WHAT WORKS AT KEY STAGE 4 IN TERMS OF IMPROVING GCSE OUTCOMES, TWO OR THREE YEARS OF STUDY?

Further Appendices

November 2022

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The Education Endowment Foundation (EEF) is an independent grant-making charity dedicated to breaking the link between family income and educational achievement, ensuring that children from all backgrounds can fulfil their potential and make the most of their talents.

The EEF aims to raise the attainment of children facing disadvantage by:

- identifying promising educational innovations that address the needs of disadvantaged children in primary and secondary schools in England;
- evaluating these innovations to extend and secure the evidence on what works and can be made to work at scale; and
- encouraging schools, government, charities, and others to apply evidence and adopt innovations found to be effective.

The EEF was established in 2011 by the Sutton Trust as lead charity in partnership with Impetus Trust (now part of Impetus - Private Equity Foundation) and received a founding £125m grant from the Department for Education. Together, the EEF and Sutton Trust are the government-designated What Works Centre for improving education outcomes for school-aged children.

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What works at Key Stage 4, two or three years of study? A School Choices project

Thank you for your interest in this survey. Our team at NFER is conducting an independent, exploratory study, investigating how schools organise their key stage 4 (KS4) curriculum. This study is funded by the Education Endowment Foundation.

We would be grateful if you could complete our short questionnaire – you will be shown **around 10 brief questions**. It would be fantastic if you could complete all of the questions, but if you are really short on time it would help us even if you are only able to complete the first 6-7 questions. You will see a screen partway through the survey where you can choose to finish the survey if you wish.

Why are we asking these questions?

We know from recent studies that some schools have opted to teach at least some of KS4 over three years, rather than two. This survey will help us understand how prevalent this approach is. We would like to hear from as many secondary schools as possible.

The information will be matched to publically available datasets and we will conduct analysis to compare the performance of schools teaching KS4 over two years with those teaching KS4 over three years.

We hope that this will provide useful information for schools considering the length of their KS4. We will produce a report based on the findings, which will be published on the EEF website.

Who should complete these questions?

We would like just one person to complete this per school. Ideally they will:

- be part of the senior leadership team
- have knowledge of the KS4 curriculum in the school, and, if there has been a change in length of KS4, know when that change occurred.

If you have any questions, please contact [contact details to be added]

Your participation will be anonymous; no individuals or schools will be identified as part of this research. You can find a copy of our Privacy Notice here. By answering questions in this survey you are agreeing that we can use your responses for research purposes.

Thank you very much in advance for your help.

Q1 – SR, Ask All, Mandatory				
1	As of the 2019/20 academic year, in which year group do pupils start formally studying the KS4 curriculum in your school?*	(please select one only)	1	All pupils start formal KS4 study of all subjects in Year 10
			2	All pupils start formal KS4 study of all subjects in Year 9
			3	All pupils start formal KS4 study of some subjects in Year 9 (and the rest of their subjects in Year 10)
			4	Some pupils start formal KS4 study in Year 9 and some pupils start formal KS4 study in Year 10

*by this we mean the earliest year in which your school's pupils start the KS4 curriculum (this could be at any point in that year). This could be to study towards GCSEs or other equivalent qualifications.

Please do not include any examples/instances of preparation for KS4 within your school's KS3 curriculum.

We are interested in your school's policy/usual practice for KS4 (rather than any special arrangements that may be put in place for a few pupils on an ad hoc basis).

Q2 – MR, Ask if Q1=3 (start in Y9, some subjects), Mandatory				
2	Please select all of the subjects for which your school's pupils start to study the KS4 curriculum in Year 9. Please do not include any examples/instances of preparation for KS4 within your school's KS3 curriculum	(please select all that apply)	1	English
			2	Maths
			3	Science
			4	Humanities subjects (e.g. history, geography)
			5	Modern foreign languages
			6	Art
			7	Music
			8	Technology
			9	Other (please type one subject area per box)
	If the subject is not listed, you can add up to five additional subject areas in the free text boxes at the bottom of the list		10	
			11	
			12	
			13	

Q3 – SR, Ask if Q1=2 or Q1=3 or Q1= 4 (start in Yr 9 some/all subjects), Gentle prompt				
3	In which term of Year 9 do pupils start studying the KS4 curriculum?	(please select one only)	1	Autumn term
			2	Spring term
			3	Summer term
			4	Not sure

Q4a – SR, Ask if Q1=2 or Q1=3 or Q1= 4 (start in Yr 9 some/all subjects), Mandatory				
4a	When your school made the change to a three year KS4, did all subjects make the change at the same time?		1	Yes
			2	No, some subjects adopted a 3 year KS4/started in Year 9 before others
			3	Not sure

Q4 – SR, Ask if Q1=2,3, or 4 (year 9 all/some pupils), Mandatory				
4	Please indicate when your school first started teaching the Key Stage 4 curriculum from Year 9 *(i.e. the academic year in which the first Year 9 cohort commenced KS4.* [Only show if Q4a = no(2) OR if Q1=4]*This could be for all or some subjects. If your school staggered this over a few years for a few subjects, please mark the earliest year that year 9 started to study KS4 for any subject)*	(please select one only)	1	2010/11 or earlier
			2	2011/12
			3	2012/13
			4	2013/14
			5	2014/15
			6	2015/16
			7	2016/17
			8	2017/18
			9	2018/19
			10	2019/20
			11	Not sure

Q4b – GRID, single response per column, Mandatory, Ask if Q4a=no (2) and Q4 does not = not sure (11) and [Q1= 2 or Q1= 3] If they answered Q2, then only show the subjects ticked.											
Earlier you indicated that subjects adopted a three year KS4 at different times. Please indicate the year in which each of the subjects shown first adopted a three year KS4.				**English**	**Maths**	**Science**	**Humanities (e.g. history, geography)**	**Modern foreign languages**	**Art**	**Music**	**Technology**
	(please select one per row)	1	2010/11 or earlier								
		2	2011/12								
		3	2012/13								
		4	2013/14								
		5	2014/15								
		6	2015/16								
		7	2016/17								
		8	2017/18								
		9	2018/19								
		10	2019/20								
		11	Not sure								

Q5 – SR, Ask if Q1=1 (start in Yr 10), Mandatory				
5	To your knowledge, has your school had a 2 year KS4 since the 2010/11 academic year?	(please select one only)	1	Yes – all pupils have always started KS4 in year 10 since 2010/11
			2	No – at some point pupils started KS4 in year 9
			3	Not sure

Q6 – SR, Ask All, Gentle prompt				
6	What is your role?	(please select one only)	1	Headteacher (including Executive Headteacher)
			2	Senior Leader (including Deputy and Assistant Headteacher)
			3	Middle Leader
			4	Teacher
			5	Other (please specify)

Q7 – SR, Ask All, Gentle prompt				
7	How long have you worked at your current school?	(please tick one box)	1	I joined this academic year/less than one year
			2	1-2 years
			3	3-4 years
			4	5-6 years
			5	7-8 years
			6	9-10 years
			7	11 years or more

Thank you for completing the questions so far. If you have time, we would be grateful if you could complete a few more – there are no more than 4 questions left. The remaining questions ask about the reasons behind the way your school organises KS4, and your school's future plans for KS4.

If you would like to continue, please click: Continue

If you would prefer to end the survey now, please click: End survey

Q8 – OR, Ask If Q1=4 (some yr9/some yr10), Gentle prompt		
8	Please briefly describe how the school decides which pupils will start KS4 in year 9 and which pupils will start KS4 in year 10	(please write your response in the box below)

Q9 – SR, Ask if Q5=2 (Y10 but pupils started in Y9 in the past), Gentle prompt				
9	Earlier you told us that although your KS4 currently starts in Year 10, your school used to start teaching KS4 in Year 9. Please indicate when your school reverted to teaching the Key Stage 4 curriculum from Year 10 (i.e. when did KS4 change back from three to two years?)	(please select one only)	1	2010/11 or earlier
			2	2011/12
			3	2012/13
			4	2013/14
			5	2014/15
			6	2015/16
			7	2016/17
			8	2017/18
			9	2018/19
			10	2019/20

Q10 – OR, Ask all, Gentle prompt		
10	We would like to understand why different schools organise KS4 in different ways. Please tell us briefly, in your own words, why your school offers a [two/three] year KS4. Please tell us even if you think the answer is obvious.	(please write your response in the box below)

Q11A – SR, Ask if Q1=1 (start in Yr 10), Gentle prompt				
11A	Does your school have any plans to start teaching KS 4 from year 9 in the future? (this could be for some or all subjects)	(please select one only)	1	Yes, the school is planning to introduce a three year KS4 starting in Year 9
			2	We are considering changing the length of KS4 but have not made any firm plans
			3	We considered it in the past, and decided against it. We will continue to commence teaching KS4 in year 10.
			4	No, we have not considered it and will continue to commence teaching KS4 in year 10
			5	Not sure

Q11B – OR, Ask if Q1=1 (start in Yr 10),, Gentle prompt		
11B	Please tell us more about the factors related to this in the box below:	(please write your response in the box below)

Q12A – SR, Ask if Q1=2,3, or 4 (start in Yr 9 all/some subjects/all some pupils), Gentle prompt				
12A	Does your school have any plans to move back to a two-year KS4? (this could be for all or some subjects)	(please select one only)	1	Yes, the school is planning to re-introduce a two year KS4 starting in Year 10
			2	We are considering changing the length of KS4 but have not made any firm plans
			3	We considered it in the past, and decided against it. We will continue to commence teaching KS4 in year 9.
			4	No, we have not considered it and will continue to commence teaching KS4 in year 9
			5	Not sure

Q12B – OR, Q1=2,3, or 4 (start in Yr 9 all/some subjects/all some pupils), Gentle prompt		
12B	Please tell us more about the factors related to this in the box below:	(please write your response in the box below)

Show all:

Thank you for completing the survey.

Appendix D: Privacy Notice

Research project: What works at Key Stage 4, two or three years of study? A School Choices project

Privacy notice for teachers and schools

1 Why are we collecting this data?

The aim of the study is to find out if the length of key stage 4 (KS4) has an impact on pupil attainment. The National Foundation for Educational Research (NFER) is collecting personal data to enable us to conduct the research project.

The Education Endowment Foundation (EEF) have funded this research. NFER is the data controller.

2 What is the legal basis for processing activities?

The legal basis for processing personal data is covered by GDPR Article 6 (1) (f):

Legitimate interests: the processing is necessary for your (or a third party's) legitimate interests unless there is a good reason to protect the individual's personal data which overrides those legitimate interests.

We have carried out a legitimate interest assessment, which demonstrates that the evaluation fulfils one of NFER's core business purposes (undertaking research, evaluation and information activities). It has broader societal benefits and will contribute to improving the lives of learners by providing evidence about the impact of the length of KS4 on pupil attainment, and the perceived impacts on pupils' wellbeing.

3 What personal data is being collected by this project and how is it being obtained?

The online survey will be hosted in the Questback survey tool and it will be sent to schools using their publically available contact details. Respondents' role and length of time working at the school will be collected in the survey to aid the validation process.

If a school would like to take part in a case study, the survey will collect personal data from teachers/senior leaders in order to arrange the visit, i.e. name, role and contact details. The contact person's name and contact details will only be used to arrange the case study visits (by a researcher) in a sample of responding schools.

None of this personal data will be shared with the EEF archive at the end of the project.

We will not be collecting any personal data about pupils; the project will only use de-identified data from the National Pupil Database (NPD).

4 Who will personal data be shared with?

No personal data will be shared with EEF at the end of the trial. School-level information about how schools organise their KS4 provision will be uploaded to the EEF archive at the end of the trial to allow for further secondary analysis.

We will not share personal data collected through case studies with other organisations.

We will not use pupil or teacher names or the name of any school in any report arising from the research.

Questback

The survey is hosted and delivered by our third party provider, Questback. You can find their privacy notice here: **https://www.questback.com/data-privacy/privacy-policy/**

5 Is personal data being transferred outside of the European Economic Areas (EEA)?

No personal data is stored or transferred outside of the EEA.

6 How long will personal data be retained?

Data is not kept longer than is necessary and is deleted in accordance with NFER's internal policy.

NFER will delete any personal data within 2 months of publication of the final report (which is due to take place in November 2021).

7 Can I stop my personal data being used?

NFER handles personal data in accordance with the rights given to individuals under data protection legislation. If at any time you wish us to withdraw your data or correct errors in it, please contact **ks4length@nfer.ac.uk.**

In certain circumstances, data subjects have the right to restrict or object to processing. They also have the right to make a subject access request to see all the information held about them. NFER will cooperate fully when a subject access request (SAR) is made of a data controller. To exercise these rights, please contact our **Compliance Officer: compliance@nfer.ac.uk.**

8 Who can I contact about this project?

NFER is responsible for the day-to-day management of the trial. If you have any queries please contact Dan Finn or Kathryn Hurd on 01753 637096 or ks4length@nfer.ac.uk

If you have a concern about the way this project processes personal data, we request that you raise your concern with us in the first instance (see the details above). Alternatively, you can contact the

Information Commissioner's Office, the body responsible for enforcing data protection legislation in the UK, at **https://ico.org.uk/concerns/**.

10 Last updated

We may need to update this privacy notice periodically so we recommend that you revisit this information from time to time. This version was last updated on 18th December 2020.

Appendix E: Matching Exercise Results

The tables below explore the different matching strategies that are mentioned in the report. For each year of conversion, we ran the following matching strategies:

1) Study plan – a 1:1 nearest neighbour matching strategy without replacement and the caliper set to 0.2
2) Nearest- a 1:5 nearest neighbour matching strategy without replacement
3) Optimal- a 1:5 optimal pairing strategy without replacement
4) Final- a 1:5 nearest neighbour and exact matching (by region and attainment) strategy without replacement.

Each match produces three results; mean treated (mean of three-year KS4 schools for each covariate), means control (mean of two-year KS4 schools for each covariate), and standardised mean difference (The standardized mean difference (SMD) is the difference in the means of each covariate between treatment groups standardized by a standardization factor so that it is on the same scale for all covariates). The most appropriate match to select is the match that produces the smallest SMD for each variable as well as enough schools matching to be powered. Tables A-E below shows some columns that are blank which indicate that the match was unsuccessful. In some matching strategies nearest and optimal, the matching strategy was ignored and so the values after the match were the same as before. Also, some of the matches that had the smallest overall SMD were actually poor matches with only one school in the two-year KS4 group matching successfully. Table F below shows the number of three-year KS4 schools that successfully matched to two-year KS4 schools. Using the findings below, the most appropriate matching strategy was the 'final' matching strategy as this resulted in a suitable number of matches and the SMD for each covariate overall were ideal.

We also considered alternative matching strategies (full matching, exact by attainment only) and they presented a few problems. In both cases, several arguments that were used in the matching such as the ratio, order of matching and matching strategy were ignored which resulted in either no matches or poor matches. As result of this, results from these matches were not included.

Table 1: Balance statistics in the final sample compared to in the unmatched sample and alternatives (2011/12)

	Before match			Study plan match			Nearest match			Optimal matching			Final match		
Variable of interest	Means Treated	Means Control	Std. Mean Diff.	Means Treated	Means Control	Std. Mean Diff.	Means Treated	Means Control	Std. Mean Diff.	Means Treated	Means Control	Std. Mean Diff.	Means Treated	Means Control	Std. Mean Diff.
distance	0.929	0.005	4.885	0.5	0.5	0	0.929	0.014	4.838	0.929	0.014	4.838	0.929	0.024	4.788
Region12North East	0.000	0.096	-0.336	0	0	0	0.000	0.029	-0.100	0.000	0.029	-0.100	0.000	0.000	0.000
Region12North West/Merseyside	0.000	0.138	-0.413	0	0	0	0.000	0.086	-0.256	0.000	0.143	-0.427	0.000	0.000	0.000
Region12Yorkshire & The Humber	0.000	0.053	-0.245	0	0	0	0.000	0.029	-0.132	0.000	0.000	0.000	0.000	0.000	0.000
Region12East Midlands	0.000	0.032	-0.188	0	0	0	0.000	0.029	-0.168	0.000	0.029	-0.168	0.000	0.000	0.000
Region12West Midlands	0.000	0.074	-0.293	0	0	0	0.000	0.086	-0.337	0.000	0.086	-0.337	0.000	0.000	0.000
Region12Eastern	0.286	0.191	0.209	1	1	0	0.286	0.286	0.000	0.286	0.314	-0.063	0.286	0.286	0.000
Region12London	0.429	0.106	0.651	0	0	0	0.429	0.286	0.289	0.429	0.057	0.751	0.429	0.429	0.000
Region12South East	0.143	0.138	0.013	0	0	0	0.143	0.086	0.163	0.143	0.200	-0.163	0.143	0.143	0.000

Region12South West	0.143	0.170	-0.078	0	0	0	0.143	0.086	0.163	0.143	0.143	0.000	0.143	0.143	0.000
nschsize12Lowest band	0.000	0.032	-0.188	0	0	0	0.000	0.029	-0.168	0.000	0.029	-0.168	0.000	0.000	0.000
nschsize122nd lowest band	0.143	0.362	-0.625	0	0	0	0.143	0.200	-0.163	0.143	0.457	-0.898	0.143	0.267	-0.354
nschsize12Middle band	0.571	0.489	0.166	1	1	0	0.571	0.657	-0.173	0.571	0.457	0.231	0.571	0.662	-0.183
nschsize122nd highest band	0.286	0.106	0.397	0	0	0	0.286	0.086	0.443	0.286	0.029	0.569	0.286	0.071	0.474
nschsize12Highest band	0.000	0.011	-0.107	0	0	0	0.000	0.029	-0.289	0.000	0.029	-0.289	0.000	0.000	0.000
Ntot8GCSE12Lowest band	0.000	0.085	-0.315	0	0	0	0.000	0.114	-0.423	0.000	0.086	-0.317	0.000	0.000	0.000
Ntot8GCSE122nd lowest band	0.143	0.213	-0.200	1	1	0	0.143	0.171	-0.082	0.143	0.229	-0.245	0.143	0.143	0.000
Ntot8GCSE12Middle band	0.571	0.234	0.682	0	0	0	0.571	0.257	0.635	0.571	0.286	0.577	0.571	0.571	0.000
Ntot8GCSE122nd highest band	0.143	0.277	-0.382	0	0	0	0.143	0.229	-0.245	0.143	0.229	-0.245	0.143	0.143	0.000
Ntot8GCSE12Highest band	0.143	0.191	-0.139	0	0	0	0.143	0.229	-0.245	0.143	0.171	-0.082	0.143	0.143	0.000
sectype12Middle	0.000	0.000	0.000	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

sectype12Comprehensive to 16	0.143	0.170	-0.078	0	0	0	0.143	0.086	0.163	0.143	0.143	0.000	0.143	0.000	0.408
sectype12Comprehensive to 18	0.000	0.223	-0.551	0	0	0	0.000	0.171	-0.422	0.000	0.200	-0.493	0.000	0.300	-0.739
sectype12Other Secondary schools	0.000	0.011	-0.107	0	0	0	0.000	0.029	-0.289	0.000	0.000	0.000	0.000	0.048	-0.481
sectype12Grammar	0.143	0.096	0.135	0	0	0	0.143	0.114	0.082	0.143	0.086	0.163	0.143	0.048	0.272
sectype12Other type	0.714	0.500	0.474	1	1	0	0.714	0.600	0.253	0.714	0.571	0.316	0.714	0.605	0.242
fsm12Lowest 20%	0.143	0.351	-0.595	0	0	0	0.143	0.429	-0.816	0.143	0.314	-0.490	0.143	0.357	-0.612
fsm122nd lowest 20%	0.000	0.309	-0.682	0	0	0	0.000	0.171	-0.379	0.000	0.429	-0.947			0.000
fsm12Middle 20%	0.429	0.191	0.479	1	1	0	0.429	0.171	0.520	0.429	0.171	0.520			0.012
fsm122nd highest 20%	0.286	0.106	0.397	0	0	0	0.286	0.171	0.253	0.286	0.057	0.506			0.161
fsm12Highest 20%	0.143	0.043	0.287	0	0	0	0.143	0.057	0.245	0.143	0.029	0.327			0.053

Source: NFER proforma (2020/21)

Table 2: Balance statistics in the final sample compared to in the unmatched sample and alternatives (2012/13)

	Before match			Study plan match			Nearest match			Optimal matching			Final match		
Variable of interest	Means Treated	Means Control	Std. Mean Diff.	Means Treated	Means Control	Std. Mean Diff.	Means Treated	Means Control	Std. Mean Diff.	Means Treated	Means Control	Std. Mean Diff.	Means Treated	Means Control	Std. Mean Diff.
distance	0.857	0.013	3.459	0.5	0.5	0	0.857	0.029	3.396	0.857	0.029	3.396	0.917	0.021	3.672
Region12East Midlands	0.000	0.039	-0.211	0	0	0	0.000	0.029	-0.153	0.000	0.029	-0.153	0.000	0.000	0.000
Region12Eastern	0.143	0.132	0.032	0	0	0	0.143	0.171	-0.082	0.143	0.171	-0.082	0.167	0.167	0.000
Region12London	0.143	0.079	0.183	0.5	0.5	0	0.143	0.143	0.000	0.143	0.057	0.245	0.167	0.167	0.000
Region12North East	0.143	0.118	0.070	0.5	0.5	0	0.143	0.086	0.163	0.143	0.143	0.000	0.167	0.167	0.000
Region12North West/Merseyside	0.143	0.171	-0.081	0	0	0	0.143	0.171	-0.082	0.143	0.200	-0.163	0.000	0.000	0.000
Region12South East	0.286	0.132	0.341	0	0	0	0.286	0.200	0.190	0.286	0.143	0.316	0.333	0.333	0.000
Region12South West	0.000	0.171	-0.471	0	0	0	0.000	0.029	-0.079	0.000	0.086	-0.236	0.000	0.000	0.000
Region12West Midlands	0.143	0.092	0.145	0	0	0	0.143	0.143	0.000	0.143	0.171	-0.082	0.167	0.167	0.000
Region12Yorkshire & The Humber	0.000	0.066	-0.277	0	0	0	0.000	0.029	-0.120	0.000	0.000	0.000	0.000	0.000	0.000

nschsize122nd highest band	0.286	0.118	0.370	0.5	0.5	0	0.286	0.200	0.190	0.286	0.057	0.506	0.333	0.153	0.400
nschsize122nd lowest band	0.286	0.395	-0.241	0	0	0	0.286	0.314	-0.063	0.286	0.571	-0.632	0.167	0.292	-0.277
nschsize12Highest band	0.000	0.013	-0.121	0	0	0	0.000	0.029	-0.262	0.000	0.029	-0.262	0.000	0.056	-0.509
nschsize12Lowest band	0.000	0.039	-0.211	0	0	0	0.000	0.029	-0.153	0.000	0.057	-0.306	0.000	0.000	0.000
nschsize12Middle band	0.429	0.434	-0.011	0.5	0.5	0	0.429	0.429	0.000	0.429	0.286	0.289	0.500	0.500	0.000
Ntot8GCSE122nd highest band	0.143	0.316	-0.494	0.5	0.5	0	0.143	0.286	-0.408	0.143	0.286	-0.408	0.167	0.458	-0.834
Ntot8GCSE122nd lowest band	0.429	0.224	0.414	0.5	0.5	0	0.429	0.229	0.404	0.429	0.143	0.577	0.500	0.278	0.449
Ntot8GCSE12Highest band	0.000	0.197	-0.513	0	0	0	0.000	0.200	-0.520	0.000	0.200	-0.520	0.000	0.000	0.000
Ntot8GCSE12Lowest band	0.000	0.105	-0.357	0	0	0	0.000	0.114	-0.387	0.000	0.143	-0.484	0.000	0.056	-0.188
Ntot8GCSE12Middle band	0.429	0.158	0.547	0	0	0	0.429	0.171	0.520	0.429	0.229	0.404	0.333	0.208	0.253
sectype12Comprehensive to 16	0.429	0.211	0.441	0.5	0.5	0	0.429	0.286	0.289	0.429	0.171	0.520	0.333	0.306	0.056
sectype12Comprehensive to 18	0.143	0.184	-0.118	0	0	0	0.143	0.171	-0.082	0.143	0.200	-0.163	0.167	0.139	0.079
sectype12Grammar	0.000	0.105	-0.357	0	0	0	0.000	0.143	-0.484	0.000	0.143	-0.484	0.000	0.000	0.000

sectype12Other type	0.429	0.500	-0.144	0.5	0.5	0	0.429	0.400	0.058	0.429	0.486	-0.115	0.500	0.556	-0.112
fsm132nd highest 20%	0.429	0.145	0.574	0	0	0	0.429	0.257	0.346	0.429	0.143	0.577	0.500	0.125	0.758
fsm132nd lowest 20%	0.000	0.263	-0.615	0	0	0	0.000	0.086	-0.200	0.000	0.371	-0.868	0.000	0.472	-1.104
fsm13Highest 20%	0.286	0.053	0.516	0.5	0.5	0	0.286	0.086	0.443	0.286	0.057	0.506	0.167	0.111	0.123
fsm13Lowest 20%	0.143	0.329	-0.532	0	0	0	0.143	0.429	-0.816	0.143	0.229	-0.245	0.167	0.111	0.159
fsm13Middle 20%	0.143	0.211	-0.193	0.5	0.5	0	0.143	0.143	0.000	0.143	0.200	-0.163	0.167	0.181	-0.040
Ntot8GCSE132nd highest band	0.286	0.329	-0.096										0.333	0.333	0.000
Ntot8GCSE132nd lowest band	0.286	0.197	0.196										0.333	0.333	0.000
Ntot8GCSE13Highest band	0.000	0.224	-0.554										0.000	0.000	0.000
Ntot8GCSE13Lowest band	0.000	0.118	-0.381										0.000	0.000	0.000
Ntot8GCSE13Middle band	0.429	0.132	0.600										0.333	0.333	0.000

Source: NFER proforma (2020/21)

Table 3: Balance statistics in the final sample compared to in the unmatched sample and alternatives (2013/14)

	Before match			Study plan match			Nearest match			Optimal matching			Final match		
Variable of interest	Means Treated	Means Control	Std. Mean Diff.	Means Treated	Means Control	Std. Mean Diff.	Means Treated	Means Control	Std. Mean Diff.	Means Treated	Means Control	Std. Mean Diff.	Means Treated	Means Control	Std. Mean Diff.
distance	0.606	0.058	2.025	0.410	0.416	-0.023	0.606	0.079	1.948	0.606	0.079	1.948	0.515	0.141	1.381
Region14East Midlands	0.000	0.049	-0.243	0.000	0.000	0.000	0.000	0.022	-0.110	0.000	0.067	-0.329	0.000	0.000	0.000
Region14Eastern	0.000	0.131	-0.412	0.000	0.000	0.000	0.000	0.067	-0.210	0.000	0.178	-0.559	0.000	0.000	0.000
Region14London	0.000	0.049	-0.243	0.000	0.000	0.000	0.000	0.067	-0.329	0.000	0.067	-0.329	0.000	0.000	0.000
Region14North East	0.000	0.082	-0.318	0.000	0.000	0.000	0.000	0.044	-0.173	0.000	0.067	-0.259	0.000	0.000	0.000
Region14North West/Merseyside	0.111	0.213	-0.325	0.333	0.000	1.061	0.111	0.222	-0.354	0.111	0.222	-0.354	0.200	0.200	0.000
Region14South East	0.222	0.098	0.298	0.333	0.333	0.000	0.222	0.133	0.214	0.222	0.089	0.321	0.000	0.000	0.000
Region14South West	0.333	0.213	0.255	0.333	0.667	-0.707	0.333	0.244	0.189	0.333	0.200	0.283	0.600	0.600	0.000
Region14West Midlands	0.111	0.082	0.093	0.000	0.000	0.000	0.111	0.089	0.071	0.111	0.089	0.071	0.200	0.200	0.000

Region14Yorkshire & The Humber	0.222	0.082	0.337	0.000	0.000	0.000	0.222	0.111	0.267	0.222	0.022	0.481	0.000	0.000	0.000
nschsize142nd highest band	0.111	0.082	0.093	0.333	0.333	0.000	0.111	0.111	0.000	0.111	0.044	0.212	0.200	0.200	0.000
nschsize142nd lowest band	0.333	0.393	-0.128	0.333	0.333	0.000	0.333	0.422	-0.189	0.333	0.400	-0.141	0.000	0.587	-1.245
nschsize14Lowest band	0.111	0.066	0.145	0.000	0.000	0.000	0.111	0.022	0.283	0.111	0.089	0.071	0.200	0.000	0.636
nschsize14Middle band	0.444	0.459	-0.029	0.333	0.333	0.000	0.444	0.444	0.000	0.444	0.467	-0.045	0.600	0.213	0.778
Ntot8GCSE142nd highest band	0.222	0.328	-0.254	0.667	0.000	1.604	0.222	0.289	-0.160	0.222	0.356	-0.321	0.200	0.200	0.000
Ntot8GCSE142nd lowest band	0.444	0.148	0.598	0.000	0.333	-0.671	0.444	0.178	0.537	0.444	0.111	0.671	0.400	0.400	0.000
Ntot8GCSE14Highest band	0.111	0.279	-0.533	0.000	0.333	-1.061	0.111	0.311	-0.636	0.111	0.267	-0.495	0.200	0.200	0.000
Ntot8GCSE14Lowest band	0.000	0.148	-0.441	0.000	0.000	0.000	0.000	0.133	-0.398	0.000	0.133	-0.398	0.000	0.000	0.000
Ntot8GCSE14Middle band	0.222	0.098	0.298	0.333	0.333	0.000	0.222	0.089	0.321	0.222	0.133	0.214	0.200	0.200	0.000
sectype14Comprehensive to 16	0.111	0.180	-0.220	0.000	0.000	0.000	0.111	0.156	-0.141	0.111	0.156	-0.141	0.000	0.253	-0.806
sectype14Comprehensive to 18	0.111	0.180	-0.220	0.333	0.000	1.061	0.111	0.133	-0.071	0.111	0.178	-0.212	0.000	0.067	-0.212

sectype14Grammar	0.111	0.131	-0.064	0.000	0.333	-1.061	0.111	0.178	-0.212	0.111	0.156	-0.141	0.200	0.200	0.000
sectype14Othertype	0.667	0.508	0.336	0.667	0.667	0.000	0.667	0.533	0.283	0.667	0.511	0.330	0.800	0.480	0.679
fsm132nd highest 20%	0.111	0.148	-0.116	0.000	0.000	0.000	0.111	0.156	-0.141	0.111	0.133	-0.071	0.000	0.040	-0.127
fsm132nd lowest 20%	0.333	0.230	0.220	0.667	0.333	0.707	0.333	0.222	0.236	0.333	0.244	0.189	0.200	0.267	-0.141
fsm13Highest 20%	0.111	0.033	0.249	0.000	0.000	0.000	0.111	0.044	0.212	0.111	0.022	0.283	0.000	0.040	-0.127
fsm13Lowest 20%	0.111	0.377	-0.846	0.000	0.333	-1.061	0.111	0.378	-0.849	0.111	0.356	-0.778	0.200	0.440	-0.764
fsm13Middle 20%	0.333	0.213	0.255	0.333	0.333	0.000	0.333	0.200	0.283	0.333	0.244	0.189	0.600	0.213	0.820

Source: NFER proforma (2020/21)

Table 4: Balance statistics in the final sample compared to in the unmatched sample and alternatives (2014/15)

	Before match			Study plan match			Nearest match			Optimal matching			Final match		
Variable of interest	Means Treated	Means Control	Std. Mean Diff.	Means Treated	Means Control	Std. Mean Diff.	Means Treated	Means Control	Std. Mean Diff.	Means Treated	Means Control	Std. Mean Diff.	Means Treated	Means Control	Std. Mean Diff.
distance	0.926	0.014	4.103	0.333	0.333	0	0.926	0.015	4.100	0.926	0.015	4.100	0.8667	0.0267	3.7800
Region14East Midlands	0.000	0.064	-0.283	0	0	0	0.000	0.044	-0.197	0.000	0.067	-0.296	0.0000	0.0000	0.0000
Region14Eastern	0.222	0.170	0.125	0	0	0	0.222	0.178	0.107	0.222	0.178	0.107	0.0000	0.0000	0.0000
Region14London	0.000	0.064	-0.283	0	0	0	0.000	0.067	-0.296	0.000	0.022	-0.099	0.0000	0.0000	0.0000
Region14North East	0.000	0.106	-0.373	0	0	0	0.000	0.111	-0.390	0.000	0.111	-0.390	0.0000	0.0000	0.0000
Region14North West/Merseyside	0.333	0.170	0.346	0	0	0	0.333	0.156	0.377	0.333	0.178	0.330	0.4000	0.4000	0.0000
Region14South East	0.111	0.128	-0.053	1	1	0	0.111	0.133	-0.071	0.111	0.133	-0.071	0.2000	0.2000	0.0000
Region14South West	0.000	0.128	-0.413	0	0	0	0.000	0.133	-0.431	0.000	0.133	-0.431	0.0000	0.0000	0.0000
Region14West Midlands	0.222	0.064	0.381	0	0	0	0.222	0.067	0.374	0.222	0.067	0.374	0.2000	0.2000	0.0000

Region14Yorkshire & The Humber	0.111	0.106	0.015	0	0	0	0.111	0.111	0.000	0.111	0.111	0.000	0.2000	0.2000	0.0000
nschsize142nd highest band	0.111	0.085	0.083	0	0	0	0.111	0.089	0.071	0.111	0.089	0.071	0.0000	0.0400	-0.1273
nschsize142nd lowest band	0.222	0.298	-0.182	1	1	0	0.222	0.311	-0.214	0.222	0.289	-0.160	0.4000	0.4133	-0.0321
nschsize14Lowest band	0.000	0.085	-0.330	0	0	0	0.000	0.089	-0.345	0.000	0.089	-0.345	0.0000	0.2000	-0.7766
nschsize14Middle band	0.667	0.532	0.286	0	0	0	0.667	0.511	0.330	0.667	0.533	0.283	0.6000	0.3467	0.5374
Ntot8GCSE142nd highest band	0.222	0.319	-0.233	0	0	0	0.222	0.311	-0.214	0.222	0.333	-0.267	0.4000	0.4000	0.0000
Ntot8GCSE142nd lowest band	0.556	0.064	0.990	0	0	0	0.556	0.067	0.984	0.556	0.067	0.984	0.4000	0.4000	0.0000
Ntot8GCSE14Highest band	0.111	0.319	-0.662	1	1	0	0.111	0.333	-0.707	0.111	0.333	-0.707	0.2000	0.2000	0.0000
Ntot8GCSE14Lowest band	0.000	0.191	-0.521	0	0	0	0.000	0.200	-0.545	0.000	0.178	-0.484	0.0000	0.0000	0.0000
Ntot8GCSE14Middle band	0.111	0.106	0.015	0	0	0	0.111	0.089	0.071	0.111	0.089	0.071	0.0000	0.0000	0.0000
sectype14Comprehensive to 16	0.000	0.106	-0.373	0	0	0	0.000	0.111	-0.390	0.000	0.111	-0.390	0.0000	0.3067	-1.0754
sectype14Comprehensive to 18	0.222	0.213	0.023	0	0	0	0.222	0.200	0.053	0.222	0.200	0.053	0.2000	0.3333	-0.3207

sectype14Grammar	0.111	0.128	-0.053	1	1	0	0.111	0.133	-0.071	0.111	0.133	-0.071	0.2000	0.1200	0.2546
sectype14Othertype	0.667	0.553	0.241	0	0	0	0.667	0.556	0.236	0.667	0.556	0.236	0.6000	0.2400	0.7637
fsm132nd highest 20%	0.333	0.170	0.346	0	0	0	0.333	0.178	0.330	0.333	0.178	0.330	0.2000	0.2000	0.0000
fsm132nd lowest 20%	0.222	0.255	-0.080	0	0	0	0.222	0.244	-0.053	0.222	0.267	-0.107	0.4000	0.3733	0.0641
fsm13Highest 20%	0.111	0.021	0.286	0	0	0	0.111	0.022	0.283	0.111	0.022	0.283	0.0000	0.0000	0.0000
fsm13Lowest 20%	0.111	0.383	-0.865	1	1	0	0.111	0.400	-0.919	0.111	0.400	-0.919	0.2000	0.2933	-0.2970
fsm13Middle 20%	0.222	0.170	0.125	0	0	0	0.333	0.200	0.283	0.222	0.133	0.214	0.2000	0.1333	0.1604

Source: NFER proforma (2020/21)

Table 5: Balance statistics in the final sample compared to in the unmatched sample and alternatives (2015/16)

	Before match			Study plan match			Nearest match			Optimal matching			Final match		
Variable of interest	Means Treated	Means Control	Std. Mean Diff.	Means Treated	Means Control	Std. Mean Diff.	Means Treated	Means Control	Std. Mean Diff.	Means Treated	Means Control	Std. Mean Diff.	Means Treated	Means Control	Std. Mean Diff.
distance	1.000	0.000	2.283				1.000	0.000	2.283	1.000	0.000	2.283	1.000	0.000	2.283
Region16East Midlands	0.091	0.091	0.000				0.091	0.091	0.000	0.091	0.091	0.000	0.250	0.250	0.000
Region16Eastern	0.000	0.242	-0.629				0.000	0.242	-0.629	0.000	0.242	-0.629	0.000	0.000	0.000
Region16London	0.182	0.091	0.236				0.182	0.091	0.236	0.182	0.091	0.236	0.250	0.250	0.000
Region16North East	0.091	0.152	-0.211				0.091	0.152	-0.211	0.091	0.152	-0.211	0.250	0.250	0.000
Region16North West/Merseyside	0.091	0.121	-0.105				0.091	0.121	-0.105	0.091	0.121	-0.105	0.000	0.000	0.000
Region16South East	0.182	0.030	0.393				0.182	0.030	0.393	0.182	0.030	0.393	0.000	0.000	0.000
Region16South West	0.091	0.182	-0.316				0.091	0.182	-0.316	0.091	0.182	-0.316	0.250	0.250	0.000
Region16West Midlands	0.273	0.030	0.544				0.273	0.030	0.544	0.273	0.030	0.544	0.000	0.000	0.000

Region16Yorkshire & The Humber	0.000	0.061	-0.291				0.000	0.061	-0.291	0.000	0.061	-0.291	0.000	0.000	0.000
nschsize162nd highest band	0.000	0.061	-0.291				0.000	0.061	-0.291	0.000	0.061	-0.291	0.000	0.000	0.000
nschsize162nd lowest band	0.636	0.273	0.756				0.636	0.273	0.756	0.636	0.273	0.756	0.750	0.375	0.780
nschsize16Data missing in ROS	0.000	0.091	-0.361				0.000	0.091	-0.361	0.000	0.091	-0.361	0.000	0.125	-0.496
nschsize16Middle band	0.364	0.576	-0.441				0.364	0.576	-0.441	0.364	0.576	-0.441	0.250	0.500	-0.520
KS4ovAtt8_162nd highest band	0.182	0.152	0.079				0.182	0.152	0.079	0.182	0.152	0.079	0.250	0.250	0.000
KS4ovAtt8_162nd lowest band	0.455	0.152	0.609				0.455	0.152	0.609	0.455	0.152	0.609	0.500	0.500	0.000
KS4ovAtt8_16Highest band	0.000	0.455	-0.959				0.000	0.455	-0.959	0.000	0.455	-0.959	0.000	0.000	0.000
KS4ovAtt8_16Lowest band	0.000	0.091	-0.361				0.000	0.091	-0.361	0.000	0.091	-0.361	0.000	0.000	0.000
KS4ovAtt8_16Middle band	0.364	0.152	0.441				0.364	0.152	0.441	0.364	0.152	0.441	0.250	0.250	0.000
sectype16Comprehensive to 16	0.364	0.273	0.189				0.364	0.273	0.189	0.364	0.273	0.189	0.500	0.625	-0.260
sectype16Comprehensive to 18	0.273	0.636	-0.816				0.273	0.636	-0.816	0.273	0.636	-0.816	0.000	0.375	-0.842

sectype16Grammar	0.000	0.091	-0.361				0.000	0.091	-0.361	0.000	0.091	-0.361	0.000	0.000	0.000
sectype16Other Secondary schools	0.182	0.000	0.471				0.182	0.000	0.471	0.182	0.000	0.471	0.000	0.000	0.000
sectype16Other type	0.182	0.000	0.471				0.182	0.000	0.471	0.182	0.000	0.471	0.500	0.000	1.296
FSM162nd highest 20%	0.364	0.152	0.441				0.364	0.152	0.441	0.364	0.152	0.441	0.750	0.125	1.299
FSM162nd lowest 20%	0.273	0.303	-0.068				0.273	0.303	-0.068	0.273	0.303	-0.068	0.250	0.500	-0.561
FSM16Highest 20%	0.182	0.030	0.393				0.182	0.030	0.393	0.182	0.030	0.393	0.000	0.000	0.000
FSM16Lowest 20%	0.000	0.333	-0.770				0.000	0.333	-0.770	0.000	0.333	-0.770	0.000	0.000	0.000
FSM16Middle 20%	0.182	0.182	0.000				0.182	0.182	0.000	0.182	0.182	0.000	0.000	0.375	-0.972

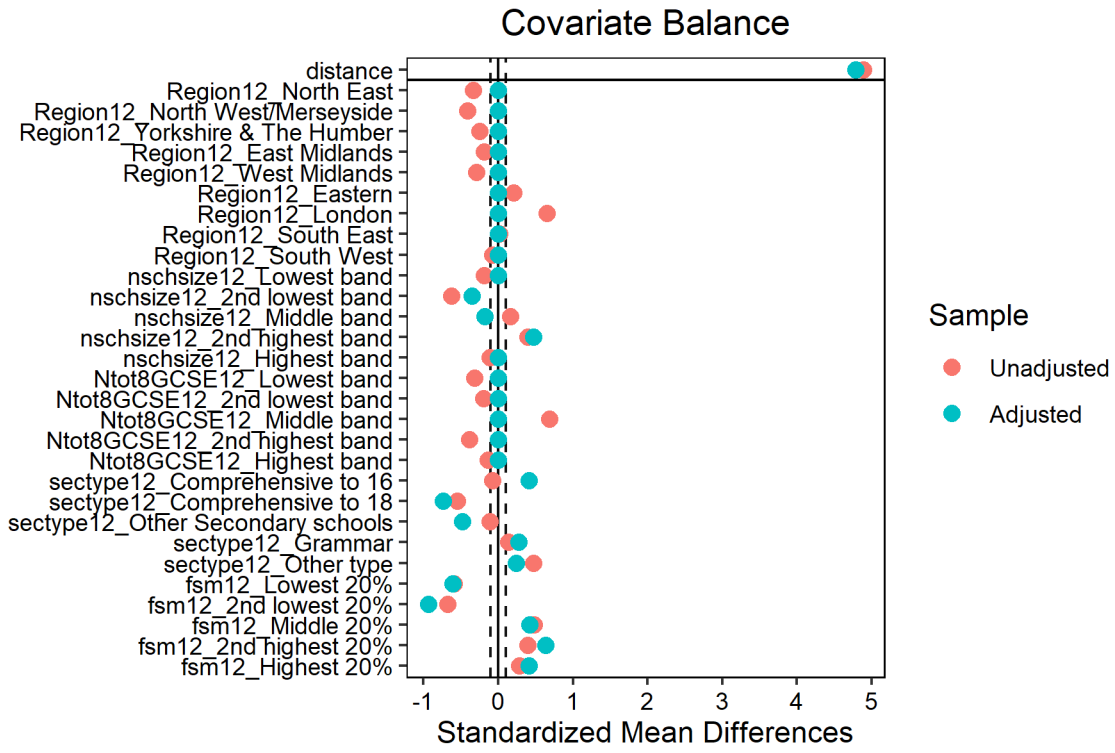
Source: NFER proforma (2020/21)

Table 6: Breakdown of schools in both KS4 groups after each matching strategy.

Year of conversion	2011/12		2012/13		2013/14		2014/15		2015/16	
Matching strategy	Three-year KS4	Two-year KS4	Three-year KS4	Two-year KS4	Three-year KS4	Two-year KS4	Three-year KS4	Two-year KS4	Three-year KS4	Two-year KS4
Before	7	94	7	76	9	61	9	47	11	33
Study plan	1	1	2	2	3	3	1	1	0	0
Nearest	7	35	7	35	9	45	9	45	11	33
Optimal	7	35	7	35	9	45	9	45	11	33
final	7	18	6	15	5	14	5	13	4	6

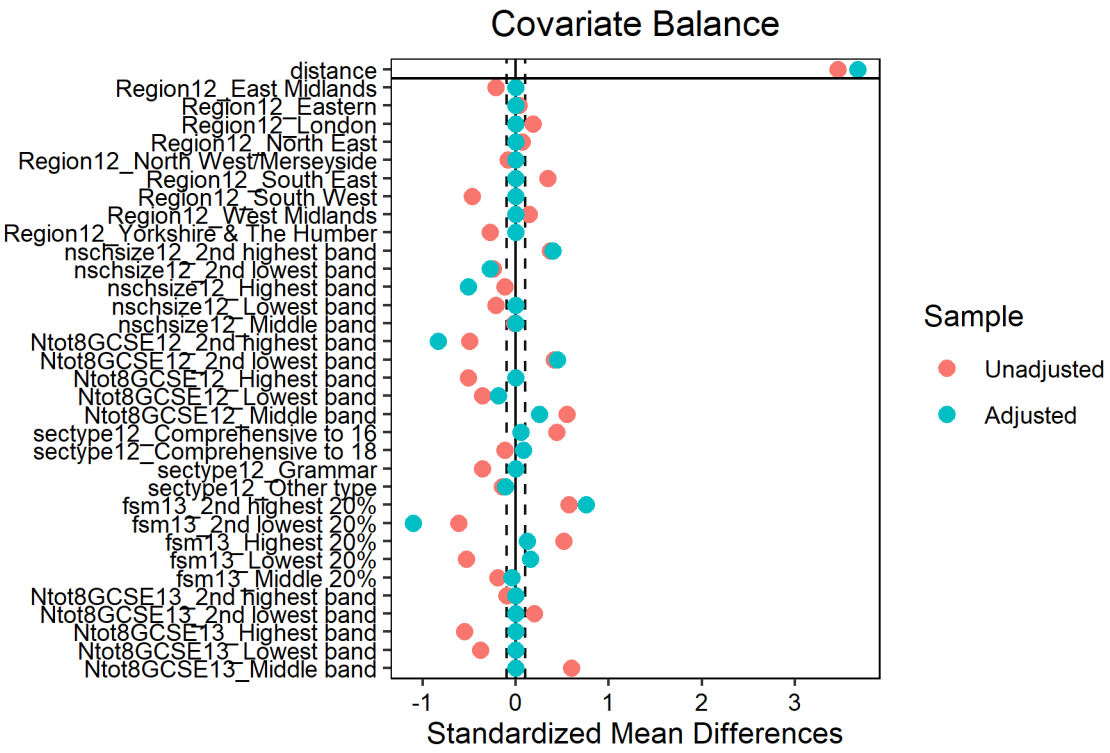
Source: NFER proforma (2020/21)

Figure 1: Love plot for final match (2011/12)



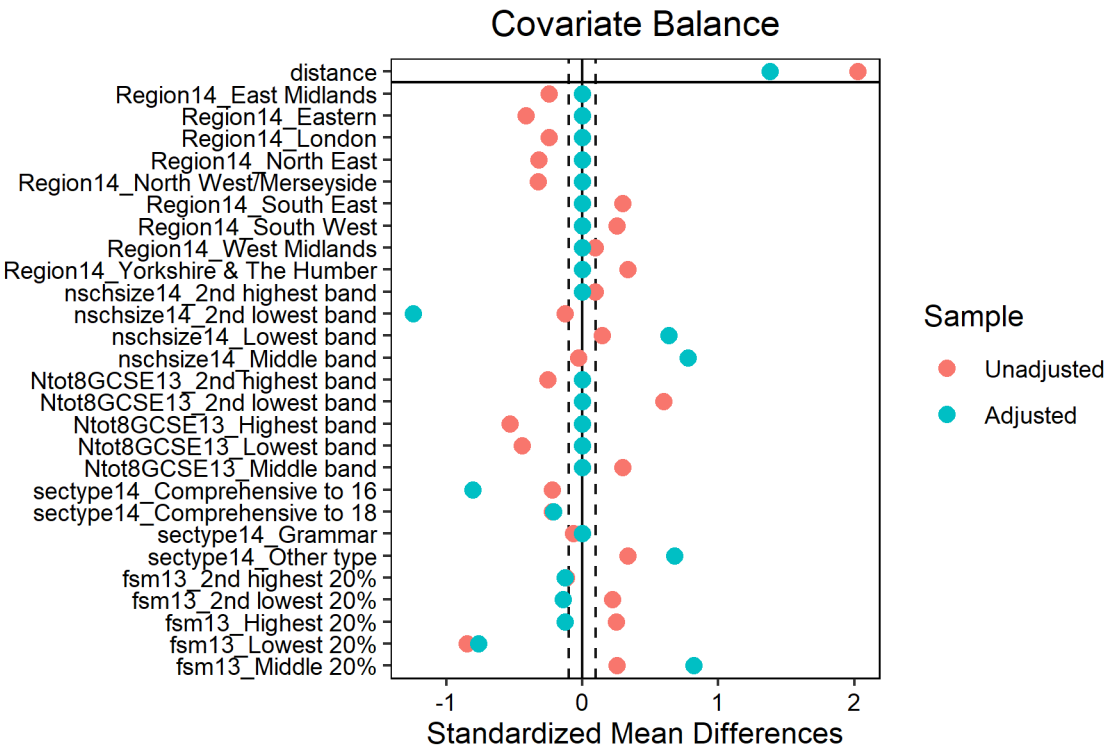
Source: NFER proforma (2020/21)

Figure 2: Love plot for final match (2012/13)



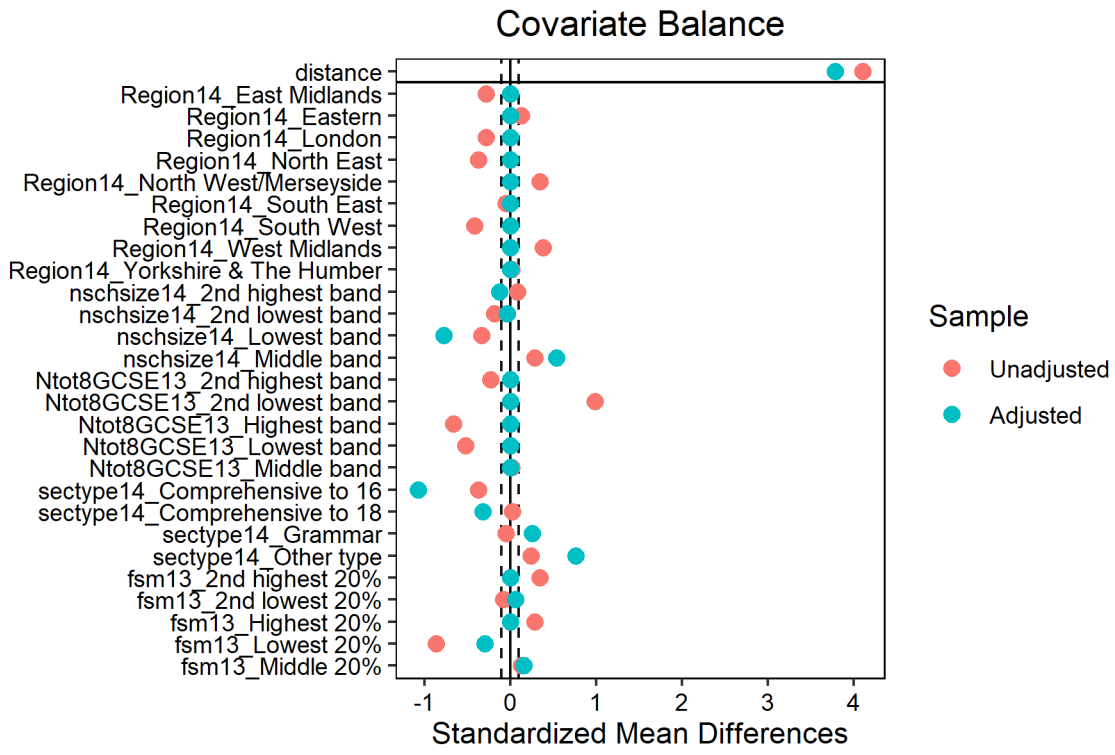
Source: NFER proforma (2020/21)

Figure 3: Love plot for final match (2013/14)



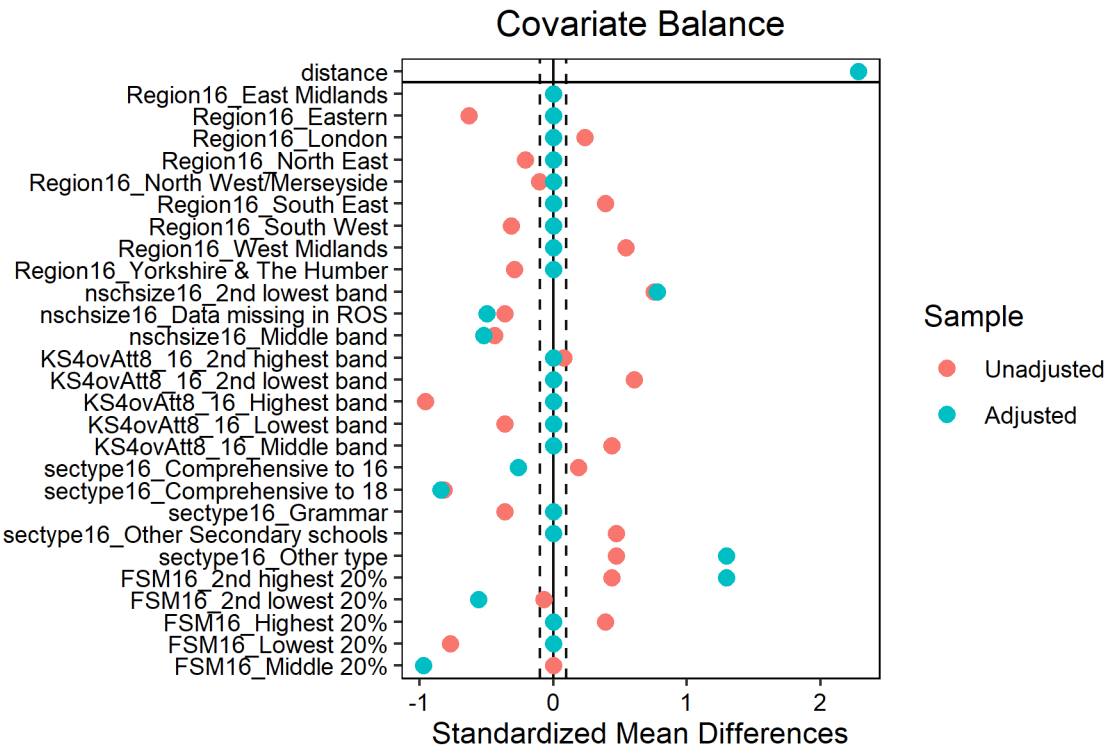
Source: NFER proforma (2020/21)

Figure 4: Love plot for final match (2014/15)



Source: NFER proforma (2020/21)

Figure 5: Love plot for final match (2015/16)



Source: NFER proforma (2020/21)

Appendix F: Proportion of pupils taking GCSEs in specific subjects (graphs for outcome (3), sub-outcome (d))

This appendix displays graphs for sub-outcome (d) of outcome (3) (curriculum breadth), which is the overall proportion of pupils taking particular GCSE subjects in an academic year. For more details see the 'outcome measures' section of the main report.

Figure 1: Overall proportion of pupils taking GCSEs in humanities subjects for all 104 schools between 2007/2008 and 2018/2019.

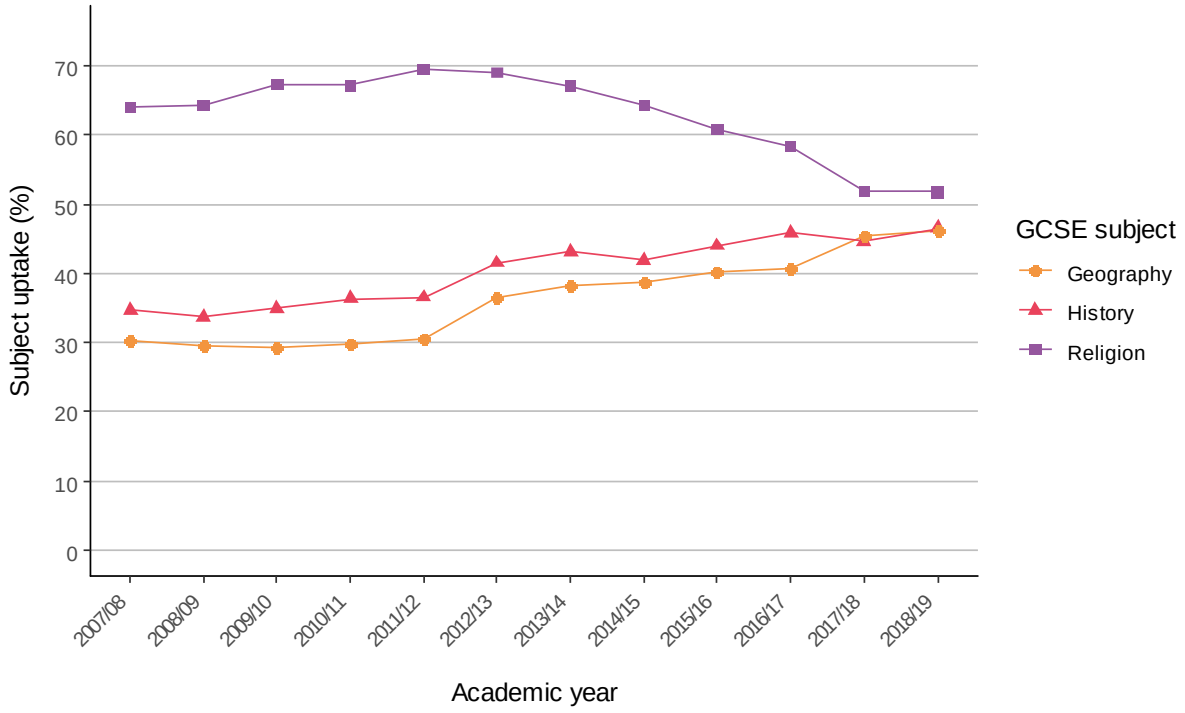


Figure 2: Overall proportion of pupils taking GCSEs in language subjects for all 104 schools between 2007/2008 and 2018/2019.

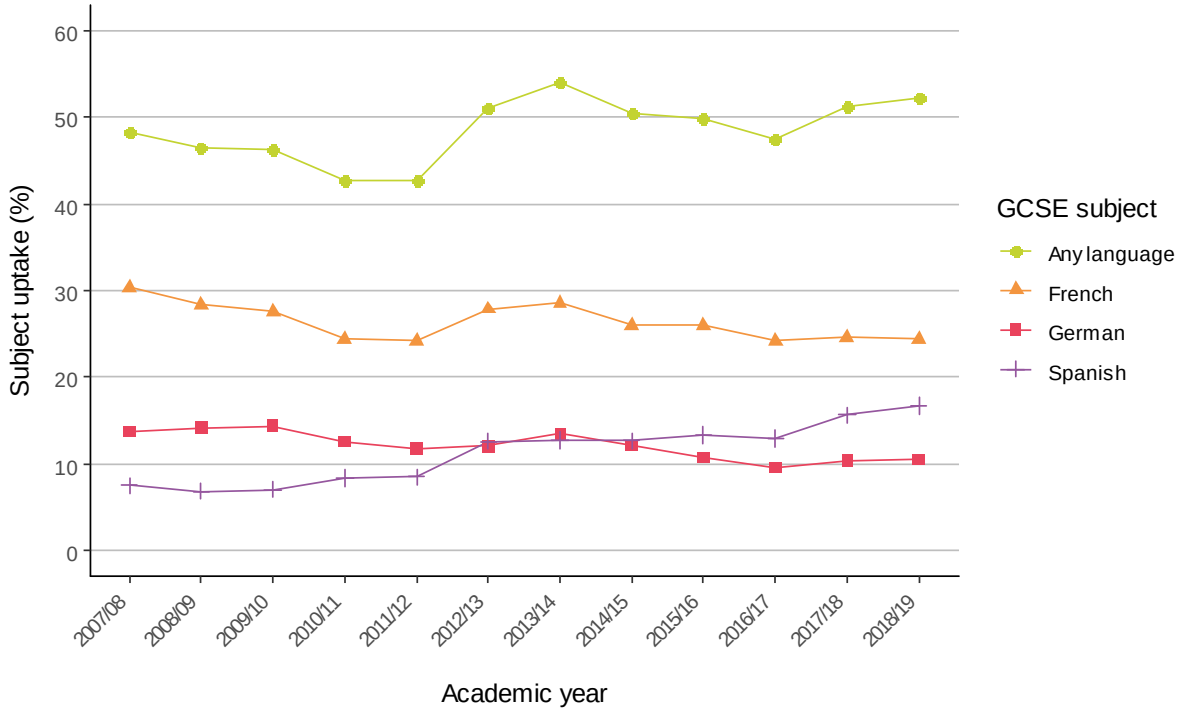


Figure 3: Overall proportion of pupils taking GCSEs in art subjects for all 104 schools between 2007/2008 and 2018/2019.

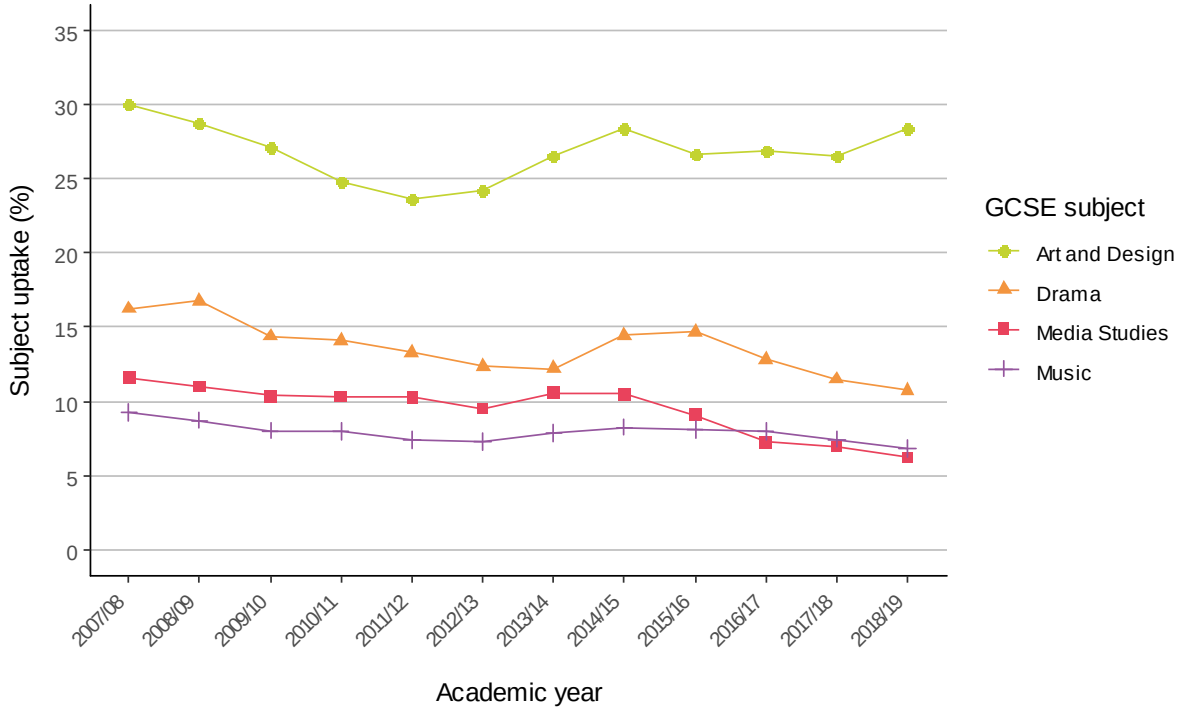
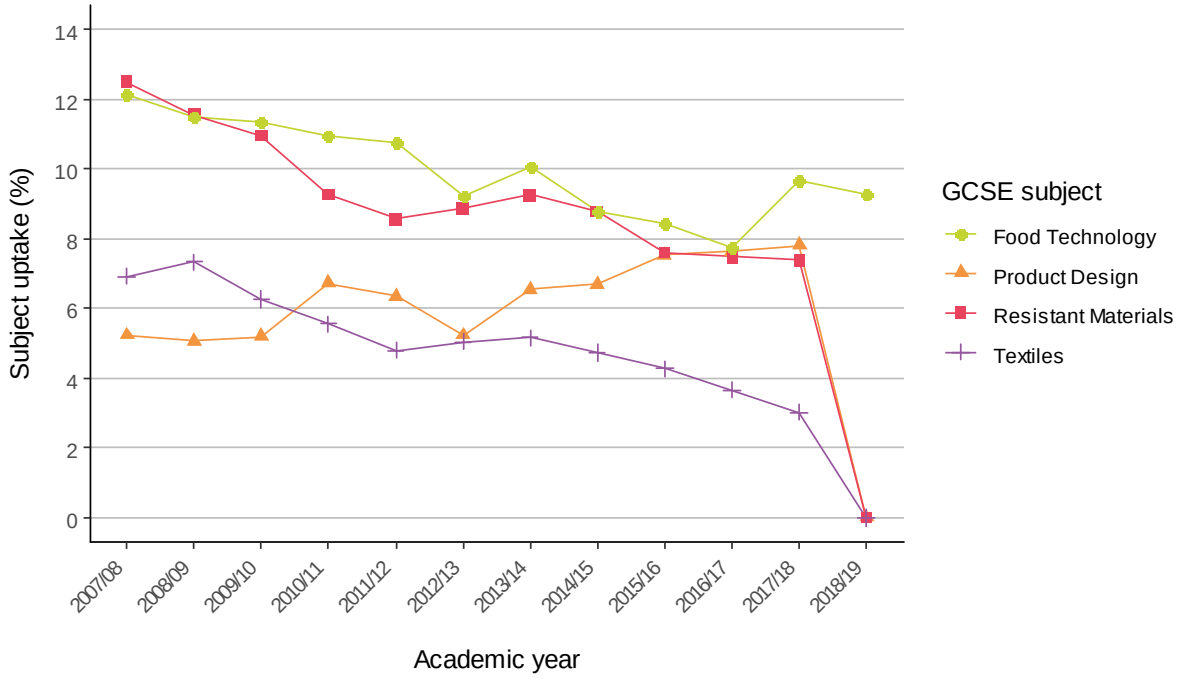


Figure 4: Overall proportion of pupils taking GCSEs in design and technology subjects for all 104 schools between 2007/2008 and 2018/2019.



Note that in Figure 4 the sudden drop to zero percent uptake in the 2018/2019 academic year for three subjects is due to a combined 'Design and Technology' GCSE being introduced to replace them, which had a 17.15% uptake that year.

Figure 6: Overall proportion of pupils taking GCSEs in Geography for 32 three-year and 72 two-year KS4 schools.

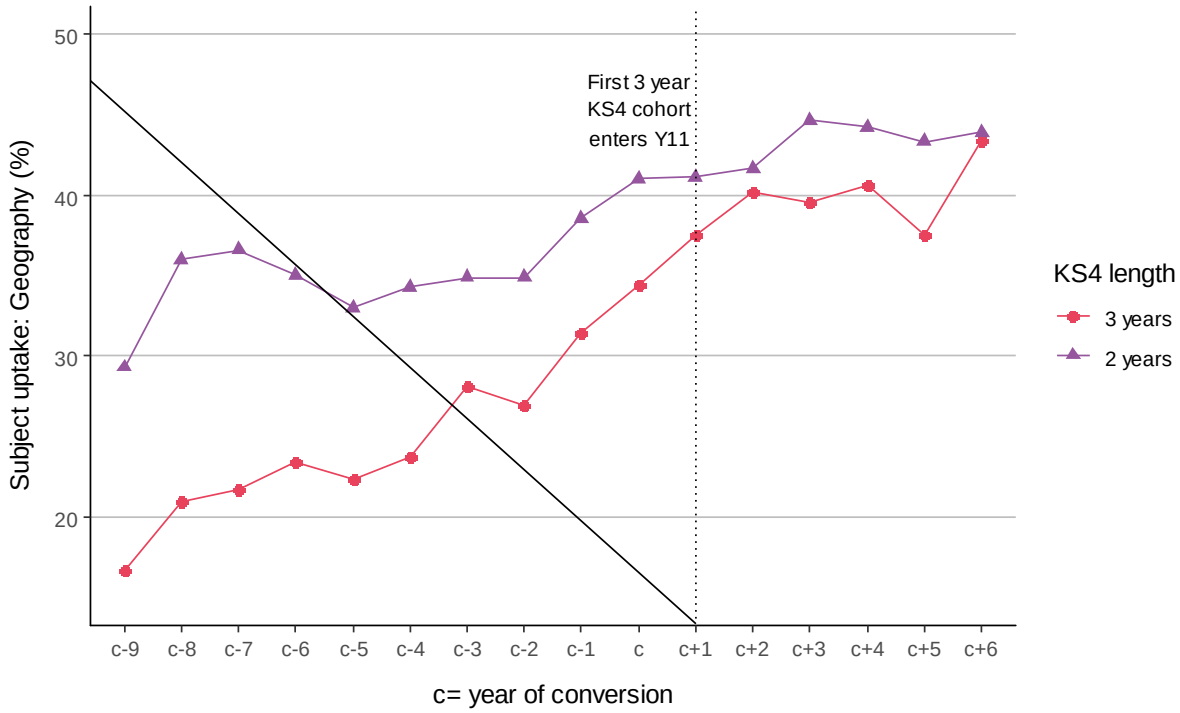


Figure 7: Overall proportion of pupils taking GCSEs in History for 32 three-year and 72 two-year KS4 schools.

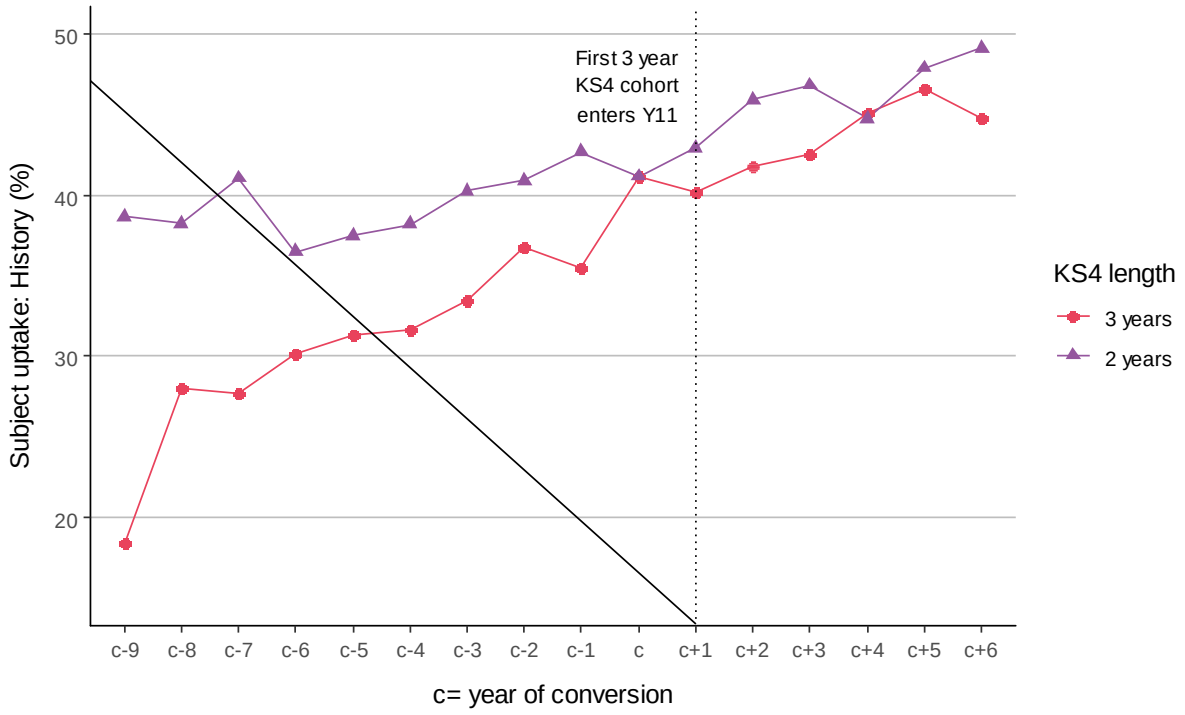


Figure 8: Overall proportion of pupils taking GCSEs in Religion for 32 three-year and 72 two-year KS4 schools.

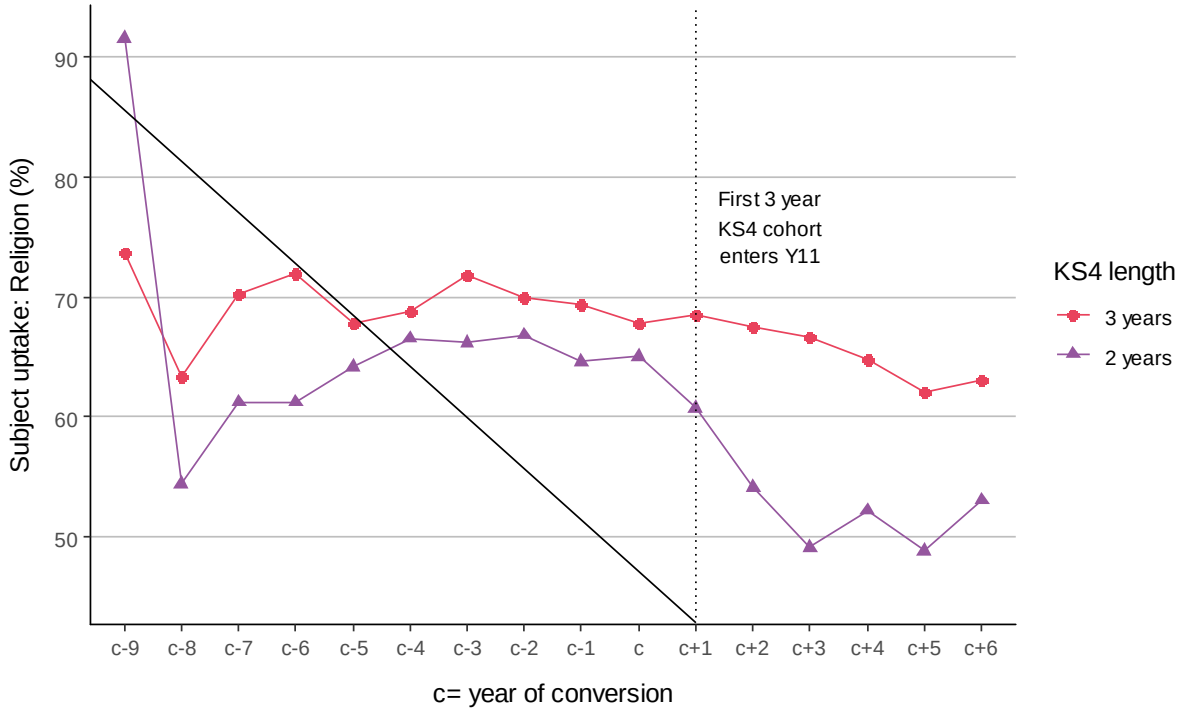


Figure 9: Overall proportion of pupils taking GCSEs in at least one language subject for 32 three-year and 72 two-year KS4 schools.

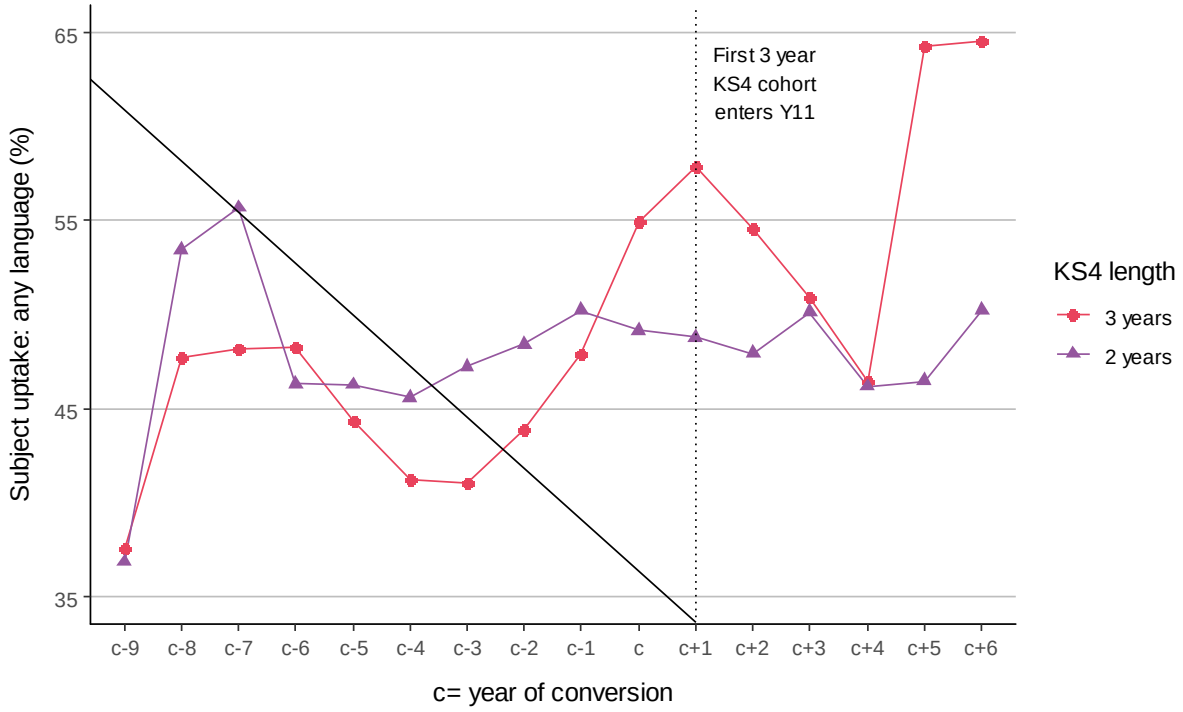


Figure 10: Overall proportion of pupils taking GCSEs in French for 32 three-year and 72 two-year KS4 schools.

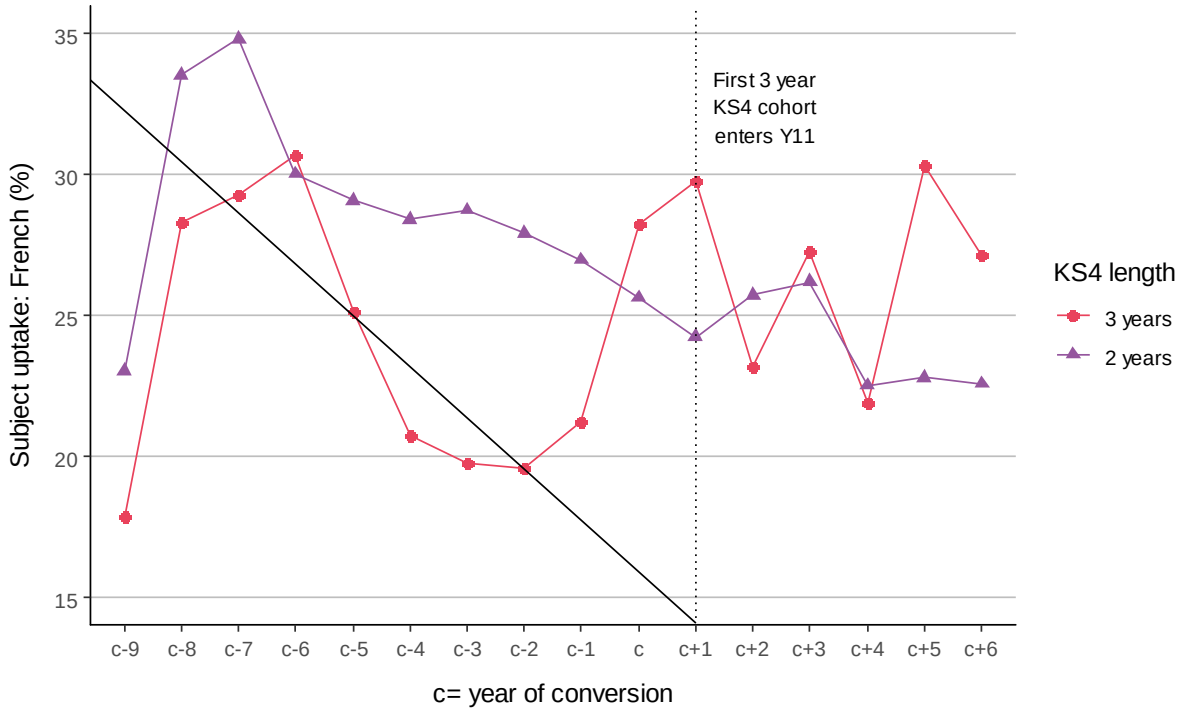


Figure 11: Overall proportion of pupils taking GCSEs in German for 32 three-year and 72 two-year KS4 schools.

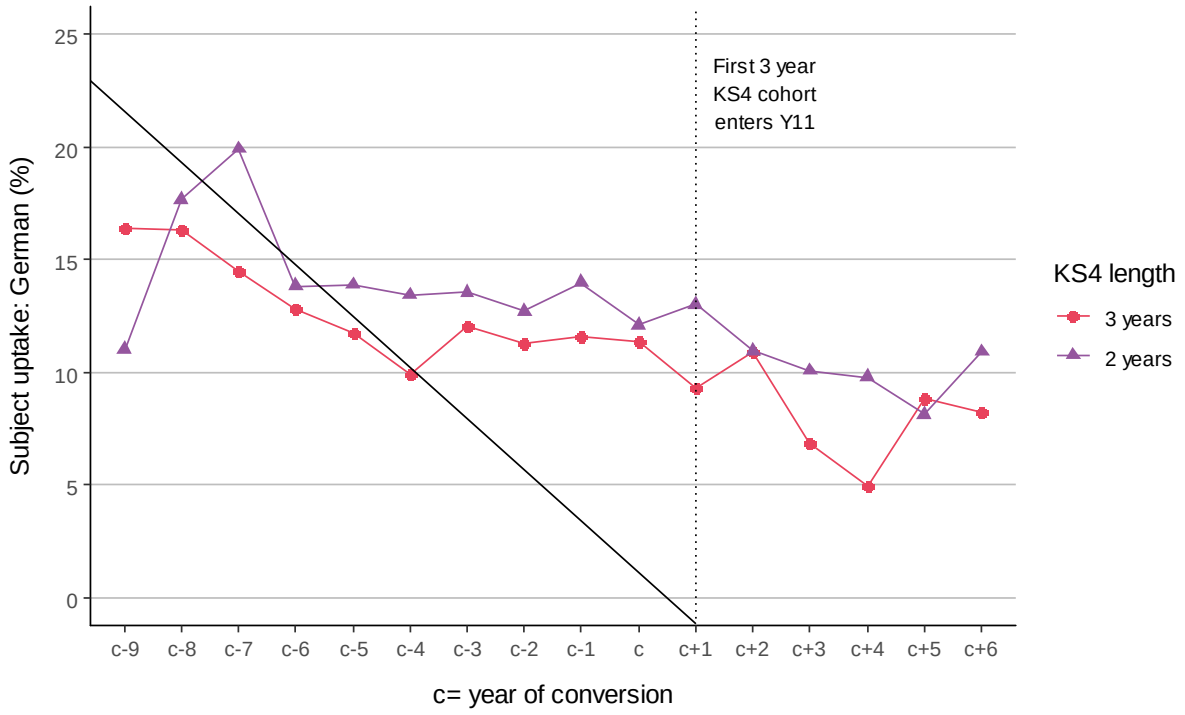


Figure 12: Overall proportion of pupils taking GCSEs in Spanish for 32 three-year and 72 two-year KS4 schools.

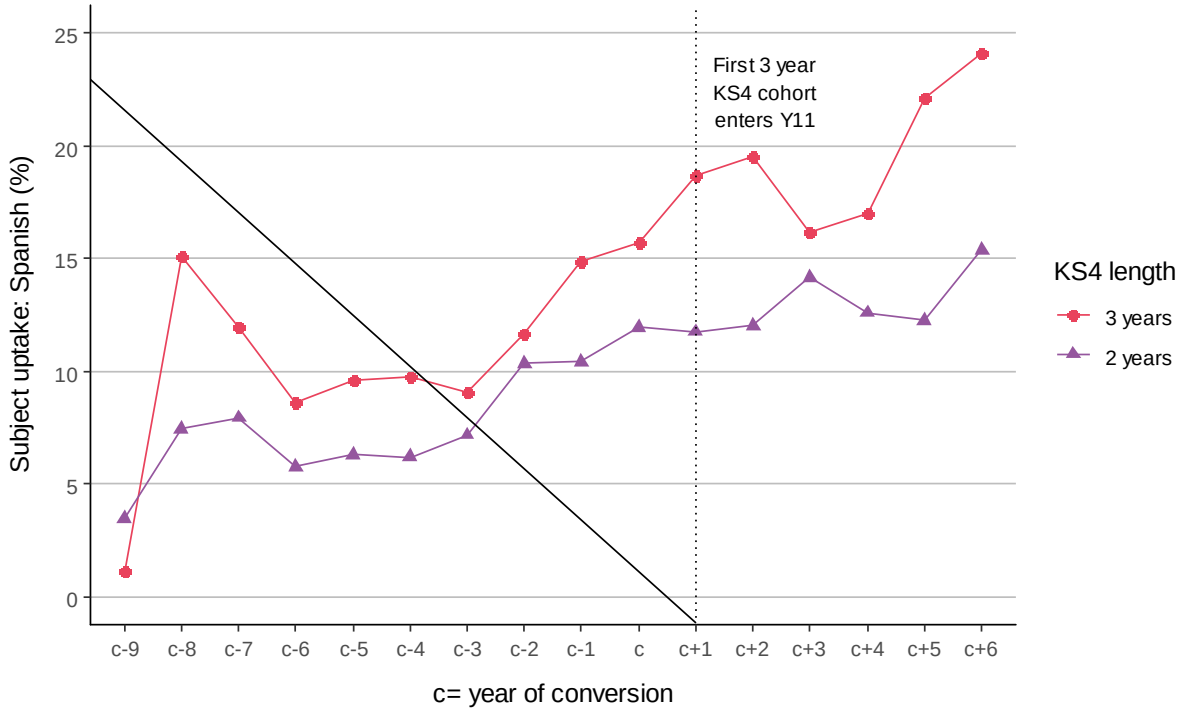


Figure 13: Overall proportion of pupils taking GCSEs in Art and Design for 32 three-year and 72 two-year KS4 schools.

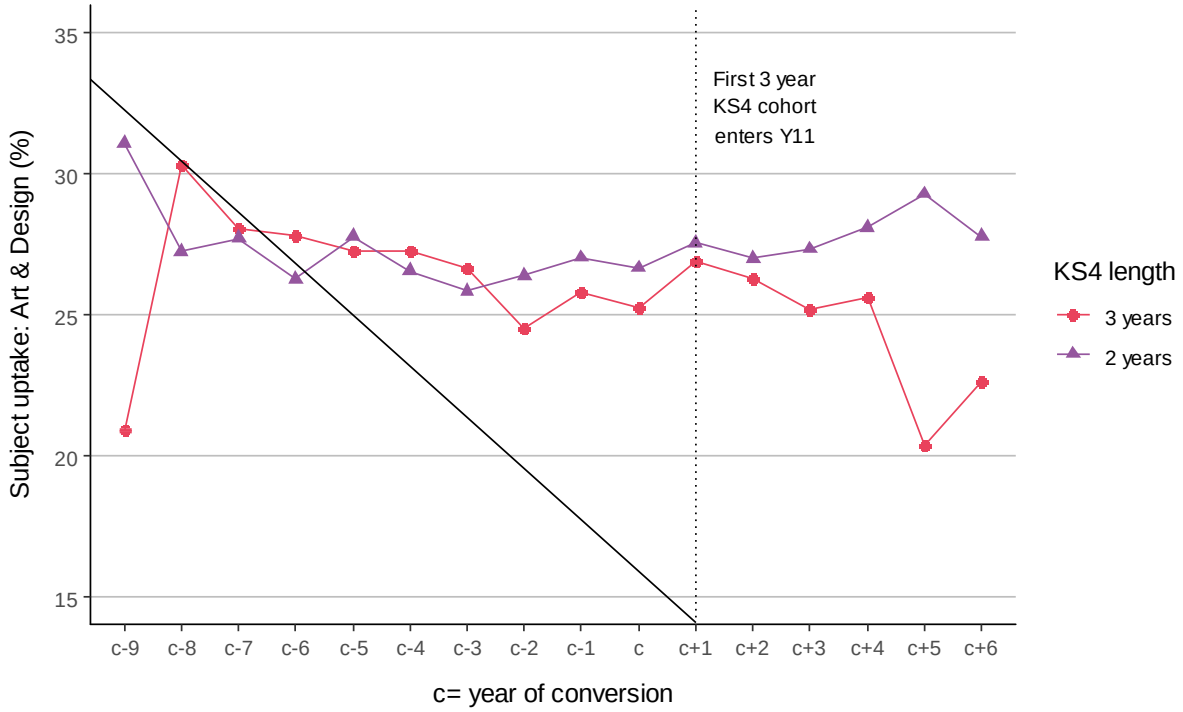


Figure 14: Overall proportion of pupils taking GCSEs in Drama for 32 three-year and 72 two-year KS4 schools.

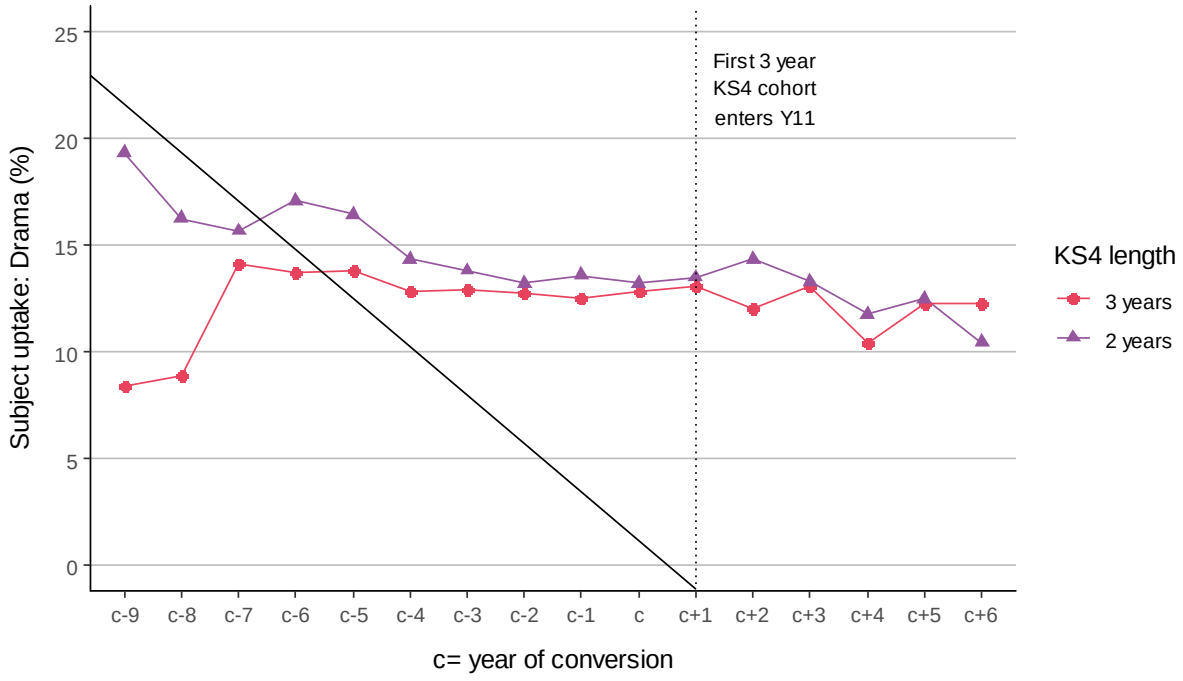


Figure 15: Overall proportion of pupils taking GCSEs in Media Studies for 32 three-year and 72 two-year KS4 schools.

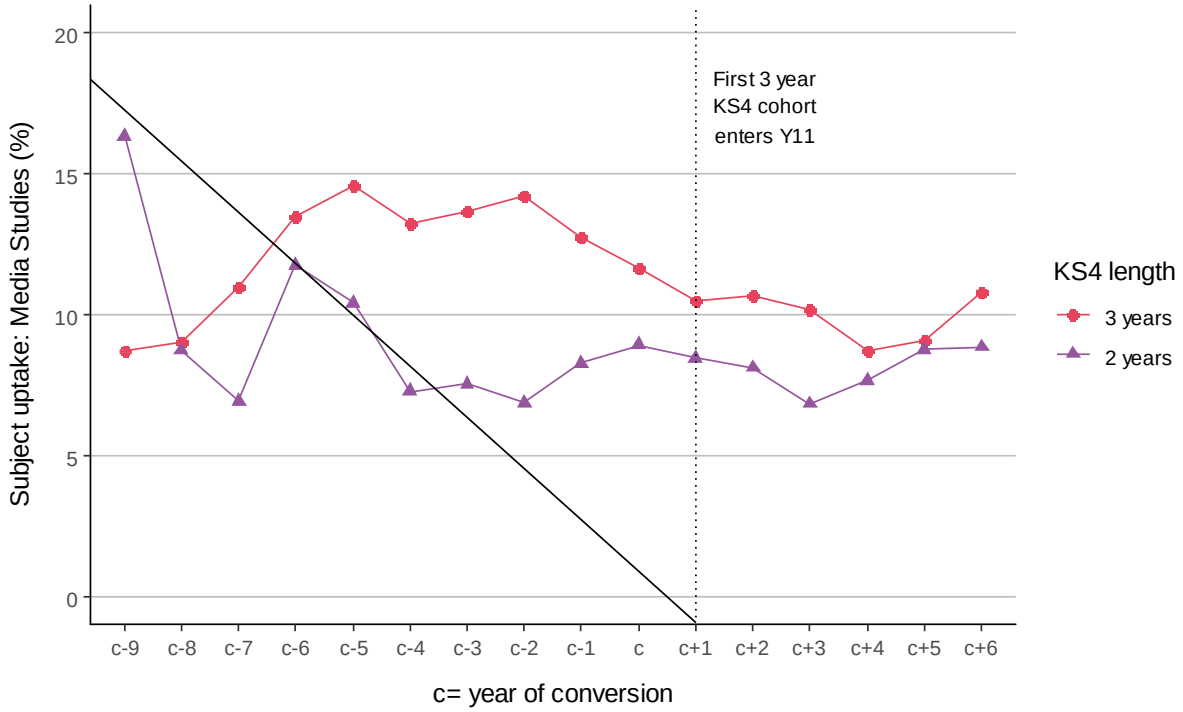


Figure 16: Overall proportion of pupils taking GCSEs in Music for 32 three-year and 72 two-year KS4 schools.

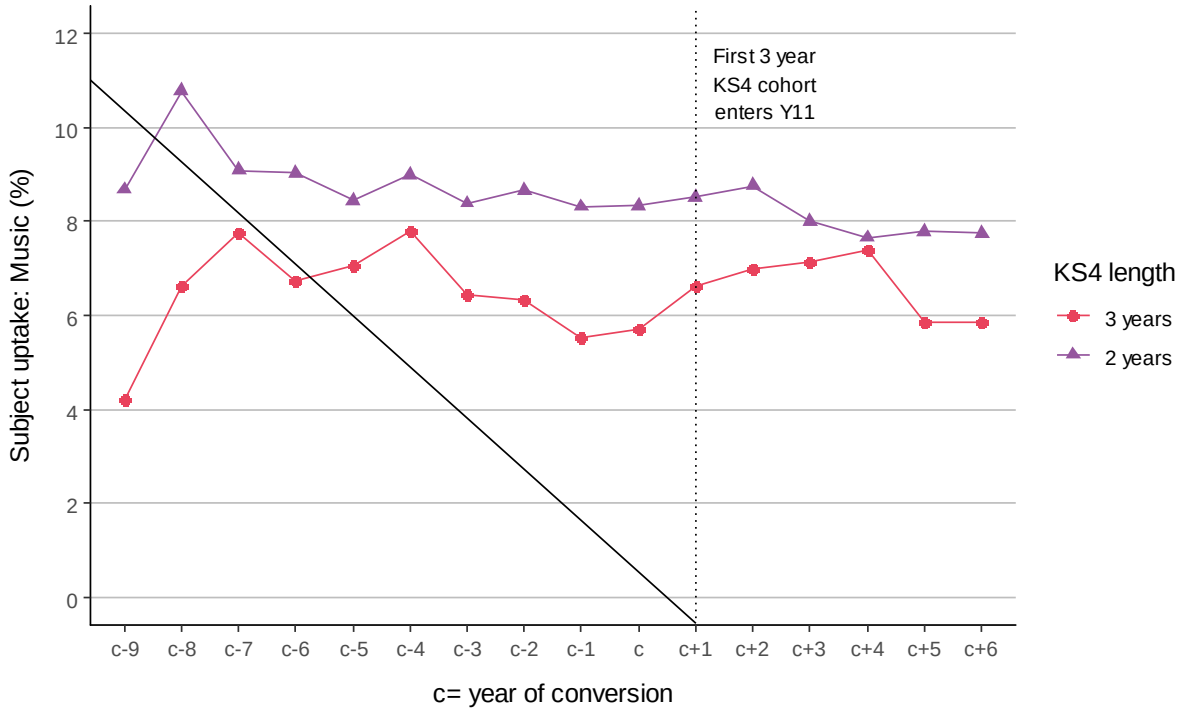


Figure 17: Overall proportion of pupils taking GCSEs in Food Technology for 32 three-year and 72 two-year KS4 schools.

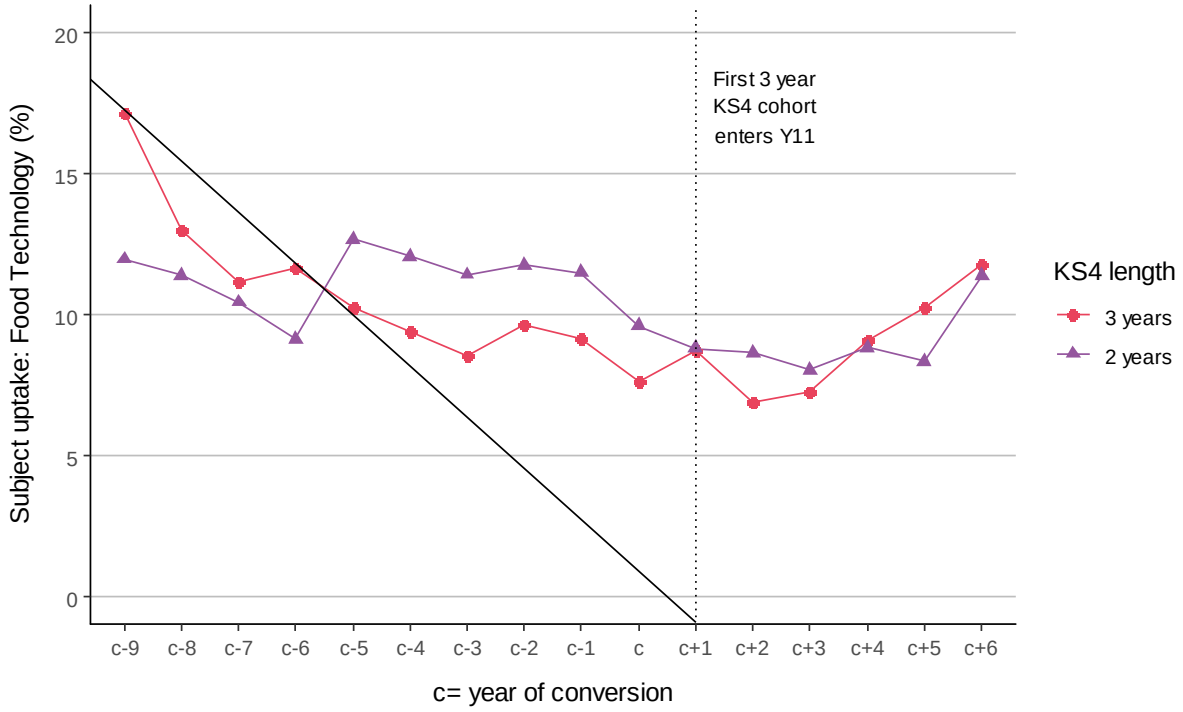
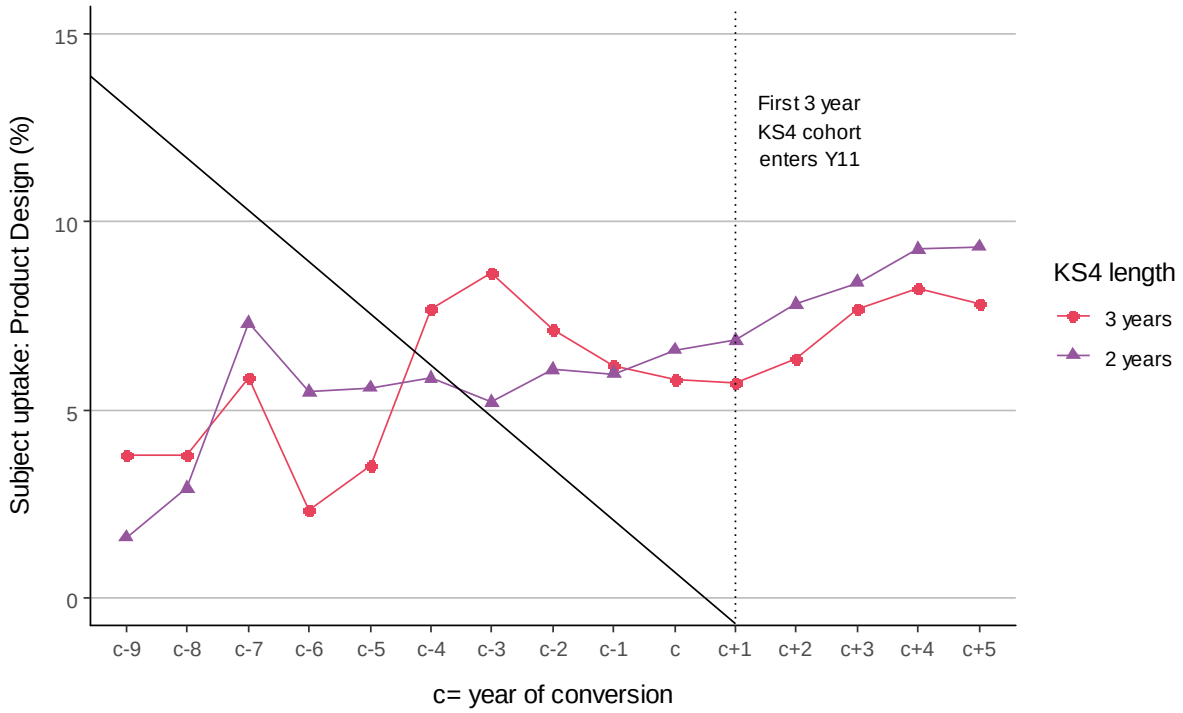
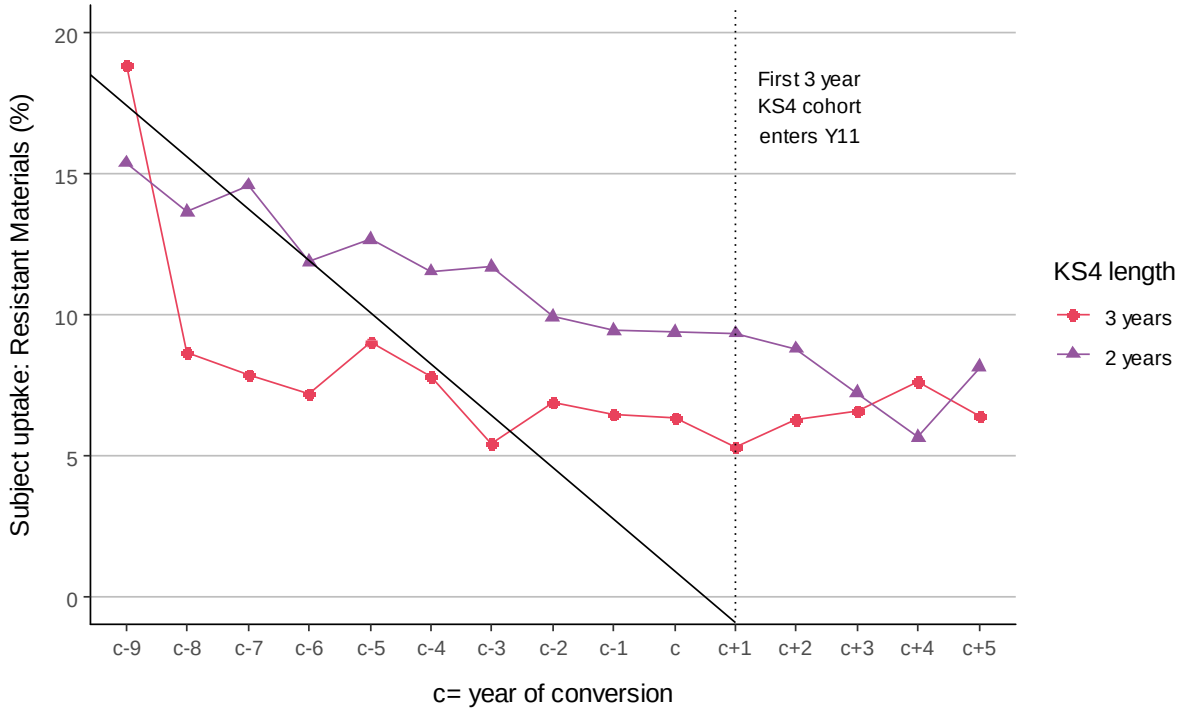


Figure 18: Overall proportion of pupils taking GCSEs in Product Design for 32 three-year and 72 two-year KS4 schools.



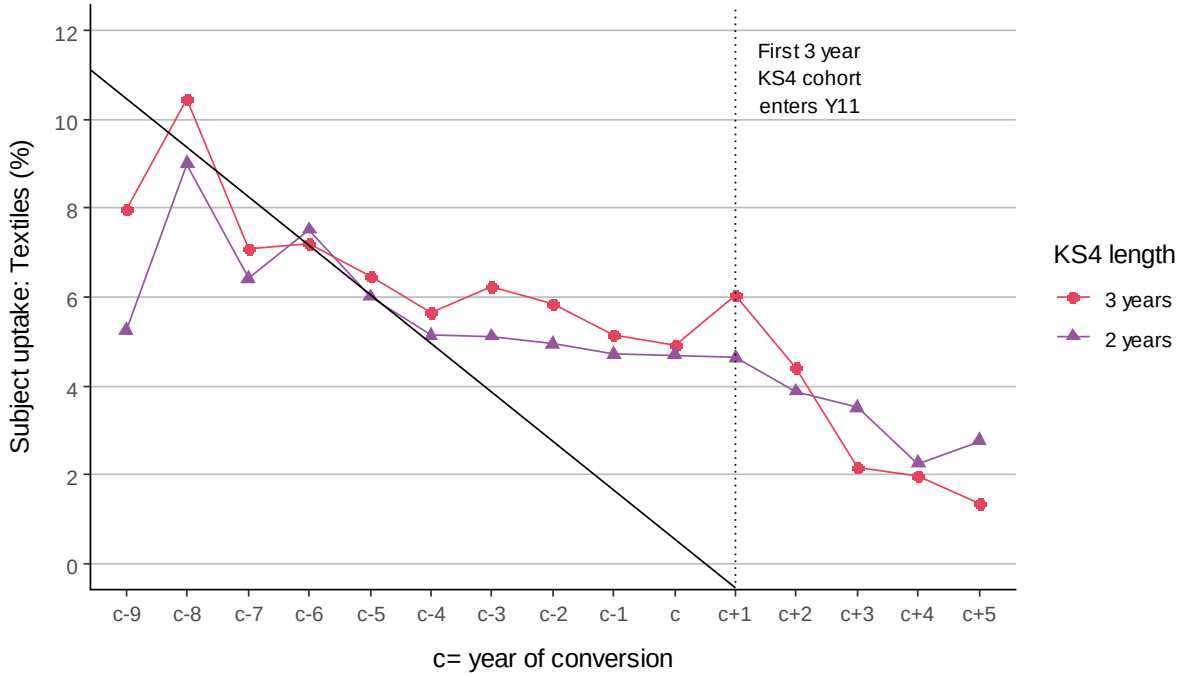
2018/29 data had to be removed for the above figure due to the removal of Product Design as a standalone subject that year (see note under Figure 4); this is why the x axis only goes up to 'c+5'.

Figure 19: Overall proportion of pupils taking GCSEs in Resistant Materials for 32 three-year and 72 two-year KS4 schools.



2018/29 data had to be removed for the above figure due to the removal of Resistant Materials as a standalone subject that year (see note under Figure 4); this is why the x axis only goes up to 'c+5'.

Figure 20: Overall proportion of pupils taking GCSEs in Textiles for 32 three-year and 72 two-year KS4 schools



2018/29 data had to be removed for the above figure due to the removal of Textiles as a standalone subject that year (see note under Figure 4); this is why the x axis only goes up to 'c+5'.

Appendix G: Subject classification tables for outcome (3), sub-outcomes (c) and (d)

Table 7: How GCSE subjects were categorised into broader subject areas for outcome (3), sub-outcome (c)

Subject area	Subjects included
Applied/other	Citizenship, Classics, Economics, General Studies, Law, Sociology, Sports, vocational subjects (Business, Childcare, Construction, Health and Social Care, Hospitality and Catering, Manufacturing, Office Technology, Tourism)
Arts	Art and Design, Dance, Drama, Media Studies, Music
Design and technology	Design and Technology (combined), Food Technology, Graphic Products, Product Design, Resistant Materials, Systems and Control, Textiles
English, maths and science	Astronomy, Biology, Chemistry, Engineering, English (combined), English Language, English Literature, Environmental Science, Geology, Mathematics, Physics, Science (combined), Statistics
Humanities	Geography, History, Humanities (combined), Religion
IT	IT, Computer Science
Languages	Arabic, Bengali, Chinese, Classical Greek, Dutch, French, German, Gujarati, Hindi, Italian, Japanese, Latin, Modern Greek, Modern Hebrew, Persian, Polish, Portuguese, Punjabi, Russian, Spanish, Turkish, Urdu

The course labels given in Table below are copied directly from the 'MAPPING_DESCRIPTION' variable provided in the NPD.

Table 8: Which GCSE course labels corresponded to each subject for outcome (3), sub-outcome (d)

Subject	GCSE course labels included
Art and design	'Applied Art & Design', 'Art & Design', 'Art & Design (3D Studies)', 'Art & Design (Fine Art)', 'Art & Design (Graphics)', 'Art & Design (Photography)', 'Art & Design (Textiles)'
Drama	'Drama & Theatre Studies', 'Expressive Arts & Performance Studies', 'Performing Arts'
Media studies	'Film Studies', 'Media/Film/TV Studies', 'Media: Communication & Production'
Music	'Music'
Any language	'Arabic', 'Bengali', 'Chinese', 'Classical Greek', 'Dutch', 'French', 'German', 'Gujarati', 'Hindi, 'Italian', 'Japanese', 'Latin', 'Modern Greek', 'Modern Hebrew', 'Persian', 'Polish', 'Portuguese', 'Punjabi', 'Russian', 'Spanish', 'Turkish', 'Urdu'
French	'French'
German	'German'

Spanish	‘Spanish’
Food technology	‘D&T Food Technology’, ‘Home Economics: Food’
Product design	‘D&T Product Design’
Resistant materials	‘D&T Resistant Materials’
Textiles	‘D&T Textiles Technology’
Geography	‘Geography’
History	‘Ancient History’, ‘History’
Religion	‘Religious Studies’

Appendix H: Confidence intervals for curriculum breadth sub-outcomes (a) and (b)

For Table 9 below the mean number of qualifications per pupil (sub-outcome (a)) is given, pooled for all pupils at 2 and 3-year KS4 schools, as in the main report. A 'two-stage' mean, for which the mean number of qualifications per pupil is first calculated at school-level, then averaged amongst schools, is also given. The reason for providing this is to allow a confidence interval to be calculated, as the assumption of independent observations is likely to hold between schools, but not between pupils due to school-level clustering. This is not necessary for sub-outcome (b) (Table 10), as observations are already at the school-level and so can be assumed to be independent of each other.

Table 9: mean number of qualifications per pupil (sub-outcome (a)) at 2 and 3-year KS4 schools.

Year of conversion	3-year KS4 schools		2-year KS4 schools	
	Pooled mean qualifications per pupil[1]	Two-stage mean qualifications per pupil[2] (95% CI)	Pooled mean qualifications per pupil	Two-stage mean qualifications per pupil (95% CI)
All qualifications				
c-9	9.84	9.81 (8.72, 10.89)	10.47	10.48 (9.94, 11.01)
c-8	9.78	9.87 (9.33, 10.41)	10.42	10.41 (10.02, 10.80)
c-7	10.09	10.20 (9.66, 10.74)	10.38	10.40 (10.06, 10.75)
c-6	10.33	10.41 (9.96, 10.87)	10.13	10.20 (9.90, 10.49)
c-5	10.36	10.46 (10.01, 10.91)	10.24	10.33 (10.08, 10.58)
c-4	10.69	10.72 (10.33, 11.10)	10.38	10.47 (10.21, 10.74)
c-3	10.47	10.50 (10.18, 10.82)	10.41	10.49 (10.24, 10.74)
c-2	10.26	10.24 (9.90, 10.59)	10.41	10.47 (10.25, 10.70)
c-1	10.69	10.57 (10.09, 11.05)	10.37	10.42 (10.16, 10.67)
c	11.14	10.98 (10.49, 11.48)	10.14	10.15 (9.90, 10.40)
c+1	10.77	10.67 (10.33, 11.02)	9.97	10.00 (9.79, 10.21)
c+2	10.56	10.49 (10.20, 10.79)	9.72	9.75 (9.55, 9.94)
c+3	10.49	10.44 (10.05, 10.84)	9.68	9.70 (9.53, 9.86)
c+4	10.28	10.22 (9.76, 10.68)	9.50	9.52 (9.34, 9.70)
c+5	9.63	9.61 (9.27, 9.95)	9.44	9.46 (9.17, 9.75)
c+6	9.68	9.73 (9.17, 10.30)	9.38	9.37 (9.16, 9.58)
GCSE qualifications				
c-9	7.87	7.82 (6.48, 9.16)	8.84	8.78 (8.09, 9.47)
c-8	8.19	8.39 (7.50, 9.28)	9.12	9.09 (8.57, 9.62)
c-7	8.21	8.38 (7.82, 8.94)	9.15	9.20 (8.80, 9.61)

[1] The mean number of qualifications per pupil is calculated with all pupils pooled together, rather than first being aggregated at school level. This is the method used to produce the graphs for sub-outcome (a) in the main report.
[2] The mean number of qualifications per pupil is first calculated at school-level, then the mean of these means is calculated amongst the schools.

c-6	8.33	8.36 (7.84, 8.89)	8.79	8.85 (8.50, 9.20)
c-5	8.32	8.40 (7.91, 8.88)	8.80	8.83 (8.54, 9.12)
c-4	8.09	8.14 (7.66, 8.61)	8.52	8.55 (8.25, 8.85)
c-3	7.91	7.99 (7.53, 8.45)	8.46	8.49 (8.14, 8.84)
c-2	7.73	7.82 (7.37, 8.27)	8.36	8.37 (8.02, 8.73)
c-1	8.01	8.06 (7.66, 8.47)	8.43	8.44 (8.10, 8.78)
c	8.39	8.44 (8.06, 8.82)	8.49	8.50 (8.18, 8.83)
c+1	8.54	8.56 (8.20, 8.92)	8.53	8.55 (8.27, 8.83)
c+2	8.60	8.57 (8.20, 8.94)	8.66	8.70 (8.51, 8.90)
c+3	8.88	8.87 (8.50, 9.23)	8.80	8.81 (8.61, 9.01)
c+4	9.04	8.95 (8.52, 9.38)	8.86	8.89 (8.70, 9.09)
c+5	8.92	8.91 (8.51, 9.30)	8.81	8.81 (8.58, 9.05)
c+6	9.20	9.25 (8.77, 9.73)	8.91	8.90 (8.68, 9.13)
Non-GCSEs qualifications				
c-9	2.27	2.30 (1.85, 2.75)	2.17	2.13 (1.40, 2.86)
c-8	2.28	1.97 (1.51, 2.43)	2.15	1.93 (1.60, 2.26)
c-7	2.43	2.19 (1.72, 2.65)	2.14	1.85 (1.61, 2.09)
c-6	2.50	2.39 (1.95, 2.83)	2.16	1.96 (1.74, 2.17)
c-5	2.65	2.48 (2.07, 2.89)	2.18	2.02 (1.79, 2.25)
c-4	3.06	2.93 (2.51, 3.35)	2.58	2.42 (2.12, 2.73)
c-3	3.05	2.85 (2.47, 3.23)	2.63	2.46 (2.16, 2.76)
c-2	3.03	2.75 (2.31, 3.19)	2.68	2.51 (2.22, 2.80)
c-1	3.29	2.89 (2.35, 3.43)	2.54	2.39 (2.11, 2.66)
c	3.31	2.90 (2.38, 3.41)	2.33	2.11 (1.82, 2.41)
c+1	2.80	2.45 (2.08, 2.82)	2.14	2.02 (1.76, 2.27)
c+2	2.54	2.29 (1.95, 2.63)	1.81	1.66 (1.50, 1.82)
c+3	2.17	1.98 (1.58, 2.39)	1.64	1.50 (1.39, 1.61)
c+4	1.90	1.76 (1.39, 2.13)	1.38	1.36 (1.29, 1.43)
c+5	1.52	1.42 (1.27, 1.58)	1.54	1.44 (1.30, 1.59)
c+6	1.40	1.36 (1.10, 1.63)	1.28	1.23 (1.15, 1.32)

Table 10: mean number of distinct qualifications per school (sub-outcome (b)) amongst 2 and 3-year KS4 schools.

Year of conversion	3-year KS4 schools		2-year KS4 schools	
	Mean distinct qualifications per school	95% CI	Mean distinct qualifications per school	95% CI
All qualifications				
c-9	49.13	(43.56, 54.69)	40.14	(31.65, 48.64)
c-8	44.05	(35.72, 52.38)	40.21	(36.18, 44.25)
c-7	47.64	(40.93, 54.35)	41.09	(37.52, 44.67)
c-6	51.42	(45.72, 57.11)	42.29	(39.14, 45.43)
c-5	54.90	(49.27, 60.54)	45.00	(42.21, 47.79)
c-4	56.95	(51.08, 62.83)	48.56	(45.70, 51.43)
c-3	54.72	(49.04, 60.39)	49.06	(46.00, 52.11)
c-2	56.20	(50.16, 62.25)	48.81	(45.89, 51.73)
c-1	53.73	(47.42, 60.05)	46.06	(42.94, 49.18)
c	51.06	(45.40, 56.73)	42.47	(39.76, 45.17)
c+1	48.05	(42.93, 53.16)	40.76	(38.32, 43.20)
c+2	42.14	(38.63, 45.66)	39.51	(37.48, 41.55)
c+3	43.37	(39.59, 47.15)	36.68	(34.95, 38.42)
c+4	40.81	(37.01, 44.61)	36.34	(34.41, 38.27)
c+5	39.93	(36.69, 43.16)	37.63	(35.30, 39.96)
c+6	41.00	(33.30, 48.70)	35.11	(32.17, 38.05)
GCSE qualifications				
c-9	26.38	(23.65, 29.1)	26.43	(22.94, 29.92)
c-8	26.05	(21.96, 30.14)	27.55	(25.91, 29.19)
c-7	27.92	(24.92, 30.92)	26.58	(24.94, 28.23)
c-6	27.79	(25.01, 30.58)	27.03	(25.79, 28.27)
c-5	29.06	(27.31, 30.82)	28.13	(27.06, 29.20)
c-4	28.48	(26.75, 30.22)	27.39	(26.28, 28.51)
c-3	27.78	(26.04, 29.53)	27.21	(26.00, 28.42)
c-2	28.92	(26.90, 30.94)	27.23	(26.08, 28.38)
c-1	28.89	(27.10, 30.68)	27.04	(25.93, 28.16)
c	29.50	(27.32, 31.68)	26.45	(25.32, 27.58)
c+1	29.23	(27.17, 31.30)	26.63	(25.50, 27.77)
c+2	27.67	(25.65, 29.70)	26.56	(25.51, 27.60)
c+3	27.85	(25.61, 30.10)	25.59	(24.53, 26.65)
c+4	27.52	(24.71, 30.34)	25.70	(24.3, 27.09)
c+5	28.43	(25.96, 30.90)	25.80	(24.13, 27.47)
c+6	30.00	(25.85, 34.15)	25.17	(23.33, 27.00)

Non-GCSEs qualifications				
c-9	22.75	(16.80, 28.70)	13.71	(7.69, 19.74)
c-8	18.00	(11.29, 24.71)	12.67	(9.46, 15.87)
c-7	19.72	(14.41, 25.03)	14.51	(11.80, 17.23)
c-6	23.63	(18.61, 28.64)	15.26	(12.71, 17.81)
c-5	25.84	(20.72, 30.96)	16.87	(14.50, 19.25)
c-4	28.47	(23.01, 33.93)	21.17	(18.66, 23.67)
c-3	26.94	(21.65, 32.22)	21.85	(19.05, 24.65)
c-2	27.28	(22.14, 32.42)	21.58	(19.02, 24.15)
c-1	24.84	(19.49, 30.20)	19.01	(16.39, 21.64)
c	21.56	(17.42, 25.70)	16.01	(13.76, 18.27)
c+1	18.81	(15.20, 22.43)	14.13	(12.24, 16.01)
c+2	14.47	(12.31, 16.63)	12.96	(11.54, 14.38)
c+3	15.52	(13.10, 17.94)	11.09	(9.79, 12.40)
c+4	13.29	(10.72, 15.86)	10.65	(9.27, 12.03)
c+5	11.50	(8.92, 14.08)	11.83	(10.16, 13.50)
c+6	11.00	(5.34, 16.66)	9.94	(7.65, 12.24)

Appendix I: School characteristics

In total, 405 schools responded to the survey, of which 104 were involved in the study Table 11 below presents key characteristics of the schools that responded to the survey. There was no collection of pupil data in the survey and so the table contains school level information only. As no schools dropped out, results of analysis to check balance at the matching stage is the same as at the analyse stage for school-level variables. As we did not obtain pupil-level data at the matching stage, we cannot say that results of analysis to check balance at the matching stage is the same as at the analyse stage for pupil-level variables

Statistical tests (chi-squared or t-tests as appropriate) were used to check for any imbalance between two and three-year KS4 schools, both at the initial response stage and the analysis stage; p-values from these tests are displayed in Table 11. No statistically significant differences between group characteristics were found for the N=405 schools that initially responded.

Table 11: Characteristics of groups that responded to survey (N=405)

School-level (categorical)	National population[3]		Three-year KS4 group[4]		Two-year KS4 group		Three vs. two-year KS4
	n/N (missing)	%	n/N (missing)	%	n/N (missing)	%	P-value[5]
<u>School governance</u> Academy or Free School Maintained	2600/3371 (35) 736/3371 (35)	77% 22%	204/263 (1) 58/263 (1)	78% 22%	103/142 (0) 39/142 (0)	73% 27%	0.372
<u>School type</u> Secondary school All through school	3205/3371 (0) 166/3371 (0)	95% 5%	247/263 (1) 15/263 (1)	94% 6%	136/142 (0) 6/142 (0)	96% 4%	0.517
<u>Urban or rural</u> Urban Rural	2902/3371 (6) 463/3371 (6)	86% 14%	226/263 (1) 36/263 (1)	86% 14%	112/142 (0) 30/142 (0)	79% 21%	0.121
<u>Ofsted rating</u> Outstanding Good Requires improvement Inadequate	686/3371 (294) 1663/3371 (294) 527/3371 (294) 201/3371 (294)	20% 49% 16% 6%	71/263 (8) 141/263 (8) 32/263 (8) 11/263 (8)	27% 54% 12% 4%	38/142 (6) 68/142 (6) 25/142 (6) 5/142 (6)	27% 48% 18% 4%	0.558
School-level (continuous)	n/N (missing)	Mean (SD)	n/N (missing)	Mean (SD)	n/N (missing)	Mean (SD)	P-value
% FSM 2018/19	3208/3371 (163)	15.4 (10.0)	258/263 (5)	13.2 (8.9)	140/142 (2)	12.8 (8.8)	0.663
Average attainment 8 score	2888/3371 (483)	43.4 (8.9)	241/263 (22)	49.6 (9.1)	133/142 (9)	48.8 (9.6)	0.448

Source: NFER's Record of Schools (at the baseline year; 2011/12, 2012/13, 2013/14, 2014/15, 2015/16)

[3] The national population is English secondary and all through schools, excluding independent schools. Population percentages may not add to 100 due to missing data.
[4] The three-year KS4 group includes schools with a three-year KS4 for only some pupils and/or subjects.
[5] P-values were obtained by performing a chi-squared test (categorical data) or an independent samples t-test with equal variances assumed (continuous data), comparing characteristics in the two and three-year KS4 groups.

Appendix J: Choice of analysis method

We considered using a school-level fixed effects model for this analysis rather than a random effects approach, and ran statistical checks to determine the best approach. A robust Hausman test was used to determine the preferred method of analysis for the primary outcome. If the null hypothesis is rejected, a fixed effect model remains unbiased and consistent; by contrast, a random effect model will end up with biased and inconsistent estimates.

The robust Hausman test showed a significant finding ($p<0.05$) indicating that the fixed effect model is preferred. The school-level fixed effects schsize (school size) and region were removed from the fixed effects model for this test and for the fixed effects models below. These variables had been used in the matching stage and were included in the model as it was likely that some imbalance between KS4 groups was present. We then ran sensitivity analyses comparing this fixed effects model to a random effects model with all variables present and to a clustered random effects model with all variables present. Results of the sensitivity analysis showed similar estimates for the variables of interest (*postchange* and *difference-in-difference,* see Table 12) and we proceeded with the random effects model.

All analysis was performed using the matched sample which includes 32 schools in the three-year KS4 maths group and 72 schools in the two-year KS4 maths group.

Table 12: Sensitivity analysis results

		Length of KS4 programme		Effect size		
		Three-year KS4 group	Two-year KS4 group			
Model	Variable of interest	n (missing)	n (missing)	Total n (intervention; control)	Hedges' G (95% CI)	p-value
Fixed effects	Postchange	51028 (0)	119647(0)	17065 (51028;119647)	-0.031 (-0.045,-0.016)	<0.05
	Difference-in-difference	51028 (0)	119647(0)	17065 (51028;119647)	0.055 (0.041,0.069)	<0.05
Random effects	Postchange	51028 (0)	119647(0)	17065 (51028;119647)	-0.025 (-0.039,-0.01)	<0.05
	Difference-in-difference	51028 (0)	119647(0)	17065 (51028;119647)	0.046 (0.032,0.061)	<0.05
Clustered random effects	Postchange	51028 (0)	119647(0)	17065 (51028;119647)	-0.025 (-0.040,-0.01)	<0.05
	Difference-in-difference	51028 (0)	119647(0)	17065 (51028;119647)	0.046 (0.032,0.060)	<0.05

Appendix K: Primary outcome analysis

Table 13: Full primary analysis results

Primary Outcome	Length of KS4 programme		Effect size		
	Three-year KS4 group	Two-year KS4 group			
Variable of interest	n (missing)	n (missing)	Total n (intervention; control)	Hedges' G (95% CI)	p-value
Treatment	51028 (0)	119647(0)	17065 (51028;119647)	-0.081 (-0.160,-0.002)	0.045
postchange	51028 (0)	119647(0)	17065 (51028;119647)	-0.025 (-0.039,-0.01)	0.001
Difference-in-difference	51028 (0)	119647(0)	17065 (51028;119647)	0.046 (0.032,0.061)	< 0.001
Gender	51028 (0)	119647(0)	17065 (51028;119647)	-0.038 (-0.044;-0.032)	0
Ethnicity	51028 (0)	119647(0)	17065 (51028;119647)	0.128 (0.119;0.138)	0
SEN	51028 (0)	119647(0)	17065 (51028;119647)	-0.287 (-0.297;-0.277)	0
FSM (pupil)	51028 (0)	119647(0)	17065 (51028;119647)	-0.200 (-0.21;-0.189)	0
School size (2nd lowest band)	51028 (0)	119647(0)	17065 (51028;119647)	0.106 (-0.267;0.48)	0.579
School size (middle band)	51028 (0)	119647(0)	17065 (51028;119647)	0.102 (-0.271;0.475)	0.593
School size (2nd highest band)	51028 (0)	119647(0)	17065 (51028;119647)	0.201 (-0.172;0.575)	0.292
School size (higher band)	51028 (0)	119647(0)	17065 (51028;119647)	0.216 (-0.161;0.592)	0.265
School FSM (2nd lowest band)	51028 (0)	119647(0)	17065 (51028;119647)	-0.027 (-0.048;-0.007)	0.008
School FSM (middle band)	51028 (0)	119647(0)	17065 (51028;119647)	0.028	0.058

				(-0.001;0.057)	
School FSM (2nd highest band)	51028 (0)	119647(0)	17065 (51028;119647)	0.009 (-0.025;0.042)	0.618
School FSM (higher band)	51028 (0)	119647(0)	17065 (51028;119647)	0.049 (0.011;0.088)	0.011
Region (Eastern)	51028 (0)	119647(0)	17065 (51028;119647)	0.052 (-0.222;0.326)	0.709
Region (London)	51028 (0)	119647(0)	17065 (51028;119647)	0.132 (-0.14;0.405)	0.345
Region (North East)	51028 (0)	119647(0)	17065 (51028;119647)	-0.143 (-0.43;0.144)	0.333
Region (North West/Merseyside)	51028 (0)	119647(0)	17065 (51028;119647)	-0.040 (-0.314;0.234)	0.775
Region (South East	51028 (0)	119647(0)	17065 (51028;119647)	0.214 (-0.057;0.486)	0.126
Region (South West)	51028 (0)	119647(0)	17065 (51028;119647)	0.100 (-0.172;0.371)	0.475
Region (West Midlands)	51028 (0)	119647(0)	17065 (51028;119647)	0.277 (-0.011;0.564)	0.062
Region (Yorkshire & The Humber)	51028 (0)	119647(0)	17065 (51028;119647)	0.084 (-0.213;0.381)	0.578
Prior attainment	51028 (0)	119647(0)	17065 (51028;119647)	0.031 (0.031;0.031)	0
KS4_EXAMYEAR (2009)	51028 (0)	119647(0)	17065 (51028;119647)	-0.059 (-0.073;-0.044)	0
KS4_EXAMYEAR (2010)	51028 (0)	119647(0)	17065 (51028;119647)	0.001 (-0.014;0.015)	0.913
KS4_EXAMYEAR (2011)	51028 (0)	119647(0)	17065 (51028;119647)	0.023 (0.008;0.037)	0.002
KS4_EXAMYEAR (2012)	51028 (0)	119647(0)	17065 (51028;119647)	-0.032 (-0.047;-0.016)	0
KS4_EXAMYEAR (2013)	51028 (0)	119647(0)	17065 (51028;119647)	-0.039	0

				(-0.053;-0.025)	
KS4_EXAMYEAR (2014)	51028 (0)	119647(0)	17065 (51028;119647)	0.004 (-0.01;0.019)	0.579
KS4_EXAMYEAR (2015)	51028 (0)	119647(0)	17065 (51028;119647)	0.016 (0;0.033)	0.062
KS4_EXAMYEAR (2016)	51028 (0)	119647(0)	17065 (51028;119647)	0.067 (0.049;0.085)	0
KS4_EXAMYEAR (2017)	51028 (0)	119647(0)	17065 (51028;119647)	-0.013 (-0.033;0.006)	0.156
KS4_EXAMYEAR (2018)	51028 (0)	119647(0)	17065 (51028;119647)	-0.005 (-0.025;0.015)	0.611
KS4_EXAMYEAR (2019)	51028 (0)	119647(0)	17065 (51028;119647)	-0.043 (-0.062;-0.024)	0

Results of the sensitivity analyses showed a fluctuation in the estimate for the treatment variable. Initially in the simple model, the estimate for this variable is negative and significant indicating that before converting to a three-year programme, schools in the three-year KS4 group performed (on average) lower in GCSE mathematics compared to schools in the two-year KS4 group during the same period. However, after controlling for pupil level characteristics, the estimate is now insignificant indicating no difference between in GCSE mathematics scores between groups pre-conversion. After adding school level characteristics to the model, we see that the estimate is negative and significant indicating that before converting to a three-year programme, schools in the three-year KS4 group performed (on average) lower in GCSE mathematics compared to schools in the two-year KS4 group during the same period. This indicates that the remaining findings should be interpreted with some caution as any improvements visible post-policy change may be a continuation of the pre-change trajectory.

The table below shows that for variable postchange, the addition of these characteristics affected the outcome. In the simple model where no pupil or school level characteristics are present, this is both positive and significant, indicating that for two-year KS4 schools pupils' GCSE mathematics point scores were significantly higher during the post-policy change period compared to the pre-policy change period. Once we controlled for pupil and school characteristics, we found that for two-year KS4 schools pupils' GCSE mathematics point scores were significantly lower during the post-policy change period compared to the pre-policy change period. There were similar estimates for the difference-in-difference variable (see Table 14 below) which meant that the addition of pupil and school level characteristics produced no effect on the findings.

Table 14: Development of the primary outcome model.

	Primary Outcome	Length of KS4 programme		Effect size		
		Three-year KS4 group	Two-year KS4 group			
Model	Variable of interest	n (missing)	n (missing)	Total n (intervention; control)	Hedges' G (95% CI)	p-value
Simple model	Treatment	51028 (0)	119647(0)	17065 (51028;119647)	-0.188 (-0.363,-0.014)	0.037
	postchange	51028 (0)	119647(0)	17065 (51028;119647)	0.167(0.156,0.178)	0
	Difference-in-difference	51028 (0)	119647(0)	17065 (51028;119647)	0.107(0.087,0.127)	0
Simple model + pupil characteristics	Treatment	51028 (0)	119647(0)	17065 (51028;119647)	-0.09(-0.181,0.001)	0.054
	postchange	51028 (0)	119647(0)	17065 (51028;119647)	-0.029(-0.044,-0.014)	0
	Difference-in-difference	51028 (0)	119647(0)	17065 (51028;119647)	0.051(0.037,0.065)	0
Simple model + pupil characteristics + school characteristics (final model)	Treatment	51028 (0)	119647(0)	17065 (51028;119647)	-0.081(-0.16,-0.003)	0.045
	postchange	51028 (0)	119647(0)	17065 (51028;119647)	-0.025(-0.039,-0.01)	0.001
	Difference-in-difference	51028 (0)	119647(0)	17065 (51028;119647)	0.046(0.032,0.06)	0

Appendix L: Missing analysis

Table 15: Association of missingness result (imputed)

Variable of interest	Effect Size	Lower Confidence interval	Upper confidence interval	p-value
Treatment	-0.171	-0.648	0.305	0.481
postchange	0.026	-0.113	0.166	0.710
Difference-in-difference	-0.108	-0.258	0.041	0.156
Gender	0.023	-0.046	0.091	0.518
Ethnicity	1.132	1.046	1.218	0.000
SEN	0.617	0.531	0.703	0.000
FSM (pupil)	-0.240	-0.343	-0.138	0.000
School size (2nd lowest band)	-0.369	-2.571	1.833	0.743
School size (middle band)	0.257	-1.936	2.450	0.818
School size (2nd highest band)	-0.120	-2.316	2.076	0.915
School size (higher band)	-0.582	-2.818	1.655	0.610
School FSM (2nd lowest band)	0.152	-0.024	0.327	0.090
School FSM (middle band)	0.639	0.359	0.918	0.000
School FSM (2nd highest band)	0.425	0.086	0.764	0.014
School FSM (higher band)	0.372	0.004	0.741	0.048
Region (Eastern)	1.045	-0.594	2.684	0.211
Region (London)	2.142	0.504	3.779	0.010
Region (North East)	1.341	-0.379	3.062	0.127
Region (North West/Merseyside)	2.086	0.447	3.725	0.013
Region (South East	2.257	0.630	3.884	0.007

Region (South West)	1.966	0.339	3.593	0.018
Region (West Midlands)	2.773	1.053	4.493	0.002
Region (Yorkshire & The Humber)	1.698	-0.072	3.468	0.060
Prior attainment	-0.319	-0.341	-0.298	0.000
KS4_EXAMYEAR (2009)	0.105	-0.066	0.275	0.229
KS4_EXAMYEAR (2010)	0.350	0.184	0.516	0.000
KS4_EXAMYEAR (2011)	0.346	0.178	0.514	0.000
KS4_EXAMYEAR (2012)	0.233	0.051	0.415	0.012
KS4_EXAMYEAR (2013)	0.132	-0.053	0.316	0.161
KS4_EXAMYEAR (2014)	0.186	-0.002	0.374	0.053
KS4_EXAMYEAR (2015)	4.647	4.479	4.816	0.000
KS4_EXAMYEAR (2016)	0.456	0.242	0.670	0.000
KS4_EXAMYEAR (2017)	0.445	0.228	0.662	0.000
KS4_EXAMYEAR (2018)	0.626	0.411	0.841	0.000
KS4_EXAMYEAR (2019)	0.371	0.153	0.588	0.001

Source: NPD data 2007/08-2018/19

Appendix M: Heterogeneity over time tables

Table 16a: Exploration of heterogeneity over time: comparison group only, relative to timepoint 'c' (considering year; also see Table 16b).

		Effect size	
Outcome	Coefficient of interest	Standardised effect size (95% CI)	p-value
GCSE mathematics scores (extended model)	*c*-9	-0.060(-0.340; 0.219)	0.673
	c-8	-0.074(-0.321; 0.174)	0.562
	c-7	-0.072(-0.289; 0.145)	0.518
	c-6	-0.065(-0.251; 0.121)	0.497
	c-5	-0.053(-0.209; 0.102)	0.502
	c-4	-0.046(-0.171; 0.079)	0.473
	c-3	-0.013(-0.107; 0.082)	0.792
	c-2	-0.007(-0.071; 0.058)	0.844
	c-1	0.08(-0.028; 0.044)	0.668
	c+1	0.001(-0.035; 0.037)	0.945
	c+2	0.005(-0.059; 0.070)	0.874
	c+3	-0.030(-0.124; 0.065)	0.538
	c+4	-0.029(-0.154; 0.096)	0.655
	c+5	-0.006(-0.162; 0.150)	0.943
	c+6	-0.041(-0.228; 0.147)	0.673

Source: NPD data 2007/08-2018/19

Table 16b: Exploration of heterogeneity over time: interaction of year ‘c’, with treatment (see Table 16a)

		Effect size	
Outcome	Coefficient of interest	Standardised effect size (95% CI)	p-value
GCSE mathematics scores (extended model)	int -9	-0.037(-0.112; 0.037)	0.323
	int-8	-0.034(-0.080; 0.013)	0.154
	int-7	-0.042(-0.080; -0.003)	0.033
	int-6	-0.064(-0.098; -0.030)	0.000
	int-5	-0.084(-0.116; -0.051)	0.000
	int-4	-0.083(-0.116; -0.051)	0.000
	int-3	-0.071(-0.104; -0.038)	0.000
	int-2	-0.033(-0.067; 0)	0.050
	int-1	-0.047(-0.081; -0.014)	0.006
	int+1	0.004(-0.029; 0.037)	0.814
	int+2	-0.010(-0.042; 0.023)	0.566
	int+3	-0.005(-0.038; 0.028)	0.787
	int+4	-0.016(-0.051; 0.020)	0.388
	int+5	-0.029(-0.068; 0.010)	0.142
	int+6	-0.049(-0.098; -0.001)	0.056

Source: NPD data 2007/08-2018/19

Table 17a: Exploration of heterogeneity over time of subgroup analysis for FSM eligible pupils, comparison group only, relative to timepoint 'c' (considering year; also see Table 17b)

		Effect size	
Outcome	Coefficient of interest	Standardised effect size (95% CI)	p-value
GCSE mathematics scores (extended model)	c-9	-0.022 (-0.317,0.273)	0.885
	c-8	-0.113 (-0.356,0.129)	0.361
	c-7	-0.155 (-0.369,0.059)	0.158
	c-6	-0.145 (-0.327,0.037)	0.122
	c-5	-0.131 (-0.288,0.027)	0.105
	c-4	-0.068 (-0.201,0.065)	0.320
	c-3	-0.045 (-0.155,0.065)	0.424
	c-2	-0.081 (-0.17,0.009)	0.079
	c-1	-0.013 (-0.084,0.059)	0.729
	c+1	-0.029 (-0.103,0.045)	0.438
	c+2	-0.023 (-0.111,0.065)	0.611
	c+3	-0.054 (-0.164,0.056)	0.336
	c+4	-0.037 (-0.17,0.096)	0.588
	c+5	0.065 (-0.096,0.227)	0.429
	c+6	-0.060 (-0.262,0.142)	0.561

Source: NPD data 2007/08-2018/19

Table 17b: *Exploration of heterogeneity over time of subgroup analysis for FSM eligible pupils, interaction of year 'c', with treatment (see Table 15a)*

		Effect size	
Outcome	Variable of interest	Standardised effect size (95% CI)	p-value
GCSE mathematics scores (extended model)	int -9	-0.147 (-0.357,0.063)	0.170
	int-8	-0.034 (-0.186,0.118)	0.665
	int-7	-0.036 (-0.165,0.093)	0.582
	int-6	0.037 (-0.068,0.142)	0.494
	int-5	-0.005 (-0.102,0.092)	0.919
	int-4	-0.045 (-0.143,0.053)	0.366
	int-3	-0.023 (-0.122,0.075)	0.645
	int-2	0.014 (-0.087,0.114)	0.792
	int-1	-0.071 (-0.169,0.028)	0.159
	int1	0.068 (-0.031,0.168)	0.179
	int2	0.004 (-0.093,0.102)	0.931
	int3	0.058 (-0.045,0.16)	0.269
	int4	0.078 (-0.029,0.185)	0.154
	int5	-0.004 (-0.121,0.114)	0.950
	int6	0.046 (-0.110,0.202)	0.565

Source: NPD data 2007/08-2018/19

Table 18a: *Exploration of heterogeneity over time of subgroup analysis for English Literature: comparison group only, relative to timepoint 'c' (considering year 'c'; also see Table 18b)*

Extended English		
Coefficient of interest	Standardised effect size (95% CI)	p-value
c-9	-0.022 (-0.303, 0.259)	0.886
c-8	-0.015 (-0.262, 0.233)	0.913
c-7	-0.045 (-0.262, 0.172)	0.699
c-6	-0.03 (-0.216, 0.157)	0.768
c-5	-0.014 (-0.169, 0.142)	0.871
c-4	-0.063 (-0.188, 0.063)	0.356
c-3	-0.016 (-0.112, 0.079)	0.750
c-2	-0.047 (-0.113, 0.019)	0.183
c-1	-0.007 (-0.045, 0.031)	0.735
c+1	0.056 (0.017, 0.095)	0.007
c+2	0.063 (-0.003, 0.129)	0.075
c+3	0.045 (-0.051, 0.14)	0.386
c+4	0.074 (-0.052, 0.2)	0.276
c+5	0.062 (-0.094, 0.218)	0.463
c+6	0.062 (-0.126, 0.25)	0.542

Source: NPD data 2007/08-2018/19

Table 18b*: Exploration of heterogeneity over time of subgroup analysis for English Literature interaction of year 'c' with treatment (see Table 19a)*

Extended English	Effect size	
Coefficient of interest	Standardised effect size (95% CI)	p-value
int-9	-0.128 (-0.218, -0.037)	0.006
int-8	-0.112 (-0.173, -0.051)	0
int-7	-0.006 (-0.056, 0.044)	0.821
int-6	-0.044 (-0.088, -0.001)	0.046
int-5	-0.076 (-0.117, -0.036)	0
int-4	-0.03 (-0.071, 0.011)	0.151
int-3	-0.029 (-0.07, 0.012)	0.164
int-2	0.032 (-0.01, 0.072)	0.132
int-1	-0.019 (-0.061, 0.022)	0.354
int+1	-0.062 (-0.104, -0.02)	0.004
int+2	-0.067 (-0.109, -0.026)	0.002
int+3	-0.057 (-0.099, -0.015)	0.008
int+4	-0.044 (-0.087, -0.001)	0.047
int+5	0.021 (-0.027, 0.069)	0.395
int+6	-0.073 (-0.132, -0.013)	0.017

Source: NPD data 2007/08-2018/19

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