Evaluation of the Further mA*ths Online Programme

2021/22 – 2022/23

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1. Executive summary

1.1 Main findings

- This report evaluates the effect of participating in the Further mA*ths Online Programme on students who completed their A-Levels in 2021/22 and 2022/23.
- We look at three outcomes: A-Level further maths grade, likelihood of achieving A or above, and likelihood of achieving A*. Where the sample size is sufficient, impact is also broken by level of engagement with the project.
- This report did not find any conclusive evidence to show that the programme had an impact on these outcomes. While point estimates of the impact on all three outcomes were positive, they were not statistically significant.
- We did not find any conclusive evidence to show that the programme had an impact on students with a higher level of engagement with the project, but we did find some evidence to suggest that the impact on these students may be higher than the impact on participants with low engagement. However, this was not entirely conclusive.
- We did not find any conclusive evidence to show that the programme had an impact on students who participated in the programme for either one or two years. We did not find consistent evidence to show that the impact varied by years of participation.
- The evaluation faced some limitations, notably the small sample size. This may have contributed to the lack of conclusive evidence.

1.2 Methodology

- This evaluation follows a quasi-experimental design. We used student-level data from the National Pupil Database (NPD) to create a matched comparison group, similar to those students who participated in the programme with respect to a set of student and school level variables.
- Participants were matched to non-participants using on nearest neighbour matching based on propensity scores.
- We then used regression models to compare the outcomes of the matched comparison group to participants.

1.3 Limitations

- This evaluation uses a quasi-experimental design, which relies on creating a matched comparison group based on data from the NPD. This means that we are unable to control for factors not recorded in the NPD, such as motivation.
- In particular, we are unable to match based on some of the programme's selection criteria: it targets students who are considering studying a maths-related degree at university, but we have no way of knowing if matched comparison students have similar ambitions.
- The students analysed in this evaluation would have faced significant disruption to their education during the COVID-19 pandemic. Participants would have taken their GCSEs in 2020 and 2021, when public examinations were cancelled and grades were awarded via centre- and teacher-assessed grades. This may have affected the matching and modelling process, in which we controlled for prior attainment at GCSE.

- The low sample size for this evaluation means that inconclusive results were more likely. The low sample size also meant that we were unable to provide estimates of effect for some of the subgroups.
- Achieving an A* in A-Level further maths is a relatively rare event. This means that the minimum detectable effect sizes are smaller for a given sample size than for other outcomes, and means that inconclusive results are more likely.

2. Introduction

The Further mA*ths Online Programme aims to assist A-level further mathematics students who are considering studying a maths-related degree at university. Participating students receive tailored online support, including online mentoring and face-to-face masterclasses at Imperial College London, which runs the programme in collaboration with Mathematics in Education and Industry (MEI) and funded by The Hg Foundation. Students can receive support in Year 12, Year 13 or both.

In this report, we evaluate the impact of the programme on A-Level further maths grade, and specifically on the likelihood of achieving either A or above, or an A* at A-Level further maths. It includes cohorts who completed A-Levels in 2021/22 and 2022/23.

We look at the impact on all participants, as well the impact broken down by their level of engagement in the project.

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2.1 Methodology

This evaluation uses a quasi-experimental design. This involves comparing the outcomes of programme participants to those of a matched comparison group of students who are statistically similar. This approach tries to mimic what would be done in a formal experiment such as a randomised control trial.

We used 1:1 nearest neighbour matching based on propensity scores. Students in the matched comparison group are similar to participants with respect to the following matching variables:

- Attainment at Key Stage 4 (Maths GCSE grade, average overall GCSE grade, Attainment 8 score)
- Student-level measures of disadvantage (% of school terms from Reception to Year 11 in receipt of free school meals, IDACI score)
- Student characteristics (ethnicity, first language, gender)

Participating students were matched to students who completed A-Level further maths in the same year. We then used regression models to compare outcomes for the participants to those in the matched comparison group. We control again for the matching variables in the model; this is known as a doubly robust approach.

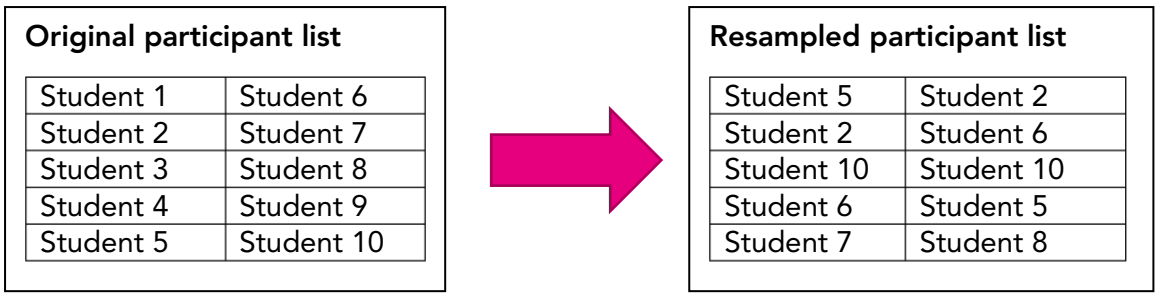
Confidence intervals are estimated using bootstrapping. While it is possible to construct confidence intervals simply by using the standard errors estimated by the regression models, this method only accounts for the uncertainty around the estimate made by the regression model; it does not account for the uncertainty in the matching process. Therefore, confidence intervals created in this way are likely to underestimate the standard errors and produce artificially narrow confidence intervals.

Bootstrapping allows us to take account of both sources of uncertainty. It involves repeatedly creating a new dataset by taking a random sample of participants from the original list, with replacement, then repeating the analysis using the fresh data. The

random sample size will be the same as the size of the original list; if there were 100 participants in a given year, the random sample would also include 100 students, although some participants would be included in the resampled list more than once, and some not at all.

The figure below shows an example of a resampled participant list, drawn from an original list of ten participants.

Figure 1: Resampling example



We repeat the process of creating and analysing new datasets 1,000 times. Our point estimates are found by taking the average of these 1,000 estimates, and the 95% confidence intervals are simply the range in which 95% of the 1,000 estimates lie.

2.2 Data

Imperial College provided a dataset consisting of information on all participating students who completed A-Levels in 2021/22 and 2022/23. This included student identifiers (name and gender) and information on their participation in the programme. This was linked to corresponding records in the National Pupil Database (NPD) and publicly available school level data.

The National Pupil Database is an administrative dataset maintained by the Department for Education, which includes records of achievements in national tests and examinations for all students who have been in state-funded education since 2002. For this evaluation, we used data on attainment at Key Stage 4 and Key Stage 5, as well as some demographic variables.

The original dataset supplied by Imperial consisted of 256 students in total. A small number of students in this dataset could not be matched to data in the NPD, could not be found in the relevant years, or had no data on outcomes available. We excluded these students from this analysis. We also excluded students with no data on available on prior attainment or disadvantage status; this will include any students who did not complete KS4 in a state-funded school in England. The final dataset used consisted of 204 students.

Participants were also broken down by two measures of their engagement with the programme: number of years of participation (one or two), and dosage (low and high). Dosage was defined according to Imperial's own definition based on the number of sessions attended by participants; we chose to group participants into just two dosage groups because of the low sample size for this evaluation. Despite this, sample sizes were still too low for models to be fitted to the data in some cases.

The number of participants in each group are shown in the table below.

Table 1: Participants by level of engagement and cohort

	Years of participation		Dosage	
Cohort	One year	Two years	Low	High
2022	33	29	33	29
2023	108	34	78	64
TOTAL	141	63	111	93

3. Summary statistics and matching

This section begins with some summary statistics about participating students and schools. It will go on to describe the matching process used and how successful it was in creating a group of similar students for comparison purposes.

3.1 Summary statistics

We begin by presenting some statistics on the demographics of programme participants and how they compare to further maths A-Level students nationally.

Table 2: Demographics of participants compared to other further maths A-Level students in state-funded schools in England

		2022		2023	
		M*ths	Other	M*ths	Other
Gender	Female	29%	27%	40%	27%
	Male	71%	73%	60%	73%
EAL	EAL	62%	23%	54%	24%
	Not EAL	38%	77%	46%	76%
Ever Eligible for FSM	Never	54%	91%	63%	91%
	0-50% terms	17%	5%	19%	5%
	50%+ terms	29%	4%	18%	4%
IDACI		0.23	0.12	0.23	0.12

Both further maths students nationally and programme participants were mostly male, although participants who took A-Levels in 2023 included a higher proportion of female students than the national profile. Programme participants were far more likely than further maths students nationally to have English as an additional language, and far more likely to have been eligible for free school meals at some point in their school career.

The next table summarises the prior attainment of participants at Key Stage 4.

Table 3: Prior attainment of participants compared to other further maths A-Level students in state-funded schools in England

	2022		2023	
	M*ths	Other	M*ths	Other
Average maths GCSE grade	8.70	8.66	8.64	8.27
Average overall GCSE grade	7.88	7.88	8.14	7.99
Average Attainment 8 score	81.65	81.02	83.28	79.37

Participants tended to have slightly higher prior attainment than their peers, particularly in GCSE maths.

Finally, we look at how participants' attainment in A-Level further maths compared to A-Level further maths students nationally.

Average A-Level grade is reported in points, with points relating to grade as follows: 60 = A*, 50 = A, 40 = B, 30 = C, 20 = D, 10 = E.

Table 4: Attainment in A-Level further maths compared to other further maths A-Level students in state-funded schools in England

	2022		2023	
	M*ths	Other	M*ths	Other
Average points score	49.05	47.35	45.74	44.26
% achieving A or above	70%	66%	61%	57%
% achieving A*	41%	39%	24%	27%

Among participants and non-participants, grades were higher than in 2022 than in 2023. This is because 2022 was the first year in which public exams returned after their cancellation during the pandemic, and grade boundaries were adjusted upwards slightly to prevent a drastic fall in grades.

In both years, the average grade of participants was higher than that of their peers, and participants were more likely to achieve a grade A or above. However, in 2023 participants were slightly less likely to achieve an A* grade than their peers.

However, as shown in this section, the characteristics and prior attainment of participants are different from that of further maths students nationally, so comparing their outcomes to national averages may be misleading.

3.2 Extent of success in creating matched comparisons

The matching process is intended to create a group of non-participants who are similar to the participating students with respect to student and school characteristics. Any differences in the outcomes of this comparison group and the participating students can then be assumed to be due to the programme.

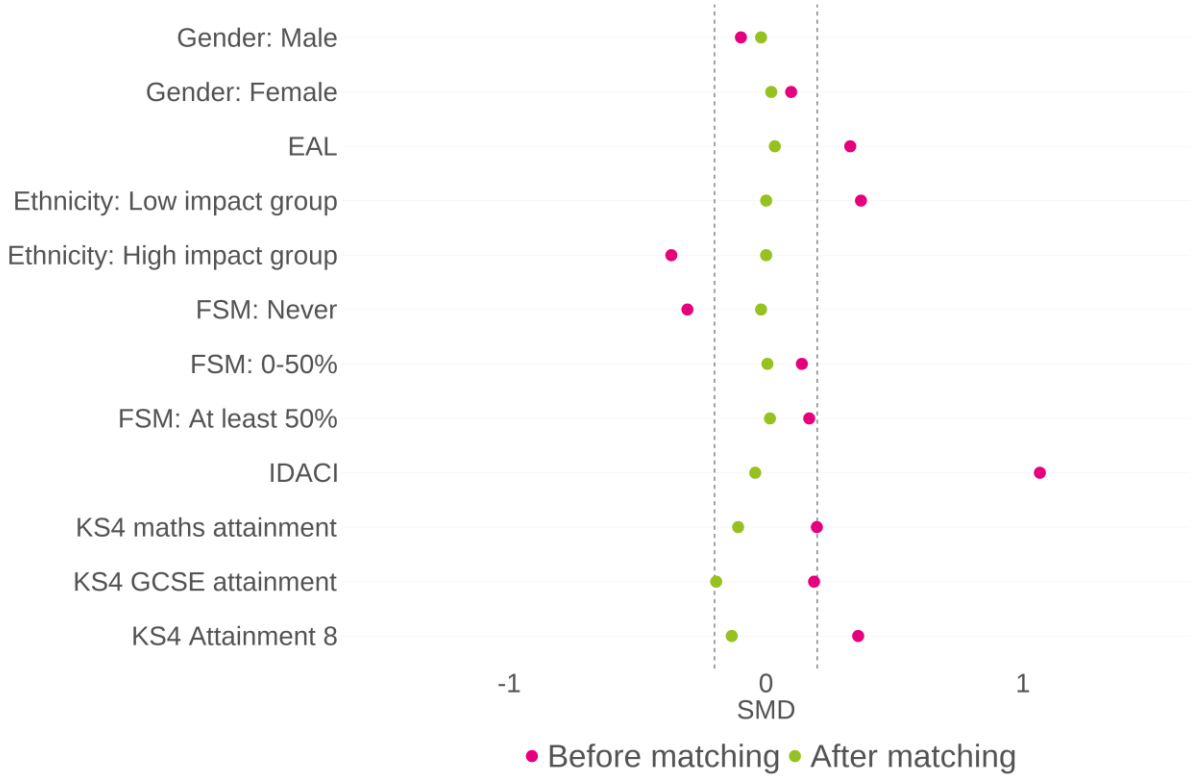
We used 1:1 nearest neighbour matching based on propensity scores to create a matched comparison group for participants.

The graphs in figure 1, known as love plots,[1] show how similar the treated and comparison students were to one another, before and after matching, using a measure called the standardised mean difference. The mean difference is simply the difference between the average value of the variable for the treated students, and the average value for the comparison students. Standardising this measure means that we can compare balance across different variables. Generally, a standardised mean difference of 0.2 or below is considered to indicate good balance. This threshold is shown on the graphs as a dotted line.

As shown in figure 1, the matching process successfully created a well-matched comparison group. The +-0.2 boundaries are shown on the chart as dotted lines.

Figure 2: Standardised mean differences between participants and non-participants, before and after matching

[1] Loveplots are named for Professor Thomas E. Love, who first developed them along with colleagues (https://academic.oup.com/eurheartj/article/27/12/1431/647407)


Gender: Male
Gender: Female
EAL
Ethnicity: Low impact group
Ethnicity: High impact group
FSM: Never
FSM: 0-50%
FSM: At least 50%
IDACI
KS4 maths attainment
KS4 GCSE attainment
KS4 Attainment 8
-1
0
1
SMD
Before matching
After matching

4. Results

Results are given in several different forms: estimated impact, odds ratios, predicted probabilities, effect size, and months of progress.

In this report, we look at outcomes in three areas:

- A-Level grade (measured in points score)
- Likelihood of achieving an A or above in A-Level further maths
- Likelihood of achieving an A* in A-Level further maths

The estimated impact on A-Level grade is reported in points, with points relating to grade as follows: 60 = A*, 50 = A, 40 = B, 30 = C, 20 = D, 10 = E. An estimated impact of ten would suggest that we'd expected a programme participant to achieve one grade higher than a matched non-participant.

We also include estimates of effect size for this outcome. Effect size is a standardised version of the estimated impact. That is, it is the estimated impact divided by the standard deviation in the outcome measure. Because it is a standardised measure, it can be compared across different outcomes, so may be useful for comparing the magnitude of the programme's impact with that of other projects that have different outcomes.

However, effect sizes can be difficult to interpret; it is not immediately obvious whether an effect size of, for example, 0.5 is large or small. Months of progress are a measure used in education research to try and help with this. In this report, effect sizes were translated into equivalent months of progress using guidance developed by the Education Endowment Foundation, as shown in table 3.[2] In our example, an effect size of 0.5 would be the equivalent of six months of additional progress; expressed using the months of progress measure, it is clear that this is a large effect.

Table 5: Effect sizes and equivalent months of progress

Effect size from	To	Months of progress
-0.04	0.04	0
0.05	0.09	1
0.10	0.18	2
0.19	0.26	3
0.27	0.35	4
0.36	0.44	5
0.45	0.52	6
0.53	0.61	7
0.62	0.69	8
0.70	0.78	9
0.79	0.87	10
0.88	0.95	11

[2] https://educationendowmentfoundation.org.uk/projects-and-evaluation/evaluation/evaluation-guidance-and-resources/reporting-templates, *Evaluation report template*, accessed September 2024

The final two outcomes, on the likelihood of achieving top grades in A-Level further maths, are binary; either a student achieves an A*, for example, or they do not. We report the estimated effect on these outcomes using odds ratios. These ratios tell us the relative odds of a student achieving the relevant grade, depending on whether they took part in the programme or not. An odds ratio of one would mean that a programme participant had exactly the same odds of achieving the grade as a comparison student. An odds ratio above one means that a participant is more likely to achieve the grade, and an odds ratio of below one means that they are less likely.

As with effect sizes, odds ratios are not always easy to interpret. To aid with interpretation, we have also included the predicted probability of a participant achieving the relevant grade and the predicted probability of a matched comparison student doing so, for comparison. The predicted probabilities are calculated by producing two predicted probabilities for each student in the dataset, based on their prior attainment and characteristics. The first predicted probability is based on the assumption that the student took part in the programme, and the second on the assumption that they did not. We then calculate the average predicted probability if students were assumed to have taken part, and the average predicted probability if students were assumed not to have done so, and compare the two. If the predicted probability when students are assumed to have taken part is higher, that indicates that the programme had a positive effect.

Overall

A-Level points score

Estimates of the impact of programme participation on A-Level grade are shown in the table below, with 95% confidence intervals (all to two decimal places). Also included in the tables are estimates of effect size and equivalent months of progress.

Note that an estimated effect of ten is the equivalent of a participant achieving one grade higher than a non-participant.

Table 6: Estimated effect of programme participation on A-Level grade, by group

Cohort	Lower CI	Estimate	Upper CI	Effect size	Months of progress	No. students
2022	-2.89	2.23	7.41	0.16	2	124
2023	-1.40	2.02	5.79	0.15	2	284

These results provide do not provide conclusive evidence to show that the programme had an impact on A-Level grade for students in either year. While both estimates are positive, the lower confidence intervals are less than zero. This means that the results are not statistically significant, and we cannot be confident that the programme had any effect on this outcome. However, the relatively high positive point estimates and effect sizes do give a positive indication, although we should be cautious about how these are interpreted as the confidence intervals are quite wide, probably due to the relatively small sample size.

Achieving A or above

Estimates of the impact of programme participation on the likelihood of a student achieving an A or above in A-Level further maths are shown in the table below are shown in the tables below, with 95% confidence intervals (all to two decimal places).

We report the estimated effect on this outcome using odds ratios. These ratios tell us the relative odds of a student achieving an A or above, depending on whether their school took part in the programme or not. An odds ratio of one would mean that a programme participant had exactly the same odds of achieving the grade as a comparison student. An odds ratio above one means that a participant is more likely to achieve the grade, and an odds ratio of below one means that they are less likely.

Table 7: Estimated effect of participation on likelihood of achieving A or above

Cohort	Lower CI	Estimate	Upper CI	No. students
2022	0.36	1.42	4.88	124
2023	0.71	1.38	2.67	284

These results so not provide conclusive evidence to show that the programme had an impact on the likelihood of achieving an A or above on students that completed A-Levels in either 2022 or 2023. While both estimates are above one, the lower confidence intervals are below one. This means that the results are not statistically significant, and we cannot be confident that the programme had any effect on this outcome.

The table below shows the predicted probabilities of all of the students in our sample achieving an A or above in A-Level further maths had they taken part in the programme, and if they had not. These probabilities may be easier to interpret than odds ratios.

Table 8: Predicted probabilities of participating students and matched comparison students achieving A or above

	Predicted probability		No. students	
Cohort	Treated	Comparison	Treated	Comparison
2022	69%	64%	62	62
2023	61%	55%	142	142

Achieving A*

Estimates of the impact of programme participation on the likelihood of a student achieving an A* in A-Level further maths are shown in the table below are shown in the tables below, with 95% confidence intervals (all to two decimal places).

We report the estimated effect on this outcome using odds ratios. These ratios tell us the relative odds of a student achieving an A*, depending on whether their school took part in the programme or not. An odds ratio of one would mean that a programme participant had exactly the same odds of achieving the grade as a comparison student. An odds ratio above one means that a participant is more likely to achieve the grade, and an odds ratio of below one means that they are less likely.

Table 9: Estimated effect of participation on likelihood of achieving A*

Cohort	Lower CI	Estimate	Upper CI	No. students
2022	0.49	1.51	5.38	124
2023	0.48	1.04	2.47	284

As with the other two outcomes, these results do not provide conclusive evidence to show that the programme had an impact on the likelihood of achieving an A* on students that completed A-Levels in either year. While both estimates are above one, albeit only slightly for 2023 entrants, the lower confidence intervals are both below one. This means that the results are not statistically significant, and we cannot be confident that the programme had any effect on this outcome.

The table below shows the predicted probabilities of all of the students in our sample achieving an A* in A-Level further maths had they taken part in the programme, and if they had not. These probabilities may be easier to interpret than odds ratios.

Table 10: Predicted probabilities of participating students and matched comparison students achieving an A*

	Predicted probability		No. students	
Cohort	Treated	Comparison	Treated	Comparison
2022	43%	36%	62	62
2023	25%	24%	142	142

By dosage

A-Level points score

Estimates of the impact of programme participation on A-Level grade are shown in the table below, with 95% confidence intervals (all to two decimal places). Also included in the tables are estimates of effect size and equivalent months of progress.

Note that an estimated effect of ten is the equivalent of a participant achieving one grade higher than a non-participant.

Table 11: Estimated effect of programme participation on A-Level grade, by dosage

Cohort	Dose	Lower CI	Estimate	Upper CI	Effect size	Months of progress	No. students
2022	Low	-5.21	1.98	10.07	0.14	2	66
	High	-4.68	3.20	11.60	0.23	3	58
2023	Low	-4.09	0.66	5.67	0.05	0	156
	High	-1.07	4.14	9.53	0.30	4	128

These results do suggest that the impact on the high dosage group is higher than the impact on the low dosage group, especially for the 2023 cohort. However, none of the estimates are statistically significant and the confidence intervals do overlap to some extent, so we cannot be confident that the programme has an impact on either group.

Achieving A or above

Estimates of the impact of programme participation on the likelihood of a student achieving an A or above in A-Level further maths are shown in the table below are shown in the tables below, with 95% confidence intervals (all to two decimal places).

We report the estimated effect on this outcome using odds ratios. These ratios tell us the relative odds of a student achieving an A or above, depending on whether their school took part in the programme or not. An odds ratio of one would mean that a programme participant had exactly the same odds of achieving the grade as a comparison student. An odds ratio above one means that a participant is more likely to achieve the grade, and an odds ratio of below one means that they are less likely.

In some cases, the sample size was not large enough to fit a reliable model. Where this was the case, the relevant fields are greyed out and marked with 'NA' in the table below.

Table 12: Estimated effect of participation on likelihood of achieving A or above

Cohort	Dose	Lower CI	Estimate	Upper CI	No. students
2022	Low	NA	NA	NA	NA
	High	NA	NA	NA	NA
2023	Low	0.37	1.09	3.04	156
	High	0.72	2.34	8.31	128

Again, there is a much higher point estimate for the high dosage group, which does suggest that the programme is having more of an impact on this group. However, neither

result is significantly significant so we cannot be confident that the programme has an impact on either group.

The table below shows the predicted probabilities of all of the students in our sample achieving an A or above in A-Level further maths had they taken part in the programme, and if they had not. These probabilities may be easier to interpret than odds ratios.

Table 13: Predicted probabilities of participating students and matched comparison students achieving A or above

		Predicted probability		No. students	
Cohort	Dose	Treated	Comparison	Treated	Comparison
2022	Low	NA	NA	NA	NA
	High	NA	NA	NA	NA
2023	Low	55%	54%	68	68
	High	69%	54%	64	64

Achieving A*

Estimates of the impact of programme participation on the likelihood of a student achieving an A* in A-Level further maths are shown in the table below are shown in the tables below, with 95% confidence intervals (all to two decimal places).

We report the estimated effect on this outcome using odds ratios. These ratios tell us the relative odds of a student achieving an A*, depending on whether their school took part in the programme or not. An odds ratio of one would mean that a programme participant had exactly the same odds of achieving the grade as a comparison student. An odds ratio above one means that a participant is more likely to achieve the grade, and an odds ratio of below one means that they are less likely.

In some cases, the sample size was not large enough to fit a reliable model. Where this was the case, the relevant fields are greyed out and marked with 'NA' in the table below.

Table 14: Estimated effect of participation on likelihood of achieving A*

Cohort	Dose	Lower CI	Estimate	Upper CI	No. students
2022	Low	NA	NA	NA	NA
	High	NA	NA	NA	NA
2023	Low	0.21	0.76	2.66	156
	High	0.43	1.54	8.44	128

Again we see a much higher point estimate for the high dosage group, suggesting that the programme may have more of an impact on this group. However, neither estimate is significant, so we cannot be confident that the programme has an impact on either group.

The table below shows the predicted probabilities of all of the students in our sample achieving an A* in A-Level further maths had they taken part in the programme, and if they had not. These probabilities may be easier to interpret than odds ratios.

Table 15: Predicted probabilities of participating students and matched comparison students achieving an A*

		Predicted probability		No. students	
Cohort	Dose	Treated	Comparison	Treated	Comparison
2022	Low	NA	NA	NA	NA
	High	NA	NA	NA	NA
2023	Low	21%	25%	68	68
	High	29%	23%	64	64

By years of participation

This section looked at the estimated impact on participants broken down by their length of participant in the programme.

A-Level points score

Estimates of the impact of programme participation on A-Level grade are shown in the table below, with 95% confidence intervals (all to two decimal places). Also included in the tables are estimates of effect size and equivalent months of progress.

Note that an estimated effect of ten is the equivalent of a participant achieving one grade higher than a non-participant.

Table 16: Estimated effect of programme participation on A-Level grade, by years of participation

Cohort	Participation	Lower CI	Estimate	Upper CI	Effect size	Months of progress	No. students
2022	One year	-7.59	-0.12	7.24	-0.01	0	66
	Two years	-4.00	4.38	12.52	0.31	4	58
2023	One year	-1.03	2.85	7.15	0.21	3	216
	Two years	-7.84	-0.60	7.03	-0.04	0	68

These results present a mixed picture. For those who took A-Levels in 2022, the point estimate is higher for those who participated over two years, but for those who took A-Levels in 2023 it is the other way around. However, none of the estimates are significant, and for entrants from both years, the confidence intervals are wider for the two year estimates are wider than for the one year estimates, and largely overlap. This means that we can't be sure that the impact is different for either cohort of students.

Achieving A or above

Estimates of the impact of programme participation on the likelihood of a student achieving an A or above in A-Level further maths are shown in the table below are shown in the tables below, with 95% confidence intervals (all to two decimal places).

We report the estimated effect on this outcome using odds ratios. These ratios tell us the relative odds of a student achieving an A or above, depending on whether their school took part in the programme or not. An odds ratio of one would mean that a programme participant had exactly the same odds of achieving the grade as a comparison student. An odds ratio above one means that a participant is more likely to achieve the grade, and an odds ratio of below one means that they are less likely.

In some cases, the sample size was not large enough to fit a reliable model. Where this was the case, the relevant fields are greyed out and marked with 'NA' in the table below.

Table 17: Estimated effect of participation on likelihood of achieving A or above

Cohort	Dose	Lower CI	Estimate	Upper CI	No. students
2022	One year	NA	NA	NA	NA
	Two years	NA	NA	NA	NA
2023	One year	0.73	1.61	3.73	216

	Two years	0.09	0.83	5.69	68

Unfortunately, we were unable to fit a reliable model for the 2022 cohort. For the 2023 cohort, the point estimate for the one year participants is much higher than for the two year participants: for the two year participants the estimate is actually below one. However, the confidence interval for the two year estimates is very wide, entirely overlapping with the one year interval. This is probably because of the difference in sample size between the two groups. For these reasons, we can't be sure if there is any difference between the groups.

The table below shows the predicted probabilities of all of the students in our sample achieving an A or above in A-Level further maths had they taken part in the programme, and if they had not. These probabilities may be easier to interpret than odds ratios.

Table 18: Predicted probabilities of participating students and matched comparison students achieving A or above

		Predicted probability		No. students	
Cohort	Dose	Treated	Comparison	Treated	Comparison
2022	One year	NA	NA	NA	NA
	Two years	NA	NA	NA	NA
2023	One year	63%	54%	108	108
	Two years	54%	58%	34	34

Achieving A*

Estimates of the impact of programme participation on the likelihood of a student achieving an A* in A-Level further maths are shown in the table below are shown in the tables below, with 95% confidence intervals (all to two decimal places).

We report the estimated effect on this outcome using odds ratios. These ratios tell us the relative odds of a student achieving an A*, depending on whether their school took part in the programme or not. An odds ratio of one would mean that a programme participant had exactly the same odds of achieving the grade as a comparison student. An odds ratio above one means that a participant is more likely to achieve the grade, and an odds ratio of below one means that they are less likely.

In some cases, the sample size was not large enough to fit a reliable model. Where this was the case, the relevant fields are greyed out and marked with 'NA' in the table below.

Table 19: Estimated effect of participation on likelihood of achieving A*

Cohort	Dose	Lower CI	Estimate	Upper CI	No. students
2022	One year	NA	NA	NA	NA
	Two years	NA	NA	NA	NA
2023	One year	0.45	1.12	3.08	216
	Two years	0.04	0.78	20.70	68

Unfortunately, we were unable to fit a reliable model for the 2022 cohort. For the 2023 cohort, again the point estimate for those participating for one year is higher than for

those participating for two, but as the confidence intervals for the two estimates overlap one another we cannot be sure if there is any difference between the groups.

The table below shows the predicted probabilities of all of the students in our sample achieving an A* in A-Level maths had they taken part in the programme, and if they had not. These probabilities may be easier to interpret than odds ratios.

Table 20: Predicted probabilities of participating students and matched comparison students achieving an A*

		Predicted probability		No. students	
Cohort	Dose	Treated	Comparison	Treated	Comparison
2022	One year	NA	NA	NA	NA
	Two years	NA	NA	NA	NA
2023	One year	25%	23%	108	108
	Two years	25%	27%	34	34

5. Conclusions

5.1 Overview

This report did not find any conclusive evidence to show that the programme had an impact on any of the outcomes. However, we did find some positive indications: point estimates for all three outcomes were positive, but the estimates had wide confidence intervals, meaning that they were not conclusive. This may be a consequence of the relatively small sample size.

Although we did not find evidence of an impact on participants with a high level of engagement with the programme, we did find some evidence to suggest that the impact on this group may be higher than the impact on participants with a low level of engagement. However, for all outcomes expect A-Level points score low sample sizes meant that we were unable to fit models broken down by level of engagement for participants who completed A-Levels in 2023, so these results were limited to the 2023 cohort. The estimates also had wide and somewhat overlapping confidence intervals, meaning that we cannot be entirely confident that there were differences between the groups.

We did not find any consistent evidence to show that the impact of the programme varied by the number of years over which participants took part. Again, low sample sizes meant that we were unable to fit models for both cohorts for some of the outcomes, and confidence intervals for the two groups overlapped. We also saw inconsistent differences in point estimates, with those for one year participants being higher in some cases, and for two year participants in others.

5.2 Limitations

This evaluation uses a quasi-experimental design; it relies on creating a matched comparison group that is statistically similar to the programme participants, based on data from the NPD. Creating a comparison group in this way means that we are unable to control for factors not recorded in the NPD. In particular, we are unable to match based on some of the programme's selection criteria: it targets students who are considering studying a maths-related degree at university, but we have no way of knowing if matched comparison students have similar ambitions.

The students analysed in this evaluation would have faced significant disruption to their education during the COVID-19 pandemic. Participants would have taken their GCSEs in 2020 and 2021, when public examinations were cancelled and grades were awarded via centre- and teacher-assessed grades. This may have affected the matching and modelling process, in which we controlled for prior attainment at GCSE.

The low sample size for this evaluation means that inconclusive results were more likely. This also meant that we were unable to provide estimates of effect for some of the subgroups.

Achieving an A* in A-Level further maths is a relatively rare event. This means that the minimum detectable effect sizes are smaller for a given sample size than for other outcomes, and means that inconclusive results are more likely.