentage achieving primary outcome	10.8%	9.4%	9.8%	10.0%

Base for percentages: number in the analysis sample.

Source: Individualised Learner Record.

The results of the main analysis for the primary outcome are reported in Table 8. The table reports the coefficient on the impact terms in a regression which controlled for prior attainment, following the approach described in the methods section. All the terms used in the column headings are explained in the glossary in Appendix 1.

The table shows that there was very little difference between learners in the group that was sent the peer support letter and the control group in the likelihood of achieving the primary outcome. Although the likelihood of starting a qualification-bearing maths course within 7 months of letter dispatch was 1.0 ppt higher (a coefficient of 0.010) for the peer support group than the control group, this difference was not statistically significant at the

95% confidence level[16]. This is unsurprising as a large sample size is required to detect an impact which is relatively small in magnitude (Dellavigna and Linos, 2022).

Similarly, being sent the urgent letter did not appear to increase the likelihood of starting a qualification-bearing maths course. Learners who were sent the urgent letter were very slightly less likely to achieve the primary outcome than the control group (a difference of -0.3 ppt). Overall, the letters only increased the likelihood of starting a qualification-bearing maths course by 0.3 ppt and again, this impact was not statistically significant. Detailed regression tables for all model specifications can be found in Appendix 8.[17]

Table 8: Regression results from primary outcome analysis

Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Impact estimate for the peer support letter	0.010 (0.006)	0.120	-0.003	0.022
Impact estimate for the urgent letter	-0.003 (0.006)	0.590	-0.015	0.009
Impact estimate for either letter	0.003 (0.005)	0.544	-0.007	0.014

Base: 9,119 for the peer support letter, 9,101 for the urgent letter and 13,647 for any letter.
* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Individualised Learner Record.

3.3.2. Secondary outcome analysis

The analysis also explored the impact of the encouraging progression letters on 2 secondary outcomes. These were: starting any qualification-bearing course within 7 months of letter dispatch and starting a qualification-bearing maths course at Level 2 or above.

[16] Differences that are statistically significant at the 95% confidence level are greater than would be expected by chance alone.

[17] Appendix 7 also reports a version of the analysis which did not control for prior attainment. As a result, it was based on a larger sample because it was not necessary to exclude learners for whom prior attainment was not observed. However, the impact estimates were unchanged and although the p-values decreased for all but the urgent letter, statistical significance remained below conventionally accepted levels.

Table 9 reports the proportions of learners from each trial arm who started any qualification-bearing course within 7 months of the letters being dispatched. This shows that 30% of learners who were sent the peer support letter started a qualification-bearing course within 7 months of letter dispatch, compared with 29% of those who were sent the urgent letter and 30% of those who were not sent either letter.

Table 9: Starting any qualification-bearing course by trial arm

Item	Peer support	Urgent	Control	Total
Number starting any qualification-bearing course	1,350	1,305	1,378	4,033
Number in the analysis sample	4,528	4,546	4,573	13,647
Percentage starting any qualification-bearing course	30%	29%	30%	30%

Base for percentages: number in the analysis sample.

Source: Individualised Learner Record.

Table 10 reports the impact of each of the letters on the likelihood of starting any qualification-bearing course within 7 months of letter dispatch. Being sent the peer support letter had no impact on the likelihood of achieving this outcome. Learners in the peer support trial arm were 0.4 ppt less likely to sign up for a qualification-bearing course than those in the control group, but this difference was not statistically significant.

Likewise, being sent the urgent letter did not affect the likelihood of starting any qualification-bearing course. Learners who were sent the urgent letter were 1.3 ppt less likely to start a qualification-bearing course than the control group, but again, this difference was not statistically significant.

Overall, learners who were sent either of the 2 letters were 0.9 ppt less likely to sign up for a qualification-bearing course than those in the control group. However, this difference was also not statistically significant.[18]

[18] When the control for prior attainment was excluded from the model, the impact estimates were almost unchanged and still below conventionally accepted levels of statistical significance. This is reported in Appendix 7.

Table 10: Regression results for starting any qualification-bearing course

Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Impact estimate for the peer support letter	-0.004 (0.010)	0.640	-0.023	0.014
Impact estimate for the urgent letter	-0.013 (0.010)	0.172	-0.032	0.006
Impact estimate for either letter	-0.009 (0.008)	0.291	-0.025	0.007

Base is 9,119 for the peer support letter, 9,101 for the urgent letter and 13,647 for any letter.
* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Individualised Learner Record.

11 shows the proportions of learners in each trial arm who started a qualification-bearing maths course at Level 2 or above within 7 months of the letters being dispatched, the other secondary outcome. As this outcome was nested within the primary outcome of starting a qualification-bearing maths course within 7 months of letter dispatch, the number of learners starting a qualification-bearing maths course at Level 2 or above was lower than those seen for the primary outcome. Around 1 in 20 (4.8%) learners who were sent the peer support letter started a qualification-bearing maths course at Level 2 or above within 7 months of letter dispatch, compared with 4.0% of those who were sent the urgent letter and 4.4% of those allocated to the control group.

Table 11: Starting a qualification-bearing maths course at Level 2 or above, by trial arm

Item	Peer support	Urgent	Control	Total
Number starting a qualification-bearing maths course at Level 2 or above	219	183	199	601
Number in the analysis sample	4,546	4,528	4,573	13,647
Percentage starting a qualification-bearing maths course at Level 2 or above	4.8%	4.0%	4.4%	4.4%

Base for percentages: number in the analysis sample.

Source: Individualised Learner Record.

12 reports findings for the second of the secondary outcomes. The peer support letter had no impact on the likelihood of learners starting a qualification-bearing maths course at Level 2 or above in the 7 months following letter dispatch. Learners in the peer support trial arm were 0.5 ppt more likely to sign up for a qualification-bearing maths course at Level 2 or above than those in the control group, but this difference was not statistically significant. Likewise, learners who were sent the urgent letter were 0.3 ppt less likely to sign up for a qualification-bearing maths course at Level 2 or above than those in the control group. This difference was also not statistically significant.

Overall, the impact of receiving either of the 2 letters was to increase the likelihood of starting a qualification-bearing maths course at Level 2 or above by 0.1 ppt but this impact estimate was well outside conventional margins of statistical significance.[19]

Table 12: Regression results for starting a qualification-bearing course at Level 2 or above

Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Impact estimate for the peer support letter	0.005 (0.004)	0.271	-0.004	0.013
Impact estimate for the urgent letter	-0.003 (0.004)	0.442	-0.011	0.005
Impact estimate for either letter	0.001 (0.004)	0.830	-0.006	0.008

Base: 9,119 for the peer support letter, 9,101 for the urgent letter and 13,647 for any letter.
* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Individualised Learner Record.

3.4. Missing data analysis

As information on prior attainment was missing for 15% of those randomised to take part in the trial, the analysis explored how the findings were affected by imputing prior attainment in cases where it was unknown. 13 reports the association between prior attainment and other baseline characteristics for learners in each trial arm.

[19] Detailed regression tables for all model specifications can be found in Appendix 8. This also reports findings from a version of the model which excluded the measure of prior attainment which also found that being sent a letter did not increase the likelihood of starting a Maths course likely to result in a qualification at Level 2 or above.

The analysis found that there was a statistically significant difference between men and women in the likelihood that prior attainment was recorded for those sent the peer support letter, with prior attainment more likely to be missing for women than men. However, this difference between men and women in the recording of prior attainment was not apparent for those sent the urgent letter or when grouping those sent either letter together.

For all other baseline characteristics, associations with the recording of prior attainment were similar across the trial arms. Information on prior attainment was less likely to be missing for learners from a Black or ethnic minority background compared with those who were White. Prior attainment was also less likely to be missing for learners who had a learning difficulty, disability or health problem at baseline compared with those who did not have any type of health condition recorded. Prior attainment was less likely to be missing for learners who lived in the most deprived areas compared with those who lived in less deprived places. It was also more likely to be missing for older learners. All these differences in the likelihood of prior attainment being missing were statistically significant.

Table 13: Probit regression predicting the likelihood that prior attainment is missing for the randomisation sample

Characteristic	Peer support v Control	Urgent v Control	Either v Control
Female	0.104**	0.023	0.050
	(0.038)	(0.037)	(0.031)
Ethnic Minority	-0.256***	-0.299***	-0.270***
	(0.037)	(0.037)	(0.030)
Learning difficulty, disability or health problem	-0.107**	-0.103**	-0.113***
	(0.039)	(0.039)	(0.032)
IMD top quintile	-0.108**	-0.137***	-0.129***
	(0.036)	(0.036)	(0.030)
Age	0.008***	0.009***	0.008***
	(0.001)	(0.001)	(0.001)
Base	9,627	9,589	14,402

Models also included constant term.
The bases are lower than for the full randomisation sample due to information on some of the characteristics listed not being recorded for all randomised learners.
* p < 0.05; ** p < 0.01; *** p < 0.001.
Standard errors in parentheses.

Source: Individualised Learner Record.

Given that prior attainment was more likely to be missing for particular types of learners across all 3 groups of trial participants, 14 reports the impact of each letter on the primary

outcome measure after imputing prior attainment in cases where it was missing. The analysis showed that the peer support letter had a small, but positive impact on the primary outcome after prior attainment was imputed, but only at the 10% level of statistical significance. However, even after imputing prior attainment in cases where it was missing, being sent the urgent letter did not appear to affect the likelihood of attaining the primary outcome. Overall, the letters did not increase the likelihood of learners starting a qualification-bearing maths course at conventionally accepted levels of statistical significance, even when prior attainment was imputed in cases where it was missing.

Table 14: Regression results from primary outcome analysis after imputing prior attainment where missing

Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Impact estimate for the peer support letter	0.010 (0.006)	0.083	-0.001	0.022
Impact estimate for the urgent letter	-0.003 (0.006)	0.593	-0.014	0.008
Impact estimate for both letters	0.004 (0.005)	0.473	-0.006	0.014

Base: 10,012 for the peer support letter, 10.025 for the urgent letter and 15,024 for any letter.
* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Individualised Learner Record.

Finally, as ethnicity was missing for 10% of trial participants, further analysis was conducted to explore the impact of including a missing dummy for ethnicity in the analysis for the primary outcome when also including other baseline controls for sex, age, ethnicity, disability and the IMD. 15 reports the findings of this analysis for each of the 3 trials. Including a range of controls and a dummy variable in cases where ethnicity was not recorded made very little difference to any of the impact estimates compared with the main analysis for the primary outcome, although the sample was smaller due to missing information on disability status and the IMD in some cases. As with the version of the analysis where prior attainment was imputed, the positive impact of being sent the peer support letter did get closer to reaching conventionally accepted levels of statistical significance when controls and the missing dummy for ethnicity were included in the model compared with the main model, but this was not the case for the urgent letter. Overall, there was no evidence that being sent the letters increased the likelihood of starting a qualification-bearing maths course in the 7 months following letter dispatch.

Table 15: Regression results from primary outcome analysis after including controls and dummies where ethnicity was missing

Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Impact estimate for the peer support letter	0.011 (0.006)	0.092	-0.002	0.023
Impact estimate for the urgent letter	-0.001 (0.006)	0.900	-0.013	0.011
Impact estimate for both letters	0.005 (0.005)	0.359	-0.006	0.016

Base: 8,880 for the peer support letter, 8,855 for the urgent letter and 13,283 for any letter.
* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Individualised Learner Record.

3.5. Subgroup analysis

This section reports the main findings of the subgroup analysis for each of the letters. The analysis took into account the learner's prior attainment as well as the other factors listed in each of the tables.

The top panel of 16 shows that within the control group women were slightly more likely than men to start a qualification-bearing maths course within 7 months of dispatch of the peer support letter (indicated by the statistically significant coefficient on the 'Female' term). However, there was no evidence that the impact of being sent the peer support letter was any different for women or men. This was apparent from the fact that the interaction term was not statistically significant.

The general patterns apparent in the subgroup analysis for the peer support letter were also apparent for the urgent letter (lower panel of 16). Within the control group, women were more likely to start a qualification-bearing maths course within 7 months of letter dispatch than men, but the impact of being sent the peer support letter was almost identical for men and women.

Table 16: Regression results interacting treatment and sex for the primary outcome

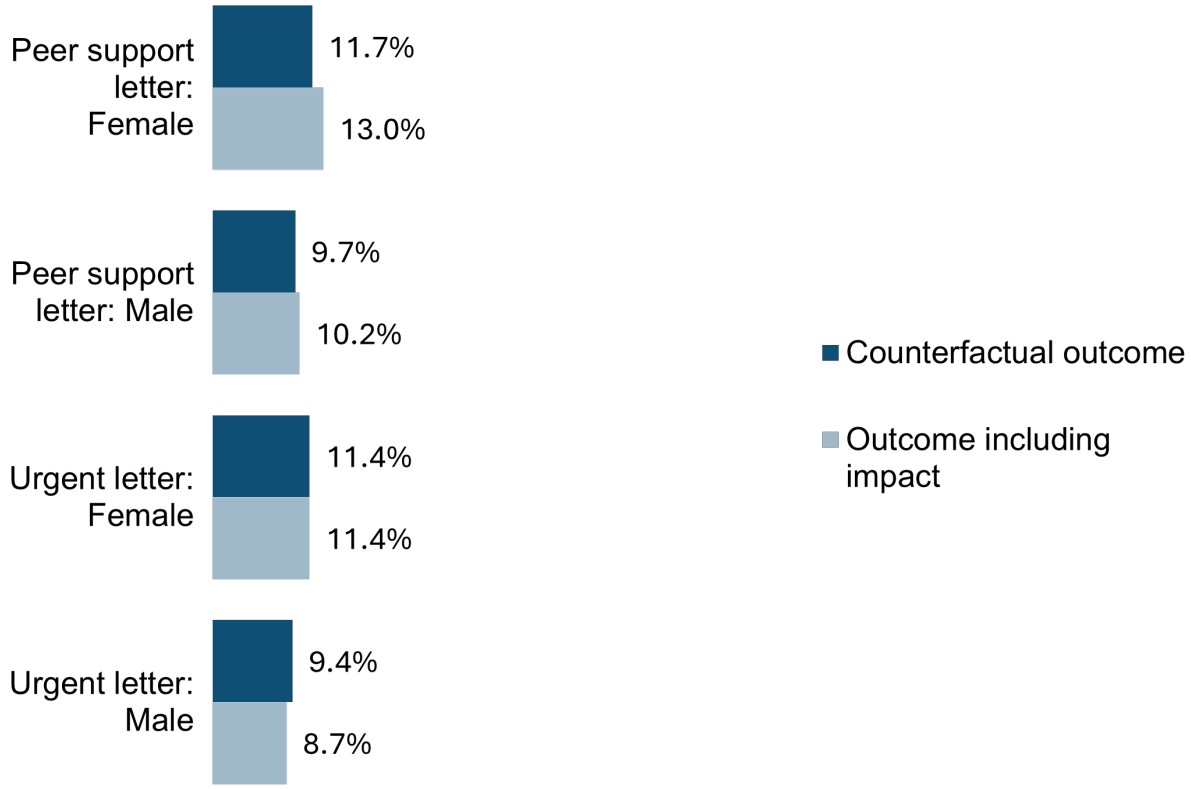
Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Peer support letter: Treatment	0.004 (0.010)	0.669	-0.016	0.024
Peer support letter: Female	0.020* (0.009)	0.024	0.003	0.037
Peer support letter: Interaction between treatment and sex	0.008 (0.013)	0.521	-0.017	0.033
Urgent letter: Treatment	-0.007 (0.010)	0.452	-0.027	0.012
Urgent letter: Female	0.020* (0.009)	0.027	0.002	0.037
Urgent letter: Interaction between treatment and sex	0.007 (0.012)	0.556	-0.017	0.032

Base: 9,469 for the peer support letter and 9,416 for the urgent letter.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Individualised Learner Record.

Figure 2 summarises the likelihood of starting a qualification-bearing maths course for women compared with men under the counterfactual scenario in which neither subgroup was sent one of the Encouraging Progression letters and for the alternative situation where men or women were sent one of the two letters. It shows that men were slightly less likely to start a qualification-bearing maths course than women even in the counterfactual scenario. For example, 10% of men would be expected to start a qualification-bearing maths course even without the peer support letter, compared with 12% of women. Among those who received the peer support letter, 10% of men started a qualification-bearing maths course, compared with 13% of women. This meant that overall, being sent the peer support letter increased the likelihood of women starting a qualification-bearing maths course by 0.8 ppt compared with men, although this difference was not statistically significant.

Figure 2 Primary outcome by sex



Base: 9,469 for the peer support letter and 9,416 for the urgent letter.

Source: Individualised Learner Record.

Among those who were not sent either letter, older learners who were aged 50 and over were less likely to start a qualification-bearing maths course than those in the younger age group (17). However, older learners were more likely to start a qualification-bearing maths course after being sent either letter than the younger age group. Being sent the peer support letter increased the likelihood of those aged 50 and over starting a qualification-bearing maths course by 2.4 ppt compared with those sent the peer support letter who were under the age of 50. Being sent the urgent letter increased the likelihood of learners aged 50 and over starting a qualification-bearing maths course by 3.1 ppt compared with younger learners.

For both letters, this difference in impact between older and younger learners was statistically significant at conventionally accepted levels. Although the earlier analysis showed that on average the urgent letter did not have a clear positive impact on the likelihood of learners starting a qualification-bearing maths course within 7 months of letter dispatch, it did appear to work better for older learners than younger learners.

Table 17: Regression results interacting treatment with age for the primary outcome

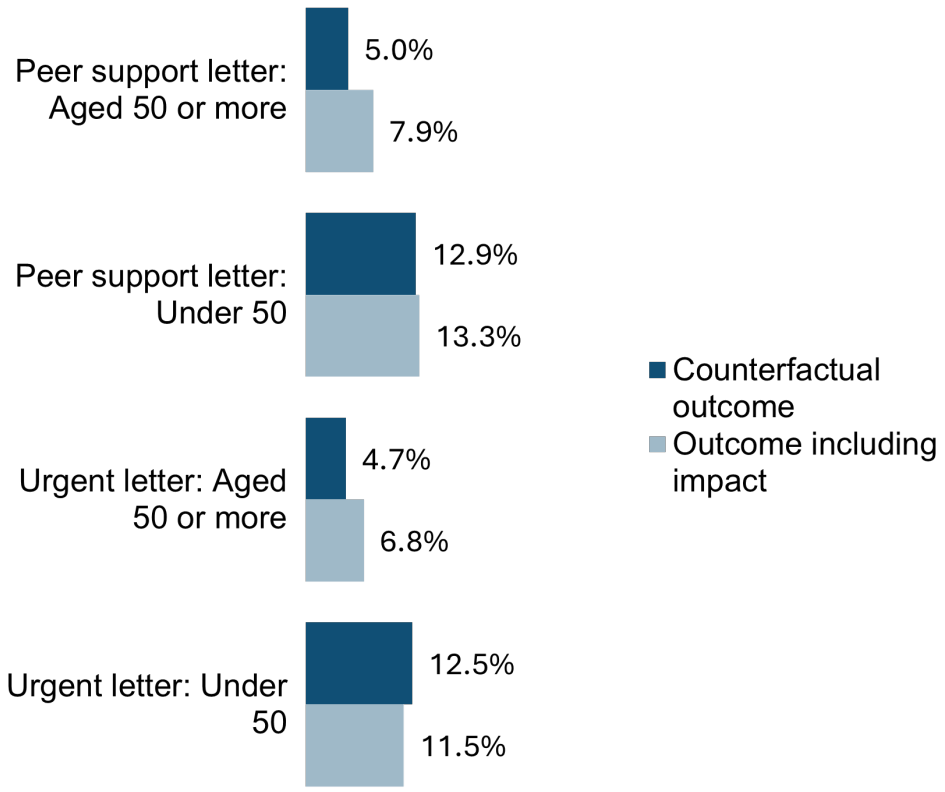
Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Peer support letter: Treatment	0.004 (0.008)	0.571	-0.011	0.019
Peer support letter: Aged 50 and over	-0.078*** (0.008)	<0.001	-0.093	-0.063
Peer support letter: Interaction between treatment and being aged 50 and over	0.024* (0.012)	0.038	0.001	0.047
Urgent letter: Treatment	-0.010 (0.007)	0.187	-0.024	0.005
Urgent letter: Aged 50 and over	-0.078*** (0.008)	<0.001	-0.093	-0.063
Urgent letter: Interaction between treatment and being aged 50 and over	0.031*** (0.011)	0.006	0.009	0.053

Base: 9,469 for the peer support letter and 9,416 for the urgent letter.
* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Individualised Learner Record.

Figure 3 summarises the likelihood of starting a qualification-bearing maths course for those aged 50 and over and those under the age of 50 under the counterfactual scenario in which the age group was not sent either of the 2 letters (controlling for prior attainment) and for those who were sent one of the 2 letters. It illustrates the much lower likelihood of the older age group starting a qualification-bearing maths course than younger learners, but the stronger positive impact of the letters in increasing take-up of qualification-bearing maths courses for older learners.

Figure 3 Primary outcome by age



Base*:* 9,469 for the peer support letter and 9,416 for the urgent letter.

Source: Individualised Learner Record.

When focusing on learners in the control group, those with a learning difficulty, disability or health problem were less likely to start a qualification-bearing maths course in the 7 months following dispatch of the peer support letter than those without health problems (18). However, there was no evidence that the impact of the letter varied depending on the disability status of the learner. Among those in the control group, learners with a learning difficulty, disability or health problem were less likely to start a qualification-bearing maths course within 7 months of dispatch of the urgent letter than learners without a health condition. However, there was no statistically significant difference in the impact of receiving the urgent letter on the primary outcome for those with and without health problems.

Table 18: Regression results interacting treatment with disability status for the primary outcome

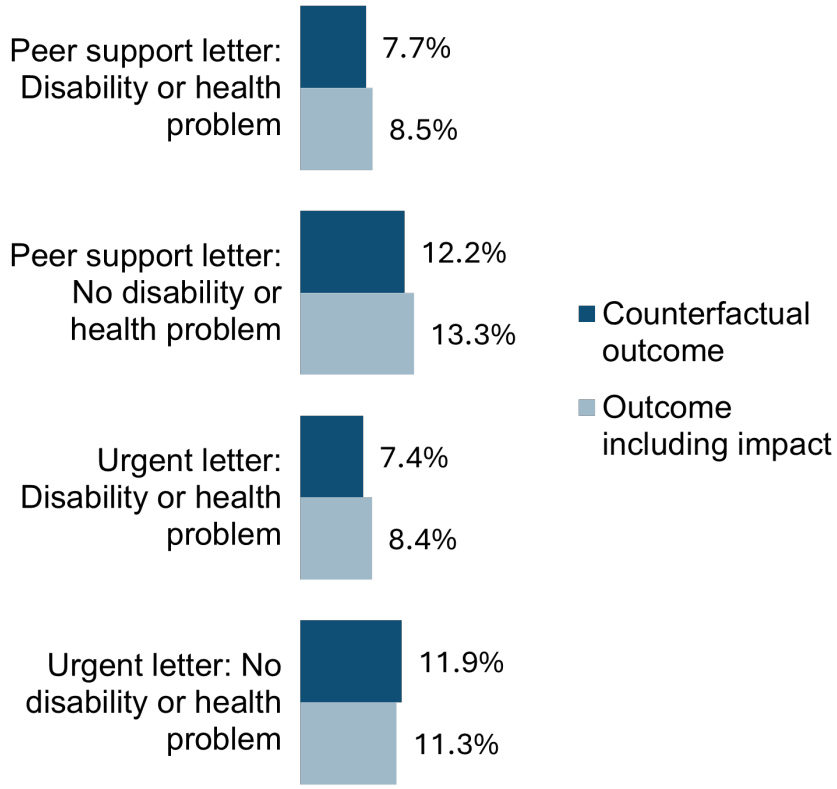
Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Peer support letter: Treatment	0.011 (0.008)	0.163	-0.004	0.026
Peer support letter: Disability or health problem	-0.045*** (0.009)	<0.001	-0.062	-0.028
Peer support letter: Interaction between treatment and disability or health problem	-0.002 (0.012)	0.875	-0.026	0.023
Urgent letter: Treatment	-0.006 (0.008)	0.431	-0.021	0.009
Urgent letter: Disability or health problem	-0.045*** (0.009)	<0.001	-0.062	-0.029
Urgent letter: Interaction between treatment and disability or health problem	0.016 (0.012)	0.201	-0.008	0.040

Base: 9,228 for the peer support letter and 9,169 for the urgent letter.
* p < 0.05, ** p < 0.01, *** p < 0.001.

Source: Individualised Learner Record.

Figure 4 summarises the likelihood of starting a qualification-bearing maths course for those with a disability or health problem and those without under the counterfactual scenario in which they were not sent either of the Encouraging Progression letters and for the alternative situation in which they were sent one of the two letters. It highlights the fact that, even without the letters, those with a disability or health problem were less likely to start a qualification-bearing maths course than those without health problems.

Figure 4 Primary outcome by health



Base: 9,228 for the peer support letter and 9,169 for the urgent letter.

Source: Individualised Learner Record.

Finally, although those in the control group from a Black or minority ethnic background were more likely to start a qualification-bearing maths course in the 7 months following dispatch of the peer support letter, ethnic background did not have a statistically significant impact on the likelihood of achieving the primary outcome in response to being sent the letter (19). Within the control group, learners from a Black or minority ethnic background were more likely to start a qualification-bearing maths course within 7 months of dispatch of the urgent letter. However, the impact of being sent the urgent letter on the primary outcome did not differ between learners from different ethnic backgrounds.

Table 19: Regression results interacting treatment with ethnicity for the primary outcome

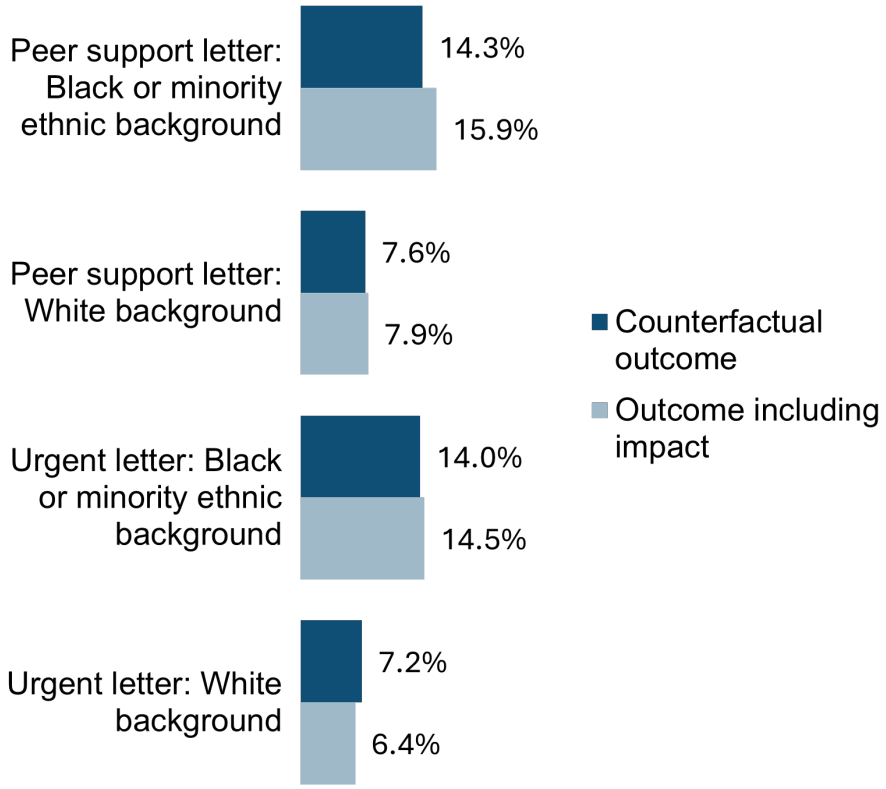
Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Peer support letter: Treatment	0.003 (0.008)	0.649	-0.011	0.018
Peer support letter: Black or minority ethnic background	0.067*** (0.009)	<0.001	0.049	0.085
Peer support letter: Interaction between treatment and being from a black or minority ethnic background	0.013 (0.013)	0.332	-0.013	0.039
Urgent letter: Treatment	-0.008 (0.007)	0.267	-0.022	0.006
Urgent letter: Black or minority ethnic background	0.068*** (0.009)	<0.001	0.051	0.086
Urgent letter: Interaction between treatment and being from a black or minority ethnic background	0.013 (0.013)	0.314	-0.012	0.038

Base: 8,760 for the peer support letter and 8,687 for the urgent letter.
* p < 0.05, ** p < 0.01, *** p < 0.001.

Source: Individualised Learner Record.

Figure 5 summarises the likelihood of starting a qualification-bearing maths course for those from a Black or minority ethnic background and those from a White background under the counterfactual scenario in which they were not sent either of the Encouraging Progression letters. It shows that learners from a Black or minority ethnic background were more likely to start a qualification-bearing maths course than those from a White background even if they were not sent one of the two letters.

Figure 5 Primary outcome by ethnicity



Base is 8,760 for the peer support letter and 8,687 for the urgent letter.

Source: Individualised Learner Record.

3.6. Estimation of effect sizes

The estimated impact of each of the letters on the primary and secondary outcomes was converted to a standardised measure of effect size, expressed as a proportion of the pooled standard deviation. The standardised effect sizes for the primary outcome of starting a qualification-bearing maths course within seven months of letter dispatch are reported in 20 along with their respective 95% confidence intervals.

Effect sizes were very similar irrespective of whether they were based on Cohen's h or Hedges' g, with only small differences in the confidence intervals between the 2 statistics.[20] In all cases, the confidence intervals spanned zero, indicating that the letters did not have a statistically significant impact on the primary outcome. Being sent the peer

[20] When the Statistical Analysis Plan was written, the intention was to report Cohen's h on the other Multiply trials. However, it was later agreed to report Hedges' g on the other trials and so we report both statistics for the Encouraging Progression trial.

support letter increased the likelihood of attaining the primary outcome by 0.033 of a standard deviation, while being sent the urgent letter reduced the likelihood of starting a qualification-bearing maths course by 0.012 standard deviations. Overall being sent either letter increased the likelihood of attaining the primary outcome by 0.011 standard deviations.

Table 20: Cohen's h and Hedges' g effect sizes for the primary outcome

Type of Effect and Letter	Effect Size	95% Confidence Interval Lower bound	95% Confidence Interval Upper bound
Cohen's h: Peer support	0.033	-0.008	0.074
Cohen's h: Urgent	-0.012	-0.053	0.029
Cohen's h: Either	0.011	-0.024	0.047
Hedges' g: Peer support	0.033	-0.008	0.074
Hedges' g: Urgent	-0.012	-0.053	0.030
Hedges' g: Either	0.011	-0.025	0.046

Base: 9,119 for the peer support letter, 9,101 for the urgent letter and 13,647 for any letter.

Source: Individualised Learner Record

For the secondary outcome of starting any qualification-bearing course within 7 months of letter dispatch, 21 again shows that Cohen's h and Hedges' g and their respective 95% confidence intervals are very similar for each of the letters. In all cases the lower and upper confidence intervals span zero, indicating that the effect sizes were not statistically significant.

The intervention groups were less likely to start any qualification-bearing course than the control group, but this negative impact was most pronounced for the urgent letter, which reduced the likelihood of attaining this outcome by 0.029 standard deviations. The peer support letter reduced the likelihood of starting any qualification-bearing course by 0.010 standard deviations. Those who were sent either of the letters saw a reduction of 0.019 standard deviations in the likelihood of starting any qualification-bearing course.

Table 21: Cohen's h and Hedges' g effect sizes for starting any qualification-bearing course within 7 months of letter dispatch

Type of Effect and Letter	Effect Size	95% Confidence Interval Lower bound	95% Confidence Interval Upper bound
Cohen's h: Peer support	-0.010	-0.051	0.032
Cohen's h: Urgent	-0.029	-0.070	0.012
Cohen's h: Either	-0.019	-0.055	0.016
Hedges' g: Peer support	-0.010	-0.051	0.031
Hedges' g: Urgent	-0.029	-0.070	0.012
Hedges' g: Either	-0.019	-0.055	0.016

Base: 9,119 for the peer support letter, 9,101 for the urgent letter and 13,647 for any letter.

Source: Individualised Learner Record.

Finally, 22 reports Cohen's h and Hedges' g effect sizes for the secondary outcome of starting a qualification-bearing maths course at Level 2 or above within 7 months of letter dispatch. Once again, Cohen's h and Hedges' g produced very similar estimates of effect sizes and the associated 95% confidence intervals were almost the same. In all cases the effects were not statistically significant. The peer support letter increased the likelihood of starting a qualification-bearing maths course by 0.022 standard deviations, whereas the urgent letter had a negative impact, reducing the likelihood of achieving this outcome by around 0.015 standard deviations. Overall, being sent either letter increased the likelihood of starting a qualification-bearing maths course at Level 2 or above by an average of 0.004 standard deviations.

Table 22: Cohen's h and Hedges' g effect sizes for starting a qualification-bearing Maths course at Level 2 or above within 7 months of letter dispatch

Type of Effect and Letter	Effect Size	95% Confidence Interval Lower bound	95% Confidence Interval Upper bound
Cohen's h: Peer support	0.022	-0.019	0.063
Cohen's h: Urgent	-0.015	-0.057	0.026
Cohen's h: Either	0.004	-0.032	0.039
Hedges' g: Peer support	0.022	-0.019	0.063
Hedges' g: Urgent	-0.015	-0.056	0.026
Hedges' g: Either	0.004	-0.032	0.039

Source: Individualised Learner Record. Base is 9,119 for the peer support letter, 9,101 for the urgent letter and 13,647 for any letter.

4. Implementation and process evaluation results

Overview

The Implementation and Process Evaluation (IPE) assessed the proportion of individuals allocated to the intervention arms who recalled receiving the letters 8 months after letter dispatch. For those who did recall receiving the letter, the IPE explored the proportion who opened and read the letter, and whether they believed that their decision to start a subsequent course was positively influenced by receipt of the letter. This section draws on quantitative survey data.

4.1. Survey response rates

All learners allocated to the intervention arms with an email address recorded on the ILR were invited to take part in the IPE survey. Email addresses were not recorded for 2,592 learners. Those learners were not invited to complete the IPE survey as it was not possible to contact them via email.

23 reports response rates to the IPE survey by intervention arm. The survey was sent to 4,705 learners who had been sent the peer support letter. Out of those, 247 learners responded to the survey (5.2% of those invited to participate). The survey was also sent to 4,648 learners who were sent the urgent letter. Out of those, 263 responded to the survey (5.7% of those who were sent the survey in the urgent letter group). The overall response rate to the survey across both intervention arms was 5.5%.

The low response rate means that the findings may not be representative of all learners who were sent one of the Encouraging Progression letters. In particular, learners who remembered receiving the letter were likely to be more motivated to respond to the survey. If this is the case, the findings may overstate the likelihood that trial participants as a whole remembered receiving the letter, or opening, reading or acting upon it.

Table 23: Response rates to the IPE survey by trial arm

Item	Peer support letter	Urgent letter	Total
Survey respondents	247	263	510
Number in the analysis sample	4,705	4,648	9,353
Response rate	5.2%	5.7%	5.5%

Base for percentages: number in the analysis sample.

Source: Individualised Learner Record and IPE survey.

4.2. Recall of receiving the Encouraging Progression letters

24 shows the proportions of learners who remembered receiving the letters by intervention arm. Over one-third (36%) of those who were sent the peer support letter and responded to the survey remembered receiving the letter and this proportion was similar for those who were sent the urgent letter (37%).

Table 24: Proportion of learners who remembered receiving letters by trial arms

Item	Peer support letter	Urgent letter	Total
Respondents who remembered receiving letters	89	98	187
Number of learners who responded to survey	247	263	510
Percentage	36%	37%	37%

Base for percentages: number of survey respondents.

Source: IPE survey.

The analysis tested whether survey respondents who were sent the peer support letter were more likely to remember receiving it than those who were sent the urgent letter.

Table 25 reports the difference between the 2 intervention arms in the proportion of survey respondents who remembered receiving the letters. The small difference in the likelihood of recalling receipt of the letters was not statistically significant. This suggests that respondents who were sent the urgent letter were no more likely to remember receiving it than those who received the peer support letter.

Table 25: Proportion of survey respondents in each intervention arm who remembered receiving either letter

Item	Peer support (Standard error)	Urgent (Standard error)	Difference (ppt)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Proportions	36.0% (3.1%)	37.3% (2.9%)	-1.23 (4.27)	0.773	-9.60	7.14

Base for percentages: number of survey respondents.
* p < 0.05, ** p < 0.01, *** p < 0.001

Source: IPE survey.

4.3. Recall of opening letters

For survey respondents who remembered receiving either of the 2 letters, Table 26 shows the percentage who remembered opening each letter. The vast majority of those who remembered receiving the letters opened them. This proportion was similar for both those sent the peer support letter and the urgent letter (87% and 86% respectively).

Table 26: Proportions of respondents who opened letter from those who remembered receiving it

Item	Peer support letter	Urgent letter	Total
Respondents who opened letter	77	84	161
Number of learners who remembered receiving letter	89	98	187
Percentage	87%	86%	86%

Base for percentages: number of survey respondents who remembered receiving letter.

Source: IPE survey.

4.4. Recall of reading letters

Table 27 shows the proportions of survey respondents who remembered reading either of the letters, from those who recalled opening the letter. All of those sent the peer support letter who remembered opening it reported that they had read it, while 92% of those who opened the urgent letter went on to read it.

Table 27: Proportions of respondents who remembered reading letter

Item	Peer support letter	Urgent letter	Total
Respondents who remembered reading letter	77	78	155
Respondents who opened letter	77	84	161
Percentage	100%	92%	96%

Base for percentages: number of survey respondents who opened letter.

Source: IPE survey.

4.5. Perceived outcomes

Around half of all survey respondents who remembered receiving either of the 2 letters reported that they started a further course (Table 28). Those who received the urgent letter were more likely to say that they started another course than those who received the peer support letter (55% and 52% respectively). However, this difference was not statistically significant.

Survey respondents were asked whether they felt that the letters had a positive influence on their decision to start another course to assess the likelihood that the letter prompted them to undertake further learning. The numbers reporting a positive influence from either of the letters were too small to analyse as percentages of the total number who recalled receiving the letters. However, the results suggest that only a small proportion of those who did start another course attributed this at least partly to receiving the letter.

Table 28: Numbers of learners who reported a positive influence from letter

Item	Peer support letter	Urgent letter	Total
Respondents who remembered receiving letter and started a further course	46	54	100
Respondents who remembered receiving letter	89	98	187
Percentage of those who remembered receiving letter who signed up for a further course	52%	55%	53%
Respondents who felt letter positively influenced their decision to start a further course	10	6	16

Base for percentages: number of survey respondents who remembered receiving letter.

Source: IPE survey.

5. Conclusions

5.1. Summary of findings

The Encouraging Progression trial sought to test whether sending letters to learners who had previously started a non-qualification-bearing Multiply course encouraging them to progress to further learning increased the likelihood of them starting a qualification-bearing maths course. The trial also considered whether either of the 2 letters sent had a positive impact on whether learners started any subsequent qualification-bearing course, or a qualification-bearing maths course at Level 2 or above. The total cost of testing and distributing the letters was approximately £44,000, or around £4 per learner.

Before discussing the results further, it is important to acknowledge that this is the first test of this nature with adult learners. It is also unusual for the impact of alternative versions of basic communications or encouragement materials to be tested. This project - in keeping with other simple communication trials - has demonstrated that it is possible to send out variations of communications to assess whether any messaging works, as well as whether particular variations work. It is an important development for DfE to be testing the effectiveness of communications with learners and to continue to do so in future.

Overall, outcomes were not detectably affected by receiving a letter, and the trial did not find differences by type of letter either. The impact of the peer support or the urgent letter did not vary in effectiveness by sex, disability status or ethnicity. However, there was clear evidence that both the peer support letter and the urgent letter were more effective for learners aged 50 and over compared with younger learners. The peer support letter increased the likelihood of learners aged 50 and over starting a qualification-bearing maths course by 2.4 ppt compared with younger learners, while the urgent letter raised the likelihood of achieving the primary outcome by 3.1 ppt for the older age group compared with those under the age of 50.

To put this in context: for every 1,000 learners aged 50 and over doing a non-qualification-bearing maths course, around 50 would be expected to progress to start a qualification-bearing maths course, compared with approximately 125 learners under the age of 50. If 1,000 learners aged 50 and over were sent the peer support letter, an additional 29 individuals in this age group would start a qualification-bearing maths course, compared with just 4 additional learners if the same letter was sent to 1,000 learners under the age of 50. For every 1,000 learners aged 50 and over who were sent the urgent letter, an additional 21 individuals would be expected to start a qualification-bearing maths course, whereas 10 fewer learners under the age of 50 would progress to a qualification-bearing maths course as a result of being sent the urgent letter.

The finding that the urgent letter was more effective for older learners than younger learners is particularly surprising. This is because, overall, the urgent letter did not appear to have a positive impact on the primary outcome.

Findings on the impact of each of the 2 letters on the secondary outcomes were similar to those for the primary outcome in that neither letter had a statistically significant impact on the likelihood of starting any qualification-bearing course, or a maths course at Level 2 or above in the 7 months following letter dispatch. However, there were some indicative findings which, whilst not statistically significant, suggest possible positive impacts: while both letters reduced the likelihood of starting any qualification-bearing course compared with business as usual, those sent the peer support letter were more likely to start a qualification-bearing maths course at Level 2 or above. This might suggest that the letters steered learners towards enrolling in maths courses rather than undertaking qualification-bearing courses in another subject.

Around 1 in 20 trial participants from each of the 2 intervention arms responded to a survey which sought to establish whether trial participants remembered receiving either of the Encouraging Progression letters, whether they opened and read the letters, and whether they felt the letters influenced their decision to start a further course.

It was not possible to explore the impact of the letters on those who definitely received and read them due to the difficulties of observing compliance for all intended recipients. However, the fact that nearly 2 in 3 survey respondents did not remember receiving a letter at all, and of those that did, only a handful felt that it positively influenced their decision to start further learning, is consistent with the finding from the impact analysis that the letters did not have a discernible impact on any of the primary or secondary outcomes.

Recommendations

This trial has shown that further testing of the effectiveness of different sorts of communication (in this case letters) to learners may be a fruitful area for further research. In any future trial of similar letters it would be beneficial to explore the option of sending 2, or perhaps more, letters to intervention arms to see whether this raises the likelihood of the letters having a positive impact on the primary outcome.

Another option might be to follow up on the initial letter with a reminder sent using a different means of communication, such as a text message. Additionally, given that an email address was recorded on the ILR for the vast majority of learners who took part in the trial, it may be beneficial for a future trial to explore whether email is a more effective and efficient means of encouraging progression than letters sent by post.

The impact of targeting certain sub-groups of the population could be explored in further research to help refine communications and maximise the impact and cost effectiveness of this approach. This could include exploring motivations and the most common barriers to learning for particular groups to inform ways of designing future communications tailored to overcome the most common concerns of certain groups of potential learners. The effectiveness of more tailored communications could then be tested in future DfE trials.

To enhance the likelihood that future trials are able to produce robust evidence, it would be beneficial for DfE to take further steps to ensure providers obtain permanent ULNs for all learners included in the ILR. This could include monitoring providers that supply ILR returns containing learners with temporary ULNs and issuing targeted reminders that they should obtain a permanent ULN at the earliest opportunity. Emphasising the importance of recording the learner's prior attainment to providers would also increase the likelihood that future trials produce evidence that captures impacts across all eligible learners.

Future studies might benefit from exploring the potential overlap in outcome measures to a greater degree prior to finalising the trial protocol.

5.2. Lessons learned for future delivery

To understand why the letters did not appear to have a positive impact on the primary or secondary outcomes at an aggregate level, it is helpful to reflect on the evidence base for the trial. Previous evidence on the effectiveness of peer support letters suggests that they are not universally effective. A peer-to-peer letter to headteachers and chairs of governors was found to increase applications to become National Leaders of Education, but not to affect applications or appointments as Teaching Schools (Chadeesingh, Carr, and Chande 2018). Similarly, a trial which tested the effectiveness of peer-to-peer communications to encourage those in the first year of sixth form to progress to a more selective university found that sending a single peer support letter did not influence outcomes (Sanders, Chande, and Selley 2017). It was only when trial participants received 2 such letters that a positive impact on the likelihood of applying to and accepting an offer at a Russell Group university was apparent. This would be consistent with the low levels of recall of the Encouraging Progression letters in the current trial, given that participants might be more likely to remember receiving more than 1 letter. In future there may be benefits to contacting learners more than once to encourage progression to further learning.

The extent to which the letter is seen as generic or tailored to the specific circumstances of individuals may have a bearing on effectiveness. Given the large scale of the Encouraging Progressing trial, the letters were designed to be relevant to all learners who had previously started a non-qualification-bearing Multiply course. By contrast the trial of peer-to-peer communications to encourage applications to more selective universities was targeted at high-achieving young people at schools in less advantaged areas and the contents of the letters tailored to the potential concerns of this group. It is possible that effectiveness might have been increased in the Encouraging Progression trial by targeting the letters at particular groups of learners. The fact that the letters appeared to have had a more positive impact on older learners compared with those aged 50 or less suggests that they may have been better suited to certain types of learners. This suggests that greater tailoring of communications to the circumstances of particular groups of learners, or targeting specific subgroups may enhance the effectiveness of future delivery.

5.3. Considerations for future research

The theory of change for the trial rested on the assumptions that learners would open and understand the letters they received, that they would serve as a call to action and that there would be qualification-bearing courses available for learners to move onto. The trial design also relied on the ILR data used to observe outcomes being comprehensive, accurate and up to date.

In practice, it was not possible to observe outcomes for all trial participants in the ILR data. Those with a temporary ULN at randomisation were included in the trial on the understanding that they would be allocated a permanent ULN by the end of the academic year. However, this was not the case for around half of all those with a temporary ULN at the time of randomisation, meaning that around 5.6% of those randomised had to be excluded from the trial. Additionally, some of those randomised had to be excluded from the analysis sample because prior attainment was not recorded. Despite these factors reducing the size of the analysis sample compared with the full population of learners who were eligible for the trial, the analysis suggested that all trial arms were balanced on baseline characteristics, for the analysis sample as well as those randomised. Furthermore, imputing prior attainment in cases where it was not observed did not change the main findings of the analysis, although the peer support letter did have a positive impact on the primary outcome at the 10% level of statistical significance when prior attainment was imputed in cases where it was missing.

The main findings were not sensitive to the inclusion of controls for baseline characteristics or a dummy variable for learners who were missing information on ethnic background. While the ILR data was generally well recorded across the range of variables included in the analysis for those with a permanent ULN, it is important to note that in cases where learners were not observed to start a further course it was necessary to assume that this was because they did no further learning, rather than because of any errors in recording.

With the benefit of hindsight, there was a high degree of similarity between the primary outcome of starting a qualification-bearing maths course and the secondary outcome of starting a qualification-bearing maths course at Level 2 or above, given that Multiply is targeted at those with prior qualifications in maths below Level 2.

Despite these limitations, the trial provides valuable insights into the effectiveness of postal communications in encouraging adult learners to progress to qualification-bearing courses. Future research should consider testing multiple communication touchpoints, exploring different communication channels, and tailoring messages to specific learner groups. The evidence that older learners responded more positively to both letters suggests that age-specific messaging strategies might be particularly effective. Additionally, exploring the optimal timing of communications relative to course completion could enhance effectiveness.

Finally, this trial was part of a programme of trials on adult numeracy commissioned by the DfE. Alongside the individual trial reports, DfE has published a programme report on findings related to running RCTs in the adult learning sector, describing the broader learnings for the sector.

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Appendices

Appendix 1 Glossary

Absolute standardised differences: A measure used to check if the treatment and control groups had similar characteristics at the start of a study. It compares the difference between the groups in a standardised way. A result below 0.1 (or 10%) usually shows the groups were well-balanced.

Adult Education Budget (AEB): The AEB provides government funding for skills training for adults aged 19 and over in England. It covers basic English, maths and digital skills. In 2024, it was renamed the Adult Skills Fund.

Adult education provider: An organisation that offers learning, training, and courses to adults aged 19 and over. These can include a wide range of institutions, such as Further Education (FE) colleges, local authority services, independent training providers (ITPs), and voluntary or community organisations.

Analysis sample: The final group of participants whose data is used to generate the final statistical results. It is often smaller than the initial sample due to exclusions (e.g. attrition, missing data, loss to follow-up).

Attrition: When participants leave a study before it is finished. This reduces the final sample size for analysis. This can occur when providers or learners withdraw, fail to complete assessments at the end of an intervention or submit required data. Attrition by trial arm looks at the attrition in the treatment and control groups separately. It is used to check for differential attrition (unequal loss between arms) that could bias comparisons.

Base size (base): The number of respondents that a particular statistic (e.g. a percentage or mean) is calculated from. In surveys, this is the number of responses.

Baseline: Data collected from participants at the start of a study, prior to any intervention. It serves as a benchmark for measuring change over time, checks that groups are balanced, and improves the precision of the final analysis.

Bias: A systematic error that can make research results misleading. Unlike random chance, this error does not disappear by simply increasing the number of participants in the study.

Binary variable: A type of variable that can only have two possible values, such as 'pass'/'fail' or 'yes'/'no', often coded as 1 or 0 in statistical analysis.

Blinded: The practice of withholding information about group assignment to prevent conscious or unconscious bias. This ensures that outcomes are not influenced by the placebo effect (participants changing behaviour because they know they are being treated)

or observer bias (researchers interpreting data differently based on their expectations). When information is withheld, a study is described as being ‘blind’.

Business as Usual (BAU): The standard set of conditions or practices that participants experience if they are not assigned to receive a new intervention. BAU does not mean doing nothing; it means continuing with the existing approaches (e.g. the standard curriculum) rather than the new approach.

Cluster Randomised Controlled Trial (RCT): A research method where groups of people (or “clusters”), rather than individuals, are randomly assigned to different trial arms.

Coefficient (Standard error): In a regression analysis, the coefficient is the number that represents the size and direction of the relationship between a predictor variable and the outcome. The standard error is a measure of the statistical accuracy of that coefficient; a smaller standard error means a more precise estimate.

Cohen’s d: A widely used statistical measure for calculating effect size, which shows the size of the difference between the averages (means) of two groups. A smaller number (e.g. around 0.2) indicates a small effect, meaning the difference between the two groups is minor. A larger number (e.g. 0.8 or higher) indicates a large effect, signifying a substantial and more meaningful difference between the groups.

Cohen’s h: This is a standardised measure of effect size used to compare two proportions (i.e., the difference between two percentages). It is useful for comparing results across different studies that might have different sample sizes or baseline rates. A small Cohen’s h (around 0.2) means a smaller difference between proportions. Even if the difference is statistically significant, it might not be very meaningful in a practical sense. A larger Cohen’s h (around 0.8) means a more substantial difference between proportions.

Compliance: The extent to which providers adhered to the trial requirements outlined in the Trial Readiness Packs, including data submission requirements and adherence to eligibility criteria.

Confidence intervals: Confidence intervals are used to express the certainty of an estimate. The interval is the range of values within which the 'true' value for the whole group is highly likely to lie. The smaller the range, the more certain the estimate. A 95% confidence level (the most common) means that if we repeated the study and analysis 100 times, 95 of the ranges calculated would include the true value of the population.

Contamination: A potential issue in a trial where the control group is unintentionally exposed to the intervention.

Control group: A group that does not receive the intervention(s) being tested within an RCT design following randomisation. They are monitored alongside the group(s) receiving the intervention(s), and their results are compared to their treatment counterparts to understand what impact the intervention has had, compared to receiving no intervention.

Any changes or effects detected within the control group over the course of the RCT can be interpreted as what would have happened normally.

Correlation: A correlation is a statistical measure that describes the strength and direction of an association between two or more variables. However, it is important to note that correlation does not imply causation, or how much such variables will change when a change is observed in the independent variable.

Covariates: Characteristics of participants (e.g. age, prior qualifications) that are measured at the beginning of a study and can be used in the statistical analysis to account for pre-existing differences between groups.

Descriptive statistics: Statistics used to summarise and describe the main features of a dataset, such as the mean, median, and standard deviation.

Dummy indicators: Also known as dummy variables, these are binary variables (using 0s and 1s) created to include categorical information (like which region a provider is in) in a regression model.

Effect sizes: A standard metric that quantifies the strength of a result. An effect size tells you not just if an intervention worked, but how much it worked, allowing for comparisons between different studies and contexts. Larger effect sizes indicate a stronger effect.

Entry level: Qualifications at entry level provide an introduction to education and can lead to certification of essential skills and knowledge for beginners.

Experimental: An evaluation design where participants are deliberately assigned to groups, ideally through randomisation. By ensuring that there are no systematic differences between the treatment and control groups at the start (such as control groups and treatment groups formed by individuals with very different ages), this design provides the strongest possible evidence that the intervention caused any observed results.

Exploratory analysis: An early analysis of data to find initial patterns or interesting results. Findings from this stage are treated as suggestions that need to be tested properly in a future study, as they have a higher risk of being due to chance.

Feasibility: An assessment of whether a proposed study or intervention can be practically implemented given the available resources, time and logistical constraints. It focuses on practical considerations such as recruitment volumes and data collection processes.

Fidelity: The extent to which an intervention is delivered as intended. It assesses whether what was implemented aligns with the original design, ensuring that the results reflect the true intervention rather than a diluted or altered version.

Guided learning hours: The amount of time a tutor is scheduled to be present to provide specific guidance to learners as part of a course of study.

Hedges' g: Hedges' g is a standardised measure of effect size that expresses the difference between two means in terms of standard deviations. It includes a small correction for bias in small samples, making it slightly more accurate when the sample size is small. Around 0.2 is considered a smaller Hedge's g (a smaller difference between means), and 0.8 is considered a larger Hedge's g (a bigger difference between means).

Impact evaluation: A study designed to determine whether an intervention is the cause of an observed change. It works by comparing the outcomes of participants against a counterfactual – that is an estimate of what would have happened to those same participants had the intervention not taken place.

Impacts: The broader, long-term effects of an intervention on participants and their environment, such as improved employment prospects or sustained changes in teaching practices.

Implementation and Process Evaluation (IPE): A study designed to complement an impact evaluation by examining how the intervention was put into practice. While the impact evaluation measures outcomes, the IPE assesses factors like fidelity and participant engagement to explain why those results occurred.

Imputation: This is the statistical process of replacing missing data with substituted, plausible values.

Individualised Learner Record (ILR): The ILR is an on-going collection of data about learners from training providers in the Further Education (FE) and Skills sector in England. It was used in the adult numeracy trials as a source of administrative data for outcomes such as grades, course completion and progression to further learning.

Intention to treat (ITT): This is a fundamental principle for analysing the results of a randomised controlled trial. It means that all participants are analysed in the group to which they were originally randomised, regardless of whether they actually received the intervention, completed it, or complied with it. This method preserves the benefits of randomisation and avoids bias.

Interaction effects: When the effect of an intervention differs depending on another factor rather than the intervention itself (for example, the impact varies by delivery mode, provider, or learner characteristics). This is also referred to as moderation.

Intercept: In a regression model, the intercept is the predicted value of the outcome variable when all predictor variables are set to zero. It represents a baseline or starting point.

Intervention/ treatment arms: In a trial, the "arms" are the different groups to which participants are assigned. An "intervention arm" or "treatment arm" is any group that receives a specific treatment or intervention being tested.

Intervention: In the context of a trial, an intervention refers to a specific programme, approach, or set of activities being tested for its effectiveness. It represents the treatment or change being implemented with participants, which is then compared against a control group or alternative approach to measure its impact on specified outcomes.

Learner progress: A measure of the change in learner outcomes over the duration of a trial. It can involve tracking of development in areas such as academic performance, confidence, and study skills amongst both the treatment and control groups, enabling comparison of the relative progress of each.

Level 1: Qualifications at level 1 include or are equivalent to GCSE grades 3, 2, or 1 (previously D, E, F or G).

Level 2: Qualifications at Level 2 include or are equivalent to GCSE grades 9, 8, 7, 6, 5, or 4 (previously grade A*, A, B, or C).

Linear regression: A statistical method used to estimate the relationship between an outcome variable (such as GCSE grade) and one or more predictor variables.

Lower bound/Upper bound: These are the lowest and highest values in a confidence interval.

Maths GCSE: An academic qualification typically taken by students in the UK around the age of 15-16, but which can also be taken by people of all ages. It is graded 1-9 with anything above grade 4 considered a pass. The GCSE serves as an important benchmark for further academic and professional pursuits, often required for entry into further education, vocational qualifications, or employment.

Minimal detectable effect sizes (MDES): This is the smallest true effect (or impact) of an intervention that a study has a good chance (usually 80% probability) of detecting as statistically significant. It is calculated before a study is carried out (at the design stage) to determine whether the sample size is sufficient to find a meaningful result.

Ordinal data: A type of categorical data where the categories have a natural, ordered relationship. For example, survey responses like 'No qualifications', 'Entry level', 'Level 1', 'Level 2', and 'Level 3 or above' are ordinal and follow that order.

Outcomes: The specific, measurable results of an intervention that are tracked to evaluate its effectiveness, such as learner pass rates, attendance, and changes in confidence.

Outputs: The immediate, tangible products or services delivered by an intervention as a direct result of its activities. They describe 'what was done' or 'what was produced' rather than the changes that resulted from it. For example, the number of learners who participated in a maths lesson.

Parameter: A numerical value that describes a characteristic of an entire population (e.g. the true average pass rate for all learners). In research, statistics from a sample are used to estimate these population parameters.

Percentage points (ppt): A percentage point is the unit for the absolute arithmetic difference of two percentages. For example, moving from 10% to 12% is an increase of two percentage points.

Probit regression analysis: This is a statistical technique used to model binary (yes/no) or ordinal outcomes. It predicts the probability that an outcome will occur based on a set of predictor variables.

p-value: The p-value, or probability value, is the probability that a result occurred by chance. A small p-value (usually 0.05 or less) suggests the result is 'statistically significant', meaning it is unlikely to be a coincidence.

Qualification-bearing Maths course: This is a Maths course that, upon successful completion, results in a formal qualification.

Randomisation: The process of assigning participants to treatment or control groups using a random mechanism (such as a computer algorithm). This ensures that every participant has an equal probability of assignment, creating groups that are statistically equivalent at the start of the study.

Randomised Controlled Trial (RCT): An evaluation design where participants are randomly assigned to either a treatment group or a control group. This process ensures the groups are statistically equivalent at the start, meaning that any difference in final outcomes can be confidently attributed to the intervention rather than external factors.

Readiness for trial: An assessment of whether an intervention is sufficiently well-developed and stable enough to meet the requirements of a randomised controlled trial, and whether the proposed research methods are feasible.

Recall bias: A systematic error that occurs when people are asked to remember past events or experiences and their memories are incomplete or inaccurate.

Regression model: A statistical tool used to model and analyse the relationship between a dependent variable (the outcome) and one or more independent variables (the predictors).

Robustness check: An analysis to test whether the main results of a study hold up when the methods or assumptions are slightly changed.

Robustness: Whether or not the main results of a study hold up when the methods or assumptions are slightly changed.

Sample frame: The list or source from which a sample of participants is drawn.

Sensitivity analysis: A statistical method used to assess how the results of a study might change if key assumptions or population data were different.

Skewed: This describes a distribution of data that is not symmetrical. A distribution is "skewed" if the data points are not evenly distributed around the average (mean). For example, a sample may be skewed towards having lower levels of qualifications if the sample contains more data entries with lower levels than higher ones.

Standard deviation: This is a measure of the amount of variation or dispersion in a set of values. A low standard deviation means that all values tend to be close to the average (mean), while a high standard deviation means that the values are spread out over a wider range.

Statistically powered: A term describing a study that has a large enough sample size to have a high probability (typically 80% or more) of detecting a real effect if one exists.

Statistically significant: A result is "statistically significant" if it is unlikely to have occurred by random chance alone. Researchers typically set a threshold to make this determination (p-value). It suggests there is a real effect or relationship in the data.

Stratification: The process of dividing a population into distinct subgroups or "strata" (e.g. by region) before randomisation to ensure that each subgroup is appropriately represented in the treatment and control arms.

Technical Steering Group (TSG): A Technical Steering Group was established by DfE to provide advice, guidance and oversight of key design elements of the trials. They also had ownership of technical risks and oversight of final outputs and ethical considerations.

Theory of Change: A model that explains how an intervention is expected to work. It maps the logical pathway from the inputs and activities to the intended short-term outcomes and long-term impacts.

TIDieR framework: TIDieR stands for the Template for Intervention Description and Replication. It is a 12-item checklist and guide designed to improve the completeness and quality of how research interventions are described in publications.

Treatment group: The group of participants randomly assigned to receive the specific programme or policy being tested. Their outcomes are compared against those of the control group to determine if the intervention caused a significant change.

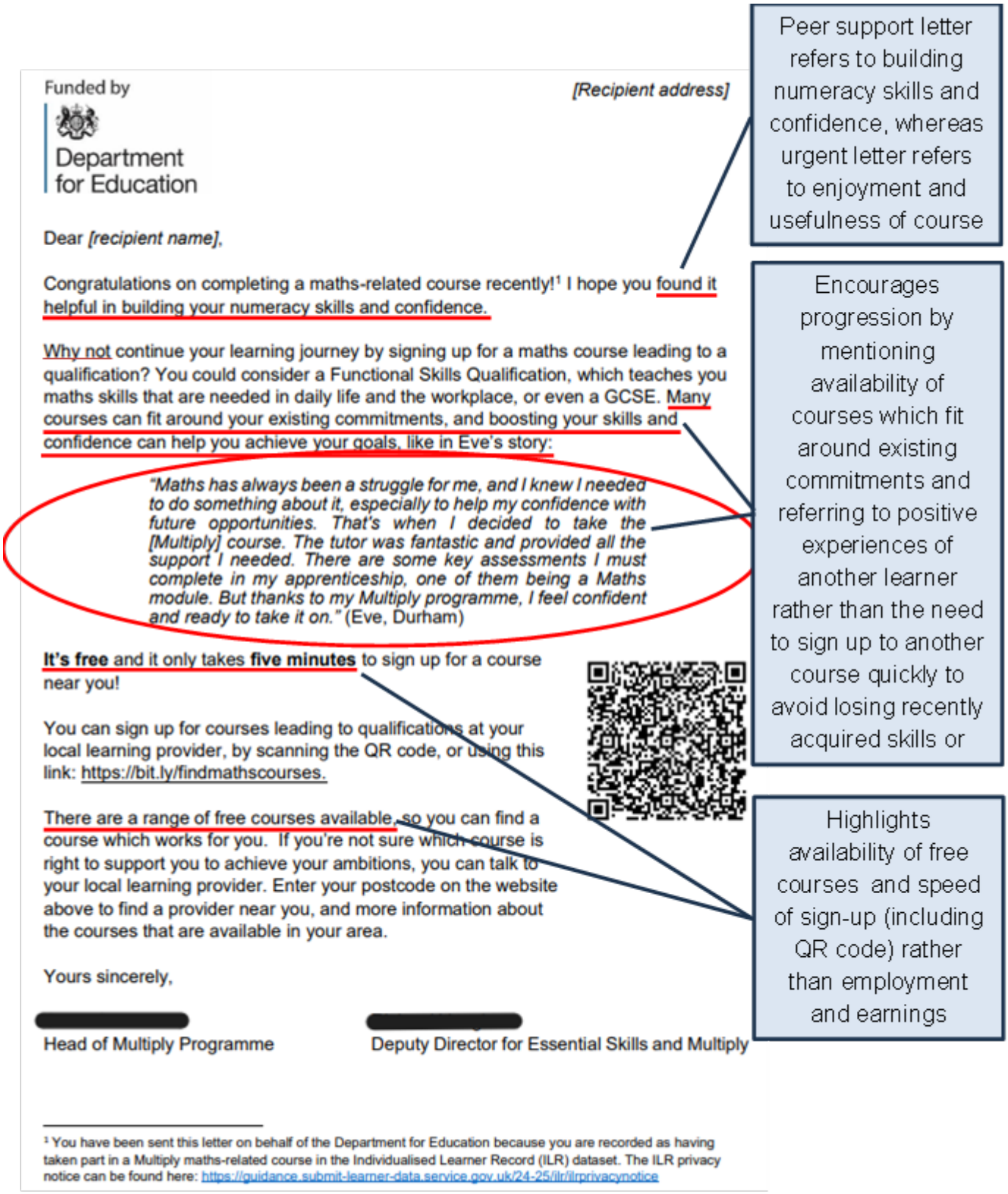
Trial participant: An individual who meets the eligibility criteria, has provided informed consent, and has been formally enrolled or randomised into the study.

ULN: Unique Learner Number. A unique 10-digit number assigned to individuals over the age of 14 involved in education or training in the UK.

Variance: A specific statistical measurement that measures the spread of data points around their average value (the mean). A small variance means the data points are clustered tightly around the average, while a large variance indicates they are more widely scattered.

Appendix 2 Letters for intervention arms

Peer support letter



Funded by

Department for Education

[Recipient address]

Dear *[recipient name]*,

Congratulations on completing a maths-related course recently![1] I hope you found it helpful in building your numeracy skills and confidence.

Why not continue your learning journey by signing up for a maths course leading to a qualification? You could consider a Functional Skills Qualification, which teaches you maths skills that are needed in daily life and the workplace, or even a GCSE. Many courses can fit around your existing commitments, and boosting your skills and confidence can help you achieve your goals, like in Eve's story:

"Maths has always been a struggle for me, and I knew I needed to do something about it, especially to help my confidence with future opportunities. That's when I decided to take the [Multiply] course. The tutor was fantastic and provided all the support I needed. There are some key assessments I must complete in my apprenticeship, one of them being a Maths module. But thanks to my Multiply programme, I feel confident and ready to take it on." (Eve, Durham)

It's free and it only takes **five minutes** to sign up for a course near you!

You can sign up for courses leading to qualifications at your local learning provider, by scanning the QR code, or using this link: https://bit.ly/findmathscourses.

There are a range of free courses available, so you can find a course which works for you. If you're not sure which course is right to support you to achieve your ambitions, you can talk to your local learning provider. Enter your postcode on the website above to find a provider near you, and more information about the courses that are available in your area.

Yours sincerely,

[redacted]
Head of Multiply Programme

[redacted]
Deputy Director for Essential Skills and Multiply

[1] You have been sent this letter on behalf of the Department for Education because you are recorded as having taken part in a Multiply maths-related course in the Individualised Learner Record (ILR) dataset. The ILR privacy notice can be found here: https://guidance.submit-learner-data.service.gov.uk/24-25/ilr/ilrprivacynotice

Peer support letter refers to building numeracy skills and confidence, whereas urgent letter refers to enjoyment and usefulness of course

Encourages progression by mentioning availability of courses which fit around existing commitments and referring to positive experiences of another learner rather than the need to sign up to another course quickly to avoid losing recently acquired skills or

Highlights availability of free courses and speed of sign-up (including QR code) rather than employment and earnings

Urgent letter

Funded by

Department for Education

[Recipient address]

Dear *[recipient name]*,

Congratulations on completing a maths-related course recently![1] I hope you enjoyed it and found it useful!

Take the opportunity **now** to continue your learning journey by signing up for a maths course leading to a qualification – don't miss out and lose the progress you've already made. You could consider a Functional Skills Qualification, which teaches you maths skills that are needed in daily life and the workplace, or even a GCSE.

Improving your skills further could put you on the path to securing employment or a better job. Research by National Numeracy shows that **developing your numeracy skills to a higher level can increase your earnings by over £1000 a year[2].**

Courses are very popular, so why not secure your place **today?** Sign up at your local learning provider, by scanning the QR code, or using this link: https://bit.ly/findmathscourses

Talk to your local learning provider about the best course to support you to achieve your ambitions. Enter your postcode on the website above to find a learning provider near you, and more information about the courses that are available in your area.

Yours sincerely,

[redacted]
Head of Multiply Programme

[redacted]
Deputy Director for Essential Skills and Multiply

[1] You have been sent this letter on behalf of the Department for Education because you are recorded as having taken part in a Multiply maths-related course in the Individualised Learner Record (ILR) dataset. The ILR privacy notice can be found here: https://guidance.submit-learner-data.service.gov.uk/24-25/ilr/ilrprivacynotice

[2] Counting on the Recovery (compressed) FINAL.pdf (nationalnumeracy.org.uk)

Urgent letter refers to enjoyment and usefulness of course whereas peer support letter refers to building numeracy skills and confidence

Emphasises urgency of signing up to a course now to avoid losing progress made or missing out on a place rather than mentioning positive experiences of another learner

Mentions employment and earnings benefits from improving numeracy skills rather than availability of free

Peer support letter (accessible version)

The peer support letter addressed the recipient by name and congratulated them on recently completing a maths-related course and prompted learners to consider continuing their learning journey by signing up for a maths course which would lead to a qualification. The letter suggested a Functional Skills Qualification or a GCSE, emphasising that courses can fit around existing commitment and boost learners' skills and confidence. The letter shared a quote from "Eve", articulating that maths had always been a struggle for her but that Multiply had helped to build her confidence to take on additional maths learning. The letter highlighted the courses were free and easy to sing up, providing both a QR code and a link through which to do this. Finally, the peer support letter described the range of free courses available and potential to choose one which would be right for them, and suggested the learner talk to their local learning provider to discuss options.

Urgent letter (accessible version)

The urgent letter addressed the recipient by name and congratulated them on recently completing a maths-related course and prompted them to take the opportunity "now" to continue their learning journey by signing up to a maths course that would lead to a qualification. The emphasis was on encouraging the learner to not miss out and lose the progress they've already made. The letter suggested learners sign up to a Functional Skills Qualification or a maths GCSE. The letter highlighted that maths skills can improve employment and progression importunities, and points to research from National Numeracy that developing numeracy skills to a higher level can increase annual earnings by over £1,000. Finally, the letter states that courses are popular and prompts learners to sign up "now" through a QR code or link and suggests talking to a local learning provider about the most suitable courses.

Appendix 3 Costs

The total cost of testing and distributing the Peer support and Urgent letters was £43,653.96 (A3 Table 1). This does not include costs incurred by DfE in developing the letters. The letters were tested prior to distribution and the total cost of the user testing was £25,500. This included incentives paid to research participants to provide feedback on the letters, as well as the cost of recruiting participants and the time spent conducting user testing.

It cost £18,153.96 to distribute the letters to the 11,114 learners in the 2 intervention arms. This included the cost of printing the letters and envelopes and postage. The overall cost of testing and distributing the letters equated to £3.93 per learner, of which user testing cost £2.29 each and printing and postage cost £1.63.

A3 Table 1: Costs of testing and distributing letters

Item	Costs
Development of letters	Developed in house (DfE)
Conduct user testing of the letters, includes recruitment fees and user incentives	£25,500.00
Postage and printing (11,114 letters and envelopes)	£18,153.96
Total cost	£43,653.96

Source: Data provided by DfE and Ipsos. Base: 11,114 individuals allocated to each of the 2 intervention arms.

Appendix 4 IPE survey questionnaire

INTRO TEXT

Welcome to this survey which is being carried out by Ipsos on behalf of the Department for Education (DfE).

You are being asked to complete this survey because you previously took part in a Maths-related course and were sent a letter by the DfE. Your answers will help the DfE to improve learning opportunities in the future.

The survey should take about 3 minutes to complete. Taking part in the survey is voluntary and you don't have to answer any questions that you don't want to. The information you provide will be used for research purposes only and it will not be possible to identify you in the research findings.

If you have any queries, please contact the Ipsos research team by emailing EducationTrials@Ipsos.com or calling us for free on 0800 470 2983 and leaving a message with your name and phone number so we can give you a call back.

To find out more, and view the privacy notice, click here: [privacy notice]

To begin the survey, please click next.

DUMMY.LETTERALLOCATED. DATA COMES FROM SAMPLE.

1. Urgent letter (trialarm = Group A)

2. Peer support letter (trialarm = Group B)

ASK ALL. SINGLE CODE.

Q1. Do you remember receiving a letter from the Department for Education in late March or early April 2024?

1. Yes, I remember receiving this letter.

2. No, I don't remember receiving this letter.

ASK ALL WHO REMEMBER RECEIVING LETTER (Q1=1). SINGLE CODE.

Q2. Did you open the letter?

1. Yes, I opened the letter as soon as it arrived.

2. Yes, I opened the letter a few weeks after it arrived.

3. Yes, I opened the letter a few months after it arrived.

4. Yes, I opened the letter after being asked to complete this survey.

5. Yes, I opened the letter before being asked to complete this survey but can't remember when exactly.

6. No, I did not open it.

7. I don't remember whether I opened the letter or not.

DV.OPENED

1. Yes, before survey (Q2=1-3, 5)

2. Yes, during survey (Q2=4)

3. No / DK (Q2=6-7)

ASK ALL WHO OPENED LETTER BEFORE SURVEY (Q2=1-3, 5). SINGLE CODE.

Q3. Did you read the letter?

1. Yes, I read the letter in full.

2. Yes, I skim-read the letter.

3. Yes, I read the letter, but can't remember whether I skim-read it, or read it in full.

4. No, I did not read the letter at all.

5. I don't remember whether I read the letter or not.

DV.READ

1. Yes (Q3 = 1-3)

2. No / DK (Q3-4-5)

ASK ALL. SINGLE CODE.

Q4. Did you sign up for a further course or courses after the Maths-related course you started in September or October 2023?

1. Yes.

2. No.

ASK ALL NOT SIGNED UP TO COURSE (Q4=2). SINGLE CODE

Q5. And are you planning to sign up for a further course or courses in the future?

1. Yes, I plan to sign up to another course in the next 3 months.

2. Yes, I plan to sign up to another course in the next 6 months.

3. Yes, I plan to sign up to another course further in the future.

4. No, I don't plan to sign up to another course.

5. Don't know.

DV.COURSEINFUTURE

1. Yes (Q5 = 1-3)

2. No / Don't know (Q5 = 4-5)

ASK ALL WHO READ LETTER (Q3=1-3). SINGLE CODE.

Q6. Did the letter influence your decision to sign up for a further course?

1. Yes, the letter did influence my decision.

2. No, the letter did not influence my decision.

3. I'm not sure.

ASK IF INFLUENCED BY LETTER (Q6=1). SINGLE CODE.

Q7. How did the letter influence your decision to sign up for a further course?

1. It made me much less likely to sign up to another course.

2. It made me less likely to sign up to another course.

3. It had no influence on signing up to another course.

4. It made me more likely to sign up to another course.

5. It made me much more likely to sign up to another course.

6. Don't know.

DV.INFLUENCE

1. Positive (Q7 = 4-5)

2. Negative (Q7 = 1-2)

3. Neutral (Q7=3)

THANK AND CLOSE. Thank you for taking part in this survey!

Appendix 5 Stata syntax

Syntax for the randomisation

Randomisation of ILR learners into 3 groups

A random number (“1346852533”) was generated from Google's random number generator, setting the range to the limits for seeds in Stata (0 to 2147483647).

```
set seed 1346852533

*Generate a random number for each individual

gen sortorder=runiform()

*Sort individuals in ascending order on the sortorder variable

sort sortorder

*Derive a variable which records the random order
gen treatid=_n

*Assign individuals in the lowest third of the distribution on the sort order variable to group A
egen trialarm = cut(treatid), group(3)
lab define trialarm 0 "Group A" 1 "Group B" 2 "Group C"
lab val trialarm trialarm
lab var trialarm "Trial arm identifer"
```

Randomisation of the groups to select the intervention arms

A random number (‘1333931150’) was generated from Google’s random number generator (0 and 2147483647), setting the range to the limits for seeds in Stata.collapse uln, by(trialarm)

```
set seed 133393115

gen sortorder=runiform()

*Sort groups in ascending order on the sortorder variable

sort sortorder

*Derive a variable which records the random order

gen treatid=_n
```

*Assign group with lowest random number to control group, middle number to peer support letter and highest number to urgent letter

egen trialarm2 = cut(treatid), group(3)

lab define trialarm2 0 "Control Group" 1 "Group 1" 2 "Group 2"

lab val trialarm2 trialarm2

lab var trialarm2 "Trial arm identifer"

lab var treatid "Random sort order used to assign to trial arms"Syntax for the primary outcome analysis

*Analysis comparing peer letter to control trial arm
reg primary_outcome treatpeer r_hiattain if samppeer==1 & uln_record==1

*Analysis comparing urgent letter to control trial arm
reg primary_outcome treaturg r_hiattain if sampurg==1 & uln_record==1

*Analysis comparing intervention to control trial arm
reg primary_outcome treatany r_hiattain if sampany==1 & uln_record==1

Syntax for the first secondary outcome analysis

*Analysis comparing peer letter to control trial arm
reg secout_qual treatpeer r_hiattain if samppeer==1 & uln_record==1

*Analysis comparing urgent letter to control trial arm
reg secout_qual treaturg r_hiattain if sampurg==1 & uln_record==1

*Analysis comparing intervention to control trial arm
reg secout_qual treatany r_hiattain if sampany==1 & uln_record==1

Syntax for the second secondary outcome analysis

*Analysis comparing peer letter to control trial arm
reg secout_math treatpeer r_hiattain if samppeer==1 & uln_record==1

*Analysis comparing urgent letter to control trial arm
reg secout_math treaturg r_hiattain if sampurg==1 & uln_record==1

*Analysis comparing intervention to control trial arm
reg secout_math treatany r_hiattain if sampany==1 & uln_record==1

Appendix 6 Eligibility criteria for the trial and learning aims used in construction of the primary outcome

A6 Table 1: Non-qualification-bearing Learning Aims – eligibility criteria

Learning Aim Title
Multiply (numeracy) provision designed to increase confidence with numbers, as a first step towards formal numeracy qualifications, 2-5 hours
Multiply (numeracy) provision designed to increase confidence with numbers, as a first step towards formal numeracy qualifications, over 5 – 10 hours
Multiply (numeracy) provision designed to increase confidence with numbers, as a first step towards formal numeracy qualifications, over 10 to 20 hours
Multiply (numeracy) provision designed to increase confidence with numbers, as a first step towards formal numeracy qualifications, over 20 to 30 hours
Multiply (numeracy) provision designed to increase confidence with numbers, as a first step towards formal numeracy qualifications, over 30 hours
Multiply (numeracy) provision for parents wanting to increase their numeracy skills in order to help their children, and help with their own progression, 2-5 hours
Multiply (numeracy) provision for parents wanting to increase their numeracy skills in order to help their children, and help with their own progression, over 5 – 10 hours
Multiply (numeracy) provision for parents wanting to increase their numeracy skills in order to help their children, and help with their own progression, over 10 to 20 hours
Multiply (numeracy) provision for parents wanting to increase their numeracy skills in order to help their children, and help with their own progression, over 20 to 30 hours
Multiply (numeracy) provision for parents wanting to increase their numeracy skills in order to help their children, and help with their own progression, over 30 hours
Multiply (numeracy) provision designed to help people use numeracy to manage their money, 2-5 hours
Multiply (numeracy) provision designed to help people use numeracy to manage their money, over 5 – 10 hours
Multiply (numeracy) provision designed to help people use numeracy to manage their money, over 10 to 20 hours
Multiply (numeracy) provision designed to help people use numeracy to manage their money, over 20 to 30 hours
Multiply (numeracy) provision designed to help people use numeracy to manage their money, over 30 hours

Learning Aim Title
Multiply (numeracy) provision aimed at people who can't apply for certain jobs because of lack of numeracy skills and/or to encourage people to upskill in numeracy in order to access a certain job/career, 2-5 hours
Multiply (numeracy) provision aimed at people who can't apply for certain jobs because of lack of numeracy skills and/or to encourage people to upskill in numeracy in order to access a certain job/career, over 5 – 10 hours
Multiply (numeracy) provision aimed at people who can't apply for certain jobs because of lack of numeracy skills and/or to encourage people to upskill in numeracy in order to access a certain job/career, over 10 to 20 hours
Multiply (numeracy) provision aimed at people who can't apply for certain jobs because of lack of numeracy skills and/or to encourage people to upskill in numeracy in order to access a certain job/career, over 20 to 30 hours
Multiply (numeracy) provision aimed at people who can't apply for certain jobs because of lack of numeracy skills and/or to encourage people to upskill in numeracy in order to access a certain job/career, over 30 hours
Multiply (numeracy) provision consisting of additional relevant Maths modules embedded into other vocational courses, 2-5 hours
Multiply (numeracy) provision consisting of additional relevant Maths modules embedded into other vocational courses, over 5 – 10 hours
Multiply (numeracy) provision consisting of additional relevant Maths modules embedded into other vocational courses, over 10 to 20 hours
Multiply (numeracy) provision consisting of additional relevant Maths modules embedded into other vocational courses, over 20 to 30 hours
Multiply (numeracy) provision consisting of additional relevant Maths modules embedded into other vocational courses, over 30 hours
Multiply (numeracy) provision delivered together with employers, including courses designed to cover specific numeracy skills required in the workplace, 2-5 hours
Multiply (numeracy) provision delivered together with employers, including courses designed to cover specific numeracy skills required in the workplace, over 5 – 10 hours
Multiply (numeracy) provision delivered together with employers, including courses designed to cover specific numeracy skills required in the workplace, over 10 to 20 hours
Multiply (numeracy) provision delivered together with employers, including courses designed to cover specific numeracy skills required in the workplace, over 20 to 30 hours

Learning Aim Title
Multiply (numeracy) provision delivered together with employers, including courses designed to cover specific numeracy skills required in the workplace, over 30 hours
Any other Multiply (numeracy) provision not covered above, 2-5 hours
Any other Multiply (numeracy) provision not covered above, over 5 – 10 hours
Any other Multiply (numeracy) provision not covered above, over 10 to 20 hours
Any other Multiply (numeracy) provision not covered above, over 20 to 30 hours
Any other Multiply (numeracy) provision not covered above, over 30 hours

A6 Table 2: Qualification-bearing Maths courses – primary outcome

Qual type	LearnAimRefTitle	NotionalNVQLevel
Functional Skills	Functional Skills Qualification in Mathematics	1
Functional Skills	Functional Skills Qualification in Mathematics	2
Functional Skills	Functional Skills Qualification in Mathematics (Entry 1)	E
Functional Skills	Functional Skills Qualification in Mathematics (Entry 2)	E
Functional Skills	Functional Skills Qualification in Mathematics (Entry 3)	E
Functional Skills	Functional Skills Qualification in Mathematics Level 2	2
Certificate	Certificate in Essential Maths in Everyday Life	1
Certificate	Certificate in Mathematics (Entry 3)	E
Certificate	Certificate in Mathematics (Stepping Stones to Functional Skills)	1
Certificate	Certificate in Mathematics (Stepping Stones to Functional Skills) (Entry 2)	E
Certificate	Certificate in Mathematics (Stepping Stones to Functional Skills) (Entry 3)	E
Certificate	Certificate in Mathematics Skills	1
Certificate	Certificate in Mathematics Skills (Entry 1)	E
Certificate	Certificate in Mathematics Skills (Entry 2)	E
Certificate	Certificate in Mathematics Skills (Entry 3)	E
Certificate	Certificate in The Principles of Using Mathematical Techniques	1
Certificate	Certificate in the Principles of Using Mathematical Techniques (Entry 3)	E
GCSE	GCSE (9-1) in Mathematics	2
QCF Units	Addition of Whole Numbers	E
QCF Units	Data Handling	E
QCF Units	Data Handling: Extracting and Interpreting Data	E

Qual type	LearnAimRefTitle	NotionalNVQLevel
QCF Units	Data Handling: Extracting and Sorting Data	E
QCF Units	Data Handling: Recording and Representing Data	E
QCF Units	Developing and Applying Addition and Subtraction Skills	E
QCF Units	Developing and Applying Decimal Skills	E
QCF Units	Developing and Applying Fraction Skills	E
QCF Units	Developing and Applying Number Skills	E
QCF Units	Division of Whole Numbers	E
QCF Units	Handling data - collect and represent information	E
QCF Units	Handling data - extract and sort data	E
QCF Units	Handling data - extract and use data	E
QCF Units	Handling data - represent information	E
QCF Units	Measure, shape and space - calculate using shape and space	1
QCF Units	Money: Adding and Subtracting	E
QCF Units	Multiplication of Whole Numbers	E
QCF Units	Number - fractions, ratio and proportion	1
QCF Units	Number - positive and negative numbers	1
QCF Units	Subtraction of Whole Numbers	E
QCF Units	Subtraction Skills	E
QCF Units	Understanding and Using Money	E
QCF Units	Understanding Measure: Weight, Capacity and Temperature	E
QCF Units	Understanding Measures	E
QCF Units	Understanding Money and Time	E
QCF Units	Understanding Shape and Space	E
QCF Units	Understanding Volume	1
QCF Units	Using Calculations: Multiplication and Division of Whole Numbers	1
QCF Units	Whole Numbers	E
Award	Award for Proficiency in Number and Measure	1

Qual type	LearnAimRefTitle	NotionalNVQLevel
Award	Award in Mathematics Skills	1
Award	Award in Mathematics Skills - Measure, Shape and Space (Entry 2)	E
Award	Award in Mathematics Skills - Number (Entry 1)	E
Award	Award in Mathematics Skills - Number (Entry 2)	E
Award	Award in Mathematics Skills - Number (Entry 3)	E
Award	Award in Mathematics Skills (Entry 1)	E
Award	Award in Mathematics Skills (Entry 2)	E
Award	Award in Mathematics Skills (Entry 3)	E
Award	Extended Award in Mathematics (Stepping Stones to Functional Skills)	1
Award	Extended Award in Mathematics (Stepping Stones to Functional Skills) (Entry 1)	E
Award	Extended Award in Mathematics (Stepping Stones to Functional Skills) (Entry 2)	E
Award	Extended Award in Mathematics (Stepping Stones to Functional Skills) (Entry 3)	E

Appendix 7 Analysis of balance at baseline

A7 Table 1 reports differences in baseline characteristics for the randomisation sample between learners who were sent the peer support letter and those in the control group, while the right panel reports differences in baseline characteristics for the analysis sample.

A7 Table 1: Absolute standardised differences in baseline characteristics for learners in the peer support letter group compared with the control group

Characteristic	Randomisation sample: Peer support letter mean	Randomisation sample: Control mean	Randomisation sample: Absolute standardised difference	Analysis sample: Peer support letter mean	Analysis sample: Control mean	Analysis sample: Absolute standardised difference
Female	69%	70%	1.1	68%	69%	2.0
Ethnicity: White	48%	48%	0.0	47%	47%	0.8
Ethnicity: Ethnic minority	42%	42%	0.5	45%	45%	0.2
Ethnicity: Missing	10%	10%	0.8	7%	8%	1.9
Ill-health	27%	28%	1.6	28%	28%	0.1
IMD top quintile	35%	35%	0.3	37%	37%	0.2
Prior Attainment: No qualification	25%	25%	1.7	30%	29%	2.0
Prior Attainment: Entry level	19%	20%	1.3	23%	23%	0.6

Characteristic	Randomisation sample: Peer support letter mean	Randomisation sample: Control mean	Randomisation sample: Absolute standardised difference	Analysis sample: Peer support letter mean	Analysis sample: Control mean	Analysis sample: Absolute standardised difference
Prior Attainment: Level 1	12%	12%	0.3	14%	15%	0.3
Prior Attainment: Level 2	12%	13%	2.4	14%	15%	2.6
Prior Attainment: Level 3 or above	16%	16%	0.9	19%	19%	0.9
Prior Attainment: Missing	15%	15%	1.0	-	-	-
Age	41	41	0.5	41	41d	0.6

Base: for the randomisation sample 5,557 for the peer support letter and 5,558 for the control; for the analysis sample 4,546 for the peer support letter and 4,573 for the control.

Source: Individualised Learner Record.

A7 Table 2 reports differences in baseline characteristics between learners who were sent the urgent letter and those assigned to the control group. Again, these were assessed at randomisation (left panel) and for the analysis sample (right panel). Once again, differences in baseline characteristics between the treatment and control groups at both randomisation and in the analysis sample were negligible, indicating that the trial arms were similar in terms of observed characteristics at baseline.

A7 Table 2: Absolute standardised differences in baseline characteristics for learners in the urgent letter group compared with the control group

Characteristic	Randomisation sample: Urgent letter mean	Randomisation sample: Control mean	Randomisation sample: Absolute standardised difference	Analysis sample: Urgent letter mean	Analysis sample: Control mean	Analysis sample: Absolute standardised difference
Female	68%	70%	3.0	68%	69%	2.0
Ethnicity: White	49%	48%	2.4	48%	47%	2.0
Ethnicity: Ethnic minority	40%	42%	2.9	44%	45%	1.9
Ethnicity: Missing	11%	10%	0.8	8%	8%	0.0
Ill-health	28%	28%	0.4	29%	28%	1.8
IMD top quintile	35%	35%	1.4	36%	37%	0.9
Prior Attainment: No qualification	24%	25%	1.9	28%	29%	1.2
Prior Attainment: Entry level	19%	20%	0.9	23%	23%	0.4
Prior Attainment: Level 1	12%	12%	1.8	14%	15%	1.3

Characteristic	Randomisation sample: Urgent letter mean	Randomisation sample: Control mean	Randomisation sample: Absolute standardised difference	Analysis sample: Urgent letter mean	Analysis sample: Control mean	Analysis sample: Absolute standardised difference
Prior Attainment: Level 2	13%	13%	1.8	16%	15%	2.5
Prior Attainment: Level 3 or above	16%	16%	0.5	19%	19%	0.3
Prior Attainment: Missing	16%	15%	3.7	-	-	-
Age	41	41	1.7	41	41	2.2

Source: Individualised Learner Record. Base: for the randomisation sample 5,557 for the urgent letter and 5,558 for the control; for the analysis sample 4,528 for the urgent letter and 4,573 for the control.

Appendix 8 Regression tables

Primary outcome analysis

A8 Table 1: Impact of the peer support letter on starting a qualification-bearing Maths course

Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Impact estimate	0.010 (0.006)	0.120	-0.003	0.022
Prior attainment	-0.009 (0.002)	<0.001***	-0.014	-0.005
Constant	0.114 (0.006)	<0.001***	0.102	0.125

Base: 9,119
* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Individualised Learner Record.

A8 Table 2: Impact of the urgent letter on starting a qualification-bearing Maths course

Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Impact estimate	-0.003 (0.006)	0.590	-0.015	0.009
Prior attainment	-0.007 (0.002)	<0.001***	-0.011	-0.003
Constant	0.110 (0.006)	<0.001***	0.099	0.1221

Base: 9,101.
* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Individualised Learner Record.

A8 Table 3: Impact of either letter on starting a qualification-bearing Maths course

Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Impact estimate	0.003 (0.005)	0.544	-0.007	0.014
Prior attainment	-0.008 (0.002)	<0.001***	-0.012	-0.005
Constant	0.112 (0.005)	<0.001***	0.101	0.122

Base: 13,647
* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Individualised Learner Record.

A8 Table 4: Impact of each letter on starting a qualification-bearing Maths course without controlling for prior attainment

Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Impact estimate for the peer support letter	0.010 (0.006)	0.084	-0.001	0.021
Impact estimate for the urgent letter	-0.003 (0.006)	0.594	-0.014	0.008
Impact estimate for either letter	0.003 (0.005)	0.480	-0.006	0.013

Base: 10,488 for the peer support letter, 10,504 for the urgent letter and 15,743 for any letter.
* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Individualised Learner Record.

Secondary outcome analysis

A8 Table 5: Impact of the peer support letter on starting any qualification-bearing course

Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Impact estimate	-0.004 (0.010)	0.640	-0.023	0.014
Prior attainment	-0.006 (0.003)	0.049*	-0.013	0.000
Constant	0.312 (0.009)	<0.001***	0.295	0.329

Base: 9,119
* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Individualised Learner Record.

A8 Table 6: Impact of the urgent letter on starting any qualification-bearing course

Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Impact estimate	-0.013 (0.010)	0.172	-0.032	0.006
Prior attainment	-0.005 (0.003)	0.109	-0.011	0.001
Constant	0.310 (0.009)	<0.001***	0.293	0.327

Base: 9,101
* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Individualised Learner Record.

A8 Table 7: Impact of either letter on starting any qualification-bearing course

Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Impact estimate	-0.009 (0.008)	0.291	-0.025	0.00
Prior attainment	-0.005 (0.003)	0.064	-0.010	0.000
Constant	0.310 (0.008)	<0.001***	0.294	0.326

Base: 13,647
* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Individualised Learner Record.

A8 Table 8: Impact of letters on starting any qualification-bearing course without controlling for prior attainment

Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Impact estimate for the peer support letter	-0.004 (0.009)	0.648	-0.021	0.013
Impact estimate for the urgent letter	-0.014 (0.009)	0.101	-0.032	0.003
Impact estimate for either letter	-0.009 (0.008)	0.226	-0.024	0.006

Base: 10,488 for the peer support letter, 10,504 for the urgent letter and 15,743 for any letter.
* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Individualised Learner Record.

A8 Table 9: Impact of the peer support letter on starting a qualification-bearing Maths course at Level 2 or above

Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper bound
Impact estimate	0.005 (0.004)	0.271	-0.004	0.013
Prior attainment	0.009 (0.001)	<0.001***	0.006	0.011
Constant	0.029 (0.004)	<0.001***	0.021	0.037

Base: 9,119
* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Individualised Learner Record.

A8 Table 10: Impact of the urgent letter on starting a qualification-bearing Maths course at Level 2 or above

Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper bound
Impact estimate	-0.003 (0.004)	0.442	-0.011	0.005
Prior attainment	0.008 (0.001)	<0.001***	0.005	0.011
Constant	0.030 (0.004)	<0.001***	0.022	0.037

Base is 9,101
* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Individualised Learner Record.

A8 Table 11: Impact of either letter on starting a qualification-bearing Maths course at Level 2 or above

Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper bound
Impact estimate	0.001 (0.004)	0.830	-0.006	0.008
Prior attainment	0.008 (0.001)	<0.001***	0.006	0.011
Constant	0.029 (0.004)	<0.001***	0.022	0.037

Base is 13,647

A8 Table 12: Impact of starting a qualification-bearing Maths course at Level 2 or above, without controlling for prior attainment

Coefficient name	Coefficient (Standard error)	P-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Impact estimate for the peer support letter	0.005 (0.004)	0.170	-0.002	0.013
Impact estimate for the urgent letter	-0.003 (0.004)	0.381	-0.011	0.004
Impact estimate for either letter	0.001 (0.003)	0.750	-0.005	0.008

Base: 10,488 for the peer support letter, 10,504 for the urgent letter and 15,743 for any letter.
* p < 0.05, ** p < 0.01, *** p < 0.001

Source: Individualised Learner Record.

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