

Evaluation of the introduction of Universal Primary Free School Meals in London (UPFSML):

Part 1 – Descriptive Analyses and Primary Results

Jake Anders and Sam Sims

UCL Centre for Education Policy & Equalising Opportunities

## Contents

Balance.....	5
Missing data.....	17
ICC and Pre-post correlations.....	18
Results.....	19
Effect sizes .....	19
Impact estimates .....	19
Pre-trends .....	22
Conditional pre-trends.....	25
Placebo estimates.....	29
Heterogeneity.....	32
Robustness Checks.....	33
Conclusion.....	33
Appendix 17. Population characteristics inside and outside London .....	33

Table 1. Number of schools and pupils in treatment and comparison groups for DID

Treatment Group	Year	Number of schools	Number of pupils	Number of FSM pupils	Mean pupils per school	Mean FSM pupils per school
Comparison	16	13485	454323	133931	34	10
Treatment	16	1374	65591	24316	48	18
Overall	16	14859	519914	158247	35	11
Comparison	17	13516	465561	137168	34	10
Treatment	17	1372	66854	24263	49	18
Overall	17	14888	532415	161431	36	11
Comparison	18	13580	481908	138885	35	10
Treatment	18	1381	70165	24565	51	18
Overall	18	14961	552073	163450	37	11
Comparison	19	13689	528735	150881	39	11
Treatment	19	1401	81860	26863	58	19
Overall	19	15090	610595	177744	40	12
Comparison	22	13789	539395	149242	39	11
Treatment	22	1443	80338	23816	56	17
Overall	22	15232	619733	173058	41	11
Comparison	23	13844	546983	154236	40	11
Treatment	23	1461	80645	24324	55	17
Overall	23	15305	627628	178560	41	12
Comparison	24	13851	538363	153839	39	11
Treatment	24	1459	78816	23615	54	16
Overall	24	15310	617179	177454	40	12
Comparison	Overall	15746	3555268	1018182	226	65
Treatment	Overall	1554	524269	171762	337	111
Overall	Overall	17300	4079537	1189944	236	69

Notes. FSM = Eligible for Free School Meals. "Mean pupils per school" column reports the mean average number of pupils in the schools, as identified in the "Number of schools" and "Number of pupils" columns; "Mean FSM pupils per school" reports the analogue of this using only the "Number of FSM pupils" column. Treatment group is all schools in London (except excluded boroughs); Comparison group is all schools in Rest of England; Overall combines these two groups.

Table 2. Numbers of schools and pupils in treatment and comparison groups for triple difference design

Treatment Group	Year	Number of schools	Number of pupils	Number of FSM pupils	Mean pupils per school	Mean FSM pupils per school
Non-London	16	13485	454323	133931	34	10

Treatment Group	Year	Number of schools	Number of pupils	Number of FSM pupils	Mean pupils per school	Mean FSM pupils per school
Already treated in London	16	134	5381	3107	40	23
Newly treated in London	16	1374	65591	24316	48	18
Overall	16	14993	525295	161354	35	11
Non-London	17	13516	465561	137168	34	10
Already treated in London	17	136	5473	3163	40	23
Newly treated in London	17	1372	66854	24263	49	18
Overall	17	15024	537888	164594	36	11
Non-London	18	13580	481908	138885	35	10
Already treated in London	18	134	5607	3060	42	23
Newly treated in London	18	1381	70165	24565	51	18
Overall	18	15095	557680	166510	37	11
Non-London	19	13689	528735	150881	39	11
Already treated in London	19	136	6516	3155	48	23
Newly treated in London	19	1401	81860	26863	58	19
Overall	19	15226	617111	180899	41	12
Non-London	22	13789	539395	149242	39	11
Already treated in London	22	135	6282	2855	47	21
Newly treated in London	22	1443	80338	23816	56	17
Overall	22	15367	626015	175913	41	11
Non-London	23	13844	546983	154236	40	11
Already treated in London	23	136	6245	2954	46	22

Treatment Group	Year	Number of schools	Number of pupils	Number of FSM pupils	Mean pupils per school	Mean FSM pupils per school
Newly treated in London	23	1461	80645	24324	55	17
Overall	23	15441	633873	181514	41	12
Non-London	24	13851	538363	153839	39	11
Already treated in London	24	133	6038	2774	45	21
Newly treated in London	24	1459	78816	23615	54	16
Overall	24	15443	623217	180228	40	12
Non-London	Overall	15746	3555268	1018182	226	65
Already treated in London	Overall	146	41542	21068	285	144
Newly treated in London	Overall	1554	524269	171762	337	111
Overall	Overall	17446	4121079	1211012	236	69

Notes. FSM = Eligible for Free School Meals. "Mean pupils per school" column reports the mean average number of pupils in the schools, as identified in the "Number of schools" and "Number of pupils" columns; "Mean FSM pupils per school" reports the analogue of this using only the "Number of FSM pupils" column.

## Balance

To contextualise our analyses, we explore imbalance between the treatment and comparison groups, not least to demonstrate why it is important to consider longitudinal change as part of our design.

Table 3. Imbalance in pupil-level characteristics in 2023

Characteristic	N	Rest of England (exc. London already treated) N = 546,983 <sup>1</sup>	Newly treated in London in 2024 N = 80,645 <sup>1</sup>	Overall N = 627,628 <sup>2</sup>	Difference <sup>2</sup>	95% CI <sup>2</sup>
Gender	627,628				0.00	0.00, 0.01
Female		271,465 (50%)	40,123 (50%)	311,588 (50%)		
Male		275,518 (50%)	40,522 (50%)	316,040 (50%)		
Month of Birth	627,628				0.02	0.01, 0.02
January		46,900 (8.6%)	6,839 (8.5%)	53,739 (8.6%)		
February		42,818 (7.8%)	6,325 (7.8%)	49,143 (7.8%)		
March		45,721 (8.4%)	6,696 (8.3%)	52,417 (8.4%)		
April		43,570 (8.0%)	6,235 (7.7%)	49,805 (7.9%)		
May		46,592 (8.5%)	7,030 (8.7%)	53,622 (8.5%)		
June		44,321 (8.1%)	6,623 (8.2%)	50,944 (8.1%)		
July		45,713 (8.4%)	6,999 (8.7%)	52,712 (8.4%)		
August		45,962 (8.4%)	6,775 (8.4%)	52,737 (8.4%)		
September		46,660 (8.5%)	6,859 (8.5%)	53,519 (8.5%)		
October		46,770 (8.6%)	6,853 (8.5%)	53,623 (8.5%)		
November		45,806 (8.4%)	6,740 (8.4%)	52,546 (8.4%)		
December		46,150 (8.4%)	6,671 (8.3%)	52,821 (8.4%)		
Major ethnic group	627,628				0.80	0.79, 0.80
White		423,016 (77%)	33,710 (42%)	456,726 (73%)		
Black		21,153 (3.9%)	13,773 (17%)	34,926 (5.6%)		
Asian		58,968 (11%)	17,822 (22%)	76,790 (12%)		
Other		43,846 (8.0%)	15,340 (19%)	59,186 (9.4%)		
Special Educational Needs	627,628				0.02	0.01, 0.03
Not identified		451,887 (83%)	67,192 (83%)	519,079 (83%)		

Characteristic	N	Rest of England (exc. London already treated) N = 546,983 <sup>1</sup>	Newly treated in London in 2024 N = 80,645 <sup>1</sup>	Overall N = 627,628 <sup>2</sup>	Difference <sup>2</sup>	95% CI <sup>2</sup>
Identified		95,096 (17%)	13,453 (17%)	108,549 (17%)		
English as an Additional Language status	627,628				0.69	0.68, 0.70
English as a native language		452,842 (83%)	42,128 (52%)	494,970 (79%)		
English as an additional language		94,141 (17%)	38,517 (48%)	132,658 (21%)		
IDACI Decile Group	627,628				0.44	0.44, 0.45
Group 1 (Low deprivation)		58,634 (11%)	3,164 (3.9%)	61,798 (9.8%)		
Group 2		50,052 (9.2%)	9,606 (12%)	59,658 (9.5%)		
Group 3		48,906 (8.9%)	10,978 (14%)	59,884 (9.5%)		
Group 4		49,908 (9.1%)	11,527 (14%)	61,435 (9.8%)		
Group 5		51,272 (9.4%)	10,729 (13%)	62,001 (9.9%)		
Group 6		53,598 (9.8%)	9,698 (12%)	63,296 (10%)		
Group 7		56,035 (10%)	8,254 (10%)	64,289 (10%)		
Group 8		58,222 (11%)	6,476 (8.0%)	64,698 (10%)		
Group 9		59,924 (11%)	5,244 (6.5%)	65,168 (10%)		
Group 10 (High deprivation)		60,432 (11%)	4,969 (6.2%)	65,401 (10%)		
Year-standardised EYFSP average score	627,628	0.10 (0.92)	-0.03 (1.09)	0.08 (0.94)	0.13	0.12, 0.13
Eligible for Pupil Premium	627,628				0.04	0.04, 0.05
Not eligible		392,747 (72%)	56,321 (70%)	449,068 (72%)		
Eligible		154,236 (28%)	24,324 (30%)	178,560 (28%)		

<sup>1</sup>n (%); Mean (SD)

<sup>2</sup>Standardized Mean Difference

Abbreviation: CI = Confidence Interval

Table 3 shows substantial differences in ethnicity, IDACI decile group, and Early Years Foundation Stage Profile (EYFSP) average schools are evident between the rest of England (our comparison group) and pupils in newly treated London boroughs. Similarly, Table 4 demonstrates substantial

compositional differences at the school level, particularly in % eligibility for pupil premium, % English as an Additional Language, and school participation in Magic Breakfast.

Table 4. Imbalance in school-level characteristics in 2023

Characteristic	N	Rest of England (exc. London already treated) N = 13,844 <sup>1</sup>	Newly treated in London in 2024 N = 1,461 <sup>1</sup>	Overall N = 15,305 <sup>1</sup>	Difference <sup>2</sup>	95% CI <sup>2</sup>
% Pupil Premium eligible	15,305	29 (19)	33 (18)	29 (19)	-0.24	-0.29, -0.18
% Special Educational Needs	15,305	21 (14)	21 (14)	21 (14)	0.06	0.00, 0.11
% English as an Additional Language	15,305	14 (19)	46 (23)	17 (22)	-1.5	-1.6, -1.5
Magic Breakfast	15,305	828 (6.0%)	232 (16%)	1,060 (6.9%)	-0.32	-0.38, -0.27

<sup>1</sup>Mean (SD); n (%)

<sup>2</sup>Standardized Mean Difference

Abbreviation: CI = Confidence Interval

When using our triple-difference approach, we also consider differences between the already treated schools in London and the rest of England (Table 5 and Table 6) and the newly treated schools in London with the already treated schools in London (Table 7 and Table 8).

Table 5. Pupil-level imbalance in 2023

Characteristic	N	Rest of England (exc. London newly treated) N = 546,983 <sup>1</sup>	Already treated in London pre-2024 N = 6,245 <sup>1</sup>	Overall N = 553,228 <sup>2</sup>	Difference <sup>2</sup>	95% CI <sup>2</sup>
Gender	553,228				0.01	-0.02, 0.03
Female		271,465 (50%)	3,074 (49%)	274,539 (50%)		
Male		275,518 (50%)	3,171 (51%)	278,689 (50%)		
Month of Birth	553,228				0.06	0.03, 0.08
January		46,900 (8.6%)	539 (8.6%)	47,439 (8.6%)		
February		42,818 (7.8%)	495 (7.9%)	43,313 (7.8%)		
March		45,721 (8.4%)	504 (8.1%)	46,225 (8.4%)		
April		43,570 (8.0%)	512 (8.2%)	44,082 (8.0%)		
May		46,592 (8.5%)	518 (8.3%)	47,110 (8.5%)		
June		44,321 (8.1%)	538 (8.6%)	44,859 (8.1%)		
July		45,713 (8.4%)	592 (9.5%)	46,305 (8.4%)		
August		45,962 (8.4%)	498 (8.0%)	46,460 (8.4%)		
September		46,660 (8.5%)	505 (8.1%)	47,165 (8.5%)		
October		46,770 (8.6%)	555 (8.9%)	47,325 (8.6%)		
November		45,806 (8.4%)	488 (7.8%)	46,294 (8.4%)		
December		46,150 (8.4%)	501 (8.0%)	46,651 (8.4%)		
Major ethnic group	553,228				1.4	1.4, 1.4
White		423,016 (77%)	1,288 (21%)	424,304 (77%)		
Black		21,153 (3.9%)	1,516 (24%)	22,669 (4.1%)		
Asian		58,968 (11%)	2,378 (38%)	61,346 (11%)		
Other		43,846 (8.0%)	1,063 (17%)	44,909 (8.1%)		
Special Educational Needs	553,228				0.04	0.01, 0.06
Not identified		451,887 (83%)	5,065 (81%)	456,952 (83%)		

Characteristic	N	Rest of England (exc. London newly treated) N = 546,983 <sup>1</sup>	Already treated in London pre-2024 N = 6,245 <sup>1</sup>	Overall N = 553,228 <sup>2</sup>	Difference <sup>2</sup>	95% CI <sup>2</sup>
Identified		95,096 (17%)	1,180 (19%)	96,276 (17%)		
English as an Additional Language status	553,228				1.0	0.97, 1.0
English as a native language		452,842 (83%)	2,456 (39%)	455,298 (82%)		
English as an additional language		94,141 (17%)	3,789 (61%)	97,930 (18%)		
IDACI Decile Group	553,228				1.3	1.3, 1.3
Group 1 (Low deprivation)		58,634 (11%)	418 (6.7%)	59,052 (11%)		
Group 2		50,052 (9.2%)	2,085 (33%)	52,137 (9.4%)		
Group 3		48,906 (8.9%)	2,097 (34%)	51,003 (9.2%)		
Group 4		49,908 (9.1%)	677 (11%)	50,585 (9.1%)		
Group 5		51,272 (9.4%)	311 (5.0%)	51,583 (9.3%)		
Group 6		53,598 (9.8%)	242 (3.9%)	53,840 (9.7%)		
Group 7		56,035 (10%)	203 (3.3%)	56,238 (10%)		
Group 8		58,222 (11%)	135 (2.2%)	58,357 (11%)		
Group 9		59,924 (11%)	44 (0.7%)	59,968 (11%)		
Group 10 (High deprivation)		60,432 (11%)	33 (0.5%)	60,465 (11%)		
Year-standardised EYFSP average score	553,228	0.10 (0.92)	-0.02 (1.03)	0.10 (0.92)	0.12	0.10, 0.15
Eligible for Pupil Premium	553,228				0.40	0.38, 0.43
Not eligible		392,747 (72%)	3,291 (53%)	396,038 (72%)		
Eligible		154,236 (28%)	2,954 (47%)	157,190 (28%)		

<sup>1</sup>n (%); Mean (SD)

<sup>2</sup>Standardized Mean Difference

Abbreviation: CI = Confidence Interval

Table 6. School-level imbalance in 2023

Characteristic	N	Rest of England (exc. London newly treated) N = 13,844 <sup>1</sup>	Already treated in London pre-2024 N = 136 <sup>1</sup>	Overall N = 13,980 <sup>1</sup>	Difference <sup>2</sup>	95% CI <sup>2</sup>
% Pupil Premium eligible	13,980	29 (19)	47 (16)	29 (19)	-1.1	-1.2, -0.90
% Special Educational Needs	13,980	21 (14)	23 (12)	21 (14)	-0.12	-0.29, 0.05
% English as an Additional Language	13,980	14 (19)	57 (25)	14 (19)	-1.9	-2.1, -1.8
Magic Breakfast	13,980	828 (6.0%)	53 (39%)	881 (6.3%)	-0.86	-1.0, -0.69

<sup>1</sup>Mean (SD); n (%)

<sup>2</sup>Standardized Mean Difference

Abbreviation: CI = Confidence Interval

Table 7. Pupil-level imbalance in 2023

Characteristic	N	Newly treated in London in 2024 N = 6,245 <sup>1</sup>	Already treated in London pre-2024 N = 80,645 <sup>1</sup>	Overall N = 86,890 <sup>1</sup>	Difference <sup>2</sup>	95% CI <sup>2</sup>
Gender	86,890				0.01	-0.02, 0.04
Female		3,074 (49%)	40,123 (50%)	43,197 (50%)		
Male		3,171 (51%)	40,522 (50%)	43,693 (50%)		
Month of Birth	86,890				0.05	0.02, 0.08
January		539 (8.6%)	6,839 (8.5%)	7,378 (8.5%)		
February		495 (7.9%)	6,325 (7.8%)	6,820 (7.8%)		
March		504 (8.1%)	6,696 (8.3%)	7,200 (8.3%)		
April		512 (8.2%)	6,235 (7.7%)	6,747 (7.8%)		
May		518 (8.3%)	7,030 (8.7%)	7,548 (8.7%)		
June		538 (8.6%)	6,623 (8.2%)	7,161 (8.2%)		
July		592 (9.5%)	6,999 (8.7%)	7,591 (8.7%)		
August		498 (8.0%)	6,775 (8.4%)	7,273 (8.4%)		
September		505 (8.1%)	6,859 (8.5%)	7,364 (8.5%)		
October		555 (8.9%)	6,853 (8.5%)	7,408 (8.5%)		
November		488 (7.8%)	6,740 (8.4%)	7,228 (8.3%)		
December		501 (8.0%)	6,671 (8.3%)	7,172 (8.3%)		
Major ethnic group	86,890				0.52	0.50, 0.55
White		1,288 (21%)	33,710 (42%)	34,998 (40%)		
Black		1,516 (24%)	13,773 (17%)	15,289 (18%)		
Asian		2,378 (38%)	17,822 (22%)	20,200 (23%)		
Other		1,063 (17%)	15,340 (19%)	16,403 (19%)		
Special Educational Needs	86,890				0.06	0.03, 0.08
Not identified		5,065 (81%)	67,192 (83%)	72,257 (83%)		

Characteristic	N	Newly treated in London in 2024 N = 6,245 <sup>1</sup>	Already treated in London pre-2024 N = 80,645 <sup>1</sup>	Overall N = 86,890 <sup>1</sup>	Difference <sup>2</sup>	95% CI <sup>2</sup>
Identified		1,180 (19%)	13,453 (17%)	14,633 (17%)		
English as an Additional Language status	86,890				0.26	0.24, 0.29
English as a native language		2,456 (39%)	42,128 (52%)	44,584 (51%)		
English as an additional language		3,789 (61%)	38,517 (48%)	42,306 (49%)		
IDACI Decile Group	86,890				1.1	1.0, 1.1
Group 1 (Low deprivation)		418 (6.7%)	3,164 (3.9%)	3,582 (4.1%)		
Group 2		2,085 (33%)	9,606 (12%)	11,691 (13%)		
Group 3		2,097 (34%)	10,978 (14%)	13,075 (15%)		
Group 4		677 (11%)	11,527 (14%)	12,204 (14%)		
Group 5		311 (5.0%)	10,729 (13%)	11,040 (13%)		
Group 6		242 (3.9%)	9,698 (12%)	9,940 (11%)		
Group 7		203 (3.3%)	8,254 (10%)	8,457 (9.7%)		
Group 8		135 (2.2%)	6,476 (8.0%)	6,611 (7.6%)		
Group 9		44 (0.7%)	5,244 (6.5%)	5,288 (6.1%)		
Group 10 (High deprivation)		33 (0.5%)	4,969 (6.2%)	5,002 (5.8%)		
Year-standardised EYFSP average score	86,890	-0.02 (1.03)	-0.03 (1.09)	-0.03 (1.09)	0.01	-0.02, 0.04
Eligible for Pupil Premium	86,890				0.36	0.33, 0.38
Not eligible		3,291 (53%)	56,321 (70%)	59,612 (69%)		
Eligible		2,954 (47%)	24,324 (30%)	27,278 (31%)		

<sup>1</sup>n (%); Mean (SD)

<sup>2</sup>Standardized Mean Difference

Abbreviation: CI = Confidence Interval

Table 8. School-level imbalance in 2023

Characteristic	N	Newly treated in London in 2024 N = 136 <sup>1</sup>	Already treated in London pre-2024 N = 1,461 <sup>1</sup>	Overall N = 1,597 <sup>1</sup>	Difference <sup>2</sup>	95% CI <sup>2</sup>
% Pupil Premium eligible	1,597	47 (16)	33 (18)	34 (18)	0.85	0.67, 1.0
% Special Educational Needs	1,597	23 (12)	21 (14)	21 (13)	0.18	0.01, 0.36
% English as an Additional Language	1,597	57 (25)	46 (23)	47 (23)	0.46	0.28, 0.64
Magic Breakfast	1,597	53 (39%)	232 (16%)	285 (18%)	0.54	0.36, 0.71

<sup>1</sup>Mean (SD); n (%)

<sup>2</sup>Standardized Mean Difference

Abbreviation: CI = Confidence Interval

### Missing data

We use a number of variables to estimate our analysis models and, as a result, exclude observations for whom any of these are missing. However, mindful that missing data can affect the composition of the sample, we report details of exclusions due to missing data in Table X.

Table 9. Missing data at pupil-level

Treatment group	Year	Pupils excluded due to missing data	Total pupils available	Proportion missing
Outside London	16	48669	502992	0.10
Outside London	17	49838	515399	0.10
Outside London	18	49535	531443	0.09
Outside London	19	22601	551336	0.04
Outside London	22	32979	572377	0.06
Outside London	23	31840	578823	0.06
Outside London	24	33180	571543	0.06
Outside London	Overall	268642	3823913	0.07
London Already Treated	16	833	6214	0.13
London Already Treated	17	845	6318	0.13
London Already Treated	18	918	6525	0.14
London Already Treated	19	312	6828	0.05
London Already Treated	22	370	6652	0.06
London Already Treated	23	335	6580	0.05

Treatment group	Year	Pupils excluded due to missing data	Total pupils available	Proportion missing
London Already Treated	24	329	6367	0.05
London Already Treated	Overall	3942	45484	0.09
London Newly Treated	16	11682	77273	0.15
London Newly Treated	17	12165	79019	0.15
London Newly Treated	18	12452	82617	0.15
London Newly Treated	19	3843	85703	0.04
London Newly Treated	22	4731	85069	0.06
London Newly Treated	23	4615	85260	0.05
London Newly Treated	24	4635	83451	0.06
London Newly Treated	Overall	54123	578392	0.09
Overall	16	61184	586479	0.10
Overall	17	62848	600736	0.10
Overall	18	62905	620585	0.10
Overall	19	26756	643867	0.04
Overall	22	38080	664098	0.06
Overall	23	36790	670663	0.05
Overall	24	38144	661361	0.06
Overall	Overall	326707	4447789	0.07

### ICC and Pre-post correlations

For the benefit of future researchers, we report the intra-cluster correlation (ICC) of our primary outcome measure and the pre-post variance explained of our primary outcome measure with prior attainment (EYFSP total score) in Table 10. These are derived from a simple hierarchical linear model including no covariates (for the ICC) and only the prior attainment covariate (for the variance explained).

Table 10. Variance explained and intra-cluster correlation of primary outcome measure

Parameter	Full Sample	FSM
R-squared (Overall)	0.18	0.17
R-squared (Within)	0.18	0.19
R-squared (Between)	0.27	0.15

Parameter	Full Sample	FSM
ICC	0.12	0.10

Notes. Full sample estimates obtained from hierarchical linear model with N=4121079 and 4121077 residual degrees of freedom in the case of the R-squared estimates and 4121078 in the case of the ICC; FSM estimates obtained from hierarchical linear model with N=1211012 and 1211010 residual degrees of freedom in the case of the R-squared estimates and 1211011 in the case of the ICC.

## Results

### Effect sizes

All estimates are reported in terms of effect sizes, which we have calculated by dividing the outcome variables by their population standard deviation in the treatment year. To provide details on the construction of these variables, we report the standard deviation of the primary and secondary outcome measures in Table 11.

Table 11. Standard deviations of outcome measures

Outcome	Standard Deviation
Key Stage 2 Average Point Score	7.165
Attendance	0.059

Notes. Standard deviations calculated from full 2024 sample; N=623217.

### Impact estimates

Turning to the impact estimates themselves, we begin by reporting our impact estimates for our primary outcome of pupil attainment at the end of Key Stage 2, with the estimates from our difference-in-differences model in Table 12 and those from our triple-difference model in Table 13. In both, our estimates (reported in effect sizes) are small and statistically insignificantly different from zero.

Table 12. Primary outcome (Key Stage 2 attainment) difference in differences impact estimate

Treatment estimate	0.010
	[-0.002, 0.023]
Num.Obs.	4079537
R2	0.382
R2 Adj.	0.380
R2 Within	0.314
R2 Within Adj.	0.314
AIC	9606771.6
BIC	9836005.9

RMSE	0.78
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	4079498

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 13. Primary outcome (Key Stage 2 attainment) triple-difference impact estimate

Treatment estimate	0.006
	[-0.042, 0.053]
Num.Obs.	4121079
R2	0.382
R2 Adj.	0.379
R2 Within	0.313
R2 Within Adj.	0.313
AIC	9704870.6
BIC	9936225.6
RMSE	0.78
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	4121039

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Turning to our secondary outcome, we report estimates of the impact on pupils' attendance in Table 14 for our difference-in-differences approach and Table 15 for our triple difference approach. Both estimates are small, but as our analysis is well-powered to detect small effects we find these to be statistically significantly different from zero. However, given the other assumptions necessary to the credibility of quasi-experimental estimates, we reserve judgement on these until exploring those assumptions through analysis of pre-trends and placebo estimates.

Table 14. Secondary outcome (attendance) difference-in-differences impact estimate

Treatment estimate	0.010
--------------------	-------

	[0.002, 0.017]
Num.Obs.	4074549
R2	0.060
R2 Adj.	0.056
R2 Within	0.029
R2 Within Adj.	0.029
AIC	9760801.9
BIC	9989948.8
RMSE	0.80
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	4074510

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 15. Secondary outcome (attendance) triple-difference impact estimate

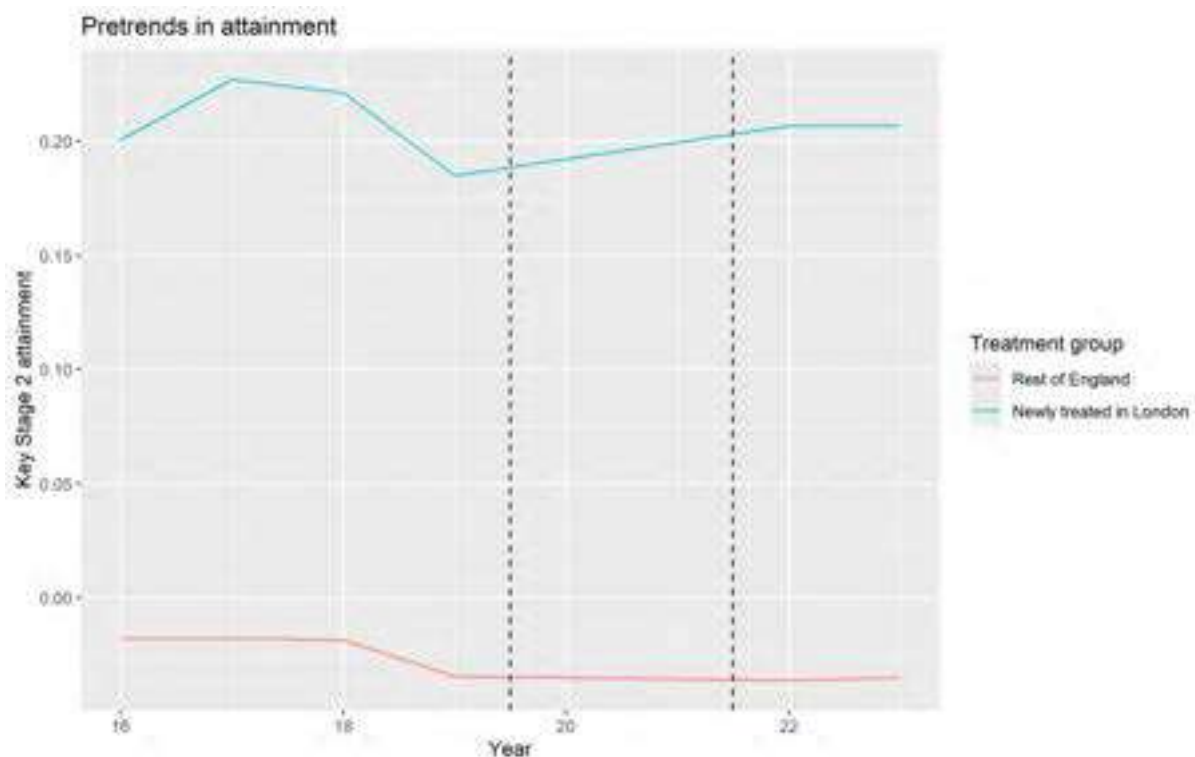
Treatment estimate	0.036
	[0.013, 0.060]
Num.Obs.	4116028
R2	0.060
R2 Adj.	0.056
R2 Within	0.029
R2 Within Adj.	0.029
AIC	9854515.9
BIC	10085783.3
RMSE	0.80
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	4115988

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

### Pre-trends

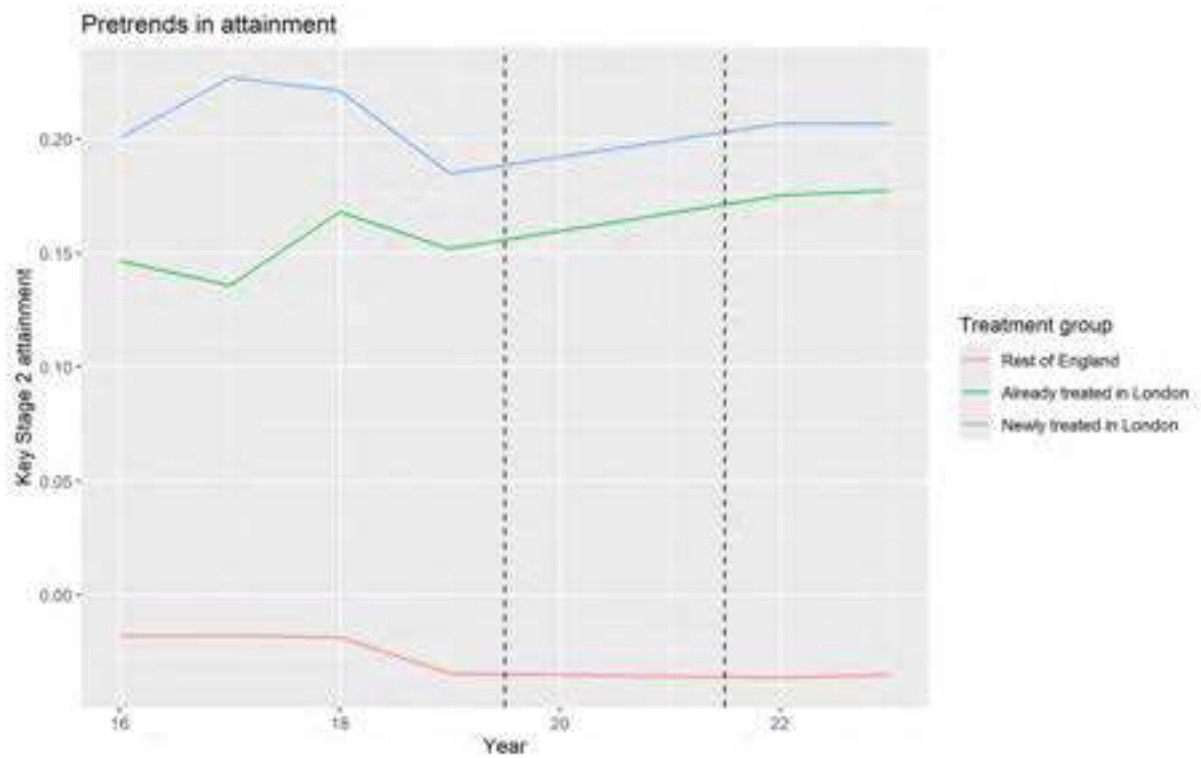
We begin this exploration of the assumptions underpinning our impact estimates by looking at unconditional pre-treatment trends in our outcome measures by treatment group. For our primary outcomes, these are reported in Figure 1 for the difference-in-differences groups and Figure 2 for the triple-difference groups. For our secondary outcomes, these are reported in Figure 3 for the difference-in differences groups and Figure 4 for the triple-difference groups.

Figure 1. Raw pre-trends in primary outcome for difference-in-differences



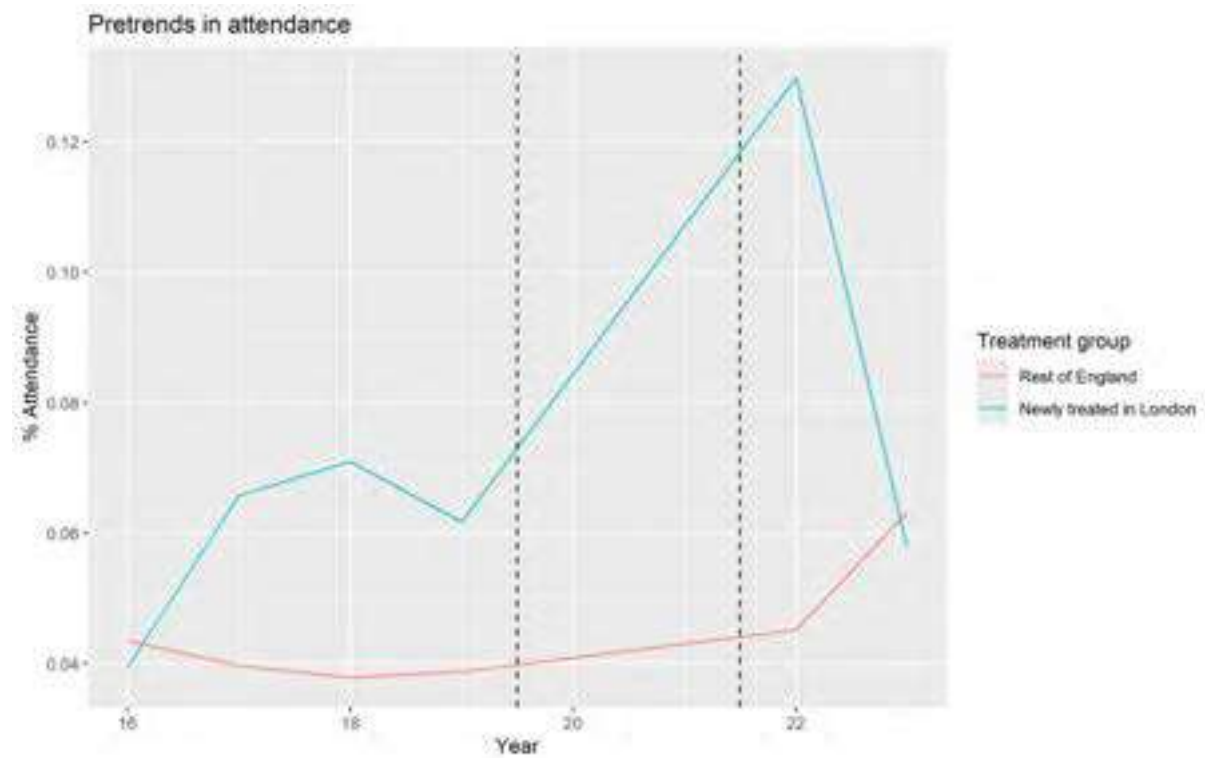
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 1 Counts.csv.

Figure 2. Raw pre-trends in primary outcome for triple difference



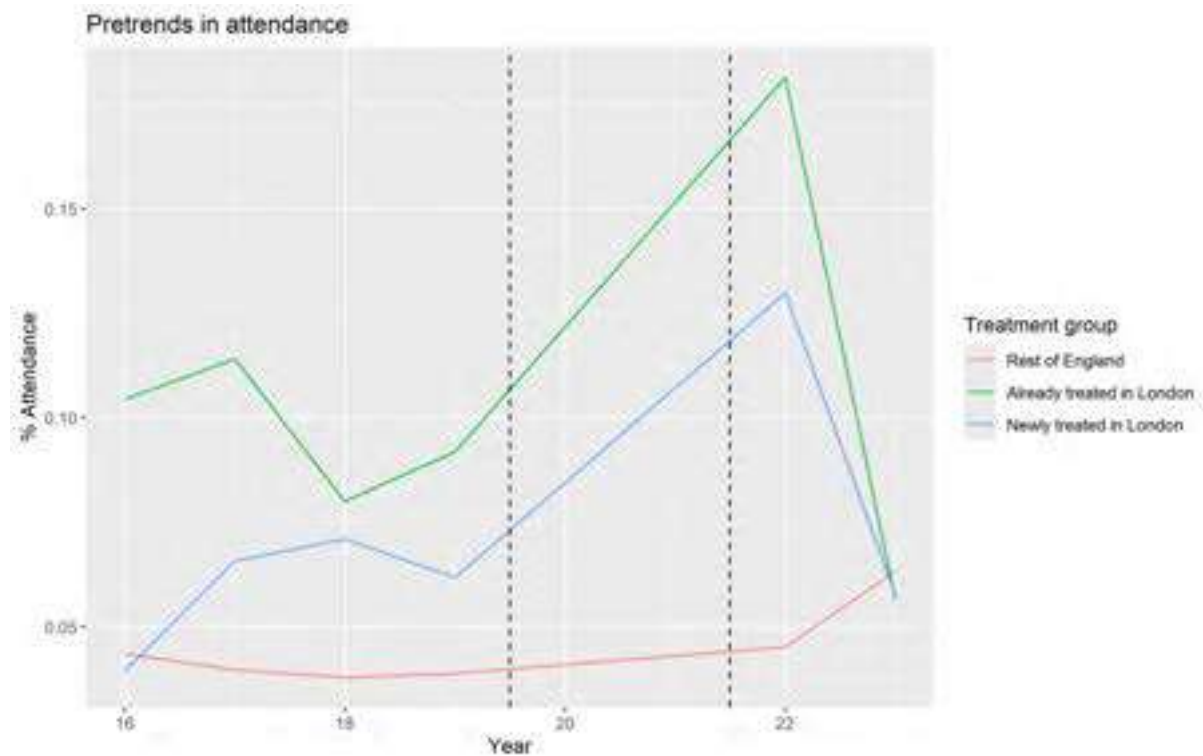
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 2 Counts.csv.

Figure 3. Raw pre-trends in secondary outcome for difference-in-differences



Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 3 Counts.csv.

Figure 4. Raw pre-trends in secondary outcome for triple difference



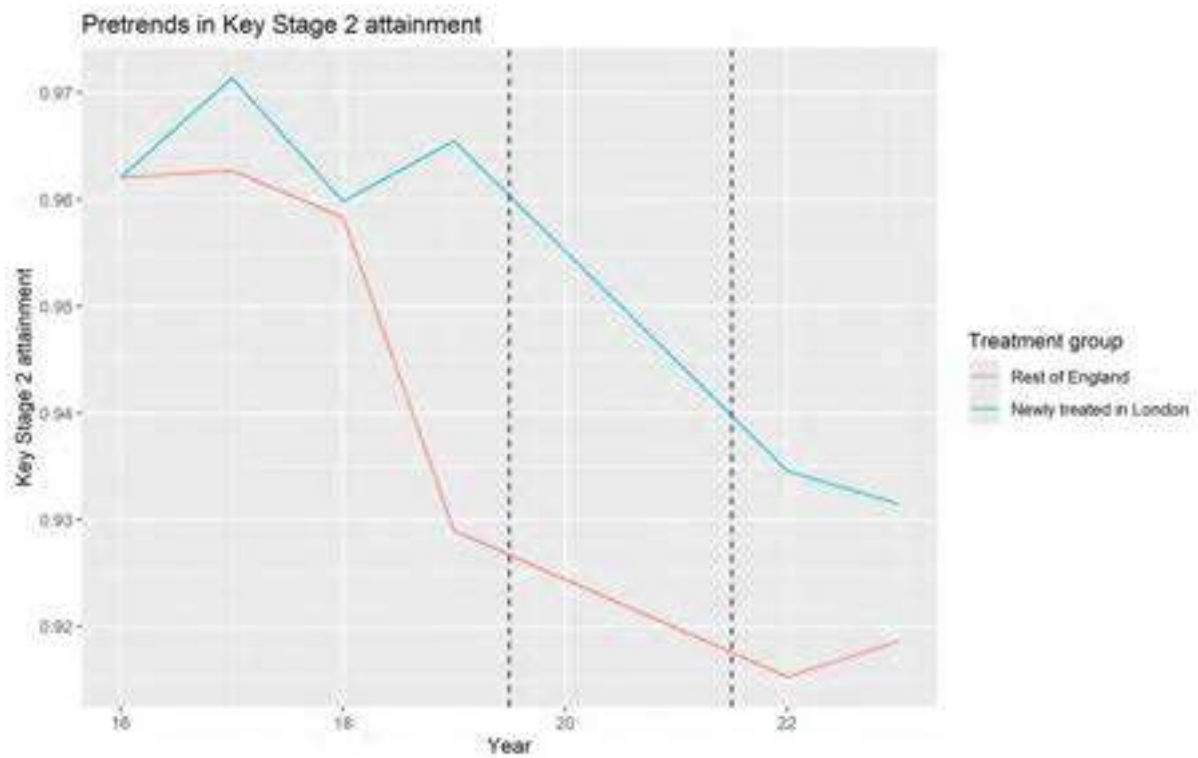
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 4 Counts.csv.

### Conditional pre-trends

These unconditional pre-trends do not, however adjust for the importance of compositional differences and changes in the trends observed. To account for this in the same manner we use for our impact estimates, we estimate conditional pre-trends using a variant of our treatment models including the same set of covariates and fixed effects. Due to the inclusion of these fixed effects, the level of the estimates is somewhat arbitrary and the differences between groups are only relative, however this is all that is needed for the purposes of these checks.

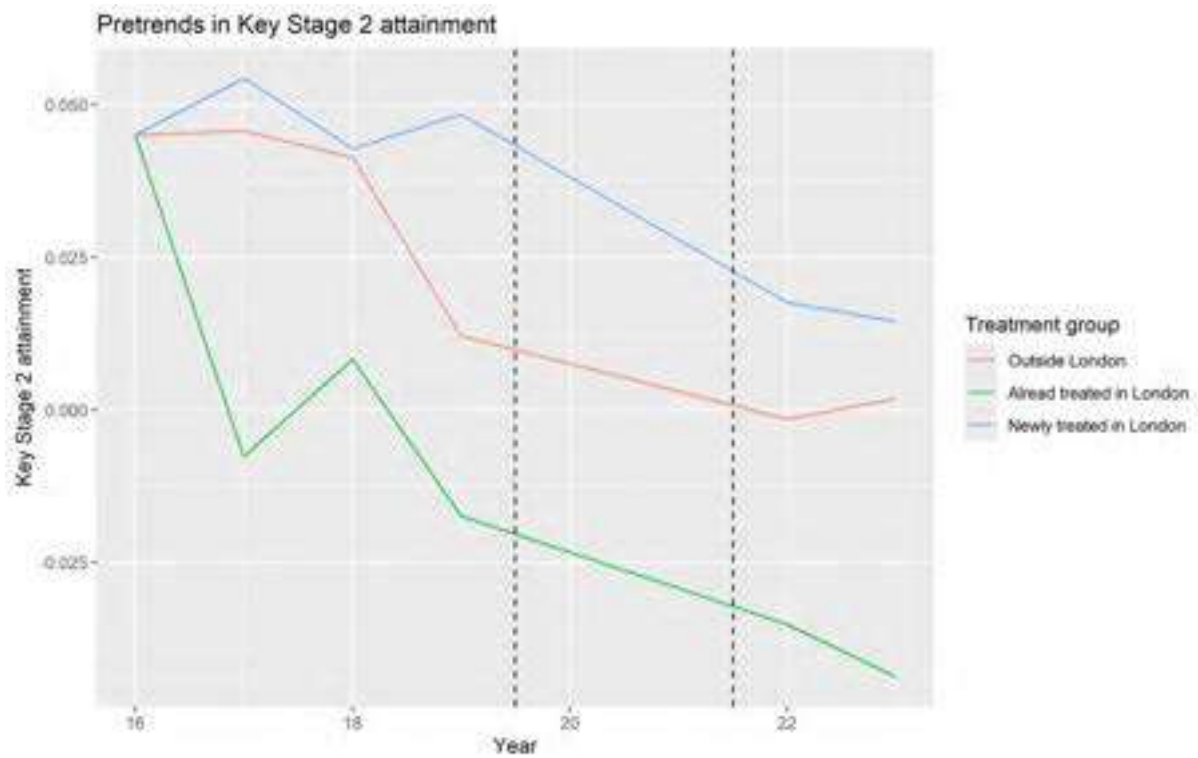
Conditional pre-trends for our primary outcome of attainment are reported in Figure 5 (for difference-in-differences groups) and Figure 6 (for triple-difference groups), and for secondary outcome of attendance in Figure 7 (for difference-in-differences group) and Figure 8 (for triple-difference groups).

Figure 5. Conditional primary outcome pre-trends for difference-in-differences



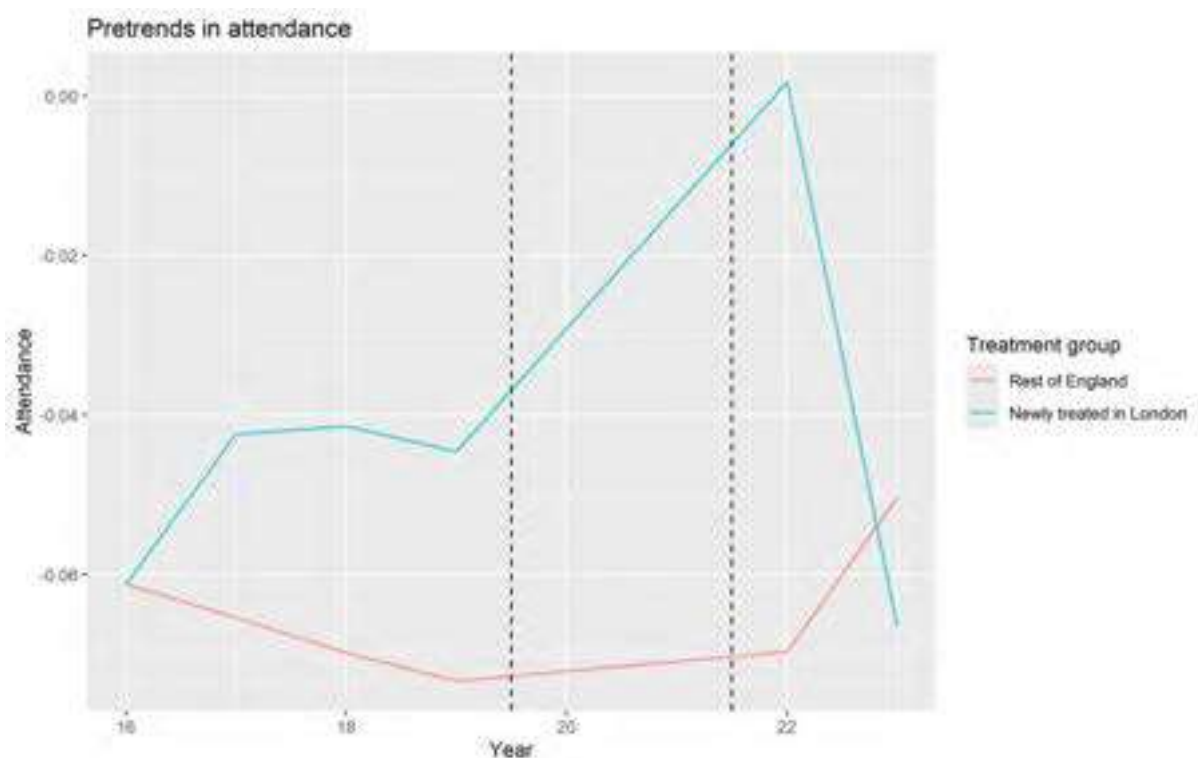
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 5 Model.docx.

Figure 6. Conditional primary outcome pre-trends for triple differences



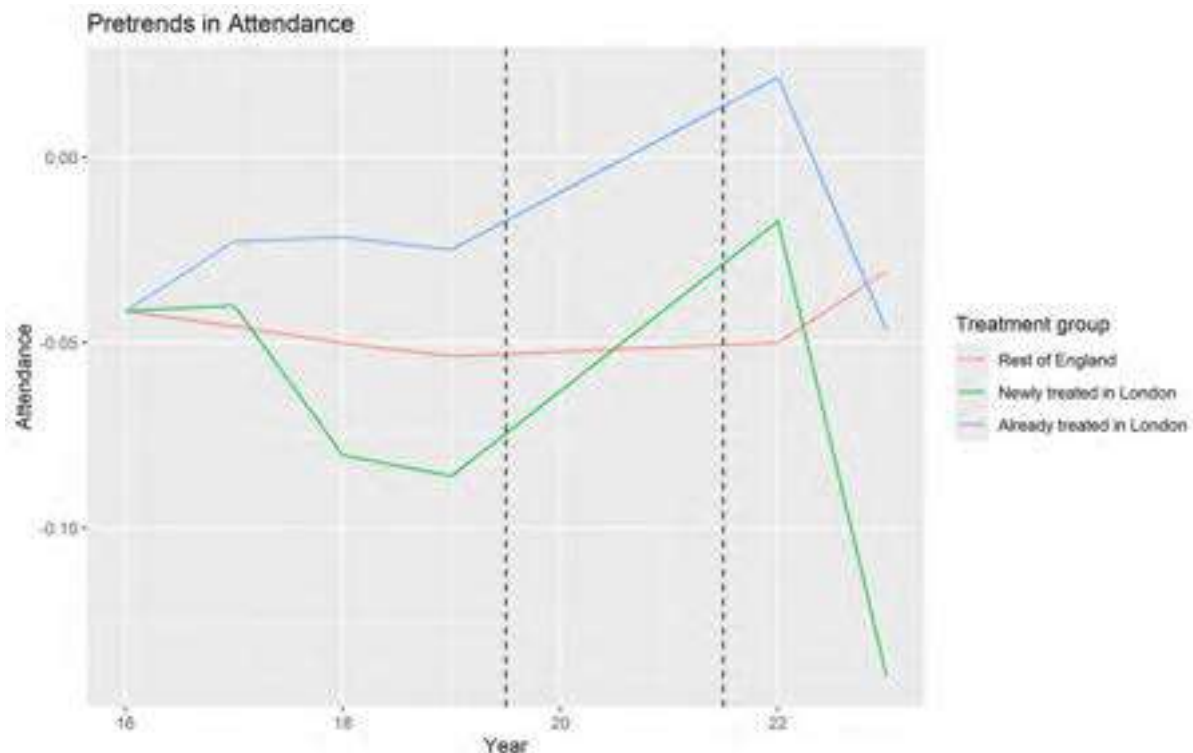
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 6 Model.docx

Figure 7. Conditional pre-trends for secondary outcome for difference-in-differences



Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 7 Model.docx

Figure 8. Conditional pre-trends for secondary outcome for triple difference



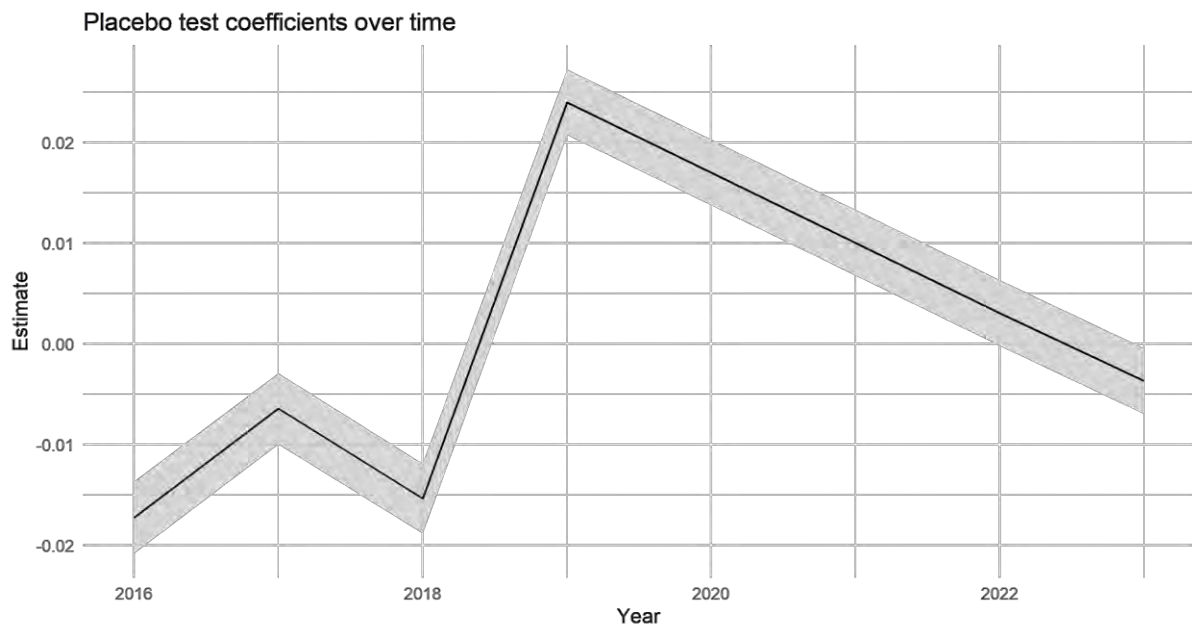
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 8 Model.docx

### Placebo estimates

Finally, in support of checking the assumptions of our main analyses, we present a set of ‘placebo’ treatment estimates, which are estimated by variants of our treatment models but where we imagine that the policy was instead introduced in each of the pre-treatment years we have available. In the absence of biases in our design, these should all be close to zero.

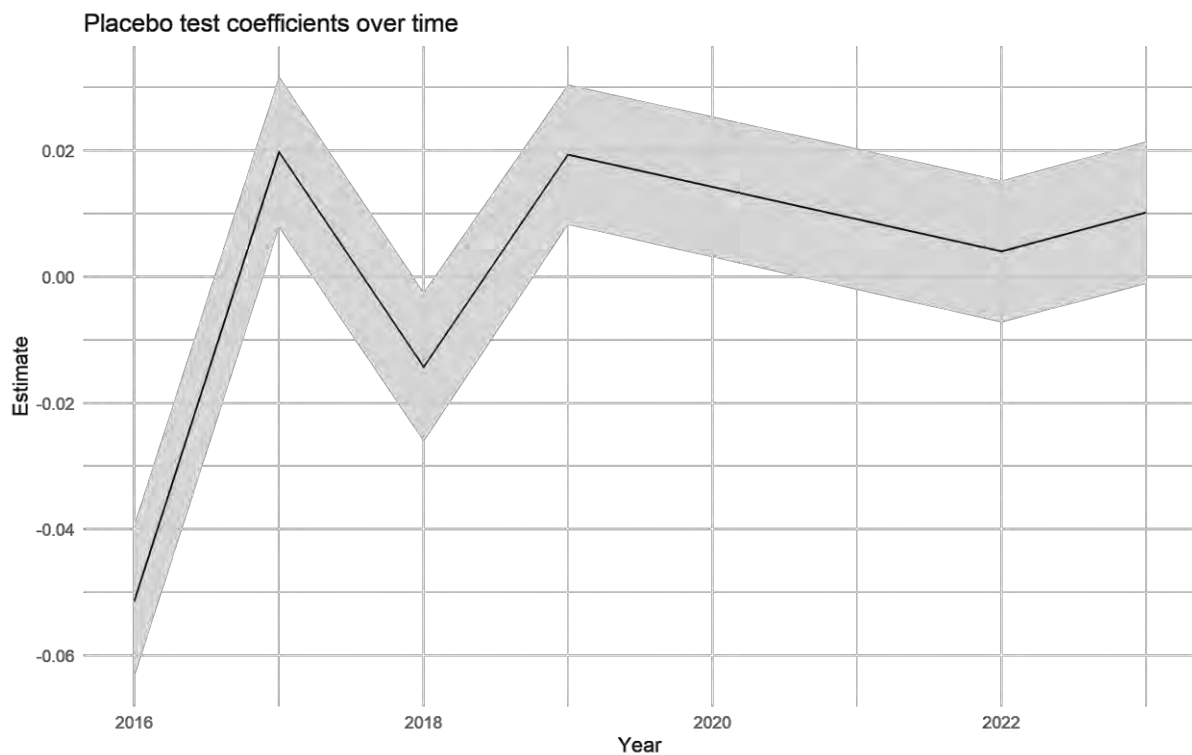
We present the placebo tests for our primary outcomes analyses in Figure 9 for difference-in-differences and Figure 10 for triple-difference, along with those for our secondary outcome analyses in Figure 11 for difference-in-differences and Figure 12 for triple-difference. While these estimates are small in magnitude they are, in at least one of the pre-treatment years, larger than the estimates obtained for our true treatment year. This implies a substantial risk that our treatment estimates suffer from bias which, while small in absolute terms, could overturn the small positive impact estimated on attendance.

Figure 9. Placebo tests in pre-treatment years for primary outcome difference in differences



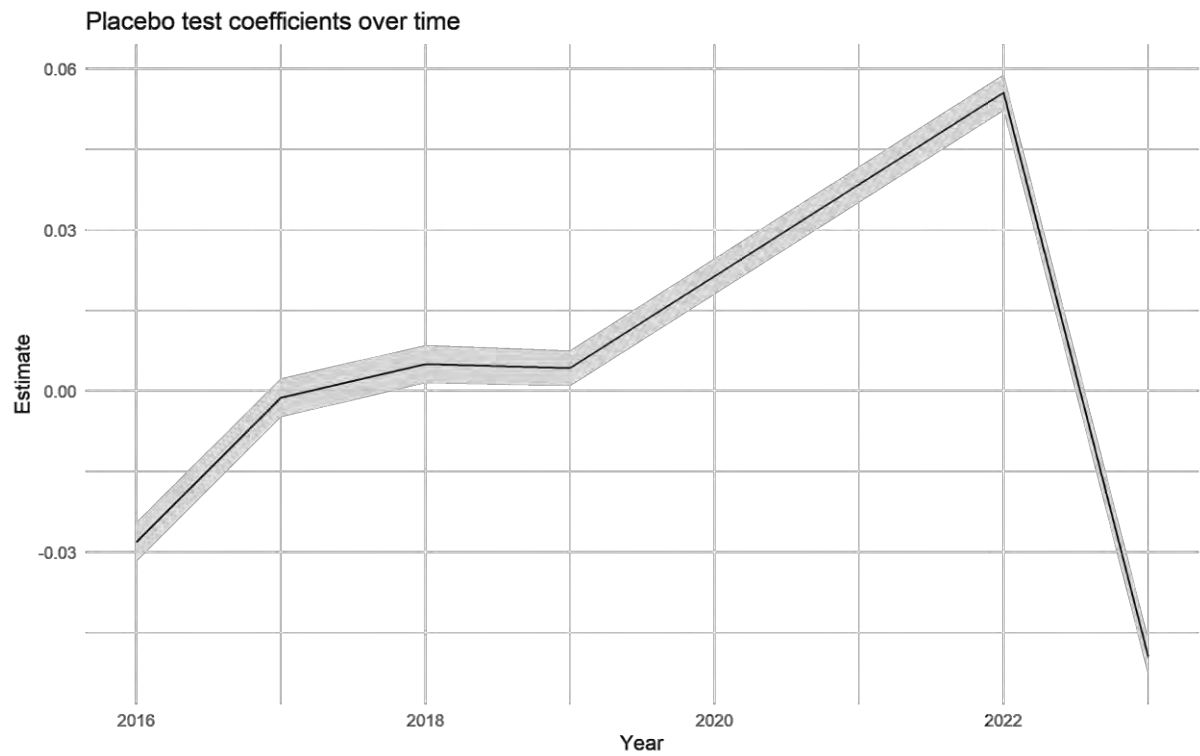
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 9 Models.csv

Figure 10. Placebo tests in pre-treatment years for primary outcome triple difference



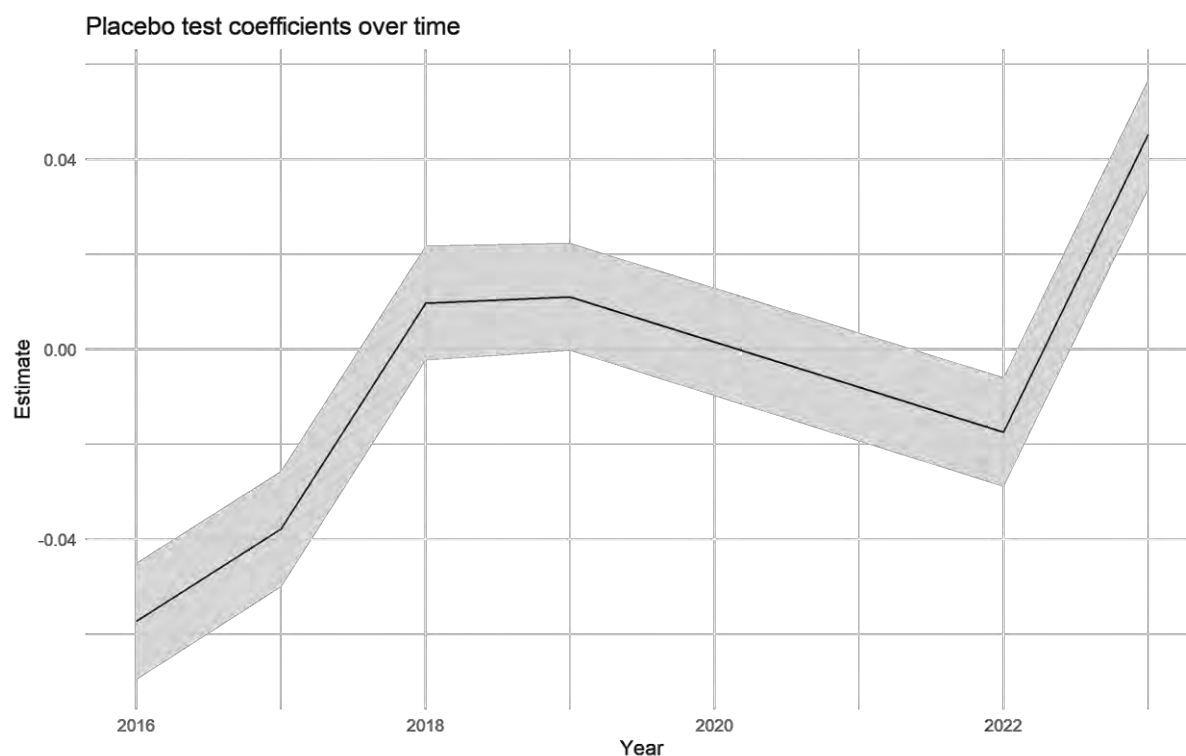
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 10 Models.csv

Figure 11. Placebo tests in pre-treatment years for secondary outcome difference-in-differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 11 Models.csv

Figure 12. Placebo tests in pre-treatment years for secondary outcome triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 12 Models.csv

## Heterogeneity

We have re-estimated our models on a range of sub-groups:

- Pupils already eligible for free school meals (i.e., pupil premium)
- Pupils newly eligible for free school meals (i.e., not pupil premium)
- Ethnic groups: Asian, Black, White, Mixed/Other
- IDACI quintile groups

In this initial reporting, we focus on a small number of these groups where there are notable points to make:

- We find a larger apparent effect (effect size = 0.03) on pupil attainment for pupils already eligible for free school meals in our difference-in-differences model, however placebo checks of this finding suggest concerns over its robustness; furthermore, it is not evident in the triple-difference model suggesting an issue with differential trends. (See Appendix 1. Heterogeneity for already-eligible pupils) We also see similar findings in relation to those in the most-deprived IDACI quintile group, regarding this as a different manifestation of the same finding.
- We find a more substantial apparent negative effect (effect size = -0.07) on pupil attainment among Black pupils in our difference-in-differences model, however placebo checks of this

finding suggest concerns over its robustness; furthermore, it is not evident in the triple-difference model suggesting an issue with differential trends. (See Appendix 3. Heterogeneity for Black pupils.)

- We find a larger apparent effect (effect size = 0.04) on pupil attendance for Asian pupils in our difference-in-differences model, with no placebo checks being as large as these. There is a larger-still effect in triple-difference models (effect size = 0.06) but we do see placebo estimates as large as this during this pre-test period. (See Appendix 4. Heterogeneity for Asian pupils.)
- We see a larger positive impact (effect size = 0.04) on pupil attendance for newly eligible pupils in our triple-difference model. However, again, we see placebo estimates of a similar magnitude reducing confidence in this estimate. (See Appendix 2. Heterogeneity for newly eligible pupils.)

## Robustness Checks

We have carried out additional models to understand the robustness of our findings to potential threats to validity:

- Excluding schools ever involved in Magic Breakfast
- Excluding pupils with one or more sibling in Key Stage 3
- Excluding data from 2015/16
- Excluding data from before 2017/18 (i.e., 2015/16 and 2016/17)
- Including an FSM covariate in our analysis models
- Focussing on within-London data only (i.e., newly-treated boroughs as our treatment group and already-treated boroughs as our control group)

None of these robustness checks ends up affecting our interpretation of our main results.

## Conclusion

In conclusion, we do not find evidence of an effect of the policy on attainment from either our difference-in-differences or triple-difference designs. We do find a small positive effect on attendance but our checks of the assumptions underlying our designs mean we cannot have confidence in this finding.

Some evidence of heterogeneity by ethnicity and pre-existing free school meals eligibility is present, but none are robust to the magnitude of biases observed from pre-treatment placebo tests.

## Appendix 17. Population characteristics inside and outside London

### Table 80. Pupil-level characteristics

Characteristic	N	0 N = 546,983 <sup>1</sup>	1 N = 86,890 <sup>1</sup>	Overall N = 633,873 <sup>1</sup>	Difference <sup>2</sup>	95% CI <sup>2</sup>
Gender	633,873				0.00	-0.01, 0.01
Female		271,465 (50%)	43,197 (50%)	314,662 (50%)		
Male		275,518 (50%)	43,693 (50%)	319,211 (50%)		
Month of Birth	633,873				0.02	0.01, 0.03
January		46,900 (8.6%)	7,378 (8.5%)	54,278 (8.6%)		
February		42,818 (7.8%)	6,820 (7.8%)	49,638 (7.8%)		
March		45,721 (8.4%)	7,200 (8.3%)	52,921 (8.3%)		
April		43,570 (8.0%)	6,747 (7.8%)	50,317 (7.9%)		
May		46,592 (8.5%)	7,548 (8.7%)	54,140 (8.5%)		
June		44,321 (8.1%)	7,161 (8.2%)	51,482 (8.1%)		
July		45,713 (8.4%)	7,591 (8.7%)	53,304 (8.4%)		
August		45,962 (8.4%)	7,273 (8.4%)	53,235 (8.4%)		
September		46,660 (8.5%)	7,364 (8.5%)	54,024 (8.5%)		
October		46,770 (8.6%)	7,408 (8.5%)	54,178 (8.5%)		
November		45,806 (8.4%)	7,228 (8.3%)	53,034 (8.4%)		
December		46,150 (8.4%)	7,172 (8.3%)	53,322 (8.4%)		
Major ethnic group	633,873				0.83	0.82, 0.84
White		423,016 (77%)	34,998 (40%)	458,014 (72%)		
Black		21,153 (3.9%)	15,289 (18%)	36,442 (5.7%)		
Asian		58,968 (11%)	20,200 (23%)	79,168 (12%)		
Other		43,846 (8.0%)	16,403 (19%)	60,249 (9.5%)		
Special Educational Needs	633,873				0.01	0.01, 0.02
Not identified		451,887 (83%)	72,257 (83%)	524,144 (83%)		
Identified		95,096 (17%)	14,633 (17%)	109,729 (17%)		

Characteristic	N	0 N = 546,983 <sup>1</sup>	1 N = 86,890 <sup>1</sup>	Overall N = 633,873 <sup>1</sup>	Difference <sup>2</sup>	95% CI <sup>2</sup>
English as an Additional Language status	633,873				0.71	0.70, 0.72
English as a native language		452,842 (83%)	44,584 (51%)	497,426 (78%)		
English as an additional language		94,141 (17%)	42,306 (49%)	136,447 (22%)		
IDACI Decile Group	633,873				0.47	0.46, 0.48
Group 1 (Low deprivation)		58,634 (11%)	3,582 (4.1%)	62,216 (9.8%)		
Group 2		50,052 (9.2%)	11,691 (13%)	61,743 (9.7%)		
Group 3		48,906 (8.9%)	13,075 (15%)	61,981 (9.8%)		
Group 4		49,908 (9.1%)	12,204 (14%)	62,112 (9.8%)		
Group 5		51,272 (9.4%)	11,040 (13%)	62,312 (9.8%)		
Group 6		53,598 (9.8%)	9,940 (11%)	63,538 (10%)		
Group 7		56,035 (10%)	8,457 (9.7%)	64,492 (10%)		
Group 8		58,222 (11%)	6,611 (7.6%)	64,833 (10%)		
Group 9		59,924 (11%)	5,288 (6.1%)	65,212 (10%)		
Group 10 (High deprivation)		60,432 (11%)	5,002 (5.8%)	65,434 (10%)		
Year-standardised EYFSP average score	633,873	0.10 (0.92)	-0.03 (1.09)	0.08 (0.94)	0.13	0.12, 0.13
Eligible for Pupil Premium	633,873				0.07	0.06, 0.08
Not eligible		392,747 (72%)	59,612 (69%)	452,359 (71%)		
Eligible		154,236 (28%)	27,278 (31%)	181,514 (29%)		

<sup>1</sup>n (%); Mean (SD)

<sup>2</sup>Standardized Mean Difference

Abbreviation: CI = Confidence Interval

Table 81. School-level characteristics

Characteristic	N	0 N = 13,844 <sup>1</sup>	1 N = 1,597 <sup>1</sup>	Overall N = 15,441 <sup>1</sup>	Difference <sup>2</sup>	95% CI <sup>2</sup>
% Pupil Premium eligible	15,441	29 (19)	34 (18)	29 (19)	-0.30	-0.35, -0.25
% Special Educational Needs	15,441	21 (14)	21 (13)	21 (14)	0.04	-0.01, 0.09
% English as an Additional Language	15,441	14 (19)	47 (23)	17 (22)	-1.6	-1.6, -1.5
Magic Breakfast	15,441	828 (6.0%)	285 (18%)	1,113 (7.2%)	-0.37	-0.42, -0.32

<sup>1</sup>Mean (SD); n (%)

<sup>2</sup>Standardized Mean Difference

Abbreviation: CI = Confidence Interval

Evaluation of the introduction of Universal Primary Free School Meals in London (UPFSML):

Part 2 – Heterogeneity and Robustness Analyses

Jake Anders and Sam Sims

UCL Centre for Education Policy & Equalising Opportunities

## Contents

Appendix 1. Heterogeneity for already-eligible pupils.....	3
Appendix 2. Heterogeneity for newly eligible pupils .....	17
Appendix 3. Heterogeneity for Black pupils .....	30
Appendix 4. Heterogeneity for Asian pupils.....	43
Appendix 5. Heterogeneity for White pupils.....	56
Appendix 6. Heterogeneity for Other ethnicity pupils .....	69
Appendix 7. Heterogeneity for pupils in IDACI quintile group 1 .....	82
Appendix 8. Heterogeneity for pupils in IDACI quintile group 2 .....	96
Appendix 9. Heterogeneity for pupils in IDACI quintile group 3 .....	109
Appendix 10. Heterogeneity for pupils in IDACI quintile group 4 .....	122
Appendix 11. Heterogeneity for pupils in IDACI quintile group 5 .....	135
Appendix 12. Robustness check excluding pupils with a sibling in KS3 .....	148
Appendix 13. Robustness check excluding schools ever involved with Magic Breakfast .....	161
Appendix 14. Robustness check excluding 2016 data .....	174
Appendix 15. Robustness check excluding pre-2018 data .....	186
Appendix 16. Robustness check including FSM covariate in models .....	198

## Appendix 1. Heterogeneity for already-eligible pupils

Table 16. Difference in differences estimates for primary outcome

Treatment estimate	0.028
	[0.008, 0.047]
Num.Obs.	1189944
R2	0.385
R2 Adj.	0.376
R2 Within	0.317
R2 Within Adj.	0.317
AIC	2863888.1
BIC	3069986.1
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	1189905

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 17. Difference in differences estimates for secondary outcome

Treatment estimate	0.034
	[0.018, 0.049]
Num.Obs.	1188263
R2	0.066
R2 Adj.	0.052
R2 Within	0.025
R2 Within Adj.	0.025
AIC	3514577.6
BIC	3720615.5
RMSE	1.05

Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	1188224

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 18. Triple difference estimates for primary outcome

Treatment estimate	-0.015
	[-0.074, 0.044]
Num.Obs.	1211012
R2	0.386
R2 Adj.	0.377
R2 Within	0.316
R2 Within Adj.	0.316
AIC	2913135.3
BIC	3121288.1
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	1210972

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

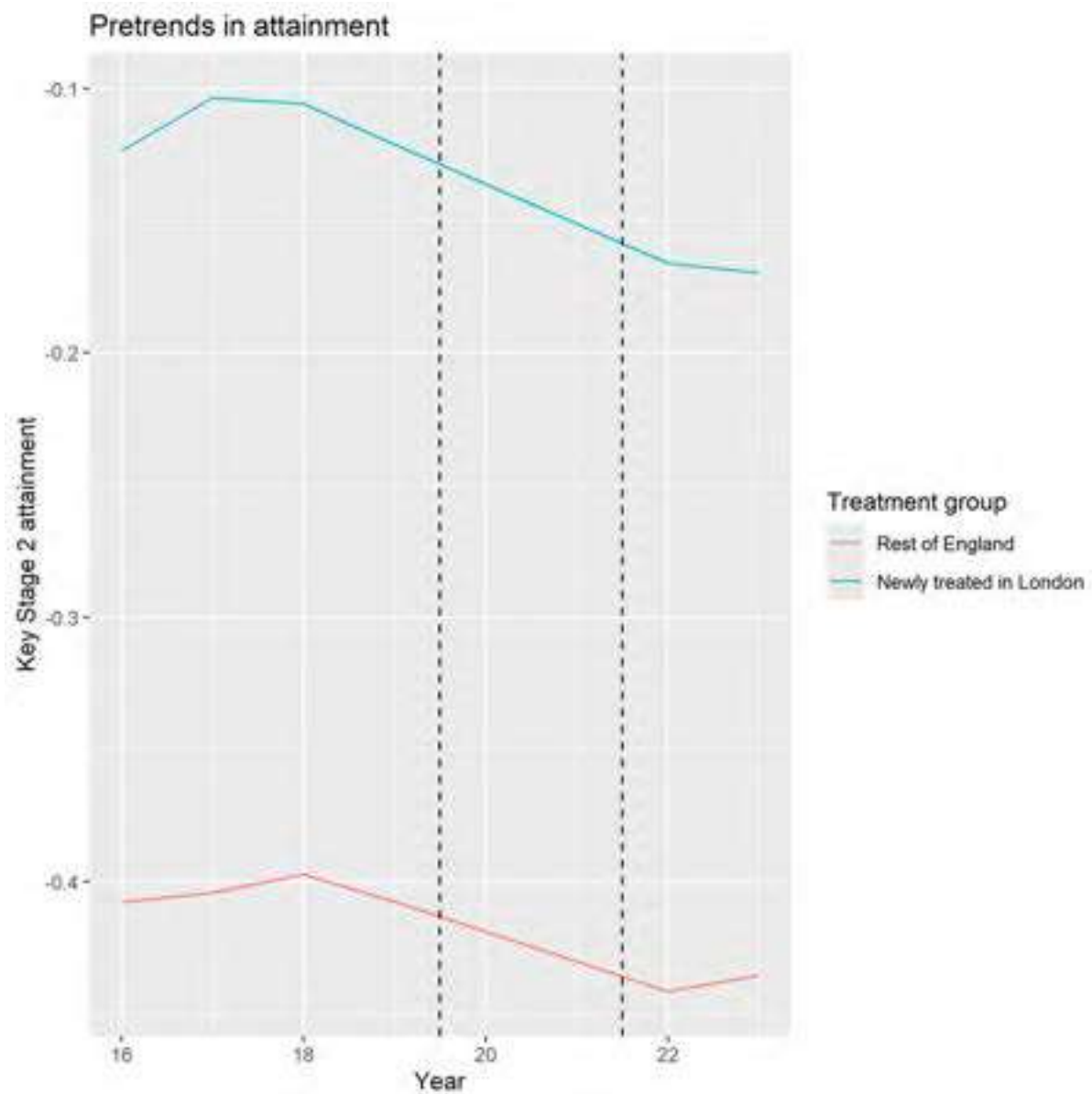
Table 19. Triple difference estimates for secondary outcome

Treatment estimate	0.018
	[-0.019, 0.054]
Num.Obs.	1209299
R2	0.067

R2 Adj.	0.053
R2 Within	0.026
R2 Within Adj.	0.026
AIC	3568342.8
BIC	3776435.0
RMSE	1.04
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	1209259

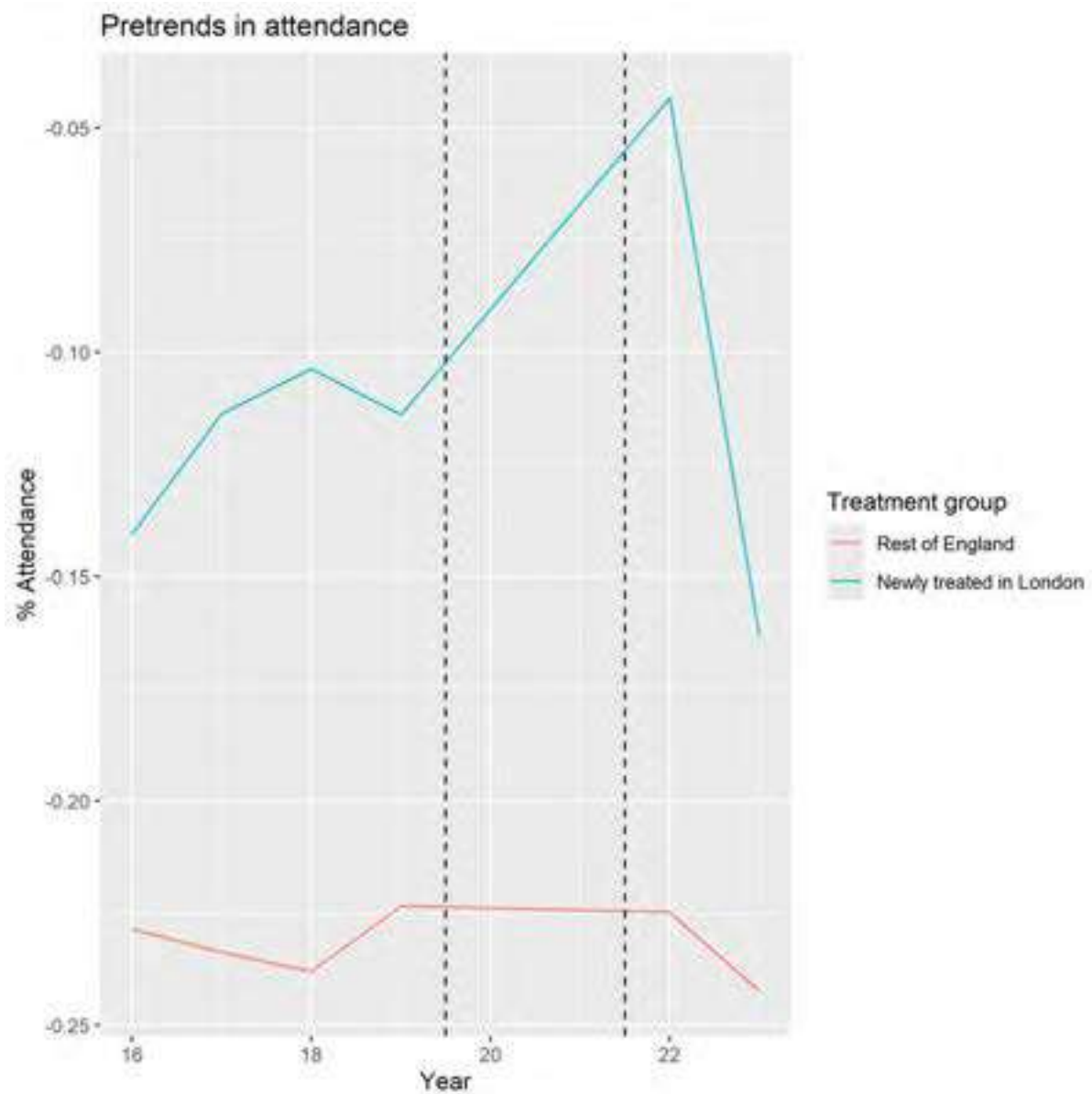
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 13. Raw pre-trends in primary outcome for difference-in-differences



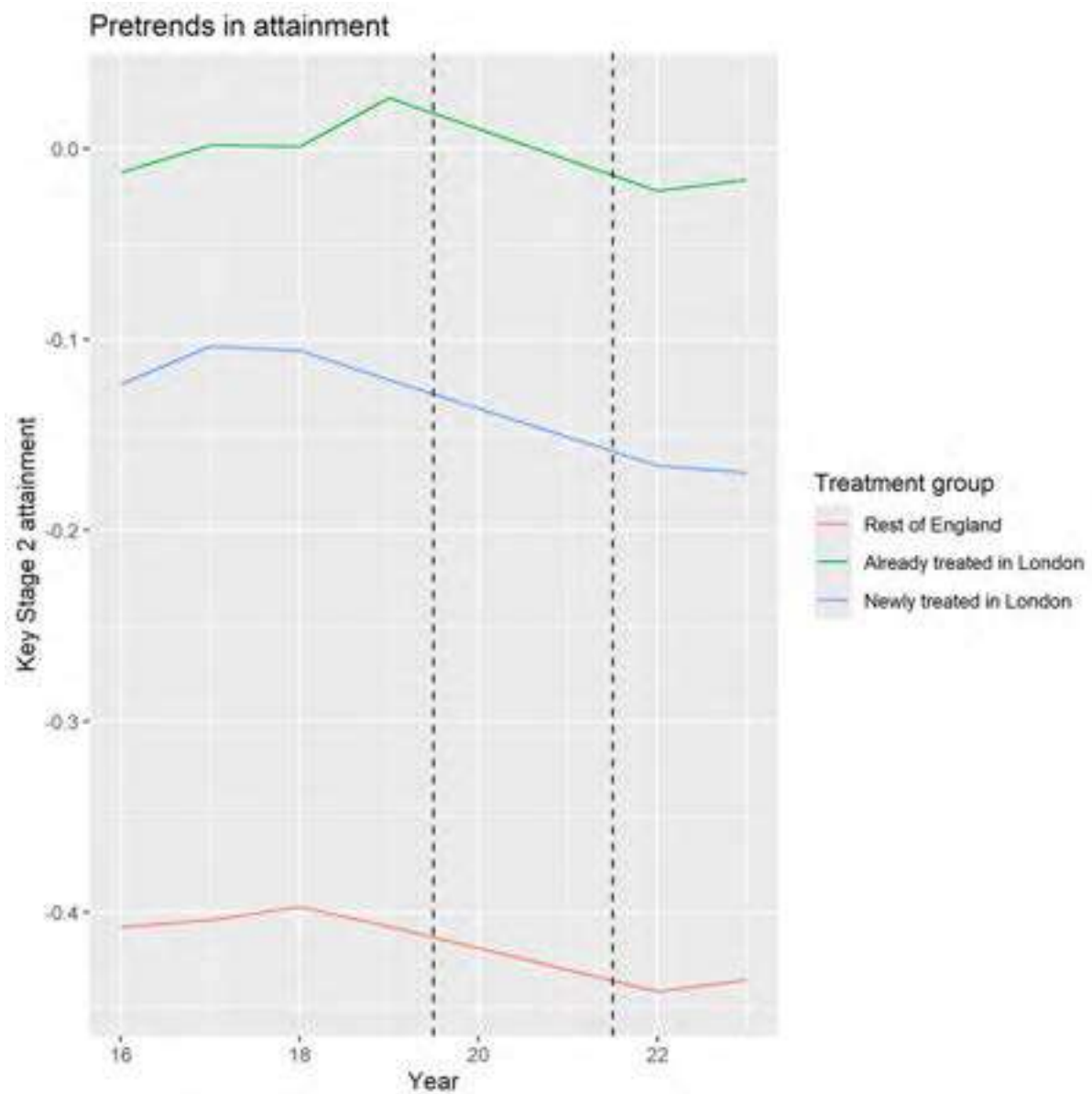
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 13 Counts.csv.

Figure 14. Raw pre-trends in secondary outcome for difference-in-differences



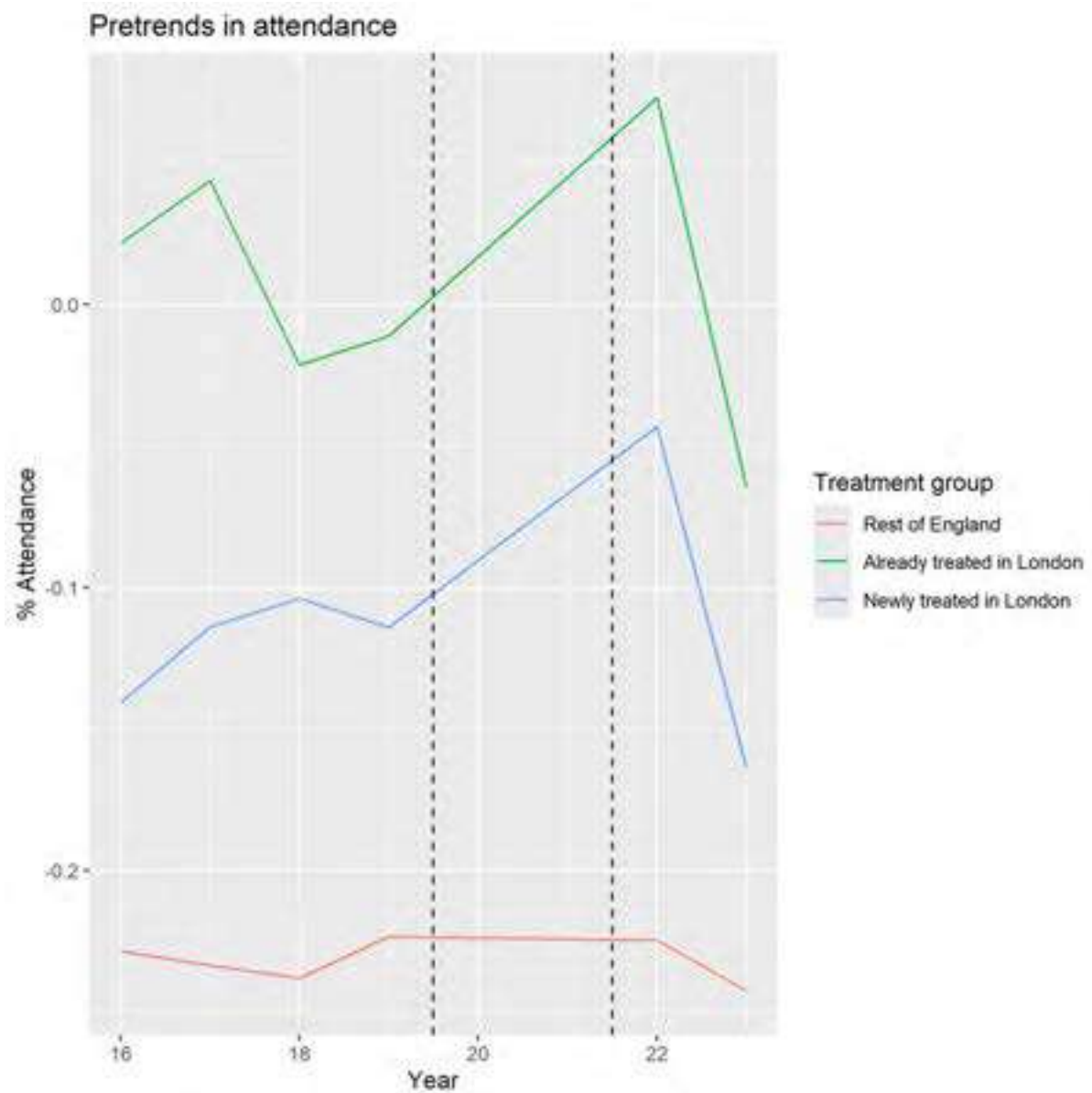
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 14 Counts.csv.

Figure 15. Raw pre-trends in primary outcome for triple difference



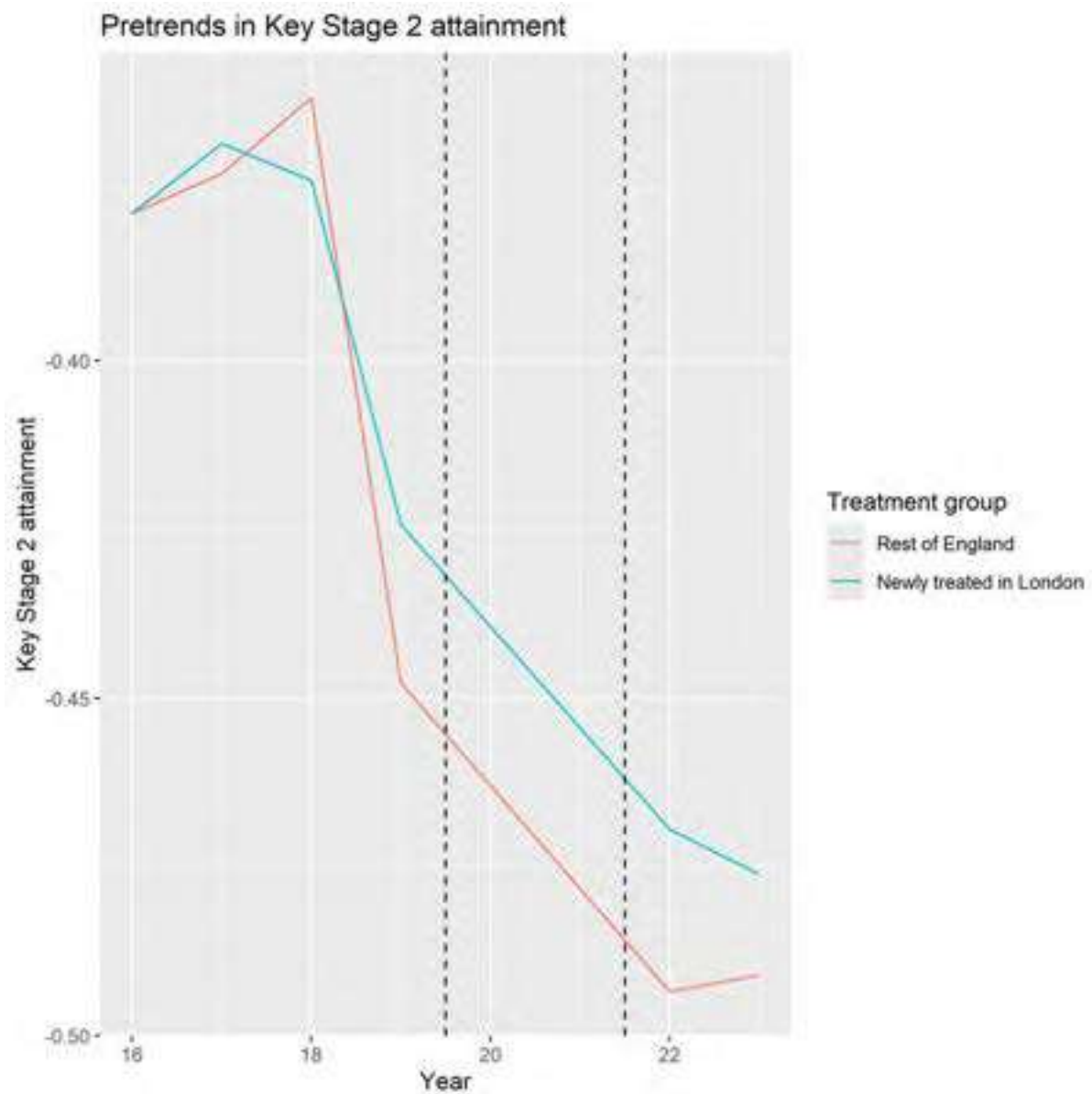
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 15 Counts.csv.

Figure 16. Raw pre-trends in secondary outcome for triple difference



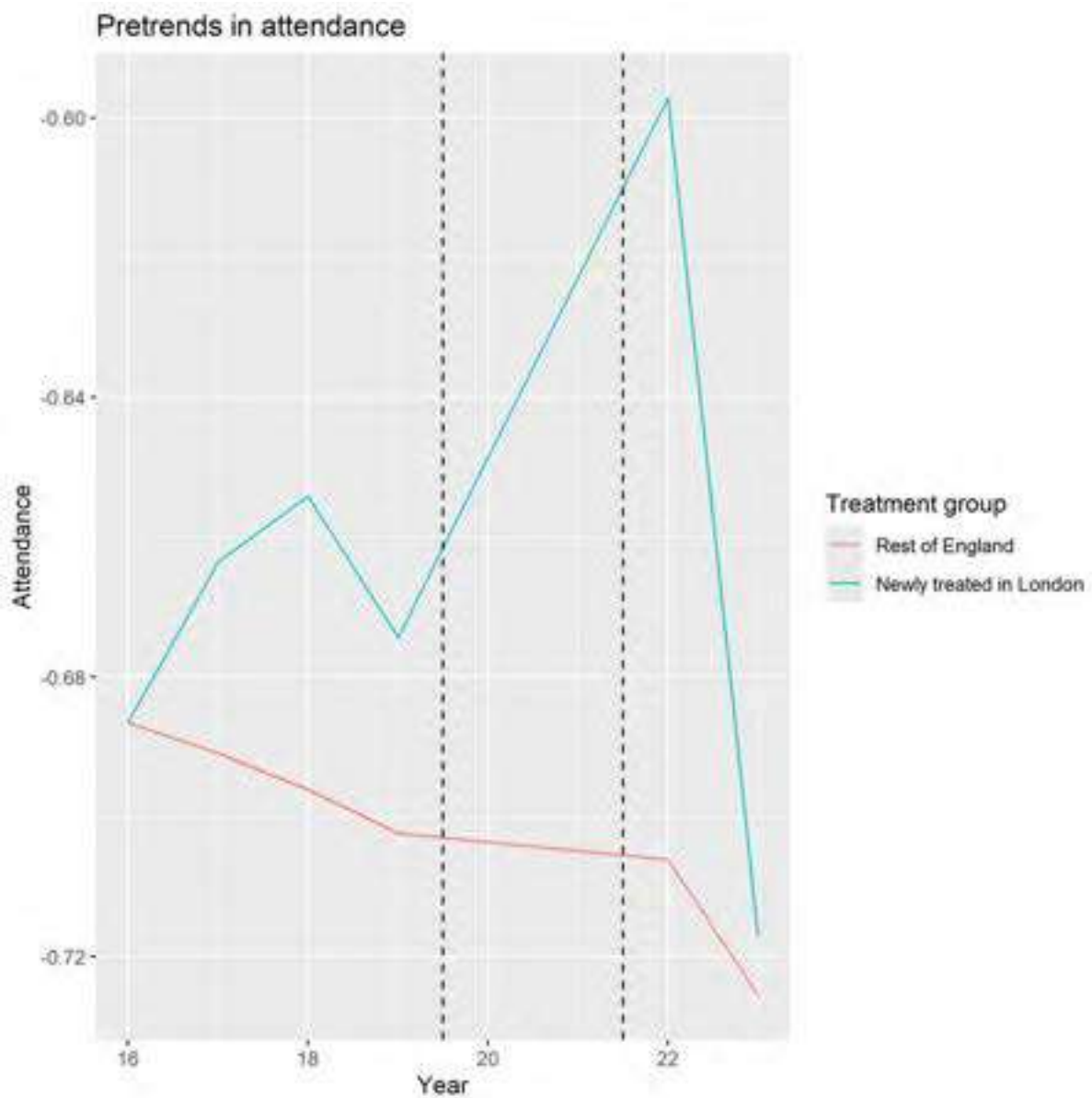
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 16 Counts.csv.

Figure 17. Conditional primary outcome pre-trends for difference-in-differences



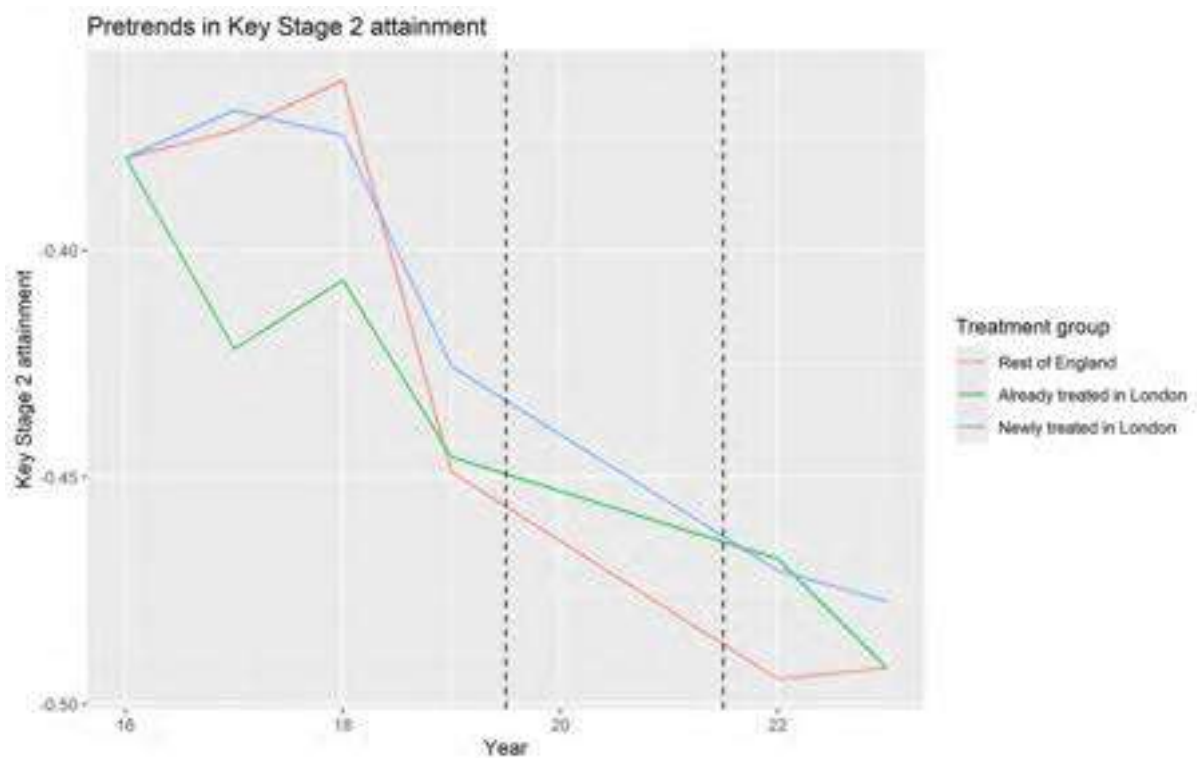
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 17 Model.docx.

Figure 18. Conditional secondary outcome pre-trends for difference-in-differences



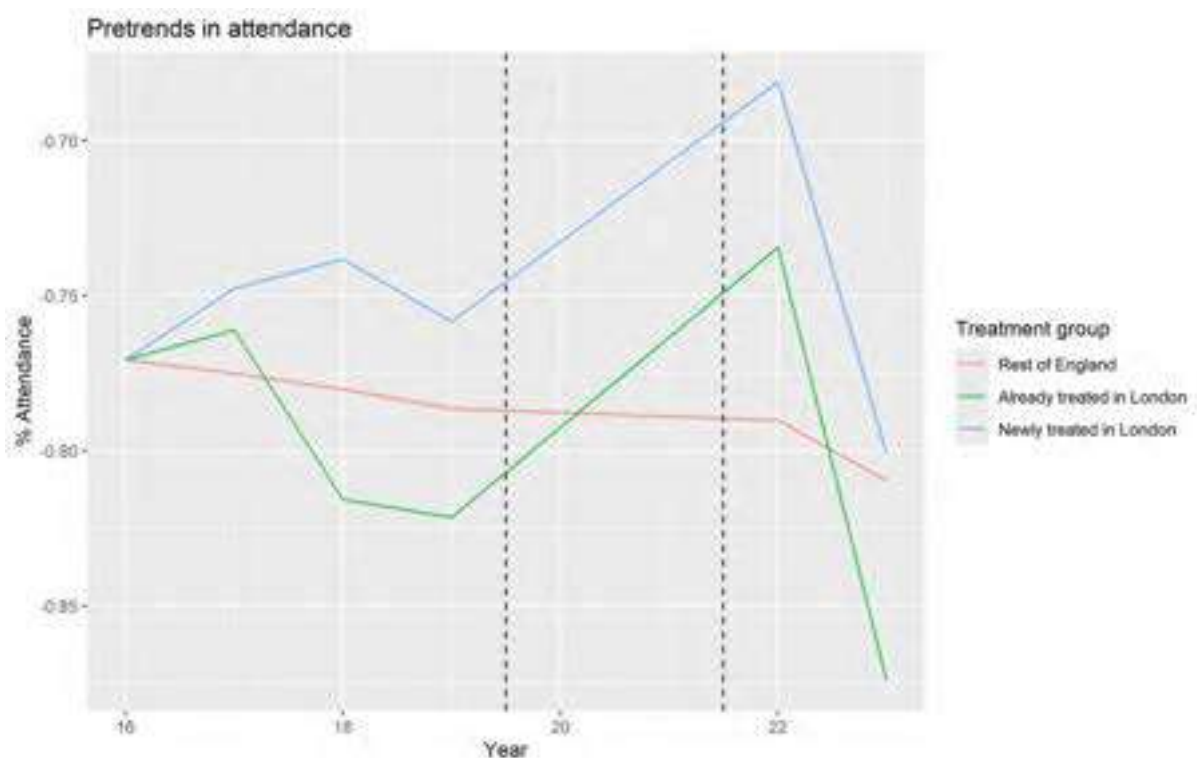
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 18 Model.docx

Figure 19. Conditional primary outcome pre-trends for triple differences



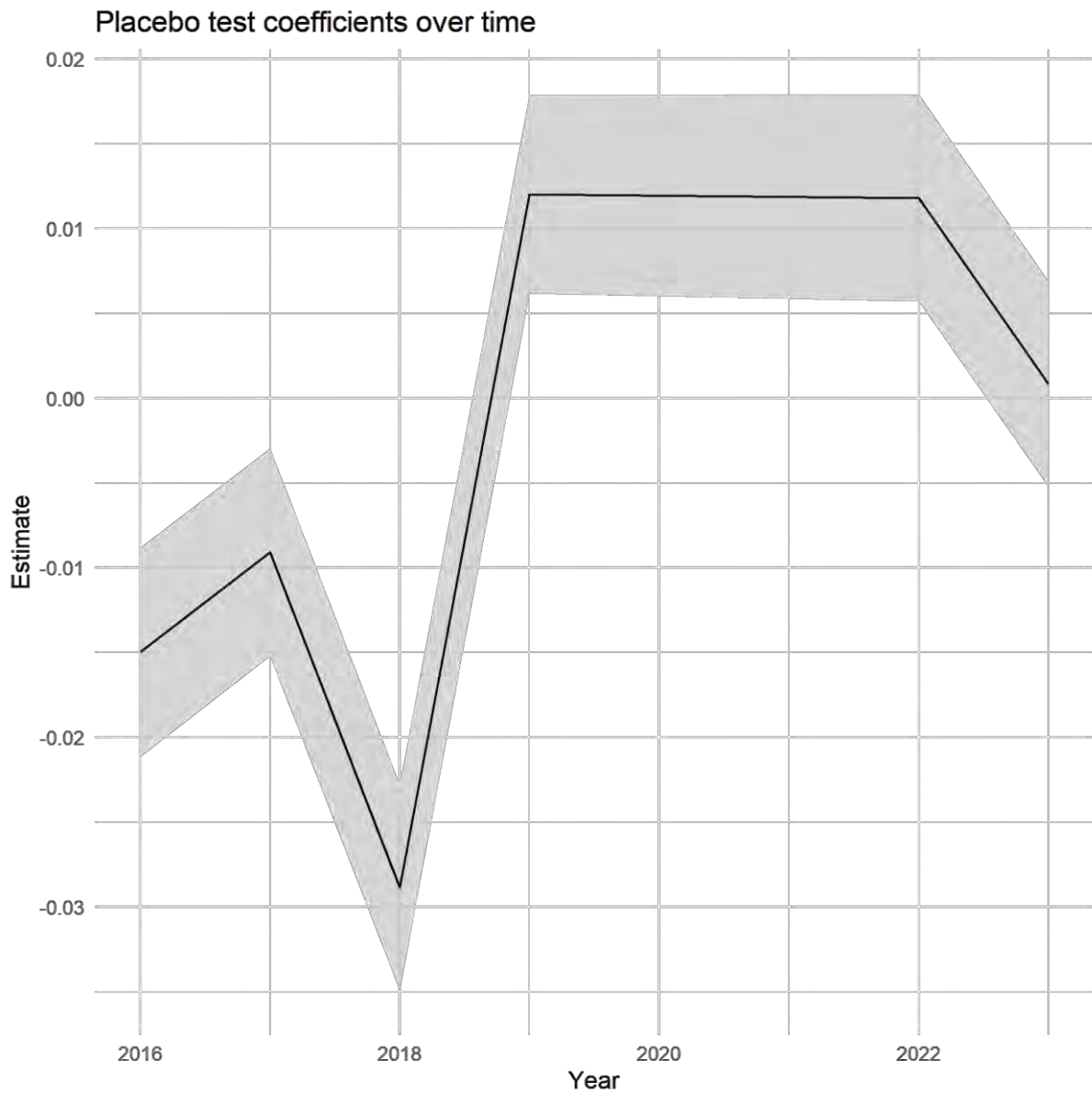
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 19 Model.docx

Figure 20. Conditional pre-trends for secondary outcome for triple difference



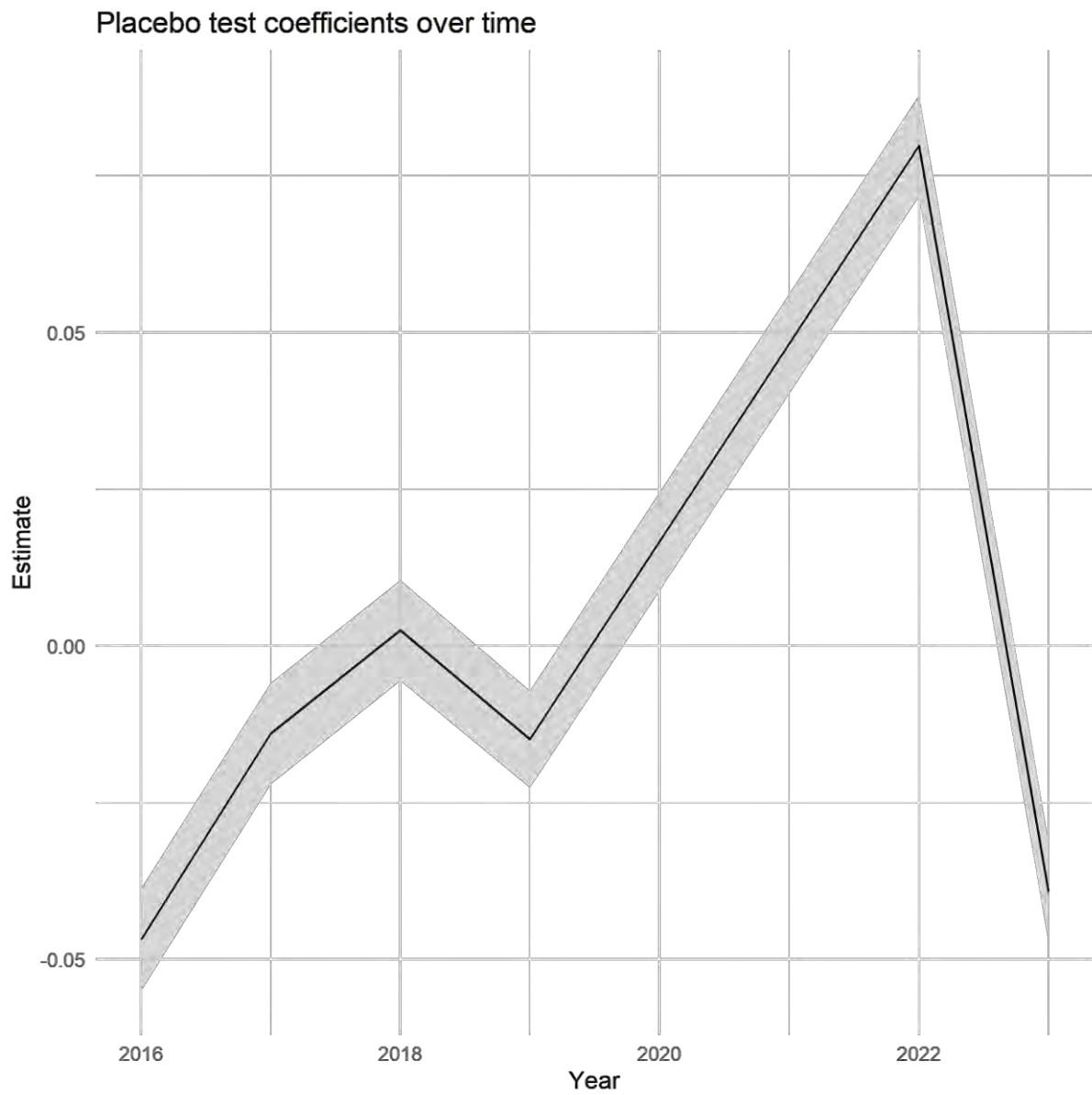
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 20 Model.docx

Figure 21. Placebo test estimates for primary outcome for difference in differences



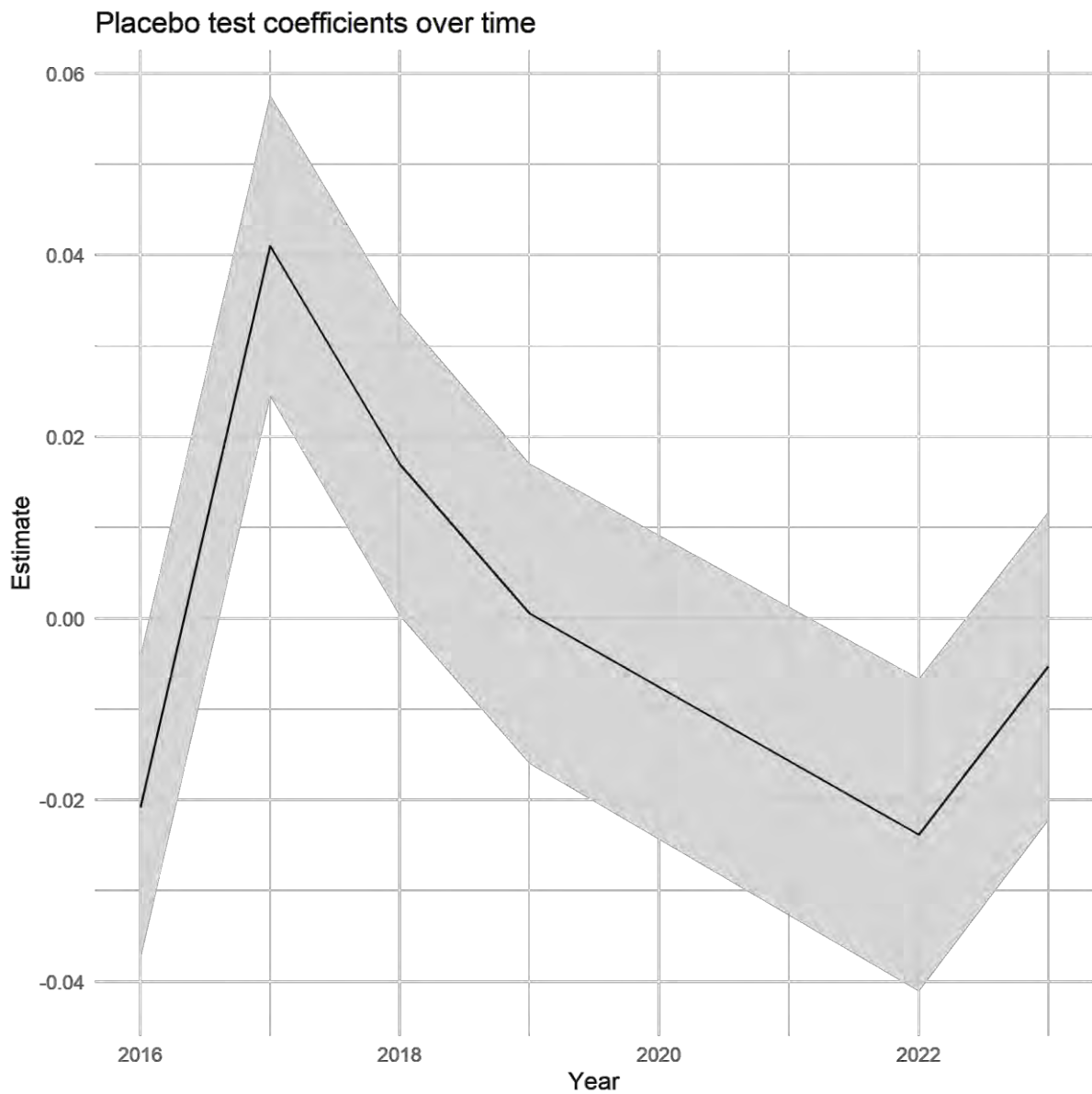
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 21 Models.csv

Figure 22. Placebo test estimates for secondary outcome for difference in differences



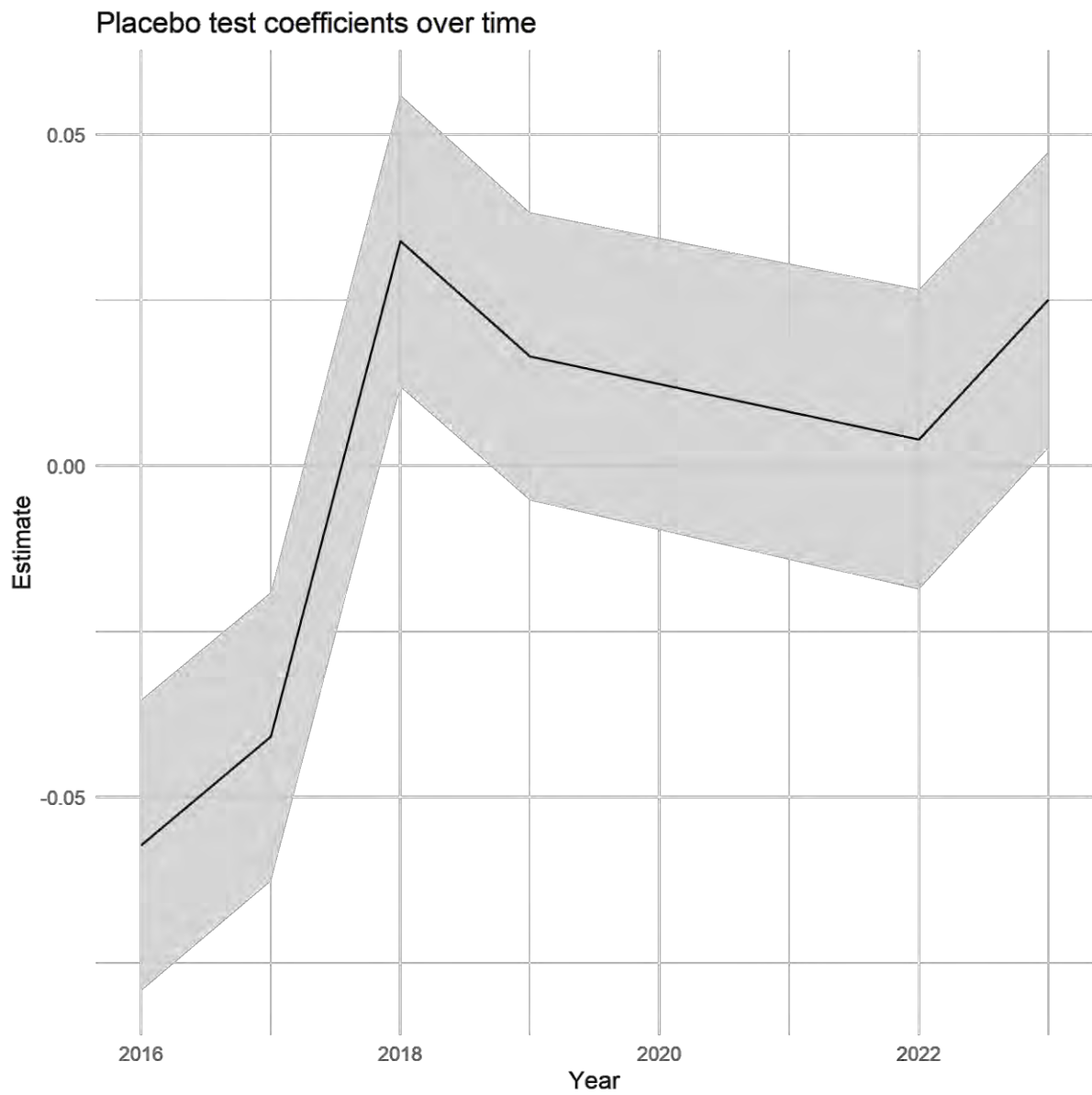
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 22 Models.csv

Figure 23. Placebo test estimates for primary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 23 Models.csv

Figure 24. Placebo test estimates for secondary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 24 Models.csv

## Appendix 2. Heterogeneity for newly eligible pupils

Table 20. Difference in differences estimates for primary outcome

---

Treatment estimate	0.008 [-0.005, 0.021]
Num.Obs.	2889593
R2	0.350
R2 Adj.	0.347
R2 Within	0.288
R2 Within Adj.	0.288
AIC	6657956.8
BIC	6879834.0
RMSE	0.76
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	2889553

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 21. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.008 [0.001, 0.015]
Num.Obs.	2886286
R2	0.046
R2 Adj.	0.040
R2 Within	0.019
R2 Within Adj.	0.019
AIC	5676979.2
BIC	5898785.1
RMSE	0.64
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	2886247

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 22. Triple difference estimates for primary outcome

Treatment estimate	0.004 [-0.045, 0.053]
Num.Obs.	2910067
R2	0.350
R2 Adj.	0.346
R2 Within	0.288
R2 Within Adj.	0.288
AIC	6705818.3
BIC	6929698.1
RMSE	0.76
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	2910026

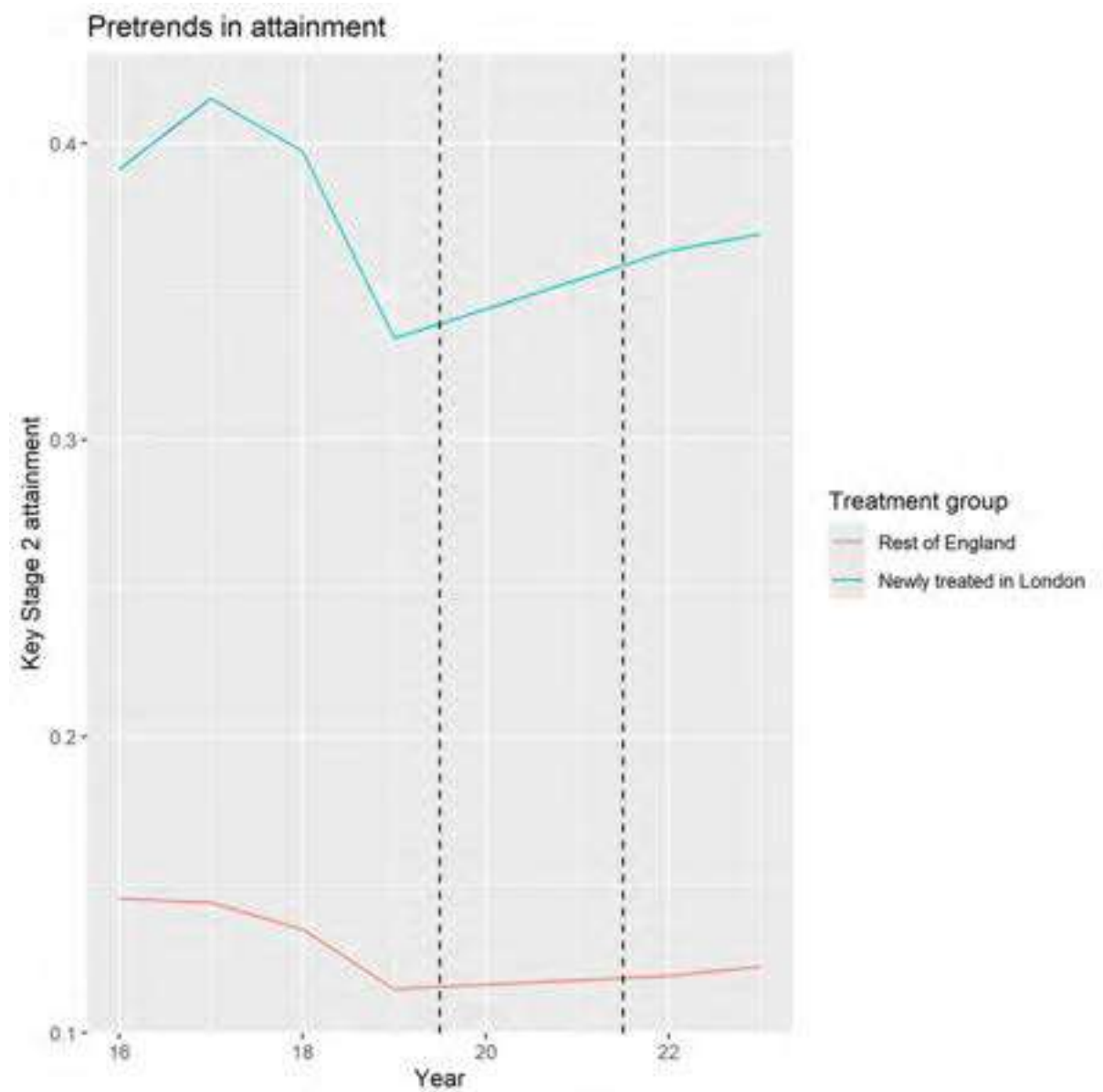
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 23. Triple difference estimates for secondary outcome

Treatment estimate	0.041 [0.010, 0.071]
Num.Obs.	2906729
R2	0.046
R2 Adj.	0.040
R2 Within	0.019
R2 Within Adj.	0.019
AIC	5715978.5
BIC	5939786.8
RMSE	0.64
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	2906689

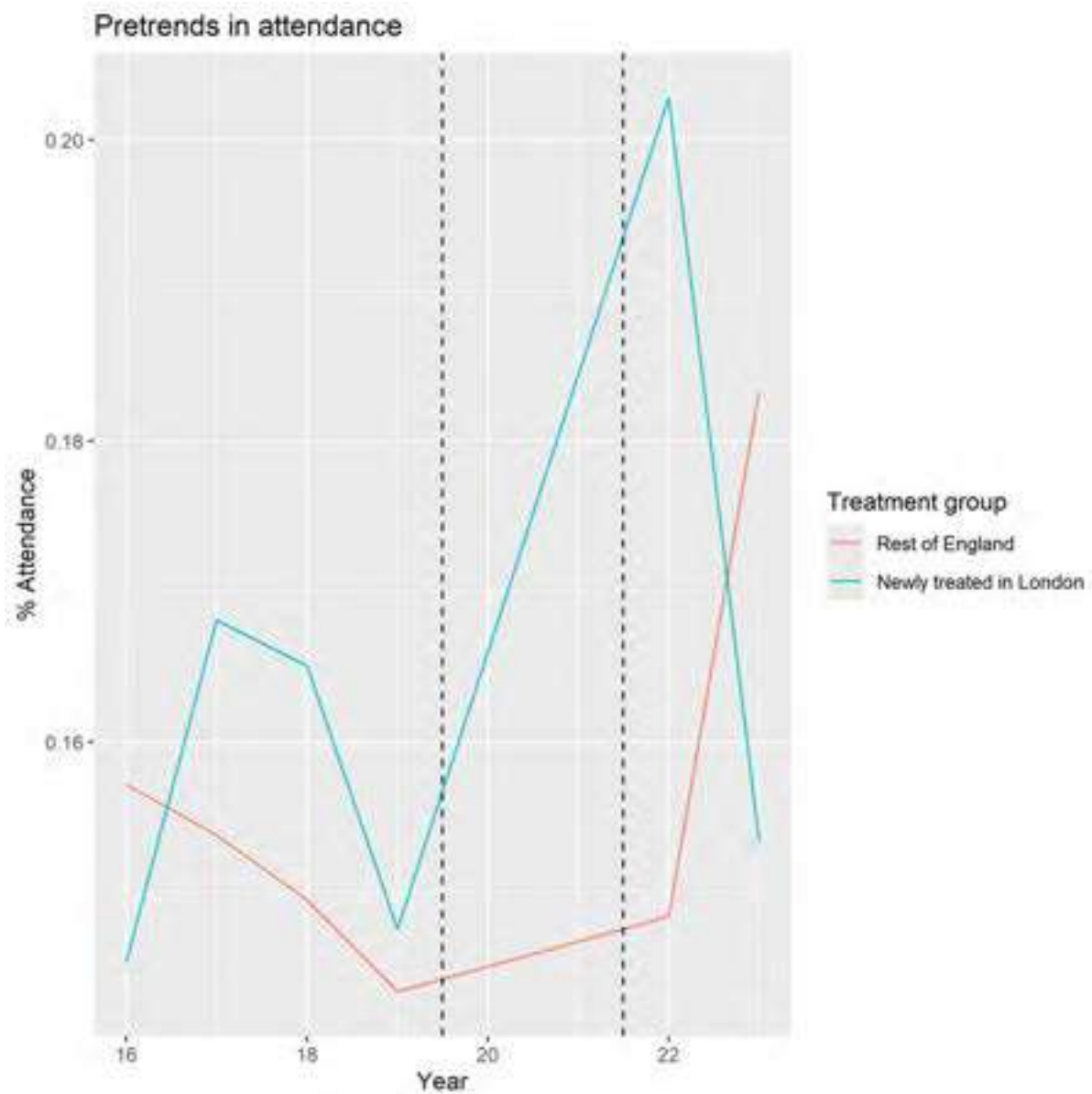
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 25. Raw pre-trends in primary outcome for difference-in-differences



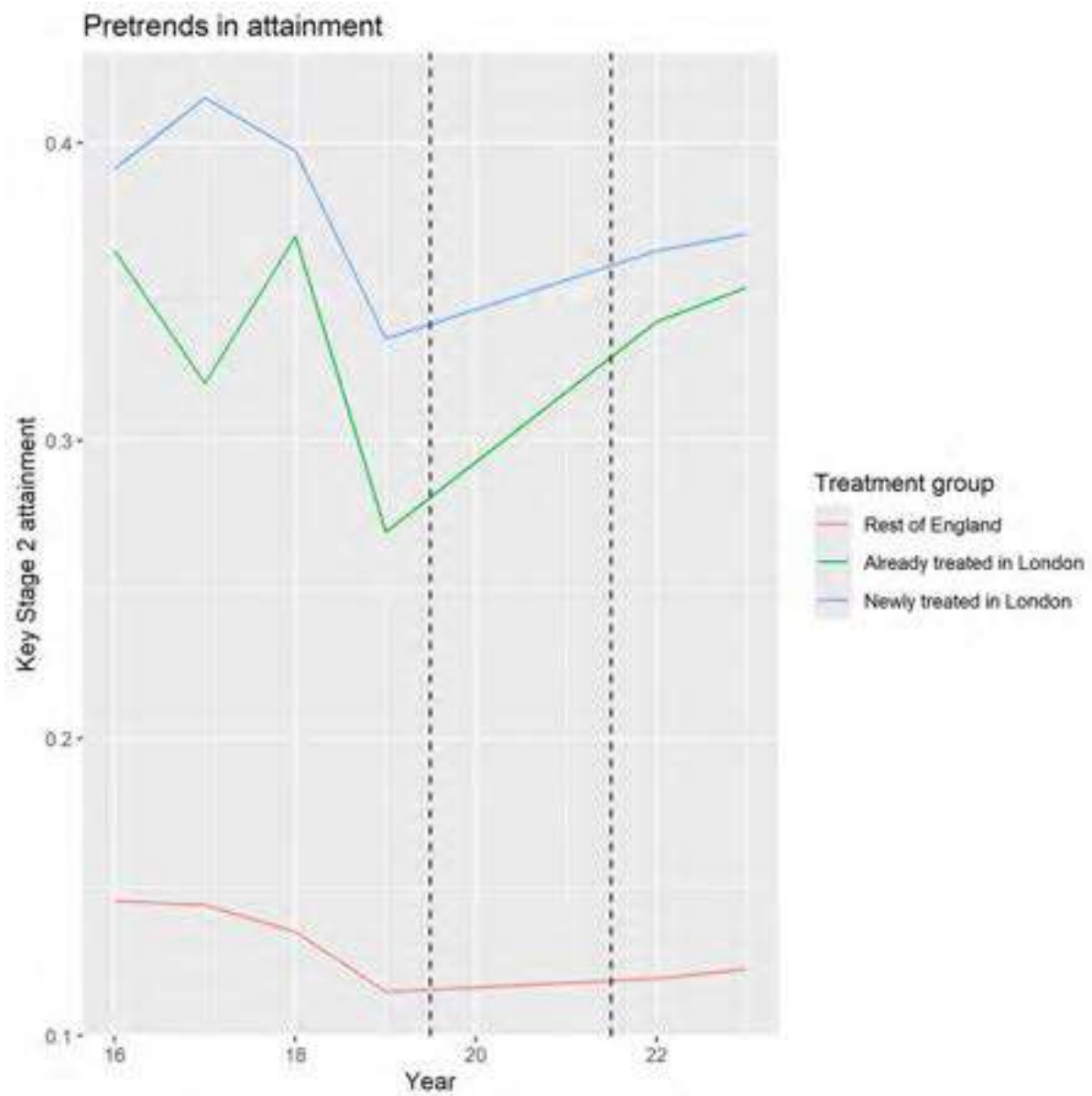
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 25 Counts.csv.

Figure 26. Raw pre-trends in secondary outcome for difference-in-differences



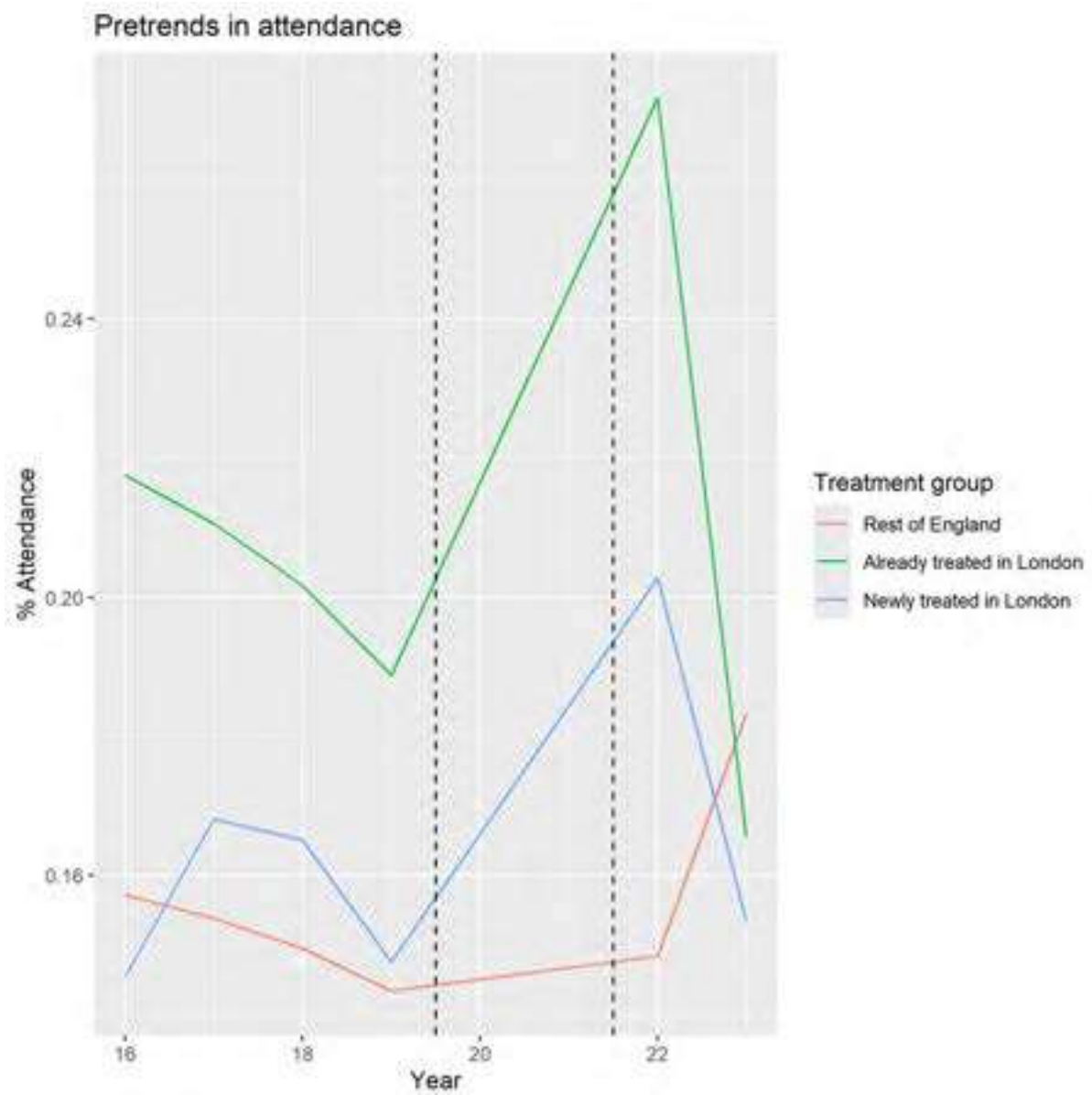
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 26 Counts.csv.

Figure 27. Raw pre-trends in primary outcome for triple difference



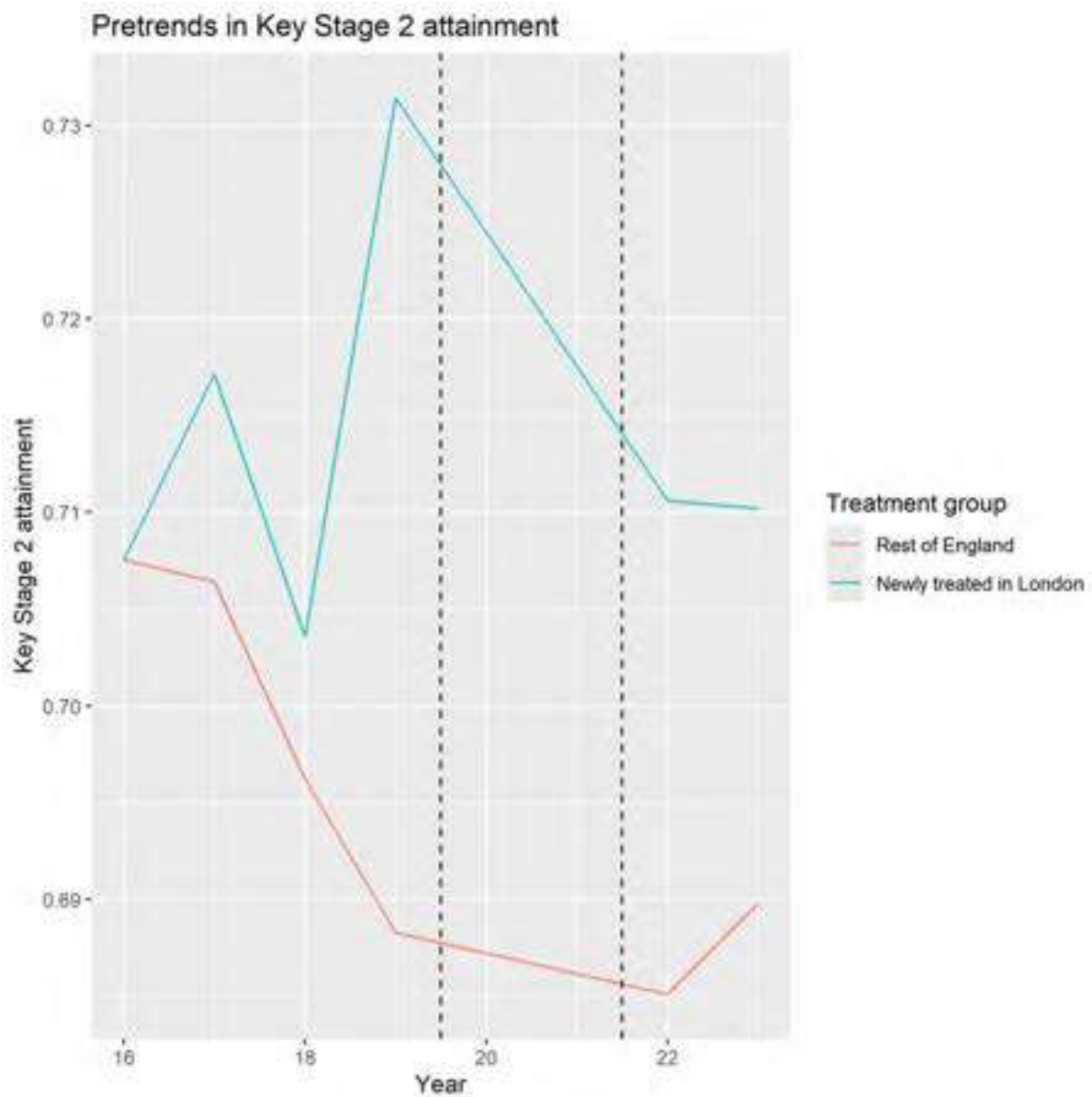
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 27 Counts.csv.

Figure 28. Raw pre-trends in secondary outcome for triple difference



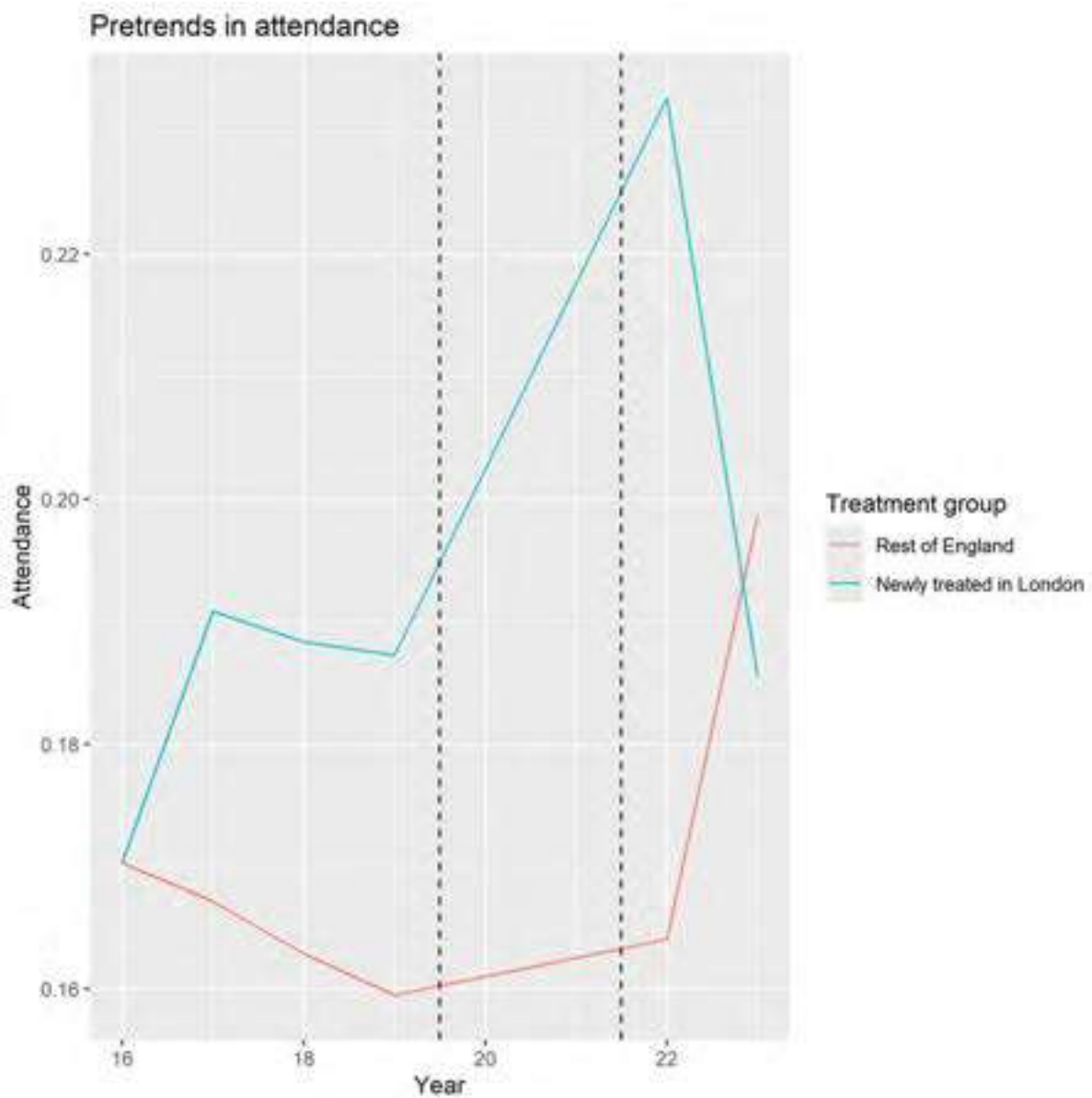
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 28 Counts.csv.

Figure 29. Conditional primary outcome pre-trends for difference-in-differences



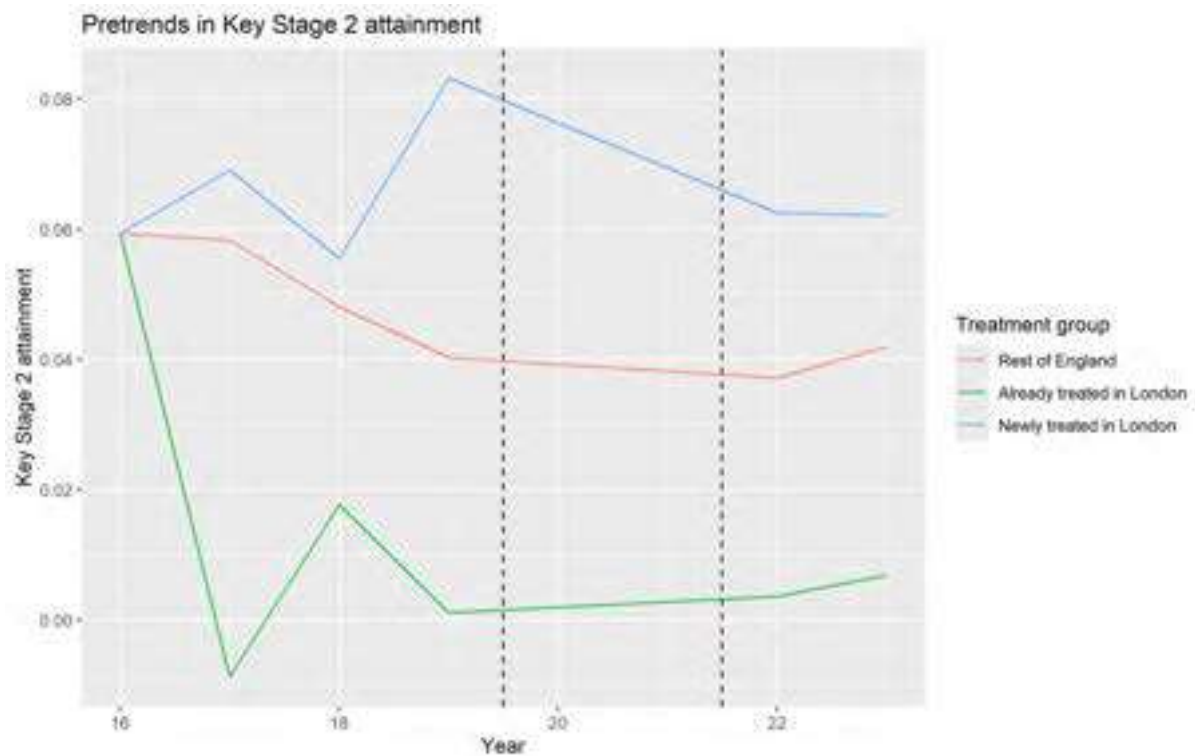
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 29 Model.docx.

Figure 30. Conditional secondary outcome pre-trends for difference-in-differences



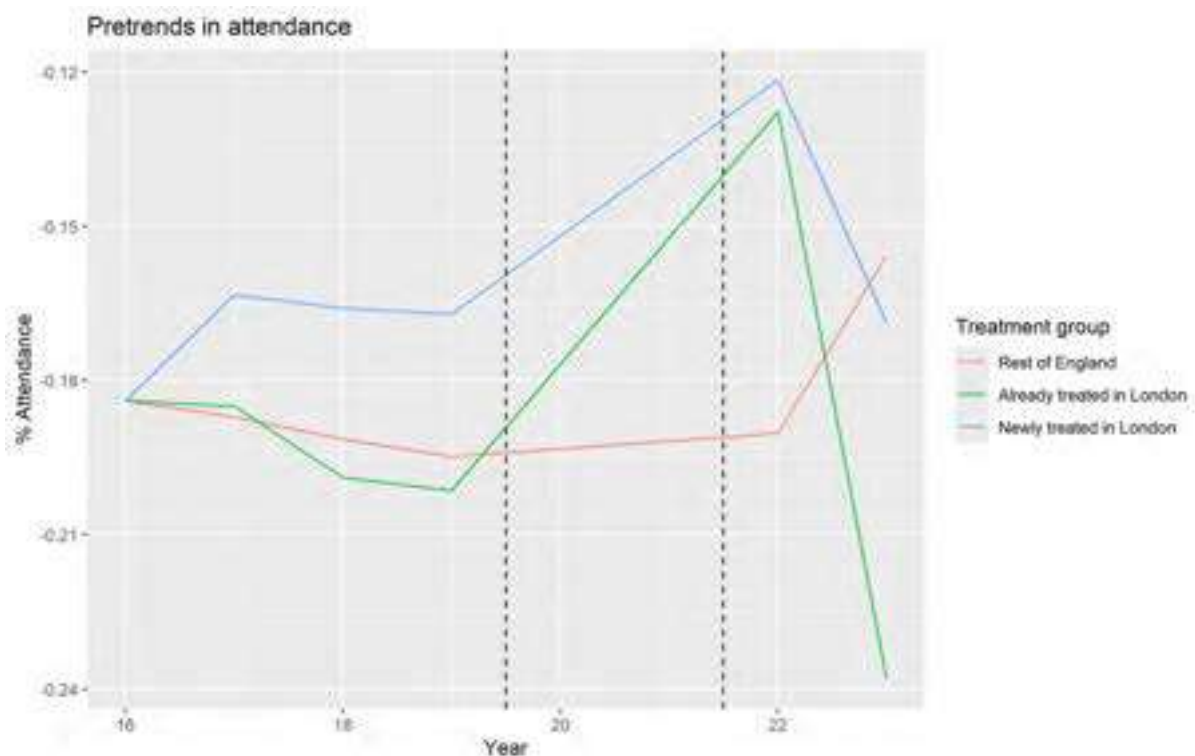
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 30 Model.docx

Figure 31. Conditional primary outcome pre-trends for triple differences



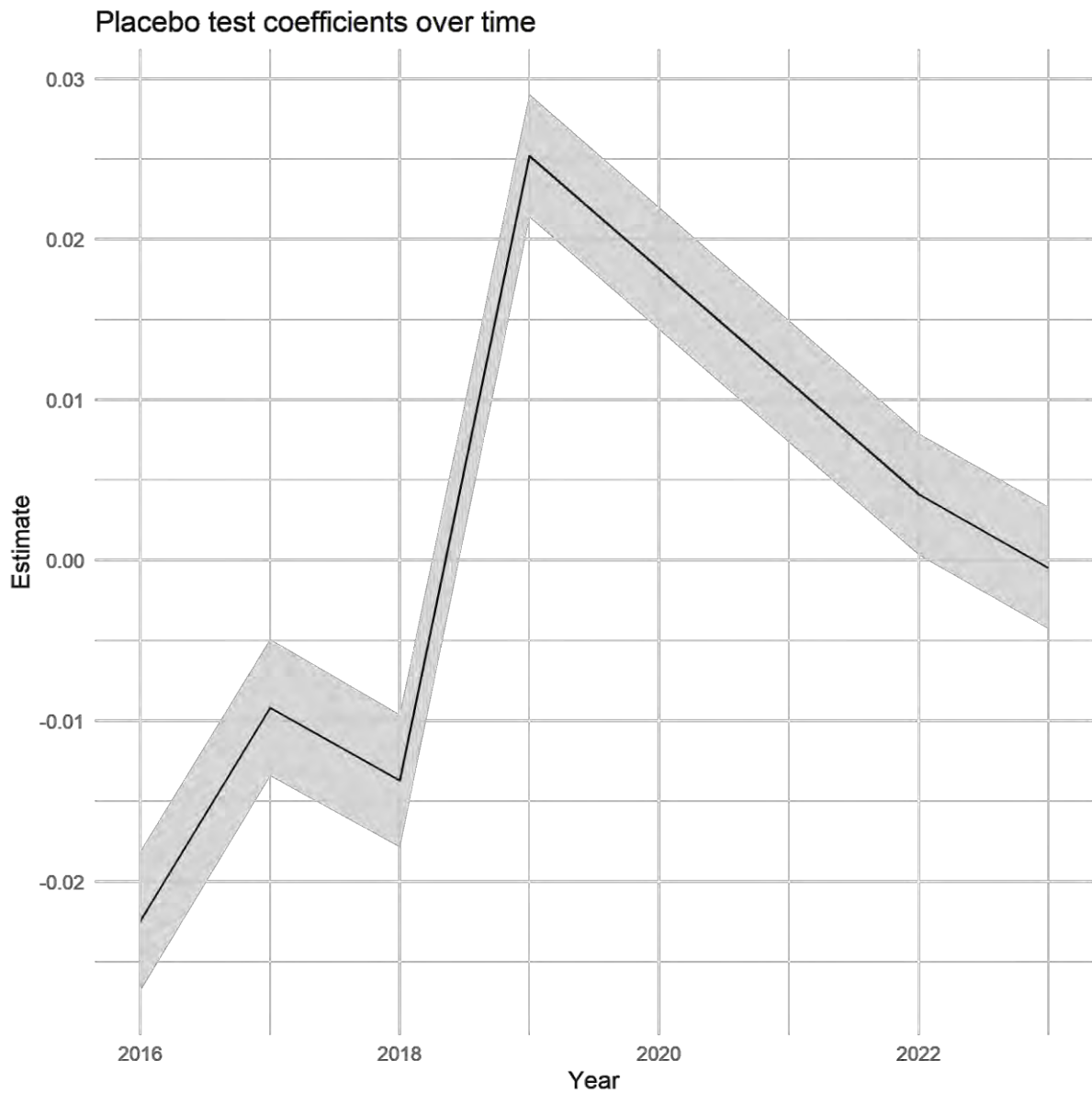
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 31 Model.docx

Figure 32. Conditional pre-trends for secondary outcome for triple difference



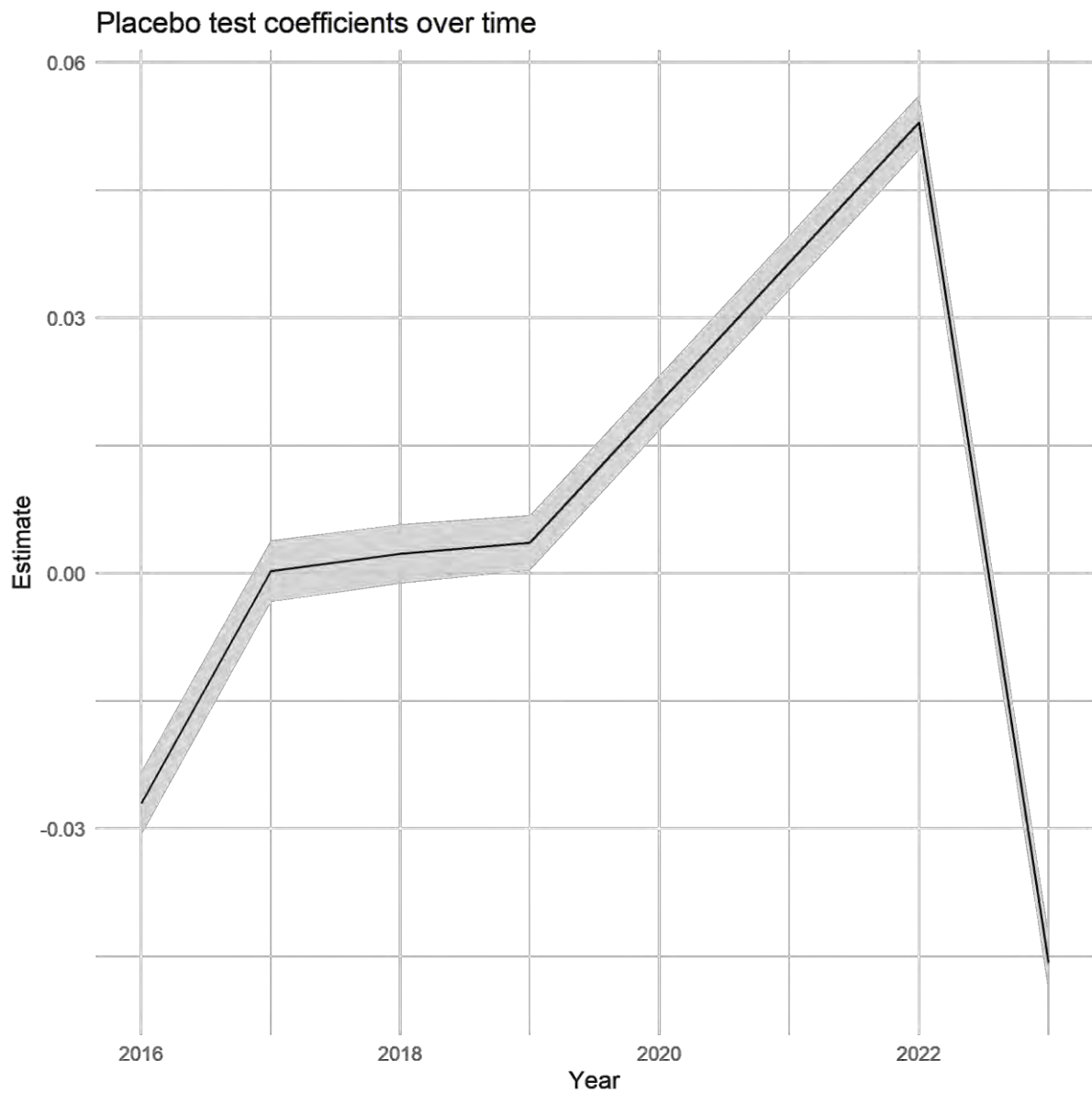
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 32 Model.docx

Figure 33. Placebo test estimates for primary outcome for difference in differences



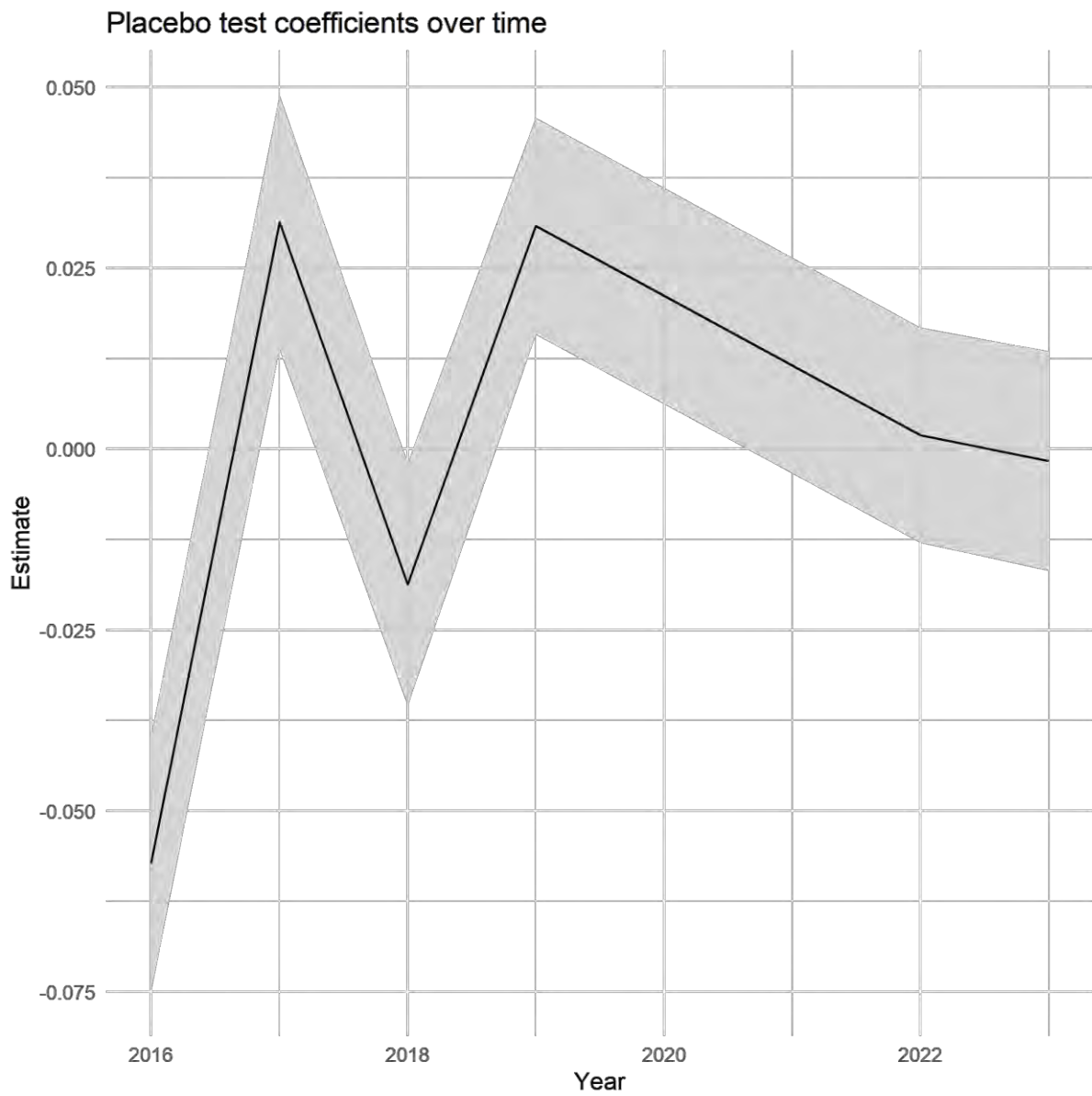
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 33 Models.csv

Figure 34. Placebo test estimates for secondary outcome for difference in differences



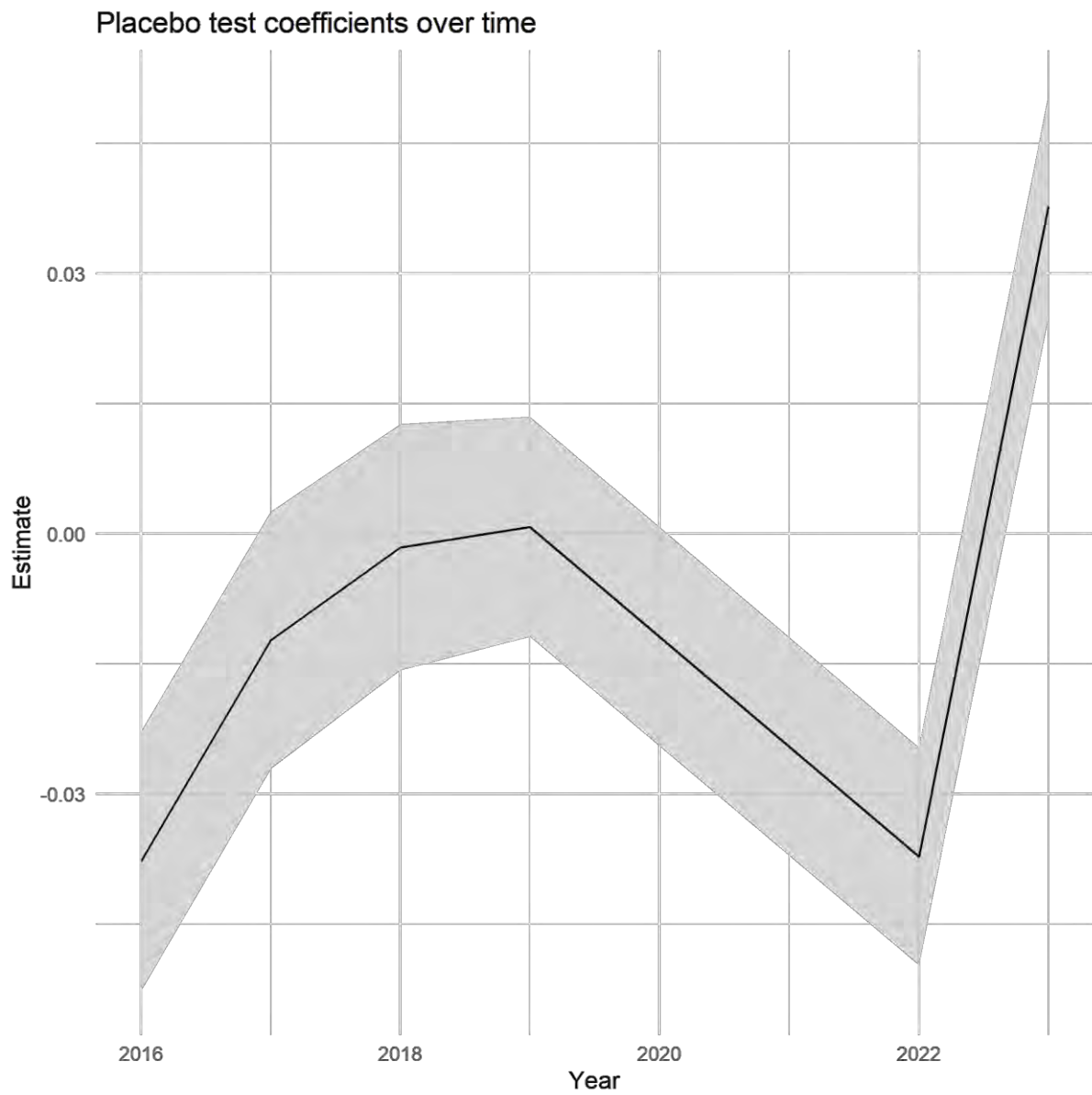
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 34 Models.csv

Figure 35. Placebo test estimates for primary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 35 Models.csv

Figure 36. Placebo test estimates for secondary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 36 Models.csv

### Appendix 3. Heterogeneity for Black pupils

Table 24. Difference in differences estimates for primary outcome

---

Treatment estimate	-0.073 [-0.098, -0.047]
Num.Obs.	221353
R2	0.360
R2 Adj.	0.326
R2 Within	0.251
R2 Within Adj.	0.251
AIC	536953.5
BIC	653315.0
RMSE	0.77
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	221317

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 25. Difference in differences estimates for secondary outcome

---

Treatment estimate	-0.023 [-0.039, -0.007]
Num.Obs.	220880
R2	0.113
R2 Adj.	0.065
R2 Within	0.017
R2 Within Adj.	0.016
AIC	466194.6
BIC	582459.8
RMSE	0.66
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	220844

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 26. Triple difference estimates for primary outcome

Treatment estimate	-0.012 [-0.078, 0.053]
Num.Obs.	232358
R2	0.360
R2 Adj.	0.326
R2 Within	0.253
R2 Within Adj.	0.252
AIC	562417.3
BIC	680828.2
RMSE	0.77
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	232321

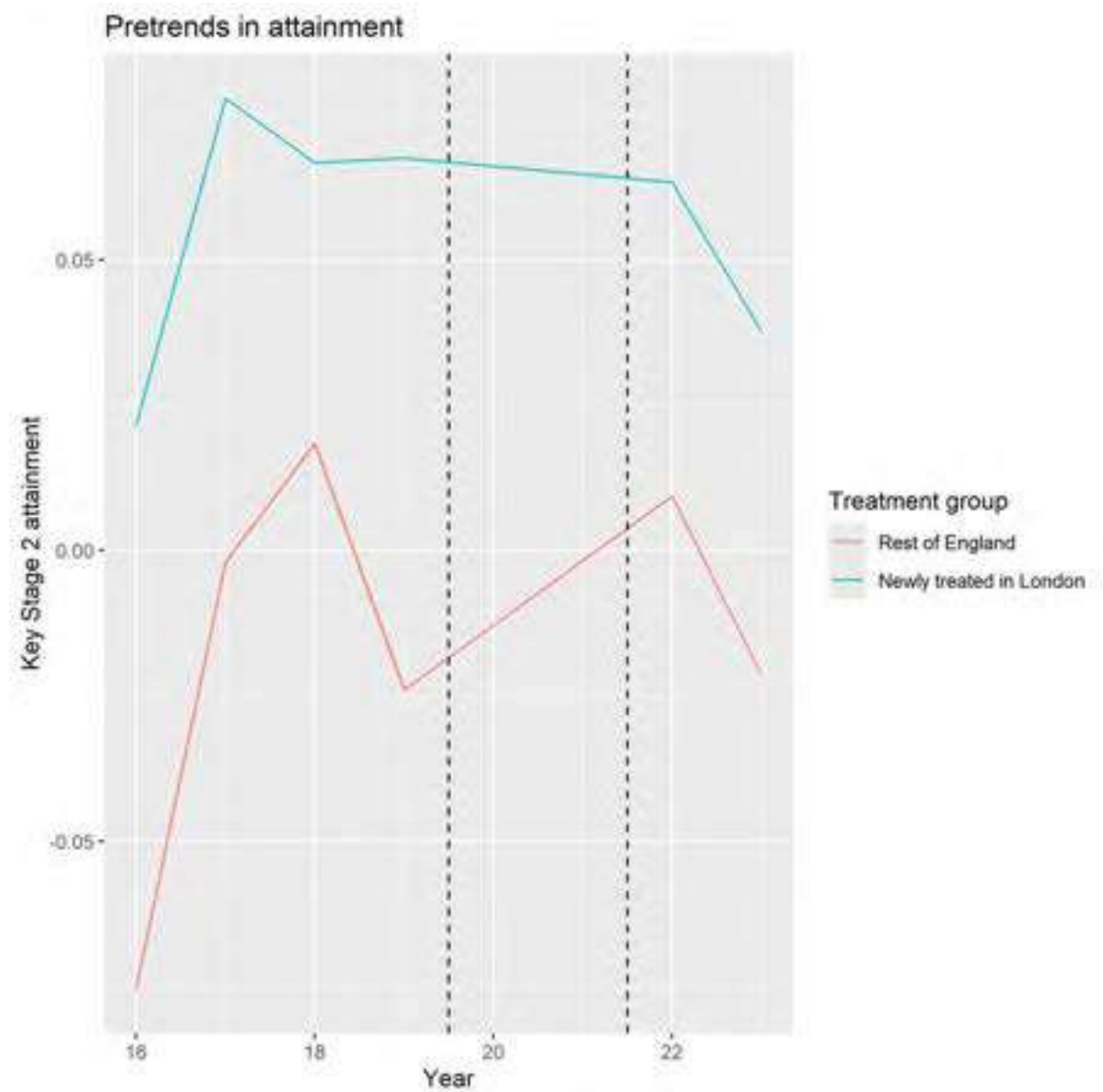
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 27. Triple difference estimates for secondary outcome

Treatment estimate	0.007 [-0.031, 0.045]
Num.Obs.	231860
R2	0.111
R2 Adj.	0.065
R2 Within	0.017
R2 Within Adj.	0.017
AIC	488225.7
BIC	606539.6
RMSE	0.66
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	231823

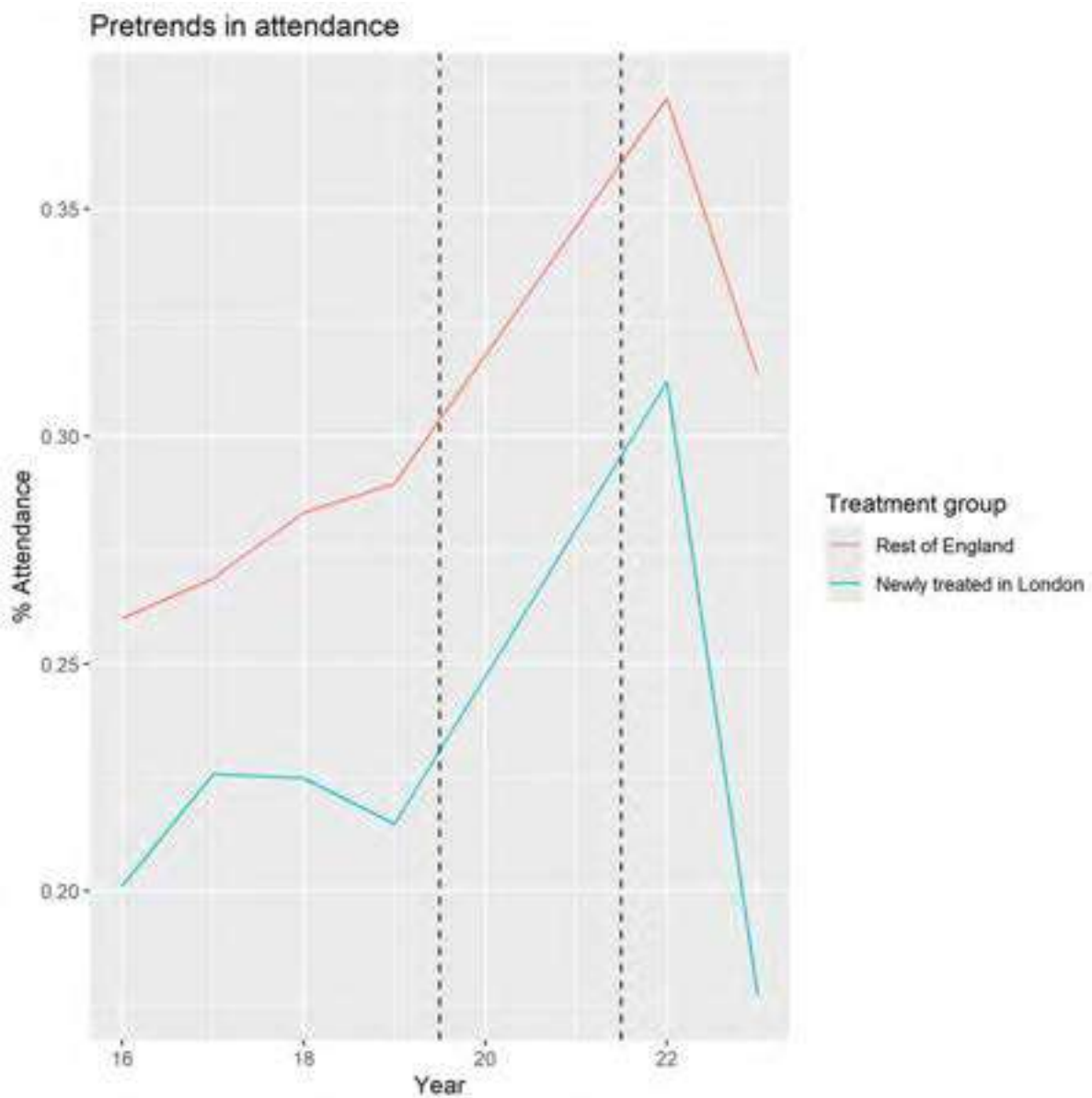
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 37. Raw pre-trends in primary outcome for difference-in-differences



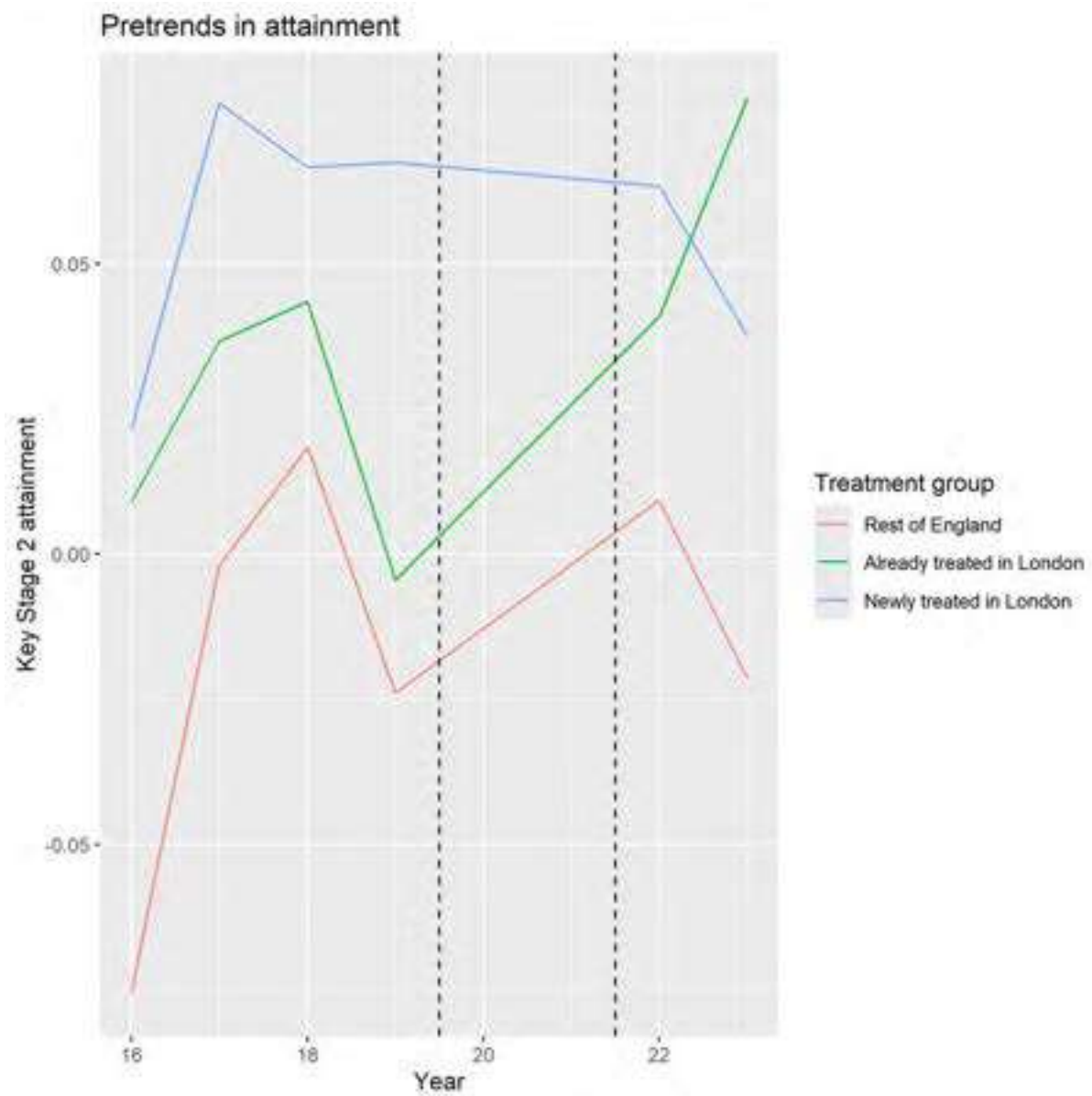
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 37 Counts.csv.

Figure 38. Raw pre-trends in secondary outcome for difference-in-differences



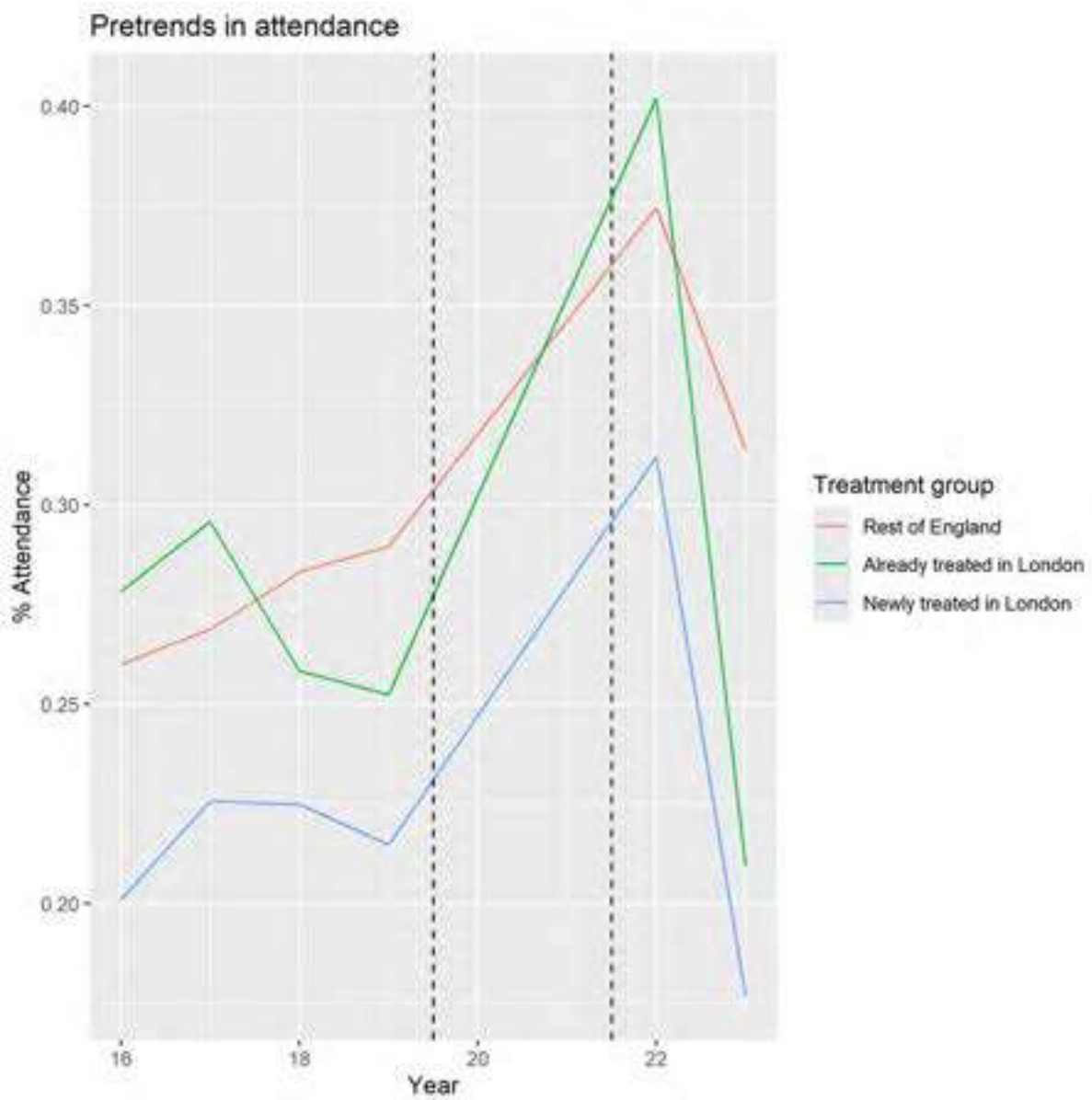
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 38 Counts.csv.

Figure 39. Raw pre-trends in primary outcome for triple difference



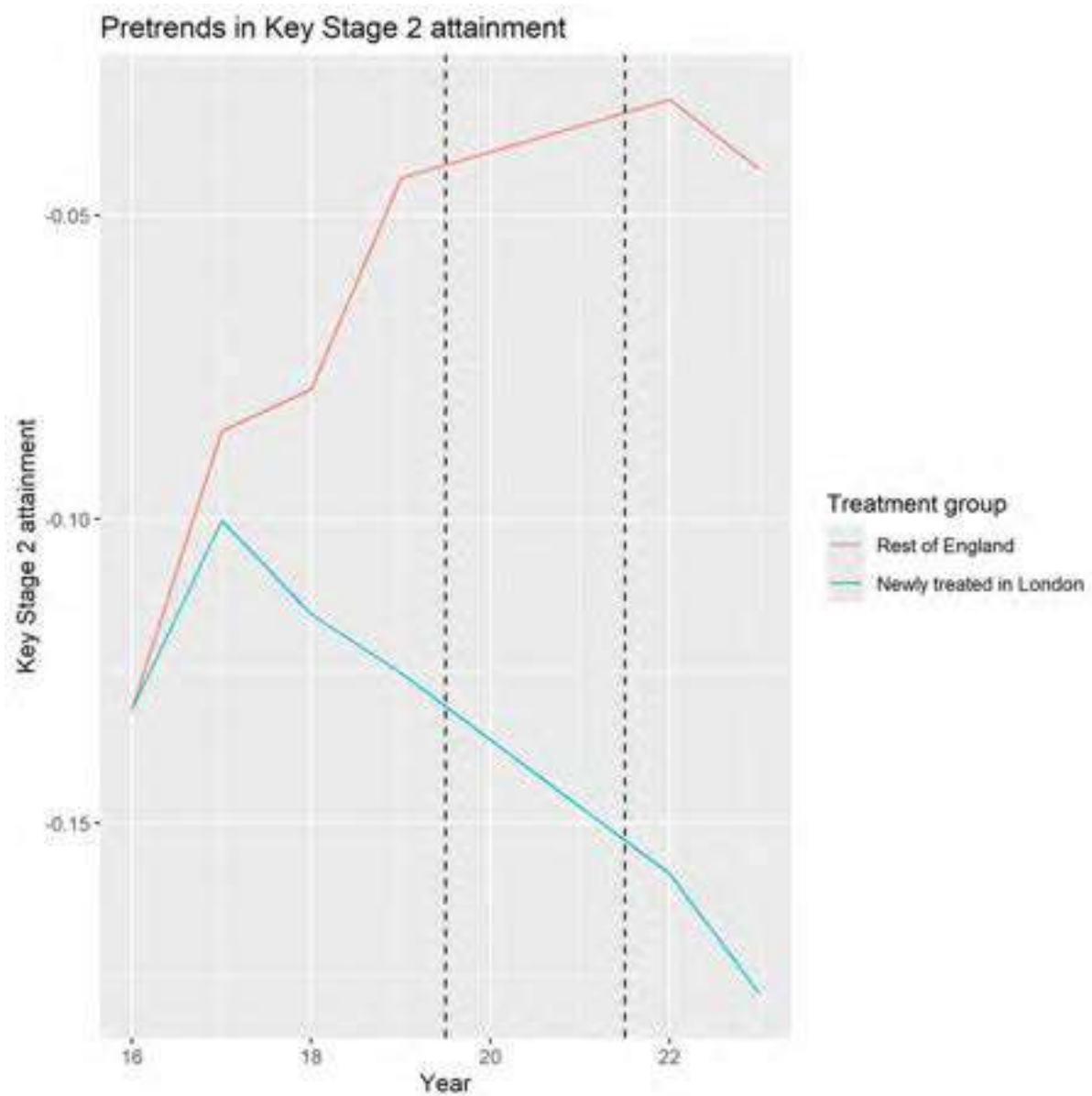
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 39 Counts.csv.

Figure 40. Raw pre-trends in secondary outcome for triple difference



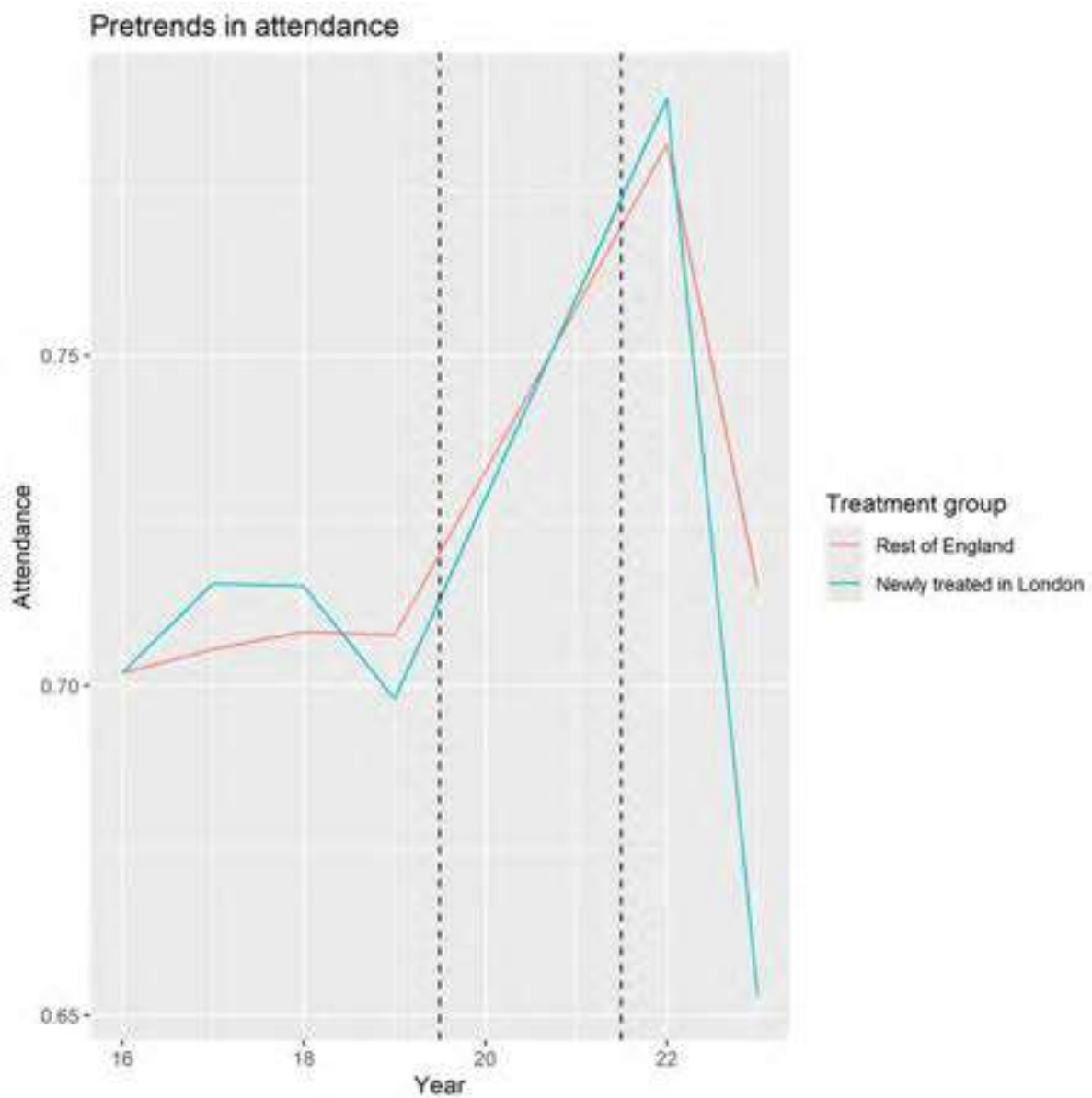
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 40 Counts.csv.

Figure 41. Conditional primary outcome pre-trends for difference-in-differences



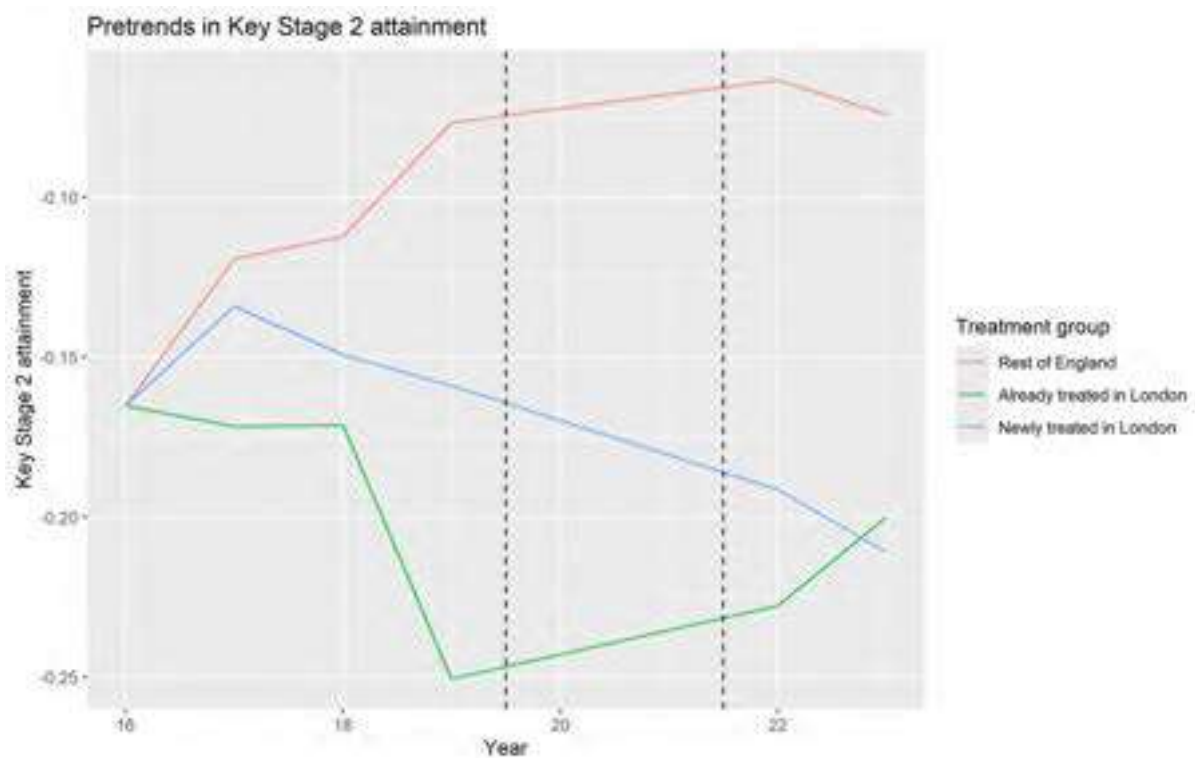
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 41 Model.docx.

Figure 42. Conditional secondary outcome pre-trends for difference-in-differences



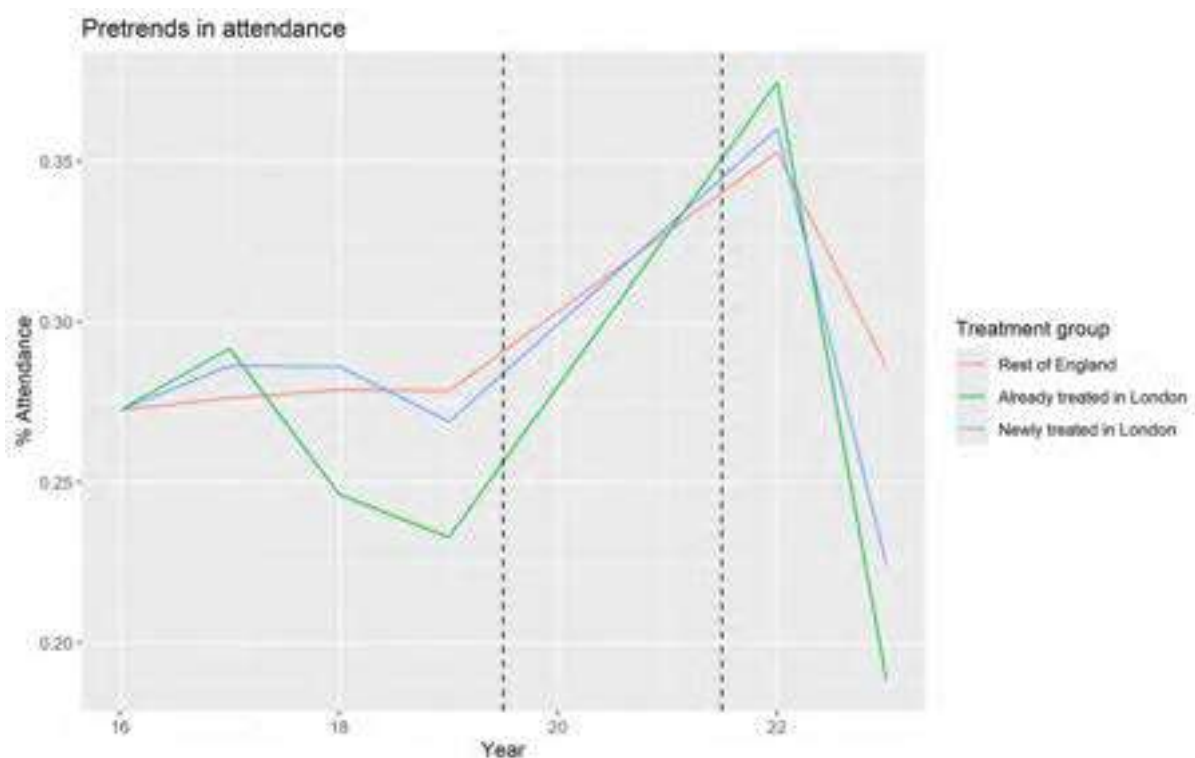
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 42 Model.docx

Figure 43. Conditional primary outcome pre-trends for triple differences



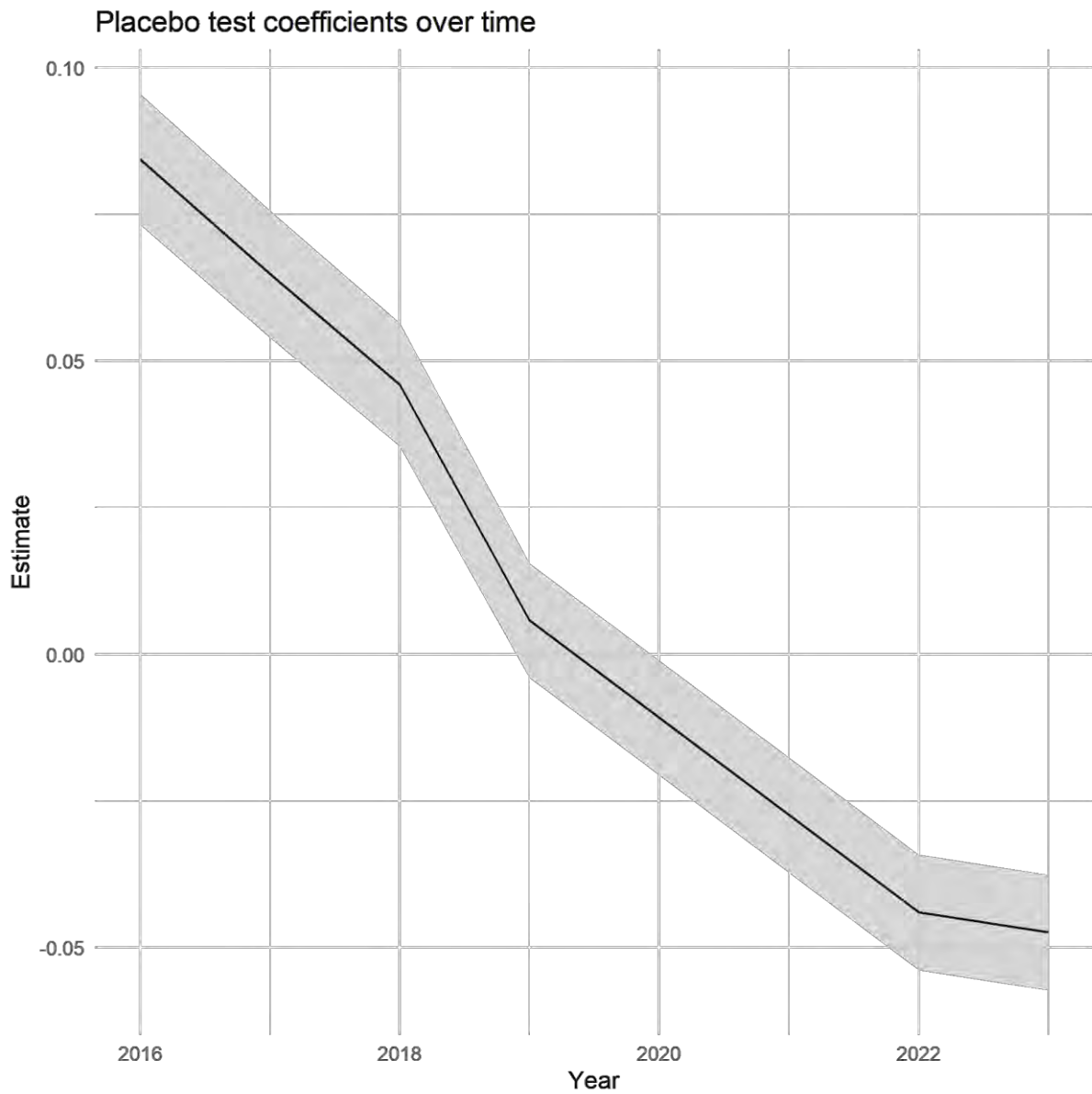
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 43 Model.docx

Figure 44. Conditional pre-trends for secondary outcome for triple difference



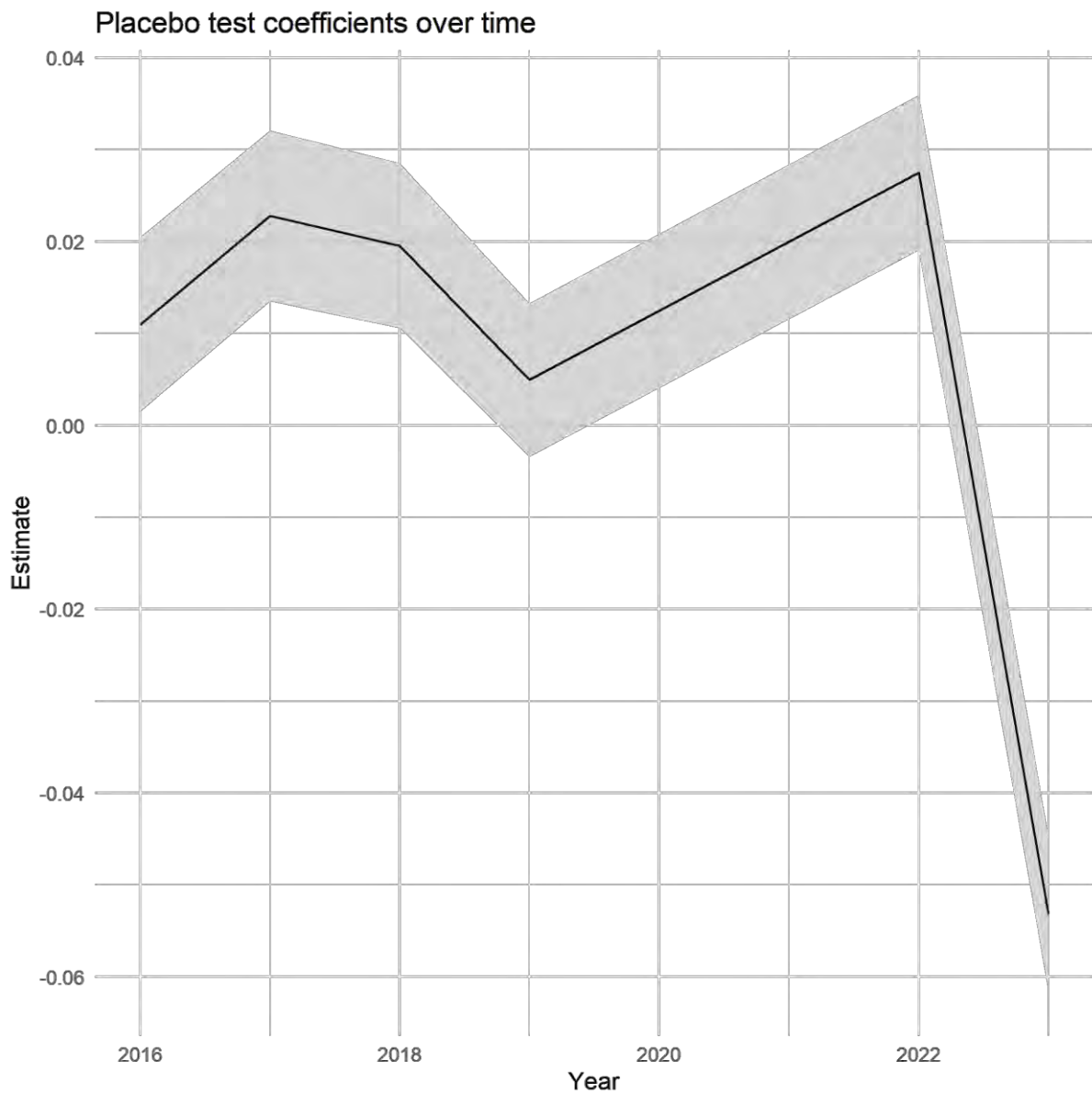
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 44 Model.docx

Figure 45. Placebo test estimates for primary outcome for difference in differences



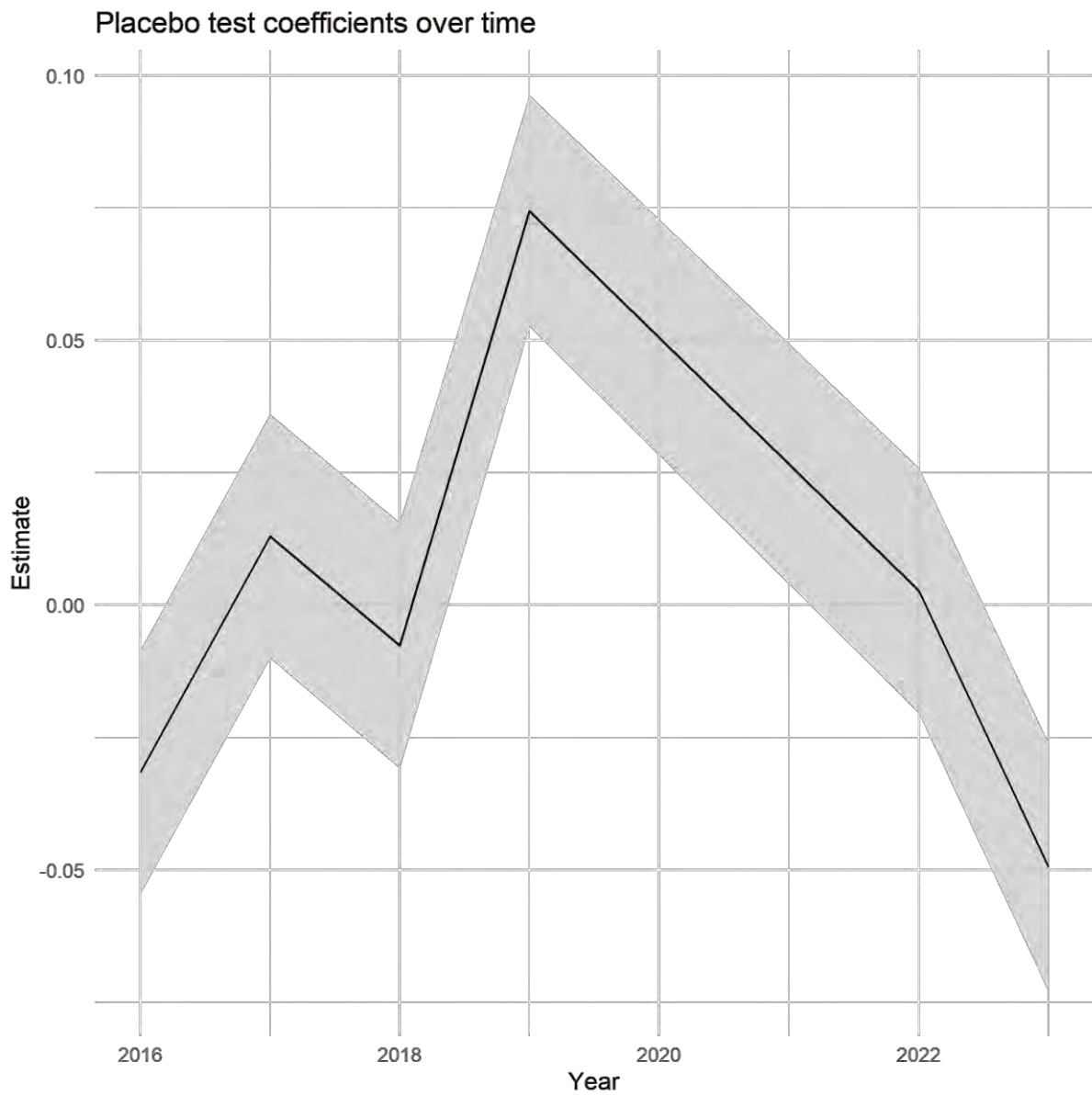
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 45 Models.csv

Figure 46. Placebo test estimates for secondary outcome for difference in differences



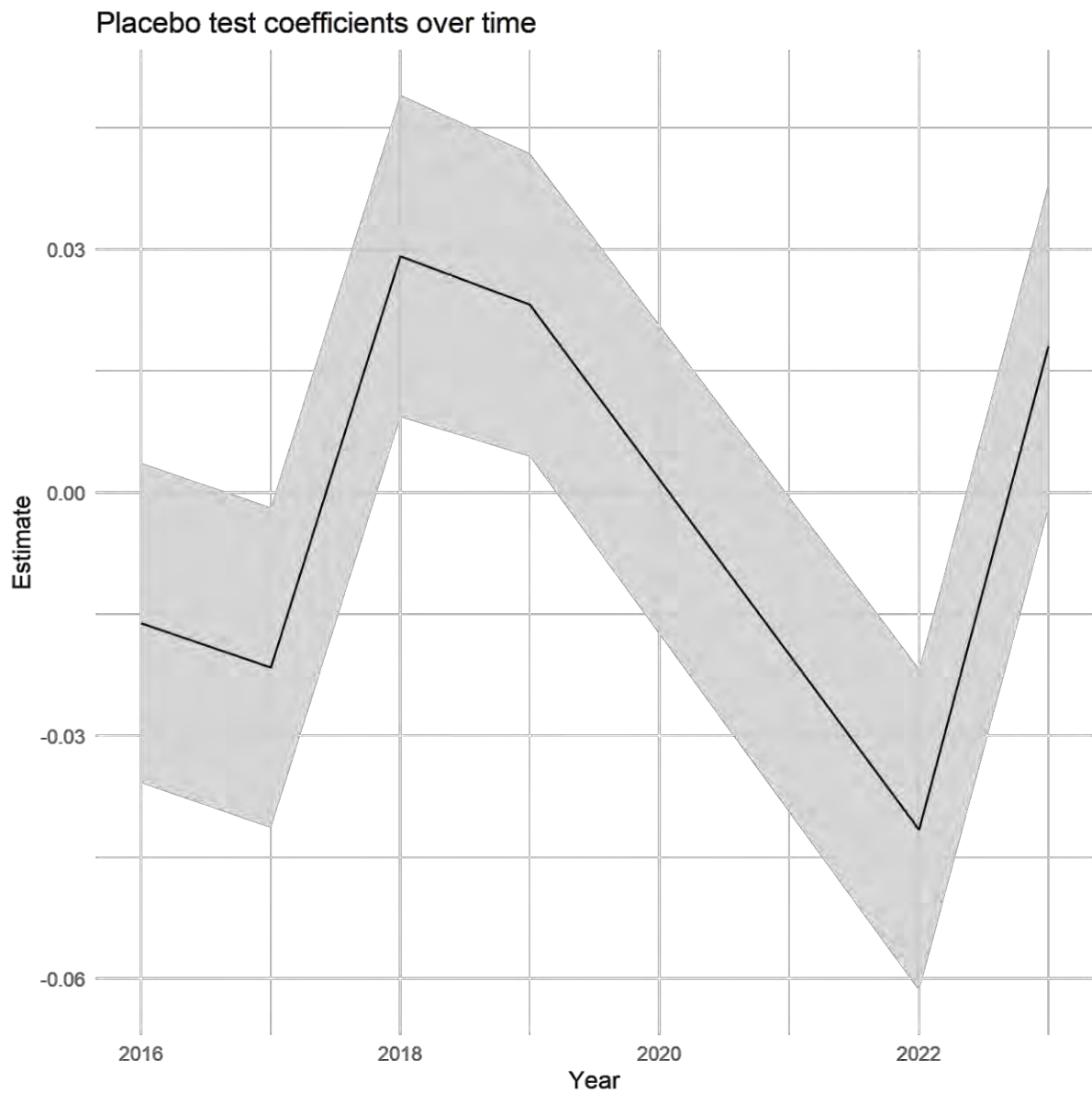
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 46 Models.csv

Figure 47. Placebo test estimates for primary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 47 Models.csv

Figure 48. Placebo test estimates for secondary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 48 Models.csv

## Appendix 4. Heterogeneity for Asian pupils

Table 28. Difference in differences estimates for primary outcome

---

Treatment estimate	-0.008 [-0.030, 0.013]
Num.Obs.	457208
R2	0.391
R2 Adj.	0.373
R2 Within	0.276
R2 Within Adj.	0.276
AIC	1094795.6
BIC	1238841.0
RMSE	0.78
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	457171

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 29. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.036 [0.022, 0.050]
Num.Obs.	456495
R2	0.072
R2 Adj.	0.045
R2 Within	0.010
R2 Within Adj.	0.010
AIC	981740.1
BIC	1125665.9
RMSE	0.69
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	456459

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 30. Triple difference estimates for primary outcome

Treatment estimate	0.010 [-0.054, 0.075]
Num.Obs.	472505
R2	0.389
R2 Adj.	0.371
R2 Within	0.276
R2 Within Adj.	0.275
AIC	1129991.9
BIC	1276049.5
RMSE	0.78
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	472467

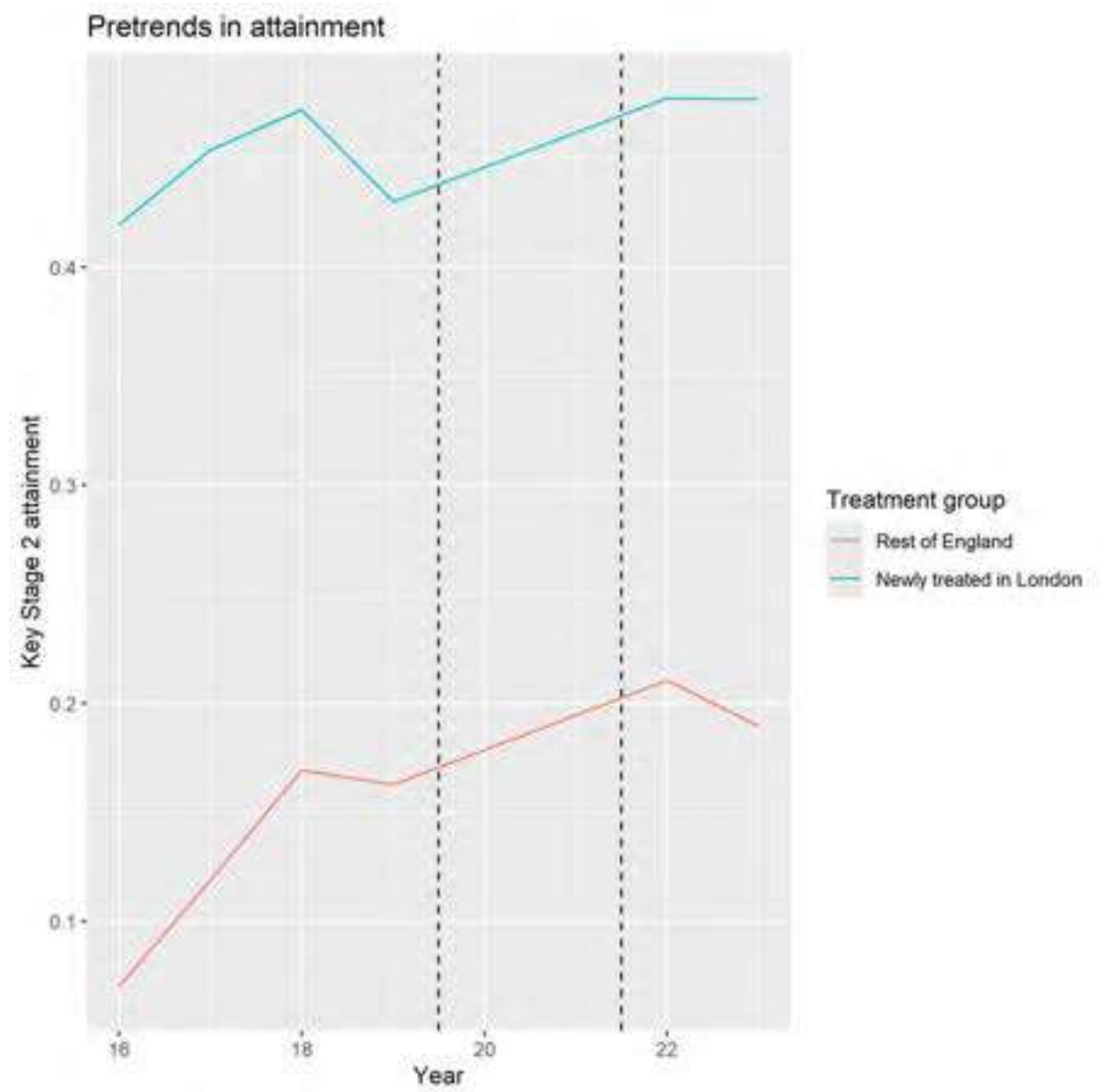
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 31. Triple difference estimates for secondary outcome

Treatment estimate	0.056 [0.021, 0.091]
Num.Obs.	471771
R2	0.071
R2 Adj.	0.045
R2 Within	0.010
R2 Within Adj.	0.010
AIC	1013191.9
BIC	1159129.3
RMSE	0.69
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	471734

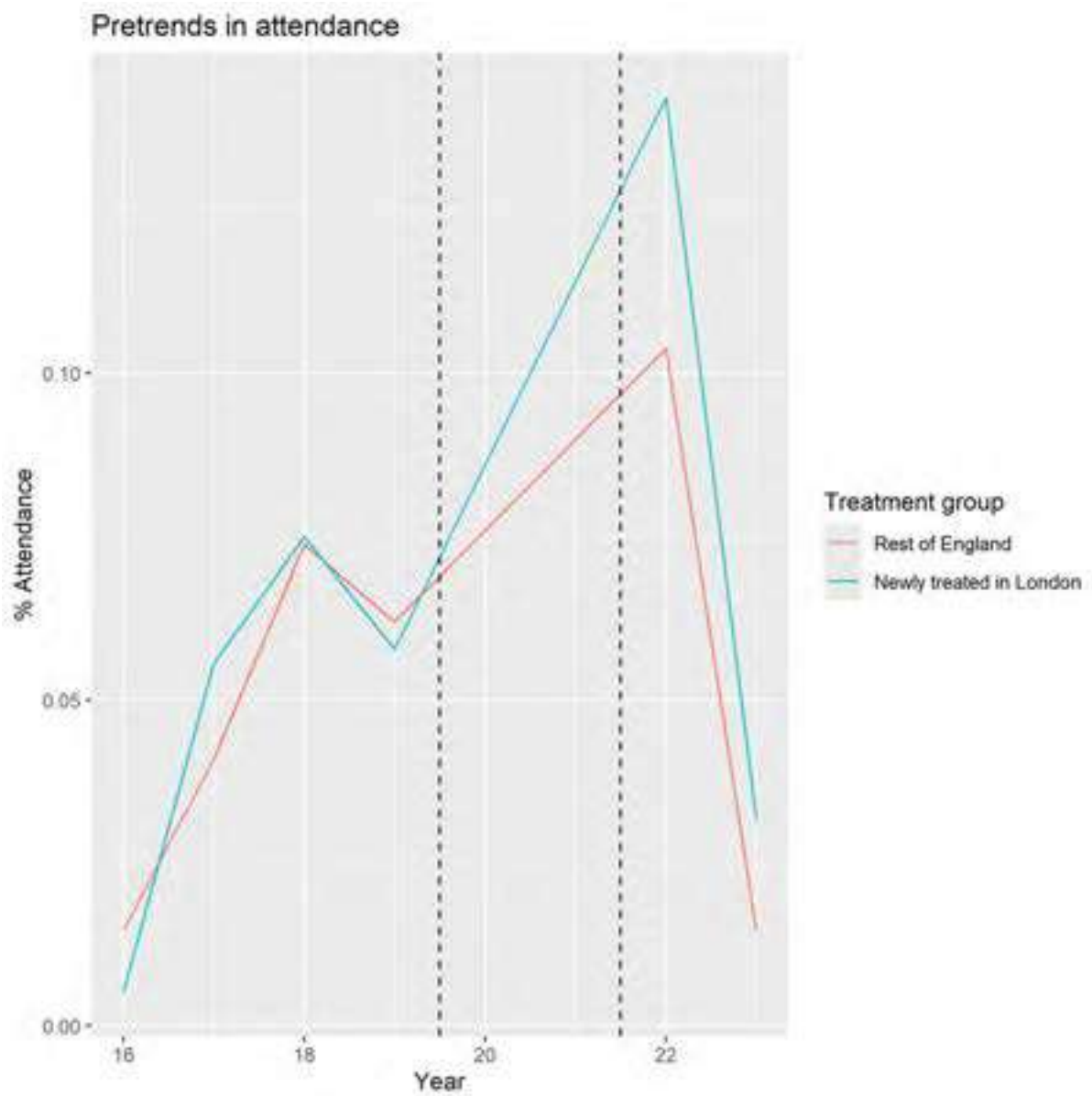
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 49. Raw pre-trends in primary outcome for difference-in-differences



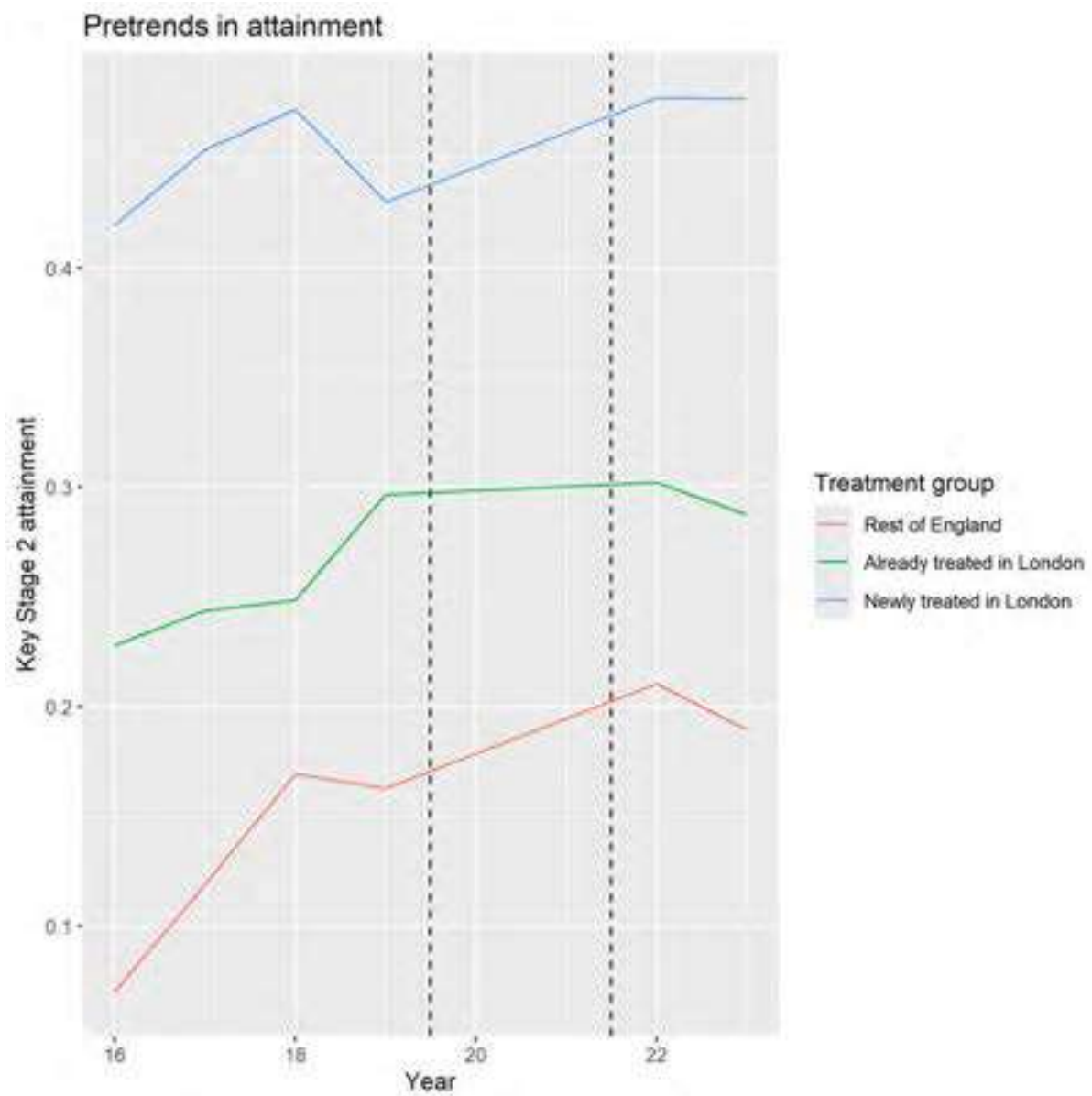
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 49 Counts.csv.

Figure 50. Raw pre-trends in secondary outcome for difference-in-differences



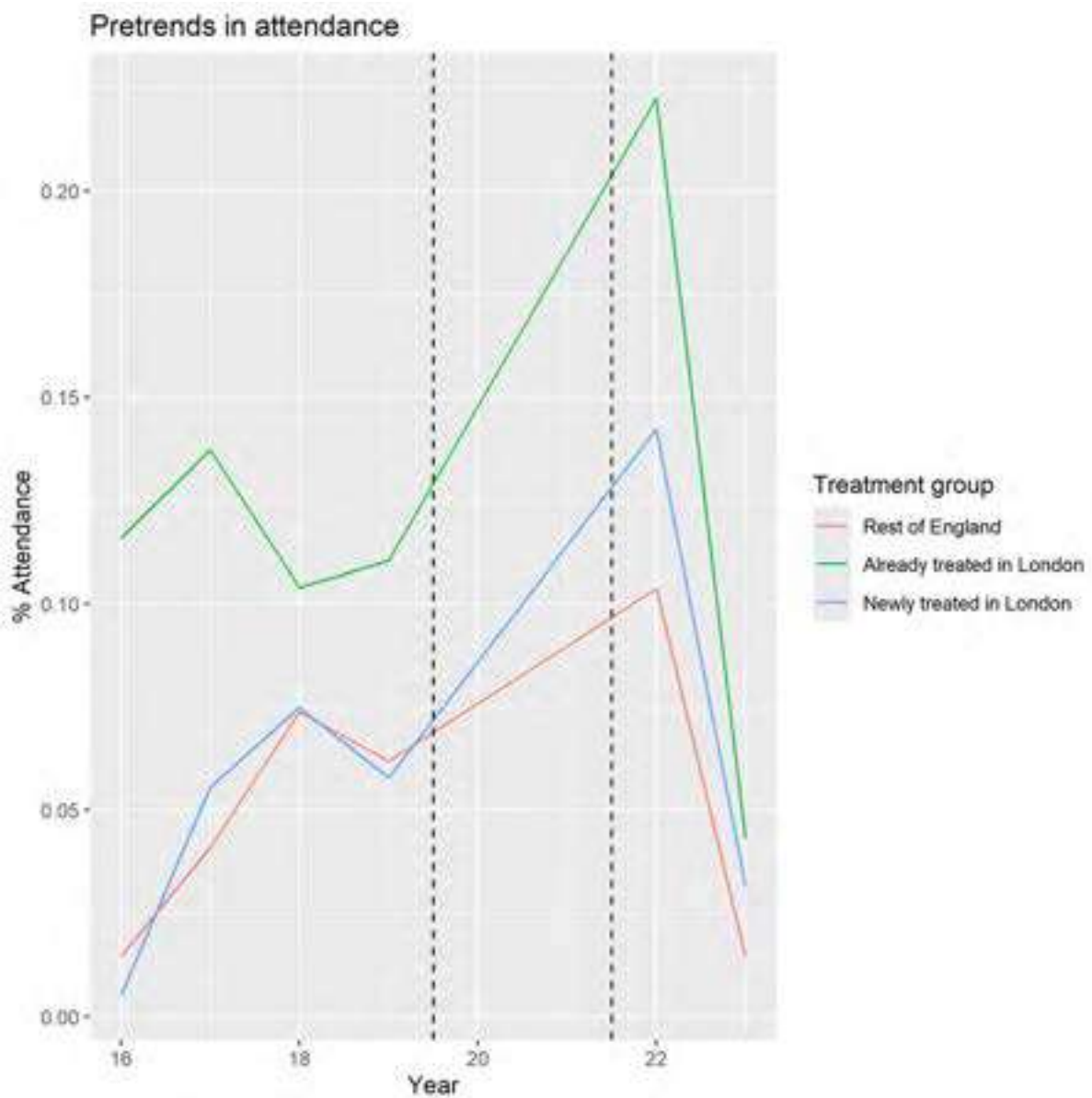
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 50 Counts.csv.

Figure 51. Raw pre-trends in primary outcome for triple difference



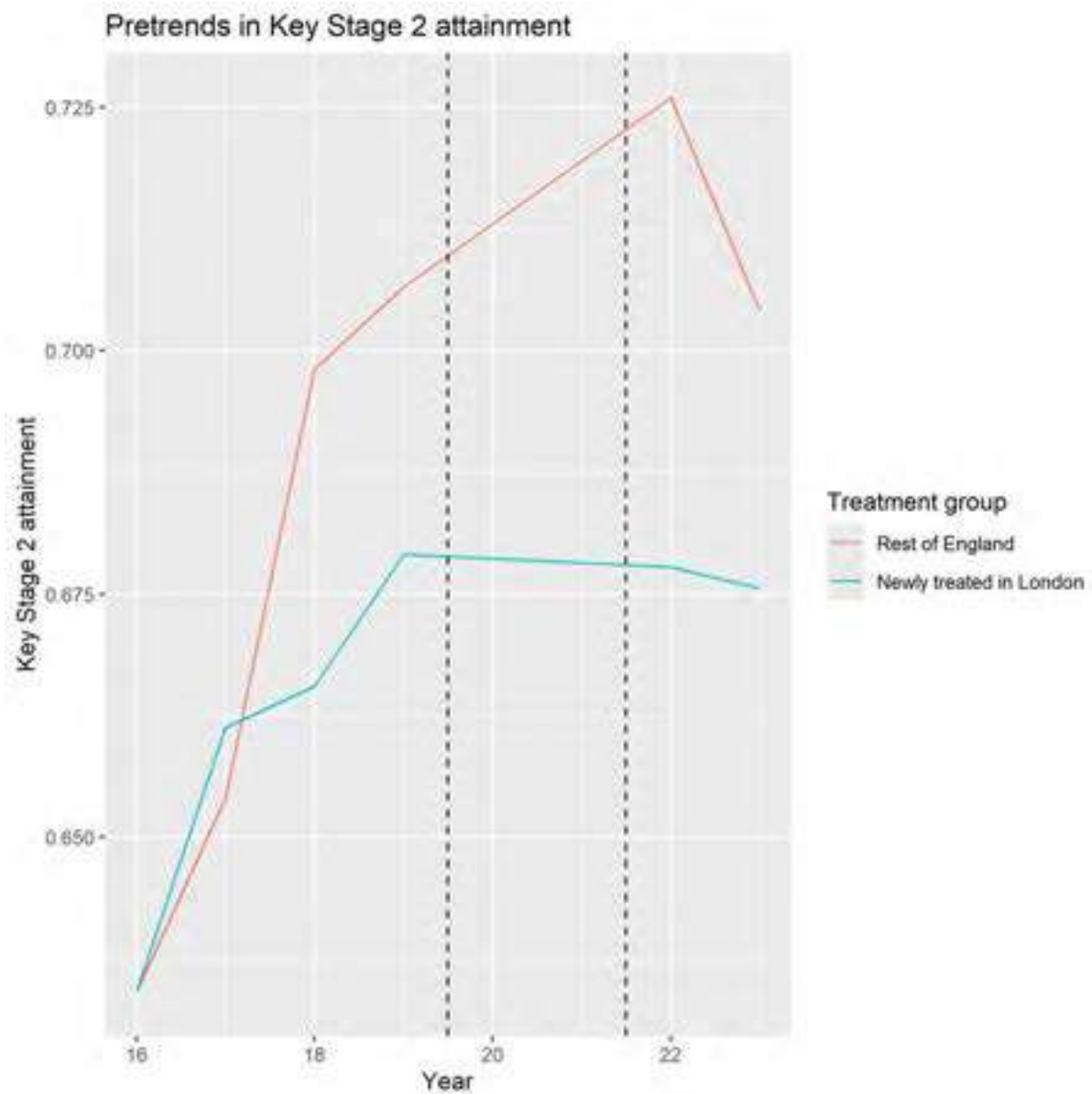
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 51 Counts.csv.

Figure 52. Raw pre-trends in secondary outcome for triple difference



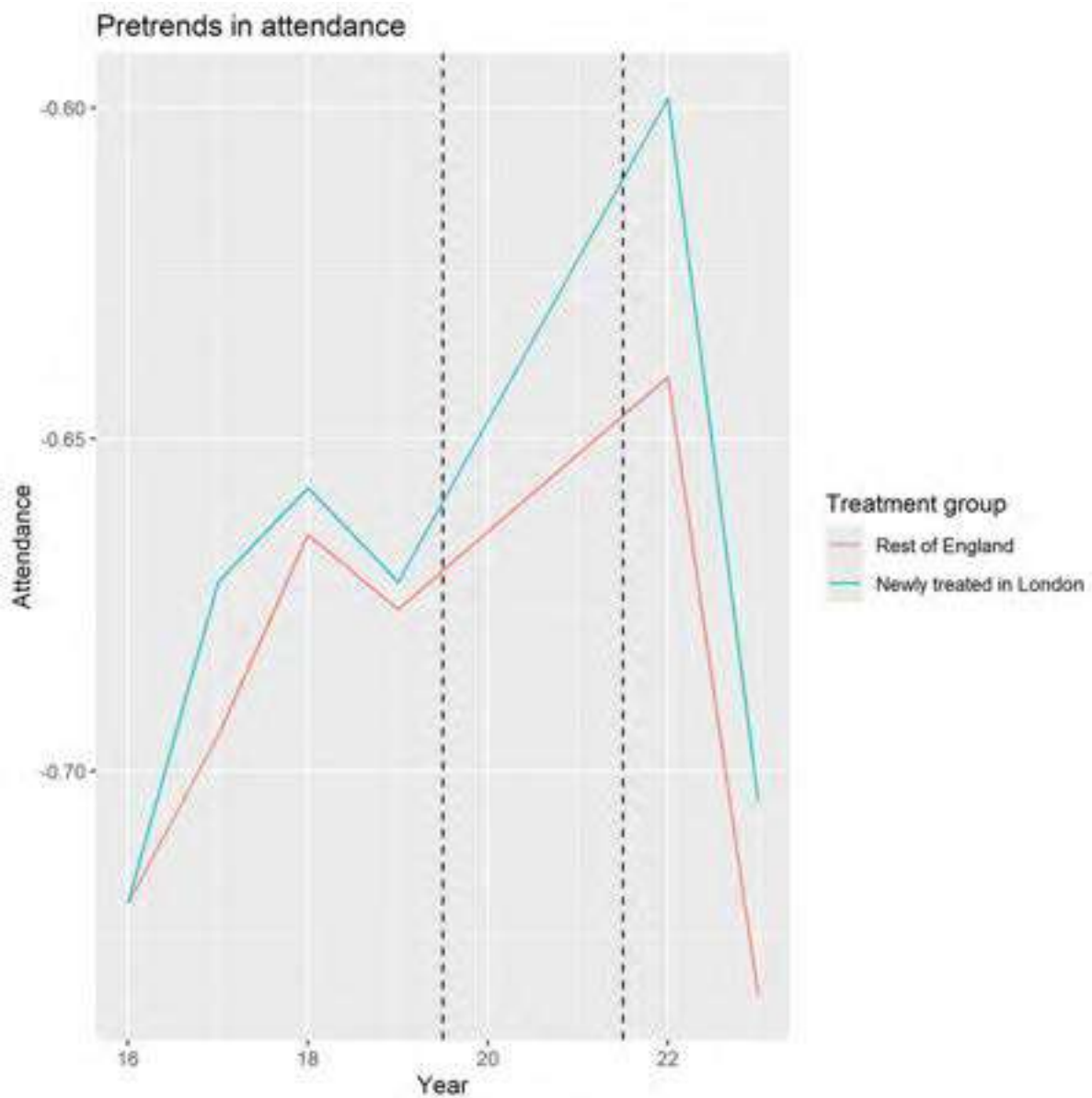
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 52 Counts.csv.

Figure 53. Conditional primary outcome pre-trends for difference-in-differences



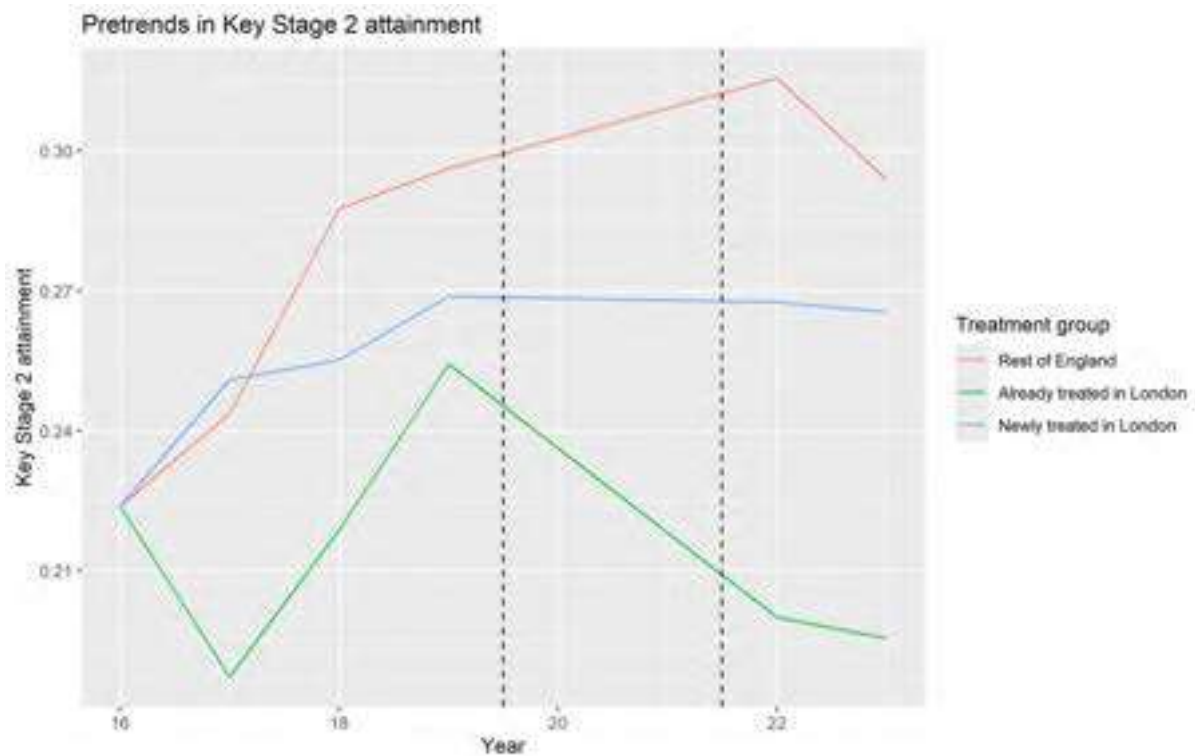
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 53 Model.docx.

Figure 54. Conditional secondary outcome pre-trends for difference-in-differences



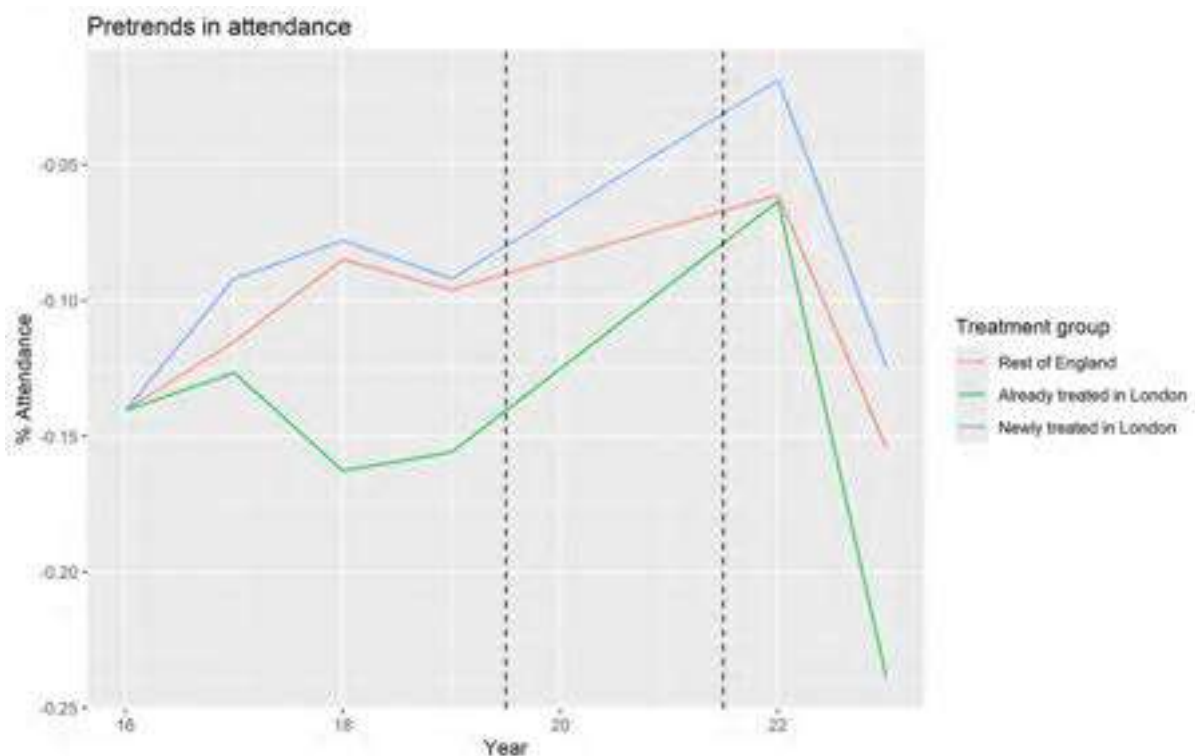
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 54 Model.docx

Figure 55. Conditional primary outcome pre-trends for triple differences



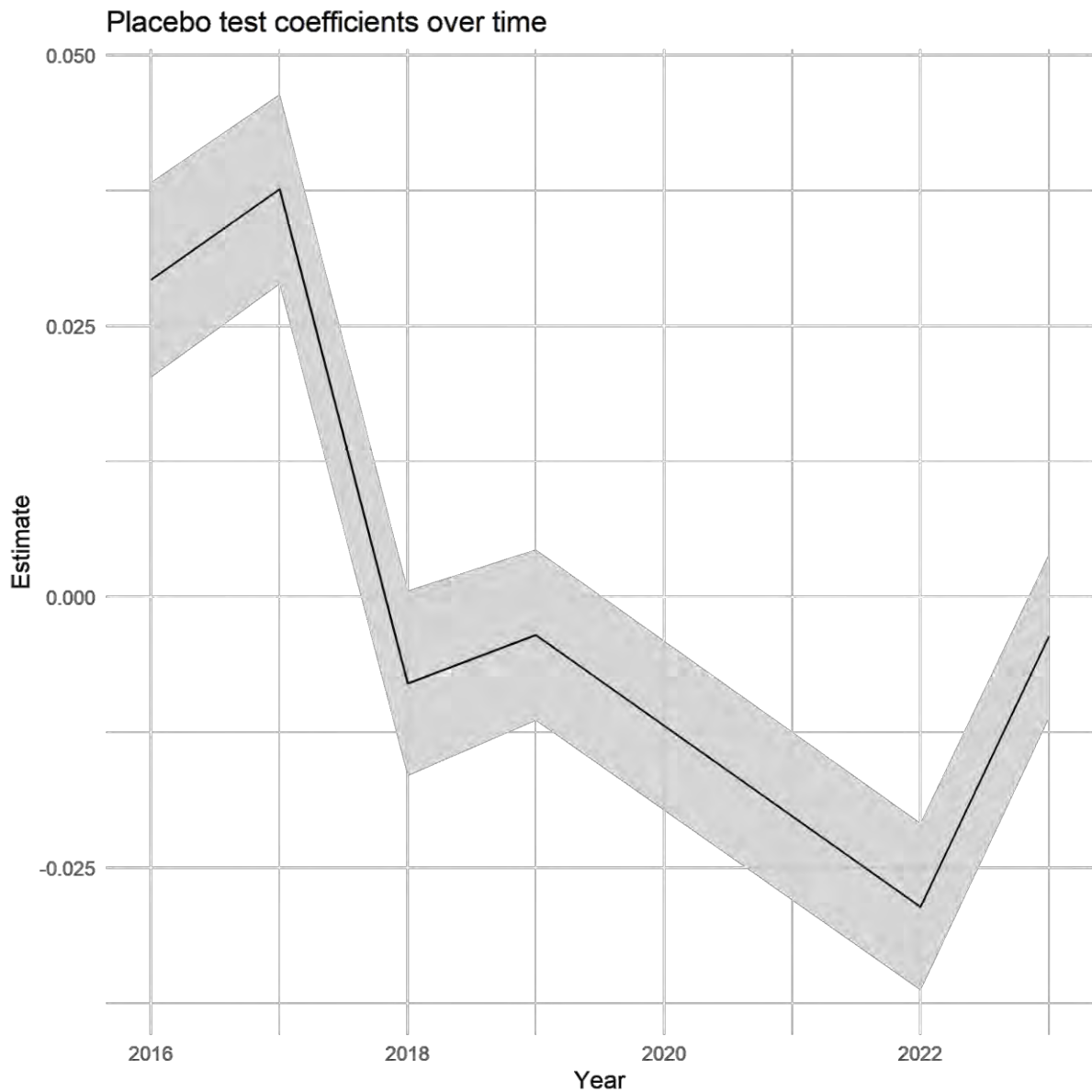
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 55 Model.docx

Figure 56. Conditional pre-trends for secondary outcome for triple difference



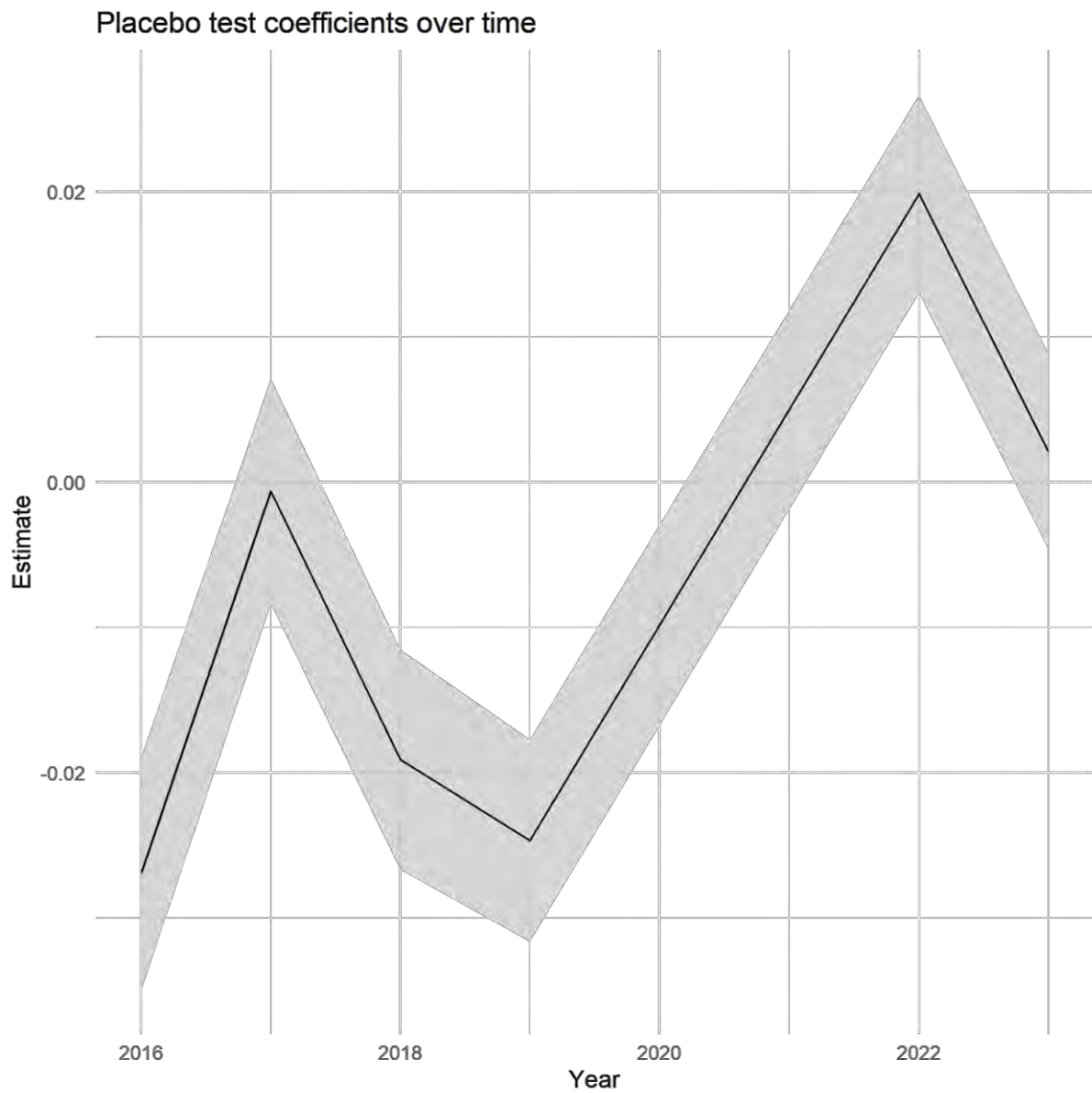
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 56 Model.docx

Figure 57. Placebo test estimates for primary outcome for difference in differences



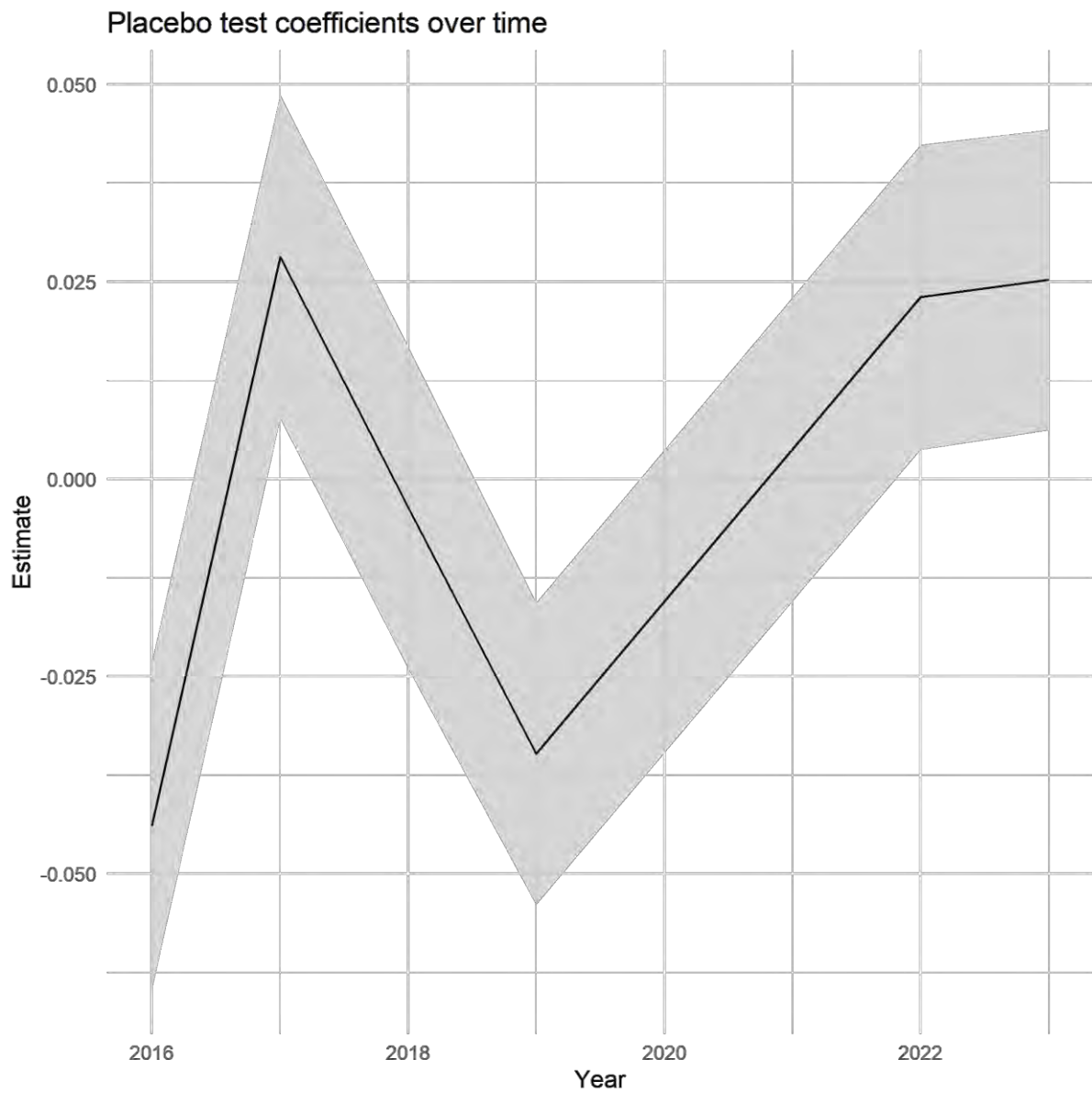
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 57 Models.csv

Figure 58. Placebo test estimates for secondary outcome for difference in differences



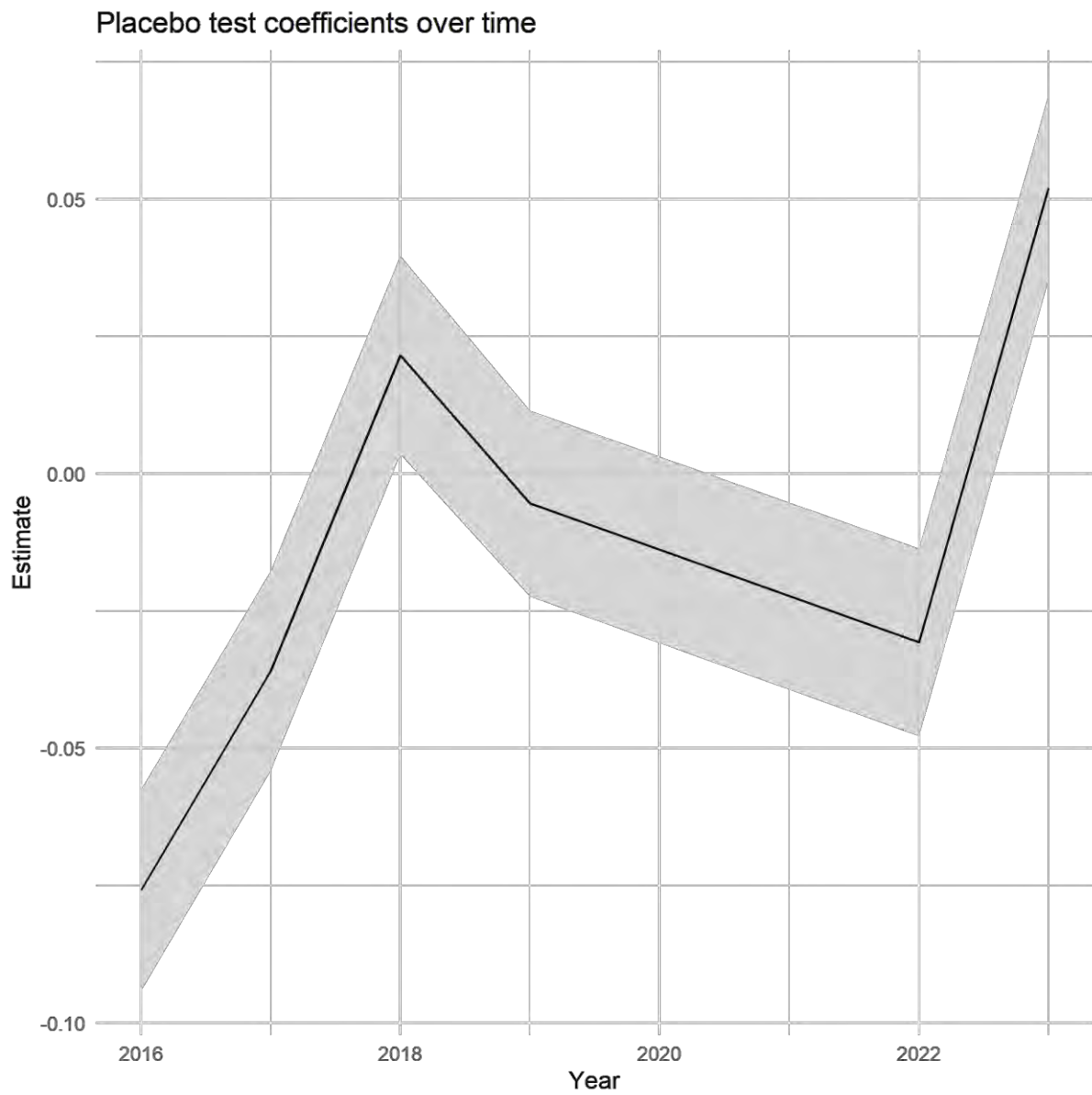
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 58 Models.csv

Figure 59. Placebo test estimates for primary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 59 Models.csv

Figure 60. Placebo test estimates for secondary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 60 Models.csv

## Appendix 5. Heterogeneity for White pupils

Table 32. Difference in differences estimates for primary outcome

---

Treatment estimate	-0.001 [-0.018, 0.016]
Num.Obs.	3056559
R2	0.403
R2 Adj.	0.400
R2 Within	0.331
R2 Within Adj.	0.331
AIC	7068176.0
BIC	7291758.2
RMSE	0.76
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	3056523

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 33. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.017 [0.006, 0.028]
Num.Obs.	3053233
R2	0.067
R2 Adj.	0.062
R2 Within	0.028
R2 Within Adj.	0.028
AIC	7405139.1
BIC	7628663.7
RMSE	0.81
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	3053197

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 34. Triple difference estimates for primary outcome

Treatment estimate	0.044 [-0.041, 0.129]
Num.Obs.	3065378
R2	0.403
R2 Adj.	0.400
R2 Within	0.331
R2 Within Adj.	0.331
AIC	7089401.2
BIC	7314896.0
RMSE	0.76
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	3065341

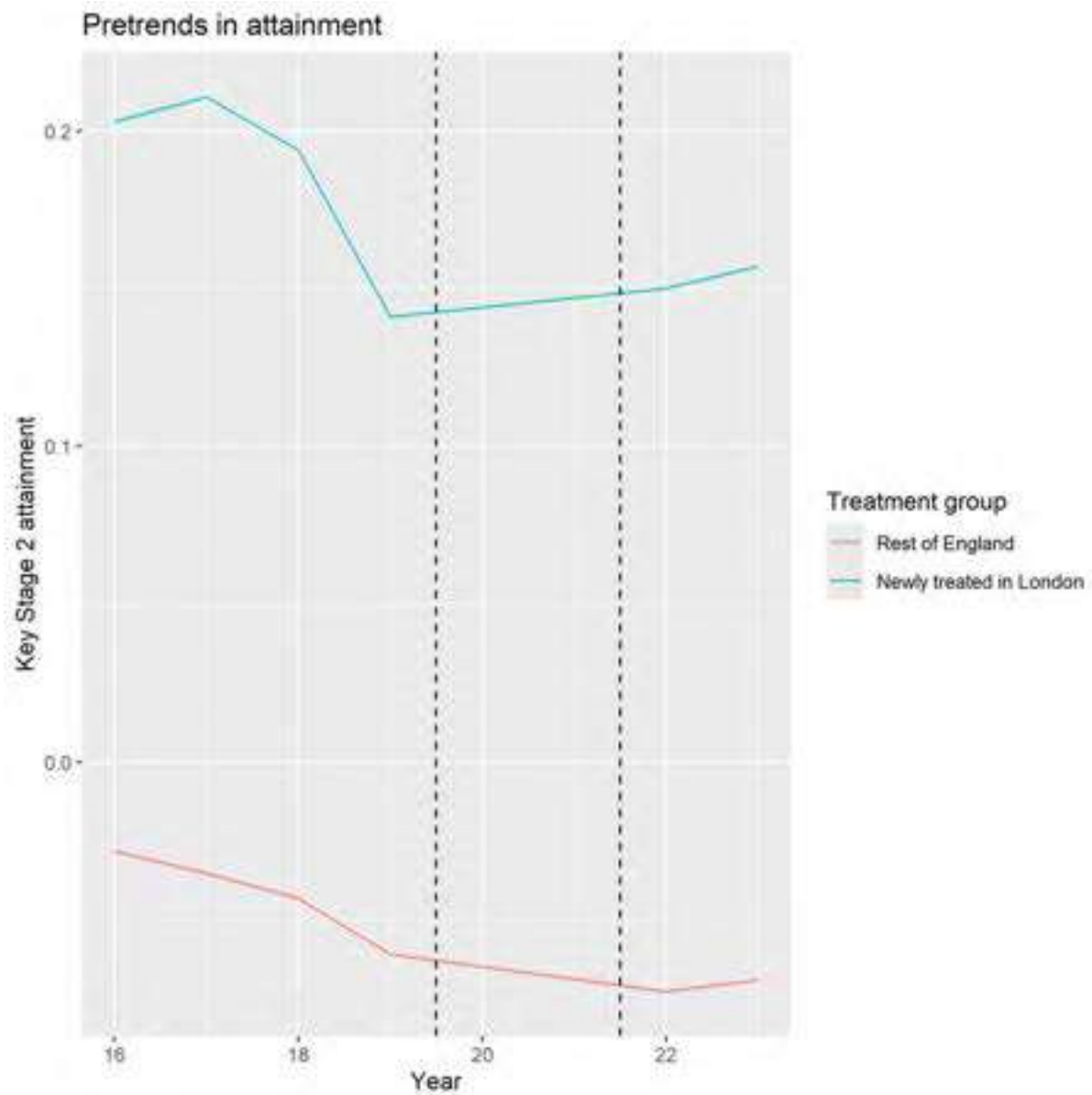
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 35. Triple difference estimates for secondary outcome

Treatment estimate	0.016 [-0.036, 0.067]
Num.Obs.	3062043
R2	0.067
R2 Adj.	0.062
R2 Within	0.028
R2 Within Adj.	0.028
AIC	7427251.7
BIC	7652688.7
RMSE	0.81
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	3062006

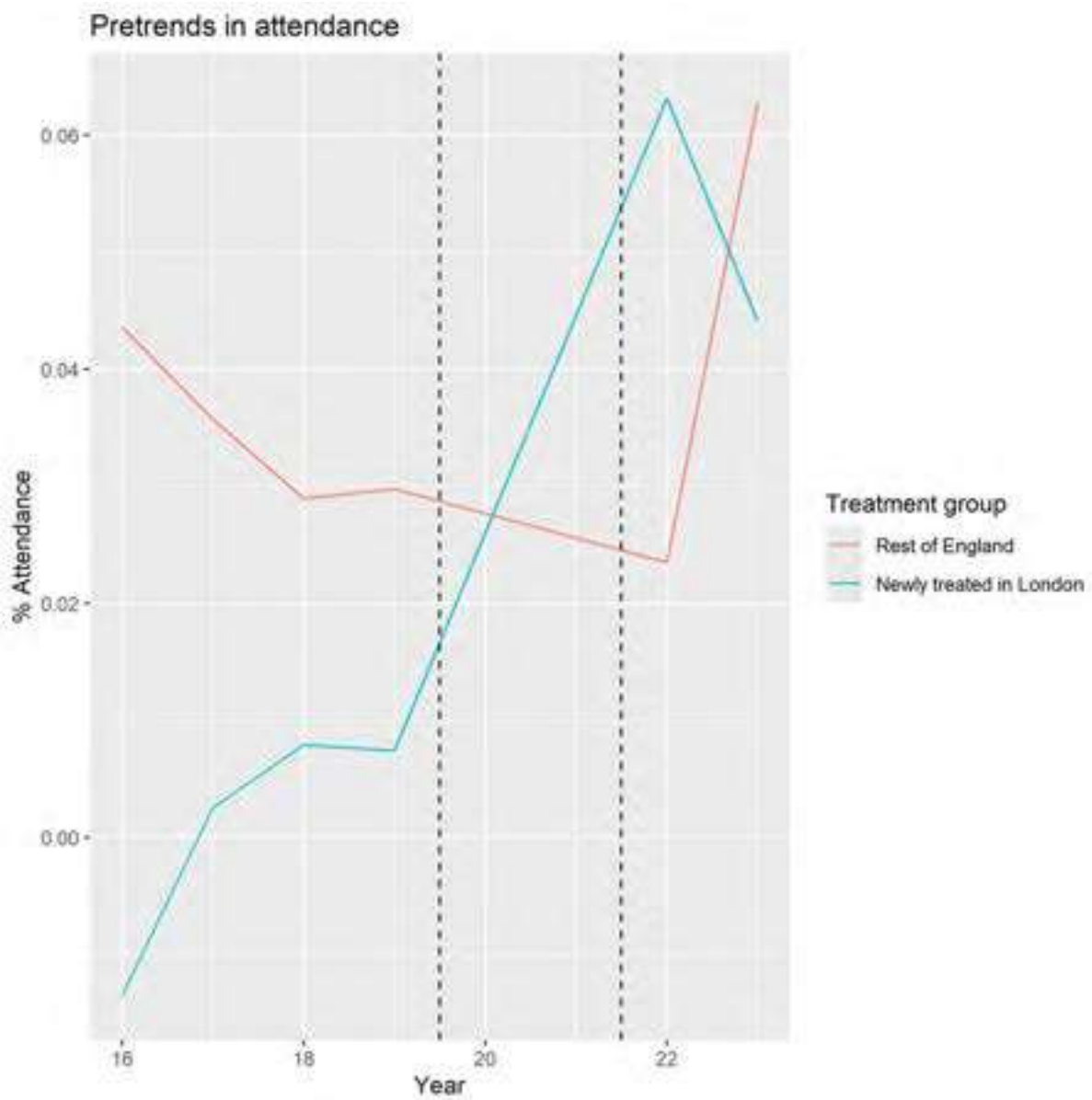
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 61. Raw pre-trends in primary outcome for difference-in-differences



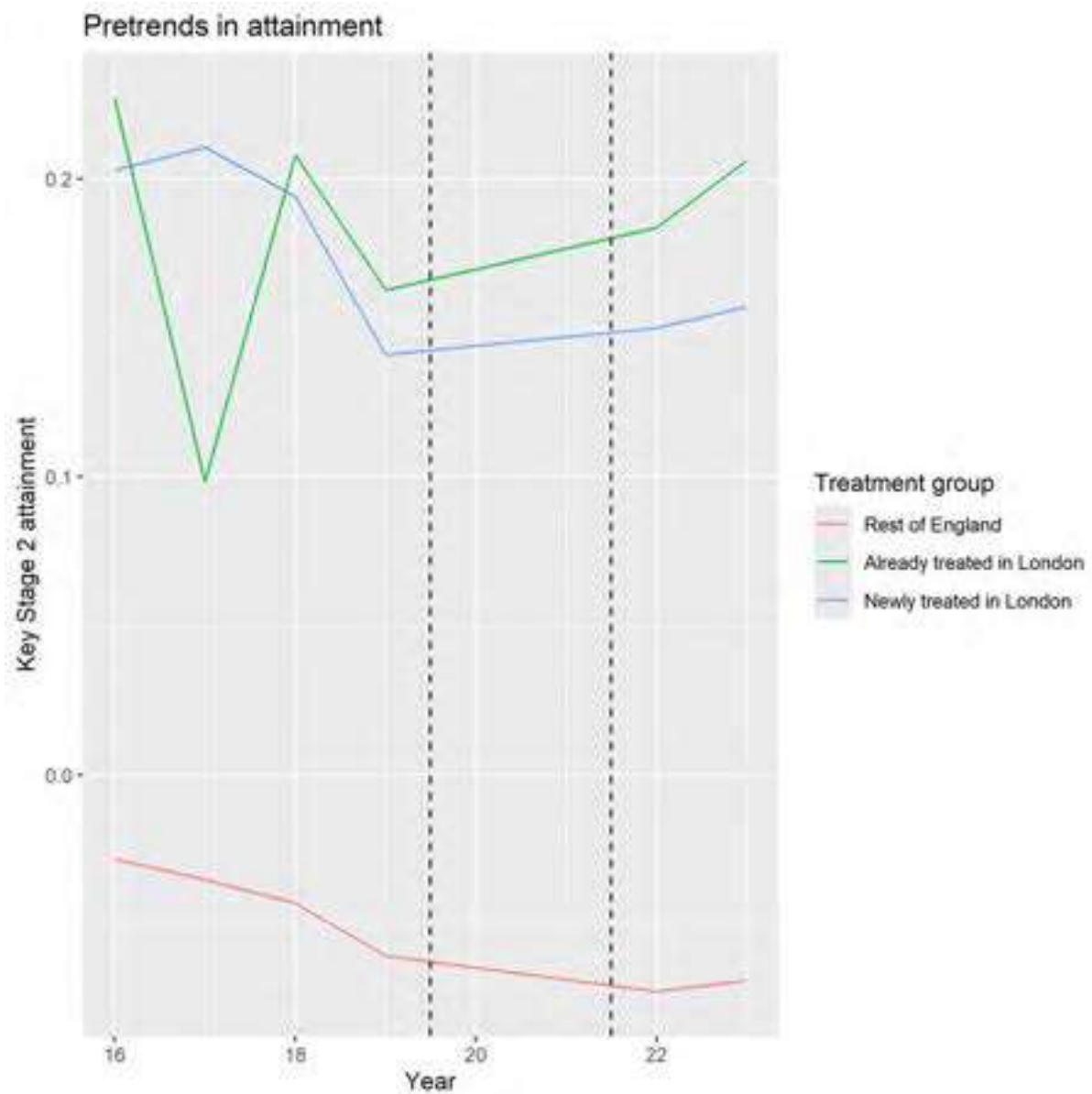
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 61 Counts.csv.

Figure 62. Raw pre-trends in secondary outcome for difference-in-differences



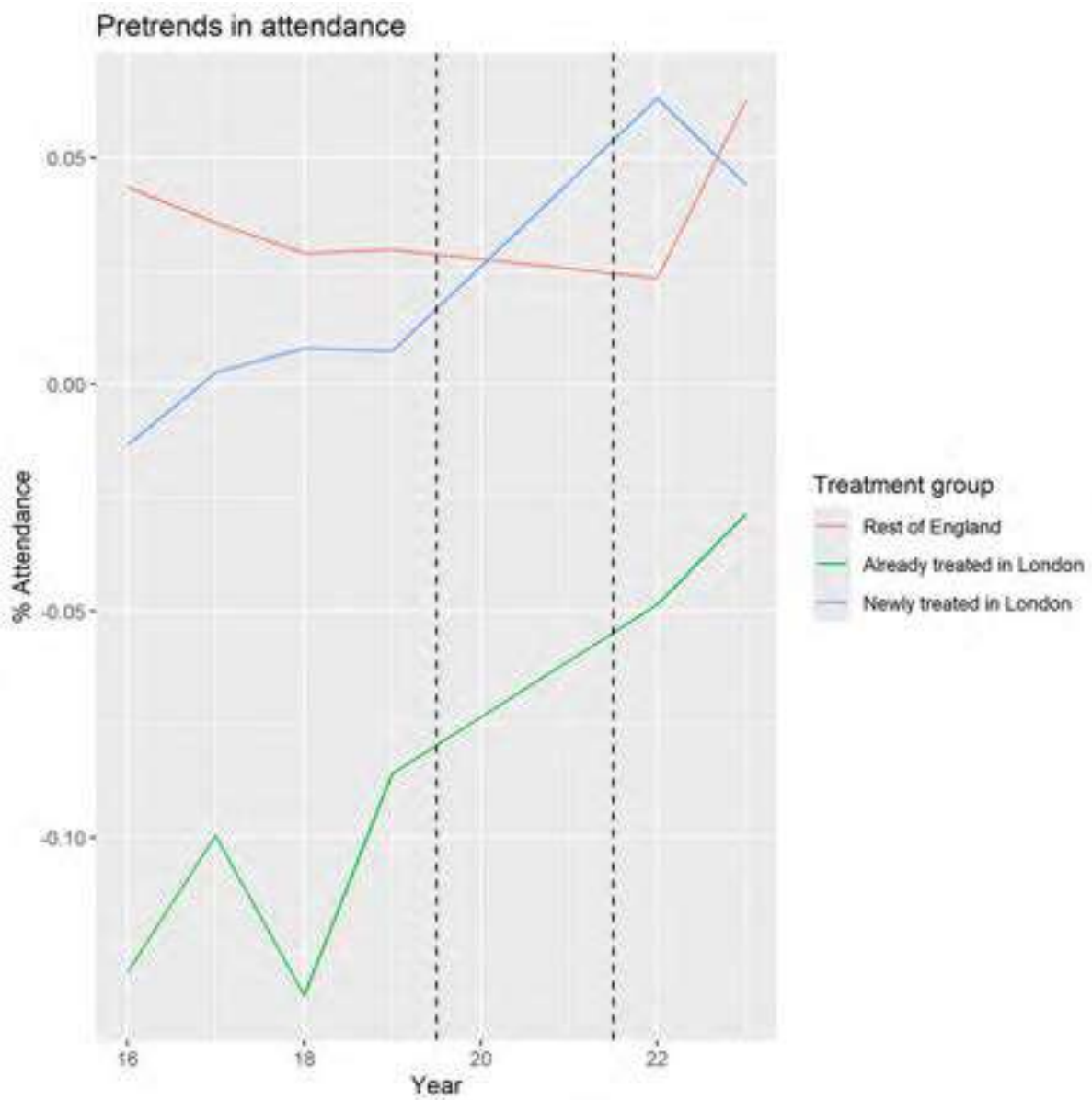
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 62 Counts.csv.

Figure 63. Raw pre-trends in primary outcome for triple difference



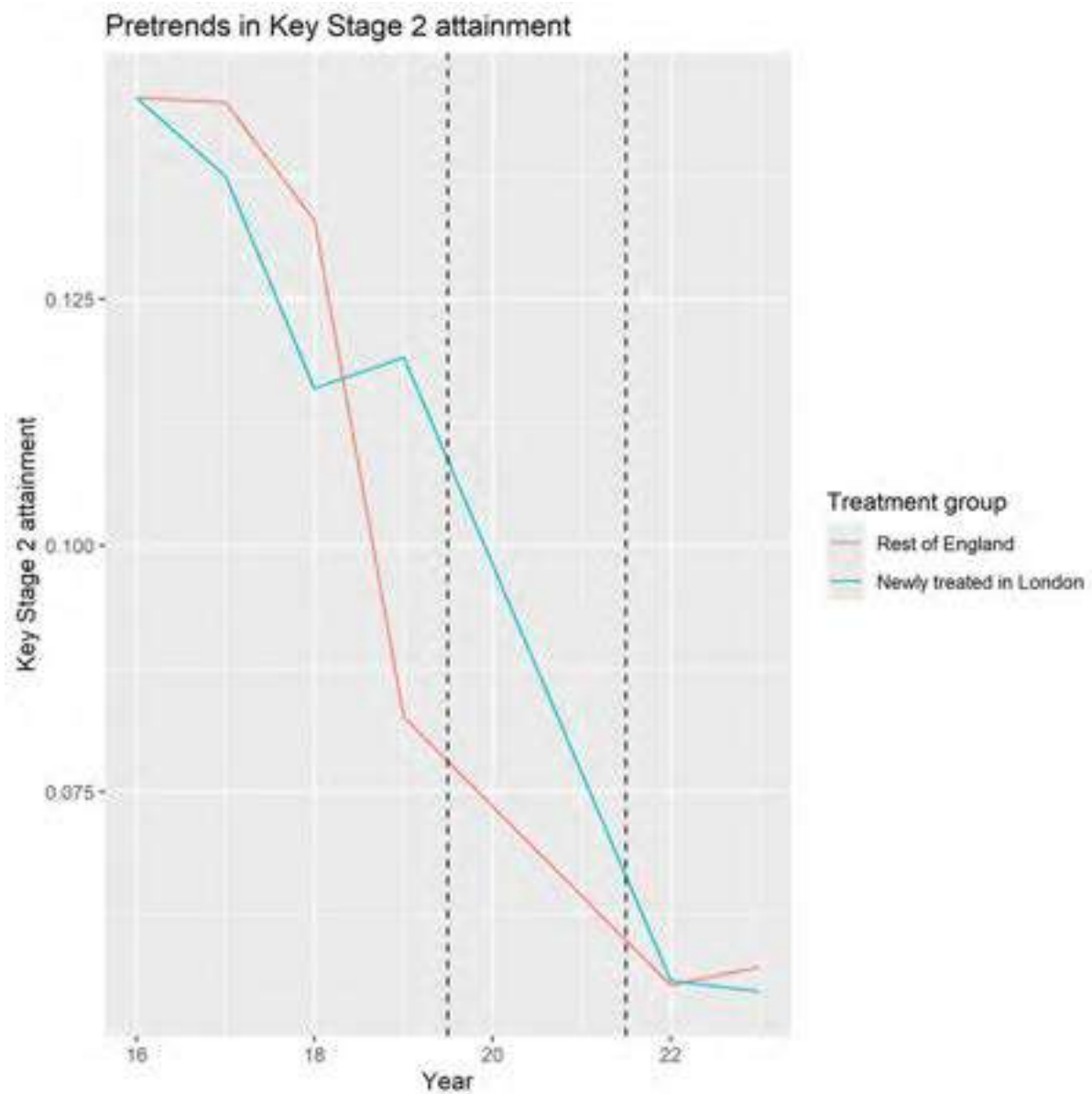
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 63 Counts.csv.

Figure 64. Raw pre-trends in secondary outcome for triple difference



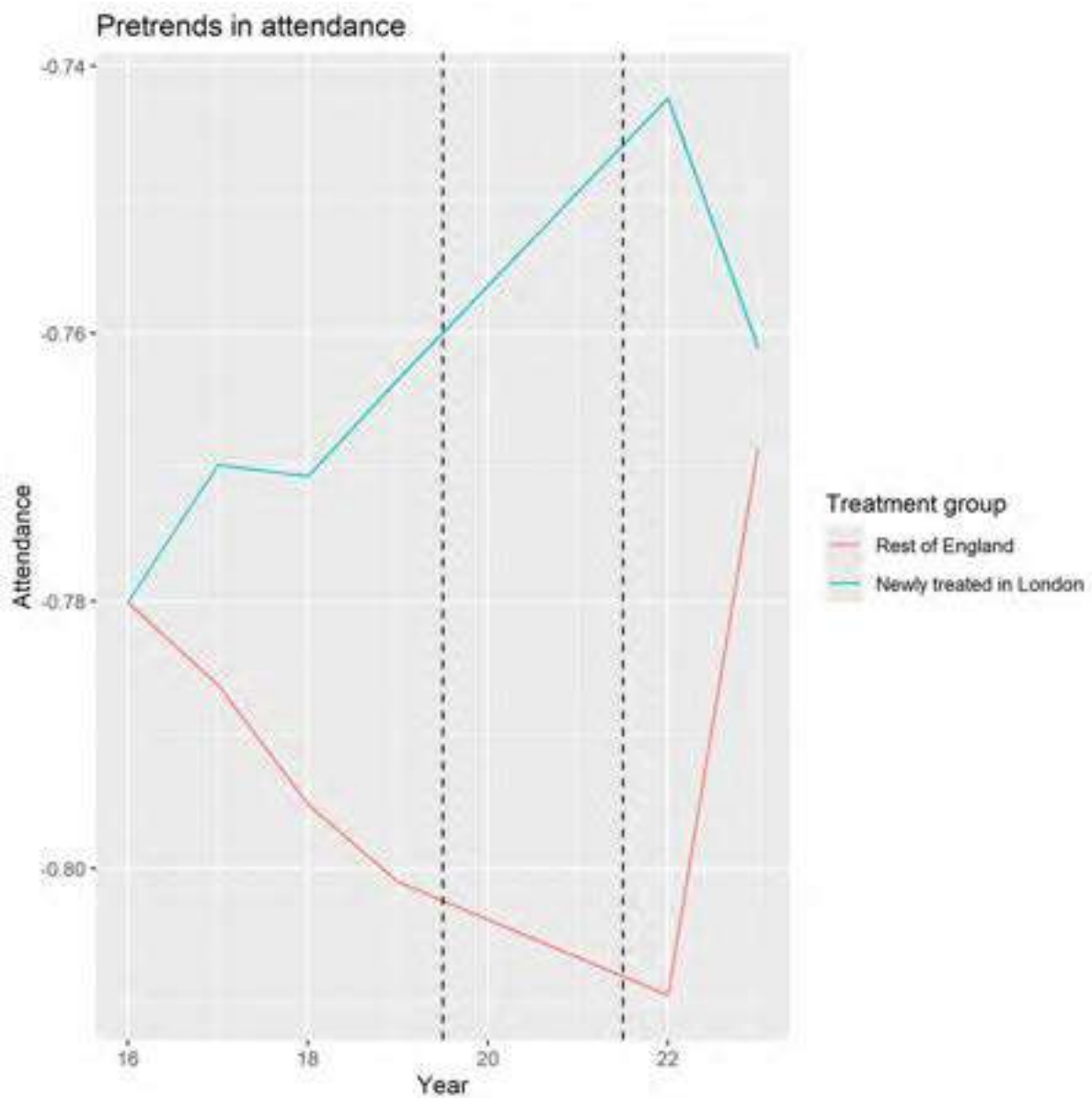
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 64 Counts.csv.

Figure 65. Conditional primary outcome pre-trends for difference-in-differences



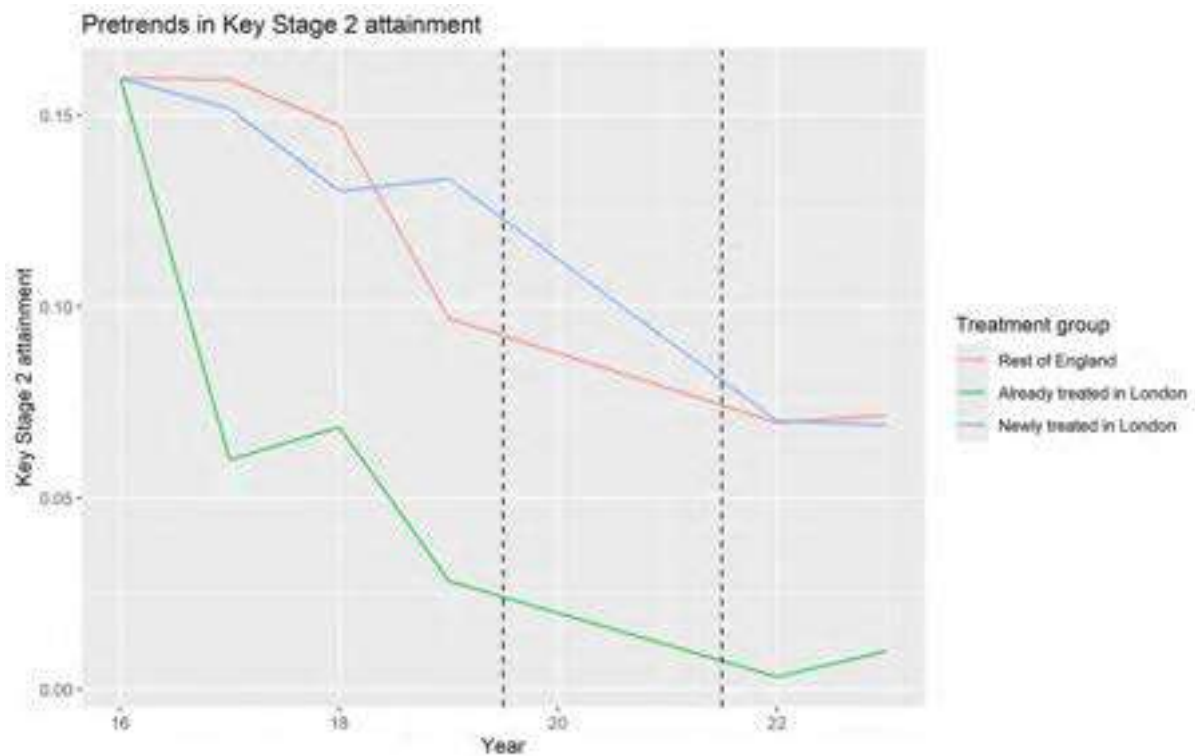
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 65 Model.docx.

Figure 66. Conditional secondary outcome pre-trends for difference-in-differences



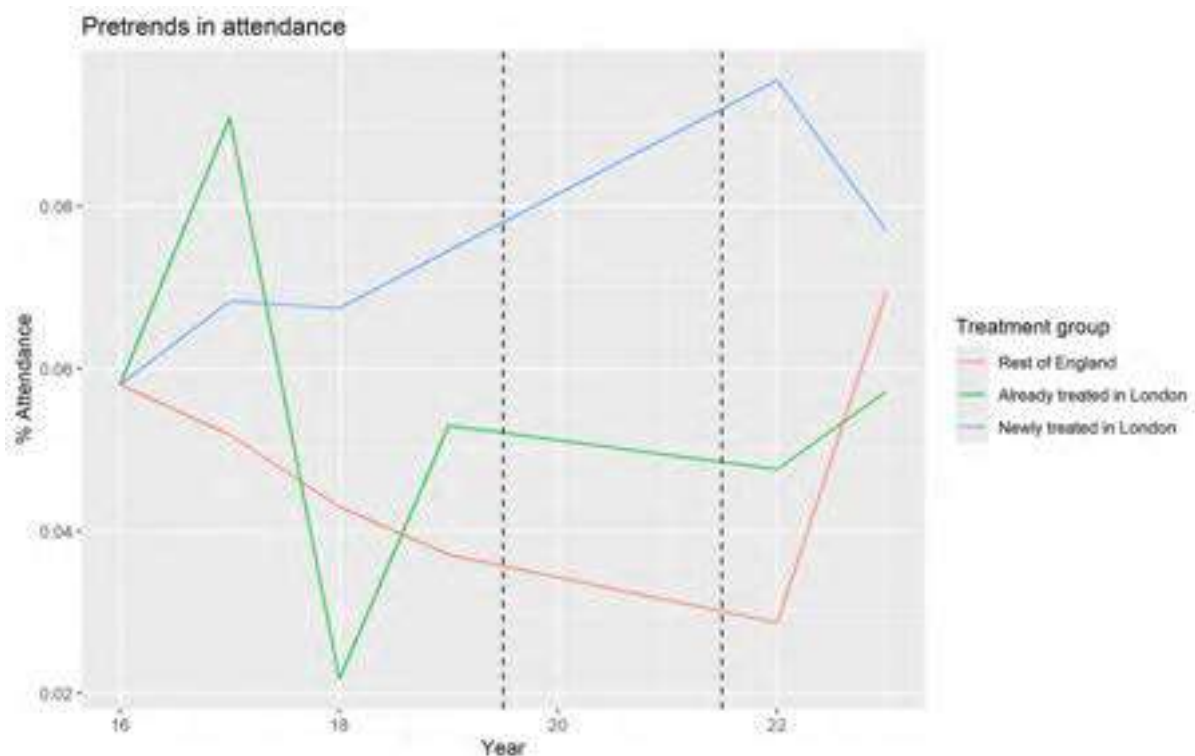
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 66 Model.docx

Figure 67. Conditional primary outcome pre-trends for triple differences



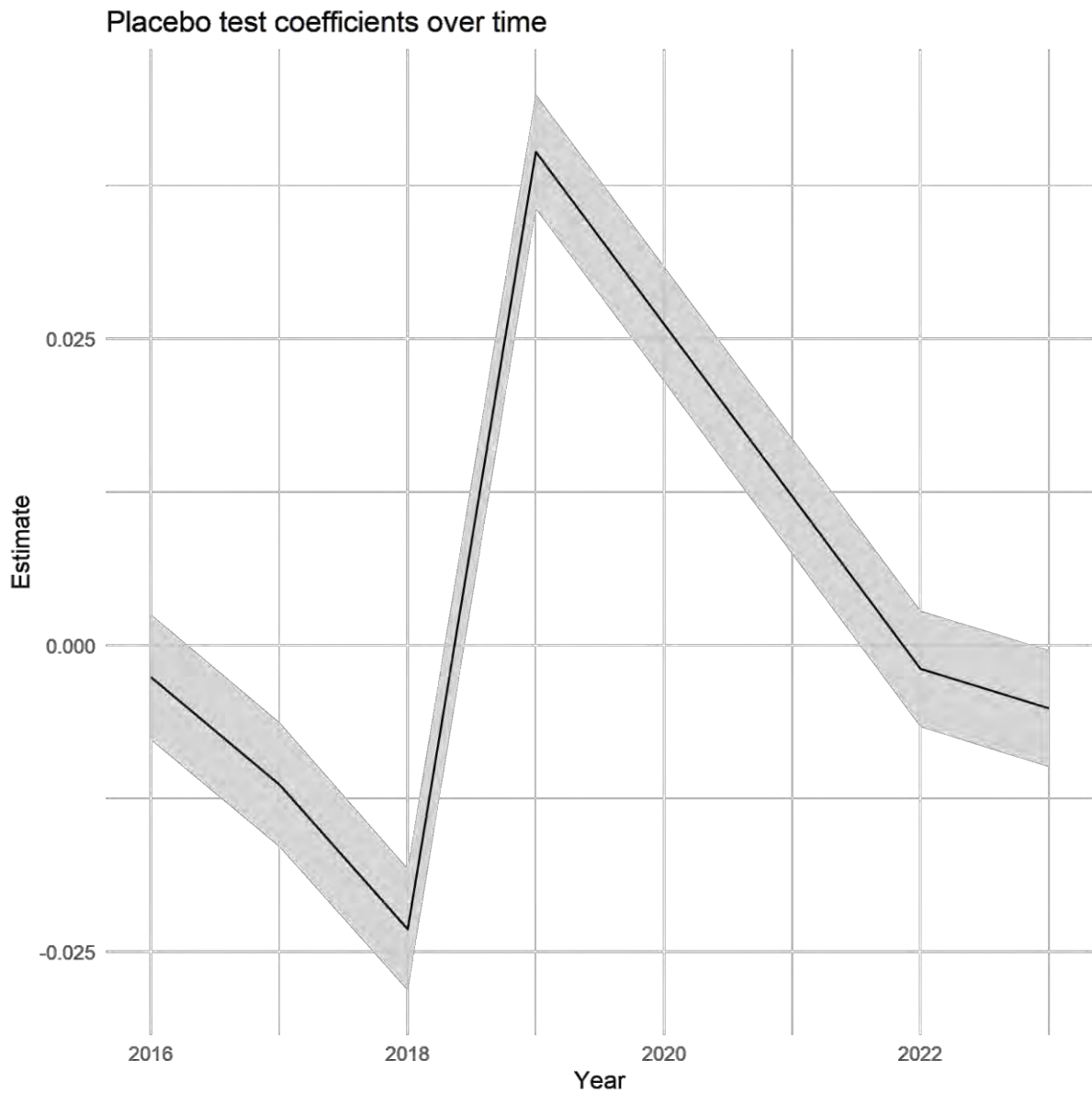
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 67 Model.docx

Figure 68. Conditional pre-trends for secondary outcome for triple difference



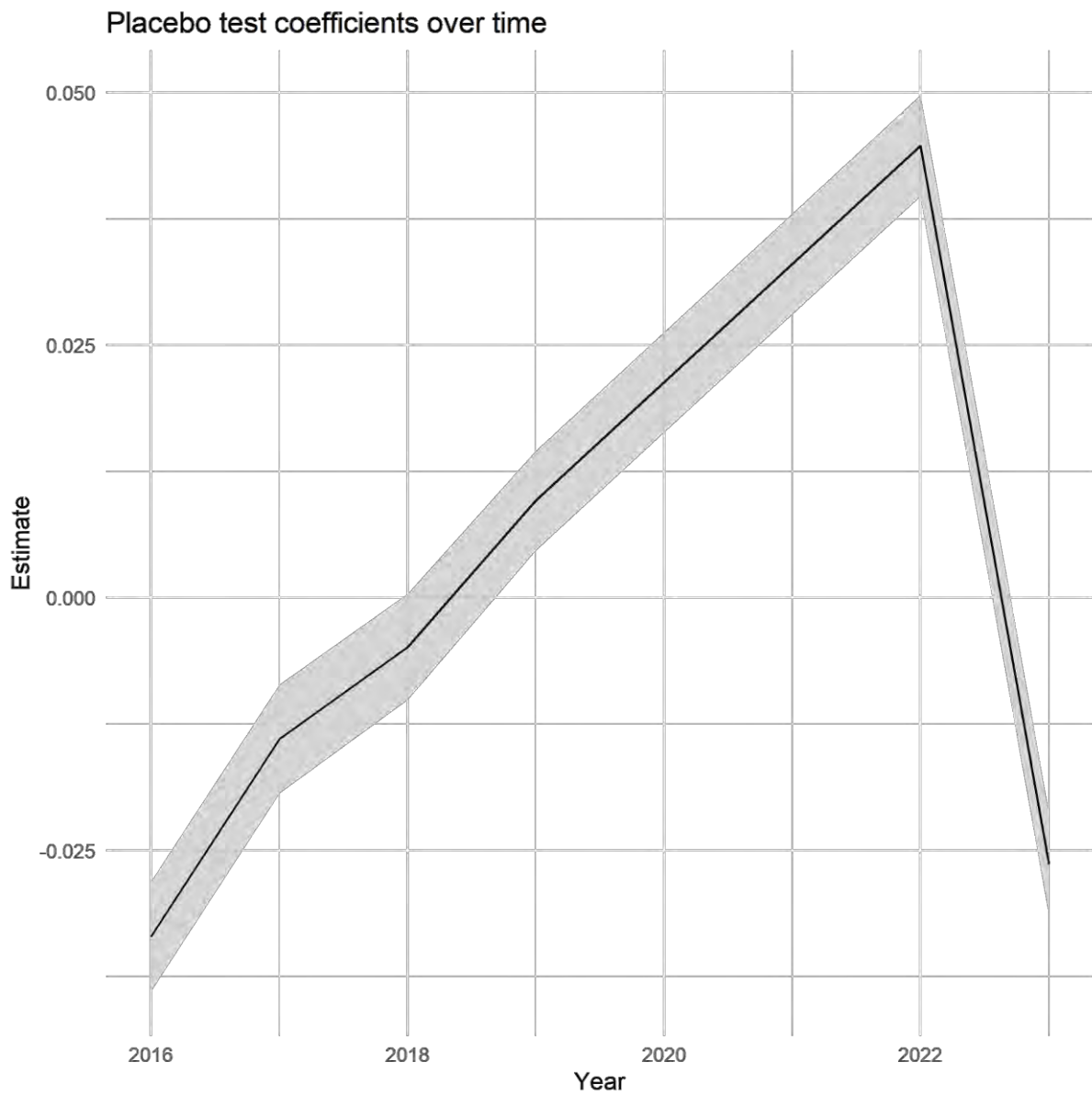
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 68 Model.docx

Figure 69. Placebo test estimates for primary outcome for difference in differences



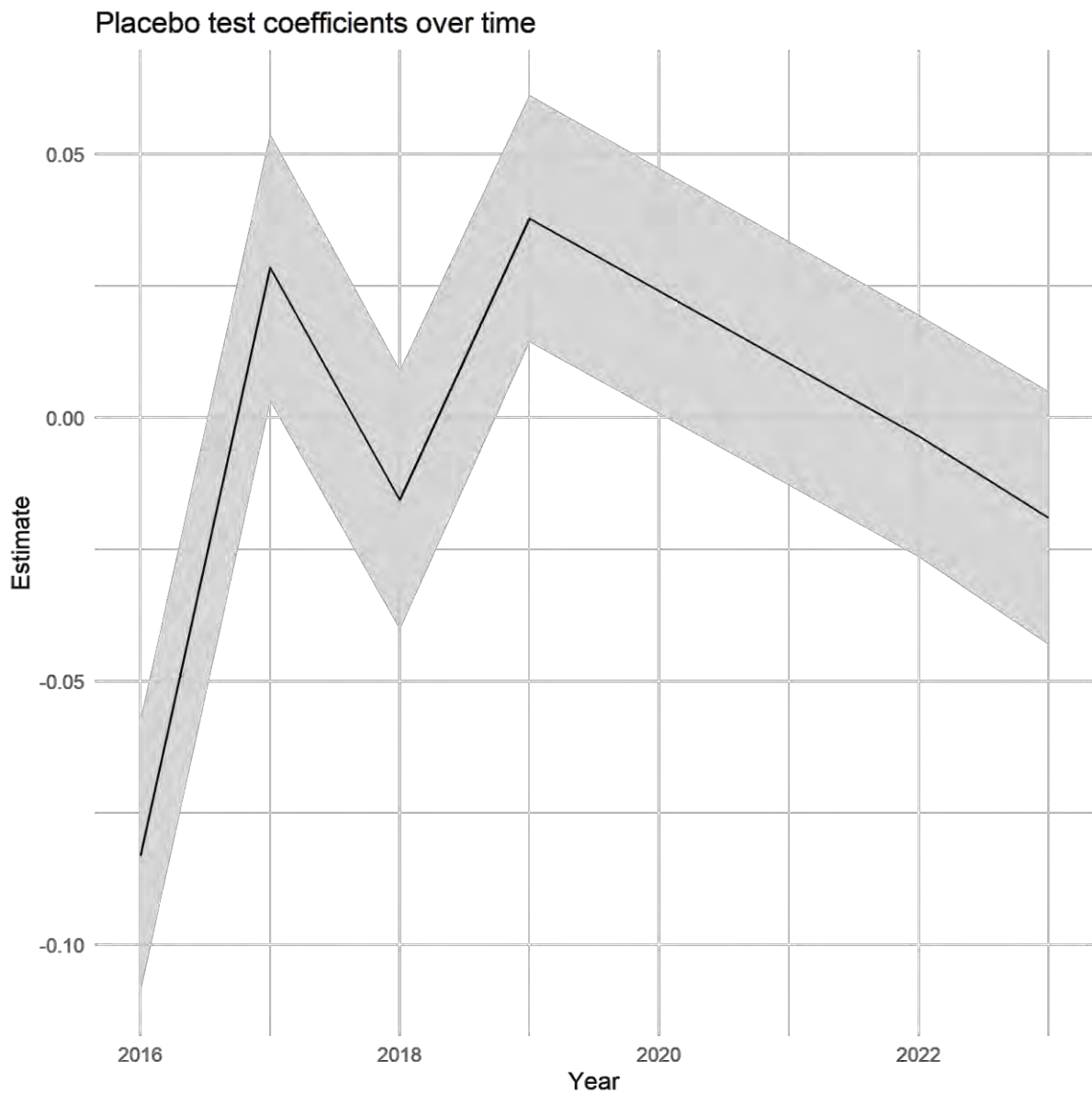
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 69 Models.csv

Figure 70. Placebo test estimates for secondary outcome for difference in differences



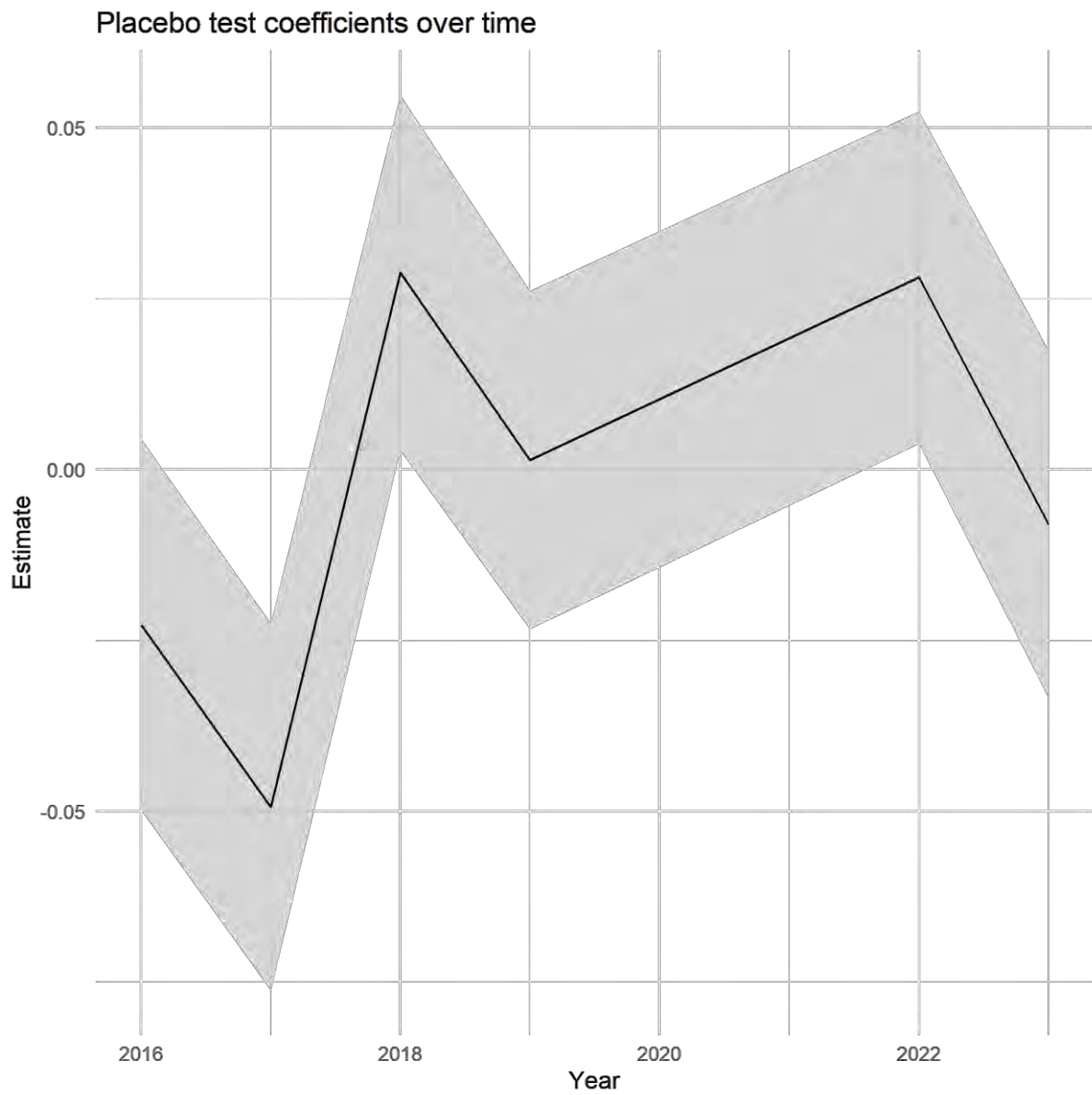
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 70 Models.csv

Figure 71. Placebo test estimates for primary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 71 Models.csv

Figure 72. Placebo test estimates for secondary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 72 Models.csv

## Appendix 6. Heterogeneity for Other ethnicity pupils

Table 36. Difference in differences estimates for primary outcome

---

Treatment estimate	-0.013 [-0.035, 0.009]
Num.Obs.	344417
R2	0.389
R2 Adj.	0.359
R2 Within	0.281
R2 Within Adj.	0.281
AIC	848493.0
BIC	1022013.2
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	344380

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 37. Difference in differences estimates for secondary outcome

---

Treatment estimate	-0.006 [-0.023, 0.011]
Num.Obs.	343941
R2	0.106
R2 Adj.	0.062
R2 Within	0.023
R2 Within Adj.	0.023
AIC	881302.9
BIC	1054768.5
RMSE	0.83
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	343904

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 38. Triple difference estimates for primary outcome

Treatment estimate	-0.017 [-0.092, 0.058]
Num.Obs.	350838
R2	0.389
R2 Adj.	0.359
R2 Within	0.281
R2 Within Adj.	0.281
AIC	863955.2
BIC	1039334.9
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	350800

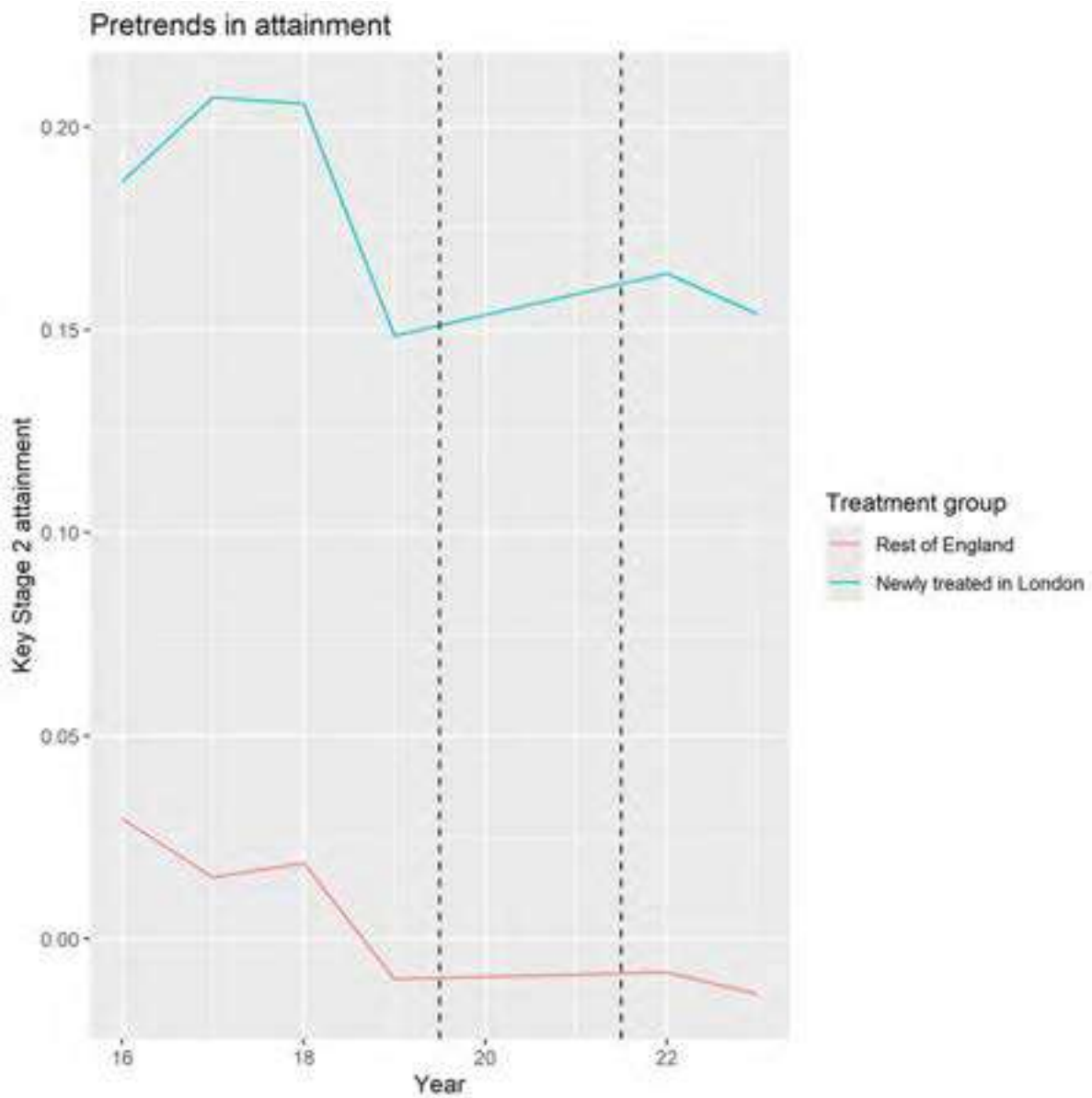
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 39. Triple difference estimates for secondary outcome

Treatment estimate	0.017 [-0.046, 0.080]
Num.Obs.	350354
R2	0.105
R2 Adj.	0.061
R2 Within	0.024
R2 Within Adj.	0.023
AIC	897506.5
BIC	1072831.5
RMSE	0.83
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	350316

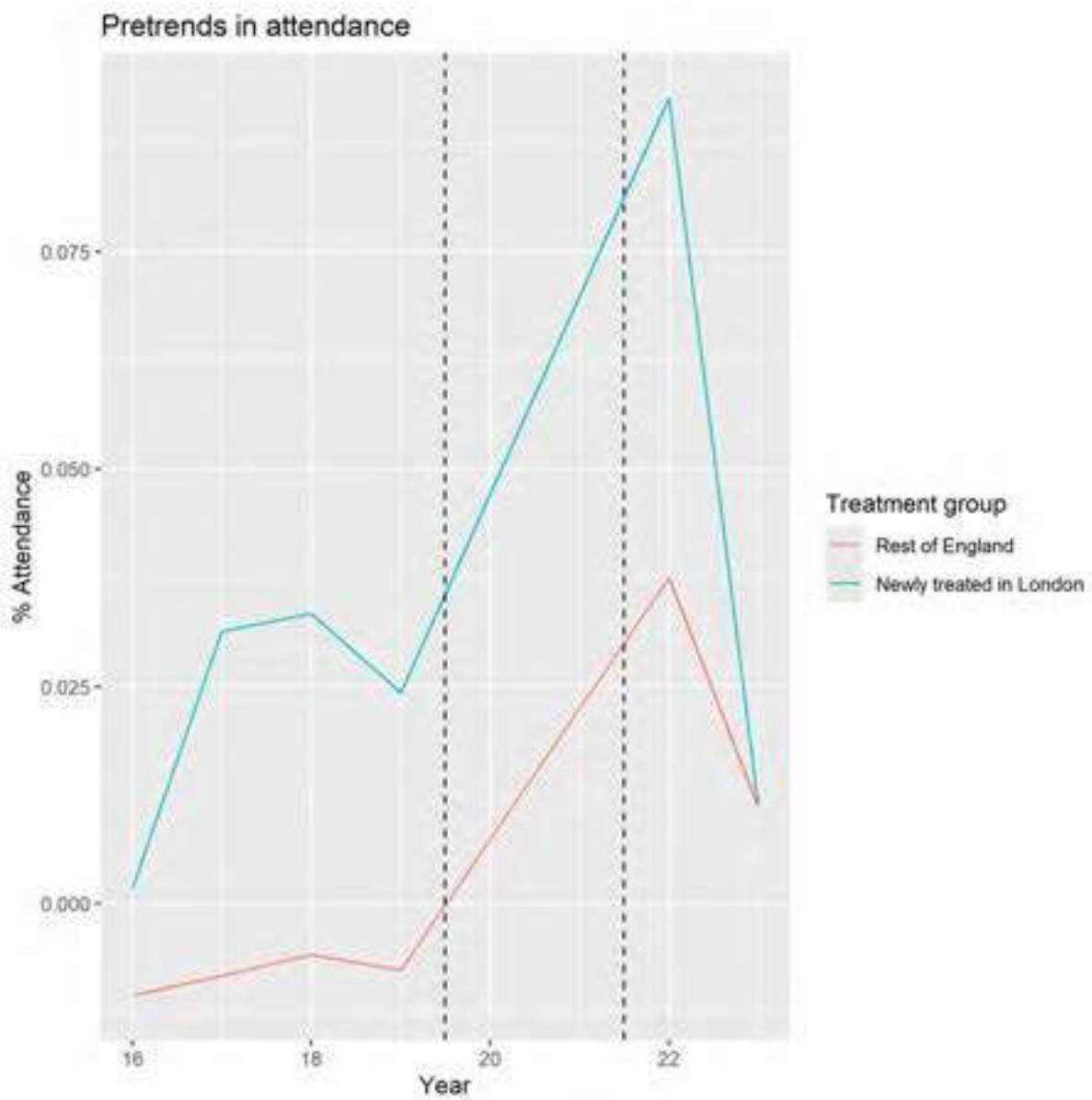
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 73. Raw pre-trends in primary outcome for difference-in-differences



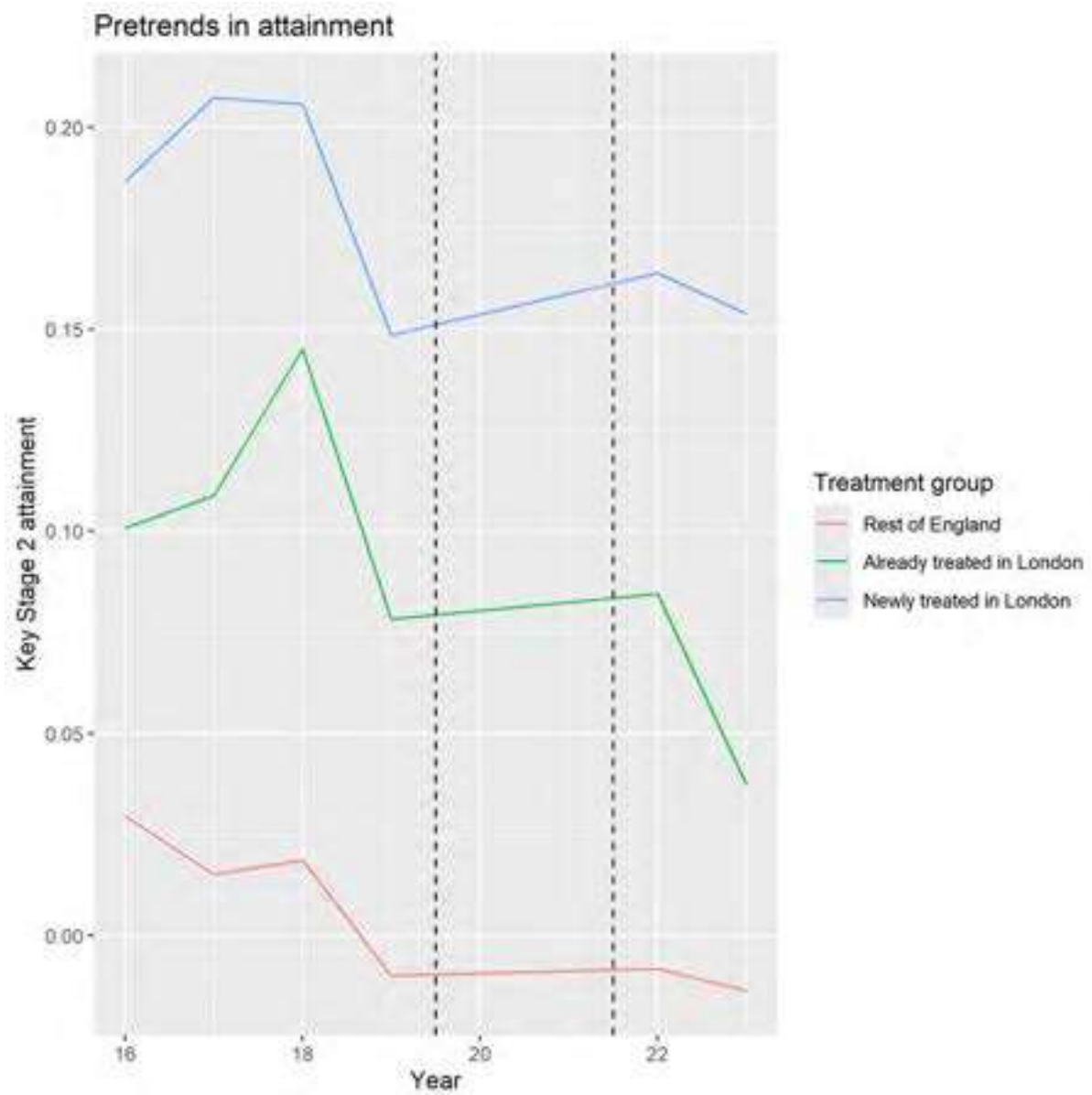
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 73 Counts.csv.

Figure 74. Raw pre-trends in secondary outcome for difference-in-differences



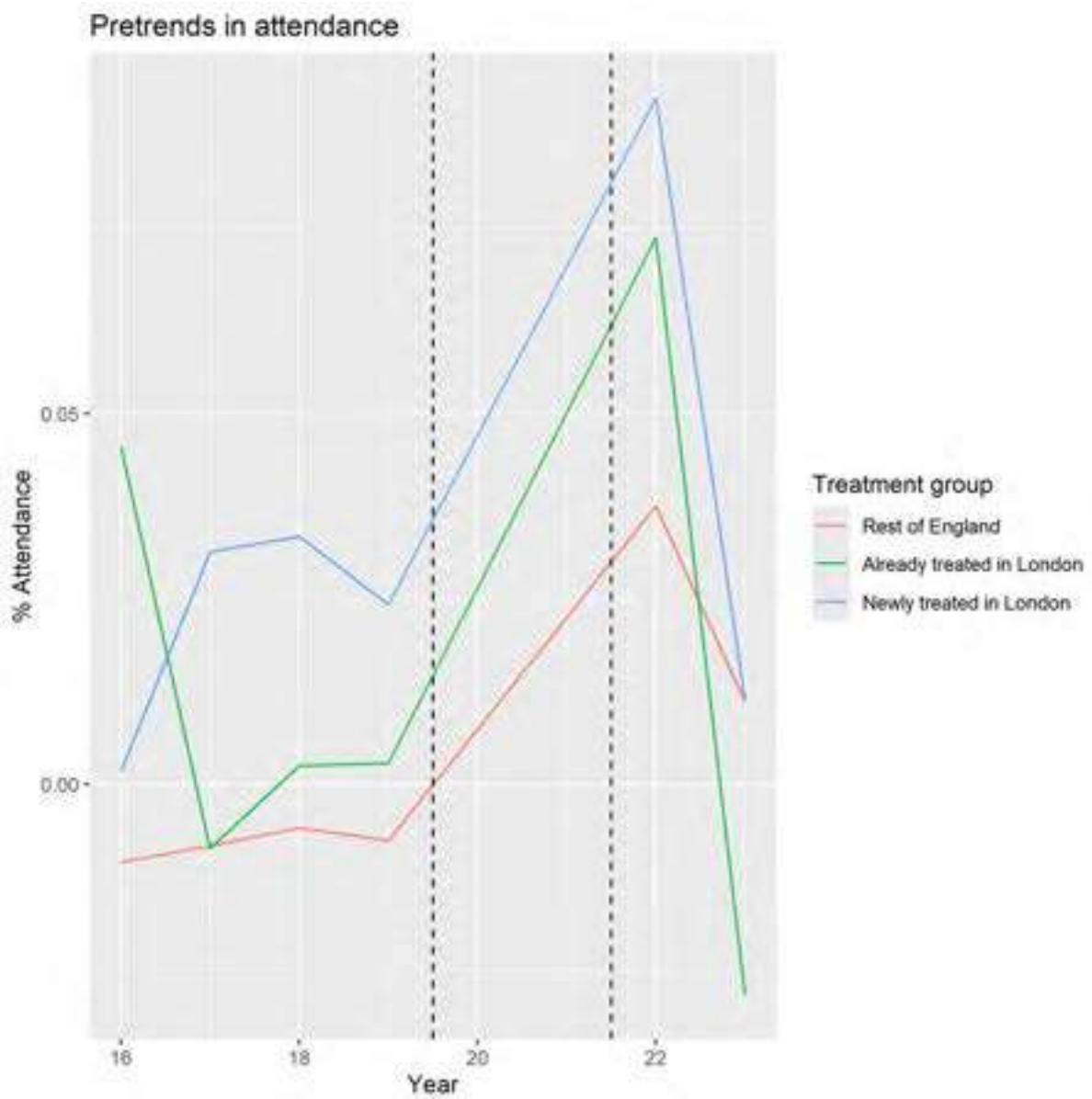
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 74 Counts.csv.

Figure 75. Raw pre-trends in primary outcome for triple difference



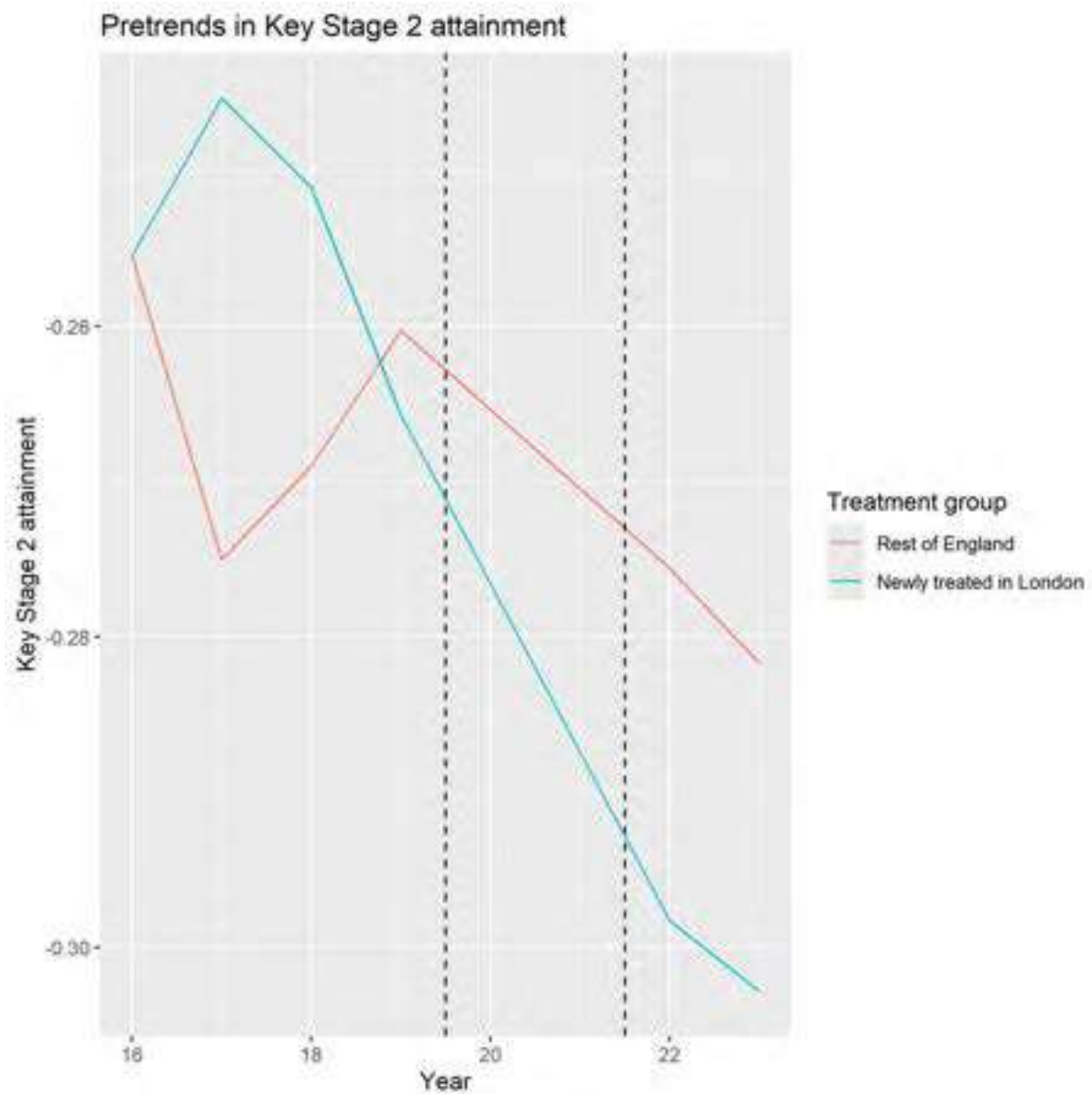
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 75 Counts.csv.

Figure 76. Raw pre-trends in secondary outcome for triple difference



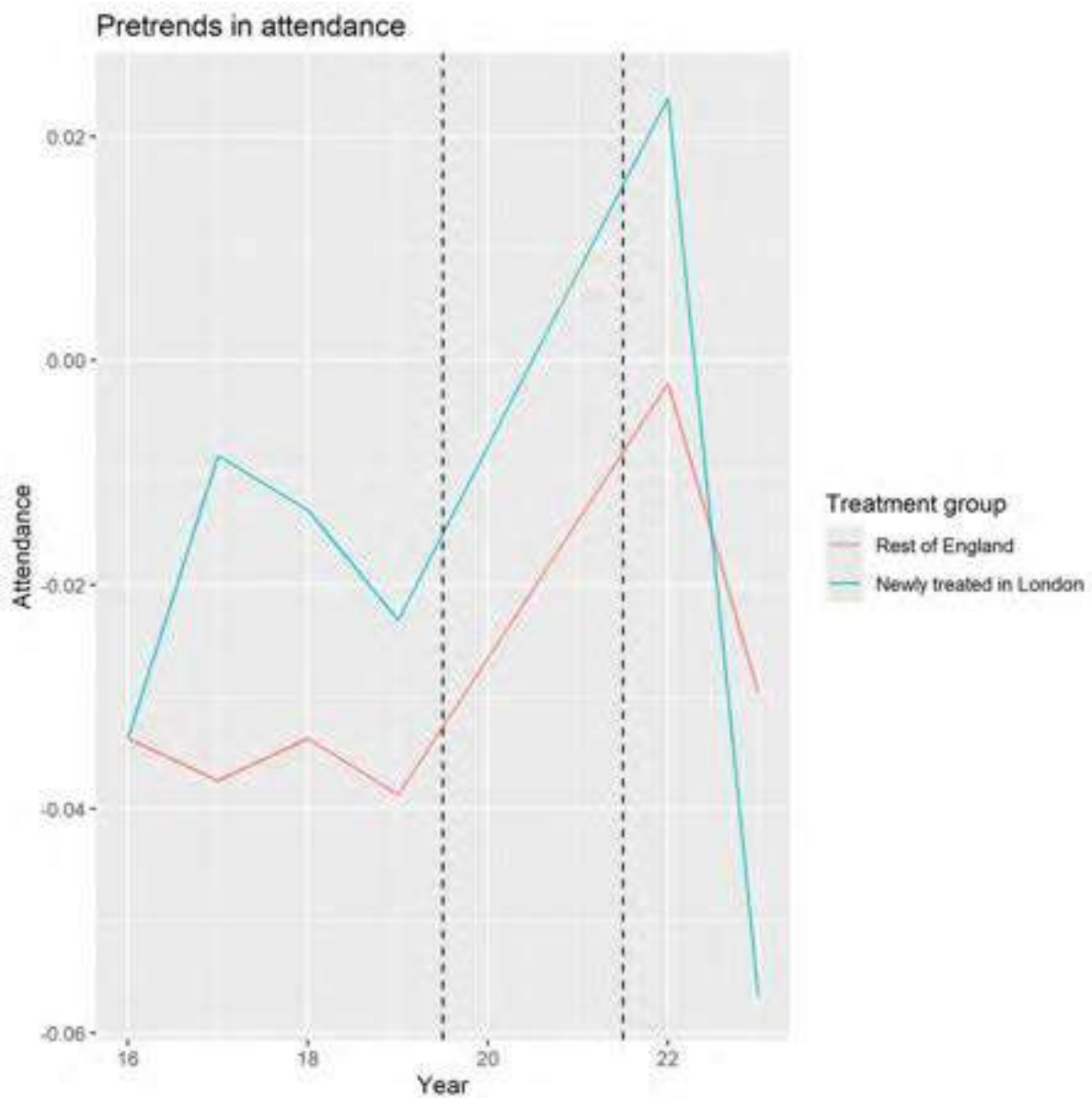
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 76 Counts.csv.

Figure 77. Conditional primary outcome pre-trends for difference-in-differences



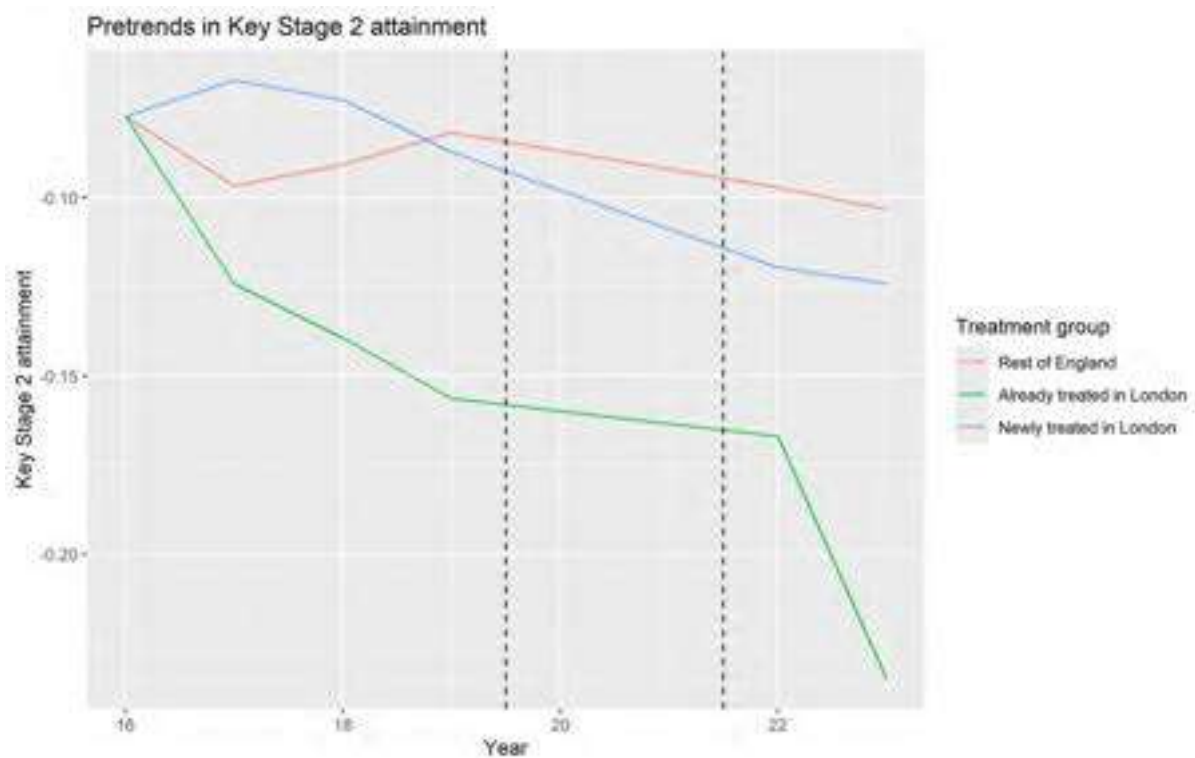
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 77 Model.docx.

Figure 78. Conditional secondary outcome pre-trends for difference-in-differences



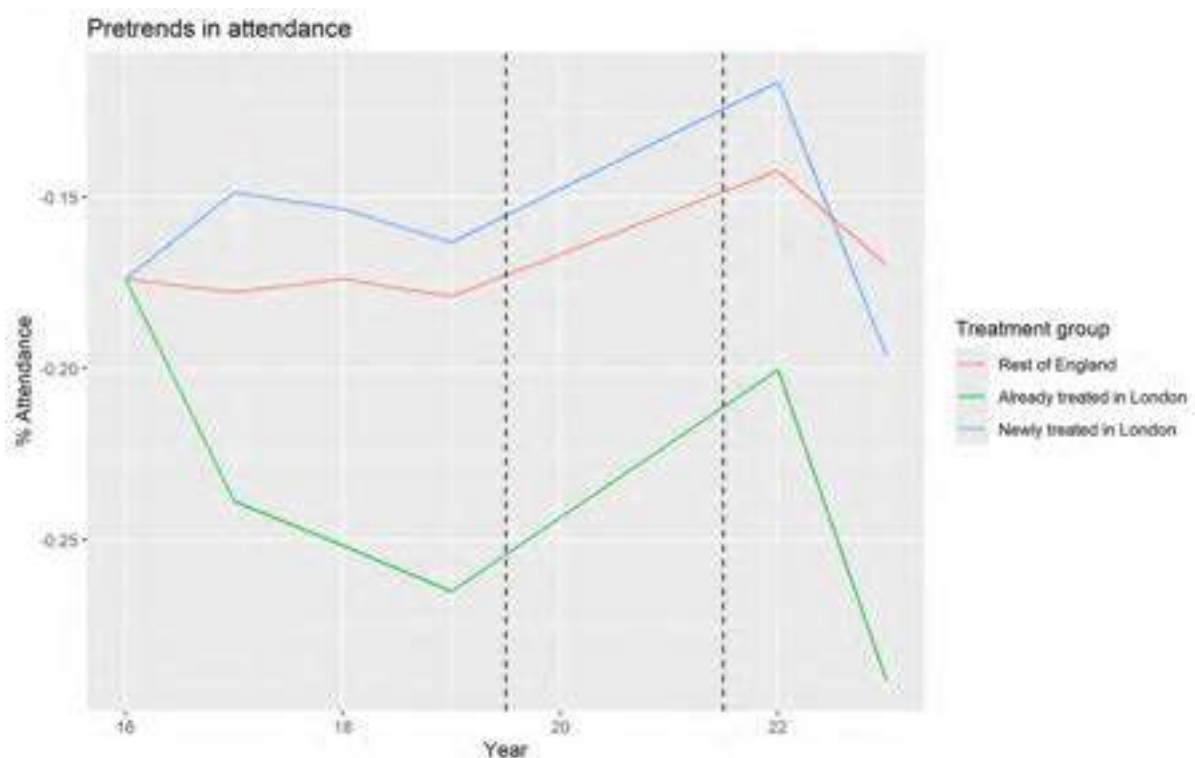
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 78 Model.docx

Figure 79. Conditional primary outcome pre-trends for triple differences



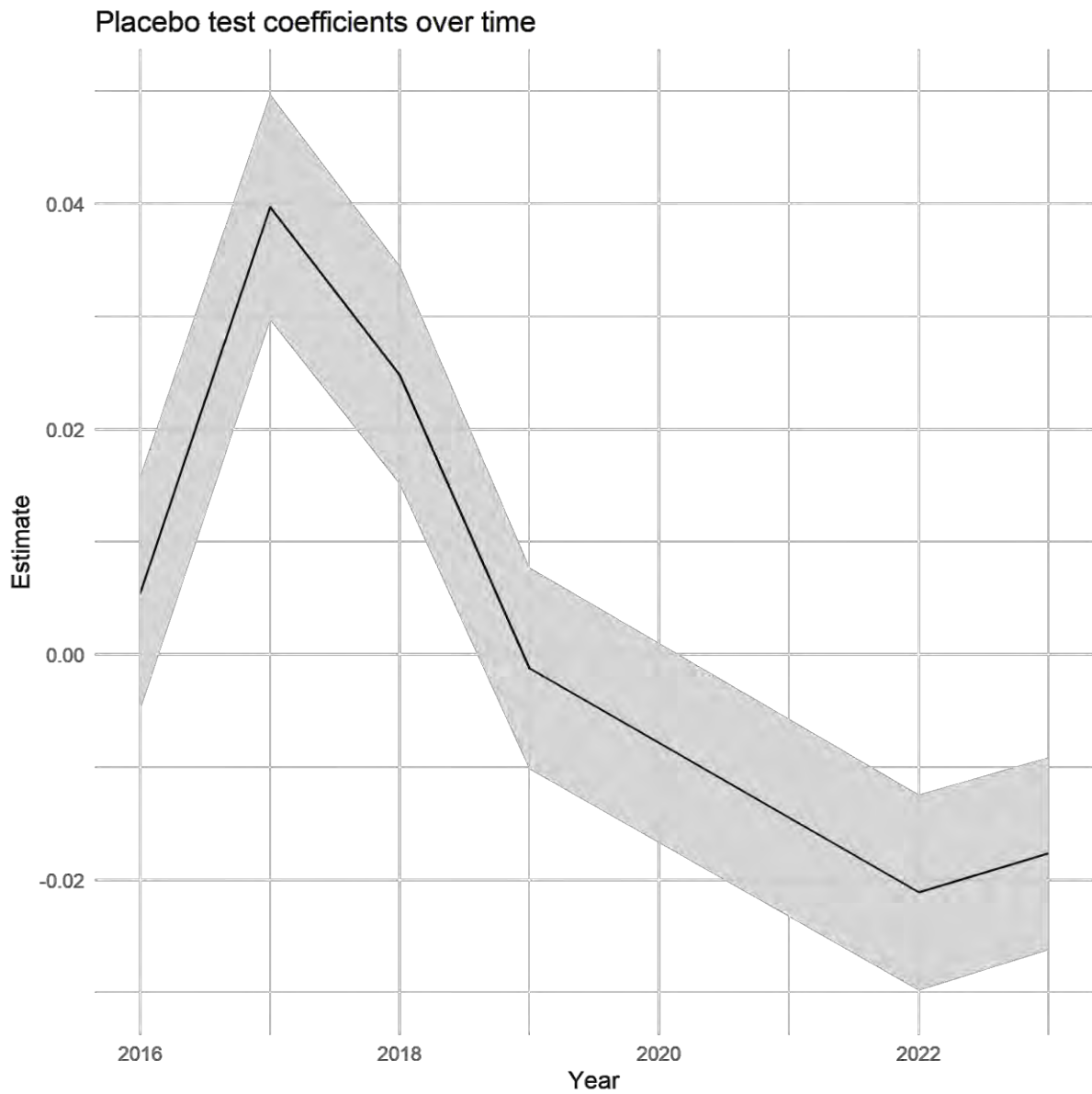
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 79 Model.docx

Figure 80. Conditional pre-trends for secondary outcome for triple difference



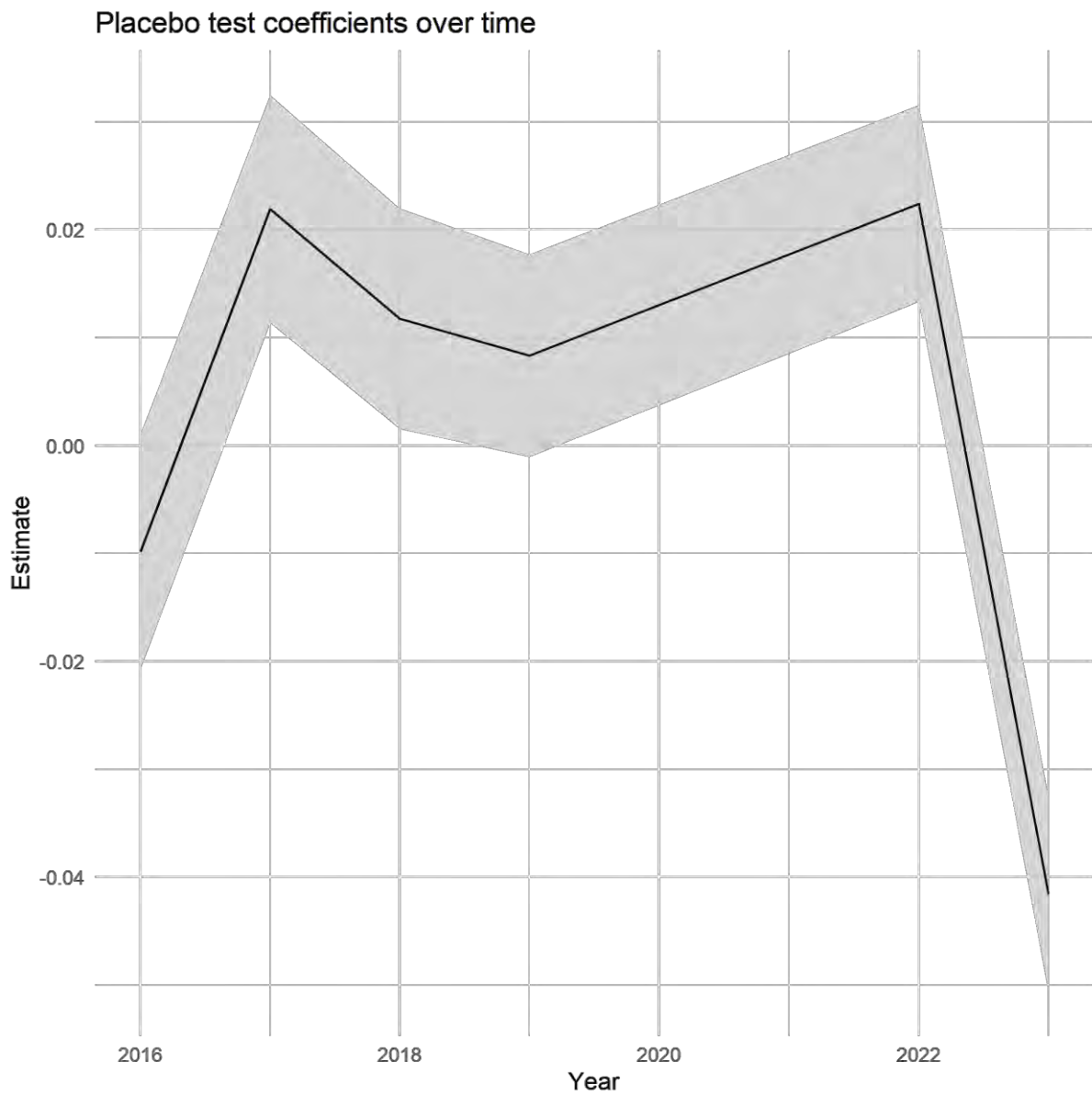
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 80 Model.docx

Figure 81. Placebo test estimates for primary outcome for difference in differences



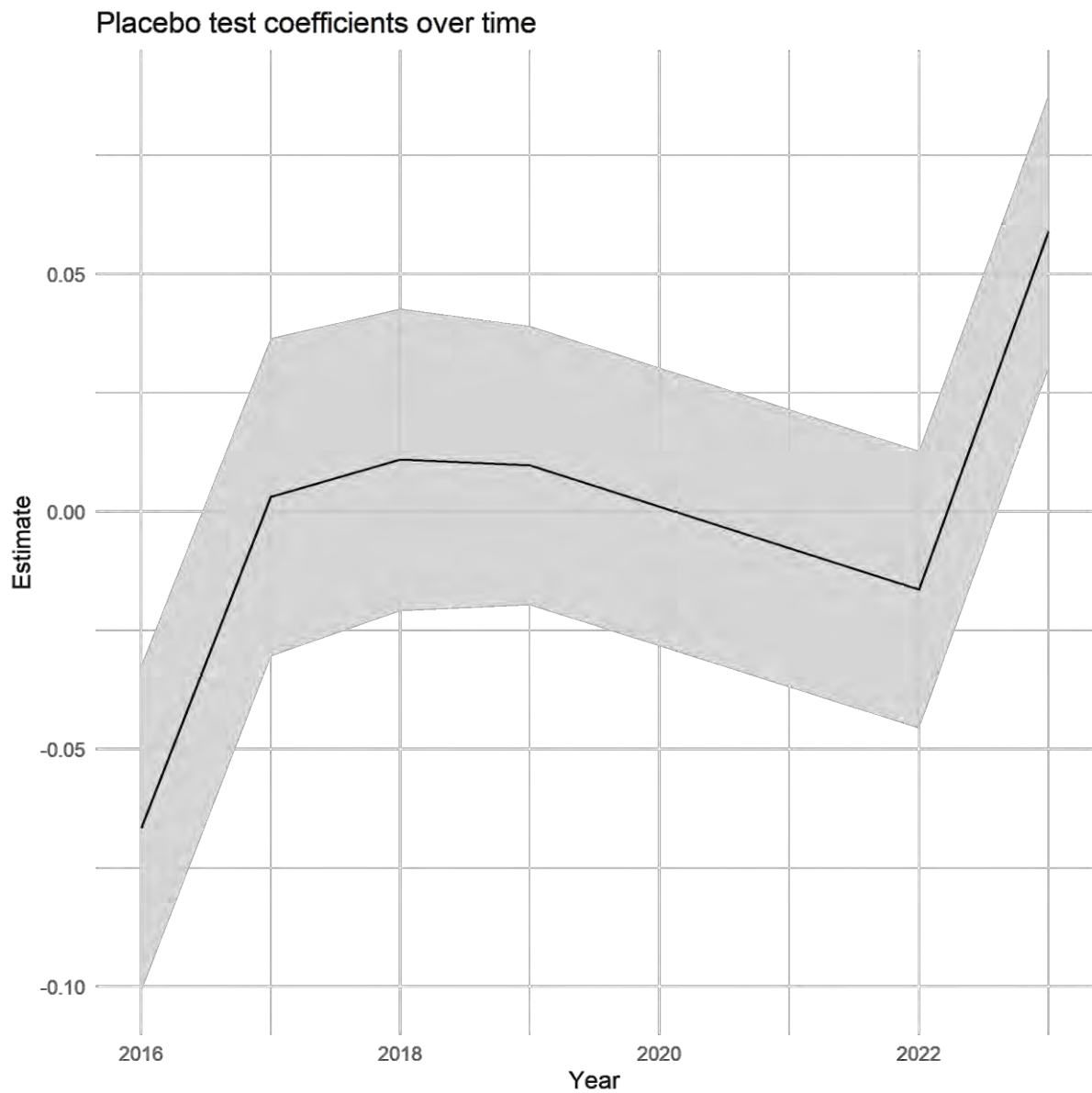
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 81 Models.csv

Figure 82. Placebo test estimates for secondary outcome for difference in differences



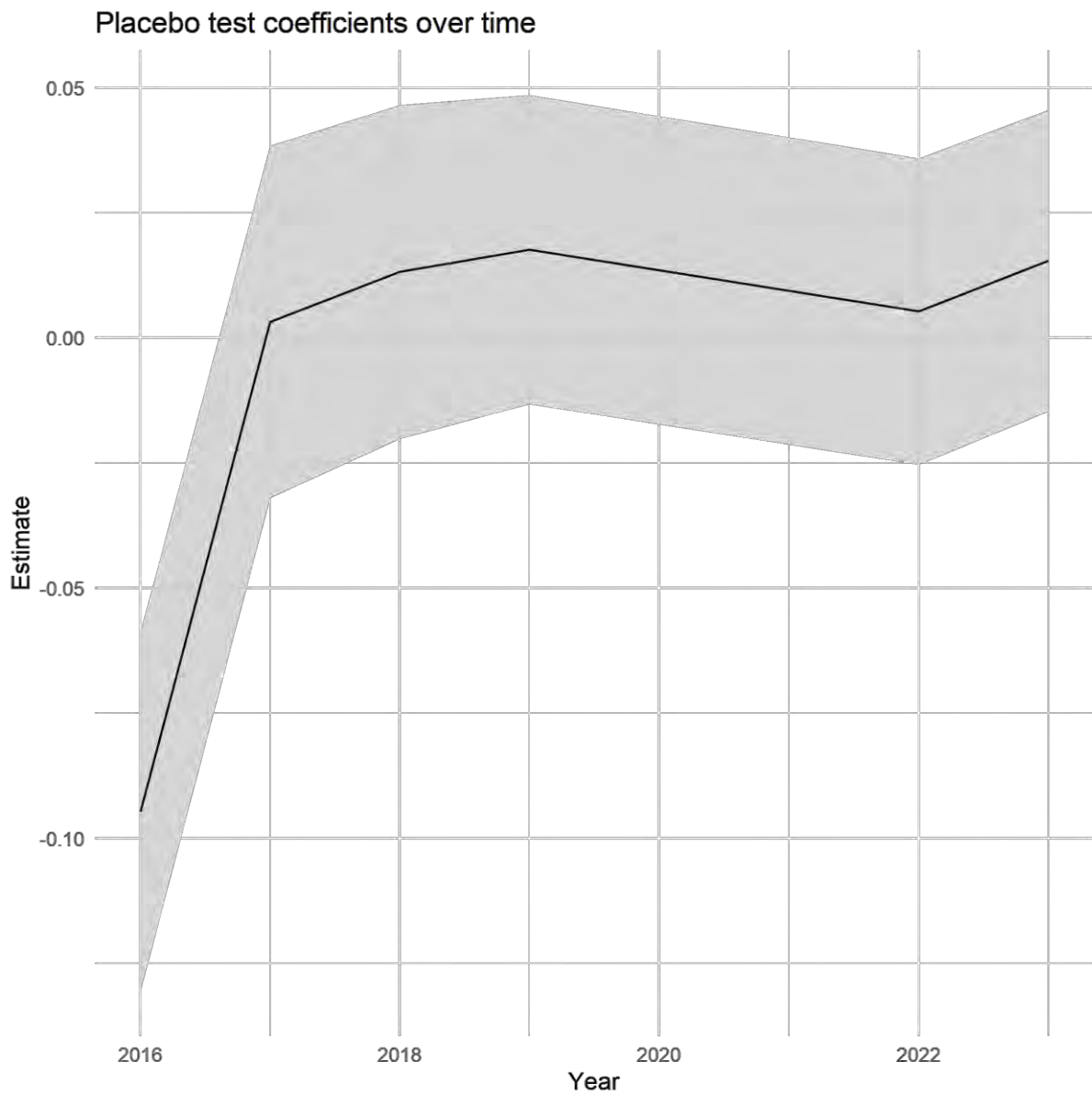
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 82 Models.csv

Figure 83. Placebo test estimates for primary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 83 Models.csv

Figure 84. Placebo test estimates for secondary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 84 Models.csv

## Appendix 7. Heterogeneity for pupils in IDACI quintile group 1

Table 40. Difference in differences estimates for primary outcome

---

Treatment estimate	0.013 [-0.014, 0.040]
Num.Obs.	773998
R2	0.388
R2 Adj.	0.377
R2 Within	0.315
R2 Within Adj.	0.315
AIC	1871828.9
BIC	2022435.3
RMSE	0.80
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	773967

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 41. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.022 [0.004, 0.039]
Num.Obs.	773103
R2	0.081
R2 Adj.	0.065
R2 Within	0.034
R2 Within Adj.	0.034
AIC	2108523.3
BIC	2259010.6
RMSE	0.93
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	773072

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 42. Triple difference estimates for primary outcome

Treatment estimate	-0.009 [-0.073, 0.056]
Num.Obs.	796197
R2	0.389
R2 Adj.	0.379
R2 Within	0.314
R2 Within Adj.	0.314
AIC	1923229.8
BIC	2075896.4
RMSE	0.80
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	796165

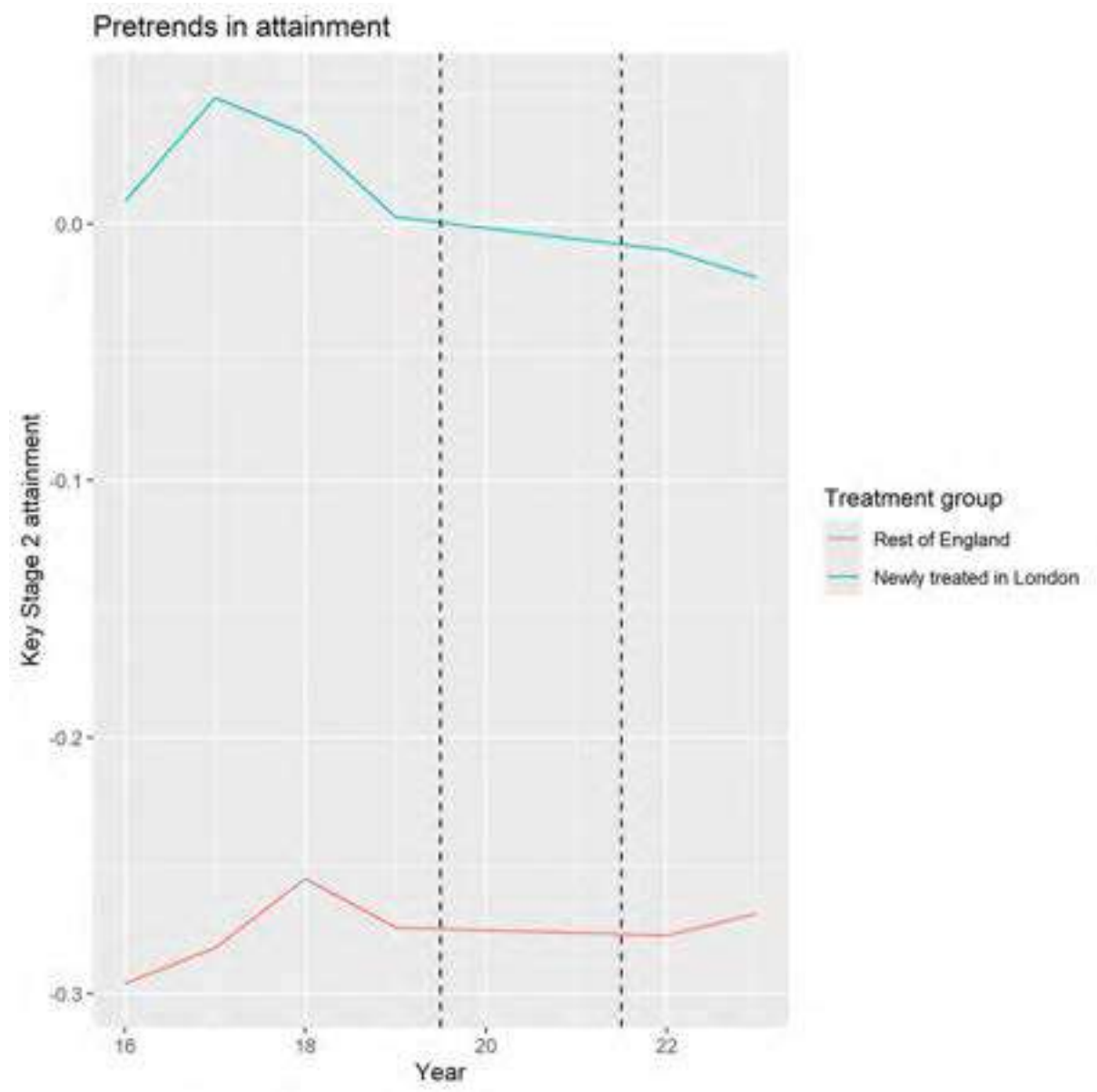
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 43. Triple difference estimates for secondary outcome

Treatment estimate	0.020 [-0.016, 0.056]
Num.Obs.	795263
R2	0.082
R2 Adj.	0.066
R2 Within	0.034
R2 Within Adj.	0.034
AIC	2160778.0
BIC	2313324.9
RMSE	0.93
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	795231

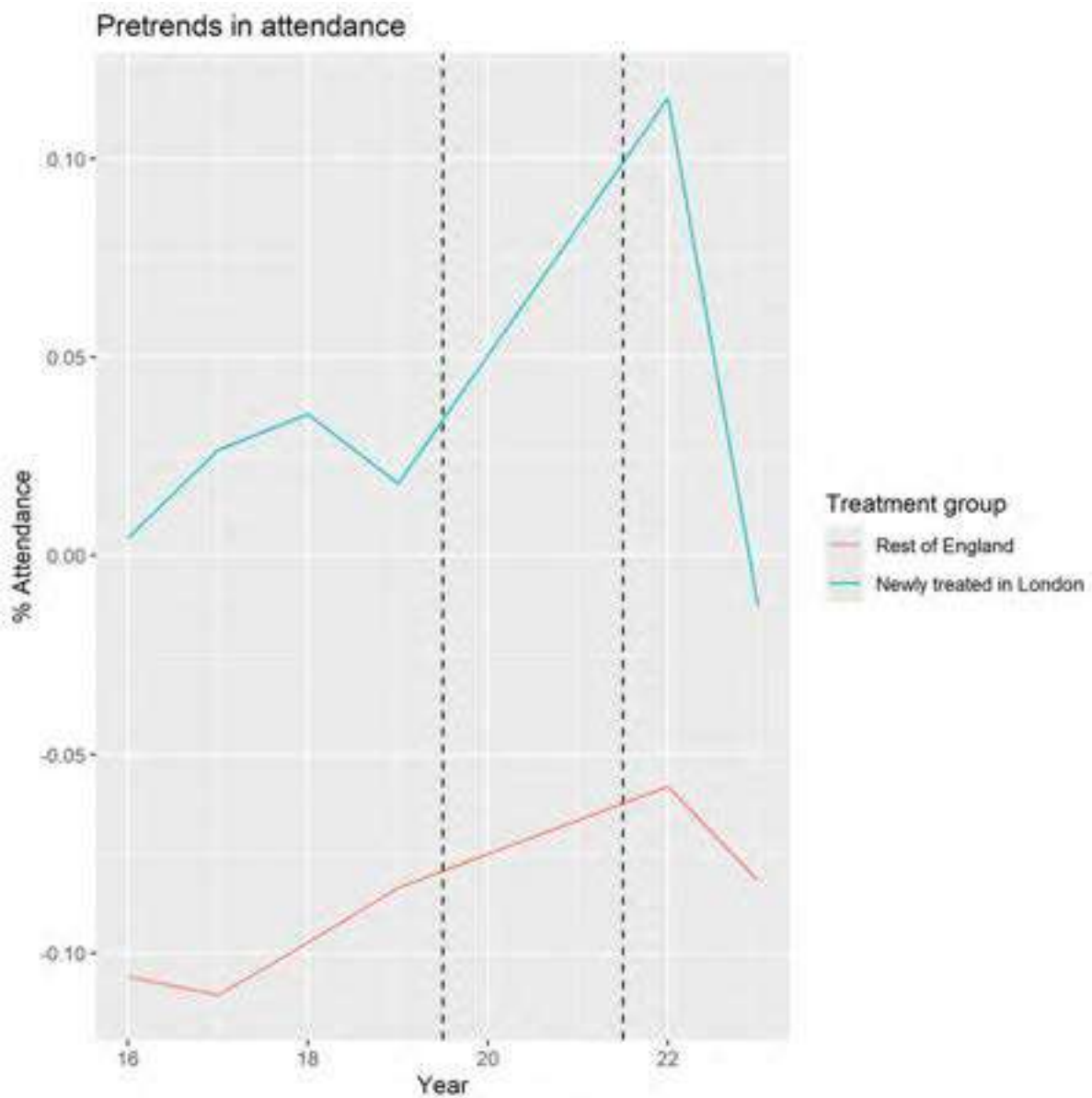
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 85. Raw pre-trends in primary outcome for difference-in-differences



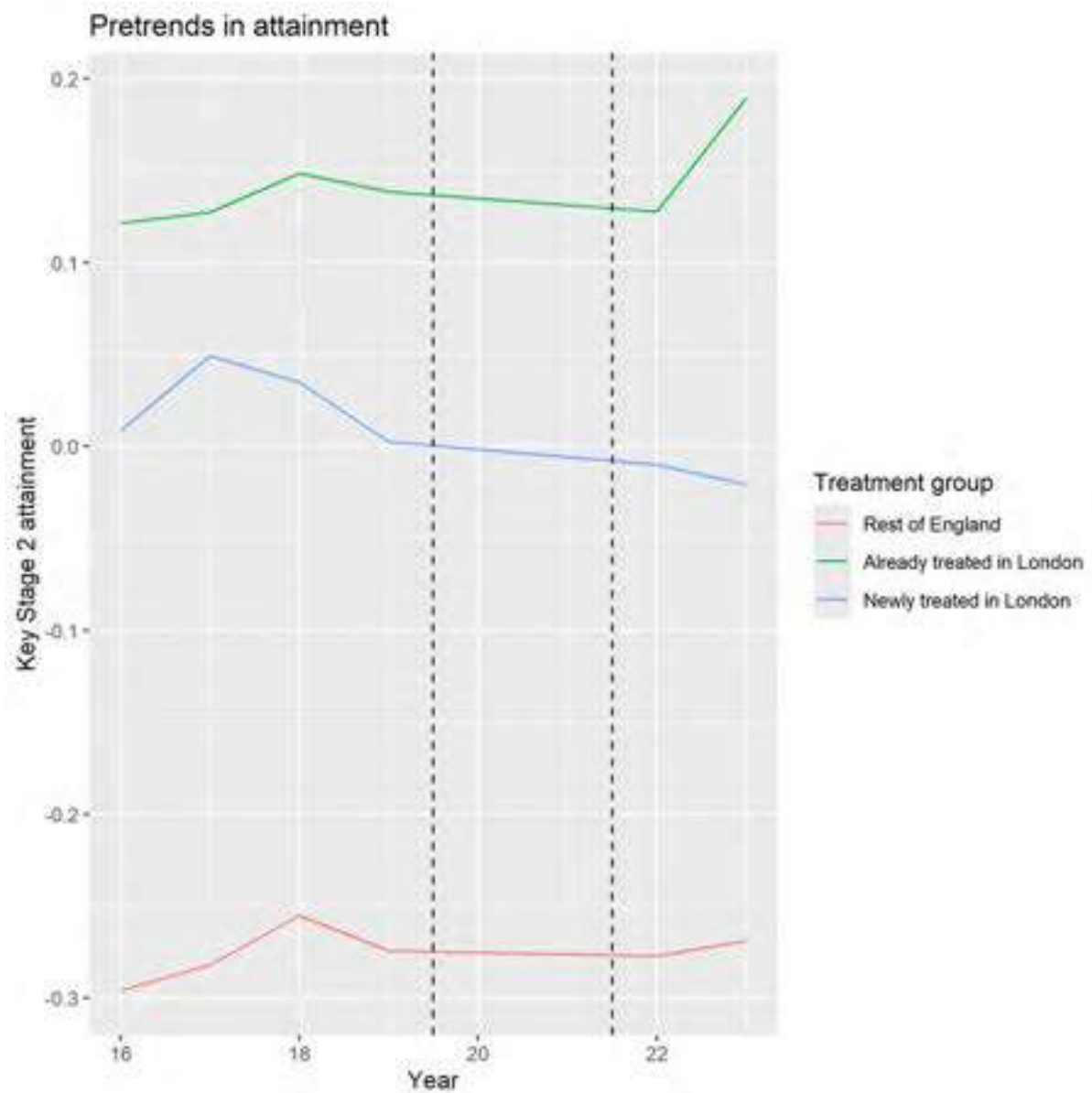
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 85 Counts.csv.

Figure 86. Raw pre-trends in secondary outcome for difference-in-differences



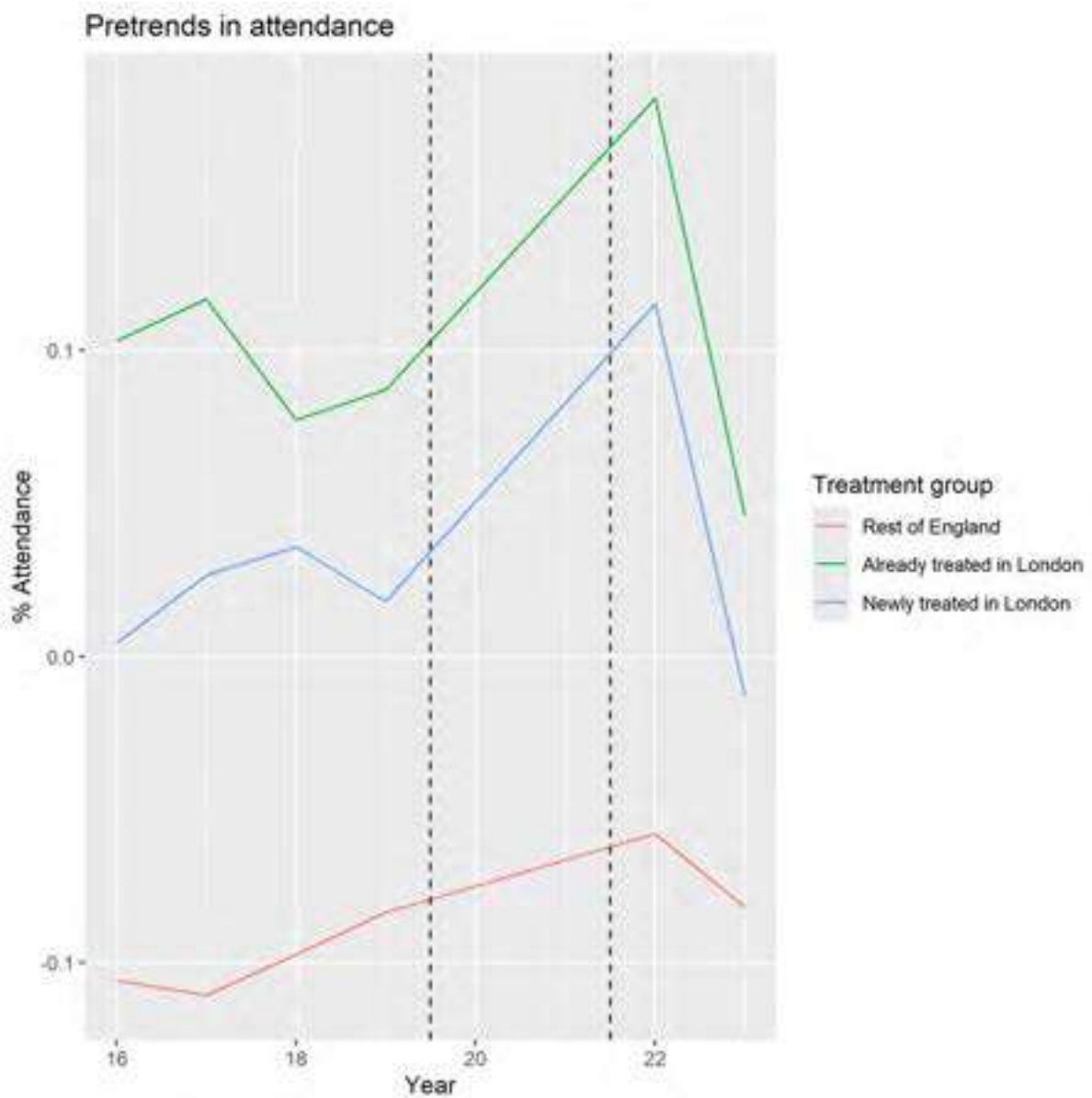
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 86 Counts.csv.

Figure 87. Raw pre-trends in primary outcome for triple difference



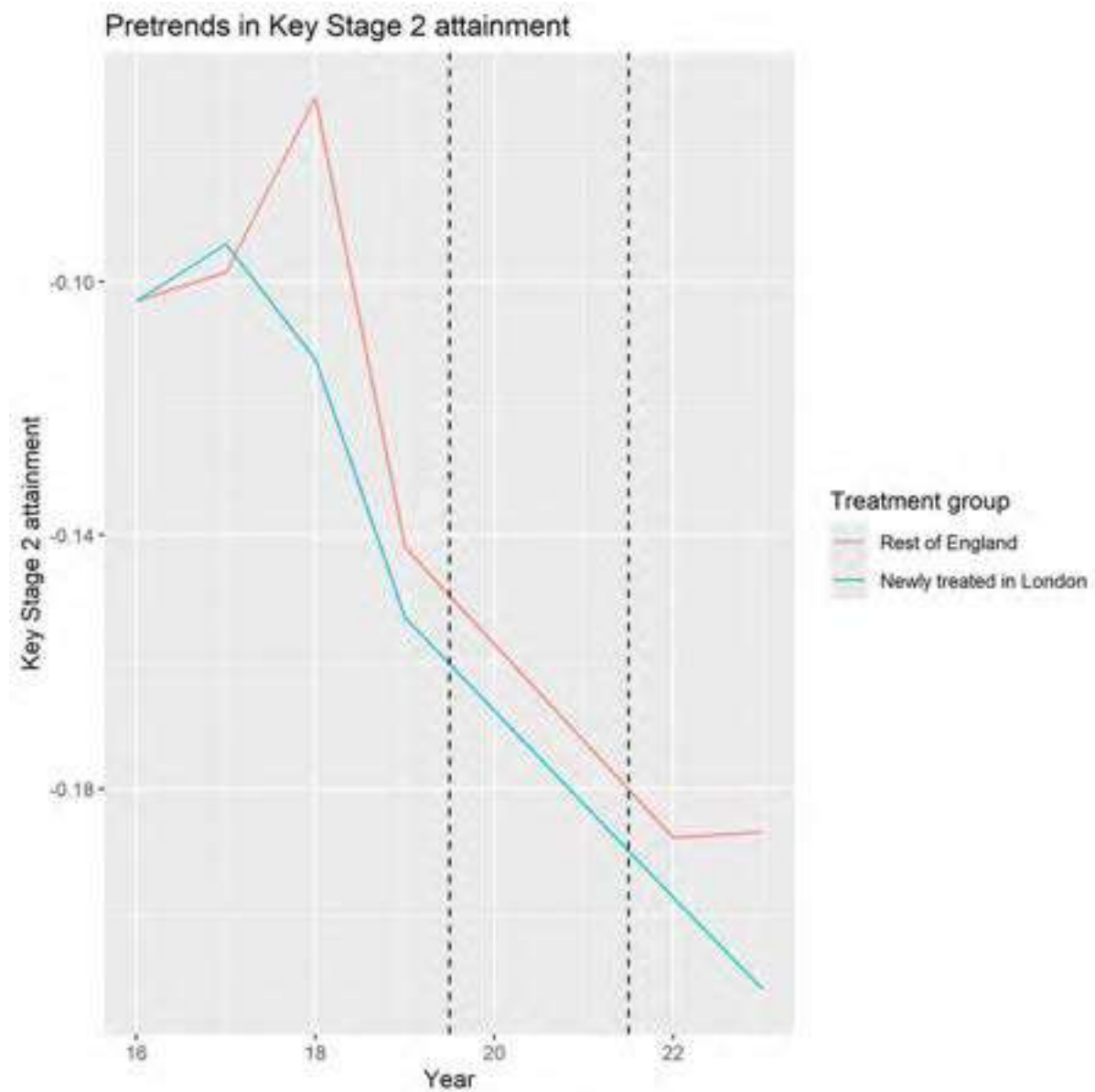
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 87 Counts.csv.

Figure 88. Raw pre-trends in secondary outcome for triple difference



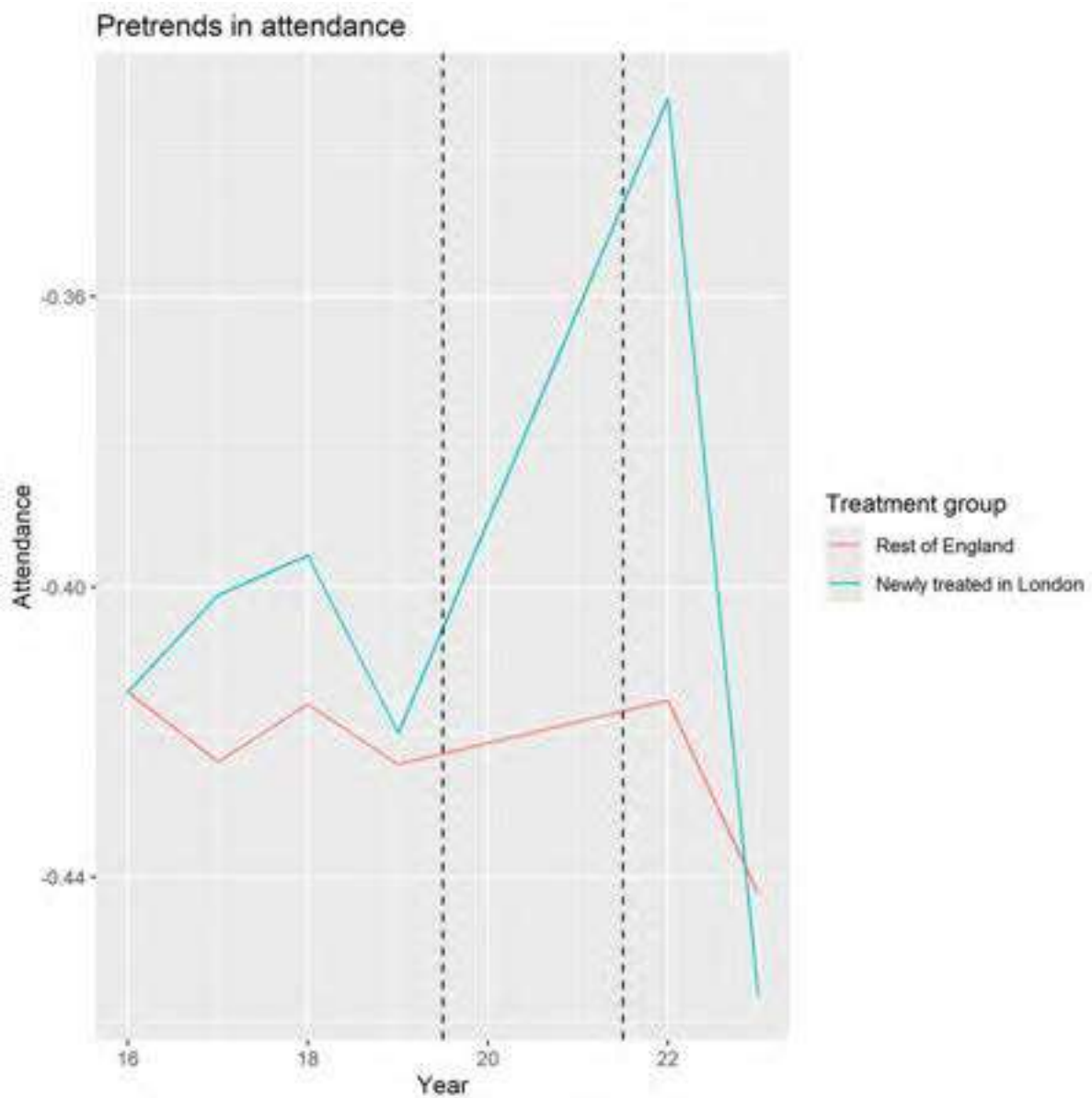
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 88 Counts.csv.

Figure 89. Conditional primary outcome pre-trends for difference-in-differences



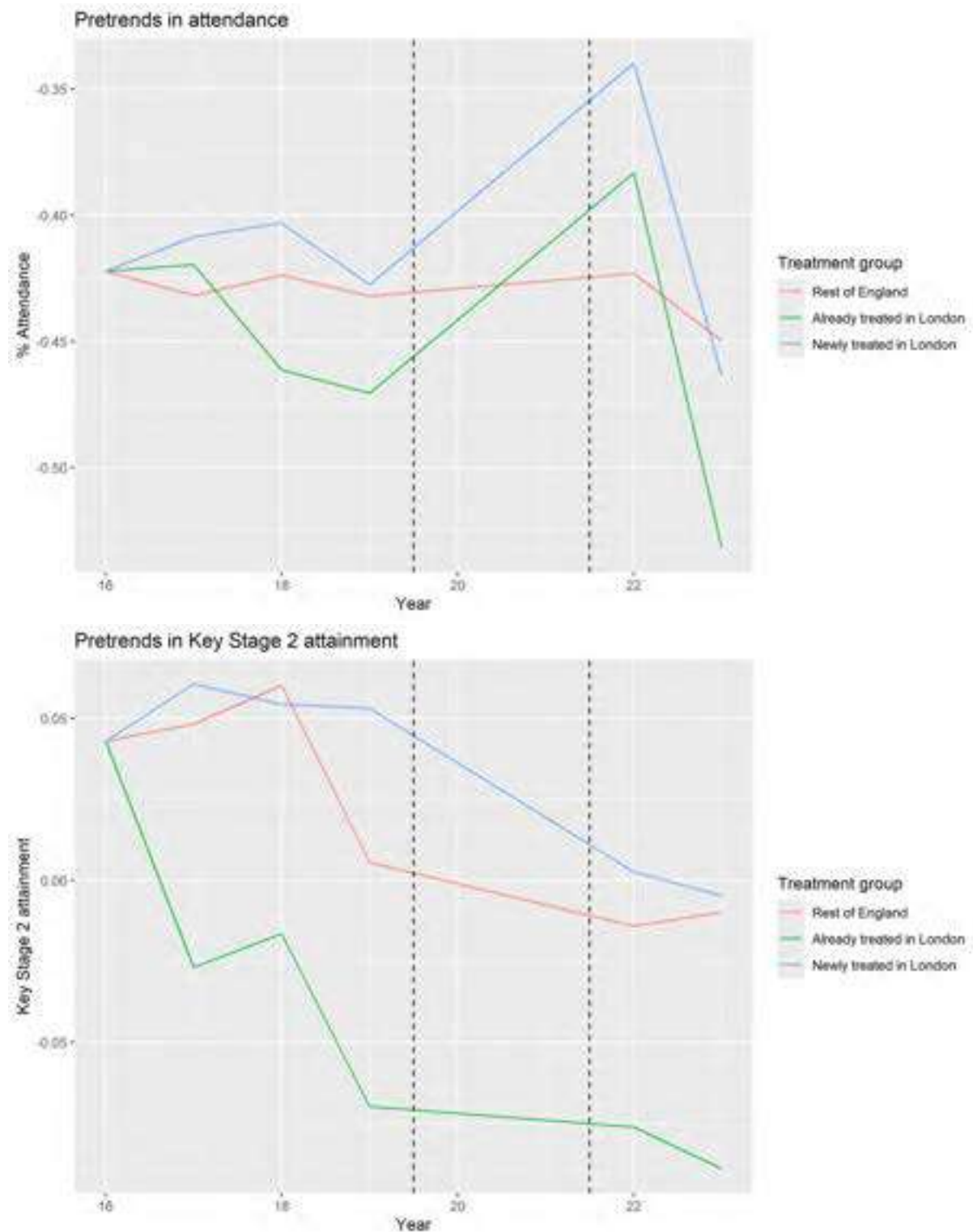
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 89 Model.docx.

Figure 90. Conditional secondary outcome pre-trends for difference-in-differences



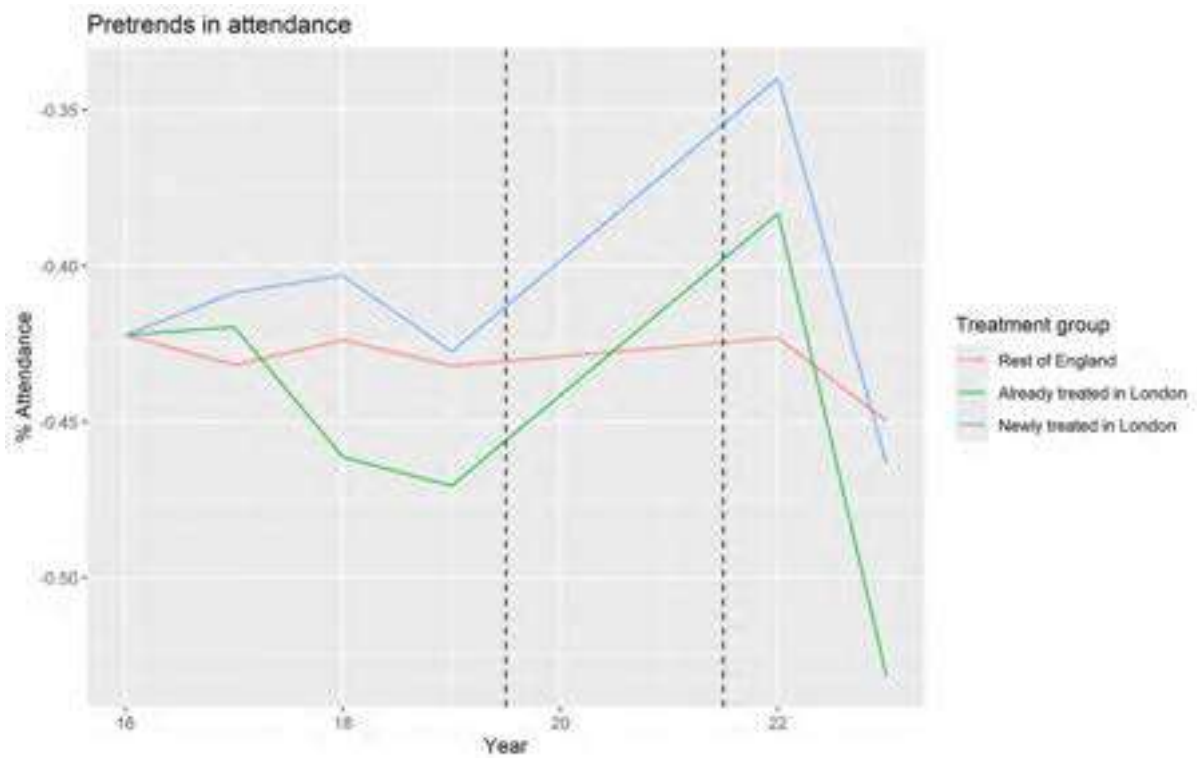
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 90 Model.docx

Figure 91. Conditional primary outcome pre-trends for triple differences



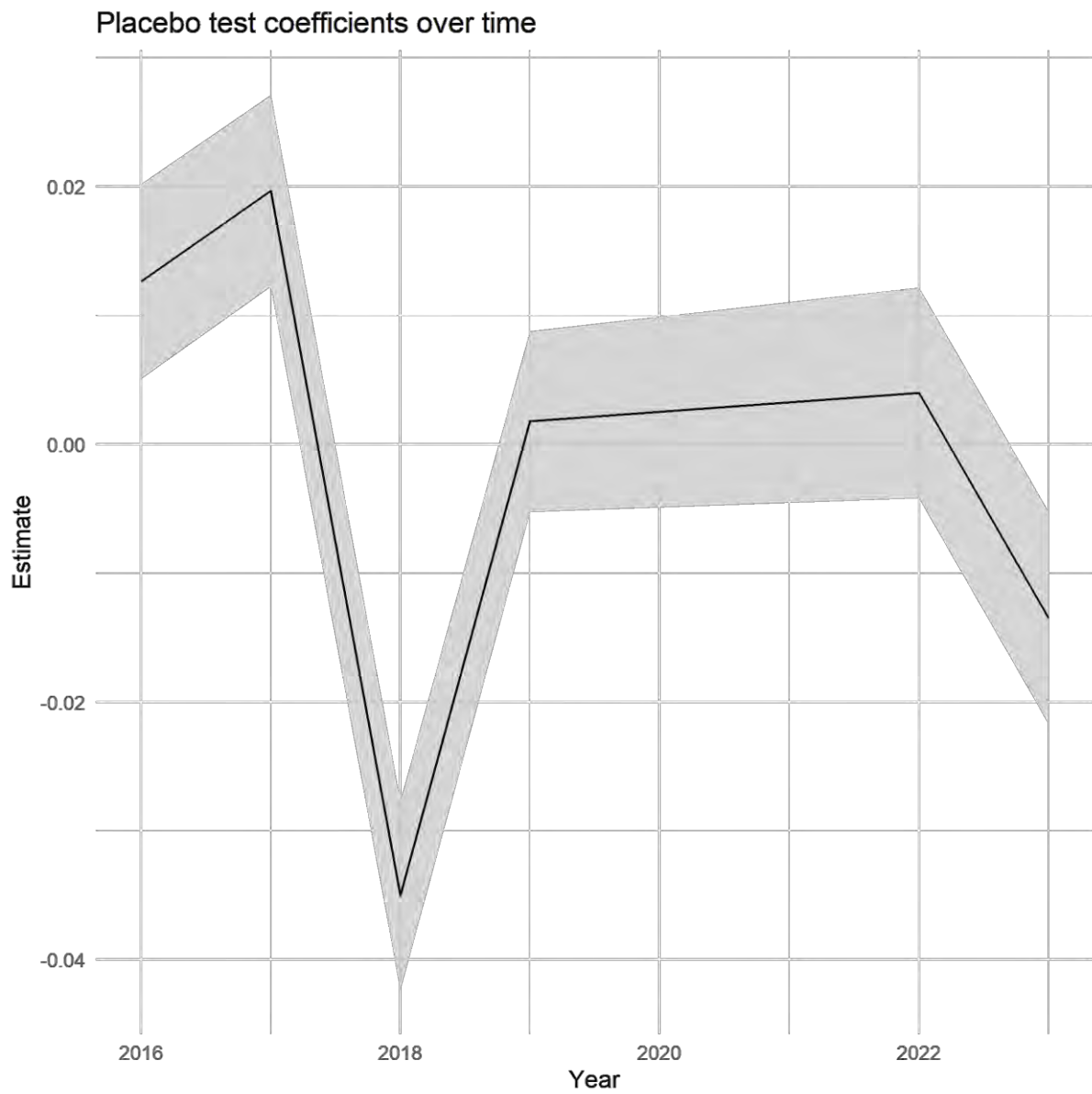
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 91 Model.docx

Figure 92. Conditional pre-trends for secondary outcome for triple difference



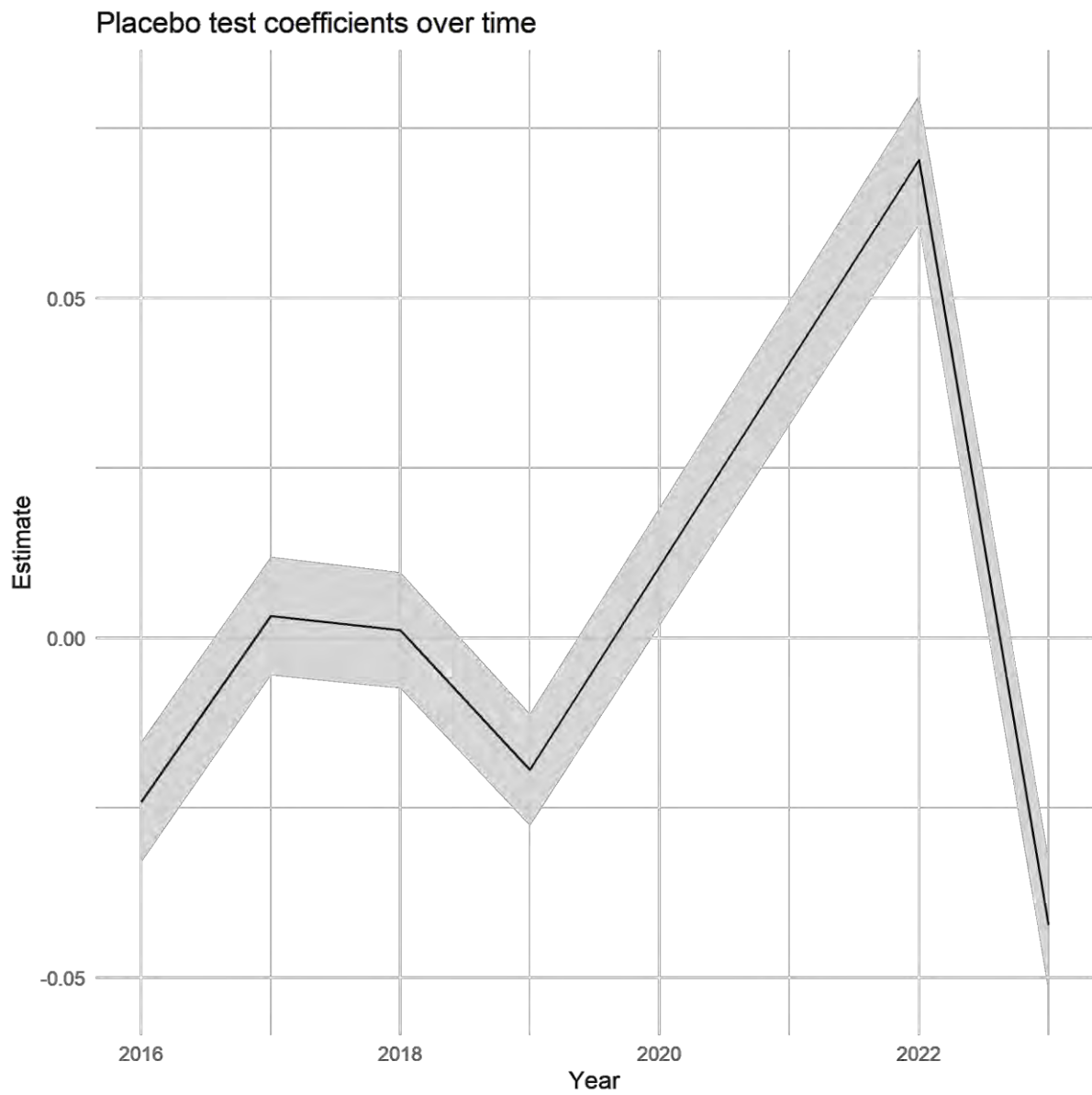
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 92 Model.docx

Figure 93. Placebo test estimates for primary outcome for difference in differences



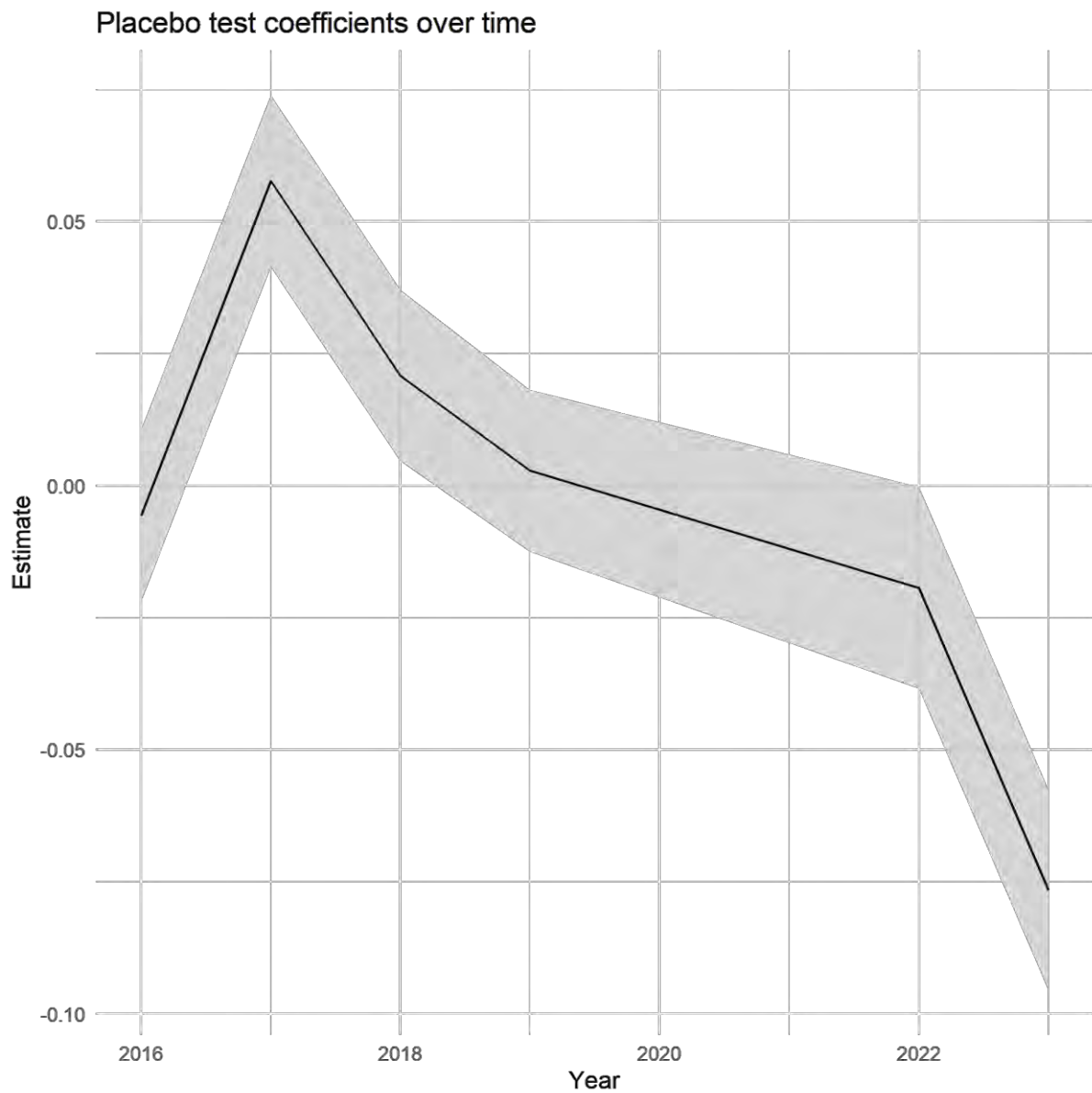
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 93 Models.csv

Figure 94. Placebo test estimates for secondary outcome for difference in differences



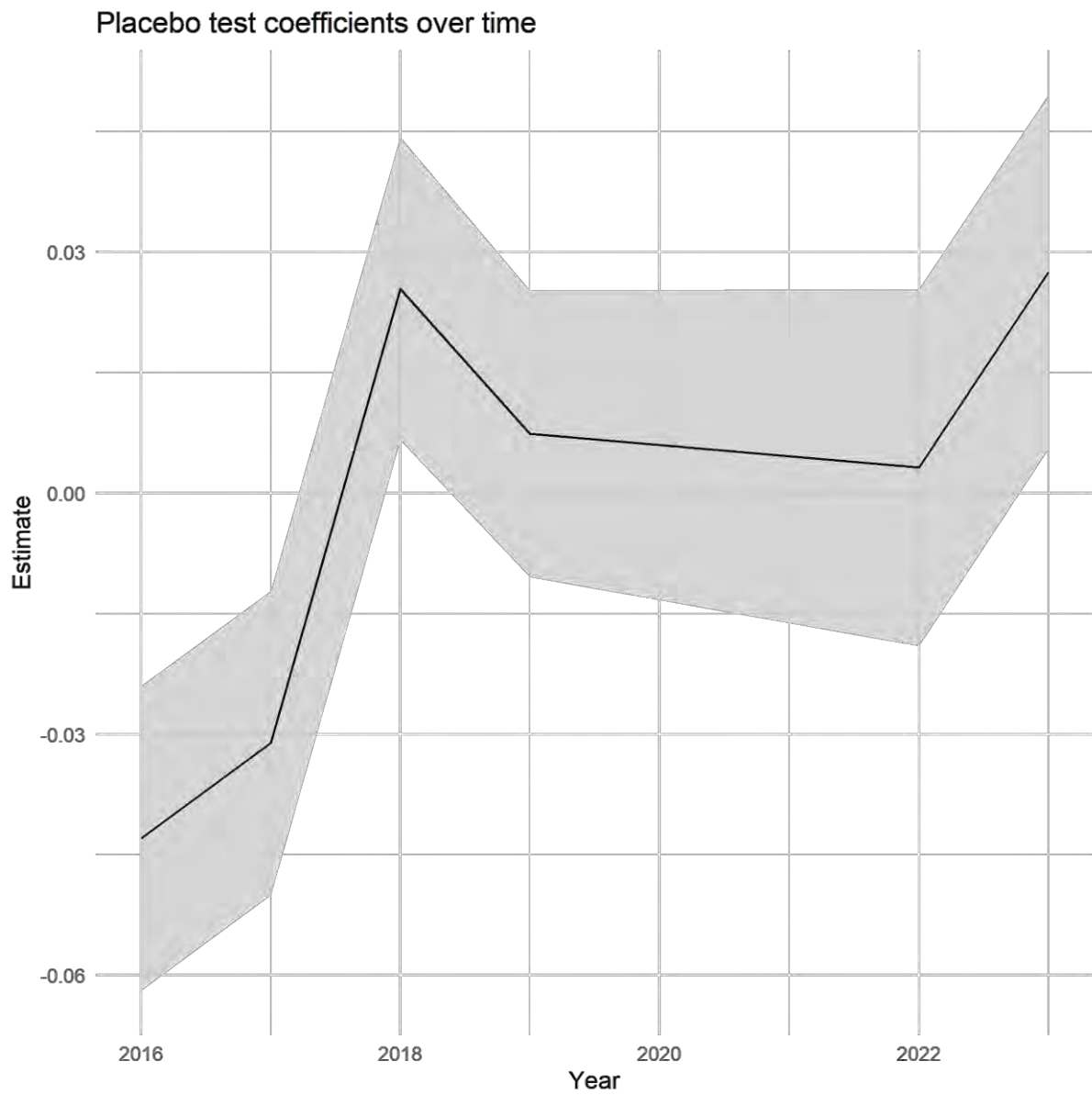
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 94 Models.csv

Figure 95. Placebo test estimates for primary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 95 Models.csv

Figure 96. Placebo test estimates for secondary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 96 Models.csv

## Appendix 8. Heterogeneity for pupils in IDACI quintile group 2

Table 44. Difference in differences estimates for primary outcome

---

Treatment estimate	0.007
	[-0.013, 0.027]
Num.Obs.	785833
R2	0.386
R2 Adj.	0.373
R2 Within	0.314
R2 Within Adj.	0.314
AIC	1888686.2
BIC	2067685.8
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	785801

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 45. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.006
	[-0.008, 0.020]
Num.Obs.	784860
R2	0.075
R2 Adj.	0.056
R2 Within	0.028
R2 Within Adj.	0.028
AIC	1998844.2
BIC	2177789.9
RMSE	0.85
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	784828

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 46. Triple difference estimates for primary outcome

Treatment estimate	0.005 [-0.046, 0.056]
Num.Obs.	799569
R2	0.385
R2 Adj.	0.373
R2 Within	0.314
R2 Within Adj.	0.314
AIC	1921531.9
BIC	2102468.8
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	799537

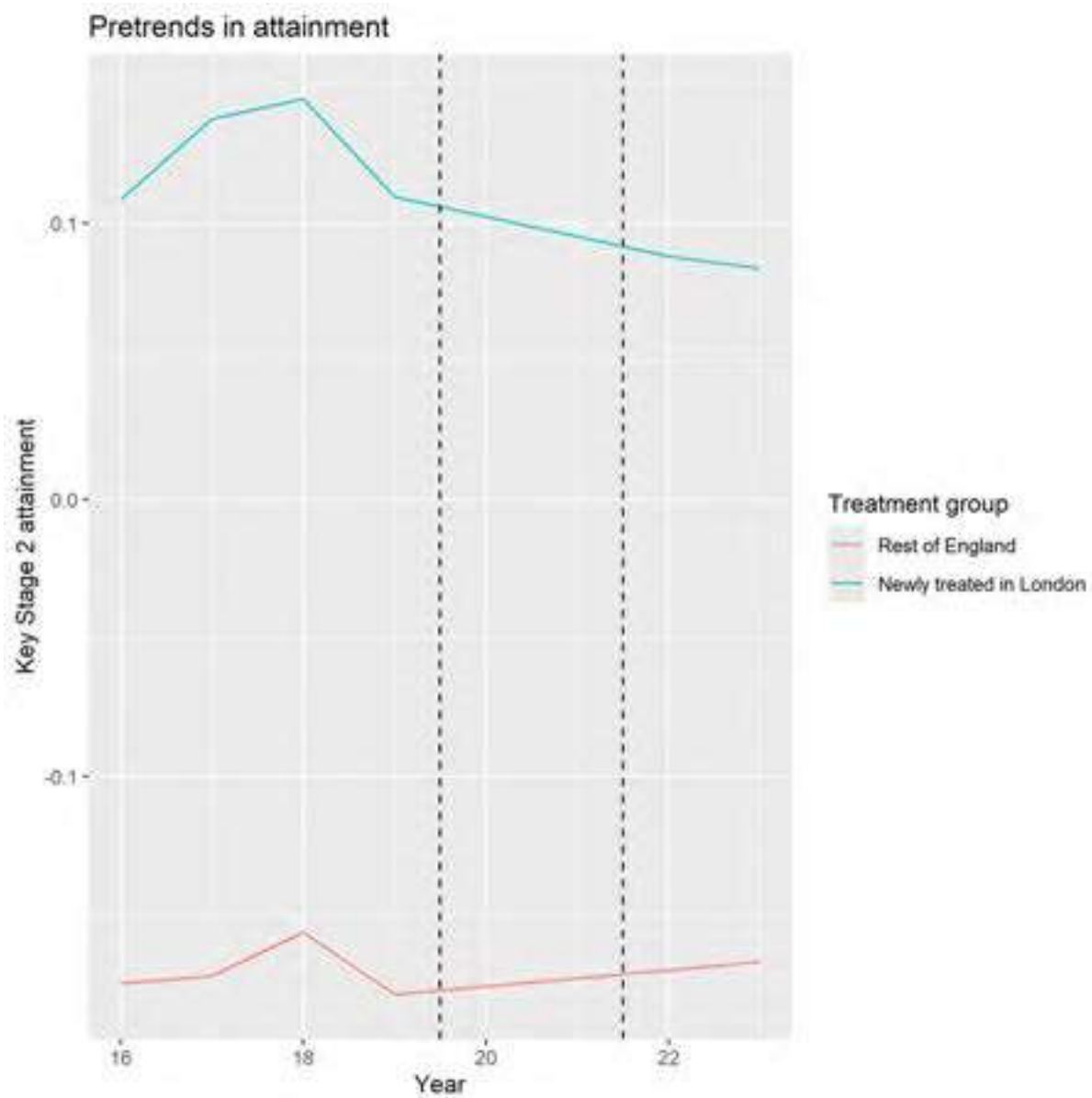
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 47. Triple difference estimates for secondary outcome

Treatment estimate	0.025 [-0.009, 0.059]
Num.Obs.	798581
R2	0.075
R2 Adj.	0.057
R2 Within	0.028
R2 Within Adj.	0.028
AIC	2029835.0
BIC	2210717.8
RMSE	0.85
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	798549

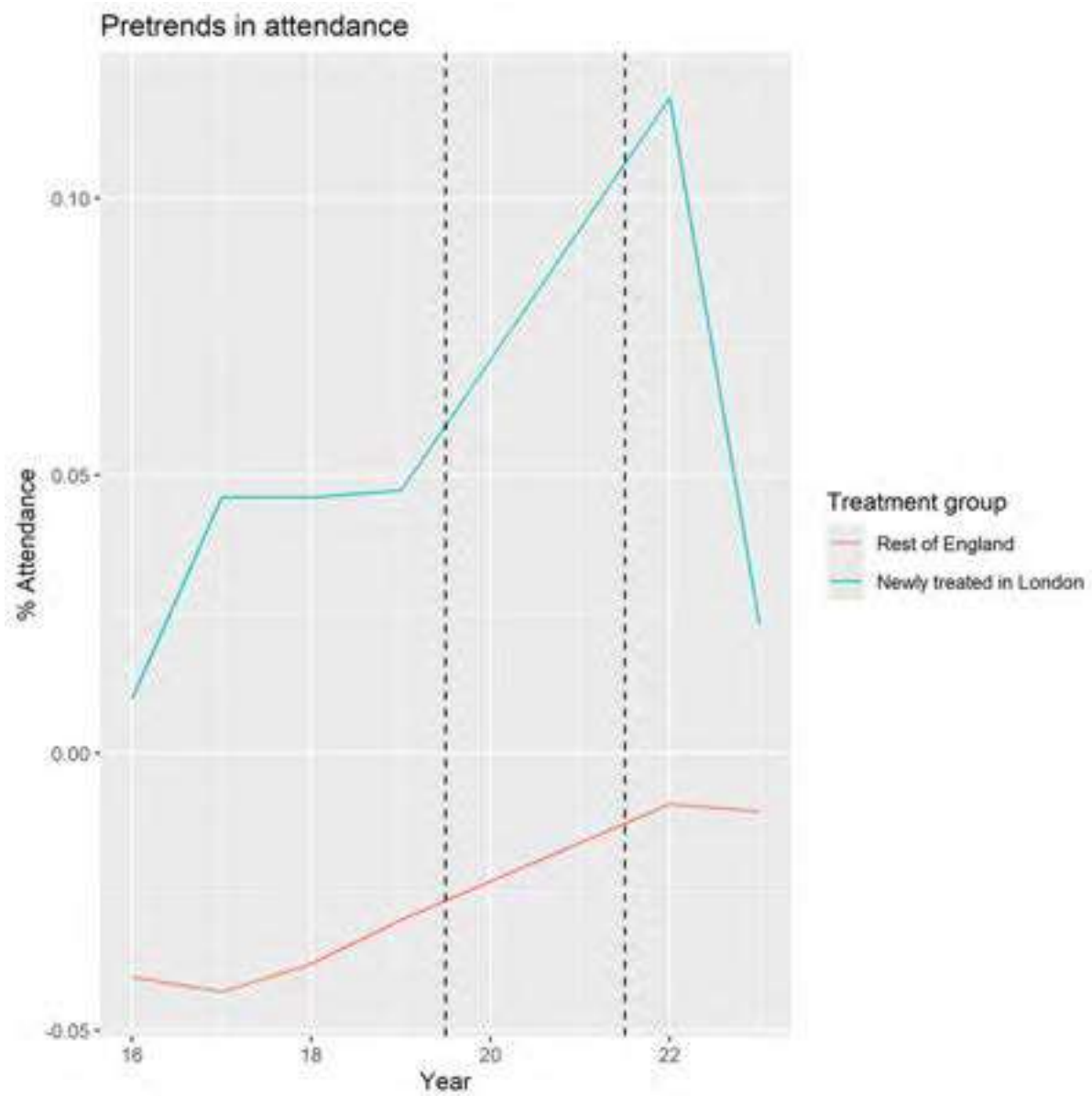
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 97. Raw pre-trends in primary outcome for difference-in-differences



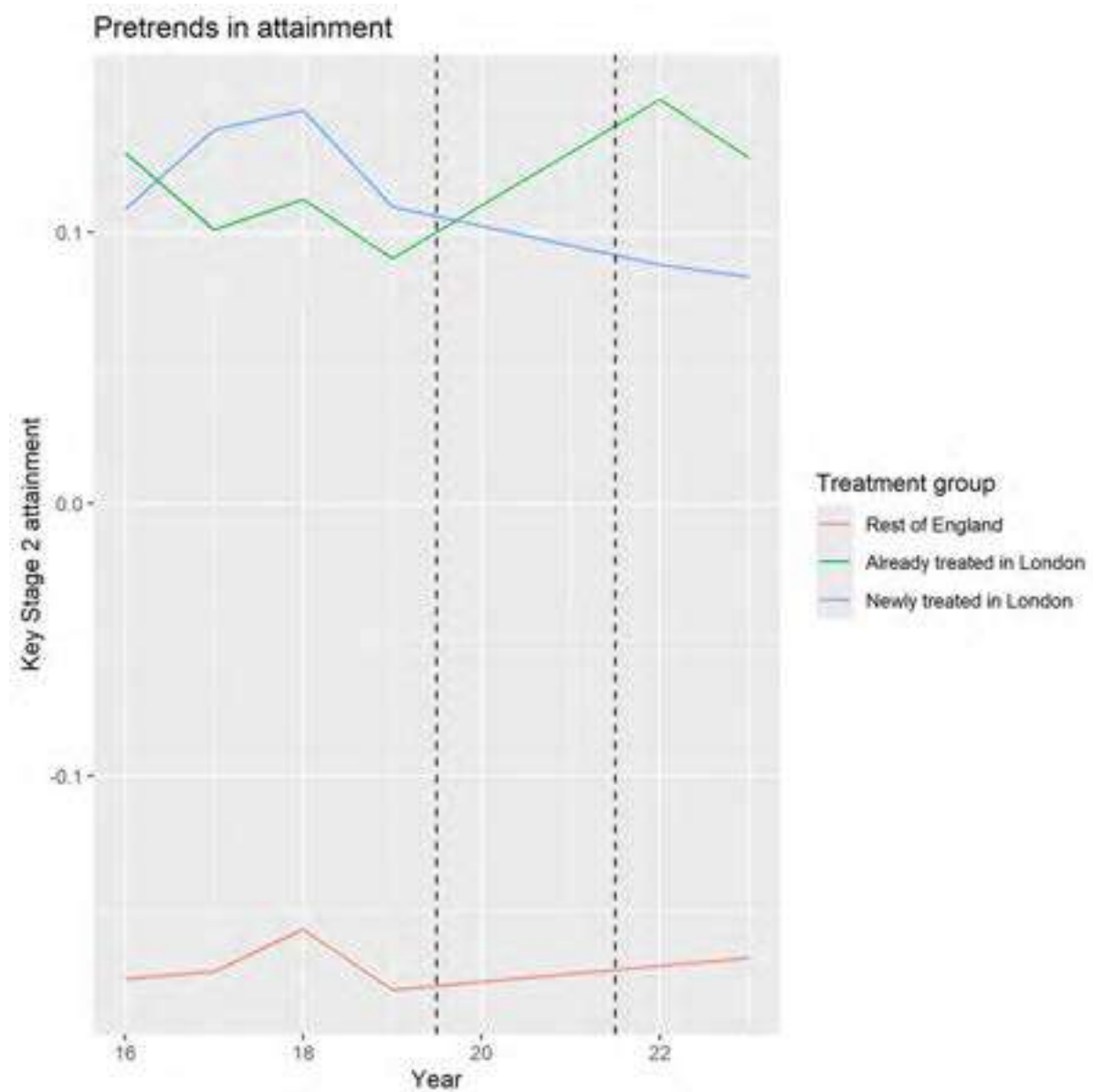
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 97 Counts.csv.

Figure 98. Raw pre-trends in secondary outcome for difference-in-differences



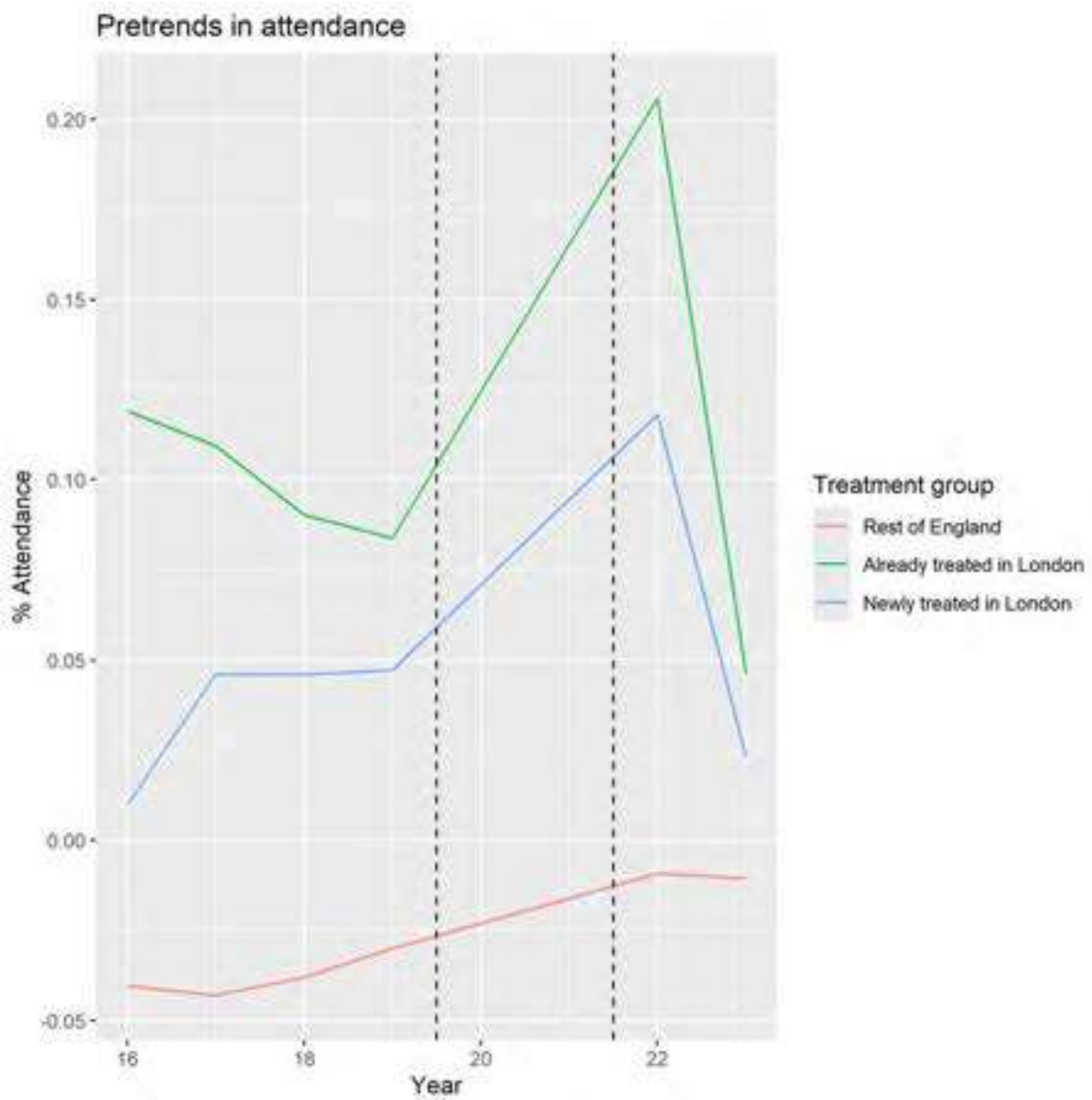
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 98 Counts.csv.

Figure 99. Raw pre-trends in primary outcome for triple difference



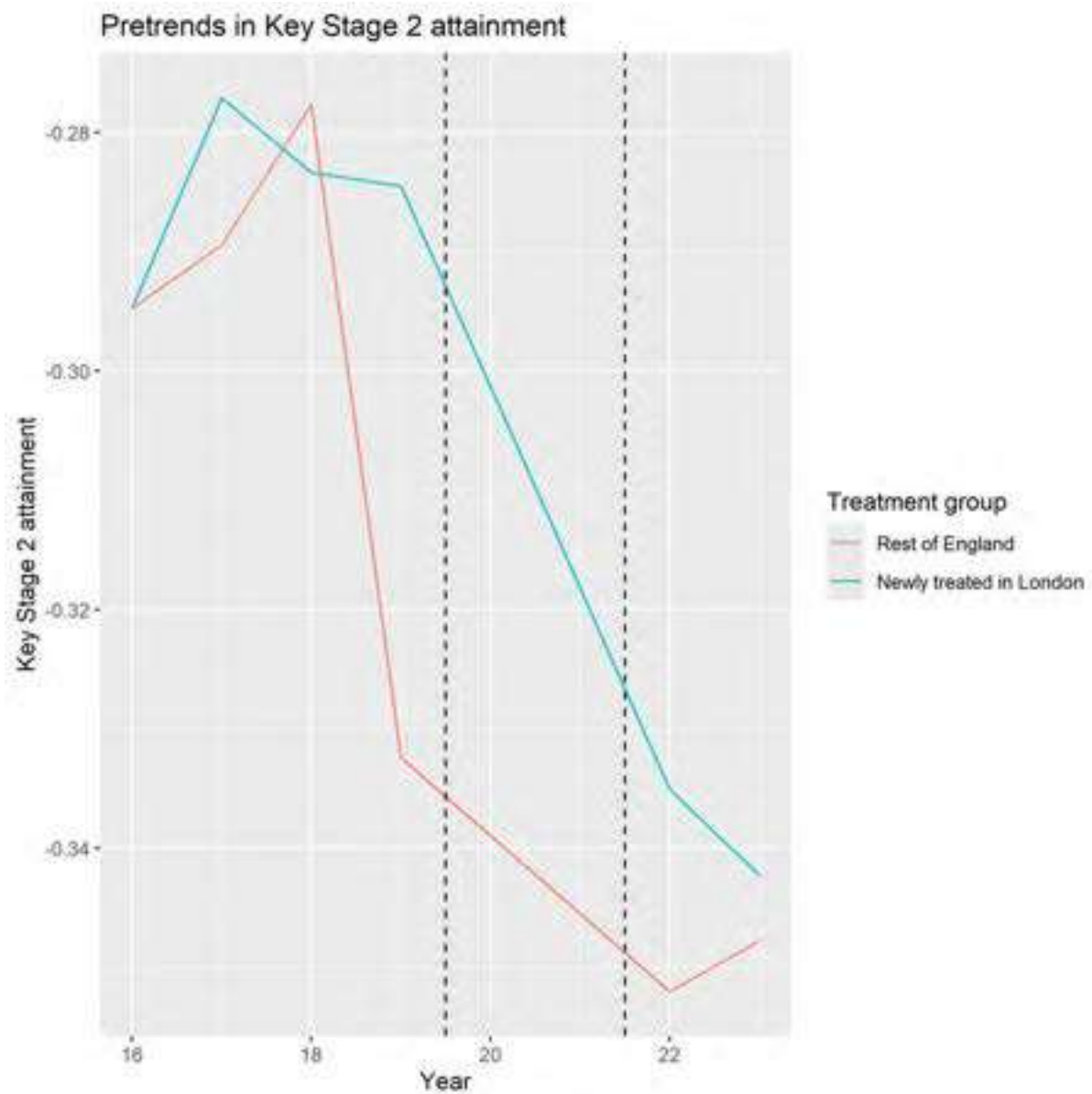
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 99 Counts.csv.

Figure 100. Raw pre-trends in secondary outcome for triple difference



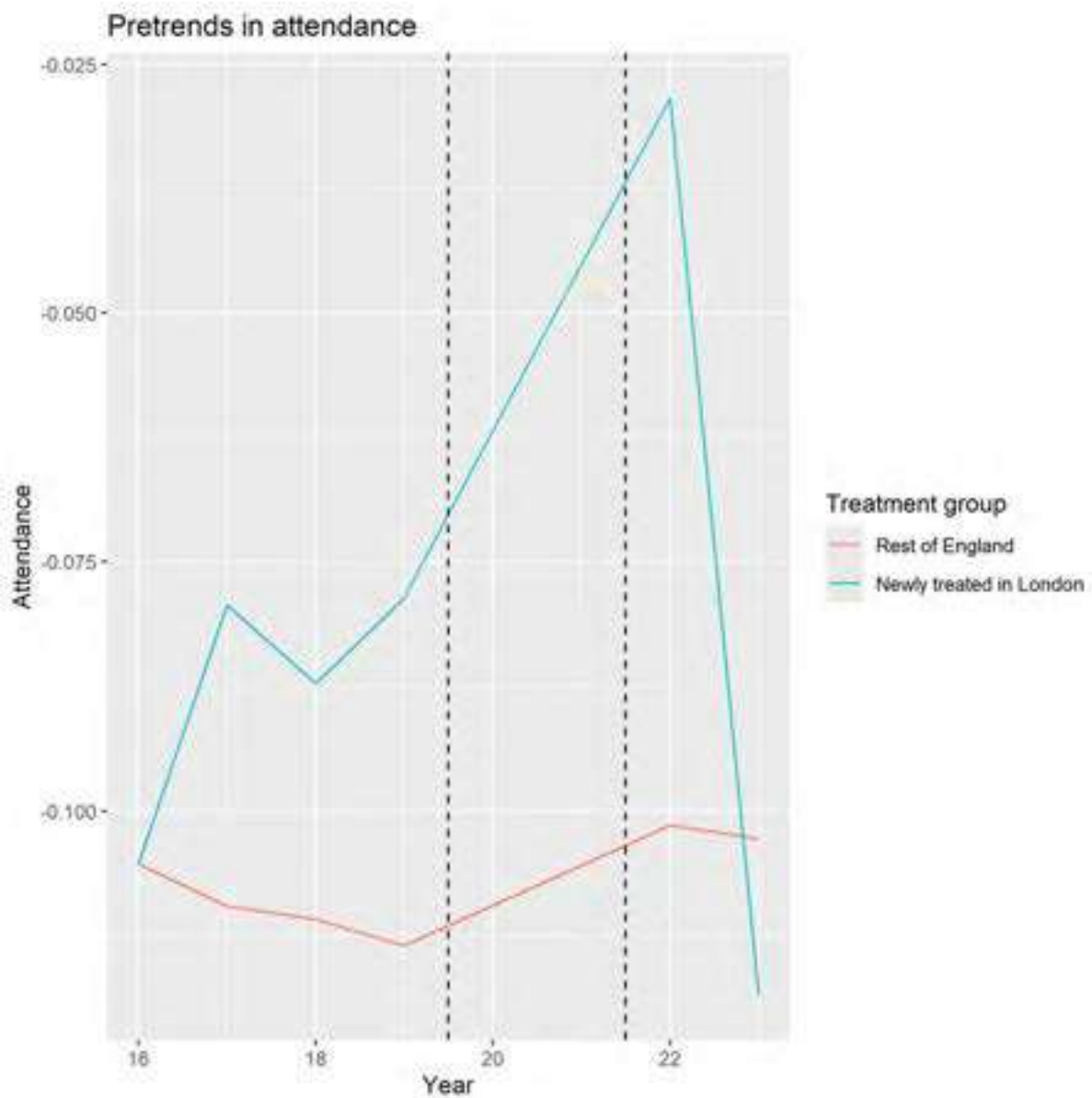
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 100 Counts.csv.

Figure 101. Conditional primary outcome pre-trends for difference-in-differences



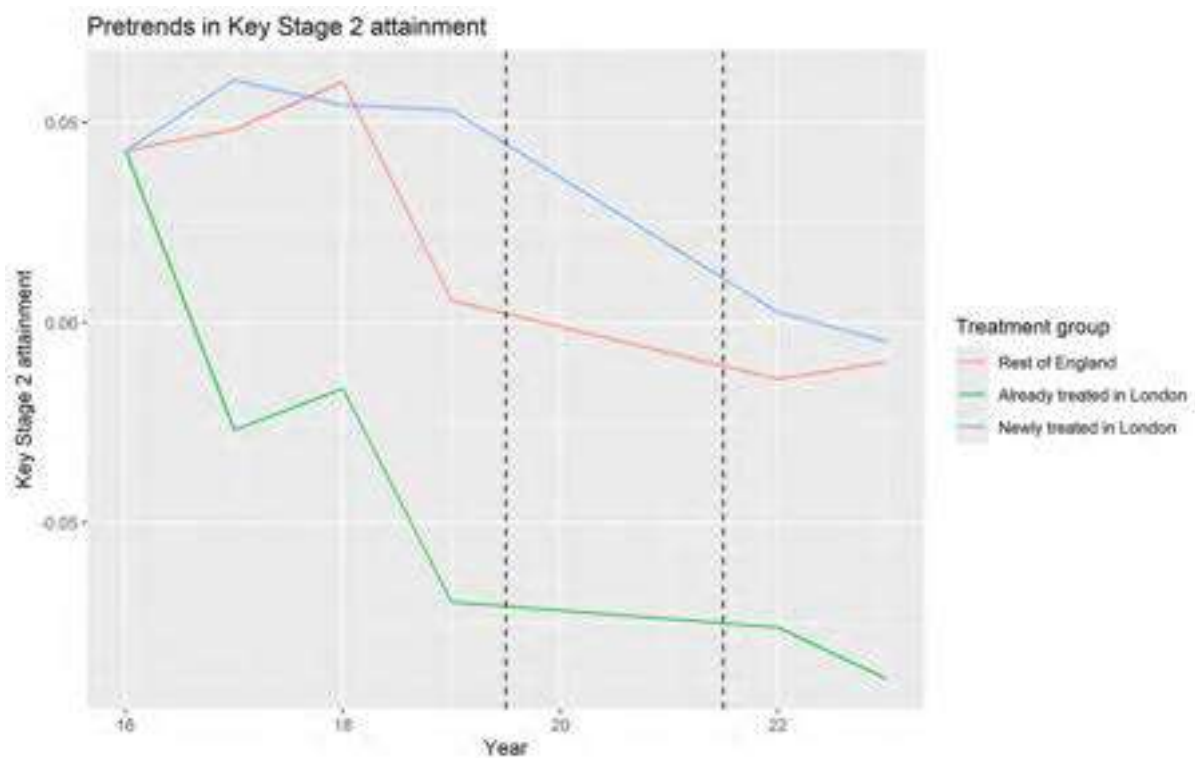
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 101 Model.docx.

Figure 102. Conditional secondary outcome pre-trends for difference-in-differences



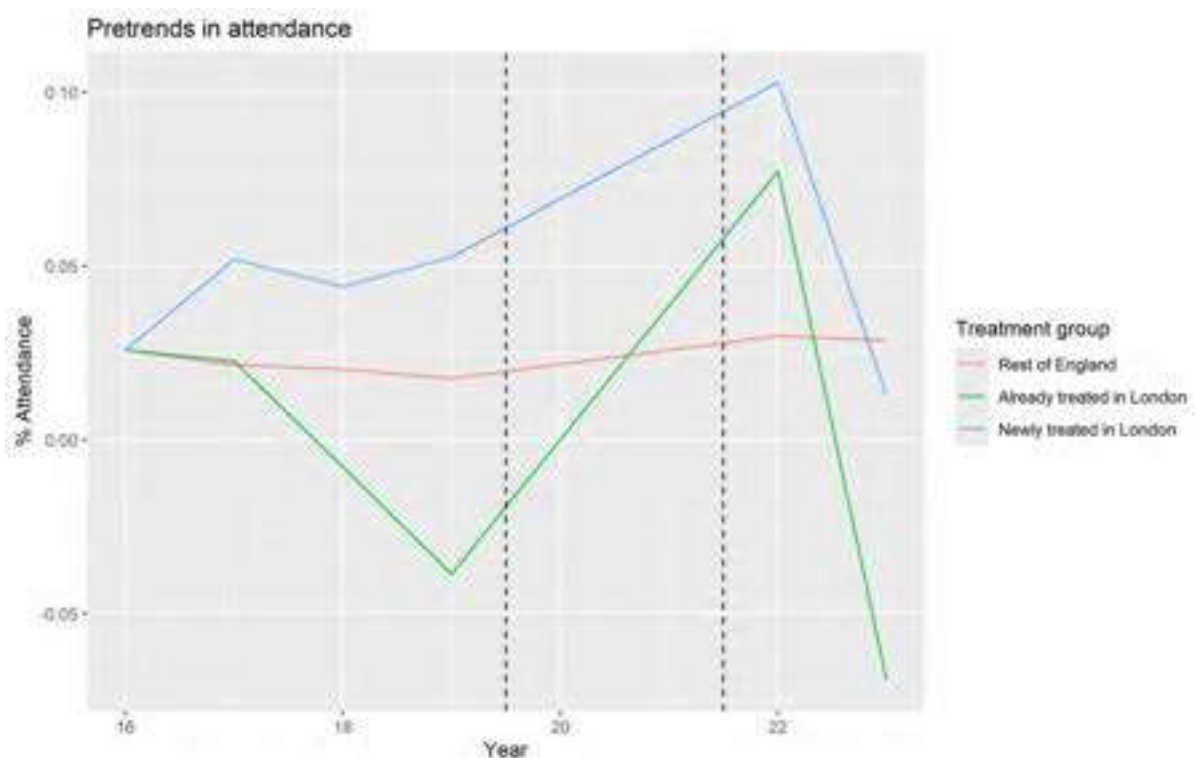
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 102 Model.docx

Figure 103. Conditional primary outcome pre-trends for triple differences



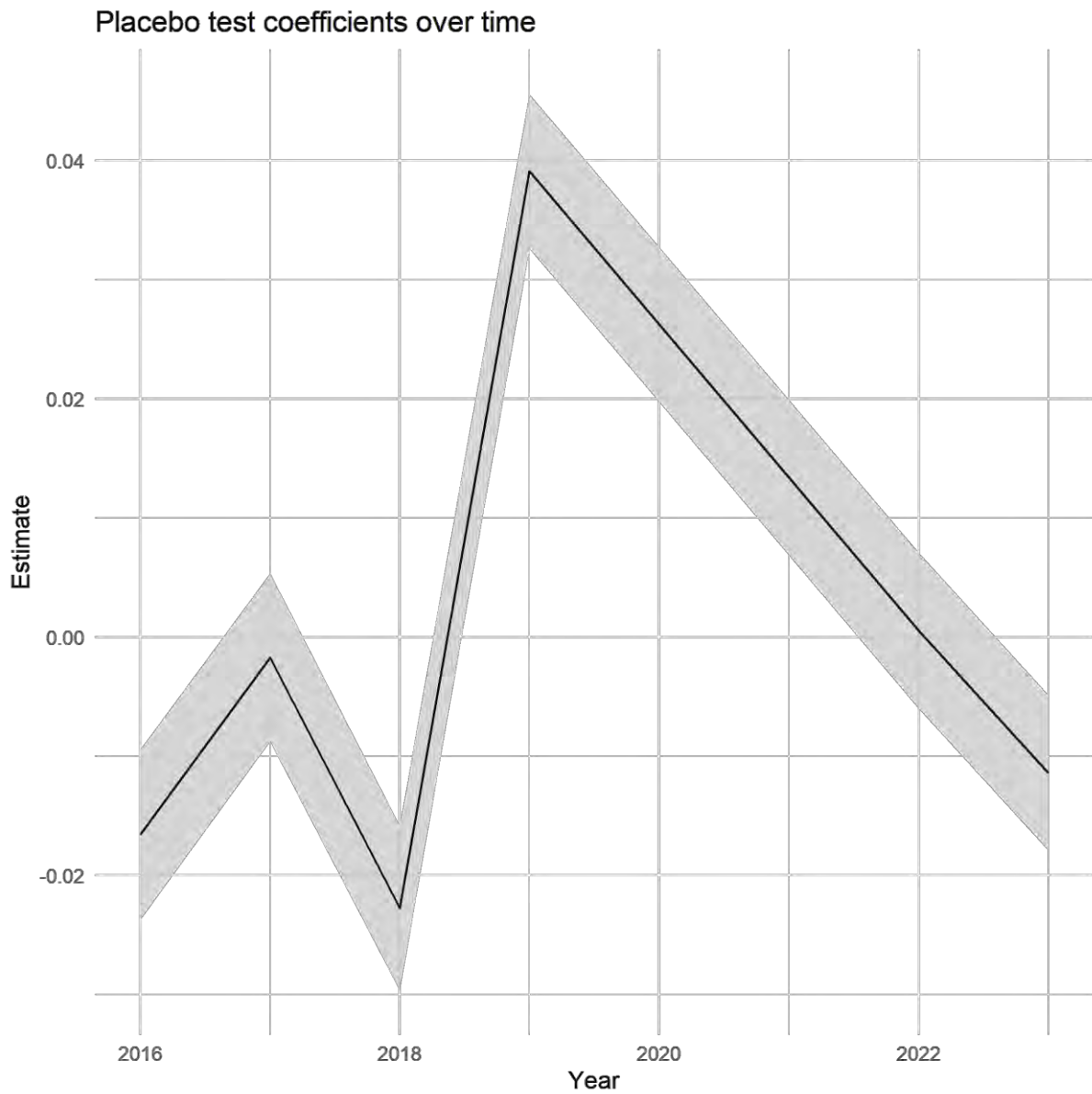
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 103 Model.docx

Figure 104. Conditional pre-trends for secondary outcome for triple difference



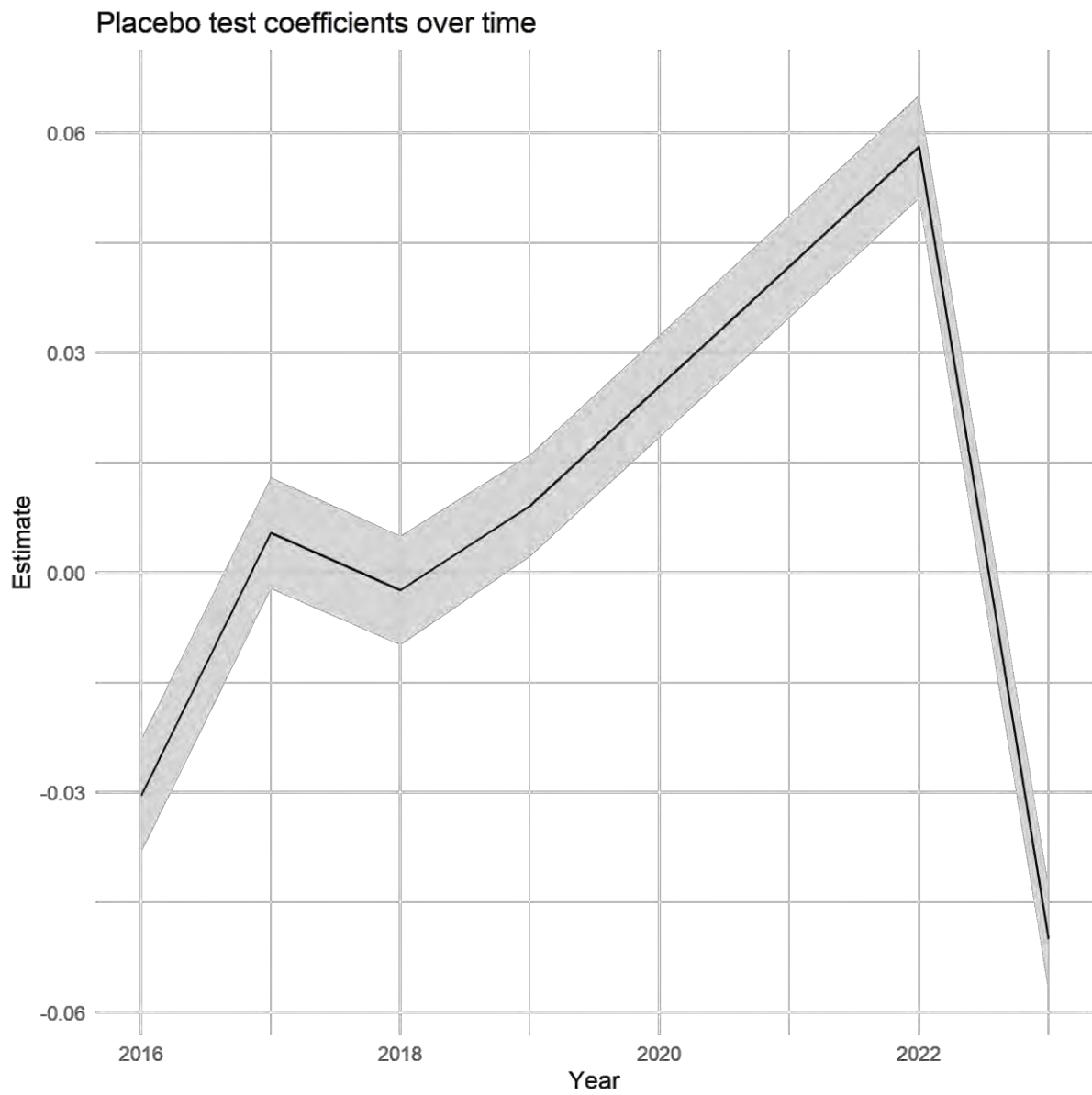
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 104 Model.docx

Figure 105. Placebo test estimates for primary outcome for difference in differences



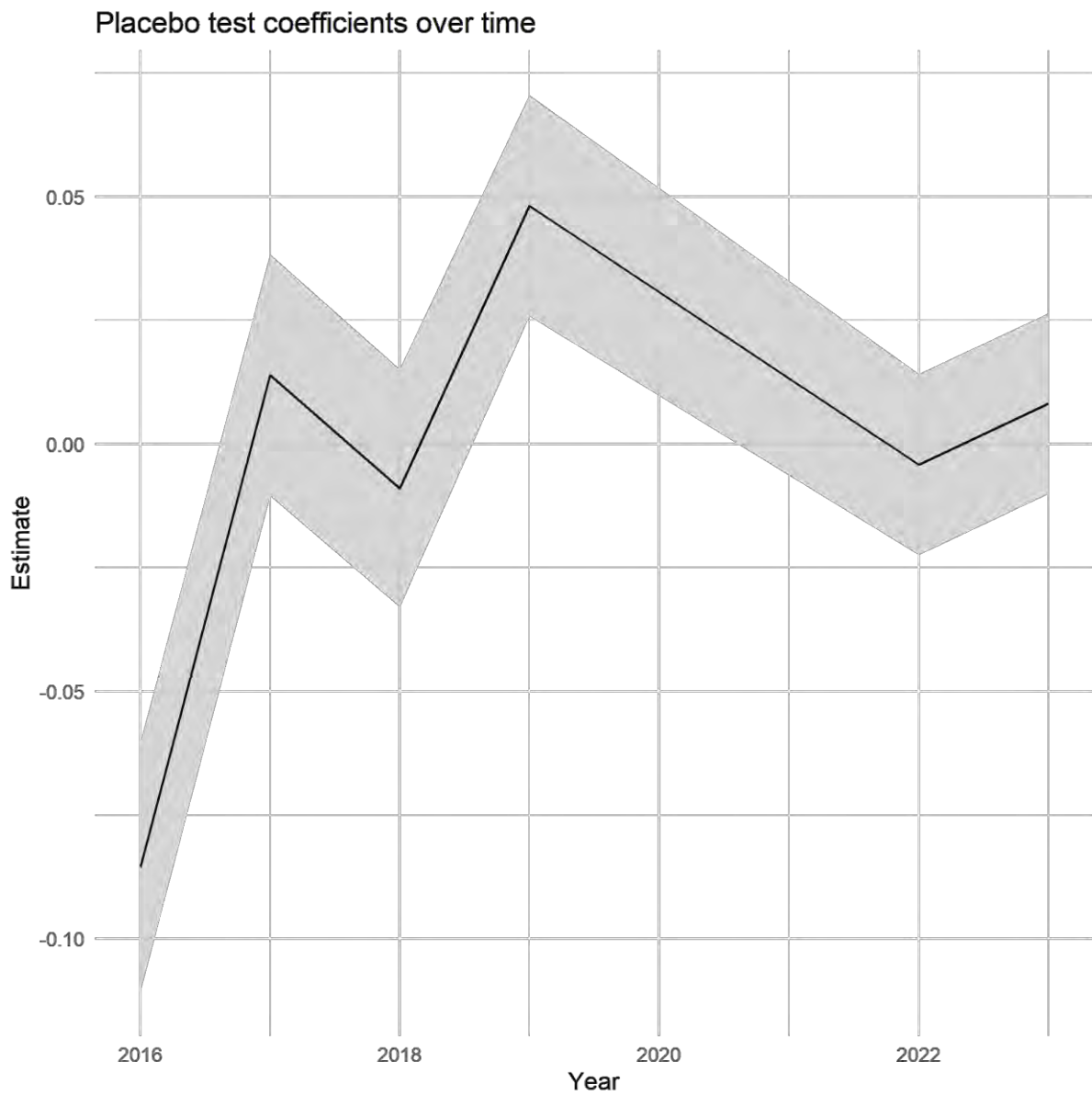
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 105 Models.csv

Figure 106. Placebo test estimates for secondary outcome for difference in differences



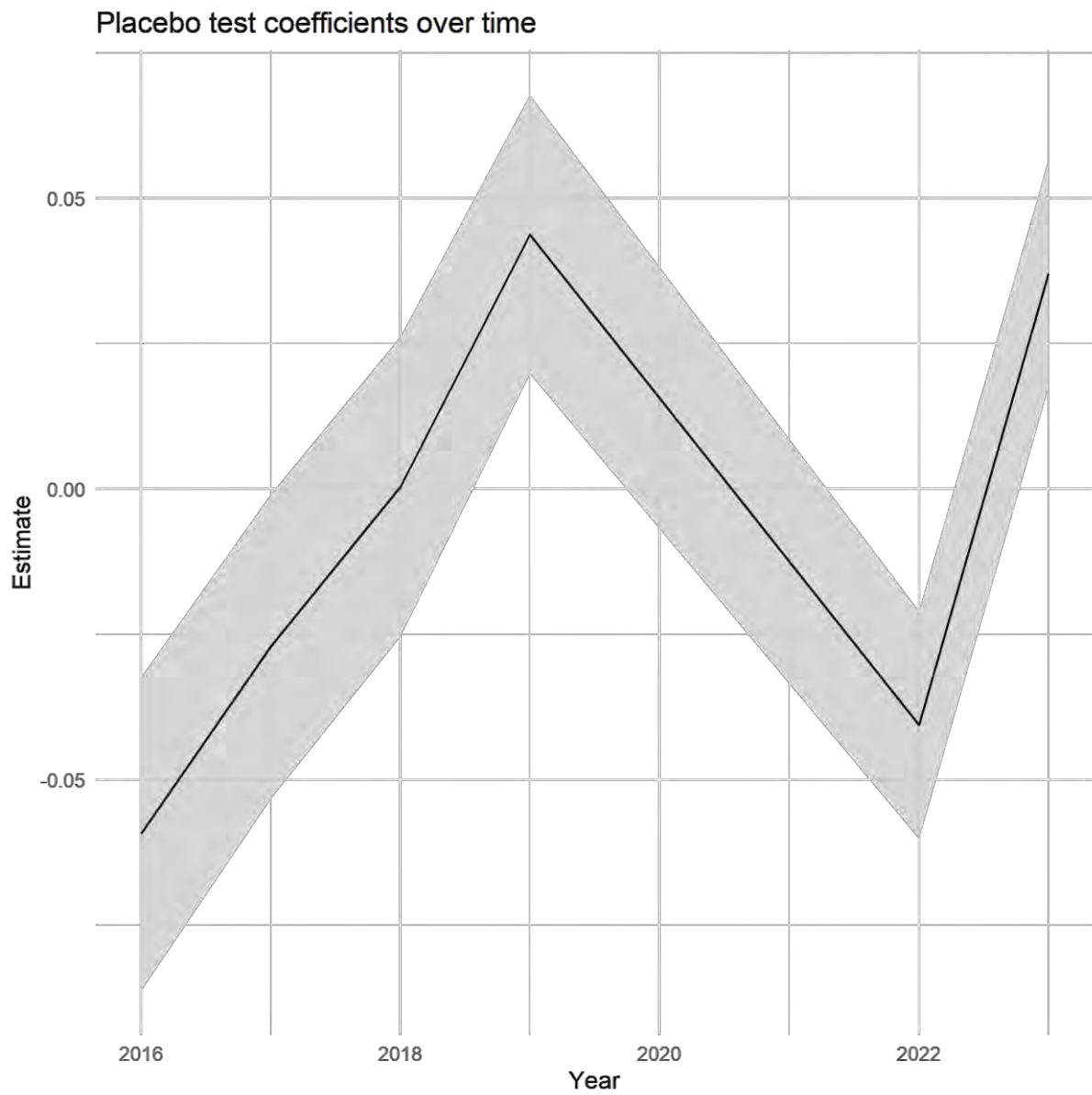
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 106 Models.csv

Figure 107. Placebo test estimates for primary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 107 Models.csv

Figure 108. Placebo test estimates for secondary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 108 Models.csv

## Appendix 9. Heterogeneity for pupils in IDACI quintile group 3

Table 48. Difference in differences estimates for primary outcome

---

Treatment estimate	0.015
	[-0.003, 0.032]
Num.Obs.	820395
R2	0.382
R2 Adj.	0.369
R2 Within	0.310
R2 Within Adj.	0.310
AIC	1950892.3
BIC	2142860.6
RMSE	0.78
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	820364

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 49. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.004
	[-0.009, 0.017]
Num.Obs.	819448
R2	0.067
R2 Adj.	0.048
R2 Within	0.023
R2 Within Adj.	0.023
AIC	1973412.5
BIC	2165350.0
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	819417

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 50. Triple difference estimates for primary outcome

Treatment estimate	-0.031 [-0.145, 0.083]
Num.Obs.	823461
R2	0.382
R2 Adj.	0.369
R2 Within	0.310
R2 Within Adj.	0.310
AIC	1958447.6
BIC	2152139.4
RMSE	0.78
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	823429

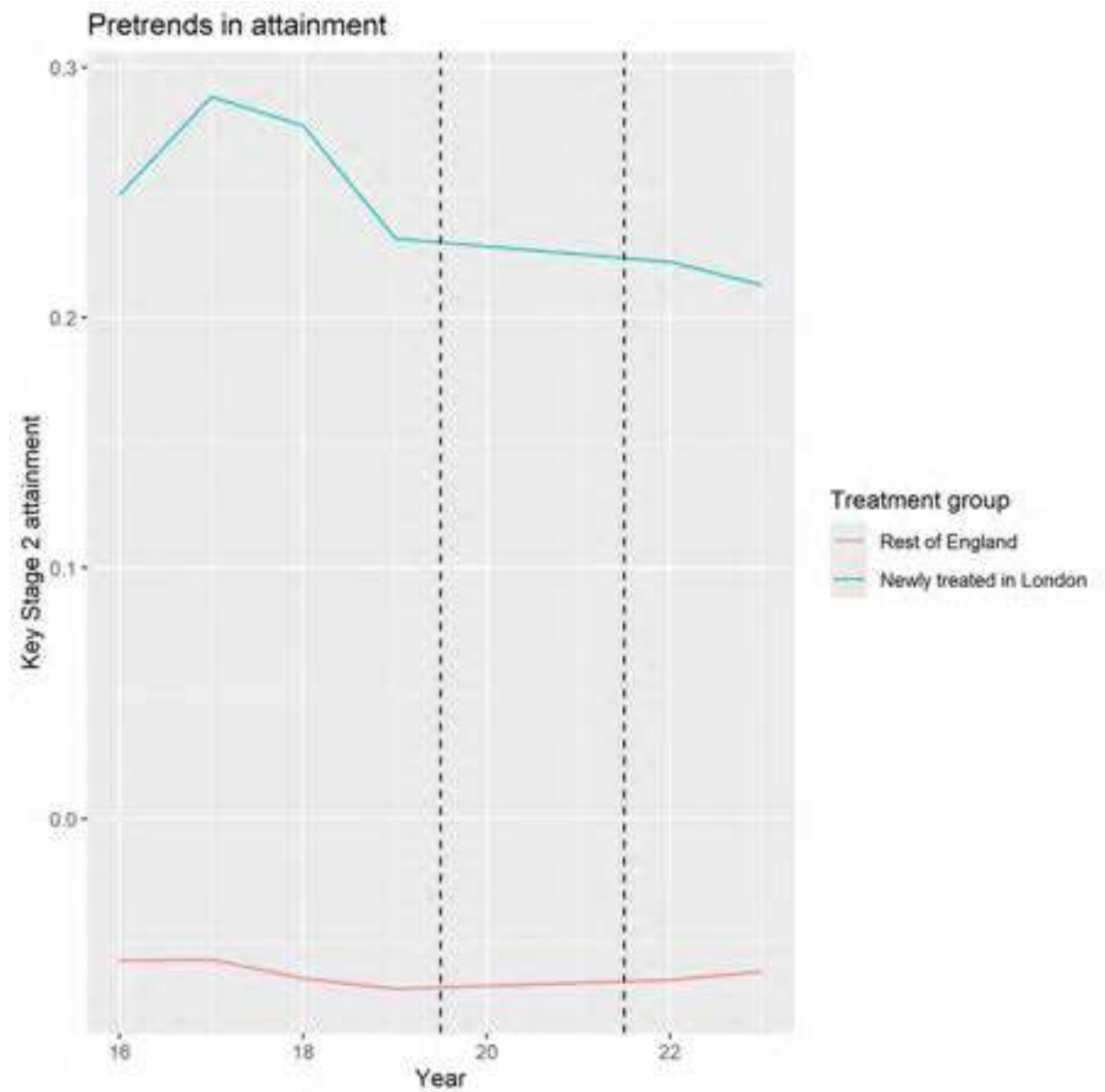
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 51. Triple difference estimates for secondary outcome

Treatment estimate	0.090 [-0.014, 0.194]
Num.Obs.	822511
R2	0.067
R2 Adj.	0.048
R2 Within	0.023
R2 Within Adj.	0.023
AIC	1980481.2
BIC	2174142.0
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	822479

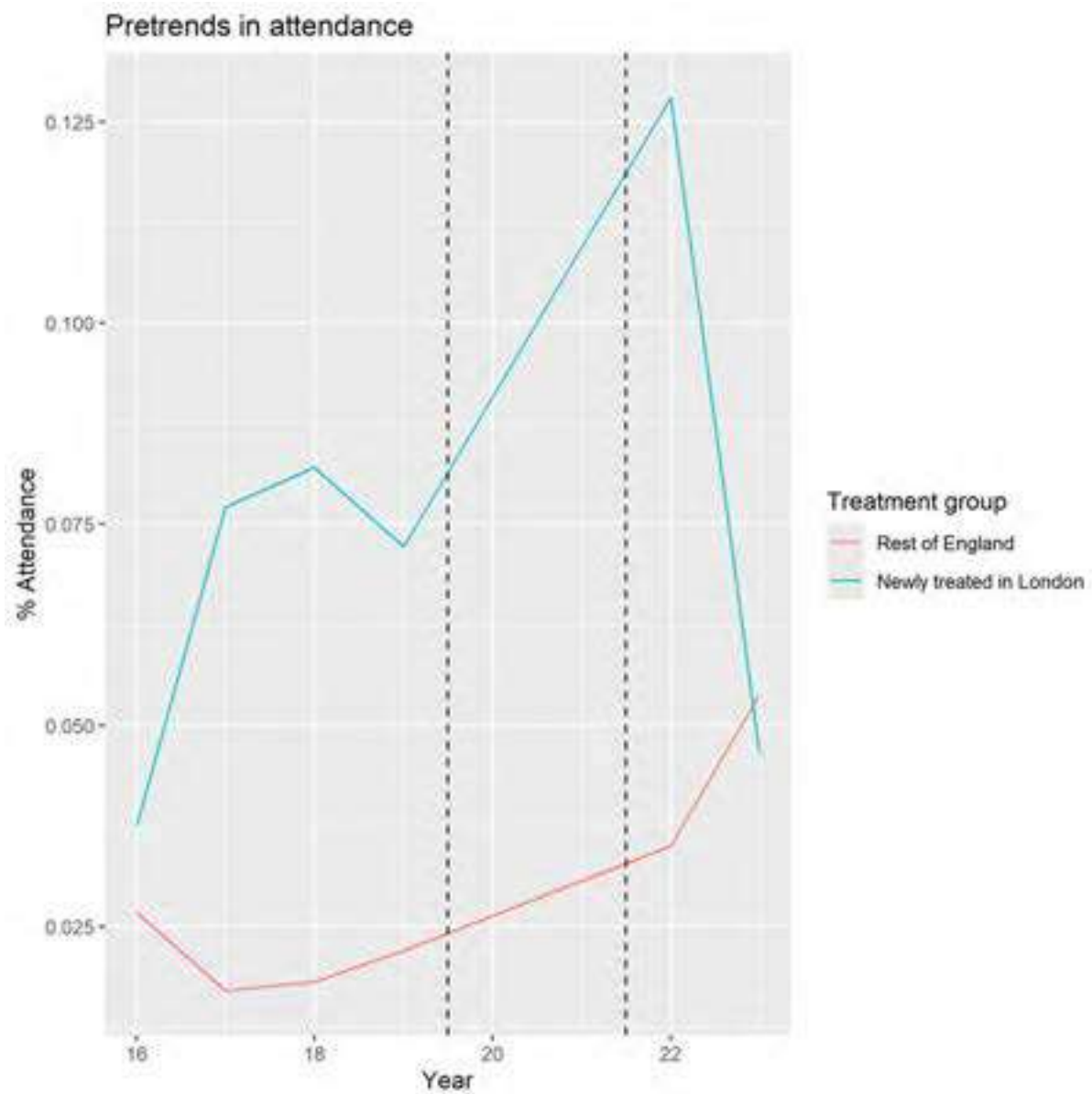
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 109. Raw pre-trends in primary outcome for difference-in-differences



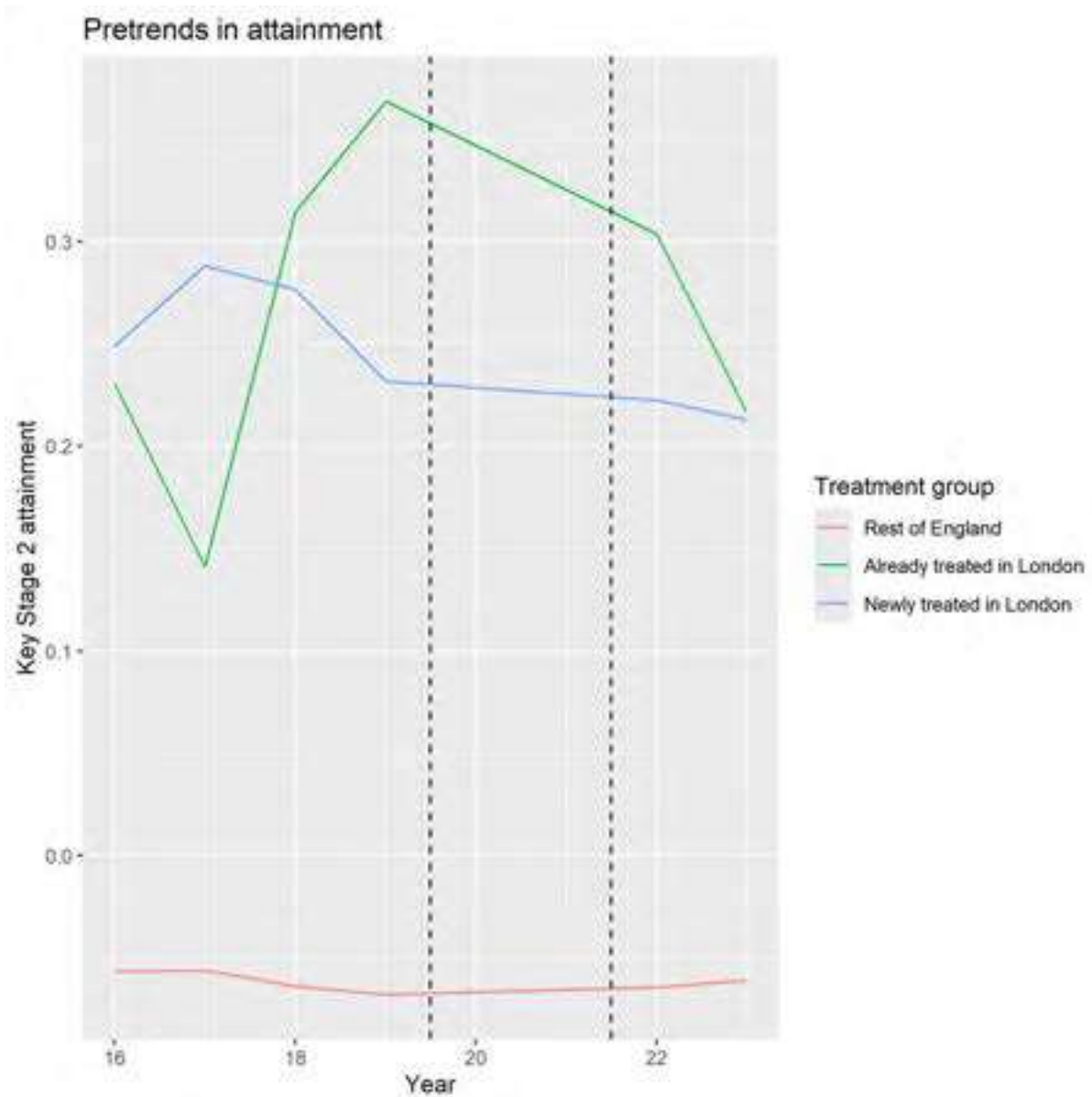
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 109 Counts.csv.

Figure 110. Raw pre-trends in secondary outcome for difference-in-differences



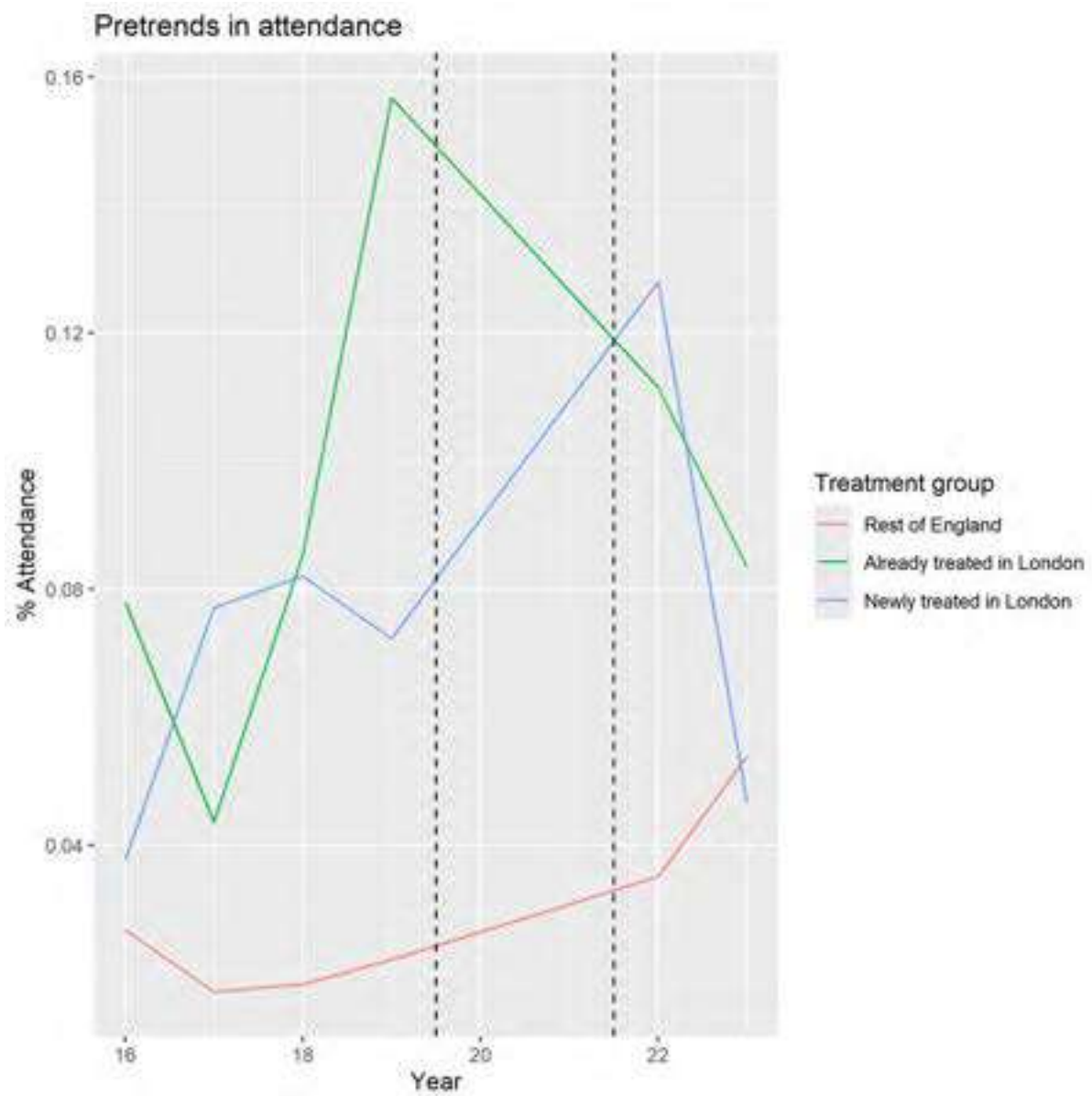
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 110 Counts.csv.

Figure 111. Raw pre-trends in primary outcome for triple difference



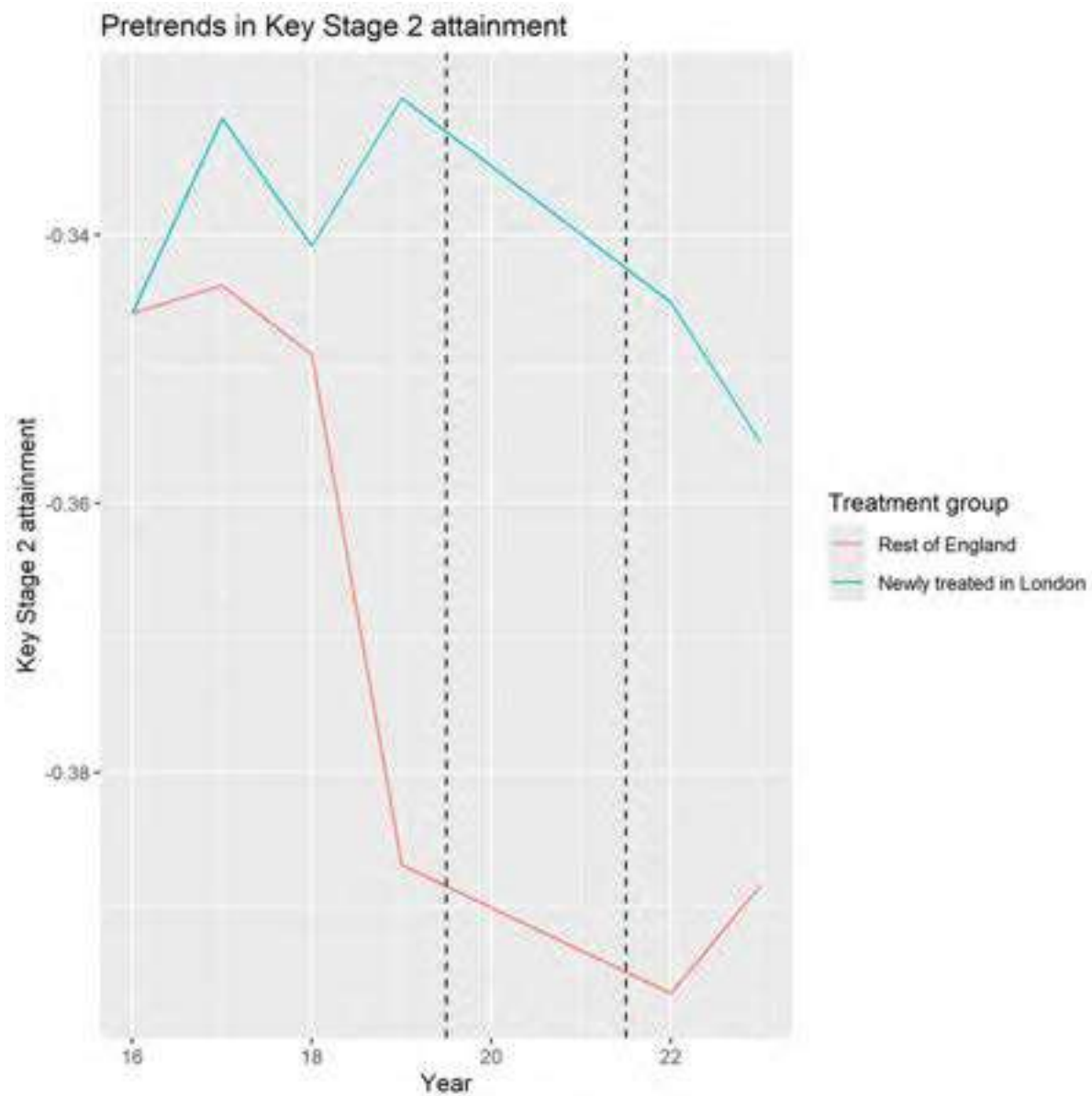
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 111 Counts.csv.

Figure 112. Raw pre-trends in secondary outcome for triple difference



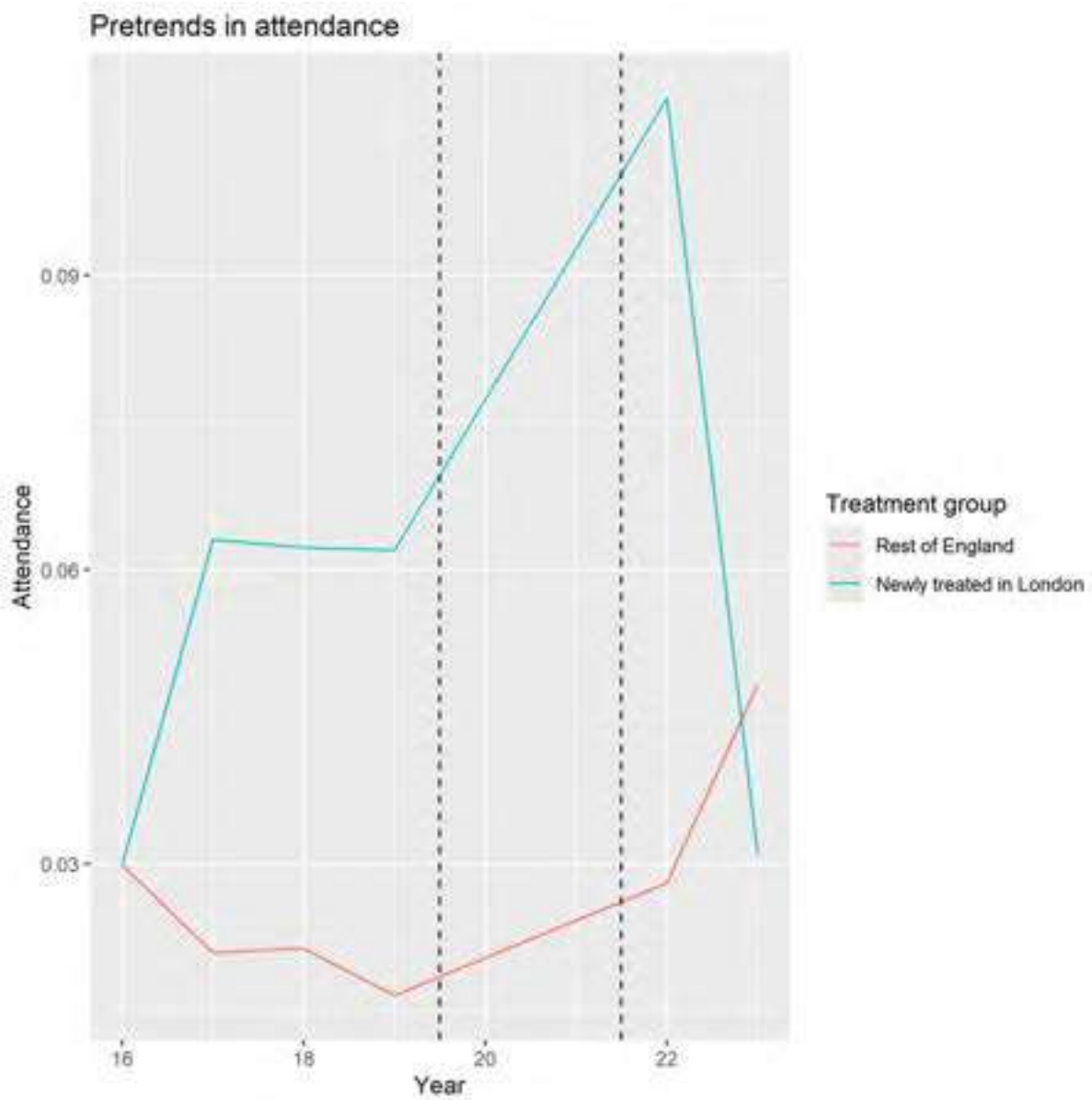
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 112 Counts.csv.

Figure 113. Conditional primary outcome pre-trends for difference-in-differences



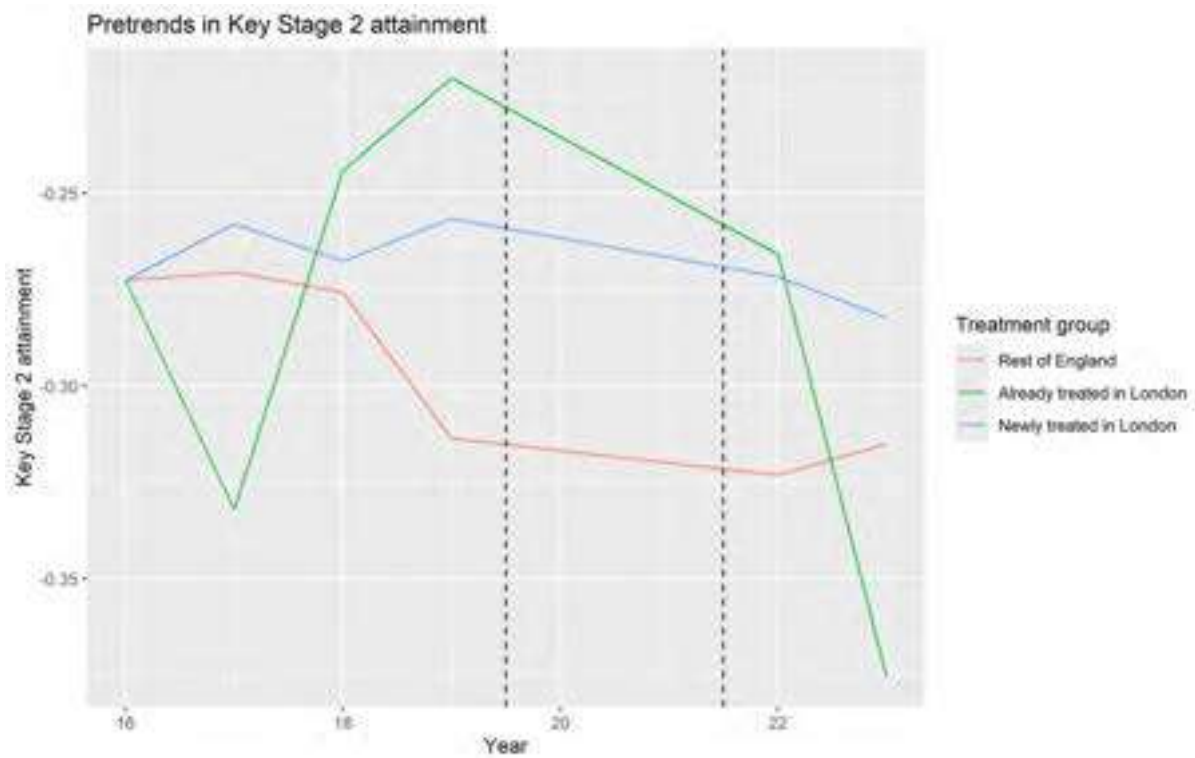
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 113 Model.docx.

Figure 114. Conditional secondary outcome pre-trends for difference-in-differences



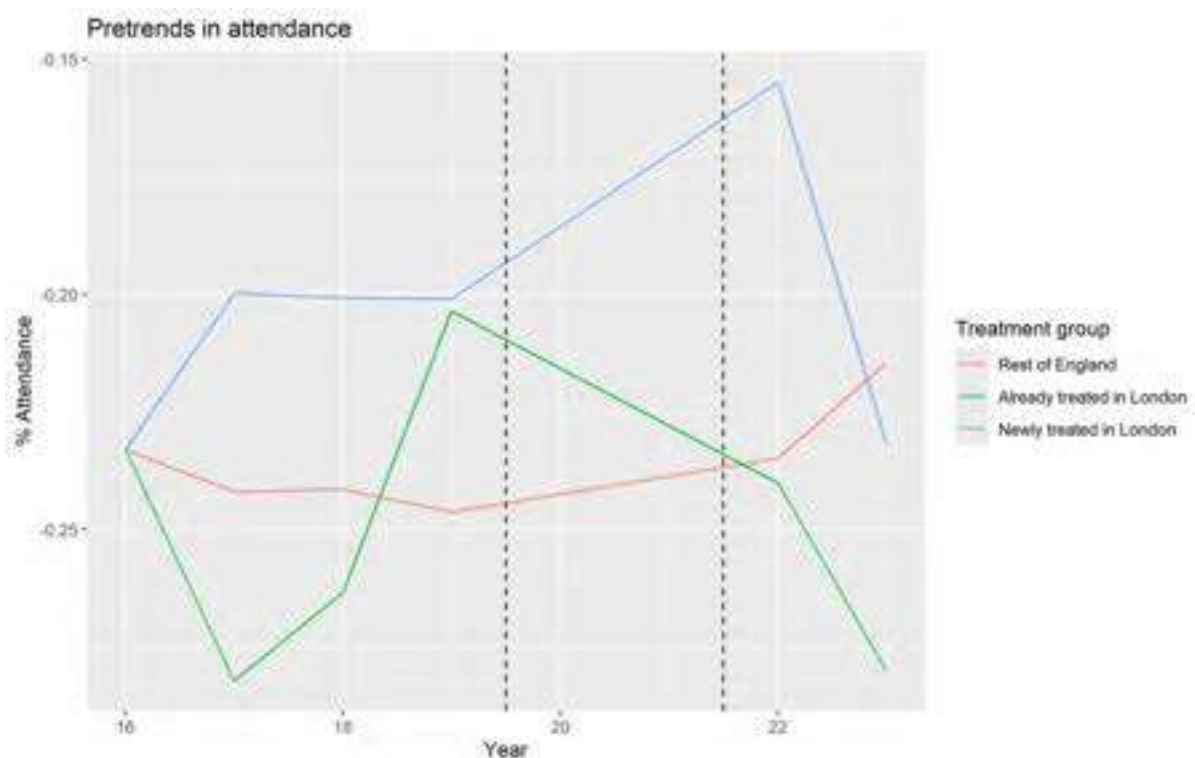
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 114 Model.docx

Figure 115. Conditional primary outcome pre-trends for triple differences



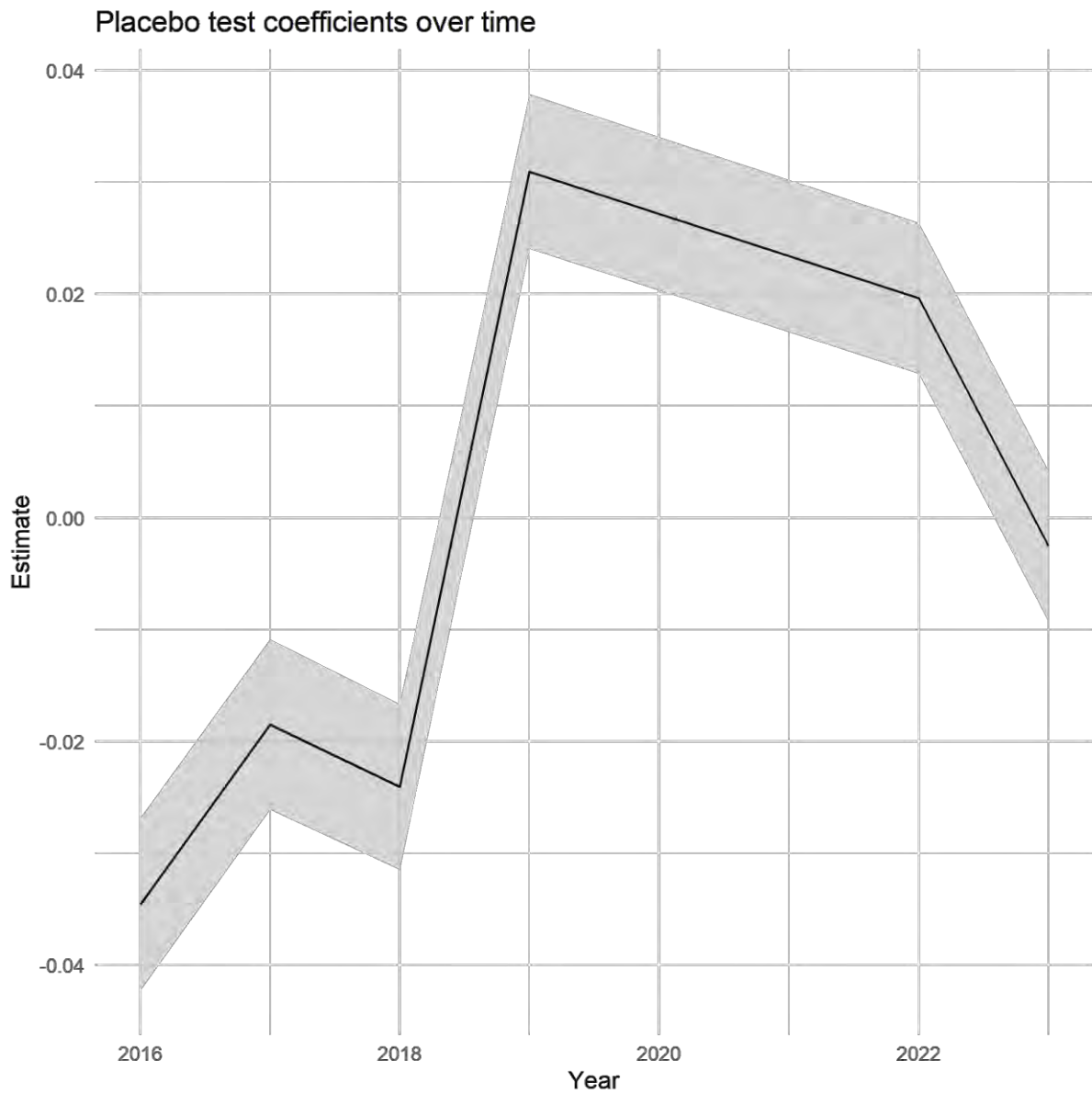
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 115 Model.docx

Figure 116. Conditional pre-trends for secondary outcome for triple difference



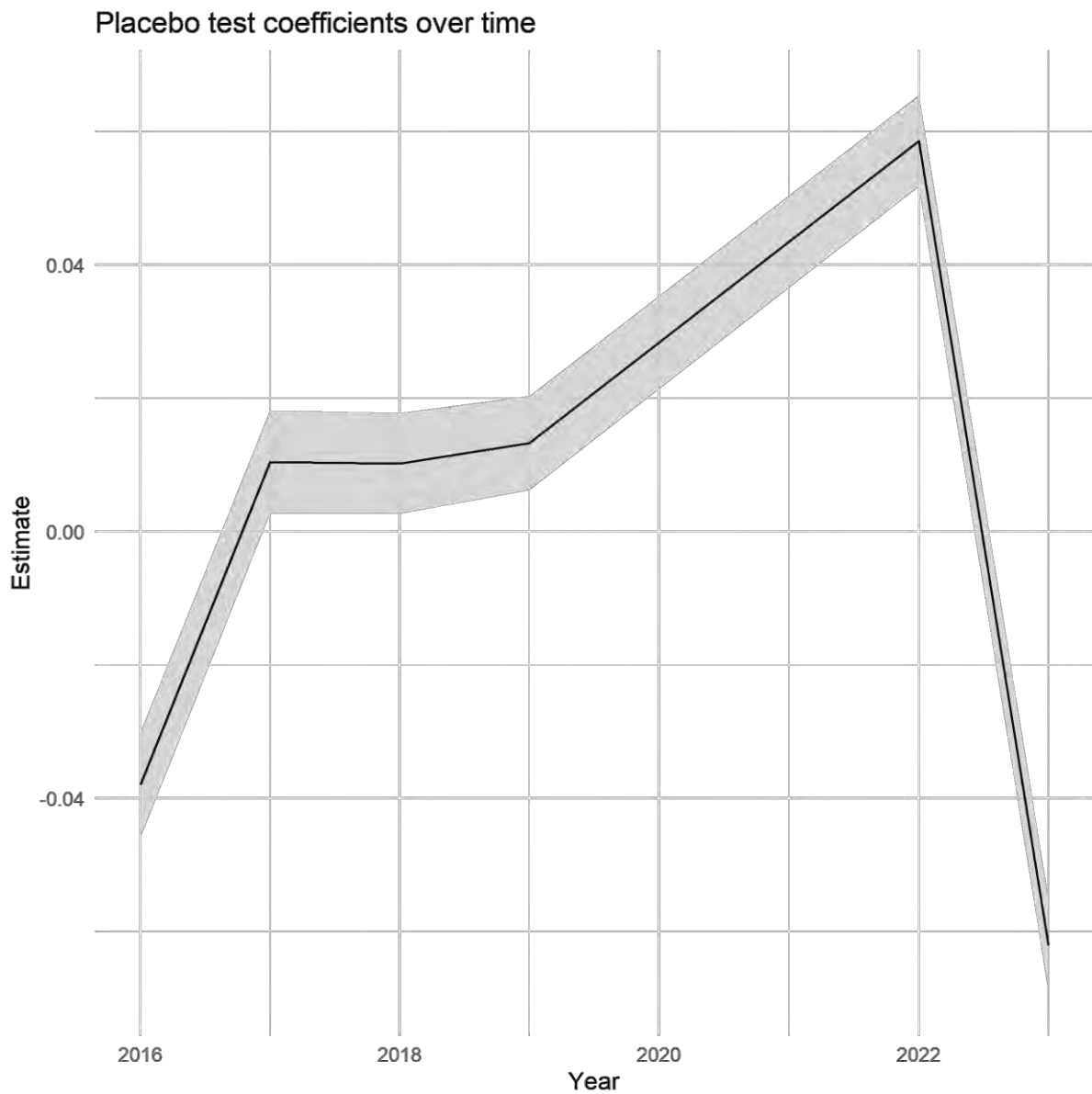
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 116 Model.docx

Figure 117. Placebo test estimates for primary outcome for difference in differences



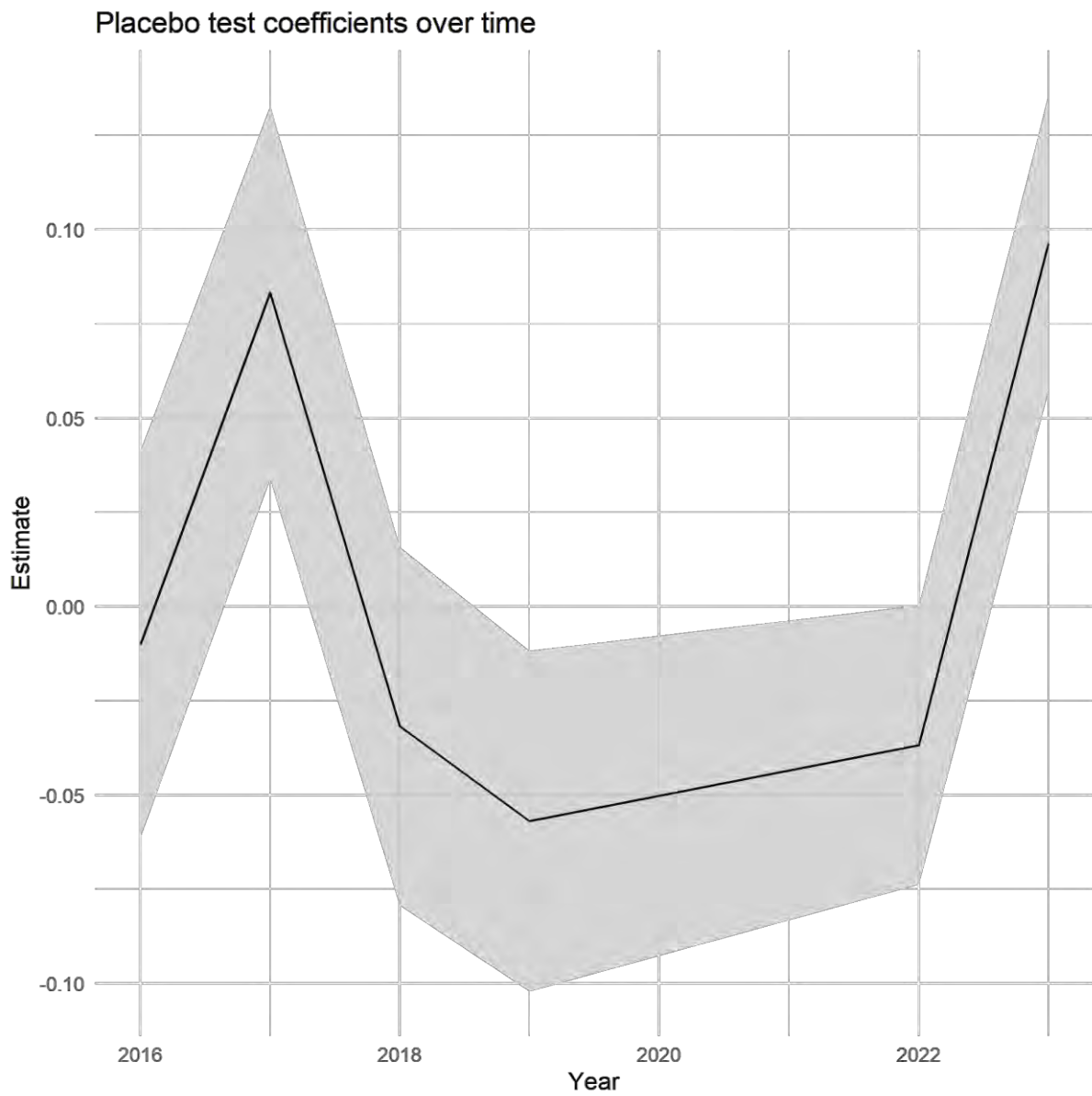
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 117 Models.csv

Figure 118. Placebo test estimates for secondary outcome for difference in differences



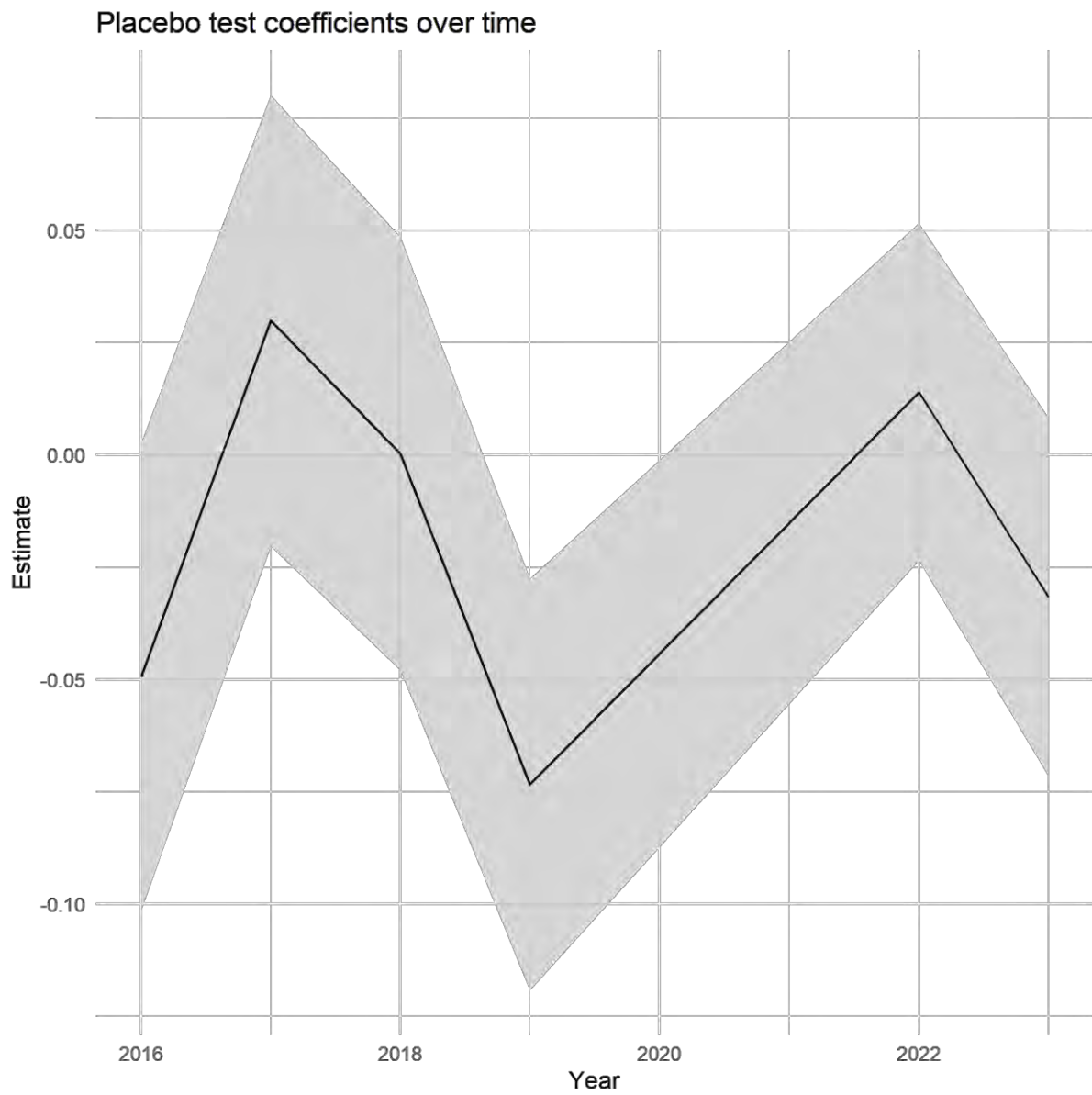
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 118 Models.csv

Figure 119. Placebo test estimates for primary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 119 Models.csv

Figure 120. Placebo test estimates for secondary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 120 Models.csv

## Appendix 10. Heterogeneity for pupils in IDACI quintile group 4

Table 52. Difference in differences estimates for primary outcome

---

Treatment estimate	0.012 [-0.009, 0.033]
Num.Obs.	844301
R2	0.374
R2 Adj.	0.361
R2 Within	0.306
R2 Within Adj.	0.306
AIC	1970252.6
BIC	2164011.5
RMSE	0.76
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	844270

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 53. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.026 [0.012, 0.040]
Num.Obs.	843347
R2	0.066
R2 Adj.	0.048
R2 Within	0.021
R2 Within Adj.	0.021
AIC	1877274.1
BIC	2070990.9
RMSE	0.72
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	843316

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 54. Triple difference estimates for primary outcome

Treatment estimate	-0.031 [-0.153, 0.091]
Num.Obs.	846368
R2	0.374
R2 Adj.	0.361
R2 Within	0.306
R2 Within Adj.	0.306
AIC	1975526.3
BIC	2170747.0
RMSE	0.76
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	846336

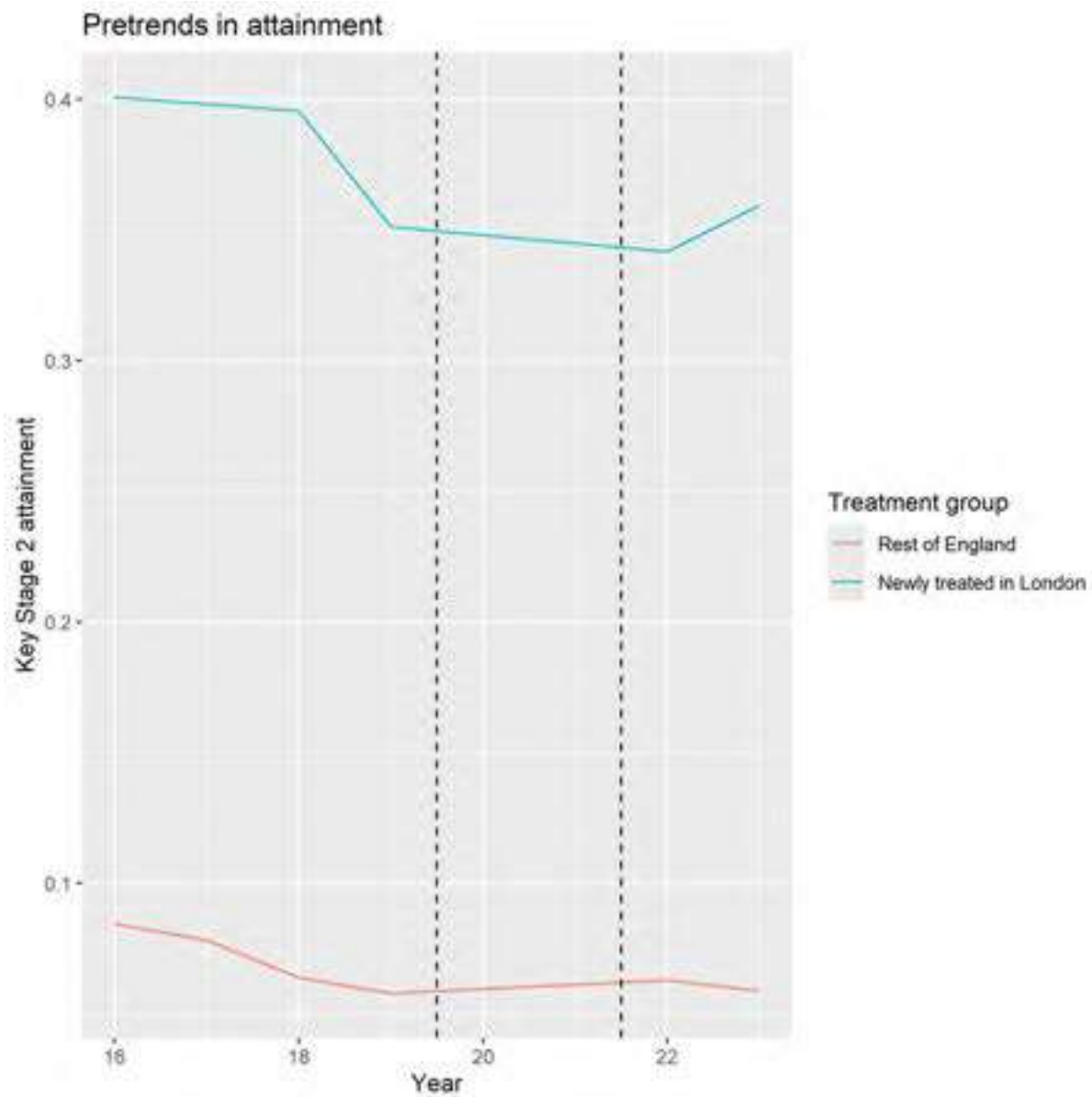
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 55. Triple difference estimates for secondary outcome

Treatment estimate	-0.039 [-0.127, 0.050]
Num.Obs.	845408
R2	0.067
R2 Adj.	0.048
R2 Within	0.021
R2 Within Adj.	0.021
AIC	1881666.9
BIC	2076845.3
RMSE	0.72
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	845376

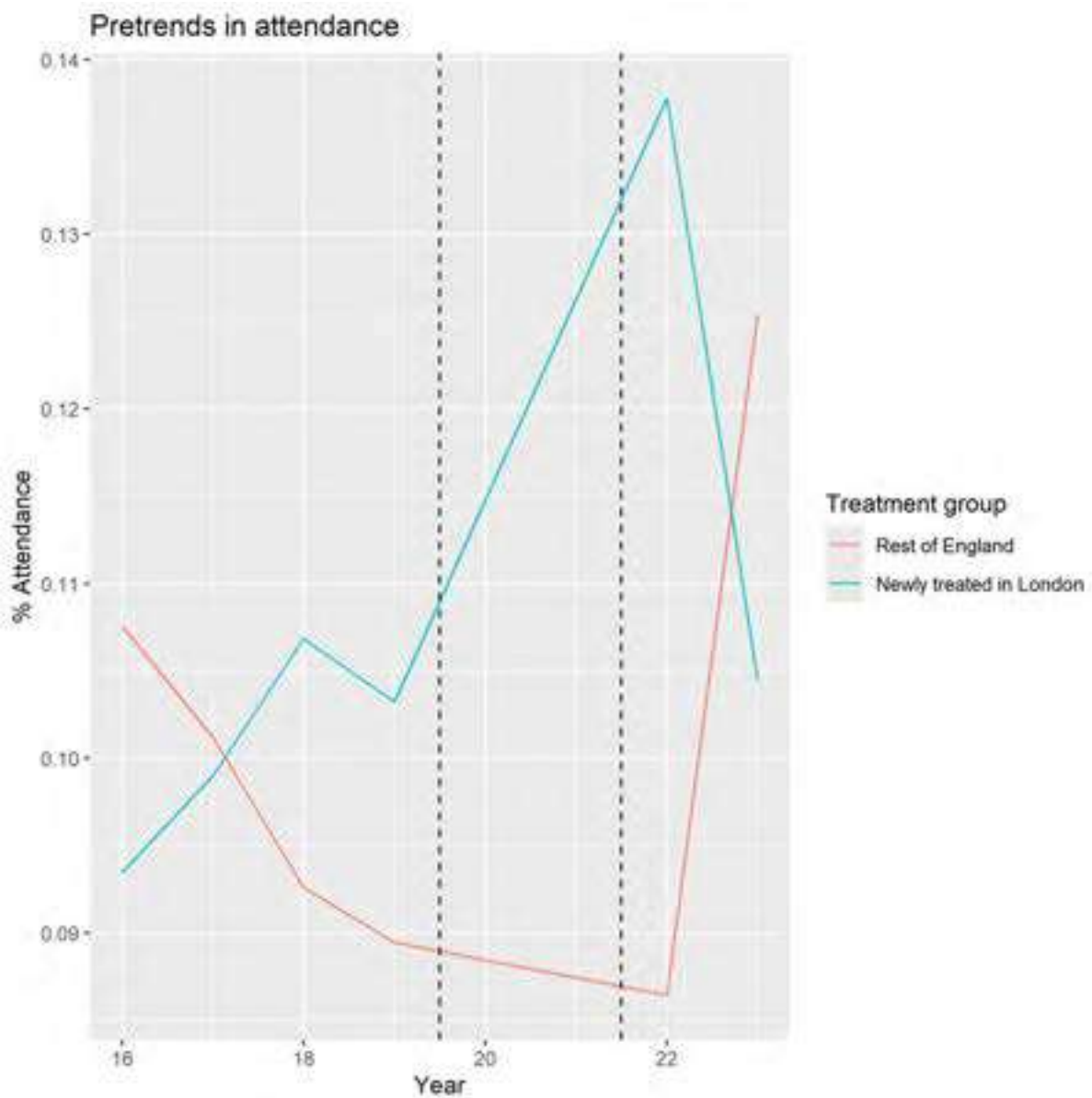
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 121. Raw pre-trends in primary outcome for difference-in-differences



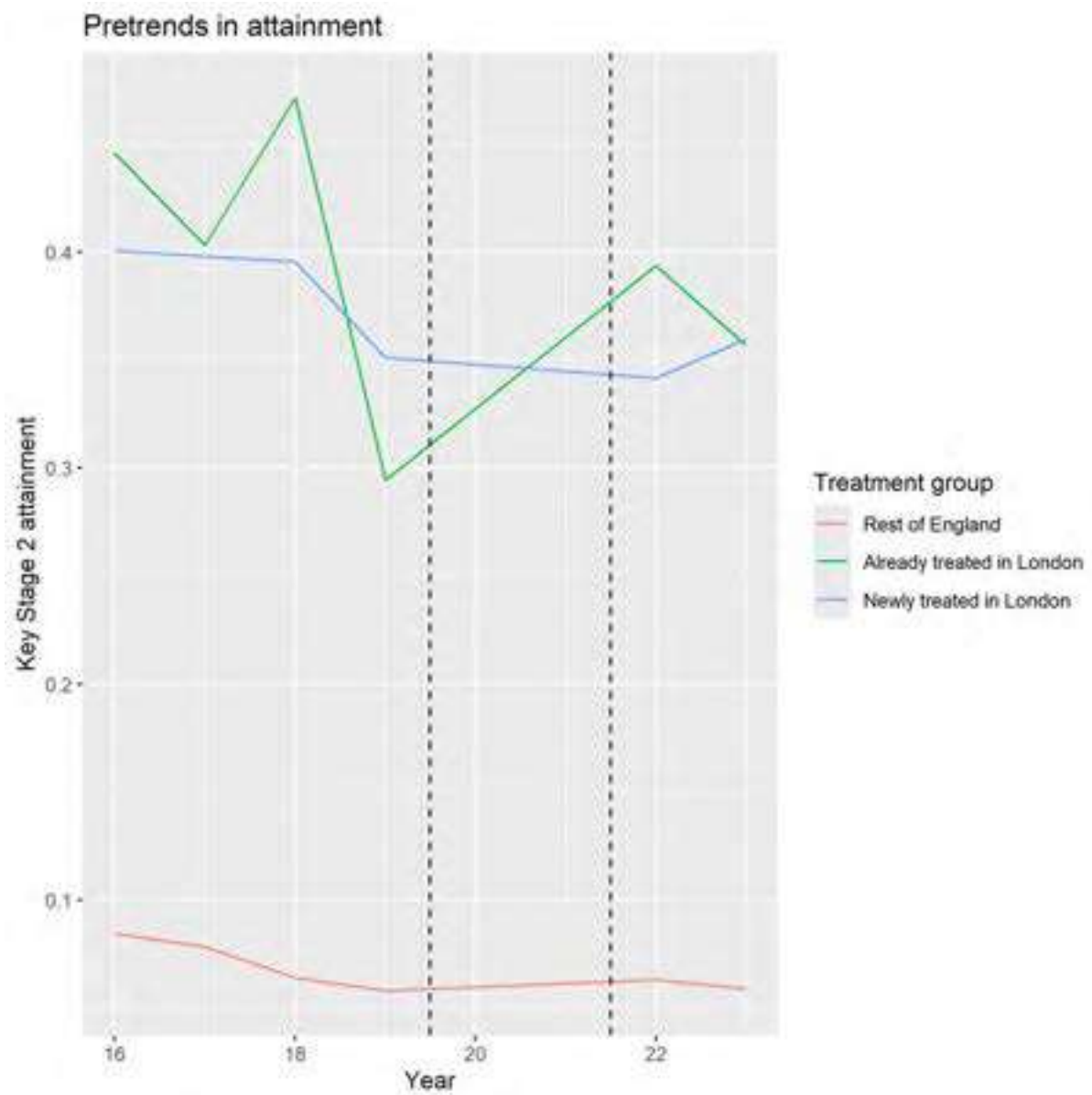
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 121 Counts.csv.

Figure 122. Raw pre-trends in secondary outcome for difference-in-differences



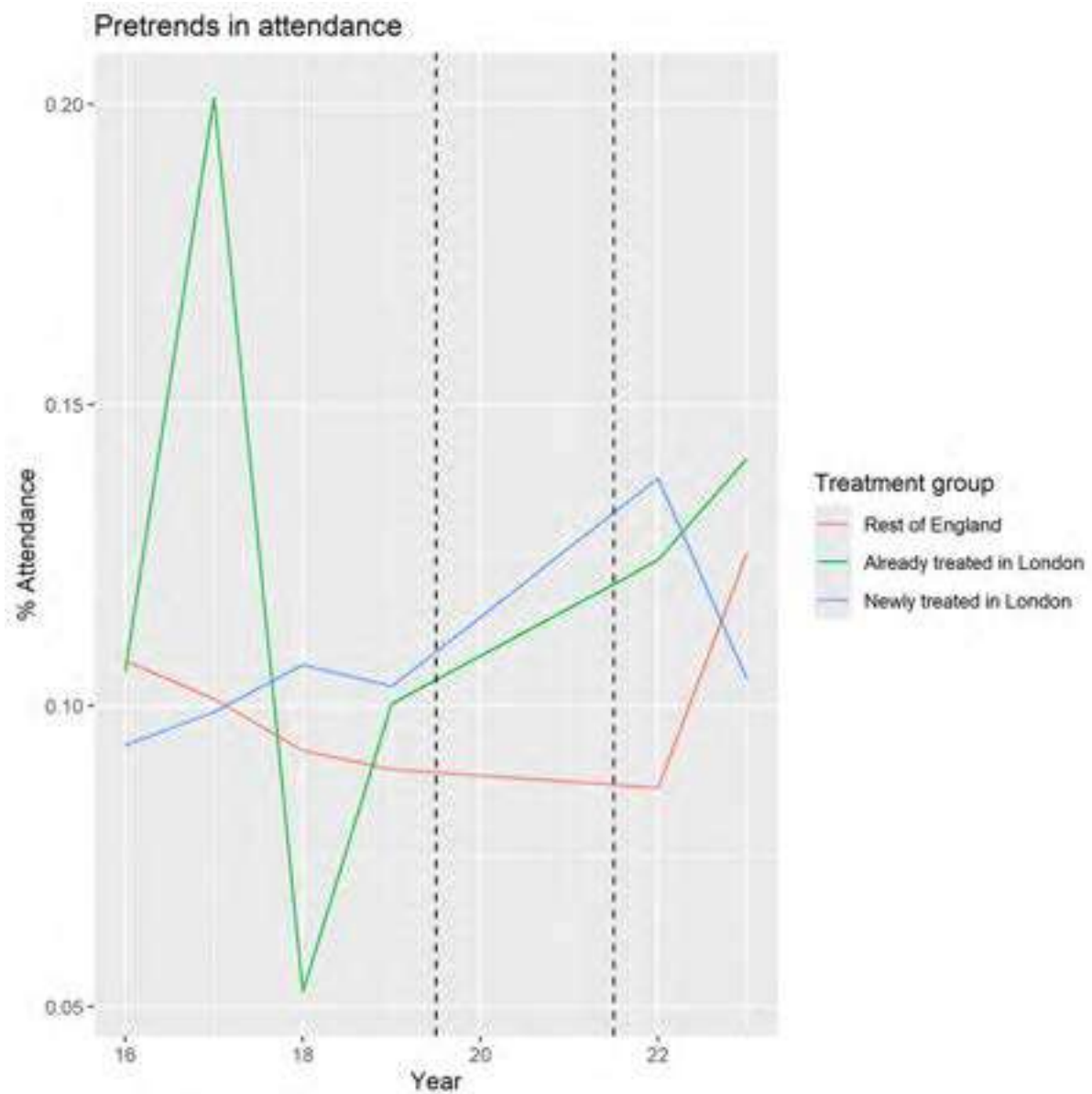
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 122 Counts.csv.

Figure 123. Raw pre-trends in primary outcome for triple difference



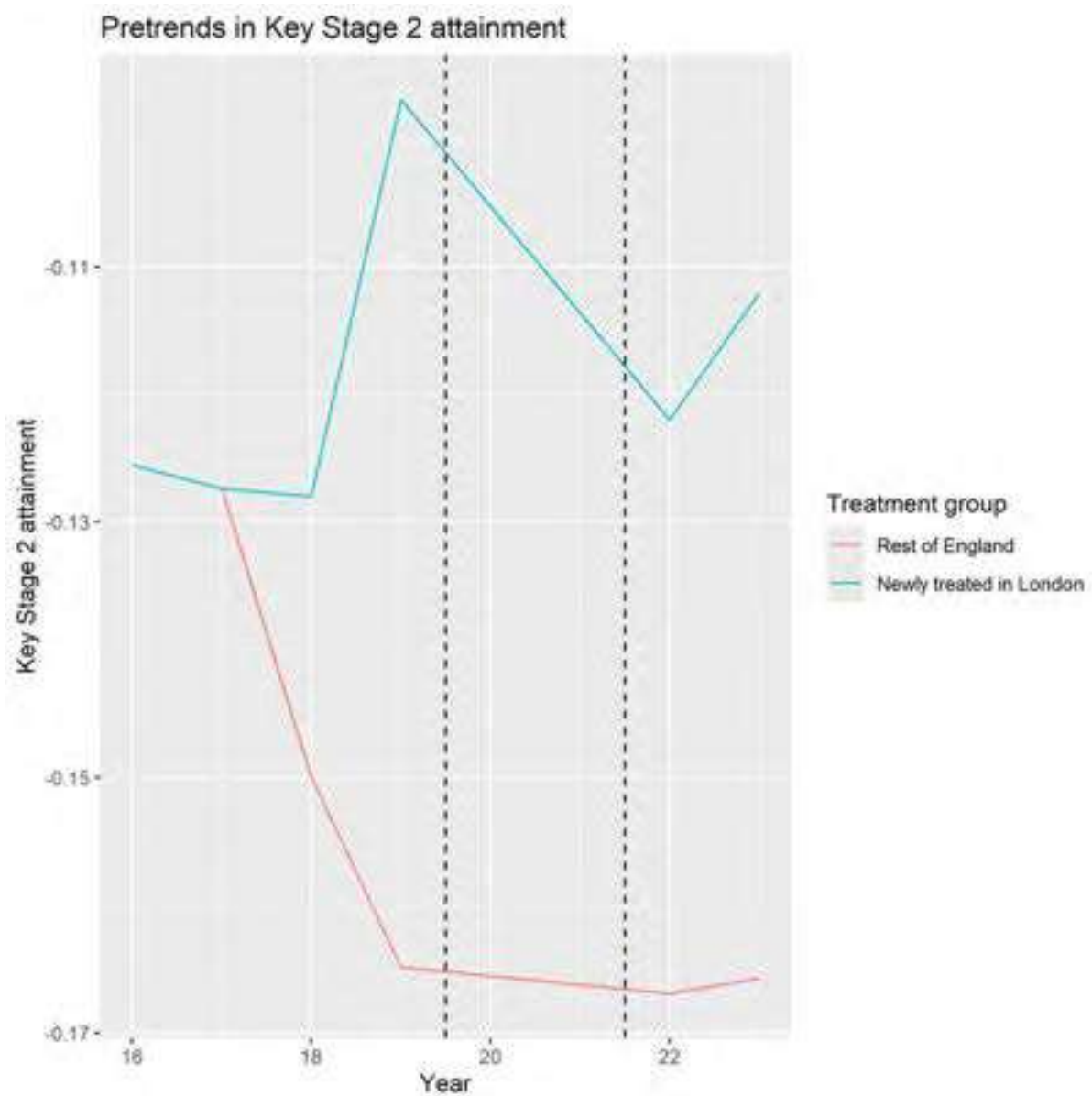
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 123 Counts.csv.

Figure 124. Raw pre-trends in secondary outcome for triple difference



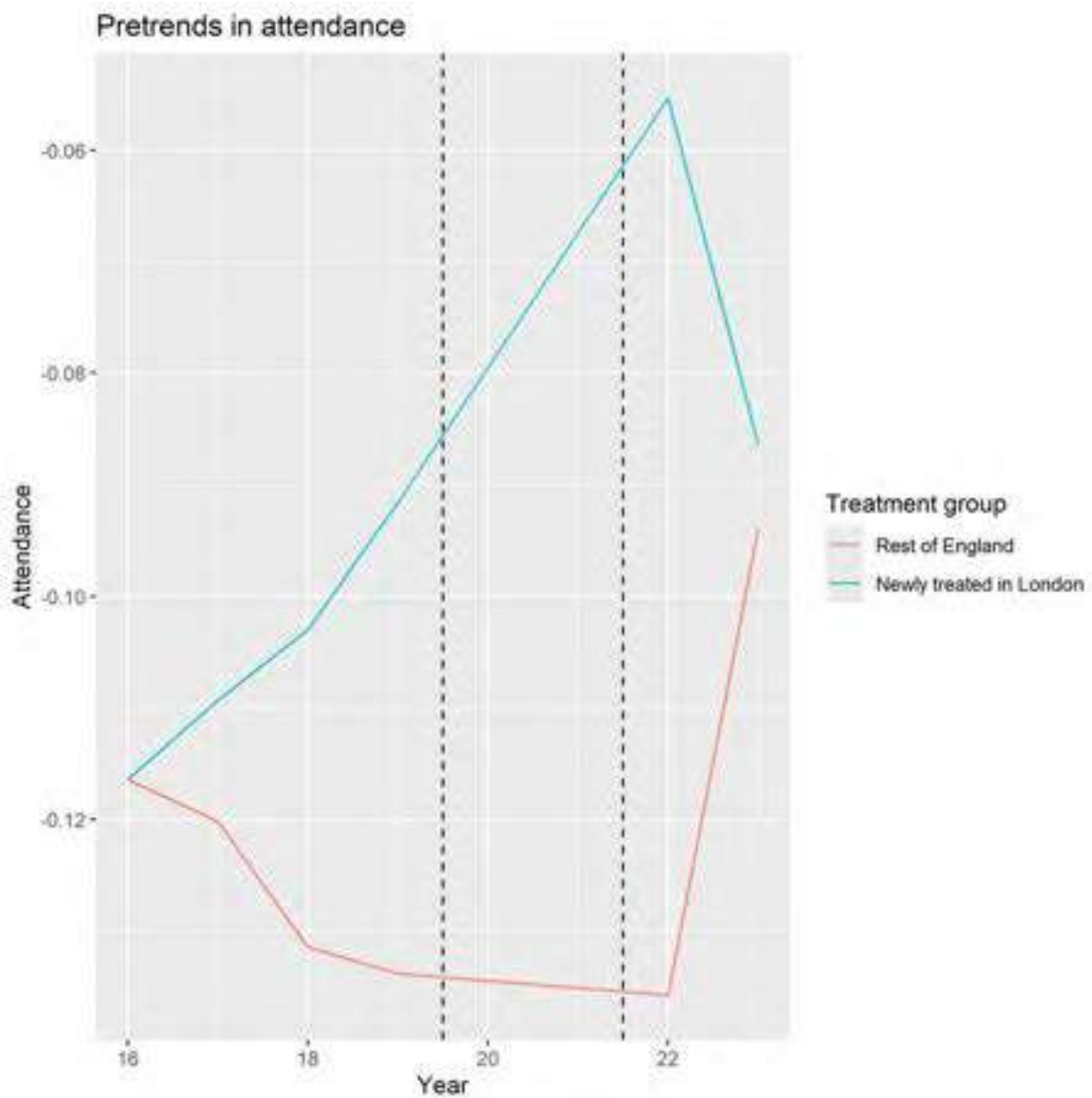
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 124 Counts.csv.

Figure 125. Conditional primary outcome pre-trends for difference-in-differences



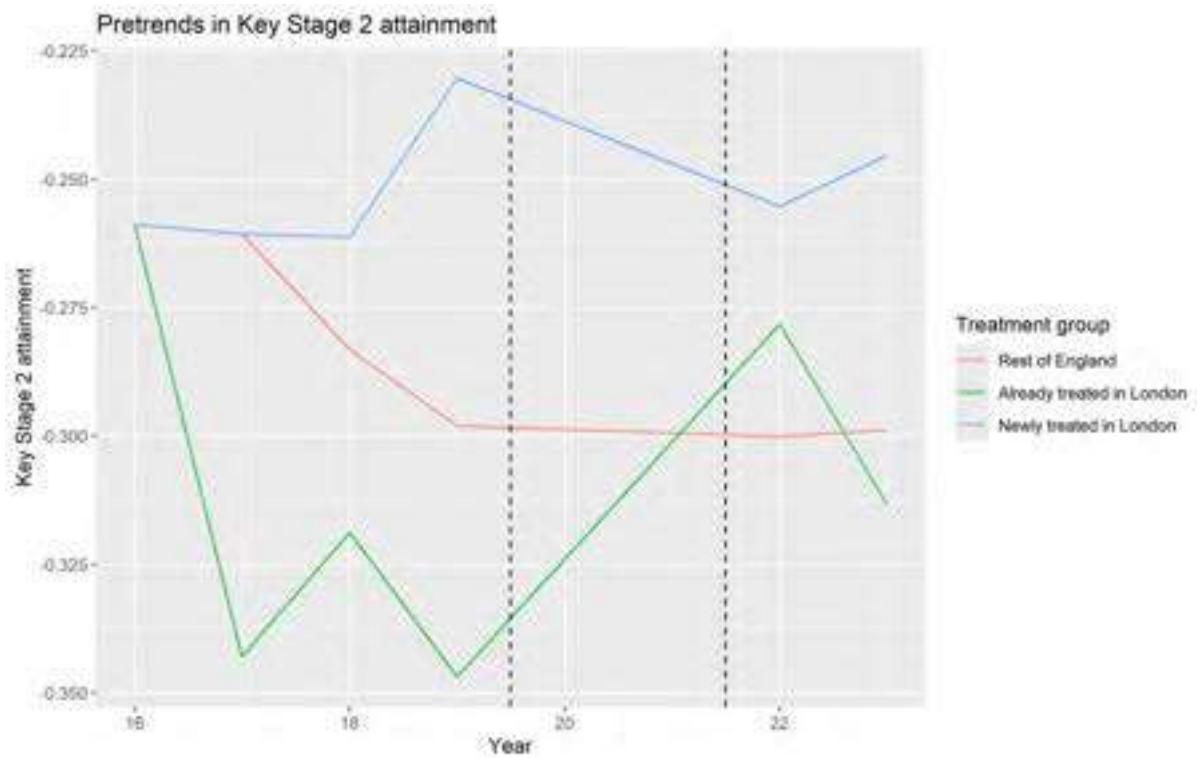
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 125 Model.docx.

Figure 126. Conditional secondary outcome pre-trends for difference-in-differences



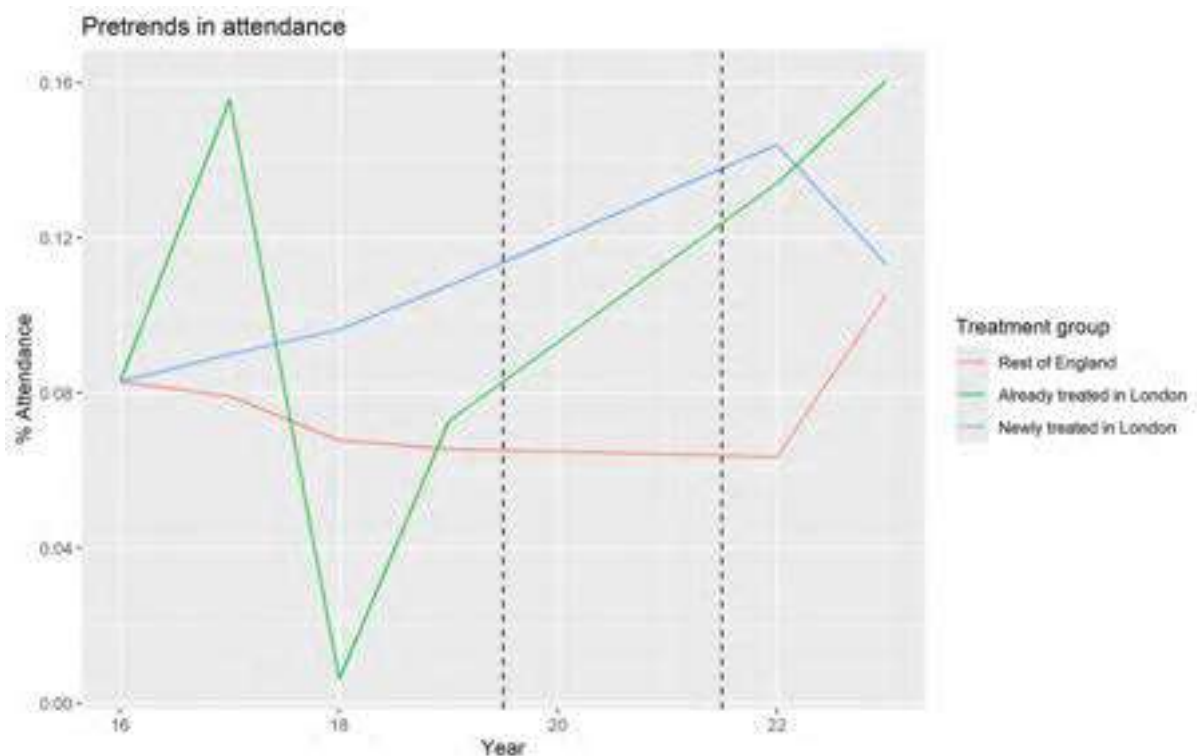
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 126 Model.docx

Figure 127. Conditional primary outcome pre-trends for triple differences



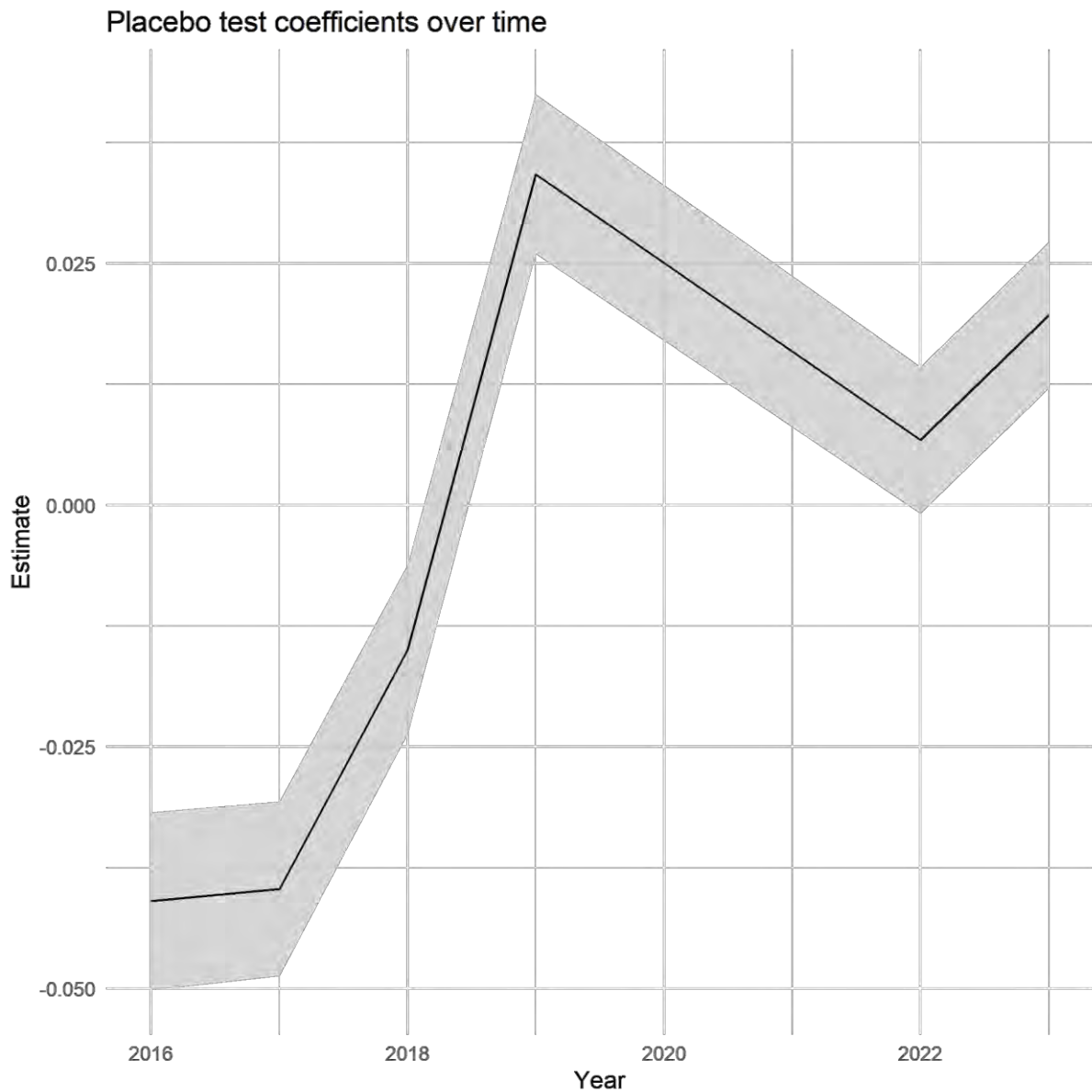
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 127 Model.docx

Figure 128. Conditional pre-trends for secondary outcome for triple difference



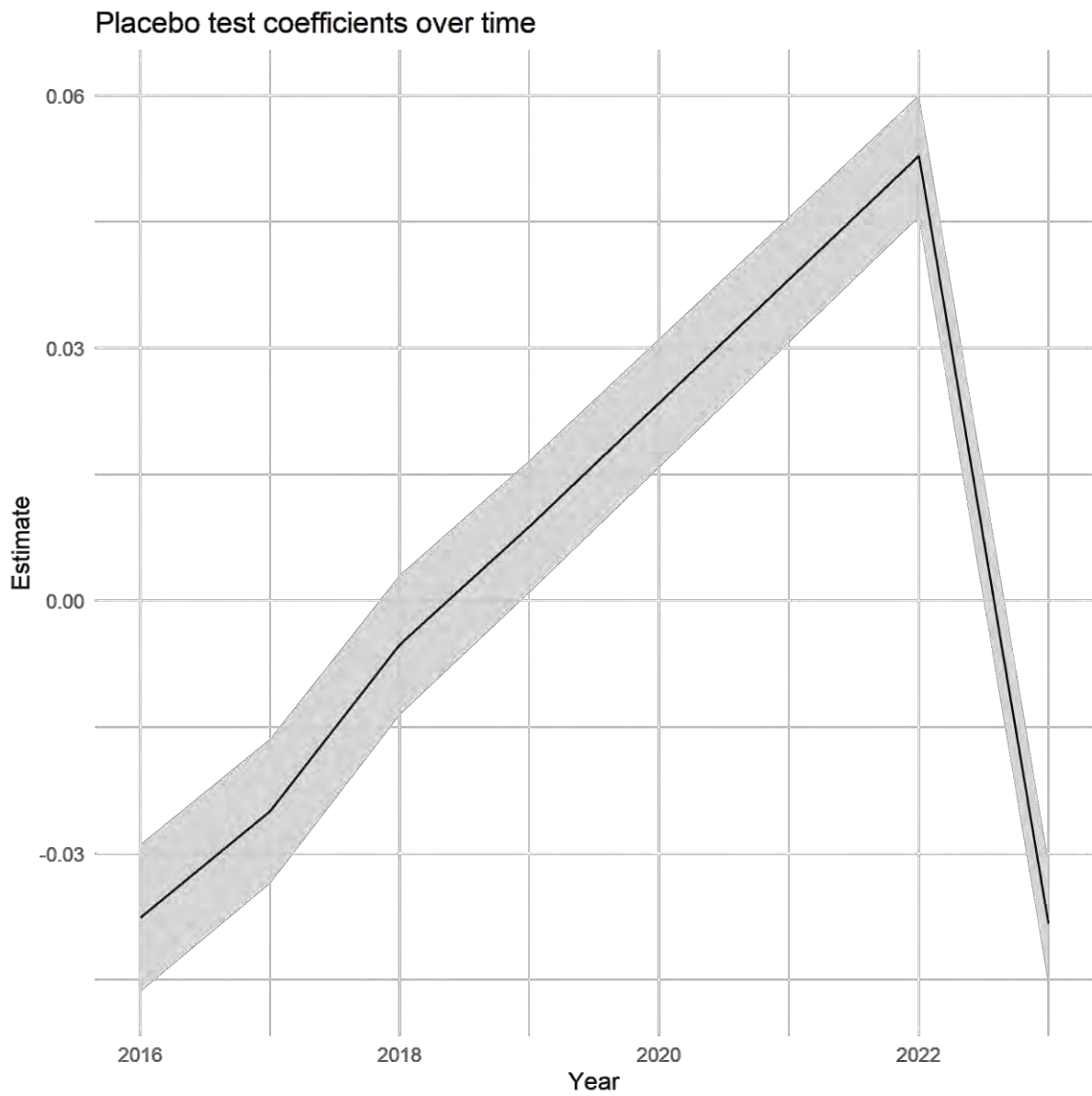
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 128 Model.docx

Figure 129. Placebo test estimates for primary outcome for difference in differences



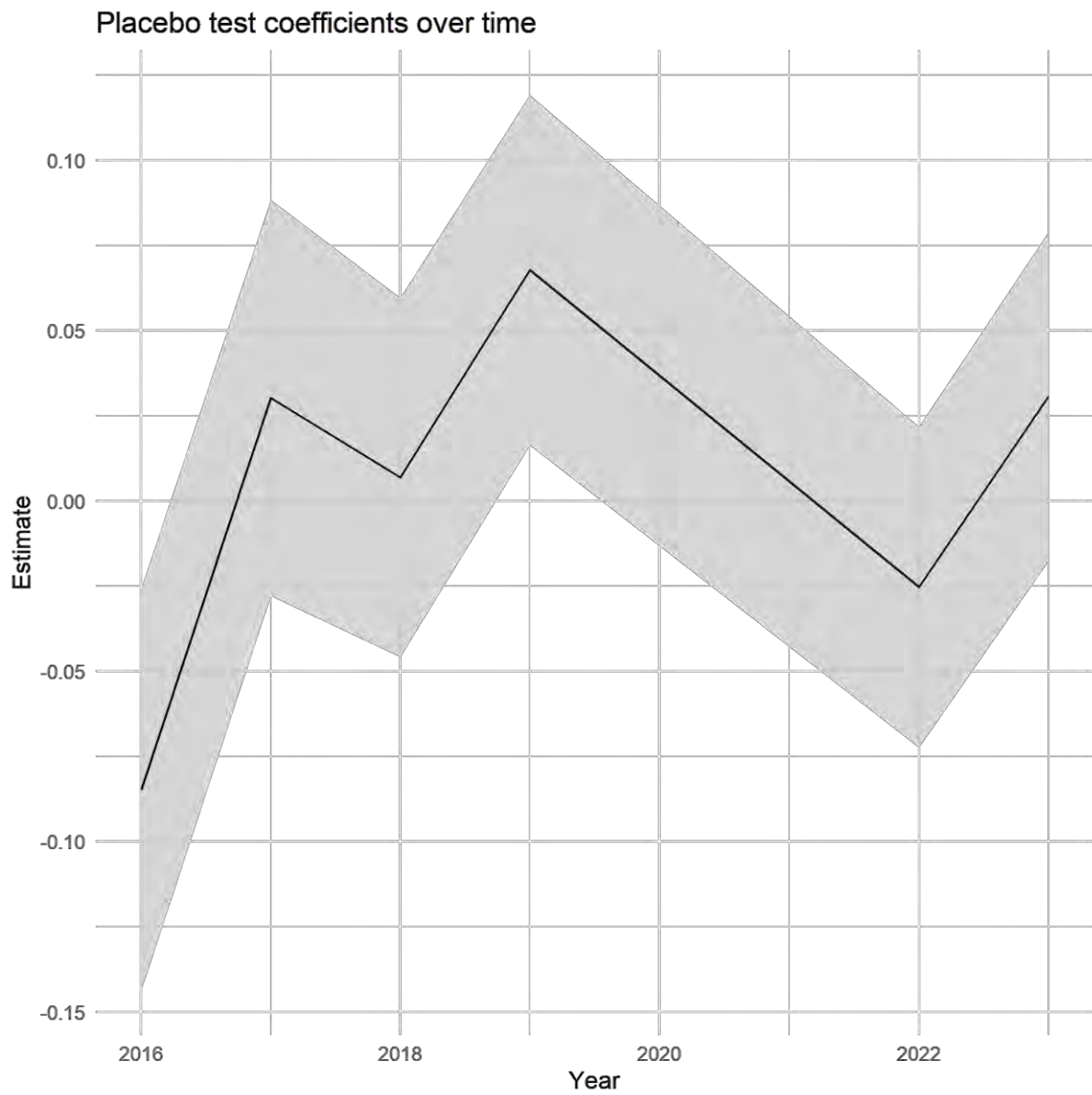
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 129 Models.csv

Figure 130. Placebo test estimates for secondary outcome for difference in differences



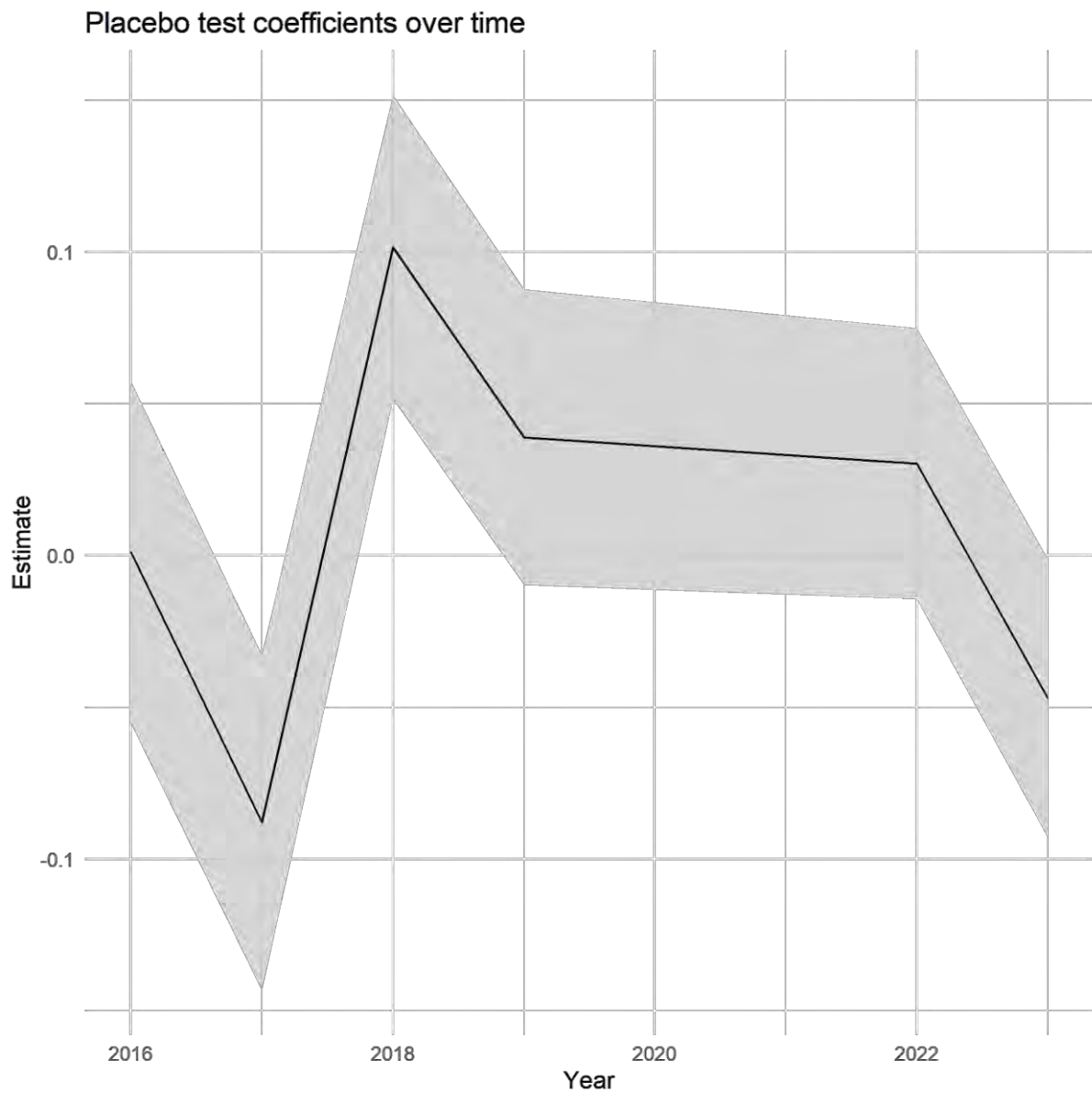
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 130 Models.csv

Figure 131. Placebo test estimates for primary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 131 Models.csv

Figure 132. Placebo test estimates for secondary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 132 Models.csv

## Appendix 11. Heterogeneity for pupils in IDACI quintile group 5

Table 56. Difference in differences estimates for primary outcome

---

Treatment estimate	0.029 [0.004, 0.054]
Num.Obs.	855010
R2	0.362
R2 Adj.	0.351
R2 Within	0.291
R2 Within Adj.	0.291
AIC	1949527.4
BIC	2128561.0
RMSE	0.74
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	854979

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 57. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.020 [0.003, 0.036]
Num.Obs.	853791
R2	0.068
R2 Adj.	0.051
R2 Within	0.019
R2 Within Adj.	0.019
AIC	1692506.2
BIC	1871482.9
RMSE	0.64
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	853760

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 58. Triple difference estimates for primary outcome

Treatment estimate	-0.005 [-0.203, 0.194]
Num.Obs.	855484
R2	0.362
R2 Adj.	0.351
R2 Within	0.291
R2 Within Adj.	0.291
AIC	1950695.6
BIC	2130460.6
RMSE	0.74
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	855452

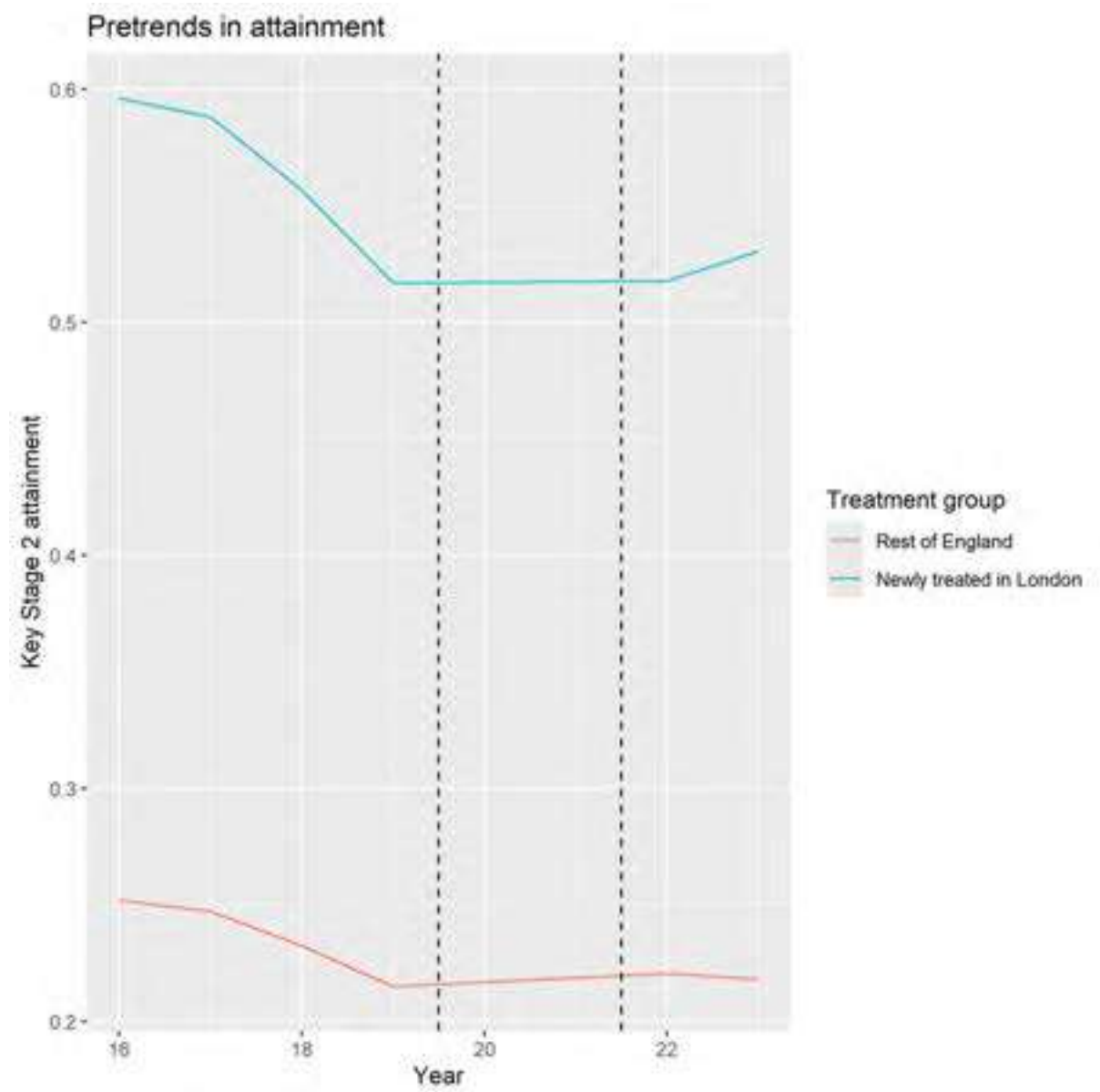
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 59. Triple difference estimates for secondary outcome

Treatment estimate	-0.095 [-0.242, 0.052]
Num.Obs.	854265
R2	0.068
R2 Adj.	0.051
R2 Within	0.019
R2 Within Adj.	0.019
AIC	1693438.4
BIC	1873146.5
RMSE	0.64
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	854233

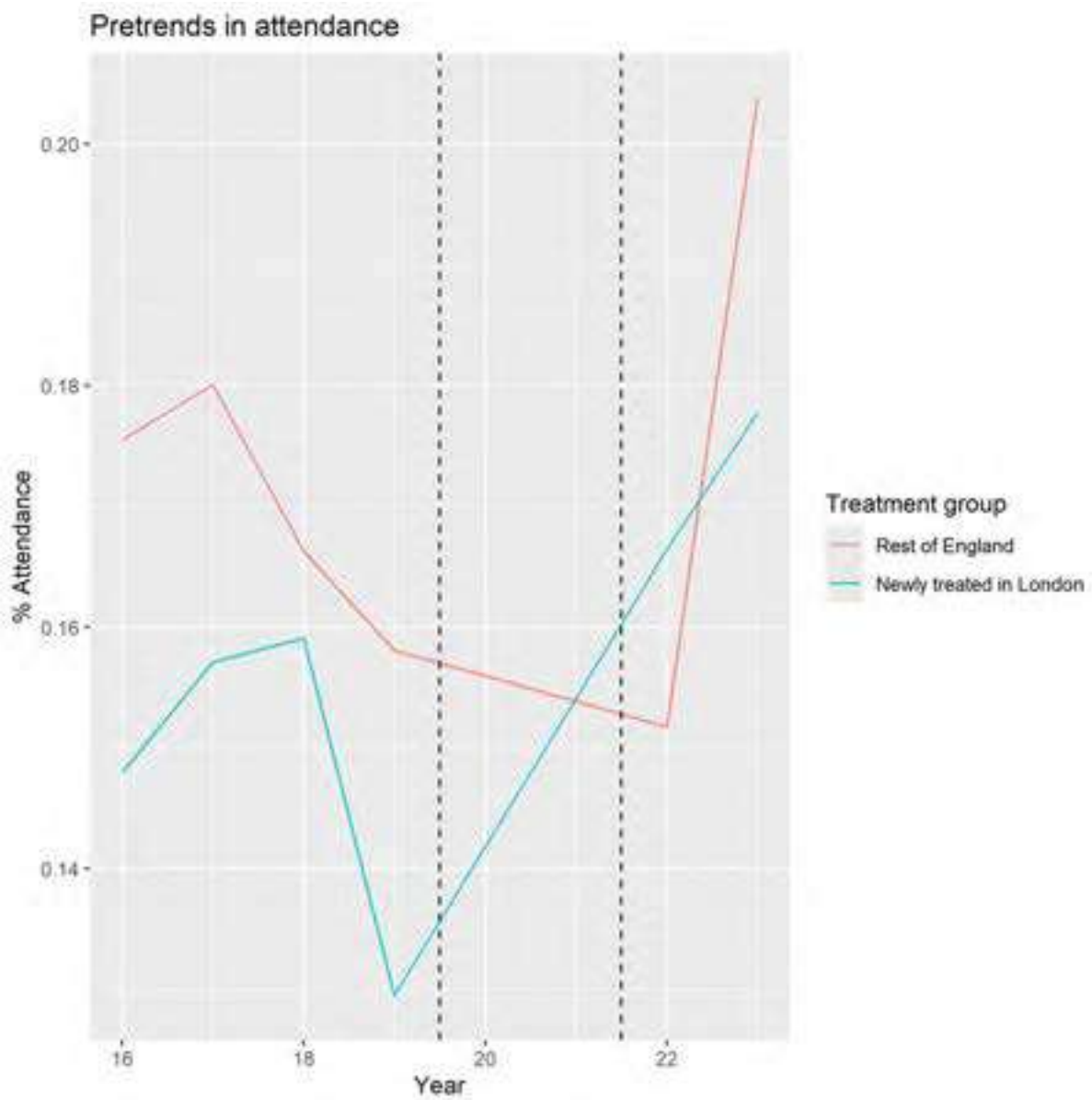
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 133. Raw pre-trends in primary outcome for difference-in-differences



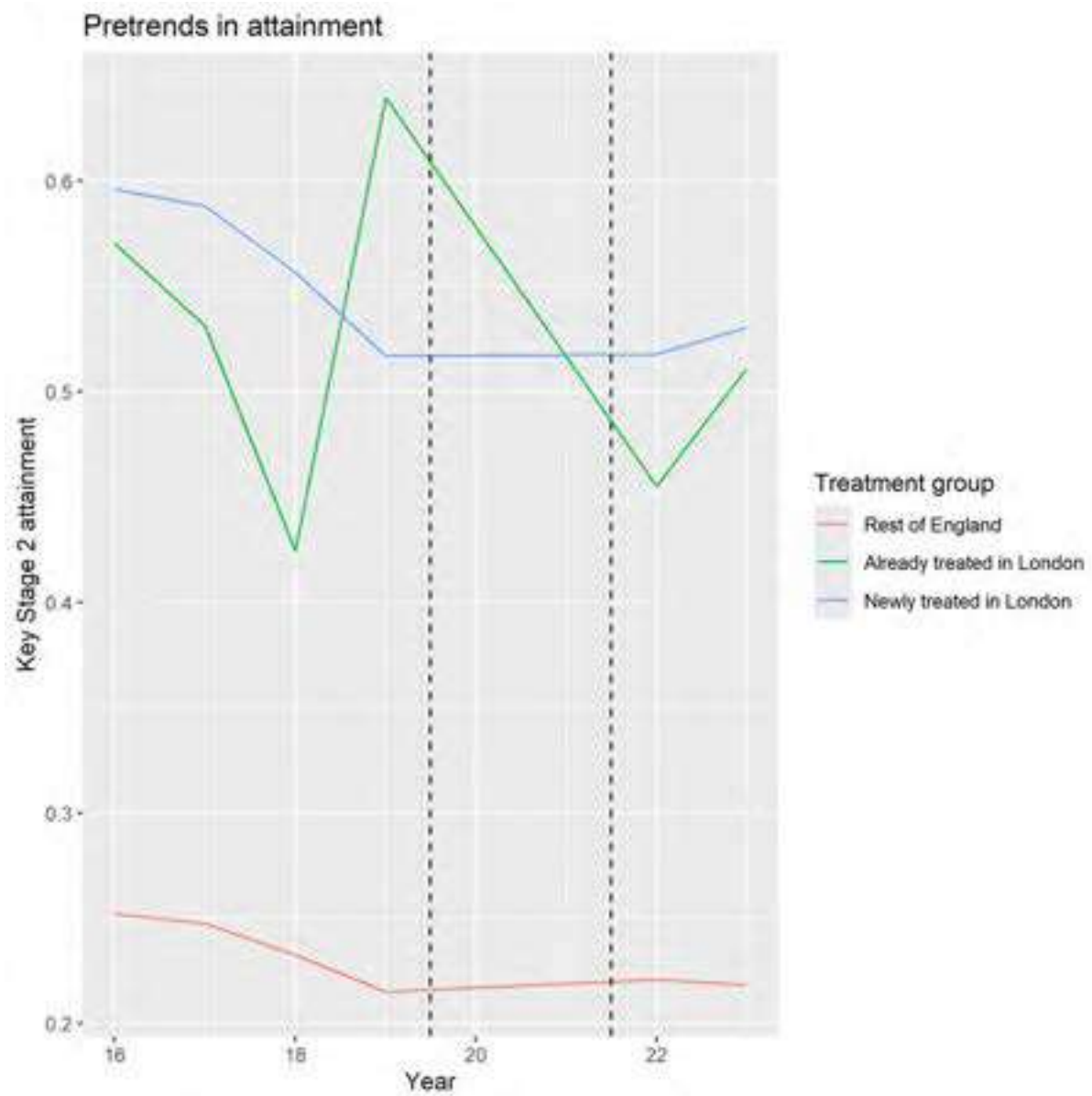
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 133 Counts.csv.

Figure 134. Raw pre-trends in secondary outcome for difference-in-differences



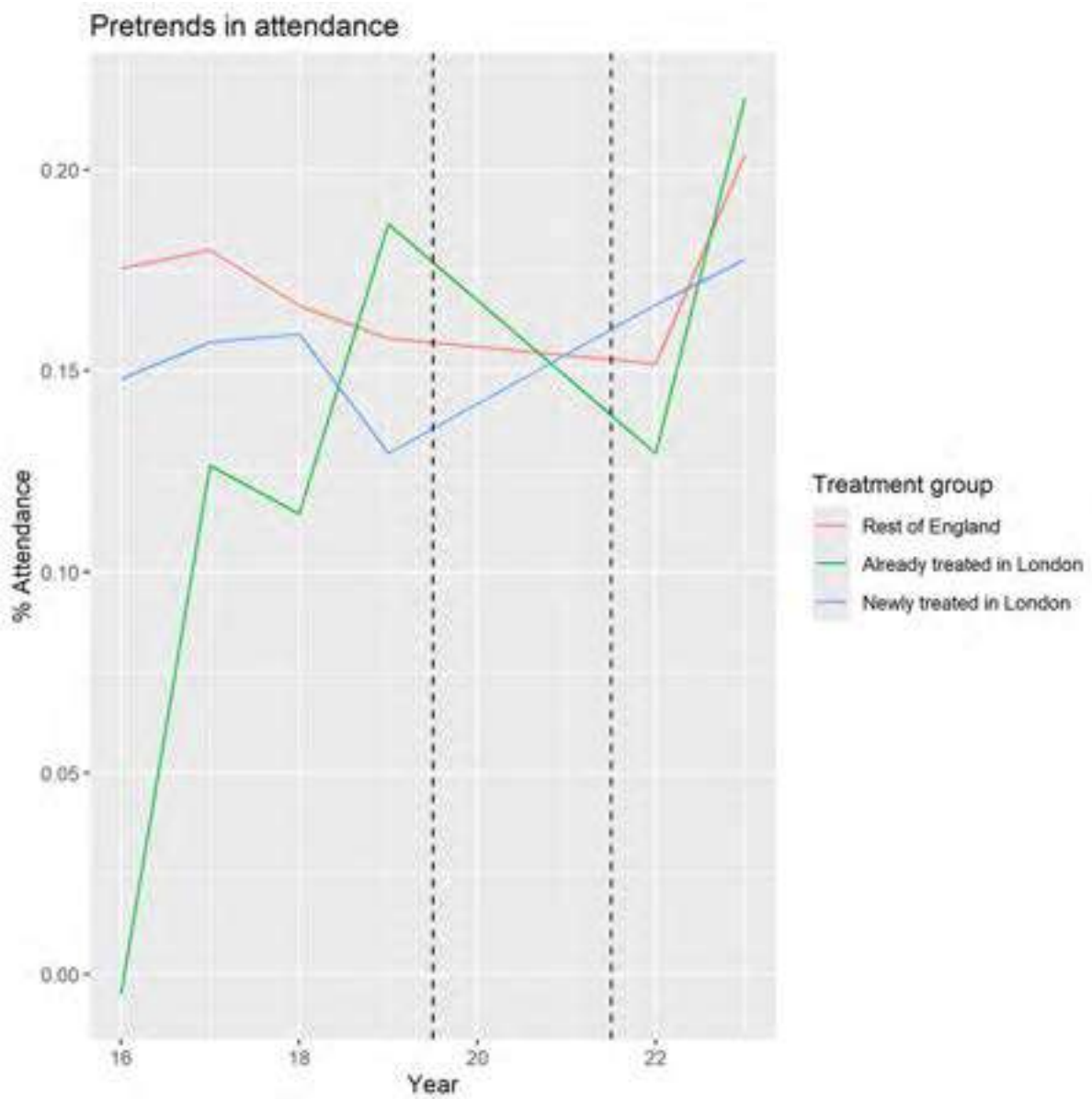
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 134 Counts.csv.

Figure 135. Raw pre-trends in primary outcome for triple difference



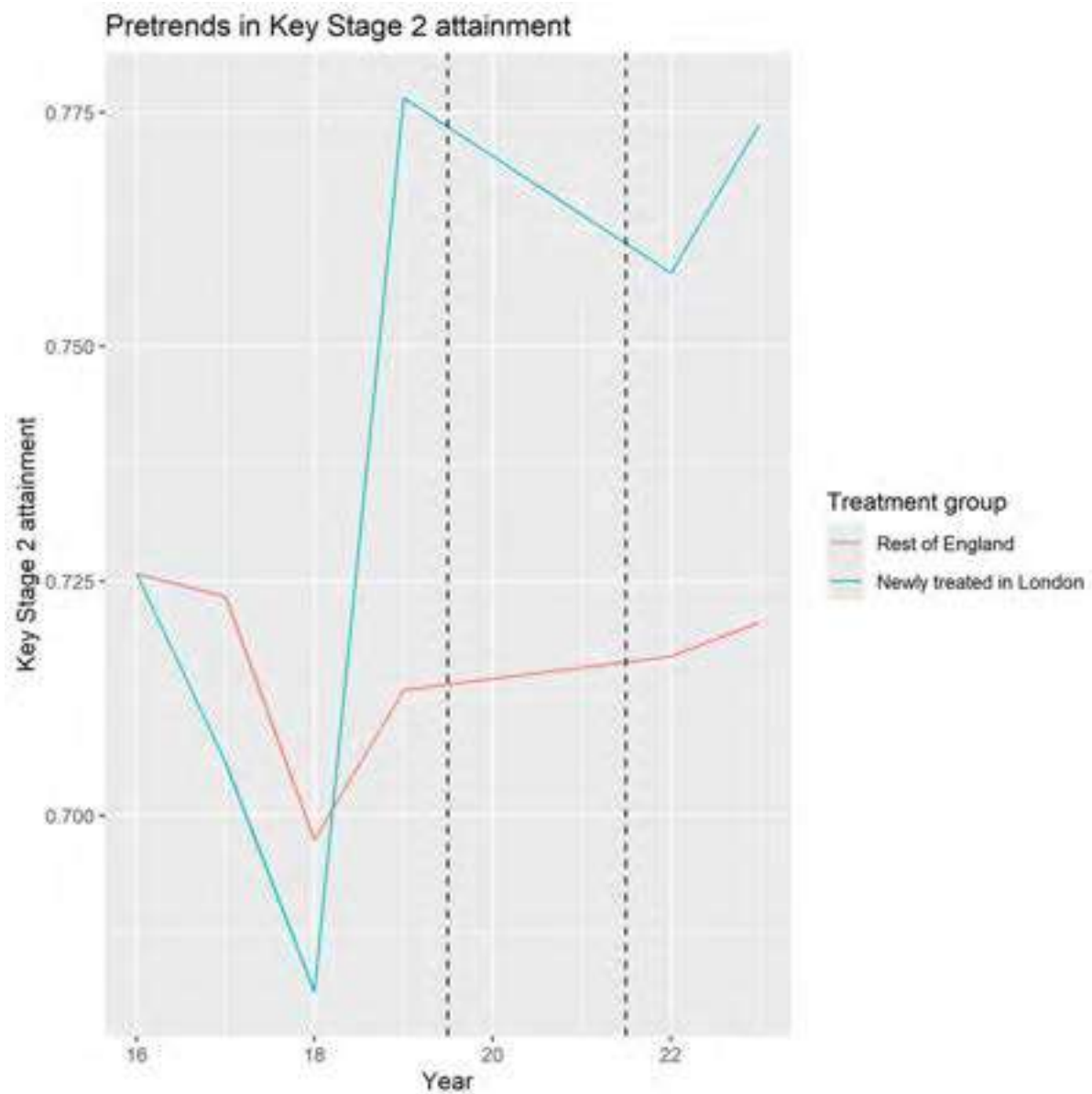
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 135 Counts.csv.

Figure 136. Raw pre-trends in secondary outcome for triple difference



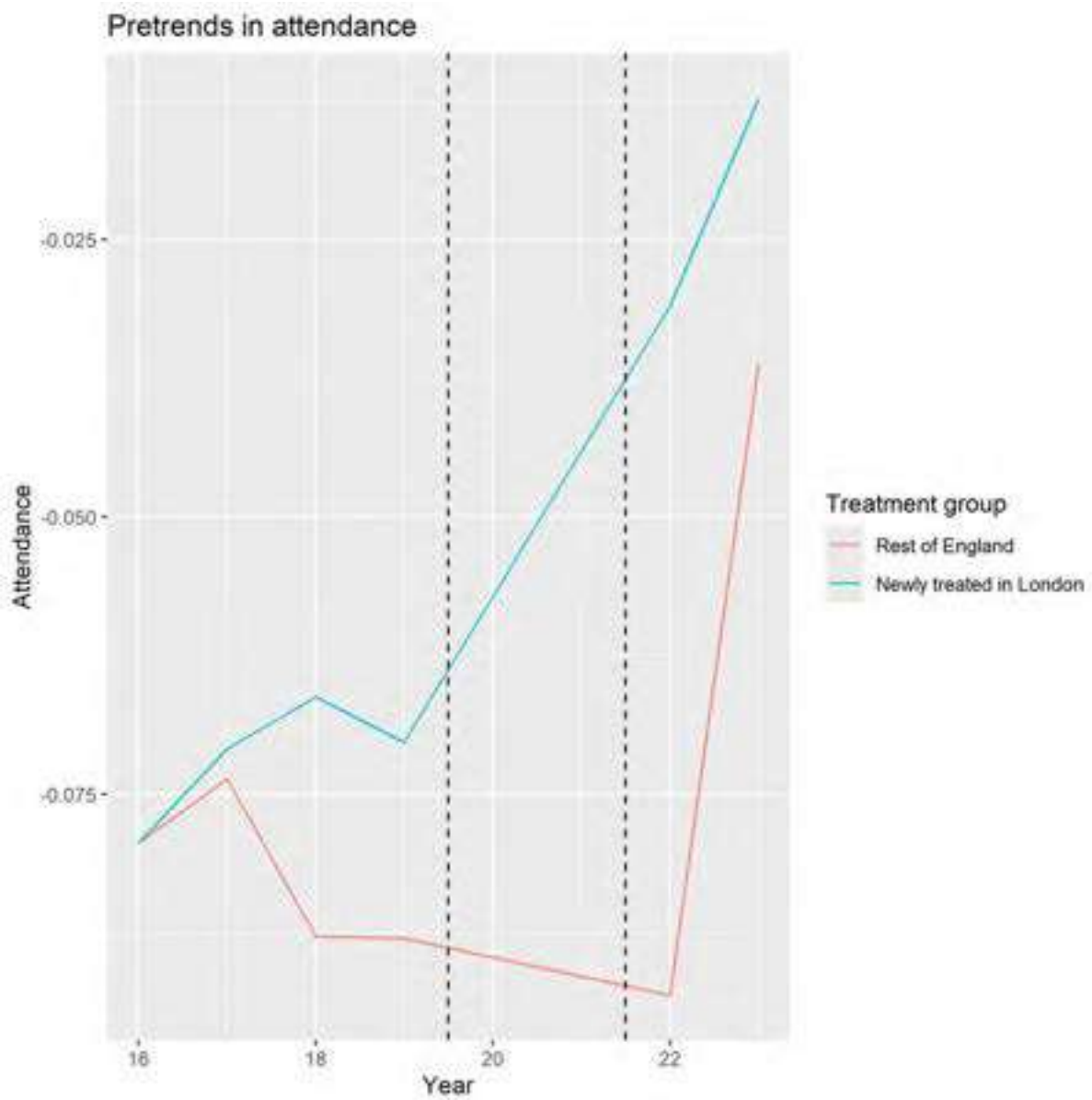
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 136 Counts.csv.

Figure 137. Conditional primary outcome pre-trends for difference-in-differences



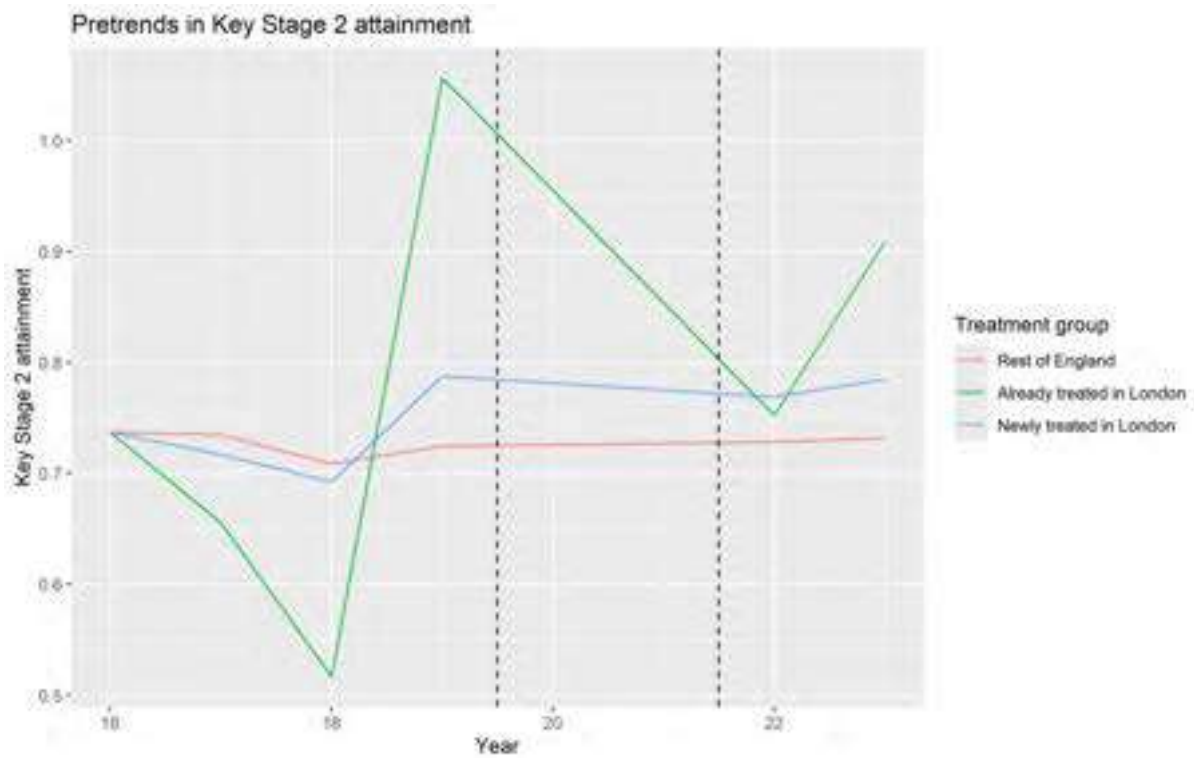
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 137 Model.docx.

Figure 138. Conditional secondary outcome pre-trends for difference-in-differences



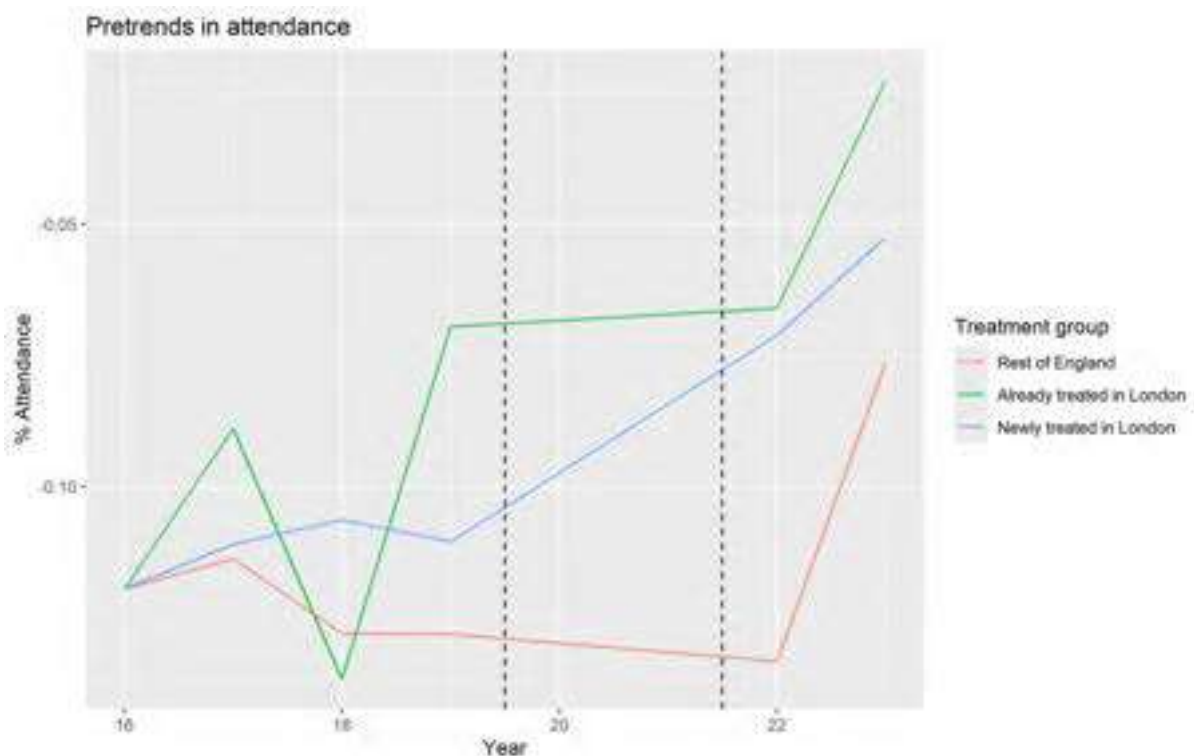
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 138 Model.docx

Figure 139. Conditional primary outcome pre-trends for triple differences



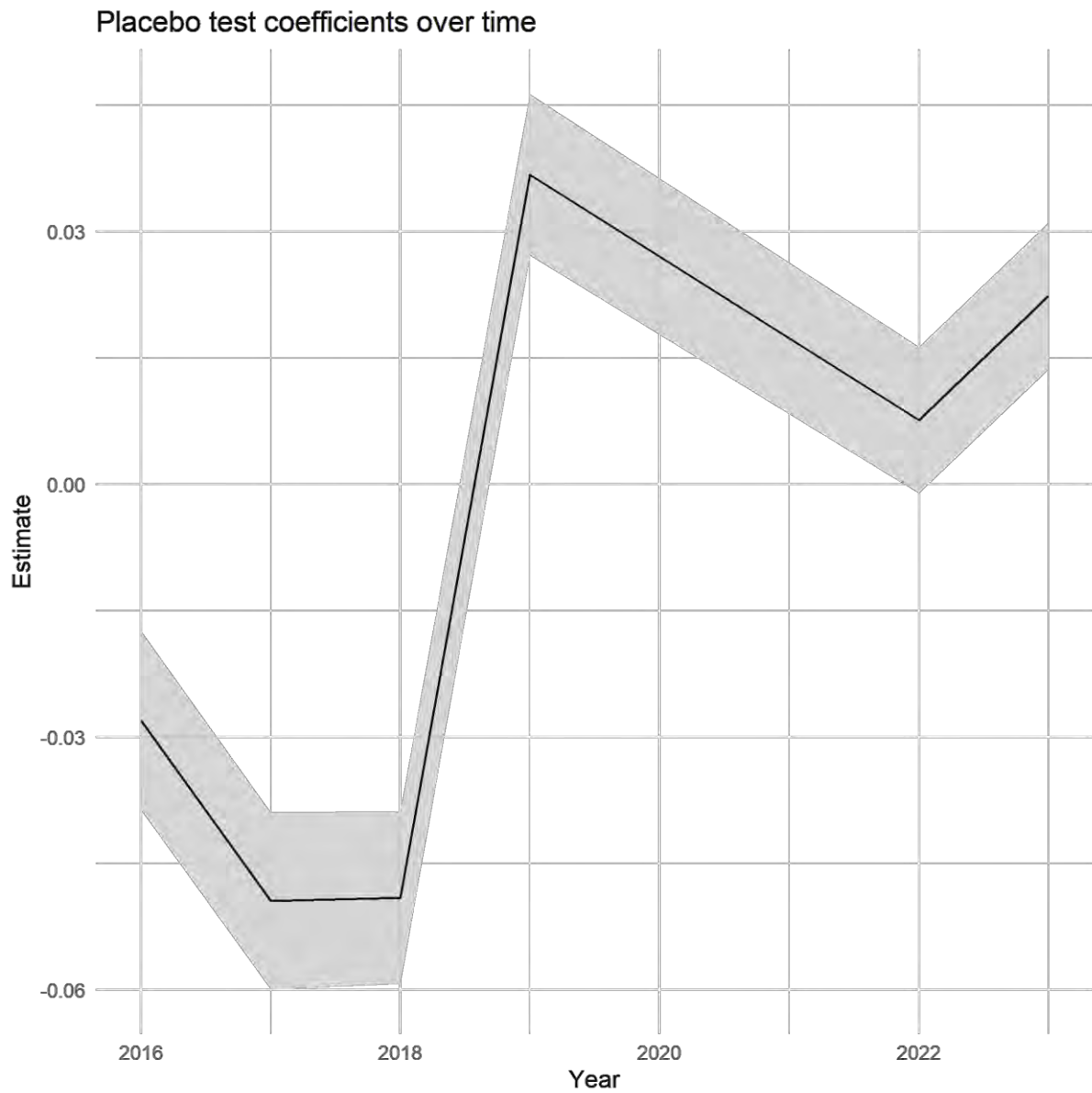
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 139 Model.docx

Figure 140. Conditional pre-trends for secondary outcome for triple difference



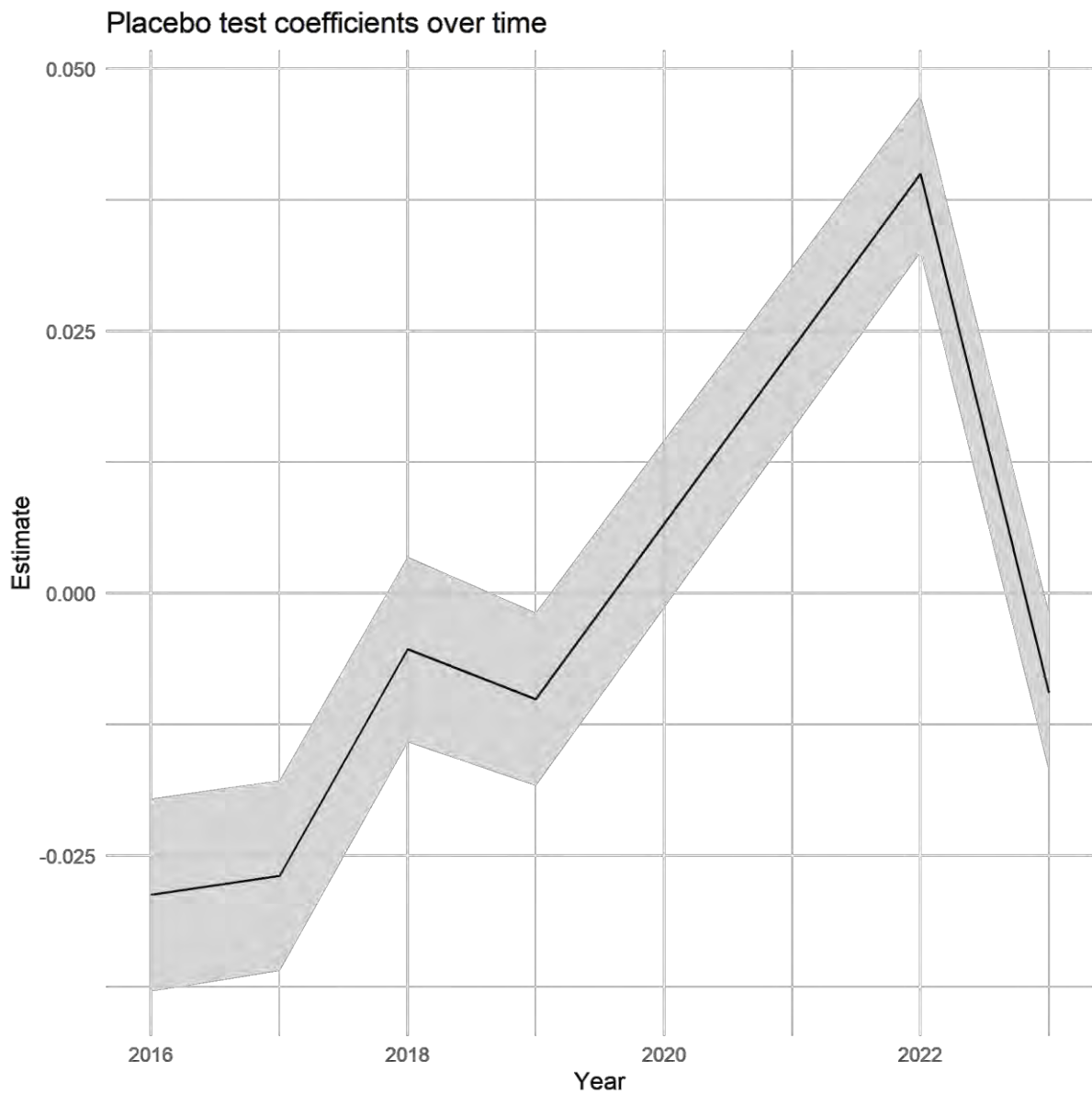
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 140 Model.docx

Figure 141. Placebo test estimates for primary outcome for difference in differences



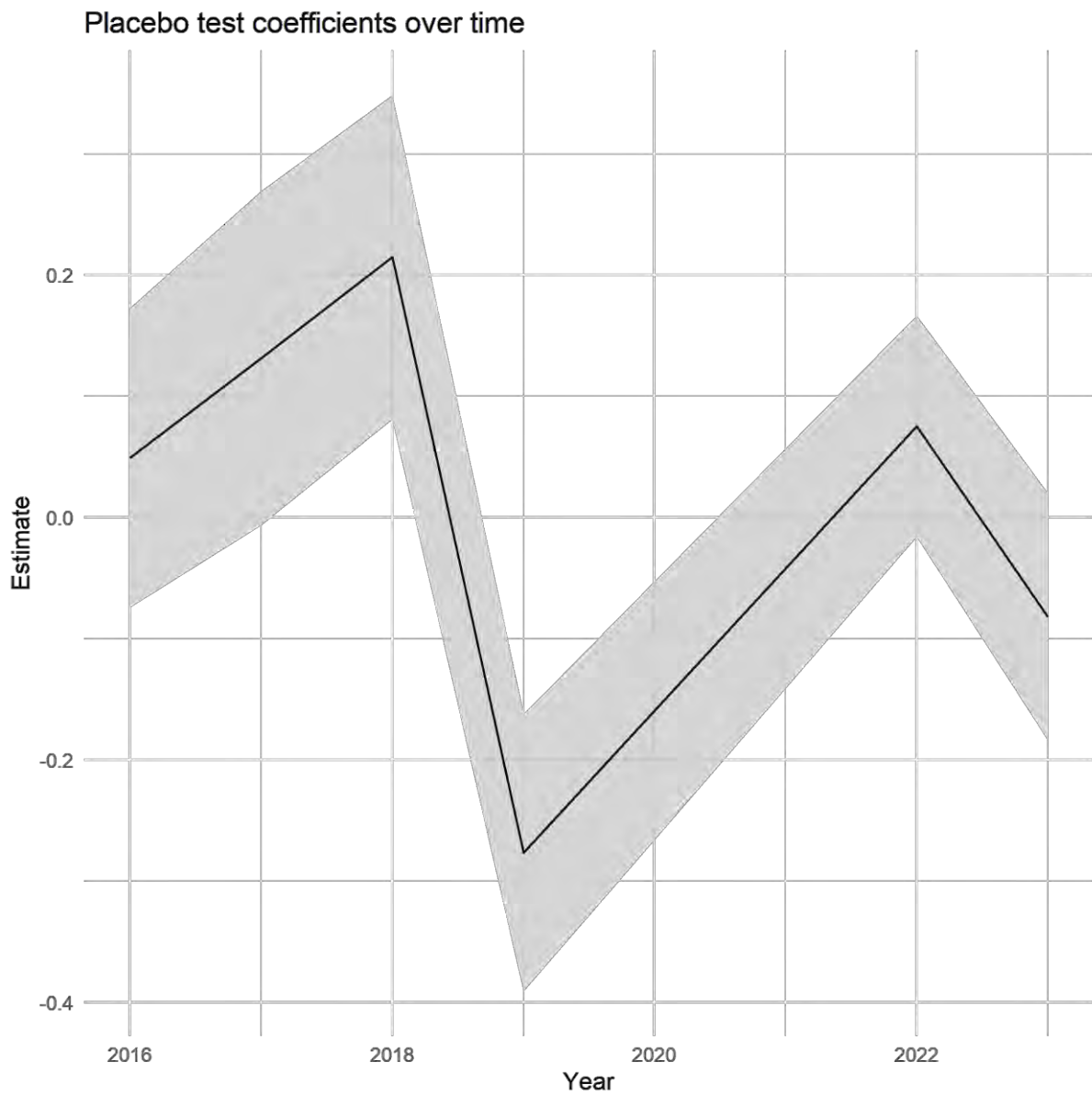
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 141 Models.csv

Figure 142. Placebo test estimates for secondary outcome for difference in differences



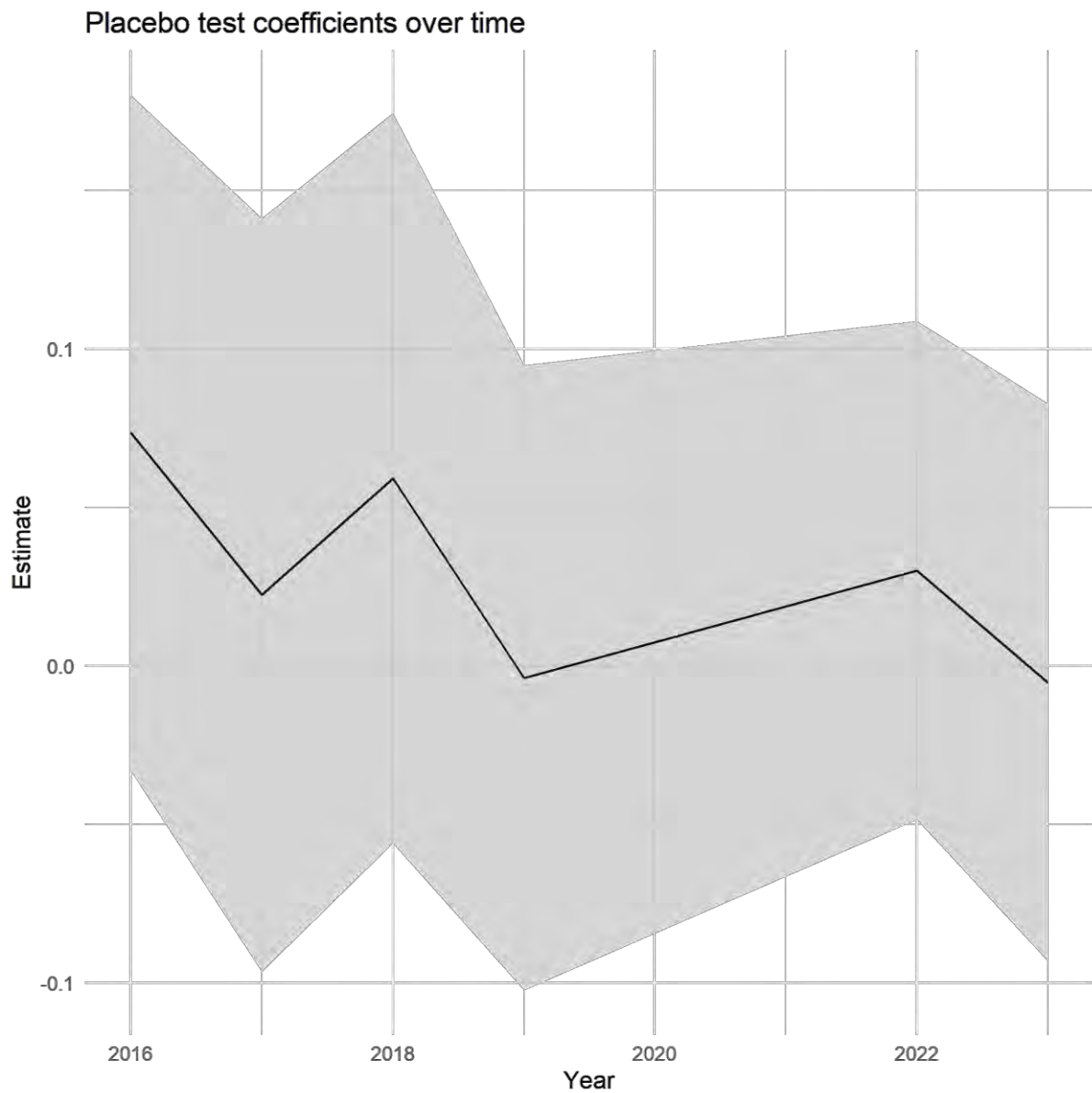
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 142 Models.csv

Figure 143. Placebo test estimates for primary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 143 Models.csv

Figure 144. Placebo test estimates for secondary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 144 Models.csv

## Appendix 12. Robustness check excluding pupils with a sibling in KS3

Table 60. Difference in differences estimates for primary outcome

---

Treatment estimate	0.010
	[-0.004, 0.024]
Num.Obs.	2652267
R2	0.380
R2 Adj.	0.376
R2 Within	0.310
R2 Within Adj.	0.310
AIC	6279030.9
BIC	6500390.6
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	2652228

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 61. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.005
	[-0.004, 0.013]
Num.Obs.	2648774
R2	0.061
R2 Adj.	0.055
R2 Within	0.028
R2 Within Adj.	0.028
AIC	6447175.7
BIC	6668448.7
RMSE	0.81
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	2648735

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 62. Triple difference estimates for primary outcome

Treatment estimate	-0.002 [-0.049, 0.046]
Num.Obs.	2679589
R2	0.380
R2 Adj.	0.376
R2 Within	0.310
R2 Within Adj.	0.310
AIC	6344039.1
BIC	6567445.2
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	2679549

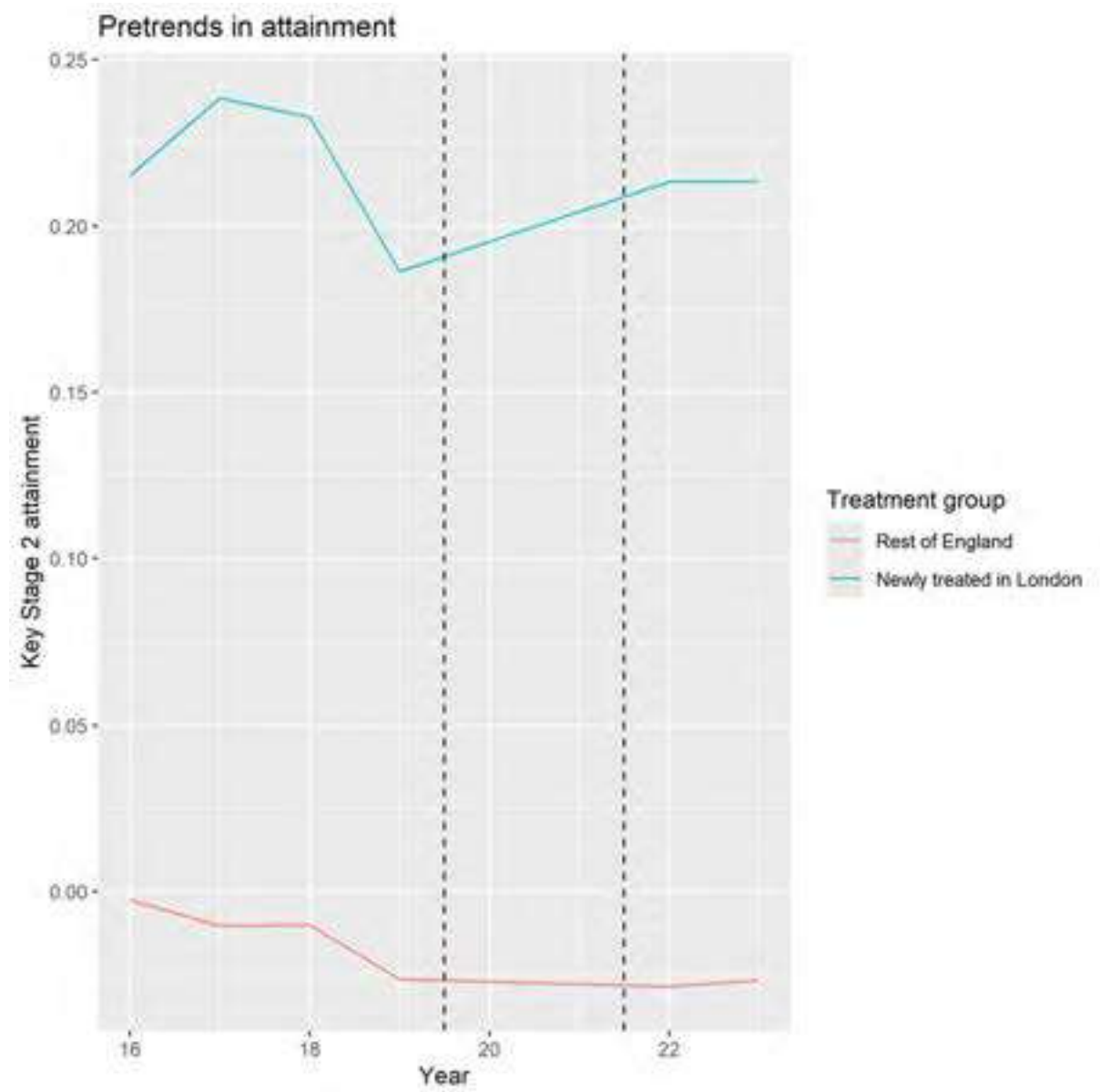
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 63. Triple difference estimates for secondary outcome

Treatment estimate	0.030 [0.002, 0.059]
Num.Obs.	2676048
R2	0.061
R2 Adj.	0.055
R2 Within	0.028
R2 Within Adj.	0.028
AIC	6510280.8
BIC	6733599.9
RMSE	0.81
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	2676008

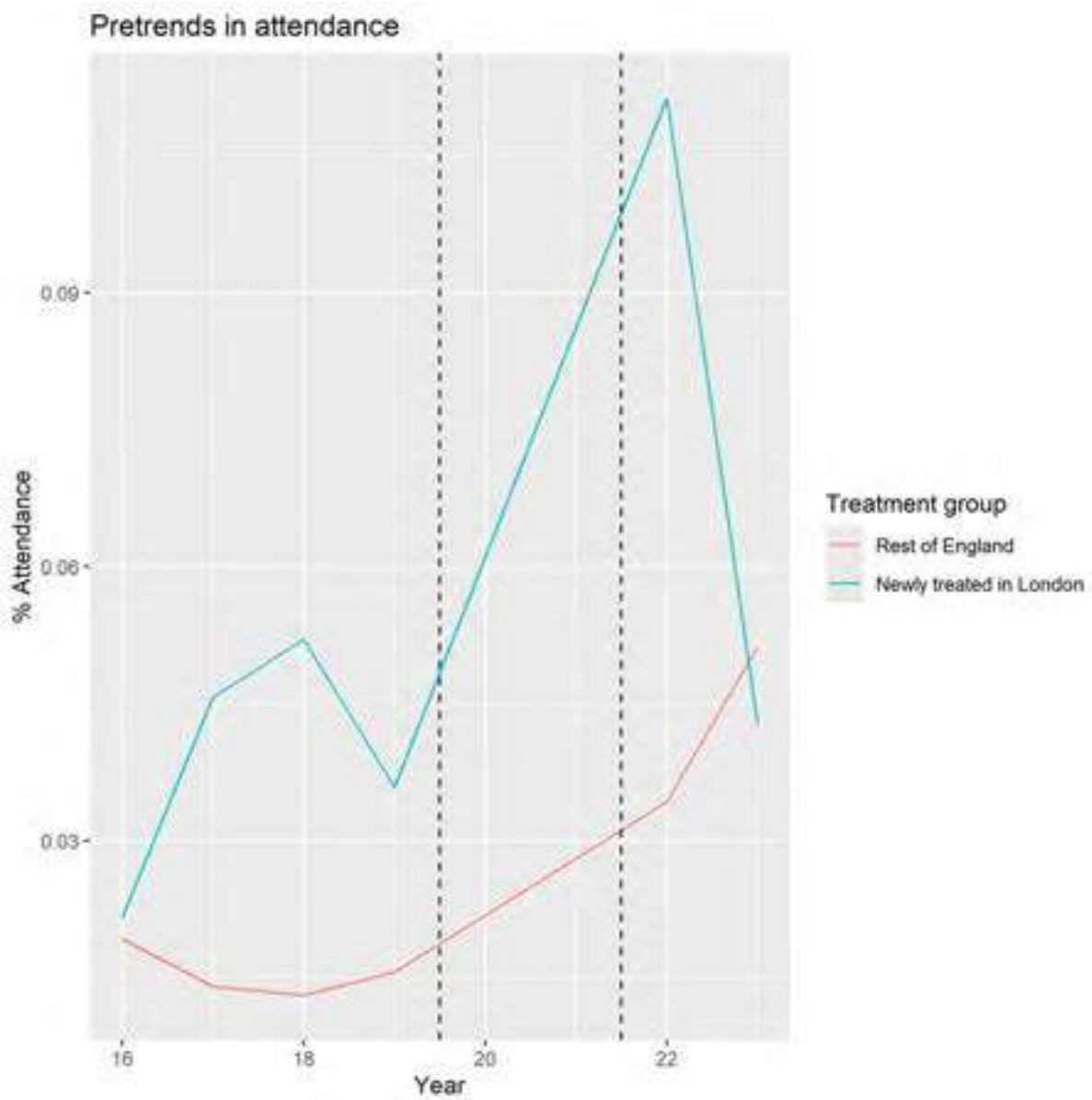
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 145. Raw pre-trends in primary outcome for difference-in-differences



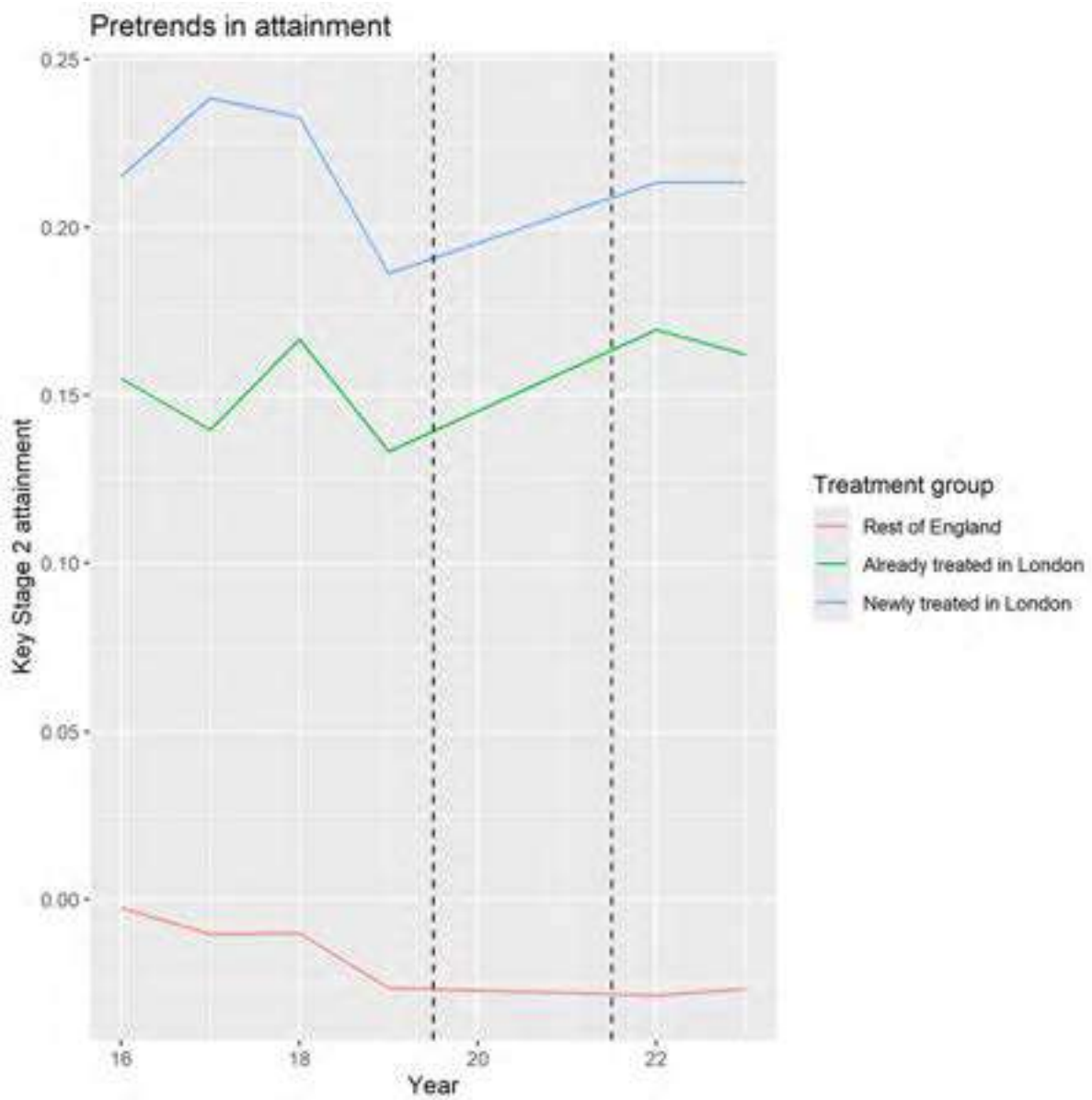
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 145 Counts.csv.

Figure 146. Raw pre-trends in secondary outcome for difference-in-differences



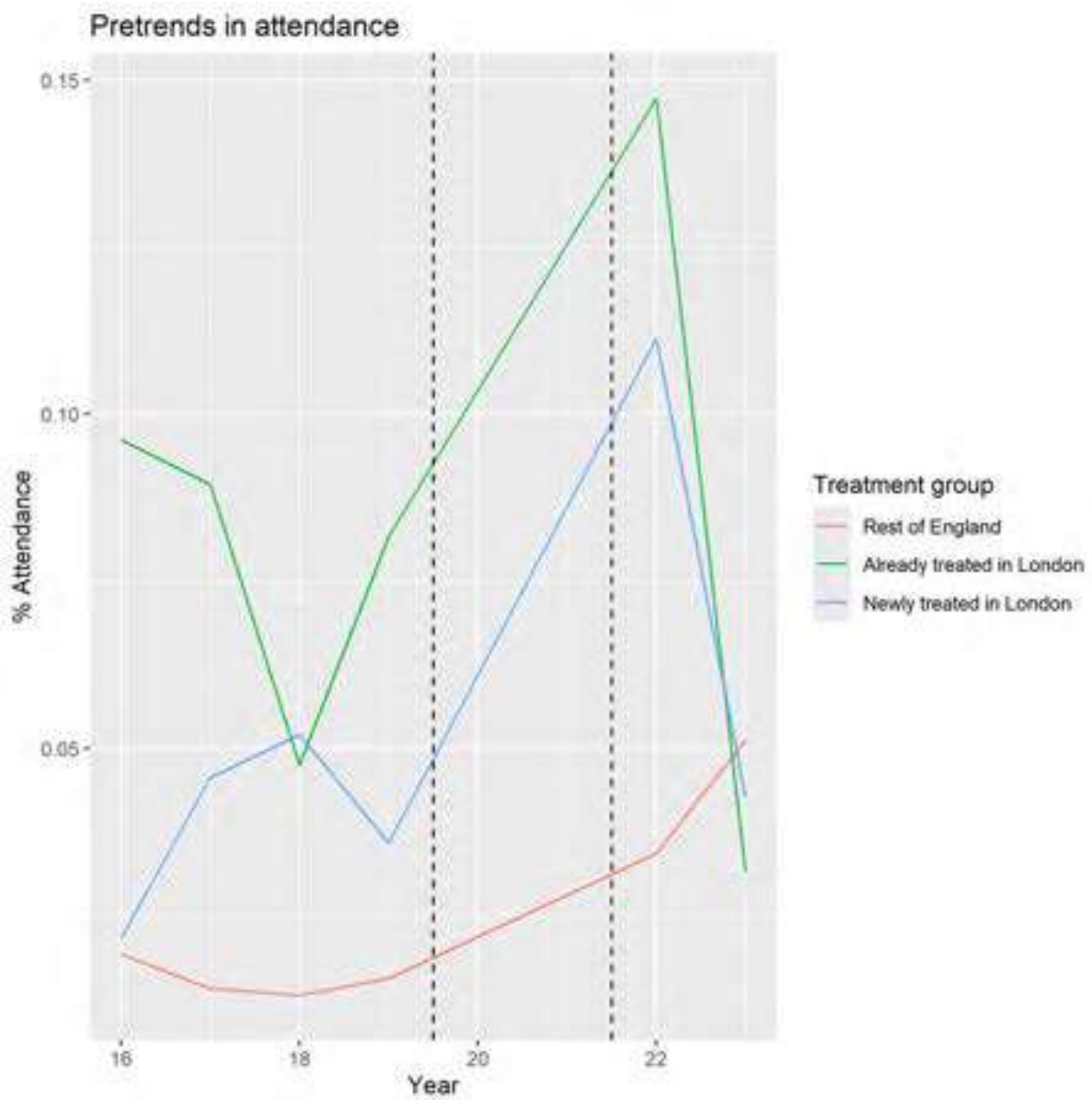
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 146 Counts.csv.

Figure 147. Raw pre-trends in primary outcome for triple difference



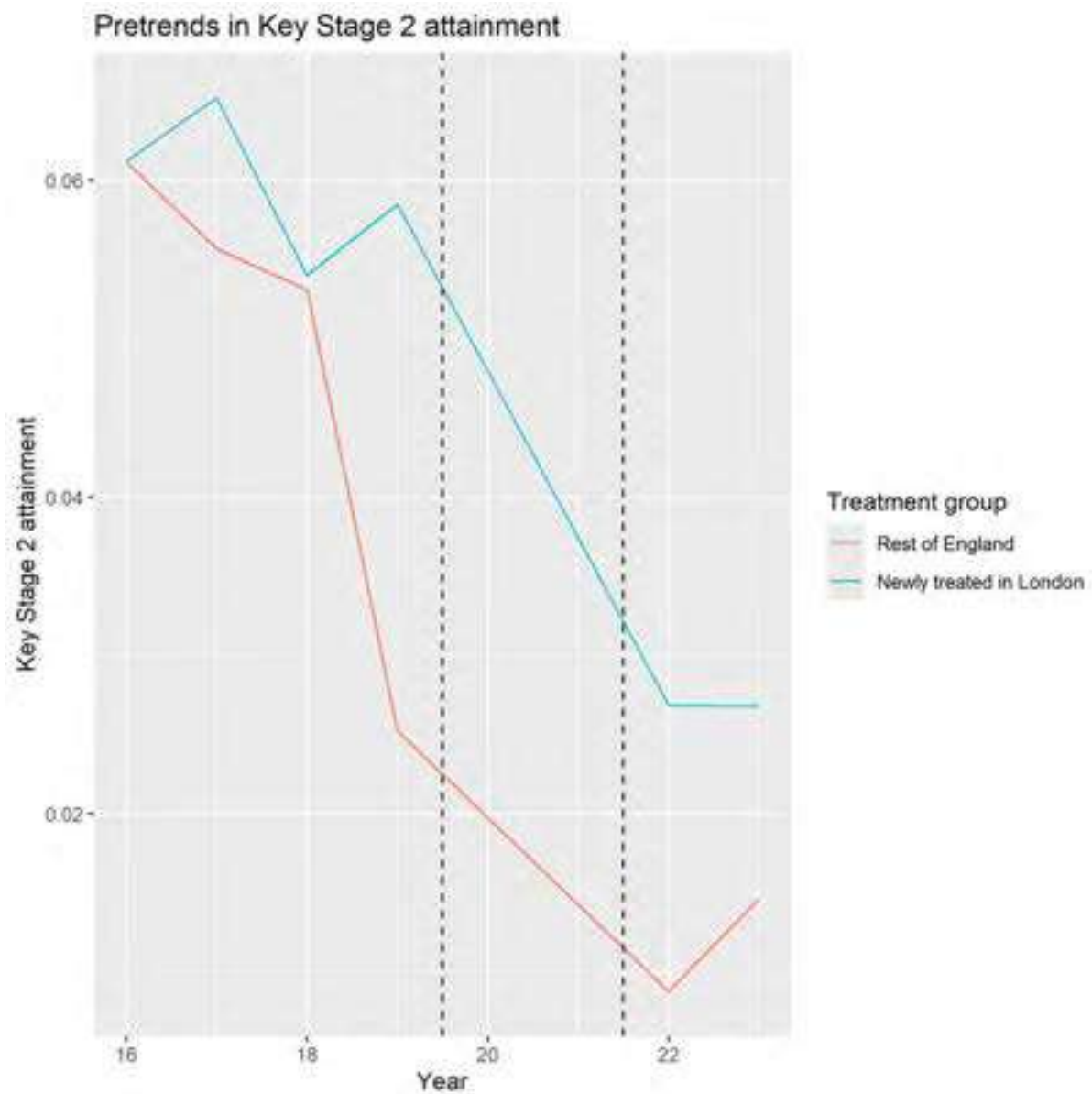
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 147 Counts.csv.

Figure 148. Raw pre-trends in secondary outcome for triple difference



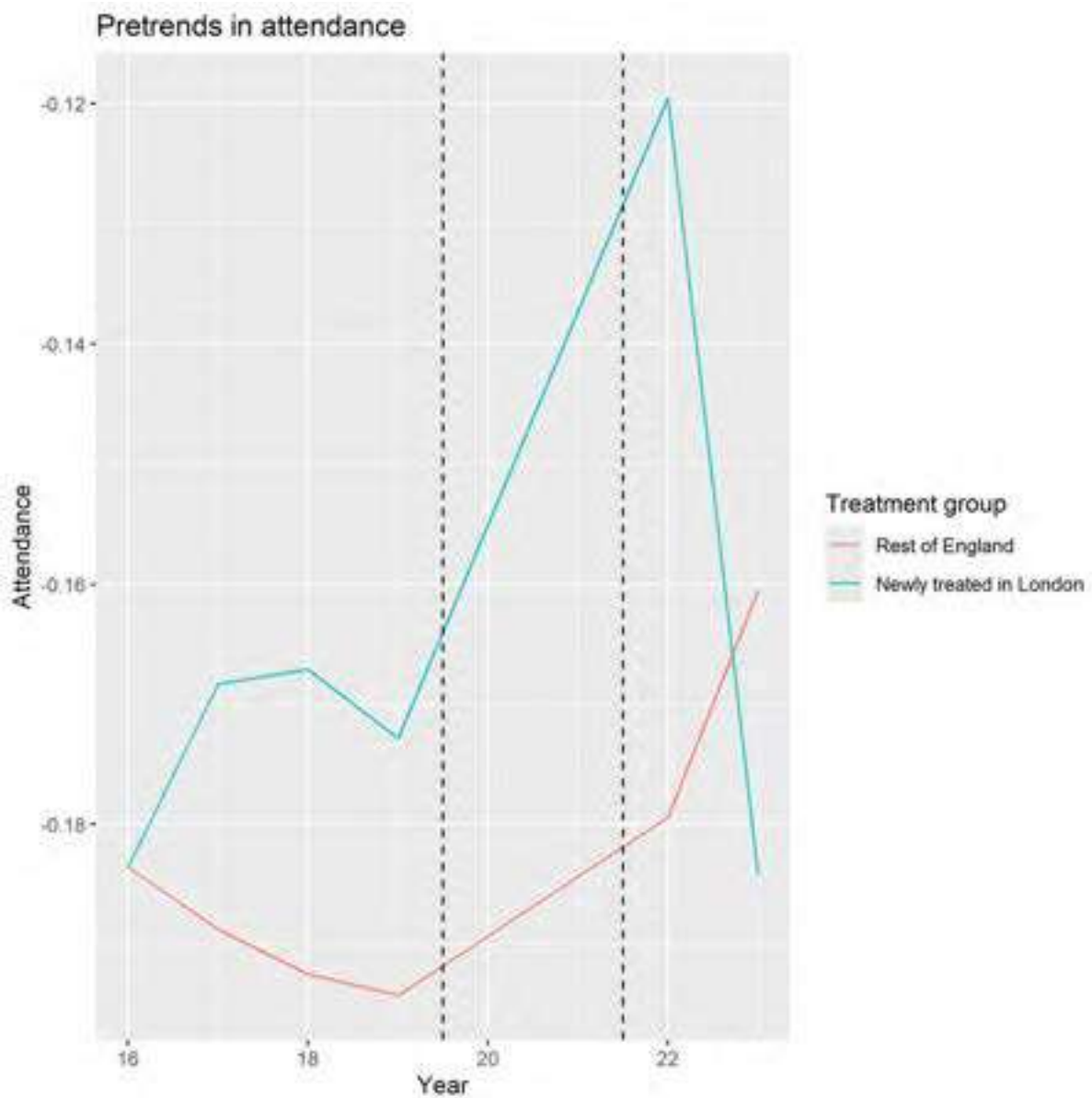
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 148 Counts.csv.

Figure 149. Conditional primary outcome pre-trends for difference-in-differences



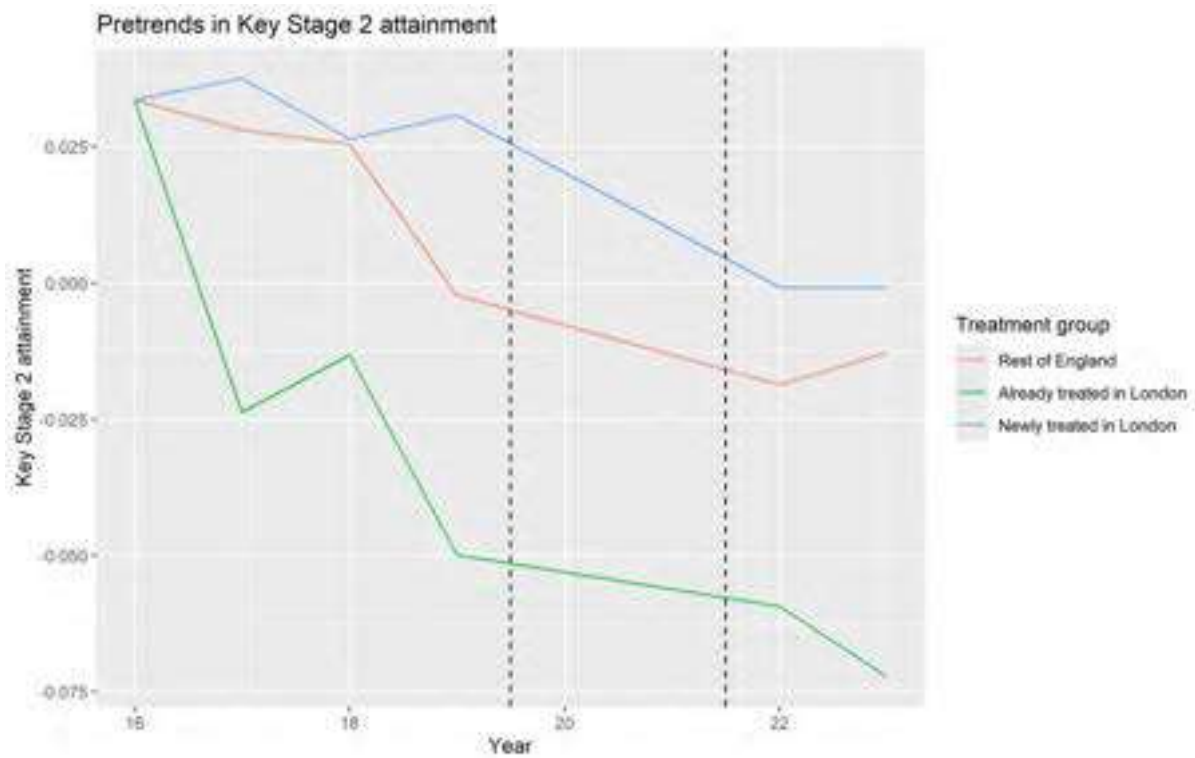
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 149 Model.docx.

Figure 150. Conditional secondary outcome pre-trends for difference-in-differences



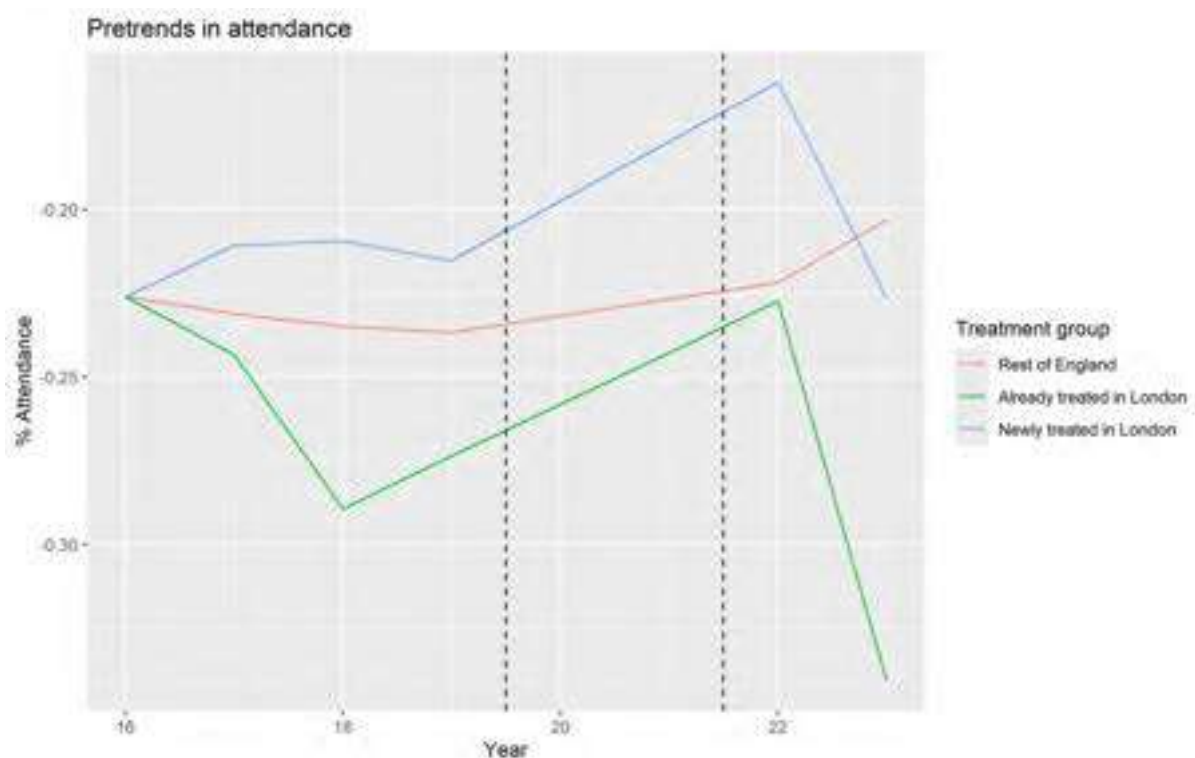
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 150 Model.docx

Figure 151. Conditional primary outcome pre-trends for triple differences



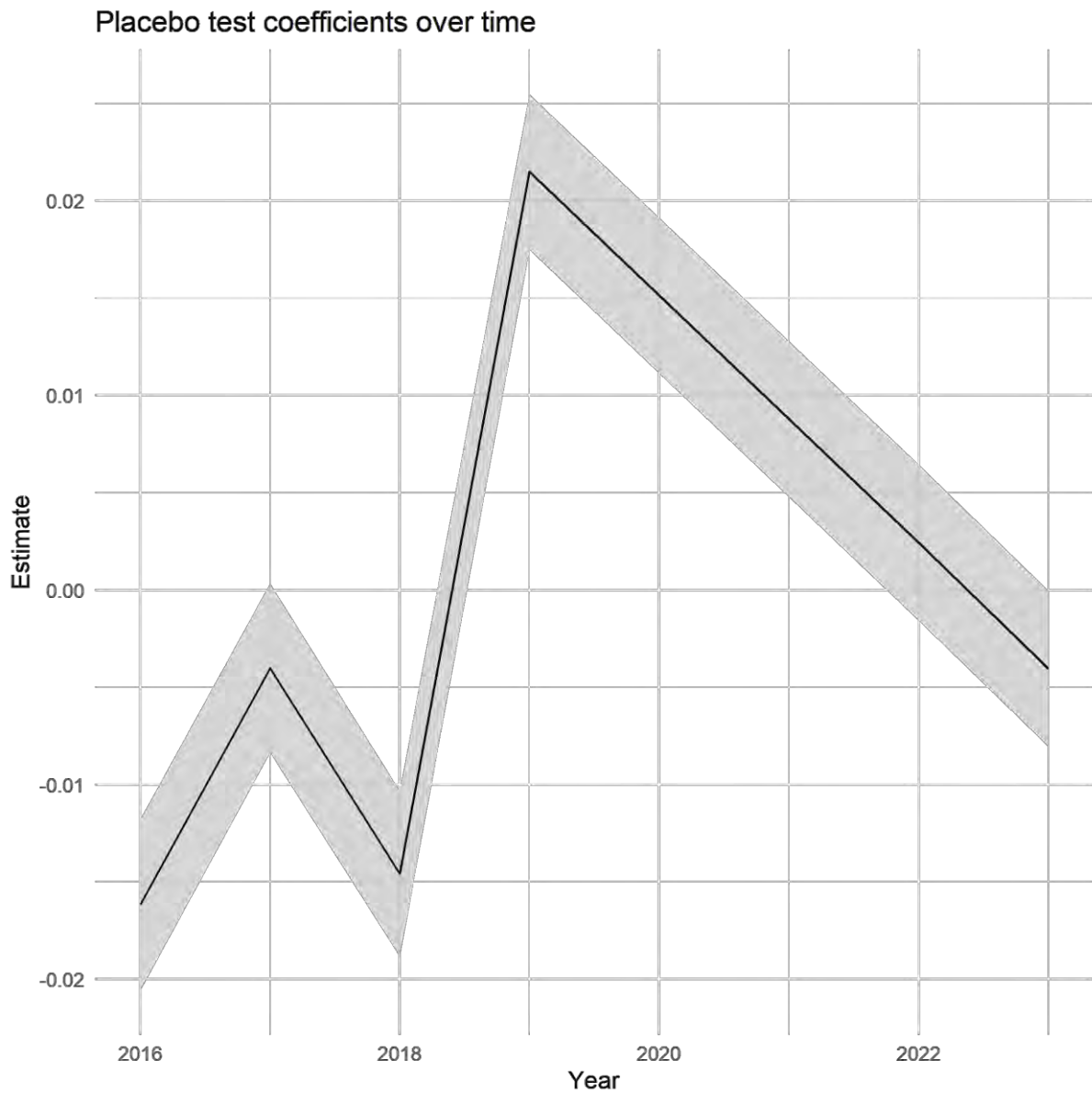
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 151 Model.docx

Figure 152. Conditional pre-trends for secondary outcome for triple difference



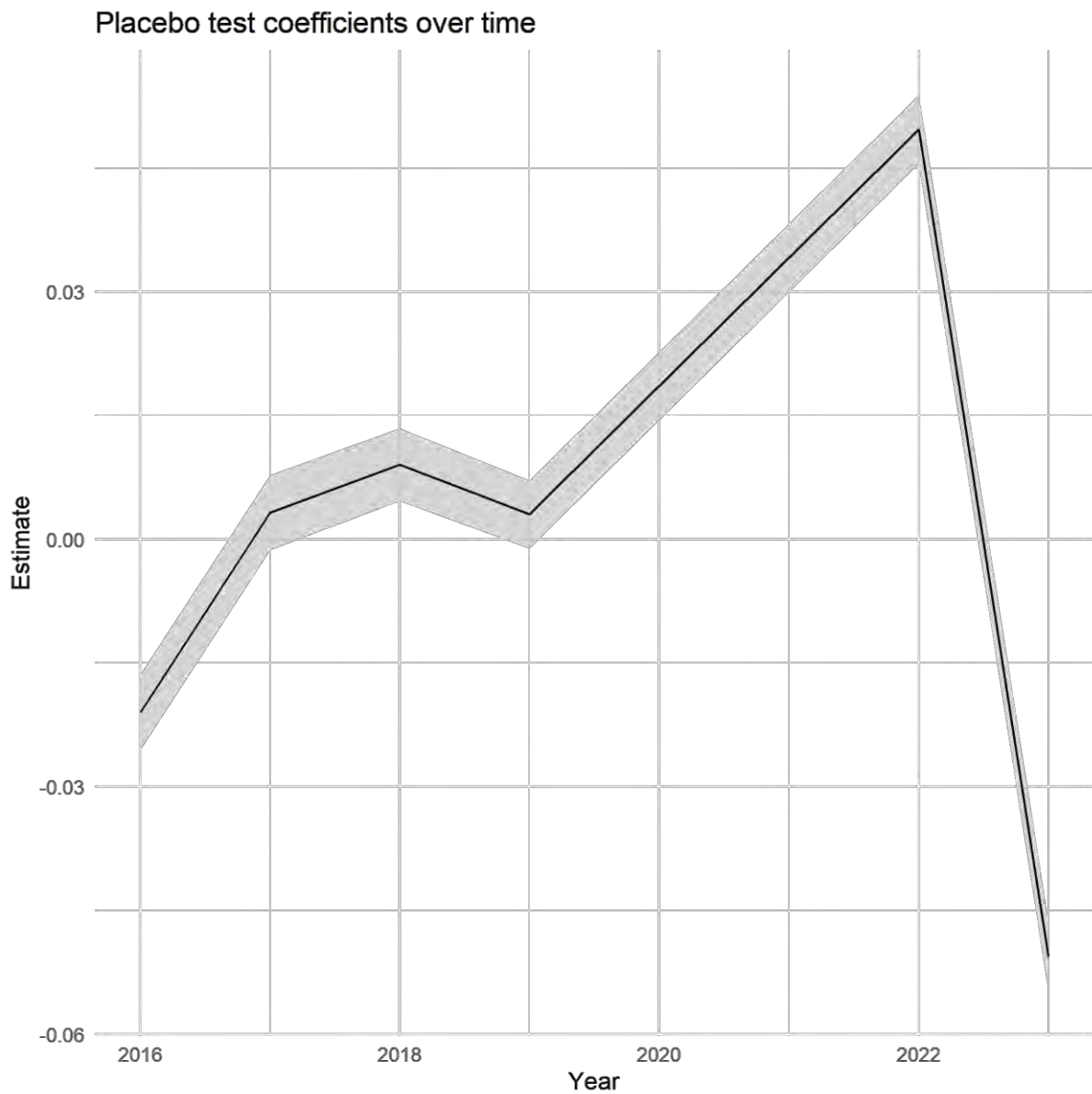
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 152 Model.docx

Figure 153. Placebo test estimates for primary outcome for difference in differences



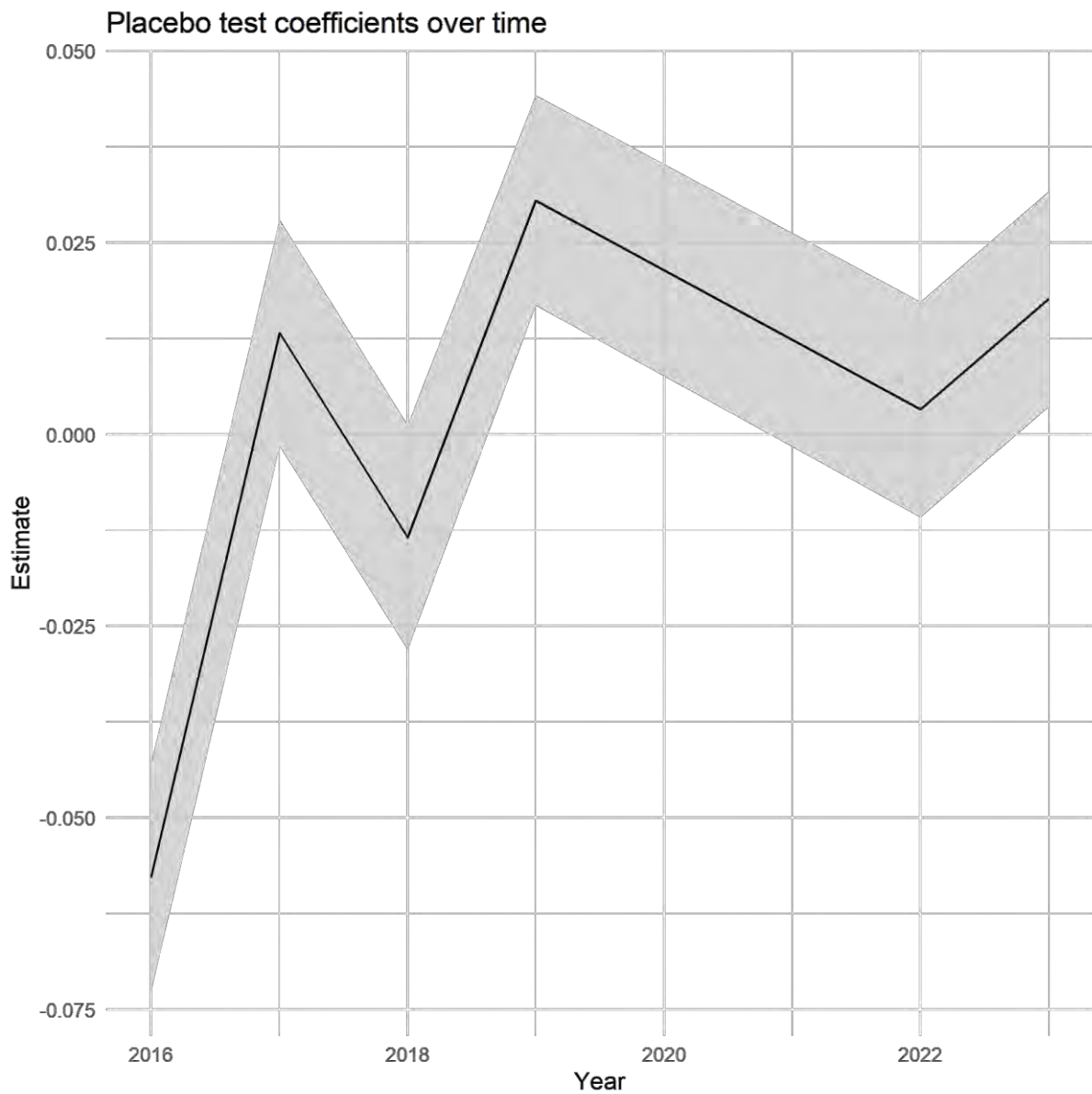
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 153 Models.csv

Figure 154. Placebo test estimates for secondary outcome for difference in differences



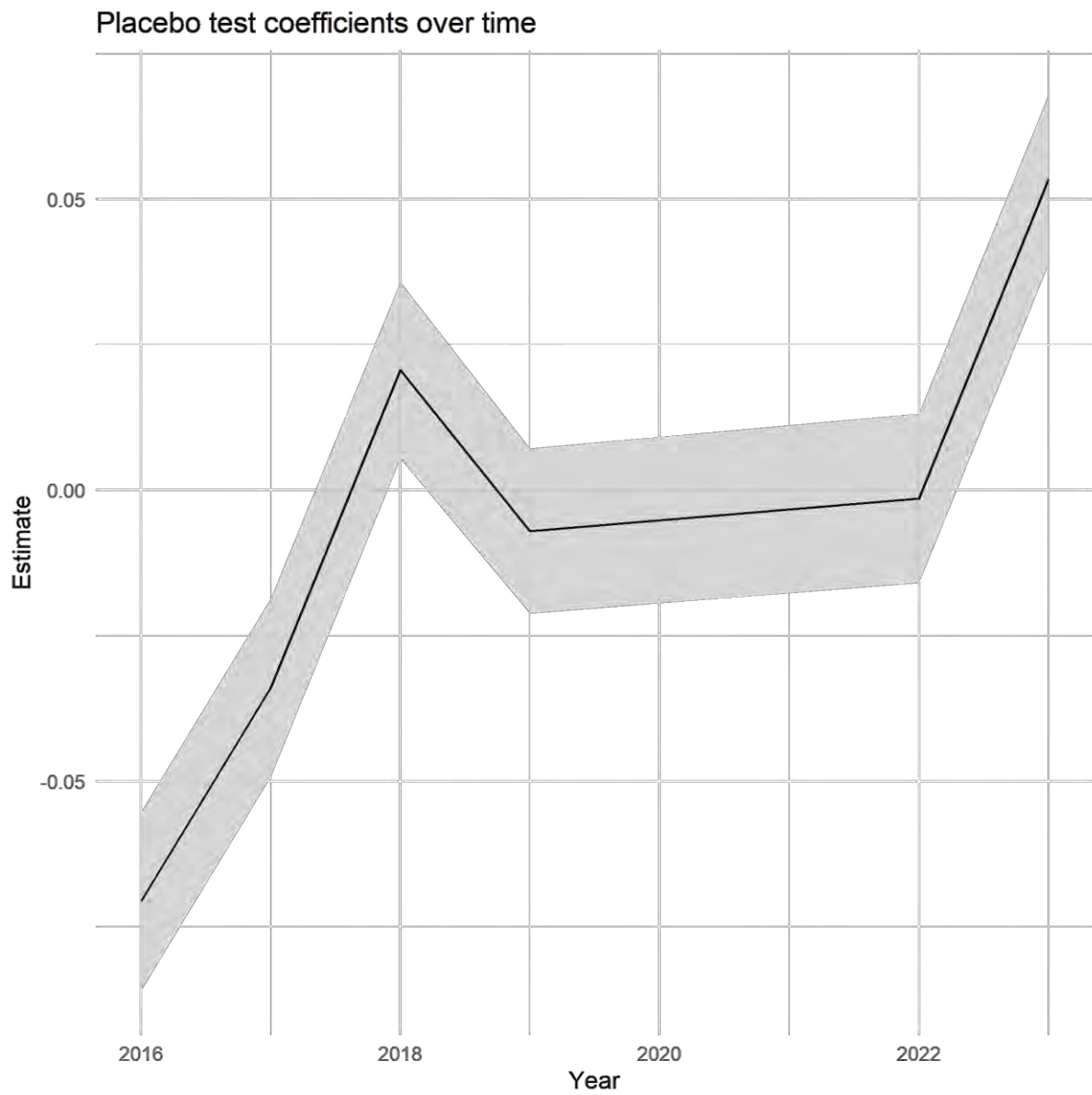
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 154 Models.csv

Figure 155. Placebo test estimates for primary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 155 Models.csv

Figure 156. Placebo test estimates for secondary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 156 Models.csv

## Appendix 13. Robustness check excluding schools ever involved with Magic Breakfast

Table 64. Difference in differences estimates for primary outcome

Treatment estimate	0.011 [-0.002, 0.025]
Num.Obs.	3815247
R2	0.382
R2 Adj.	0.380
R2 Within	0.315
R2 Within Adj.	0.315
AIC	8958980.4
BIC	9174293.5
RMSE	0.78
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	3815209

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 65. Difference in differences estimates for secondary outcome

Treatment estimate	0.013 [0.005, 0.021]
Num.Obs.	3810600
R2	0.059
R2 Adj.	0.055
R2 Within	0.029
R2 Within Adj.	0.029
AIC	9048397.7
BIC	9263625.1
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	3810562

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 66. Triple difference estimates for primary outcome

Treatment estimate	0.018 [-0.048, 0.084]
Num.Obs.	3839206
R2	0.382
R2 Adj.	0.380
R2 Within	0.315
R2 Within Adj.	0.315
AIC	9015308.3
BIC	9232000.5
RMSE	0.78
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	3839167

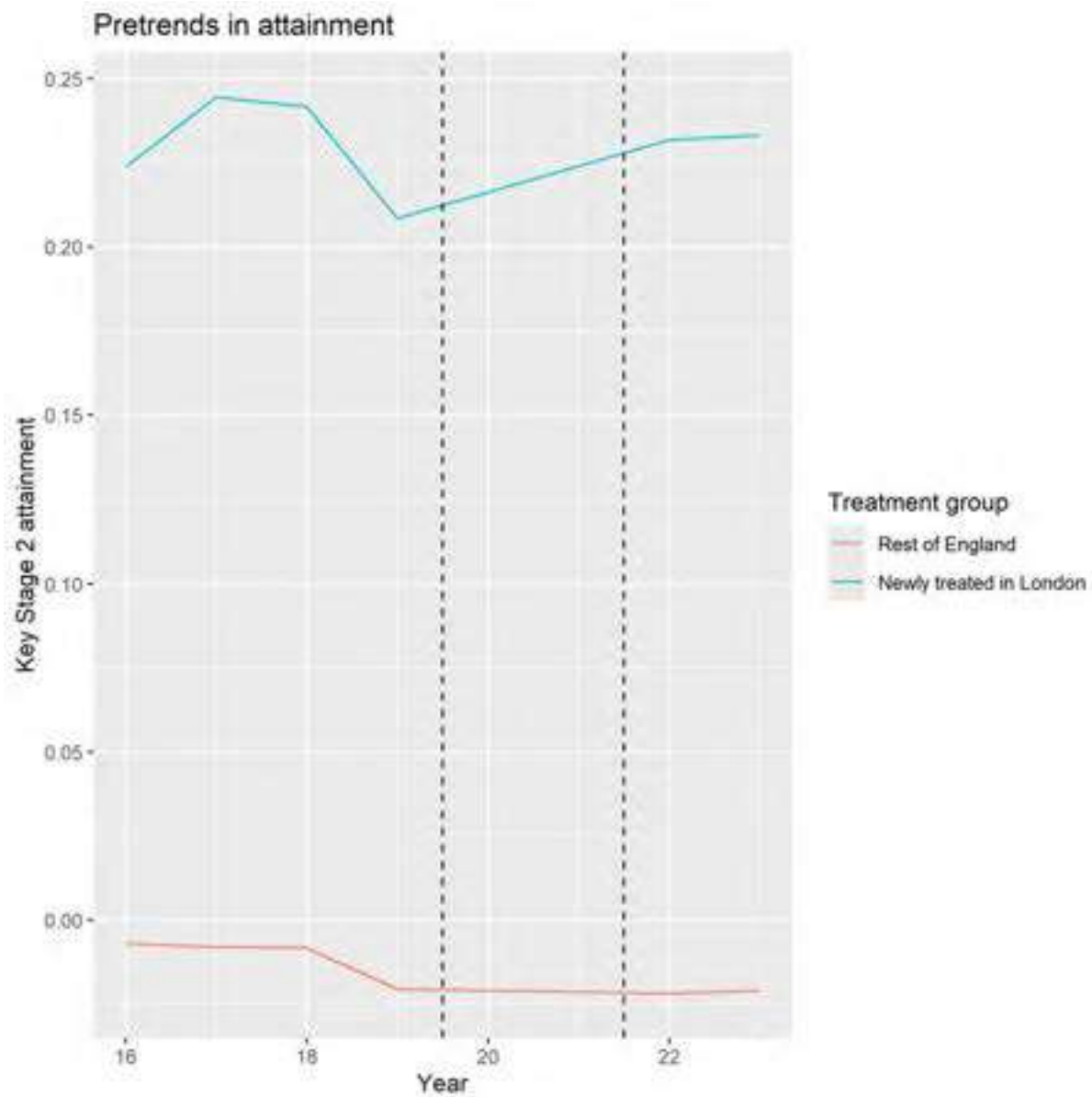
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 67. Triple difference estimates for secondary outcome

Treatment estimate	0.031 [0.000, 0.062]
Num.Obs.	3834514
R2	0.059
R2 Adj.	0.055
R2 Within	0.029
R2 Within Adj.	0.029
AIC	9102375.6
BIC	9318981.8
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	3834475

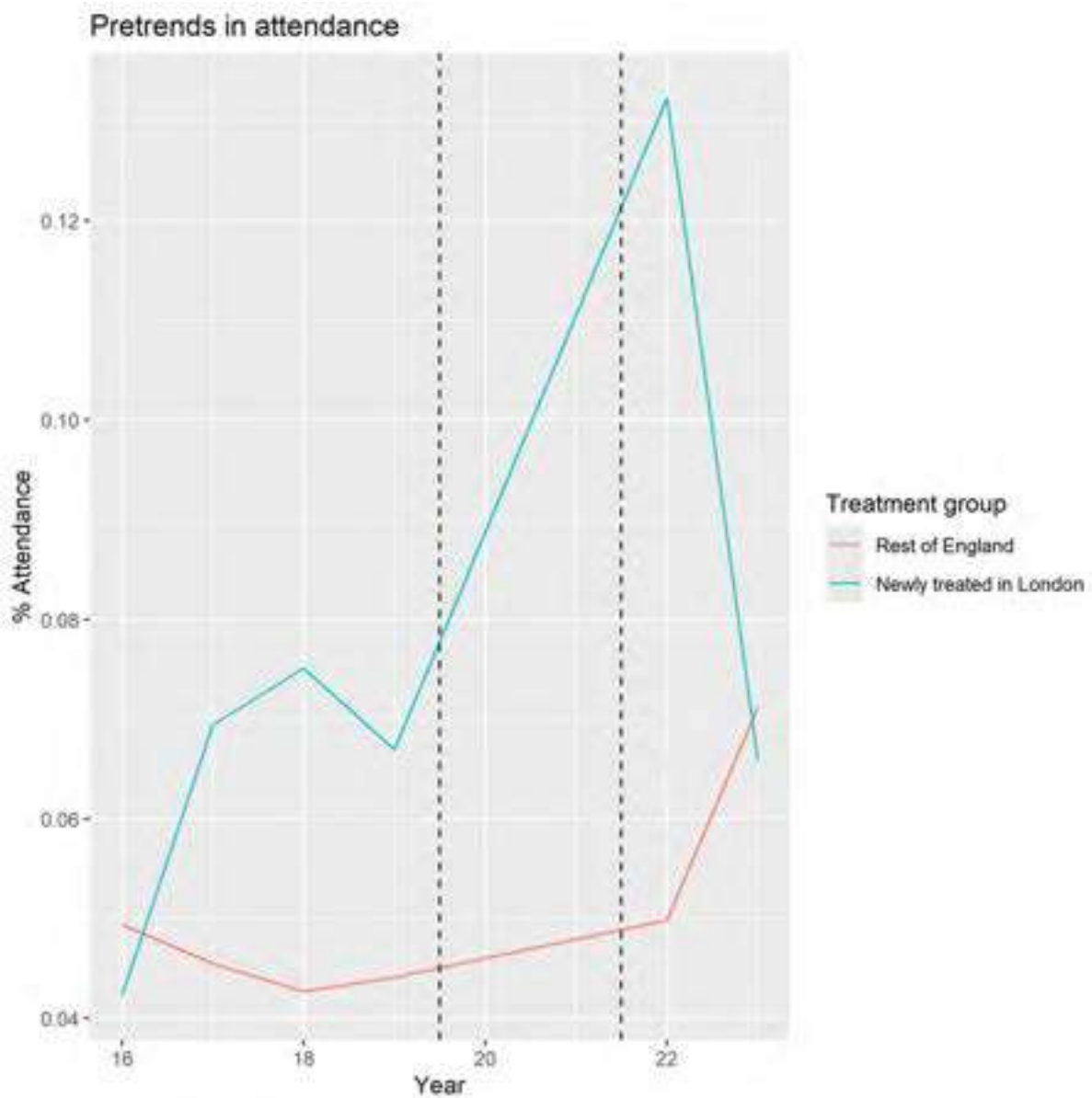
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 157. Raw pre-trends in primary outcome for difference-in-differences



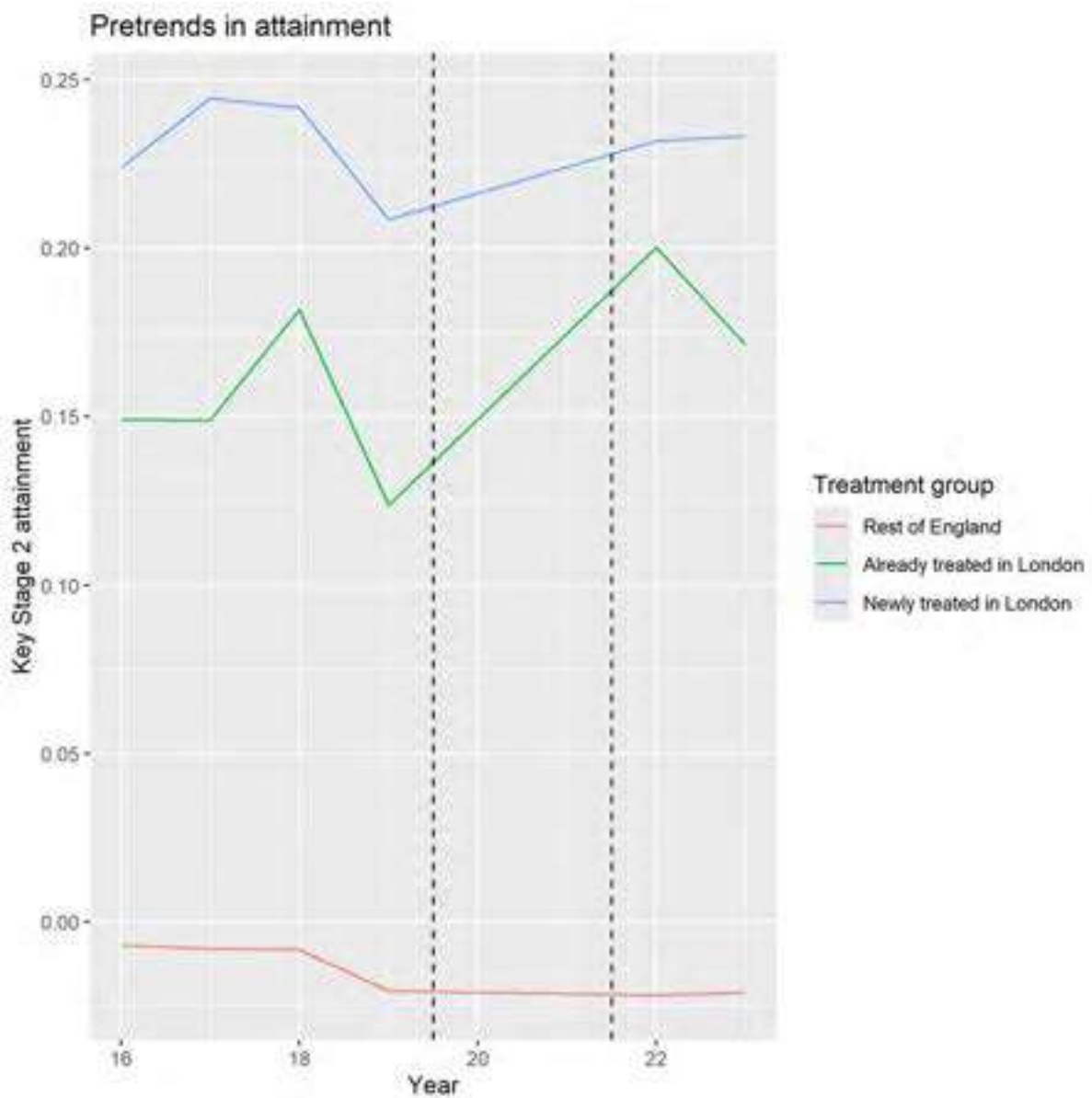
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 157 Counts.csv.

Figure 158. Raw pre-trends in secondary outcome for difference-in-differences



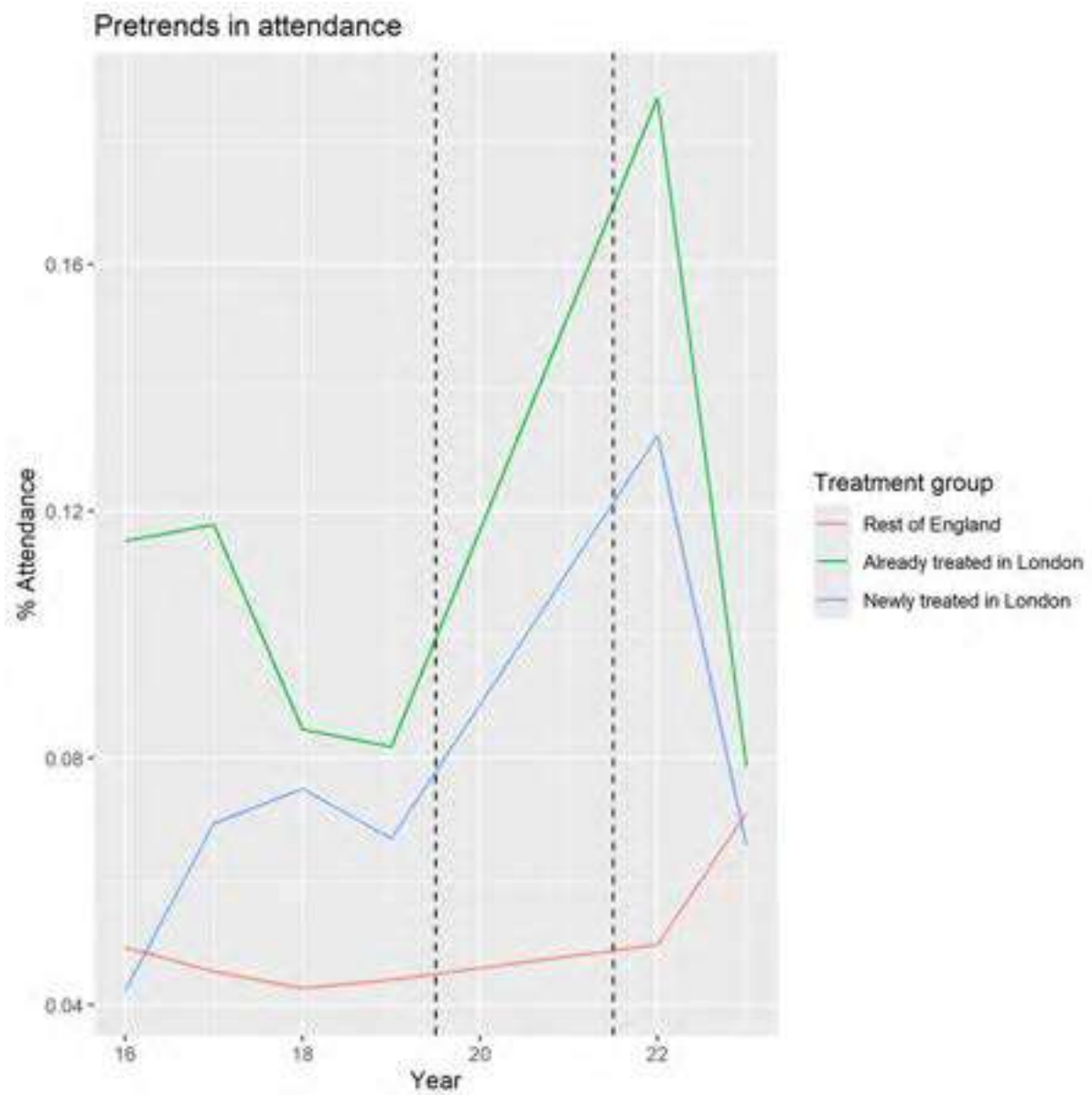
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 158 Counts.csv.

Figure 159. Raw pre-trends in primary outcome for triple difference



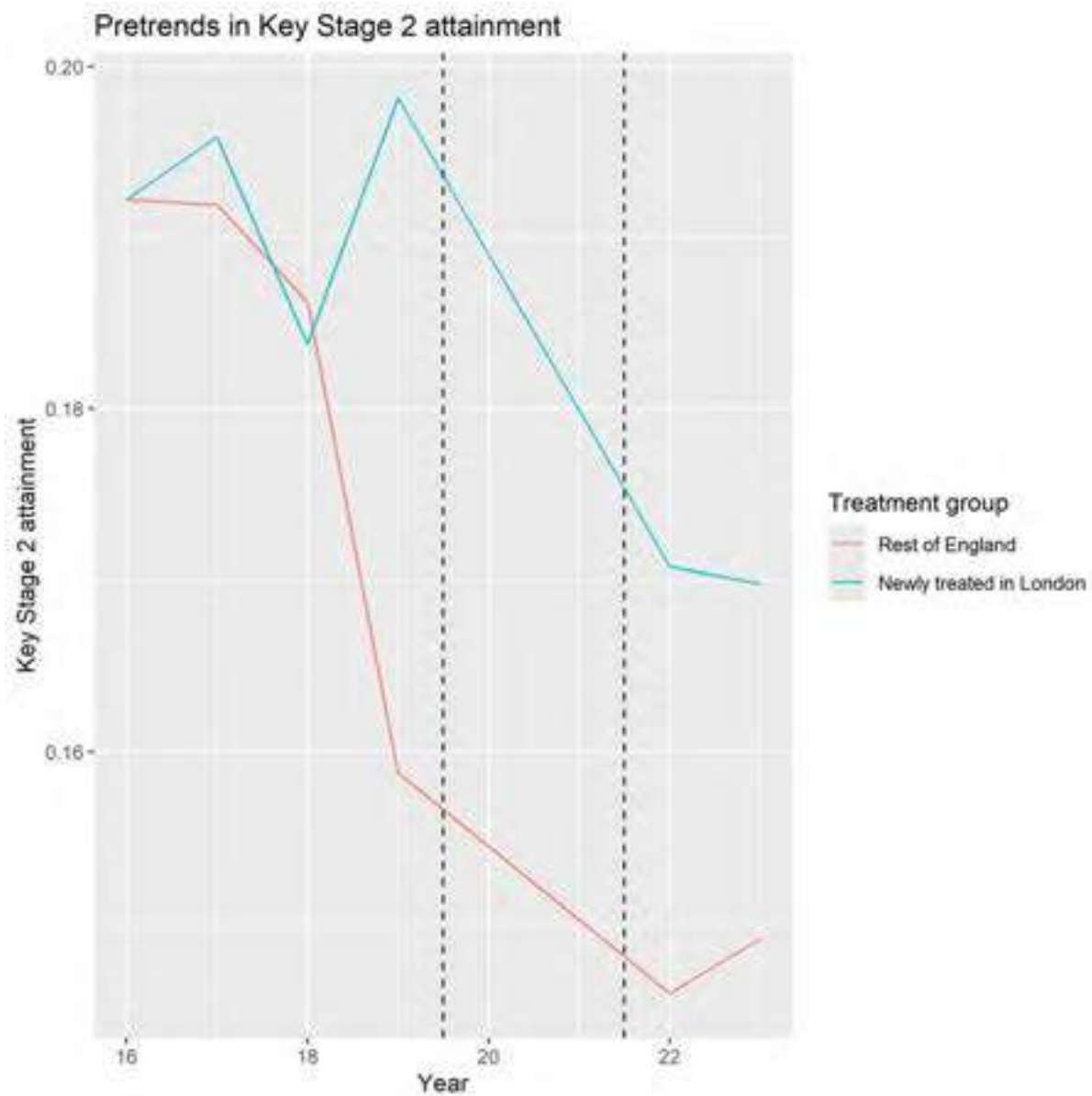
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 159 Counts.csv.

Figure 160. Raw pre-trends in secondary outcome for triple difference



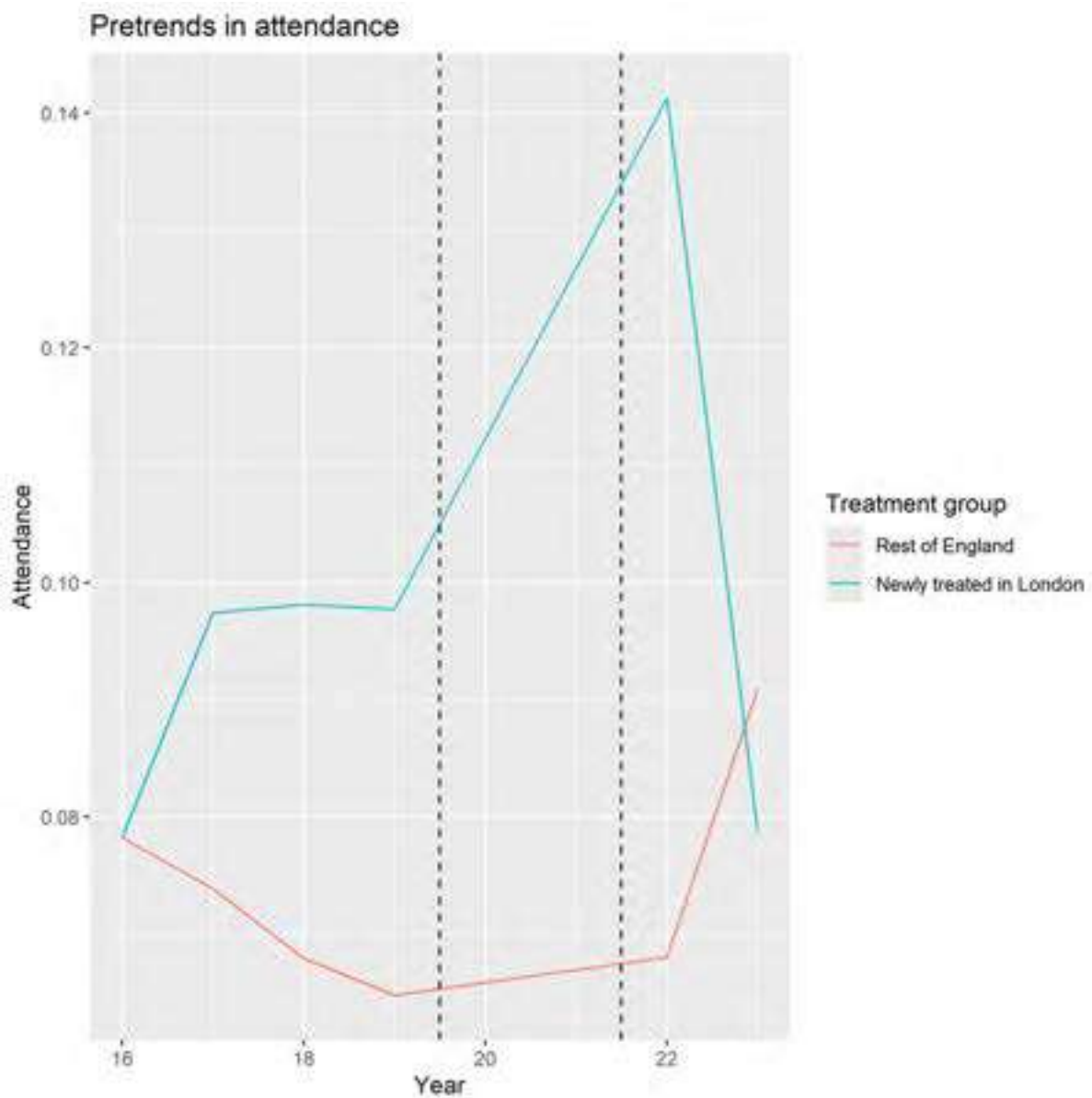
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 160 Counts.csv.

Figure 161. Conditional primary outcome pre-trends for difference-in-differences



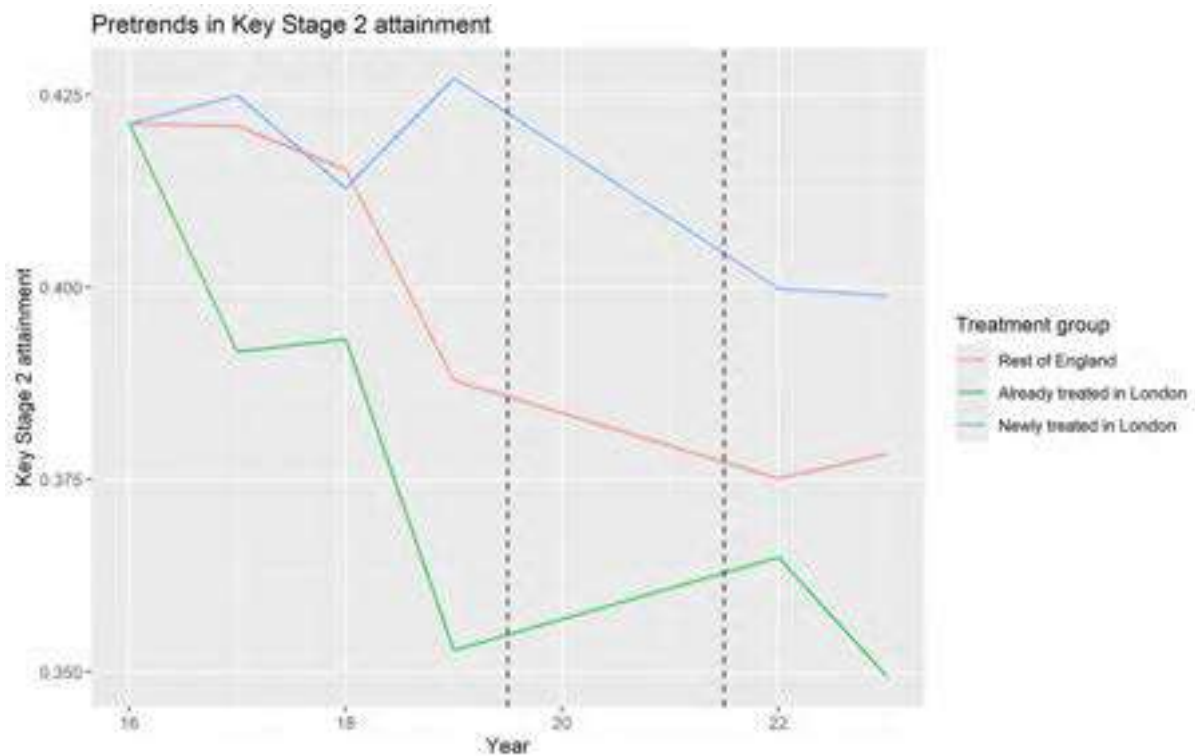
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 161 Model.docx.

Figure 162. Conditional secondary outcome pre-trends for difference-in-differences



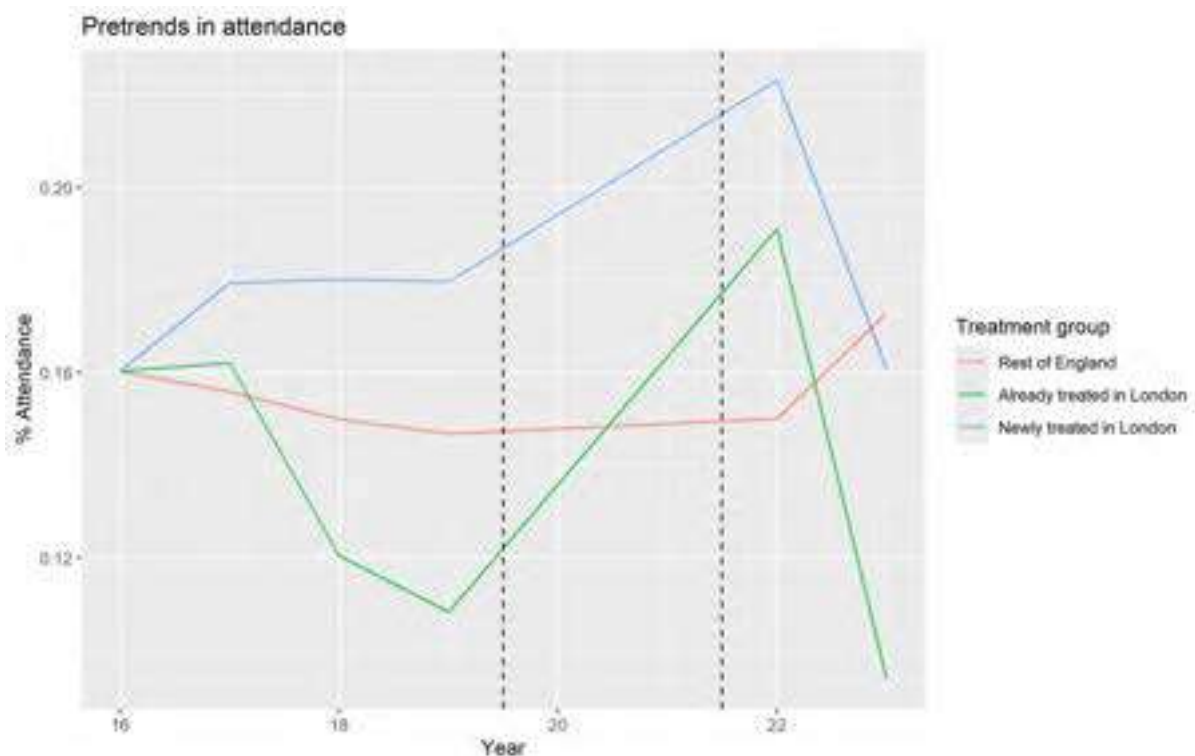
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 162 Model.docx

Figure 163. Conditional primary outcome pre-trends for triple differences



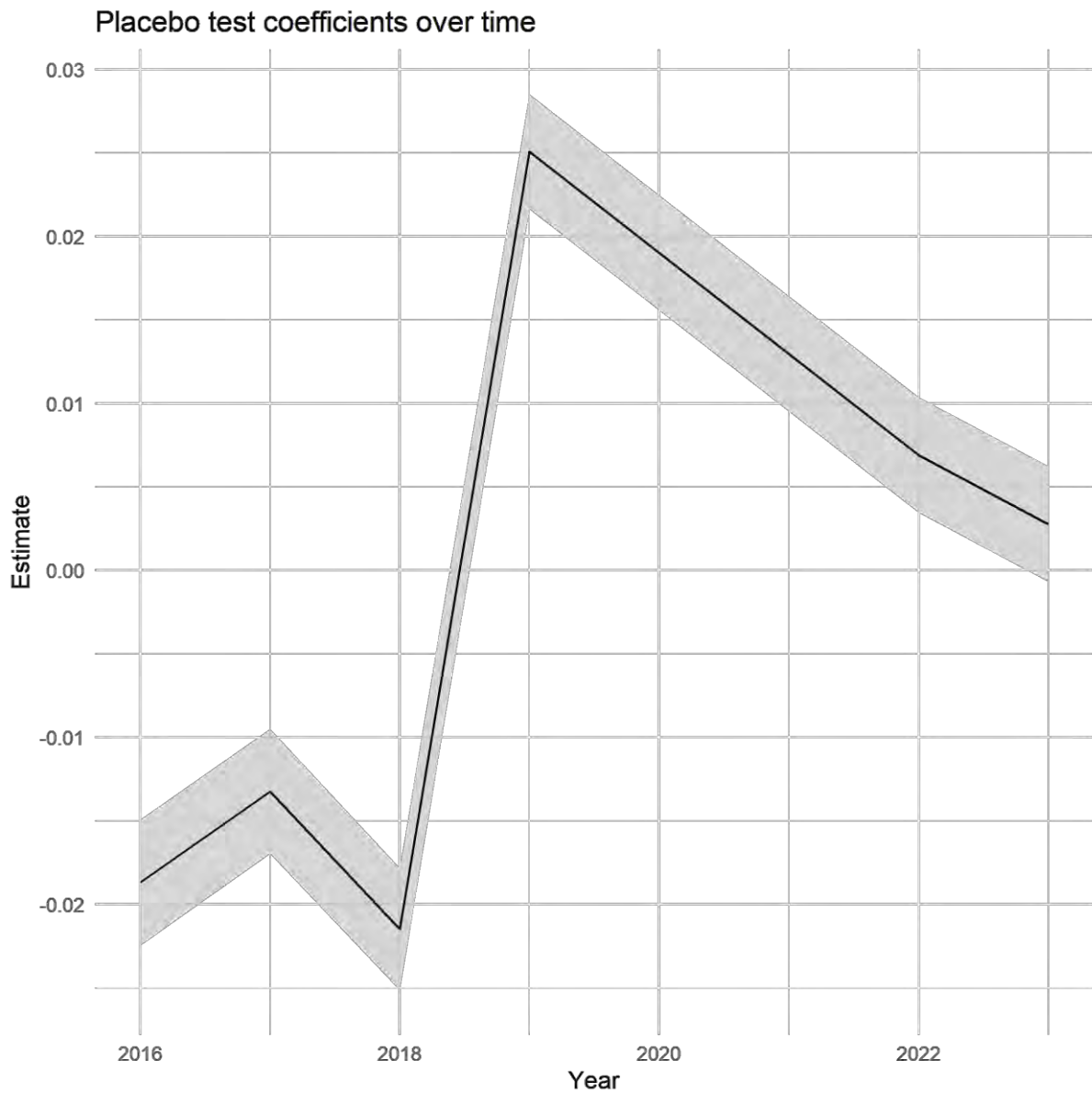
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 163 Model.docx

Figure 164. Conditional pre-trends for secondary outcome for triple difference



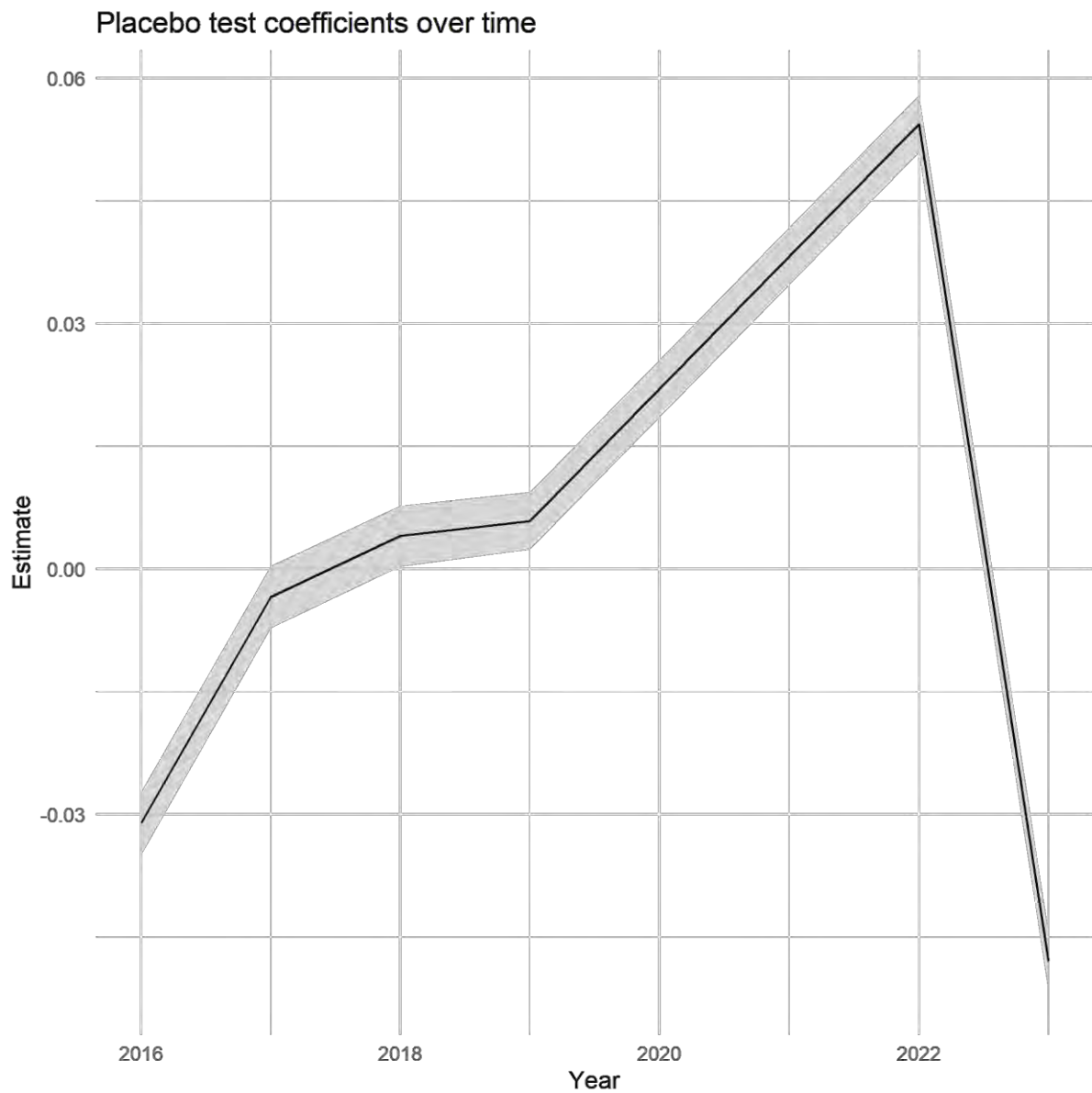
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 164 Model.docx

Figure 165. Placebo test estimates for primary outcome for difference in differences



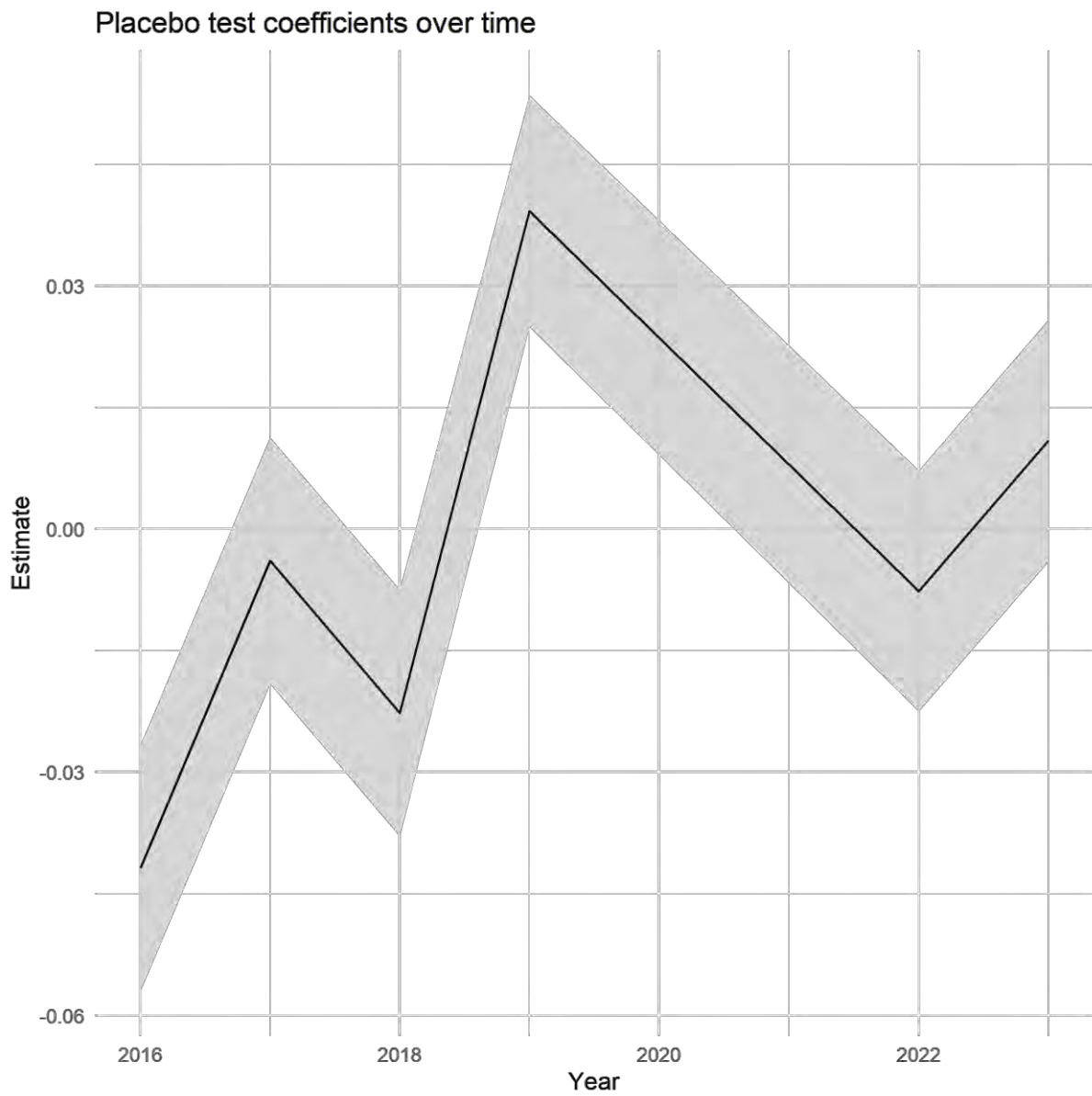
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 165 Models.csv

Figure 166. Placebo test estimates for secondary outcome for difference in differences



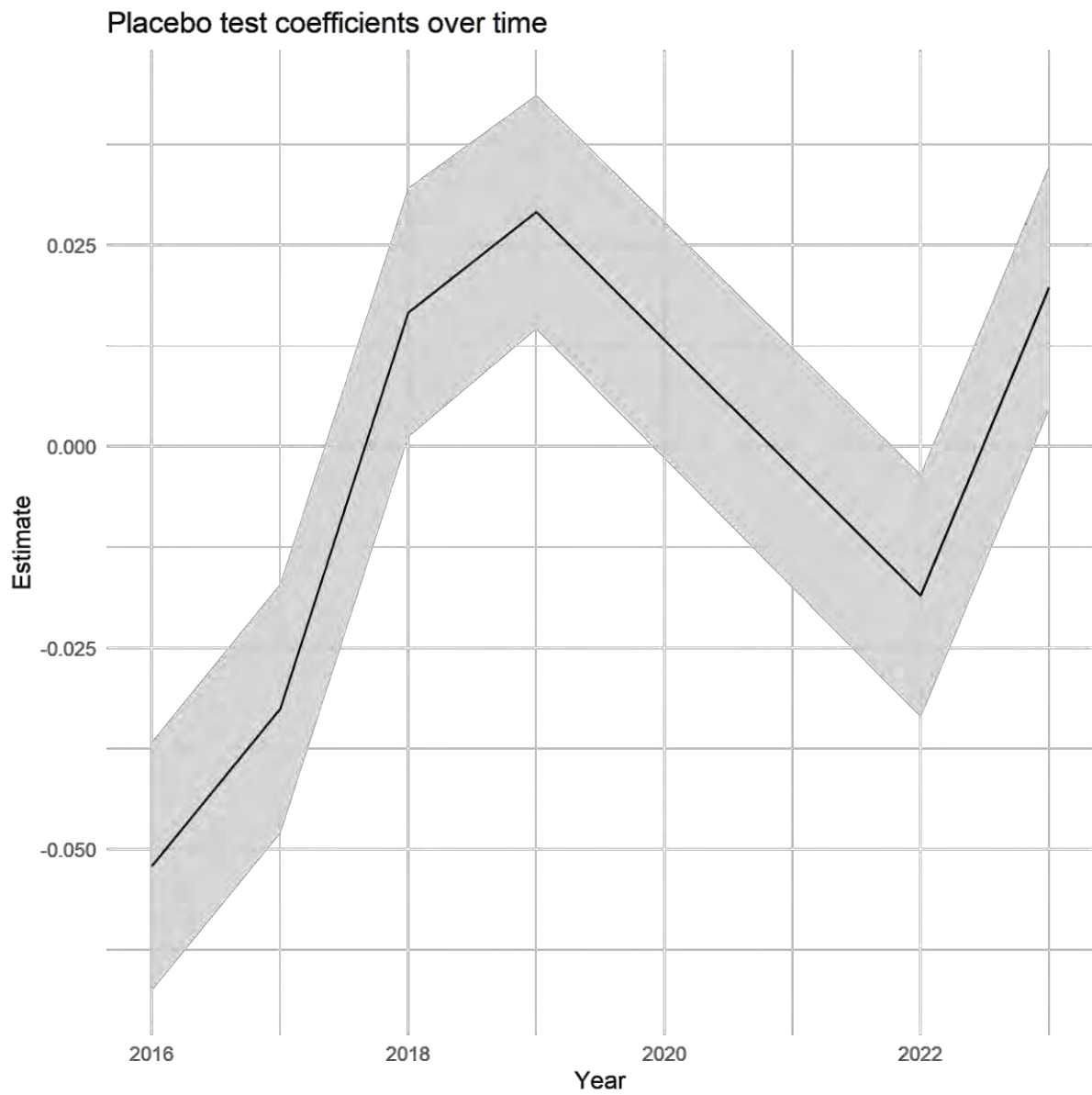
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 166 Models.csv

Figure 167. Placebo test estimates for primary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 167 Models.csv

Figure 168. Placebo test estimates for secondary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 168 Models.csv

## Appendix 14. Robustness check excluding 2016 data

Table 68. Difference in differences estimates for primary outcome

---

Treatment estimate	0.008 [-0.004, 0.021]
Num.Obs.	3559623
R2	0.379
R2 Adj.	0.376
R2 Within	0.308
R2 Within Adj.	0.308
AIC	8411132.2
BIC	8635542.8
RMSE	0.78
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	3559585

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 69. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.006 [-0.001, 0.014]
Num.Obs.	3556189
R2	0.061
R2 Adj.	0.057
R2 Within	0.029
R2 Within Adj.	0.029
AIC	8468255.3
BIC	8692636.2
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	3556151

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 70. Triple difference estimates for primary outcome

Treatment estimate	-0.004 [-0.051, 0.044]
Num.Obs.	3595784
R2	0.378
R2 Adj.	0.375
R2 Within	0.308
R2 Within Adj.	0.308
AIC	8497013.5
BIC	8723522.4
RMSE	0.78
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	3595745

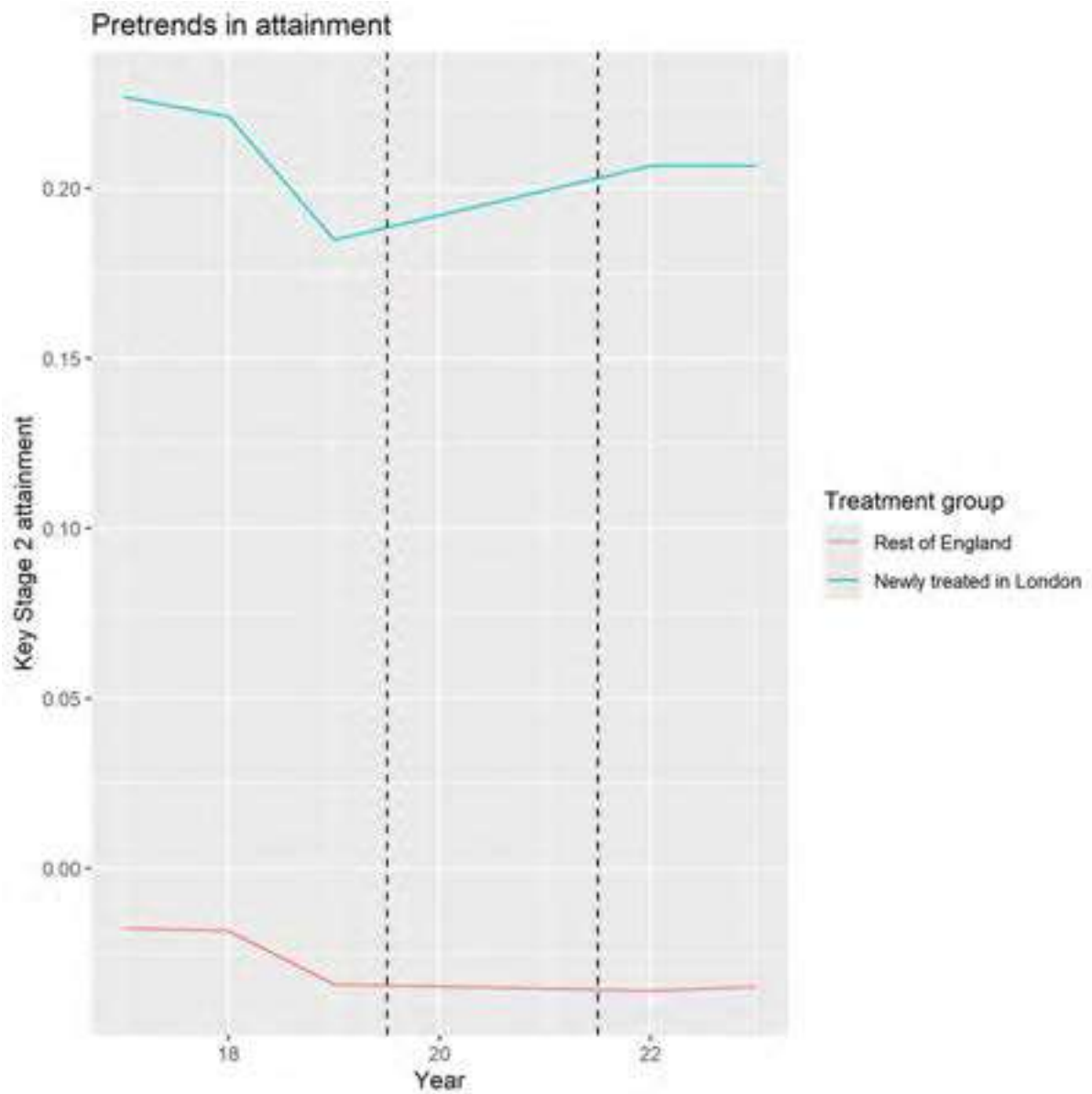
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 71. Triple difference estimates for secondary outcome

Treatment estimate	0.029 [0.006, 0.052]
Num.Obs.	3592305
R2	0.061
R2 Adj.	0.057
R2 Within	0.029
R2 Within Adj.	0.029
AIC	8550138.7
BIC	8776617.8
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	3592266

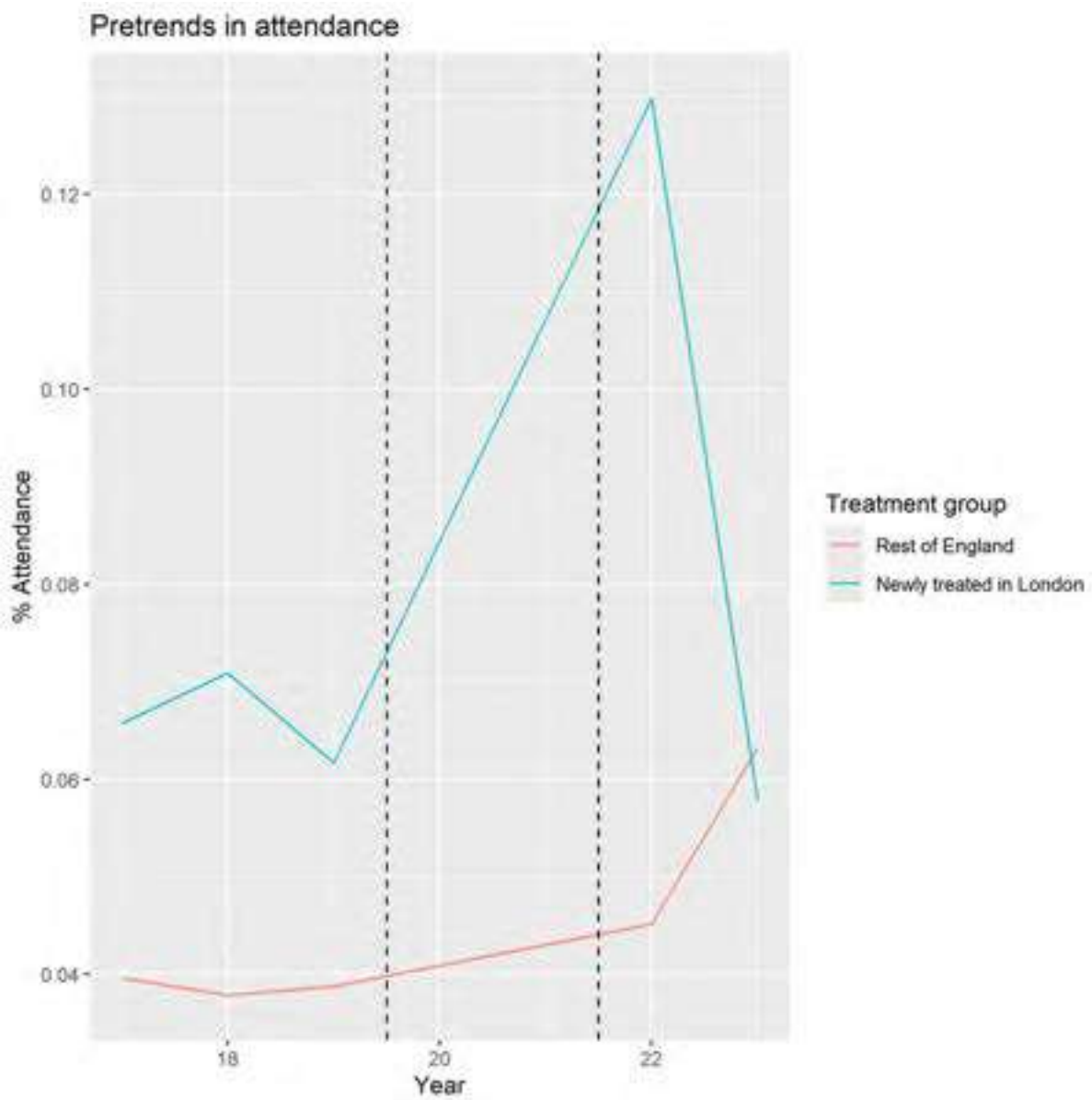
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 169. Raw pre-trends in primary outcome for difference-in-differences



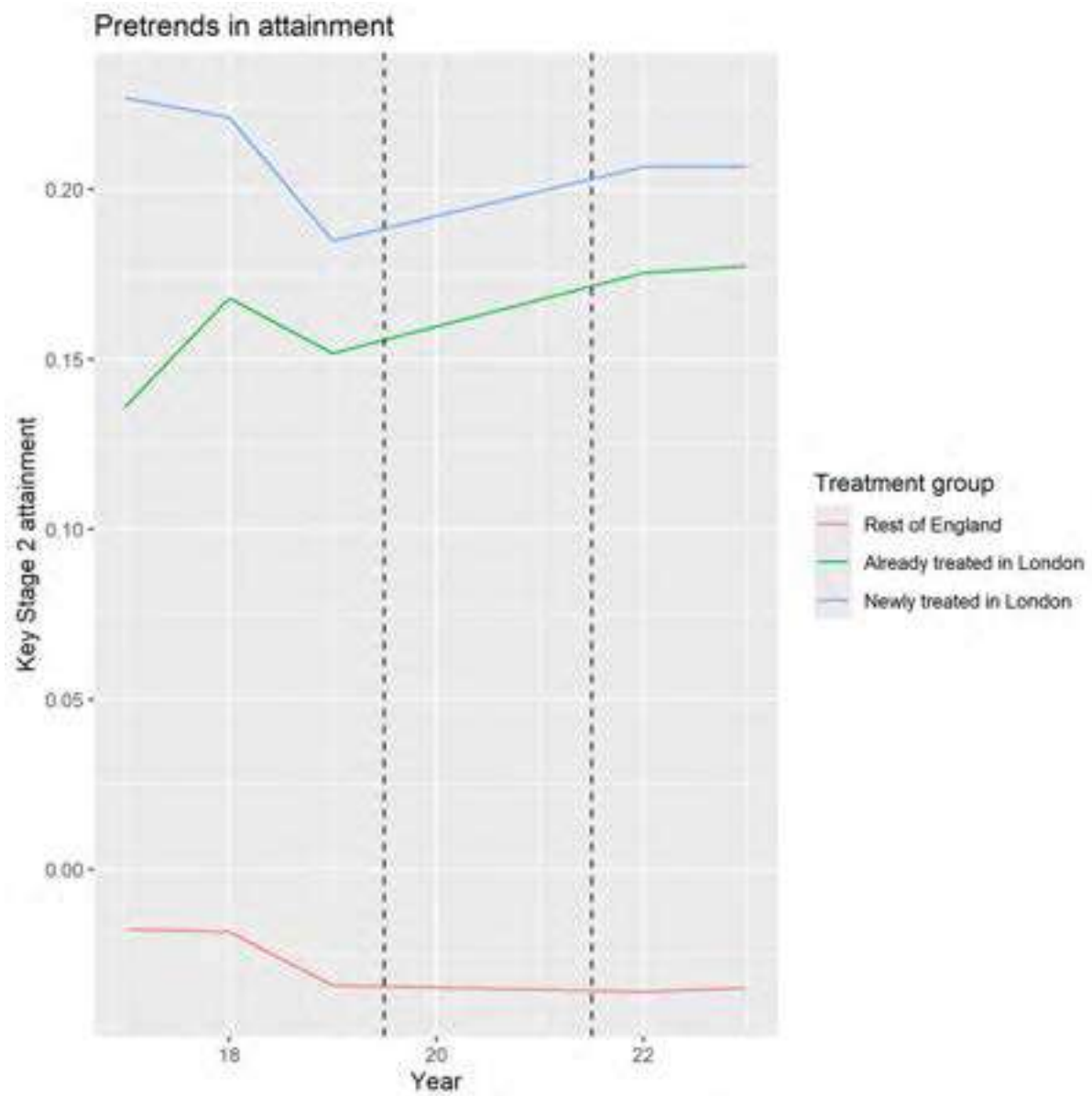
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 169 Counts.csv.

Figure 170. Raw pre-trends in secondary outcome for difference-in-differences



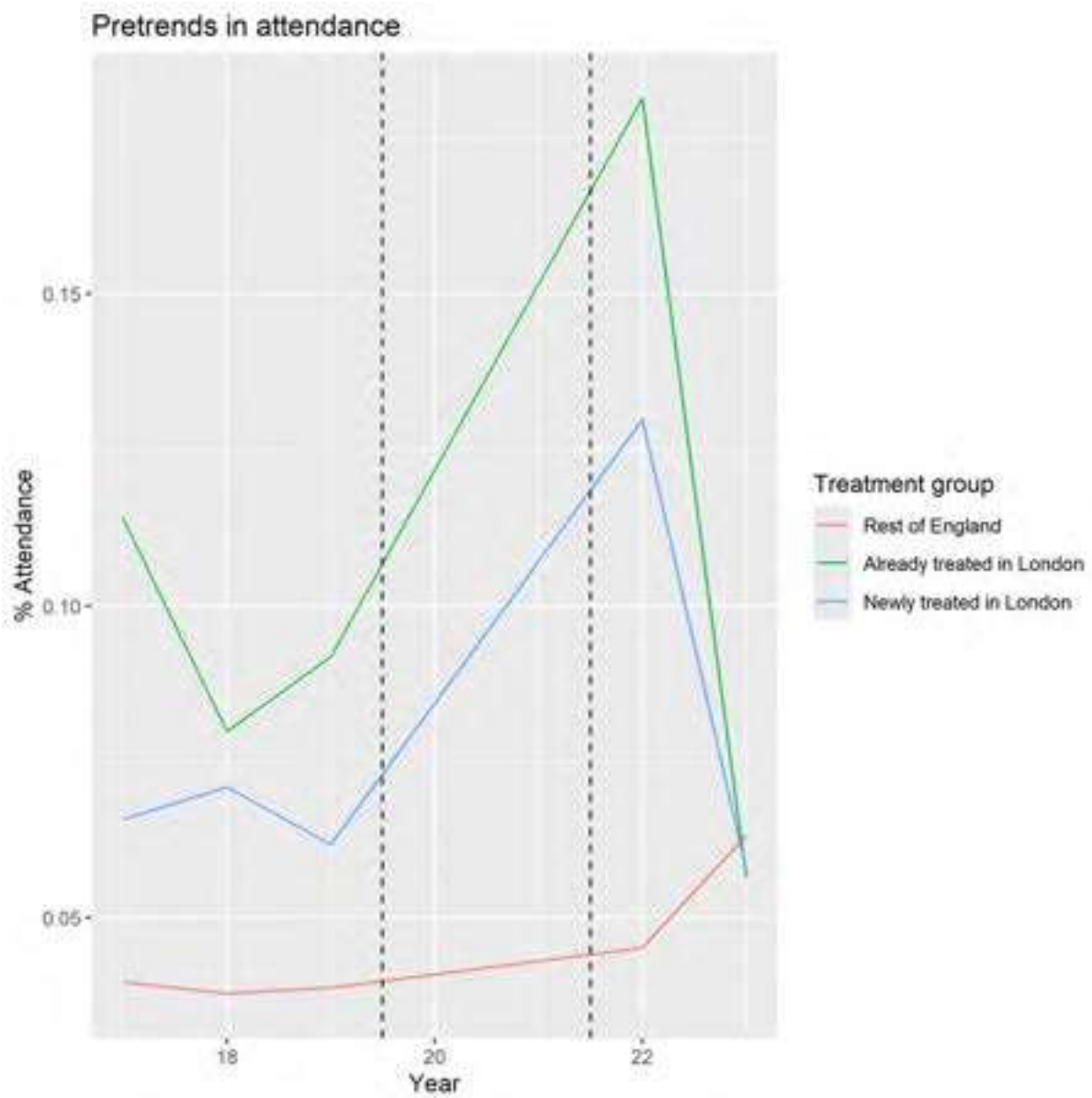
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 170 Counts.csv.

Figure 171. Raw pre-trends in primary outcome for triple difference



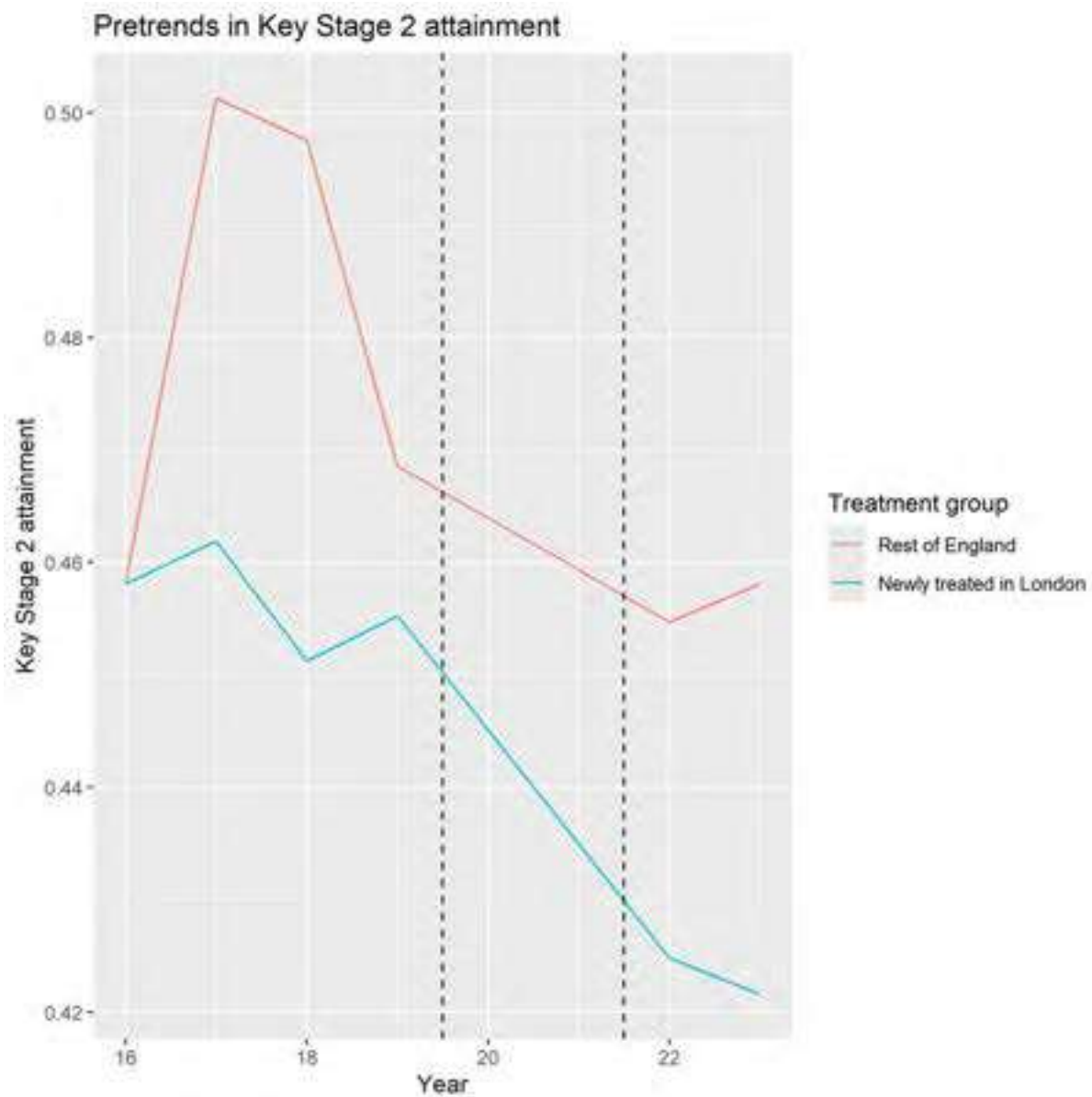
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 171 Counts.csv.

Figure 172. Raw pre-trends in secondary outcome for triple difference



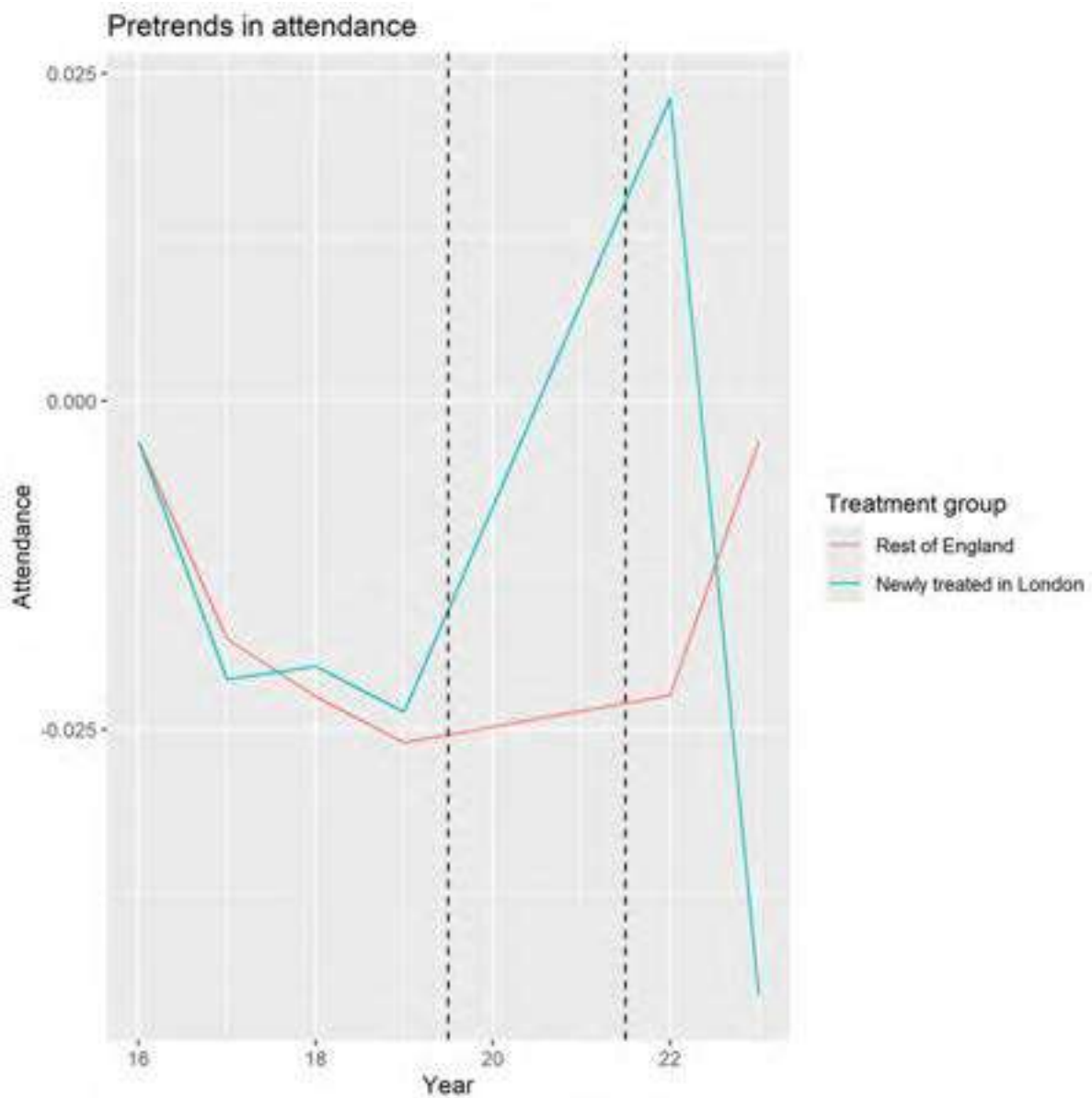
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 172 Counts.csv.

Figure 173. Conditional primary outcome pre-trends for difference-in-differences



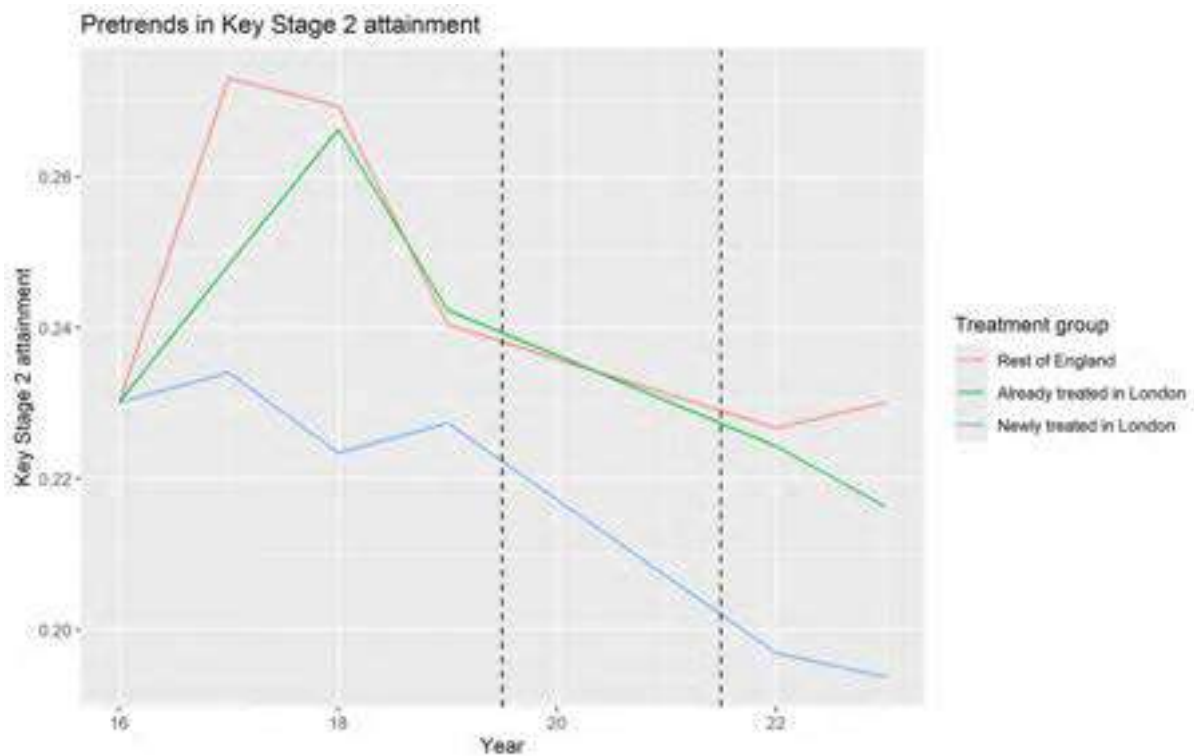
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 173 Model.docx.

Figure 174. Conditional secondary outcome pre-trends for difference-in-differences



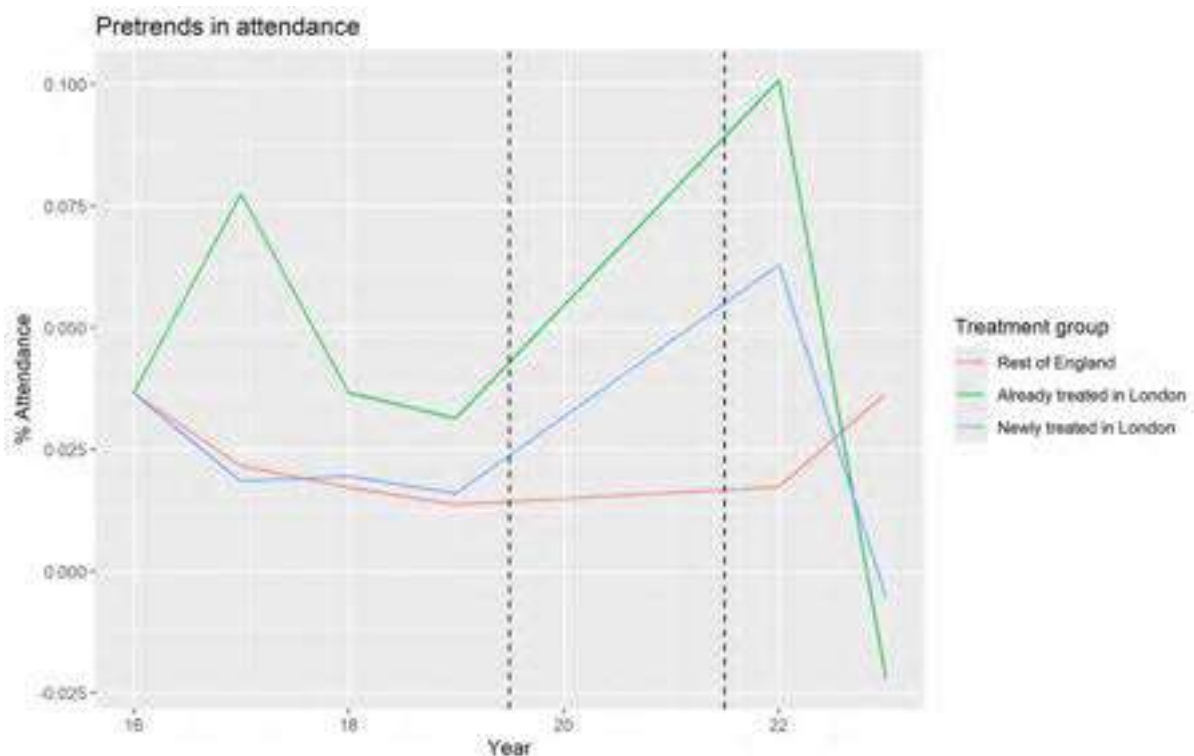
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 174 Model.docx

Figure 175. Conditional primary outcome pre-trends for triple differences



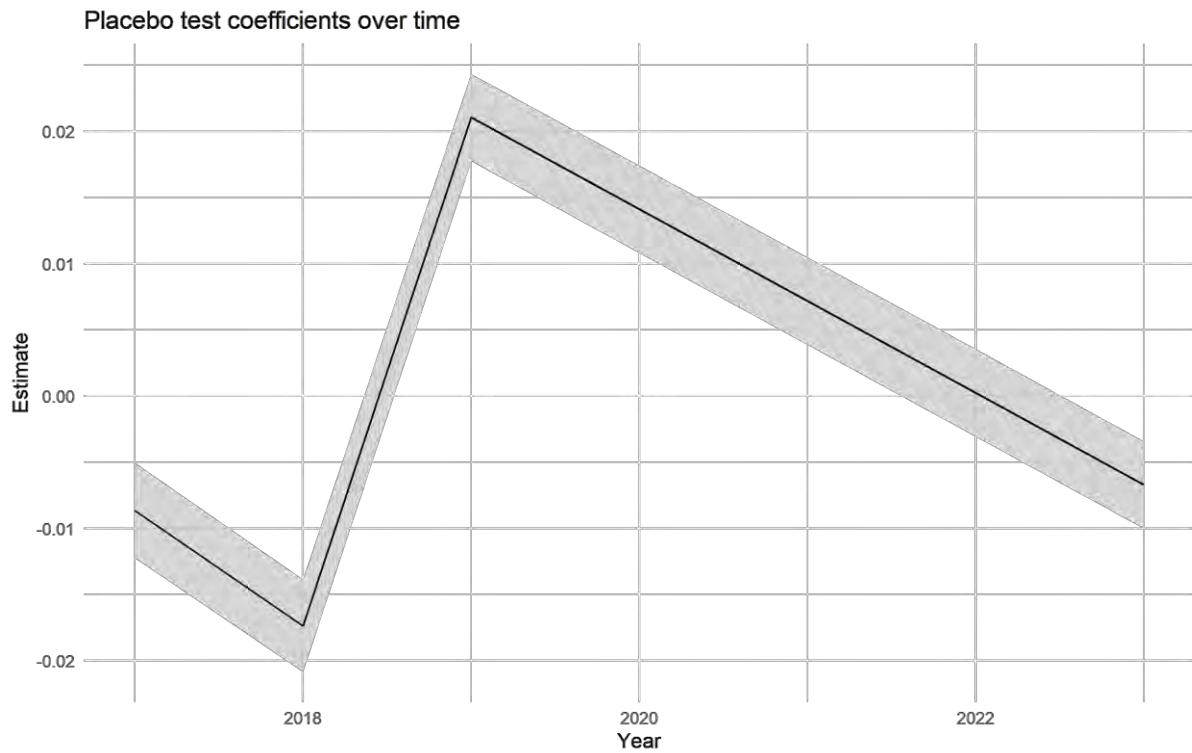
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 175 Model.docx

Figure 176. Conditional pre-trends for secondary outcome for triple difference



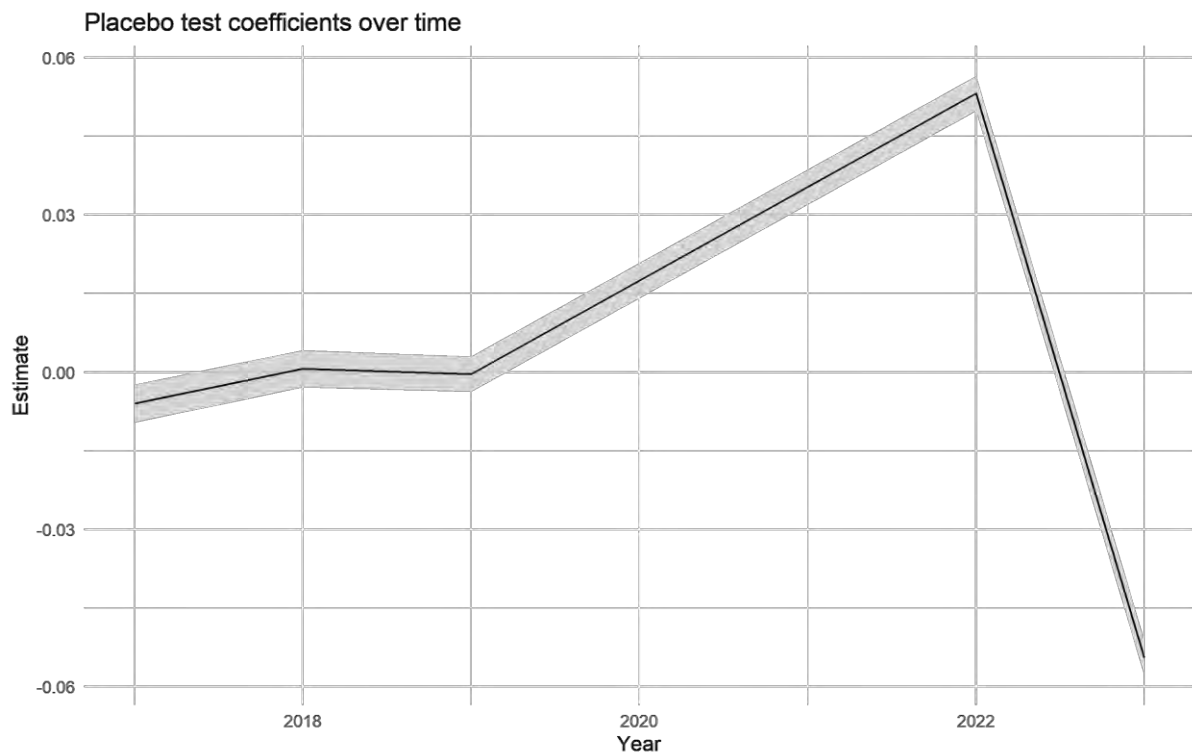
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 176 Model.docx

Figure 177. Placebo test estimates for primary outcome for difference in differences



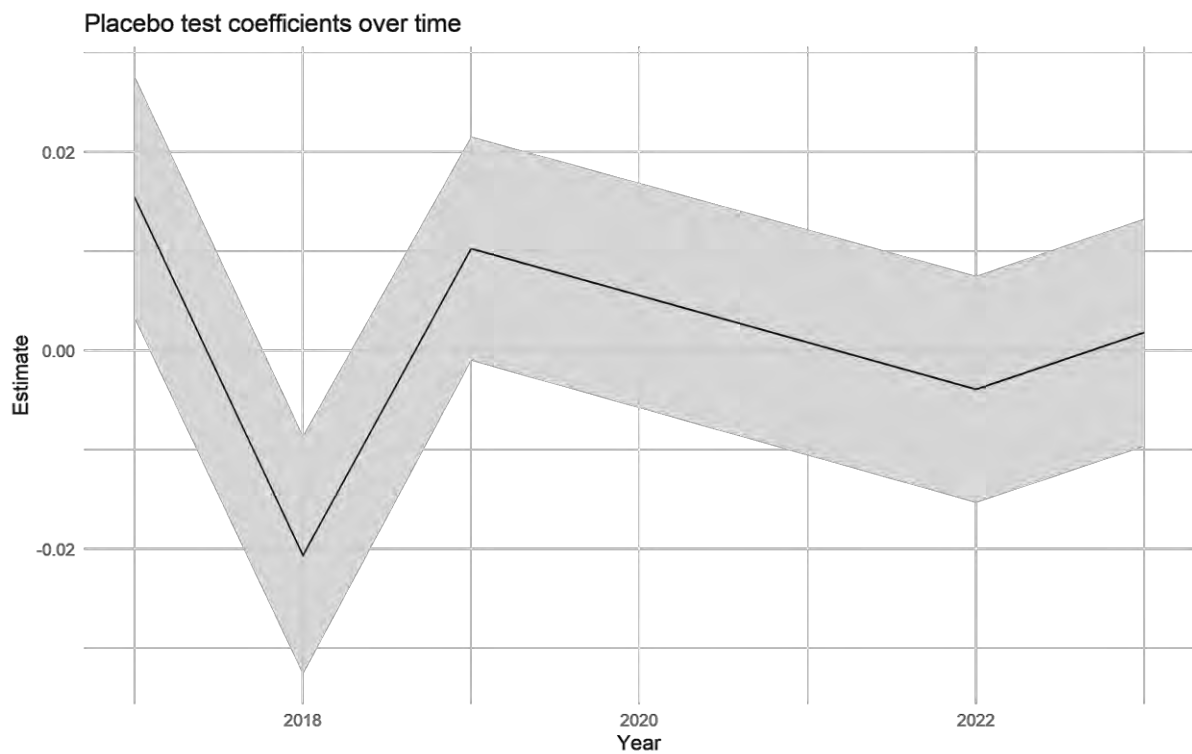
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 177 Models.csv

Figure 178. Placebo test estimates for secondary outcome for difference in differences



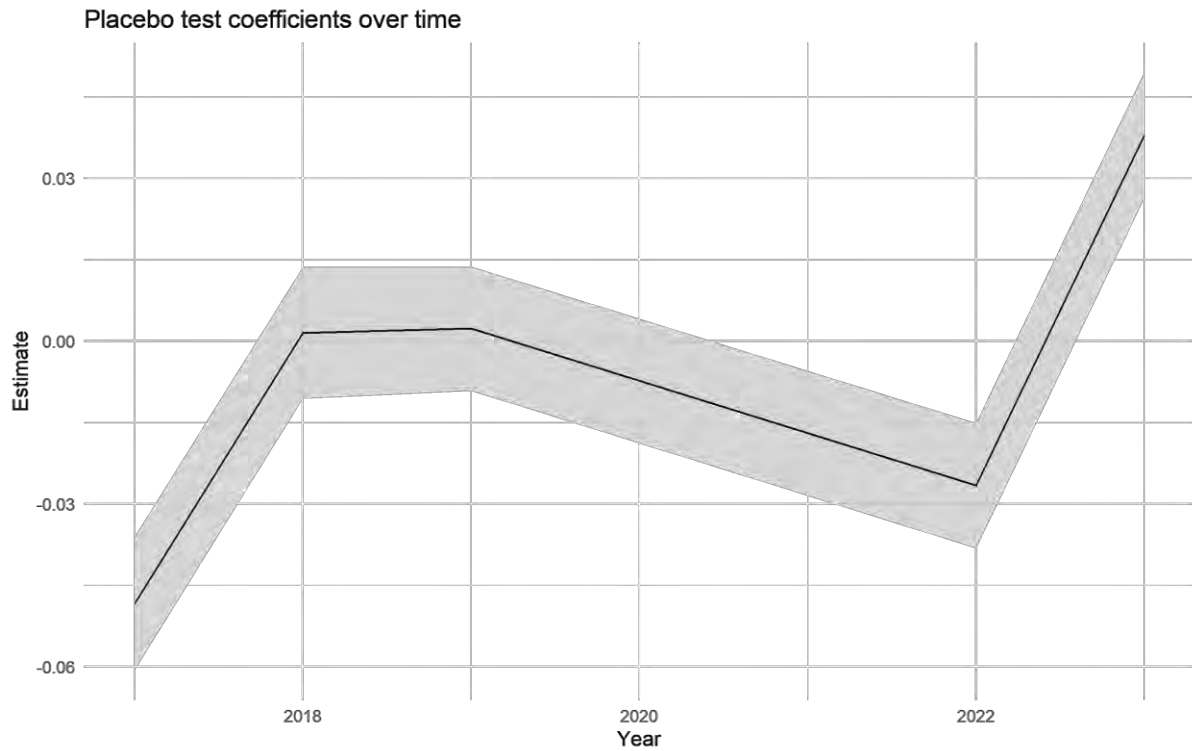
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 178 Models.csv

Figure 179. Placebo test estimates for primary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 179 Models.csv

Figure 180. Placebo test estimates for secondary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 180 Models.csv

## Appendix 15. Robustness check excluding pre-2018 data

Table 72. Difference in differences estimates for primary outcome

---

Treatment estimate	0.007
	[-0.005, 0.019]
Num.Obs.	3027208
R2	0.372
R2 Adj.	0.368
R2 Within	0.299
R2 Within Adj.	0.299
AIC	7196982.9
BIC	7414608.7
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	3027171

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 73. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.006
	[-0.002, 0.013]
Num.Obs.	3025230
R2	0.062
R2 Adj.	0.057
R2 Within	0.029
R2 Within Adj.	0.029
AIC	7165572.3
BIC	7383174.3
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	3025193

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 74. Triple difference estimates for primary outcome

Treatment estimate	-0.001 [-0.049, 0.046]
Num.Obs.	3057896
R2	0.371
R2 Adj.	0.368
R2 Within	0.299
R2 Within Adj.	0.299
AIC	7270583.0
BIC	7490241.1
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	3057858

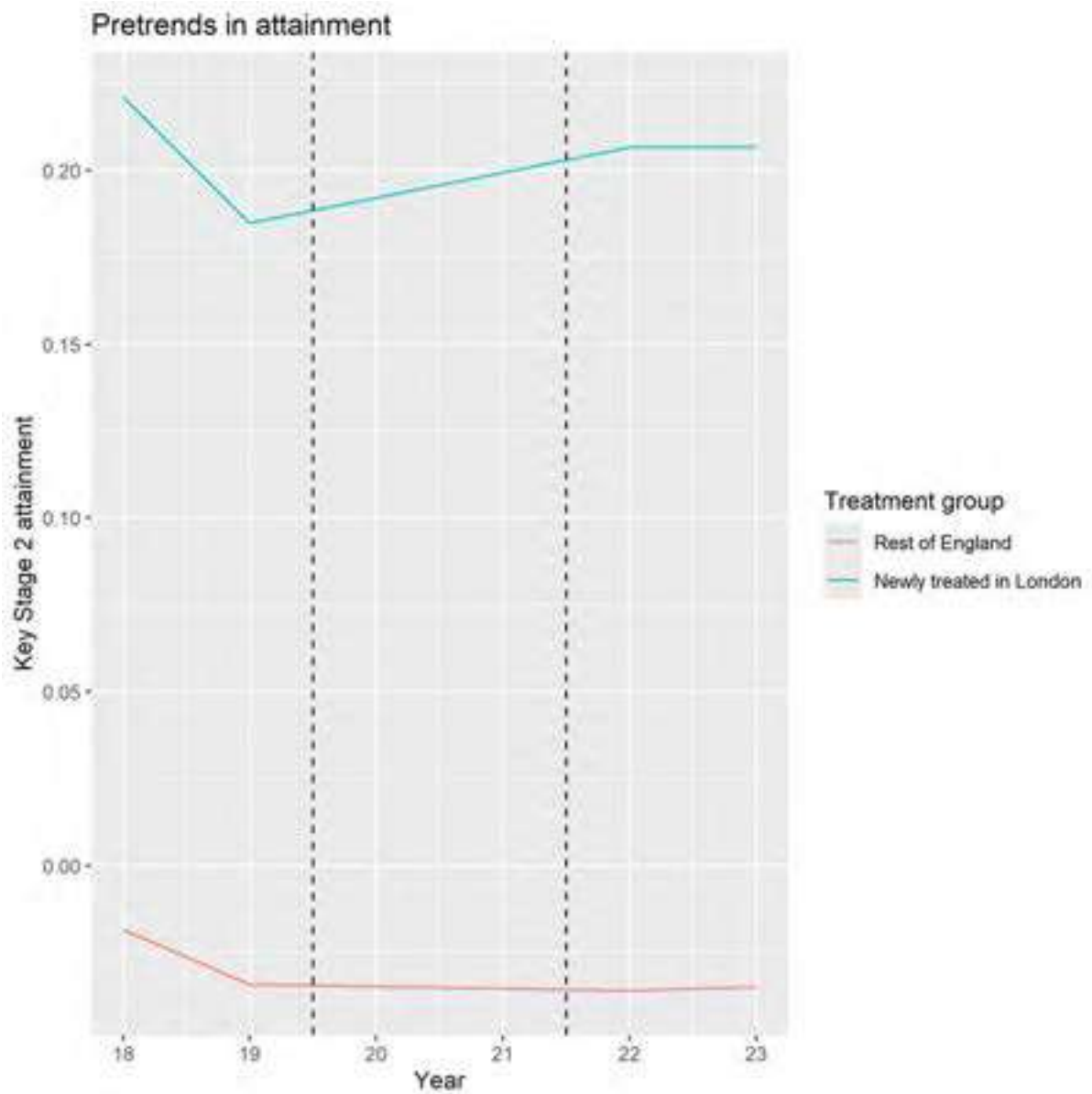
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 75. Triple difference estimates for secondary outcome

Treatment estimate	0.021 [-0.002, 0.044]
Num.Obs.	3055886
R2	0.062
R2 Adj.	0.057
R2 Within	0.029
R2 Within Adj.	0.029
AIC	7235494.4
BIC	7455128.4
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	3055848

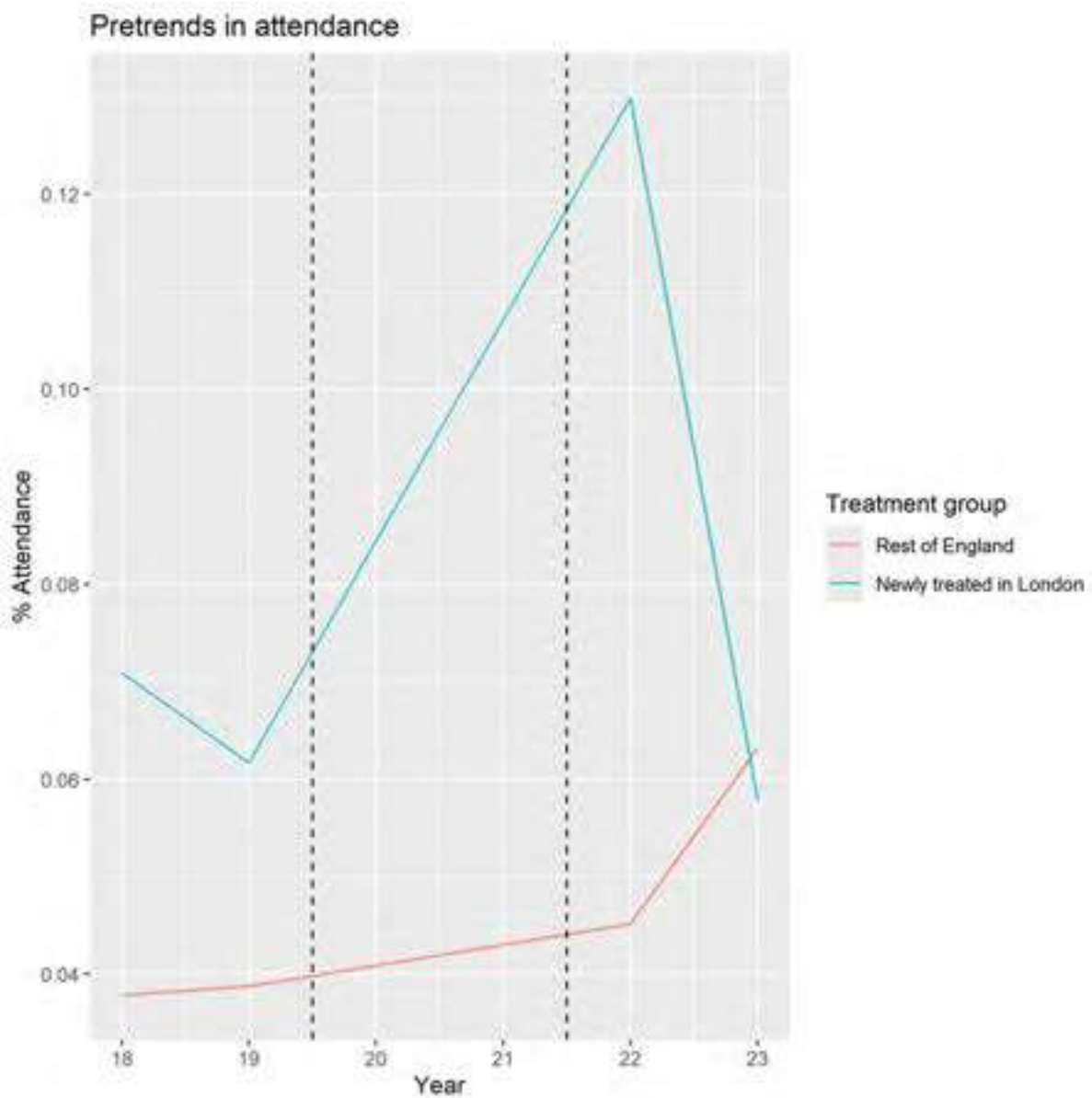
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 181. Raw pre-trends in primary outcome for difference-in-differences



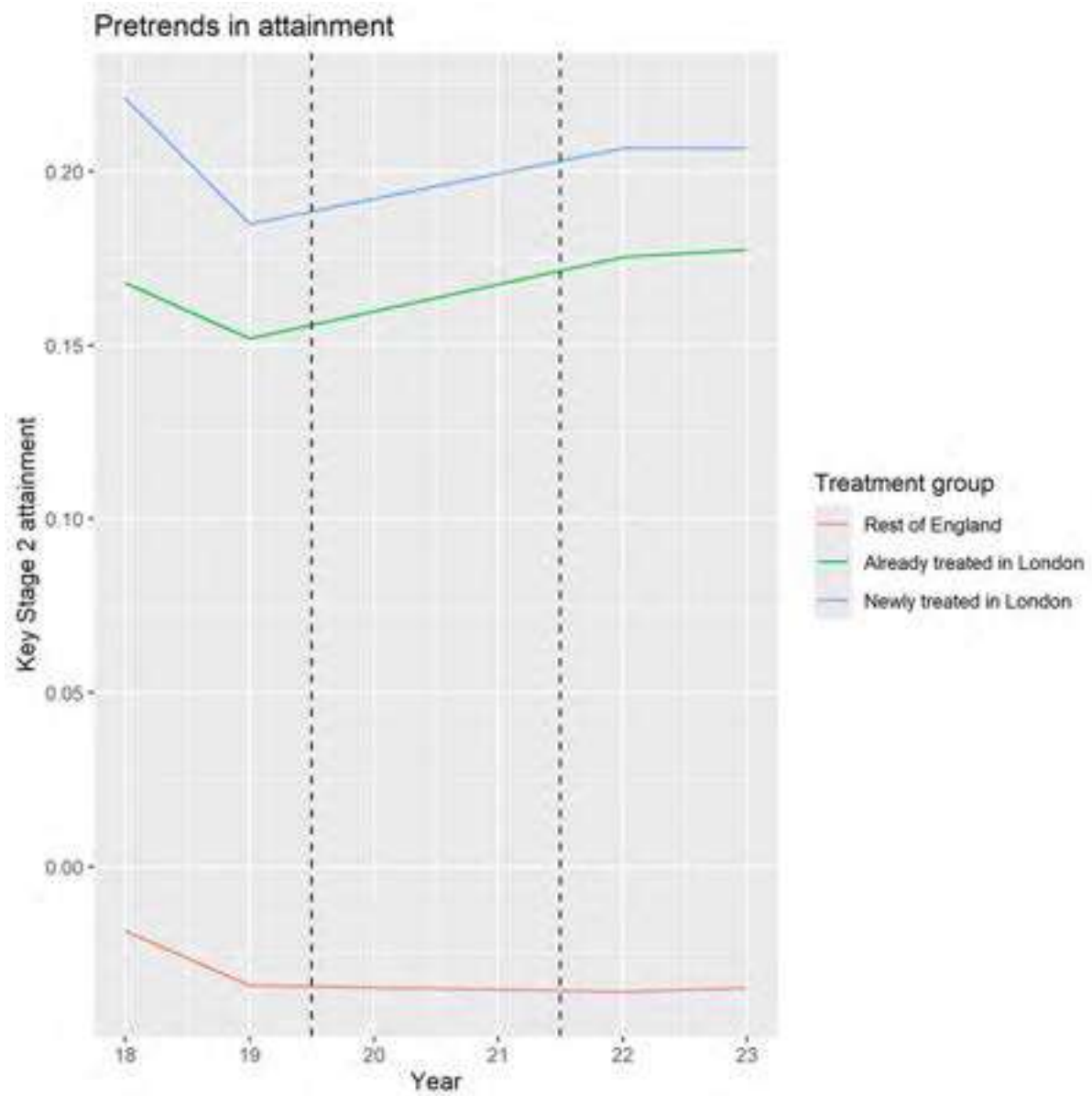
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 181 Counts.csv.

Figure 182. Raw pre-trends in secondary outcome for difference-in-differences



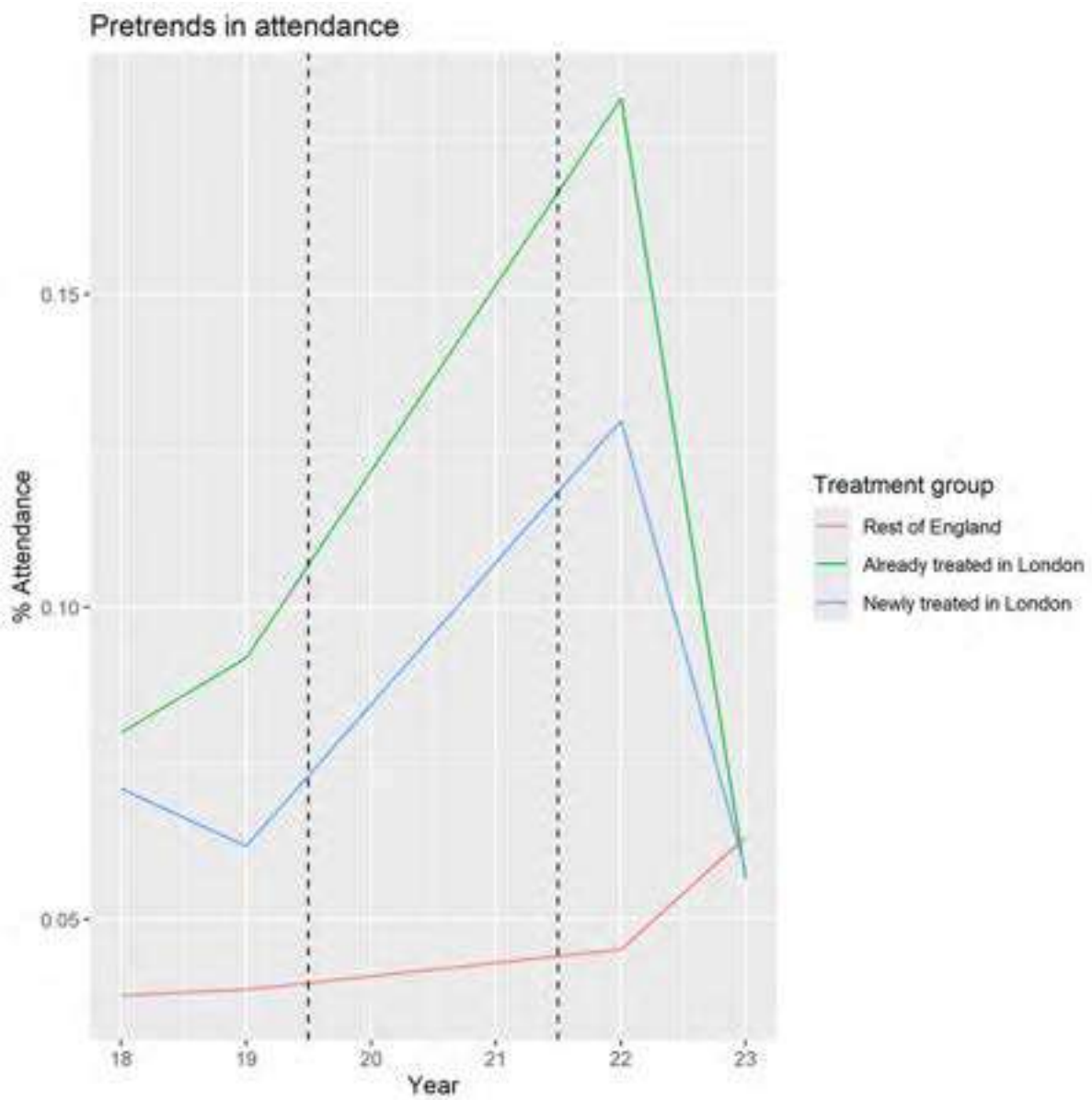
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 182 Counts.csv.

Figure 183. Raw pre-trends in primary outcome for triple difference



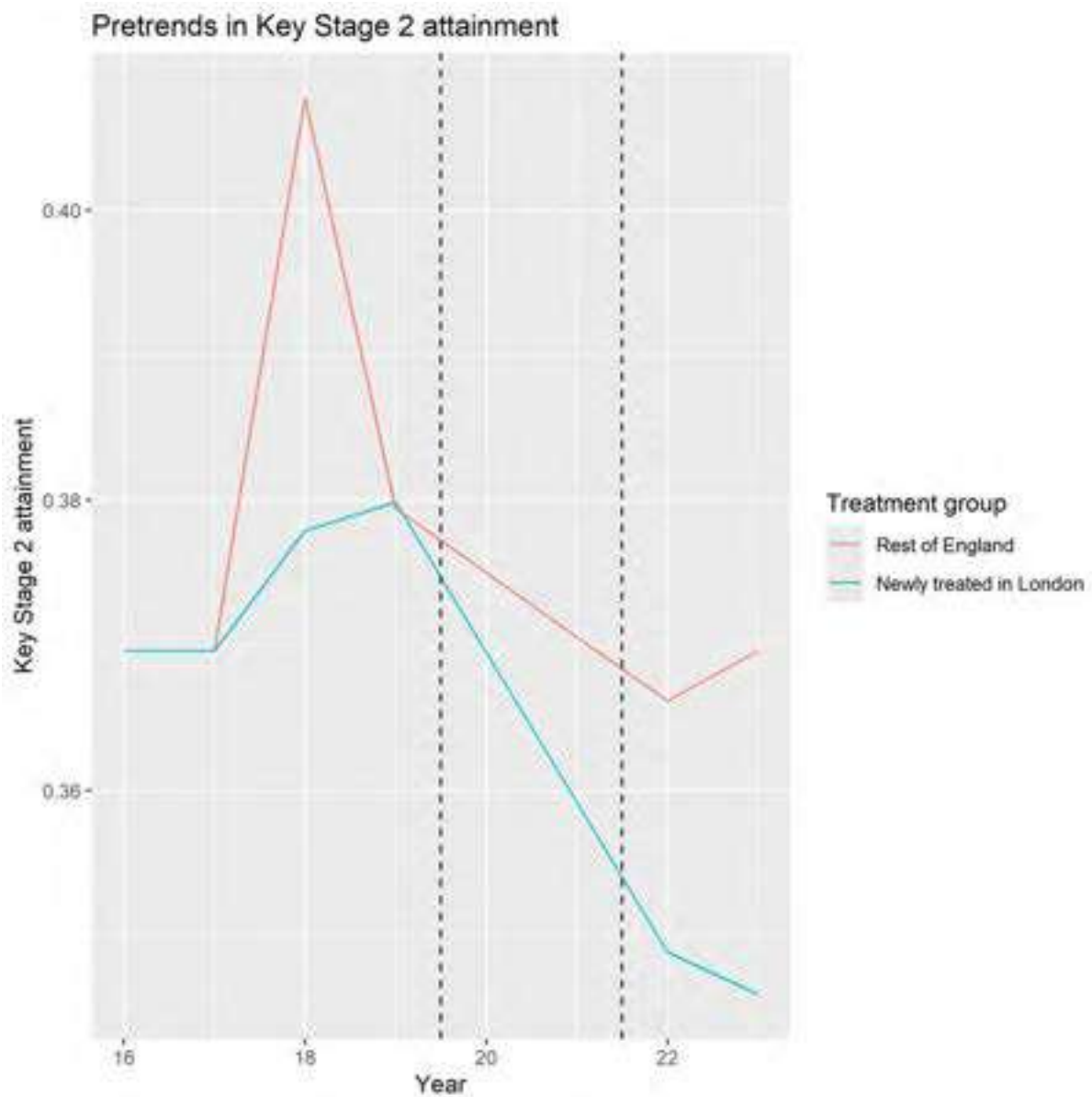
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 183 Counts.csv.

Figure 184. Raw pre-trends in secondary outcome for triple difference



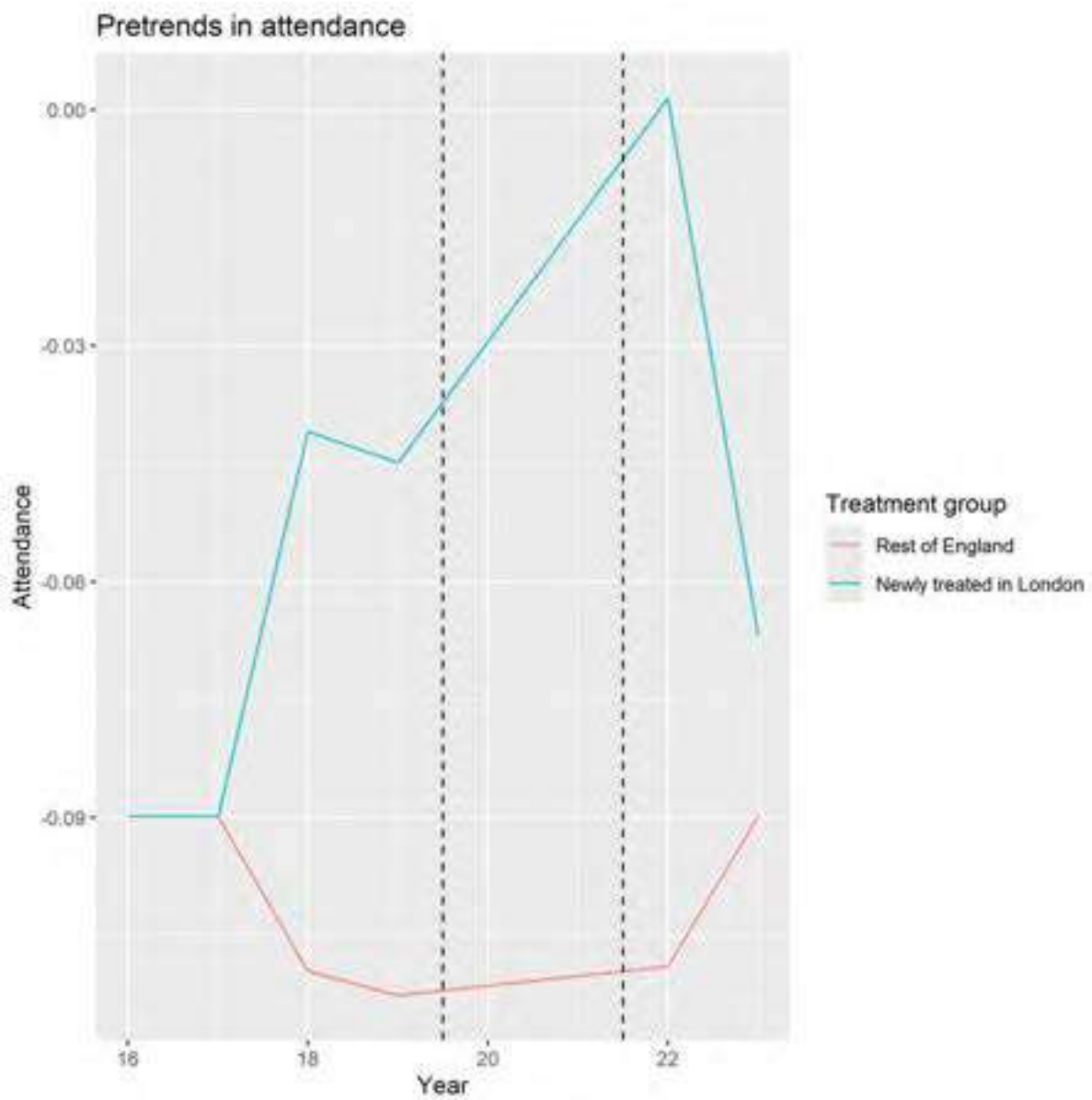
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 184 Counts.csv.

Figure 185. Conditional primary outcome pre-trends for difference-in-differences



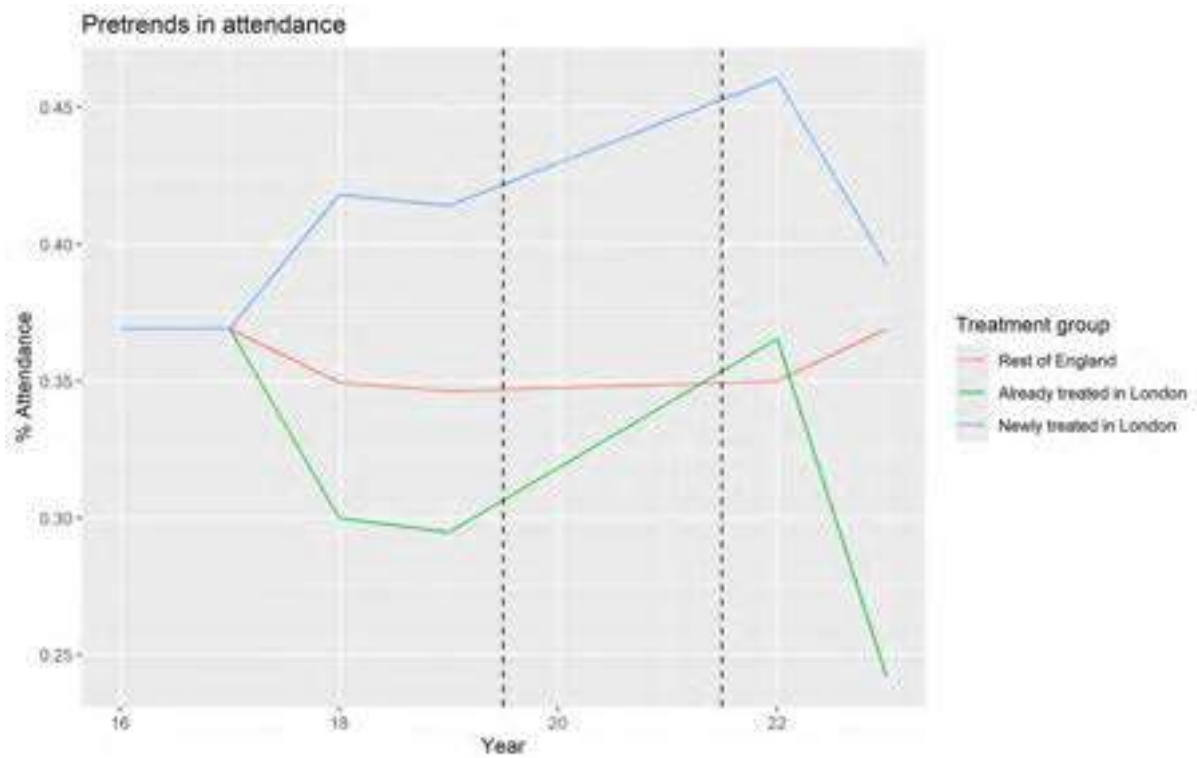
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 185 Model.docx.

Figure 186. Conditional secondary outcome pre-trends for difference-in-differences



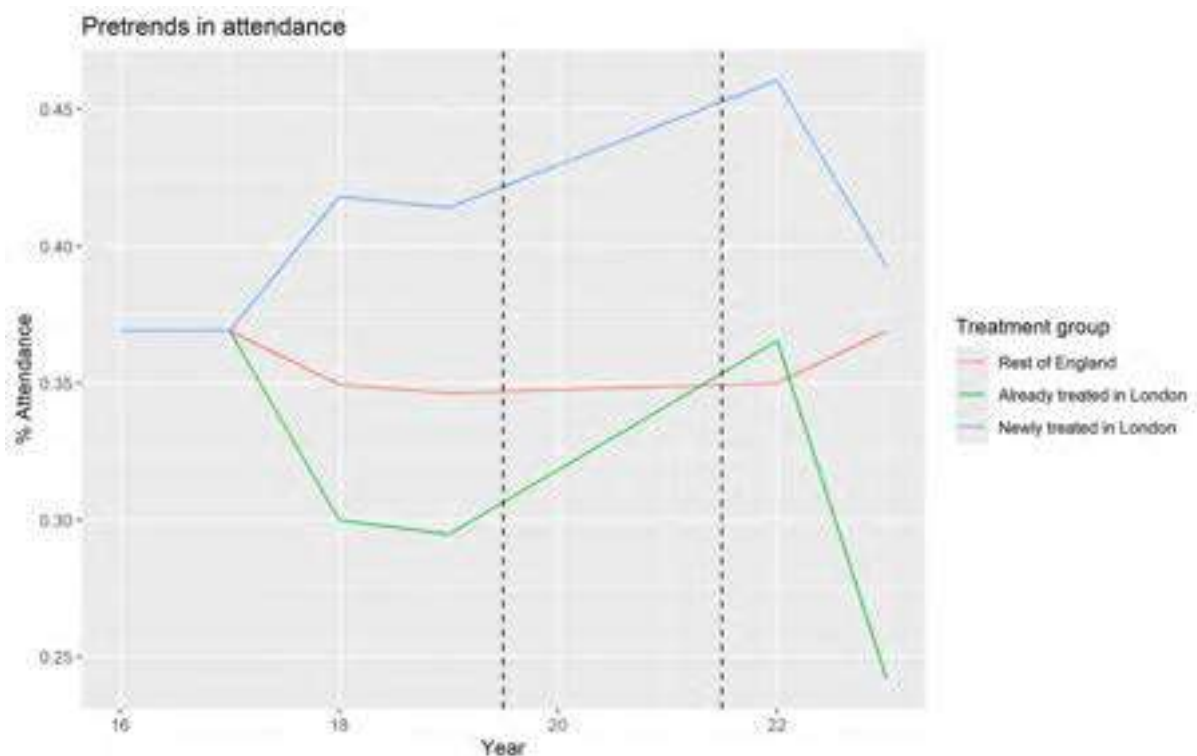
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 186 Model.docx

Figure 187. Conditional primary outcome pre-trends for triple differences



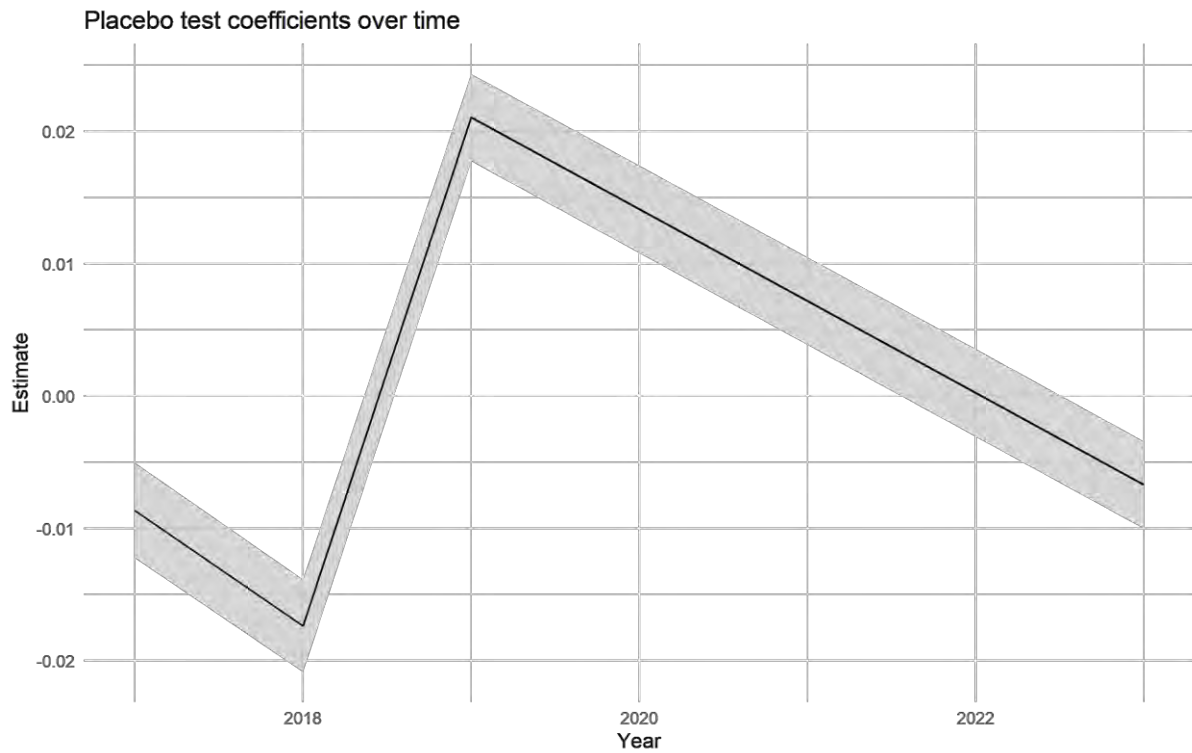
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 187 Model.docx

Figure 188. Conditional pre-trends for secondary outcome for triple difference



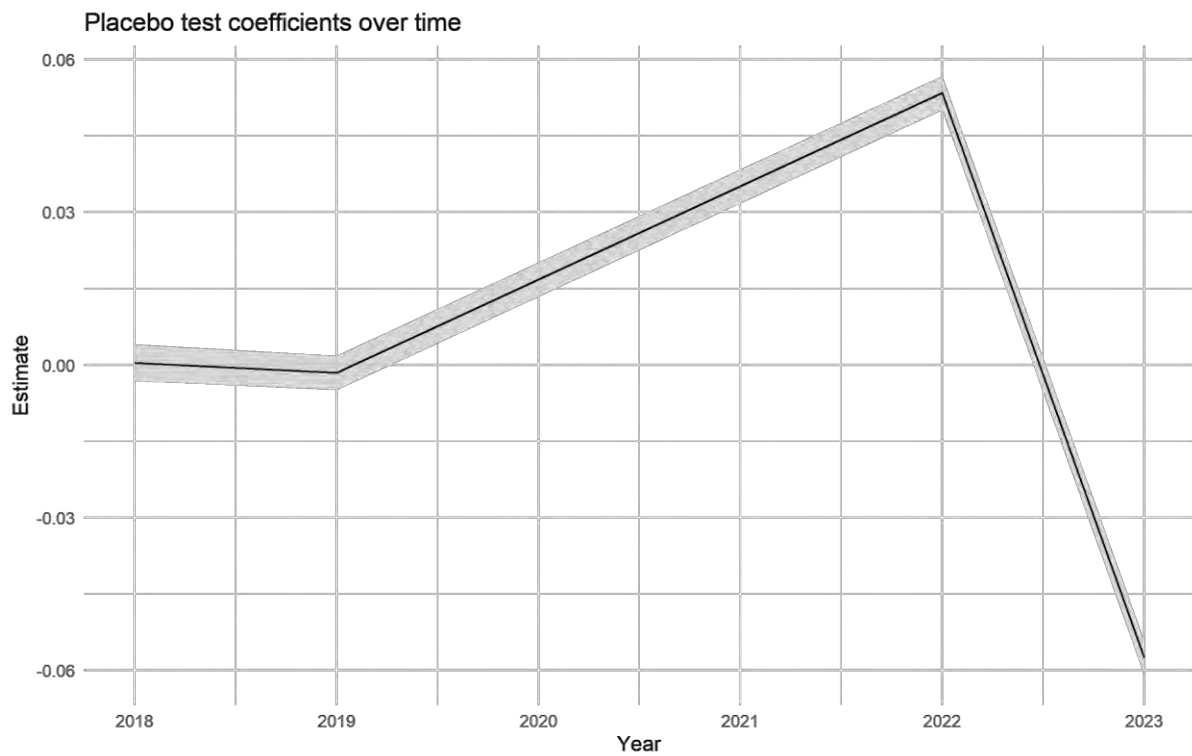
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in out impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 188 Model.docx

Figure 189. Placebo test estimates for primary outcome for difference in differences



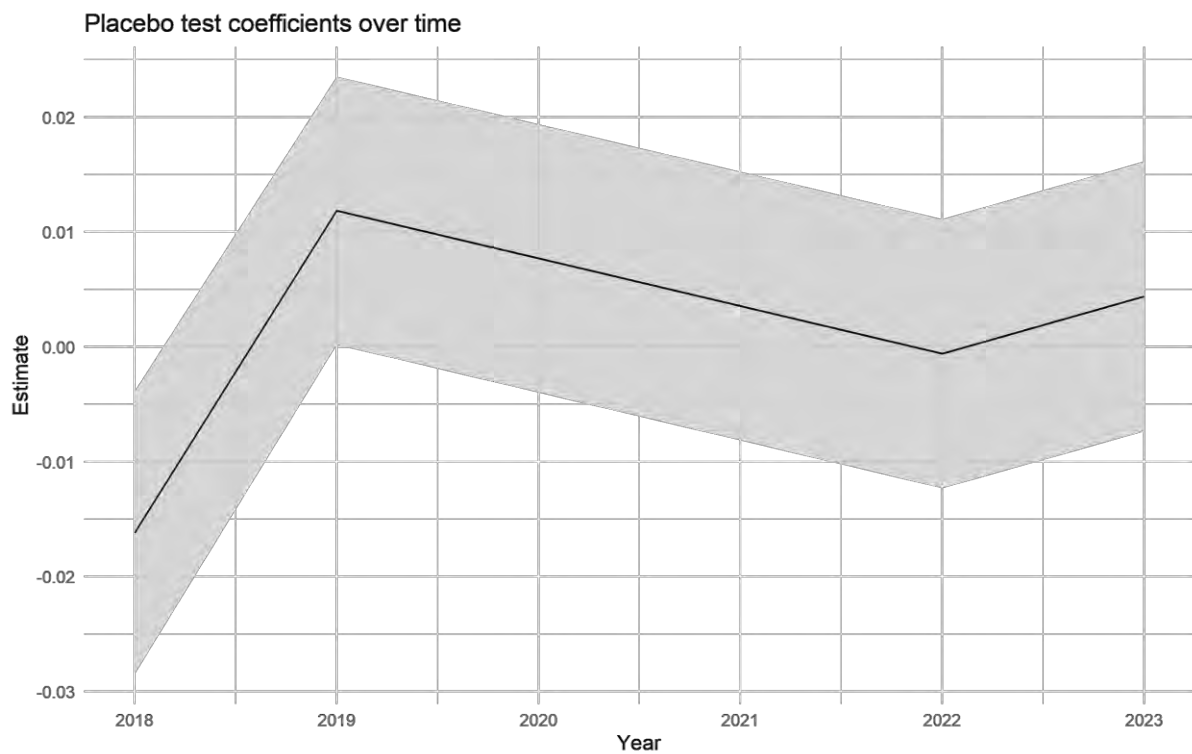
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 189 Models.csv

Figure 190. Placebo test estimates for secondary outcome for difference in differences



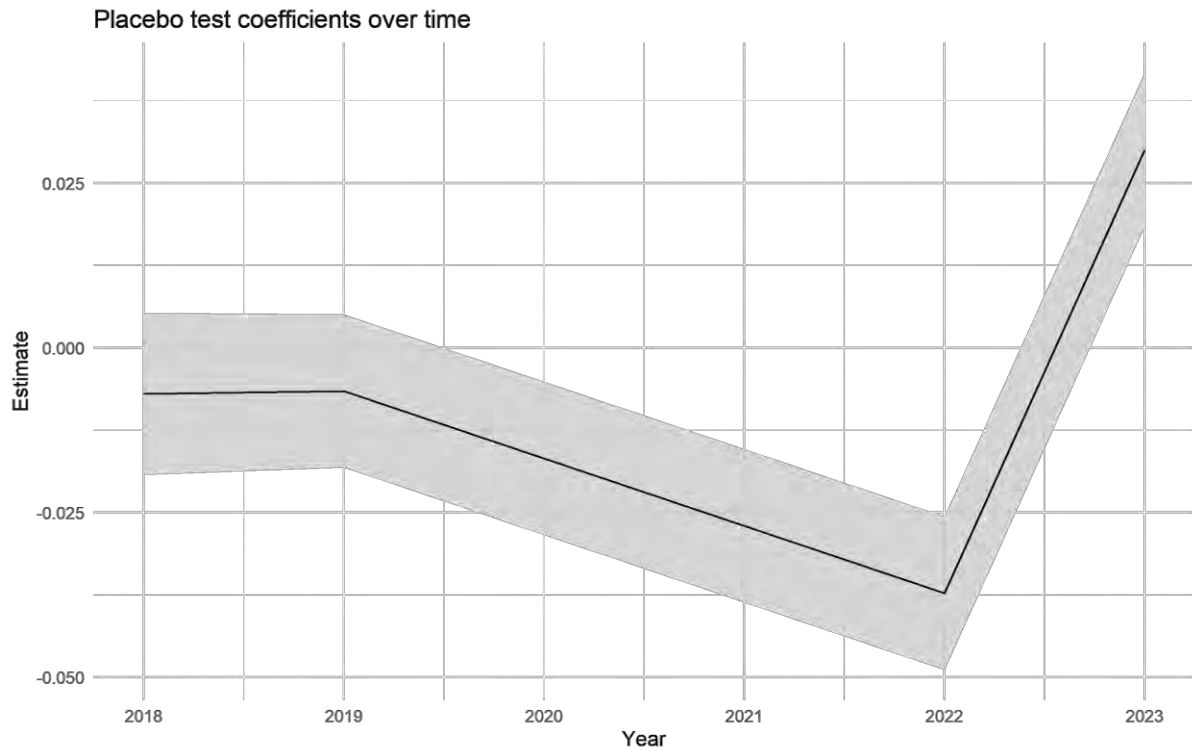
Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 190 Models.csv

Figure 191. Placebo test estimates for primary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 191 Models.csv

Figure 192. Placebo test estimates for secondary outcome for triple difference



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 192 Models.csv

## Appendix 16. Robustness check including FSM covariate in models

Table 76. Difference in differences estimates for primary outcome

---

Treatment estimate	0.013
	[0.000, 0.026]
Num.Obs.	4079537
R2	0.393
R2 Adj.	0.391
R2 Within	0.326
R2 Within Adj.	0.326
AIC	9532276.2
BIC	9761523.7
RMSE	0.78
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	4079497

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 77. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.013
	[0.006, 0.021]
Num.Obs.	4074549
R2	0.085
R2 Adj.	0.081
R2 Within	0.055
R2 Within Adj.	0.055
AIC	9652608.4
BIC	9881768.5
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	4074509

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 78. Triple difference estimates for primary outcome

Treatment estimate	0.004 [-0.043, 0.052]
Num.Obs.	4121079
R2	0.393
R2 Adj.	0.391
R2 Within	0.326
R2 Within Adj.	0.326
AIC	9629608.3
BIC	9860976.5
RMSE	0.78
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	4121038

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Table 79. Triple difference estimates for secondary outcome

Treatment estimate	0.035 [0.012, 0.058]
Num.Obs.	4116028
R2	0.085
R2 Adj.	0.081
R2 Within	0.055
R2 Within Adj.	0.055
AIC	9745884.8
BIC	9977165.4
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	4115987

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Evaluation of the introduction of Universal Primary Free School Meals in London (UPFSML)

Part 3: Within-London exploratory analyses

Jake Anders and Sam Sims

UCL Centre for Education Policy & Equalising Opportunities

## Contents

Appendix 18. Within-London analysis: primary sample .....	3
Appendix 19. Within-London analysis: already-eligible sample .....	10
Appendix 20. Within-London analysis: newly-eligible sample .....	17
Appendix 21. Within-London analysis: Black sample .....	24
Appendix 22. Within-London analysis: Asian sample .....	31
Appendix 23. Within-London analysis: White sample .....	38
Appendix 24. Within-London analysis: Other ethnicity sample .....	45
Appendix 25. Within-London analysis: IDACI1 sample .....	52
Appendix 26. Within-London analysis: IDACI2 sample .....	59
Appendix 27. Within-London analysis: IDACI3 sample .....	66
Appendix 28. Within-London analysis: IDACI4 sample .....	73
Appendix 29. Within-London analysis: IDACI5 sample .....	80

## Appendix 18. Within-London analysis: primary sample

Table 82. Difference in differences estimates for primary outcome

---

Treatment estimate	0.000
	[-0.046, 0.047]
Num.Obs.	565811
R2	0.355
R2 Adj.	0.353
R2 Within	0.293
R2 Within Adj.	0.293
AIC	1342539.3
BIC	1362084.8
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	565772

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

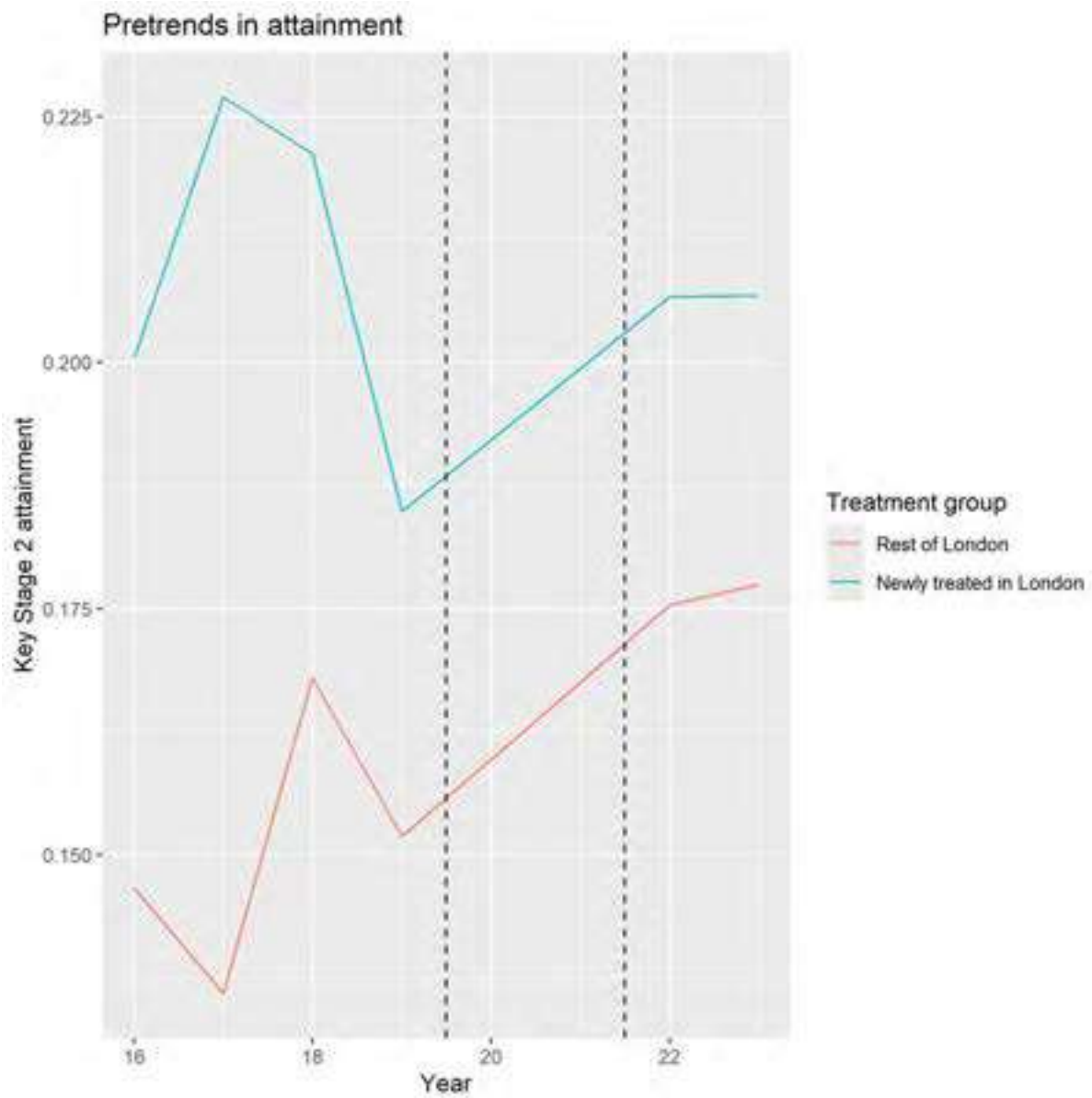
Table 83. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.030
	[0.007, 0.053]
Num.Obs.	564899
R2	0.063
R2 Adj.	0.060
R2 Within	0.037
R2 Within Adj.	0.036
AIC	1284928.0
BIC	1304470.8
RMSE	0.75
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	564859

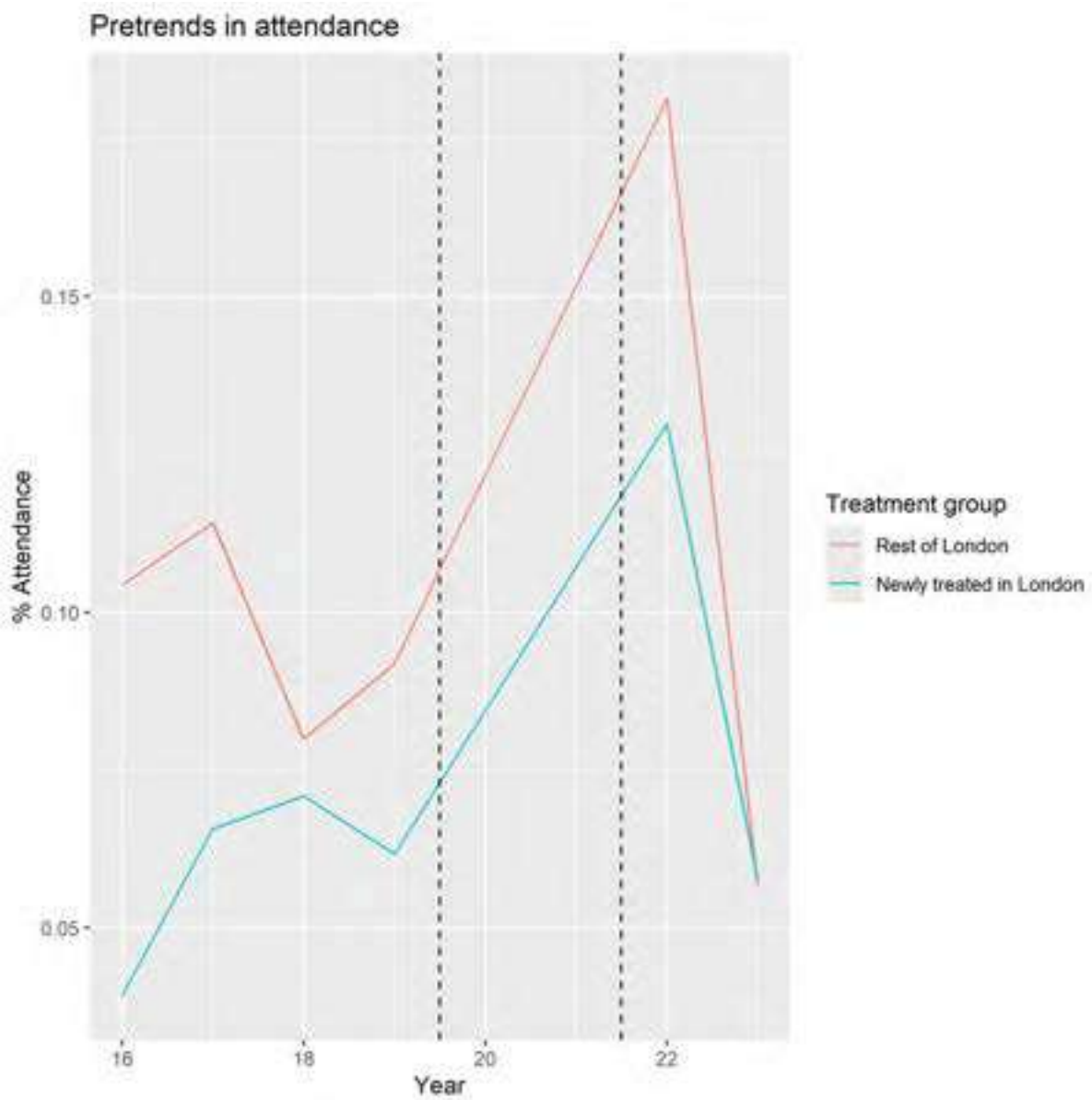
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 193. Raw pre-trends in primary outcome for difference-in-differences



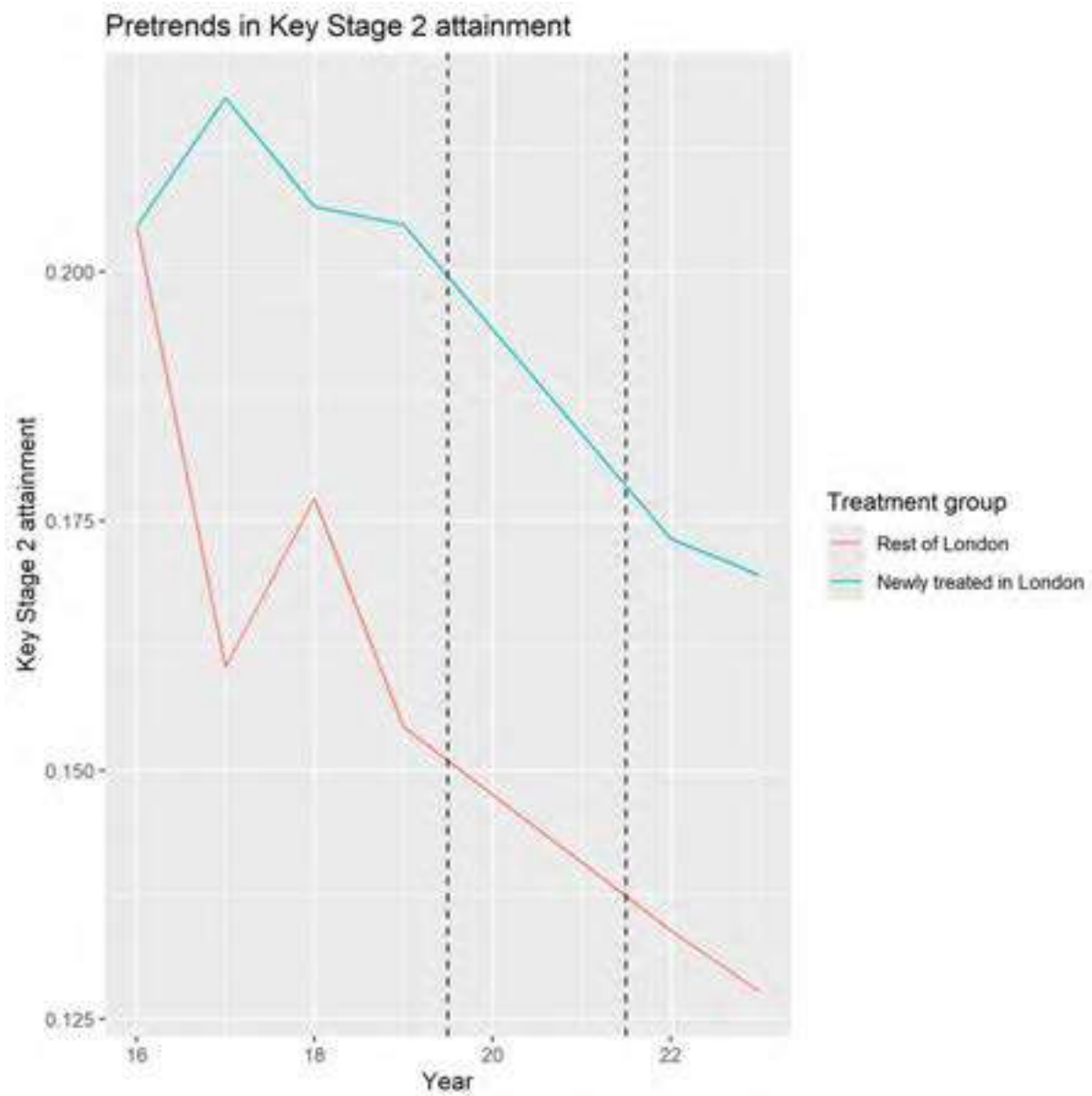
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 193 Counts.csv.

Figure 194. Raw pre-trends in secondary outcome for difference-in-differences



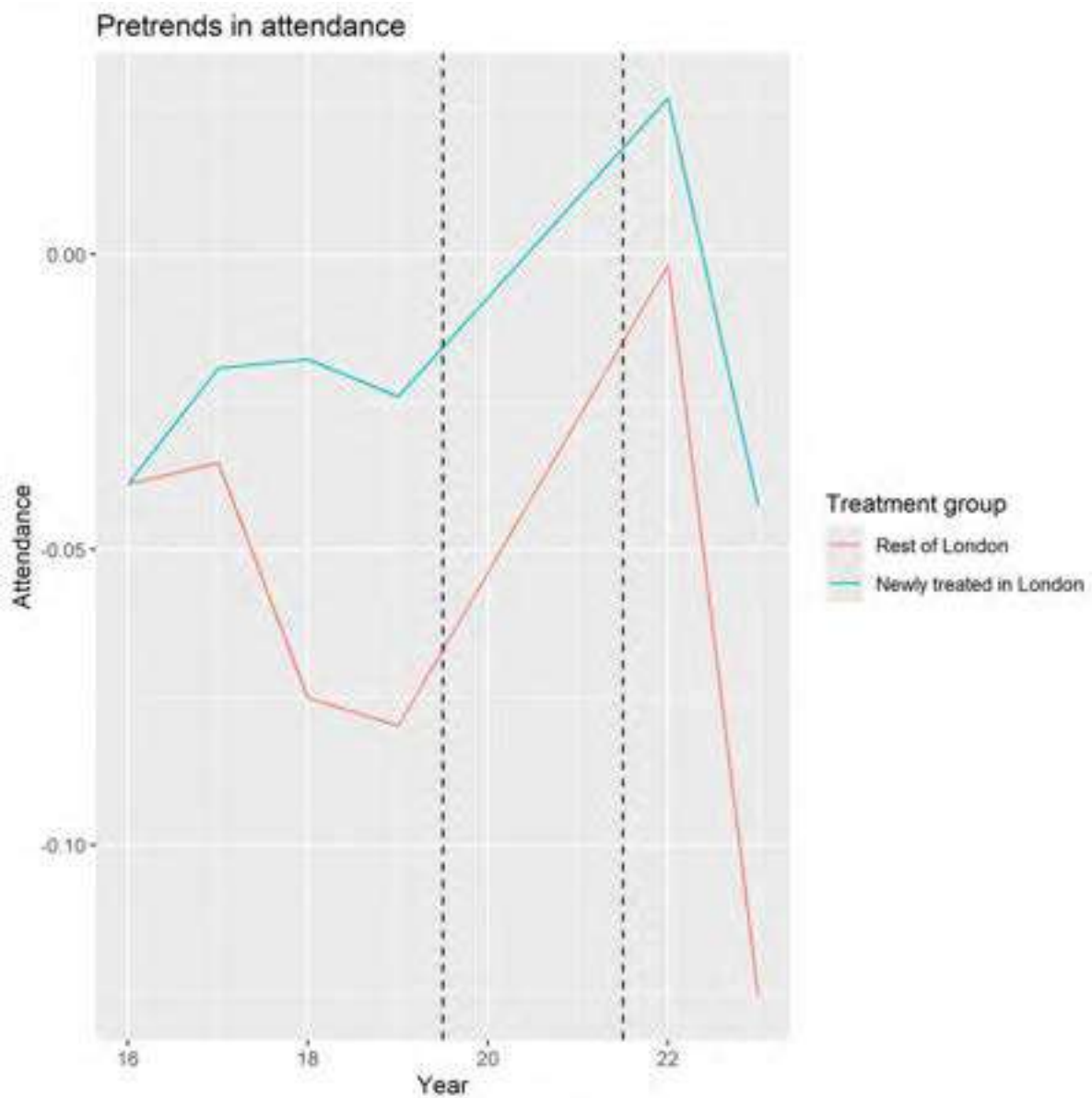
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 194 Counts.csv.

Figure 195. Conditional primary outcome pre-trends for difference-in-differences



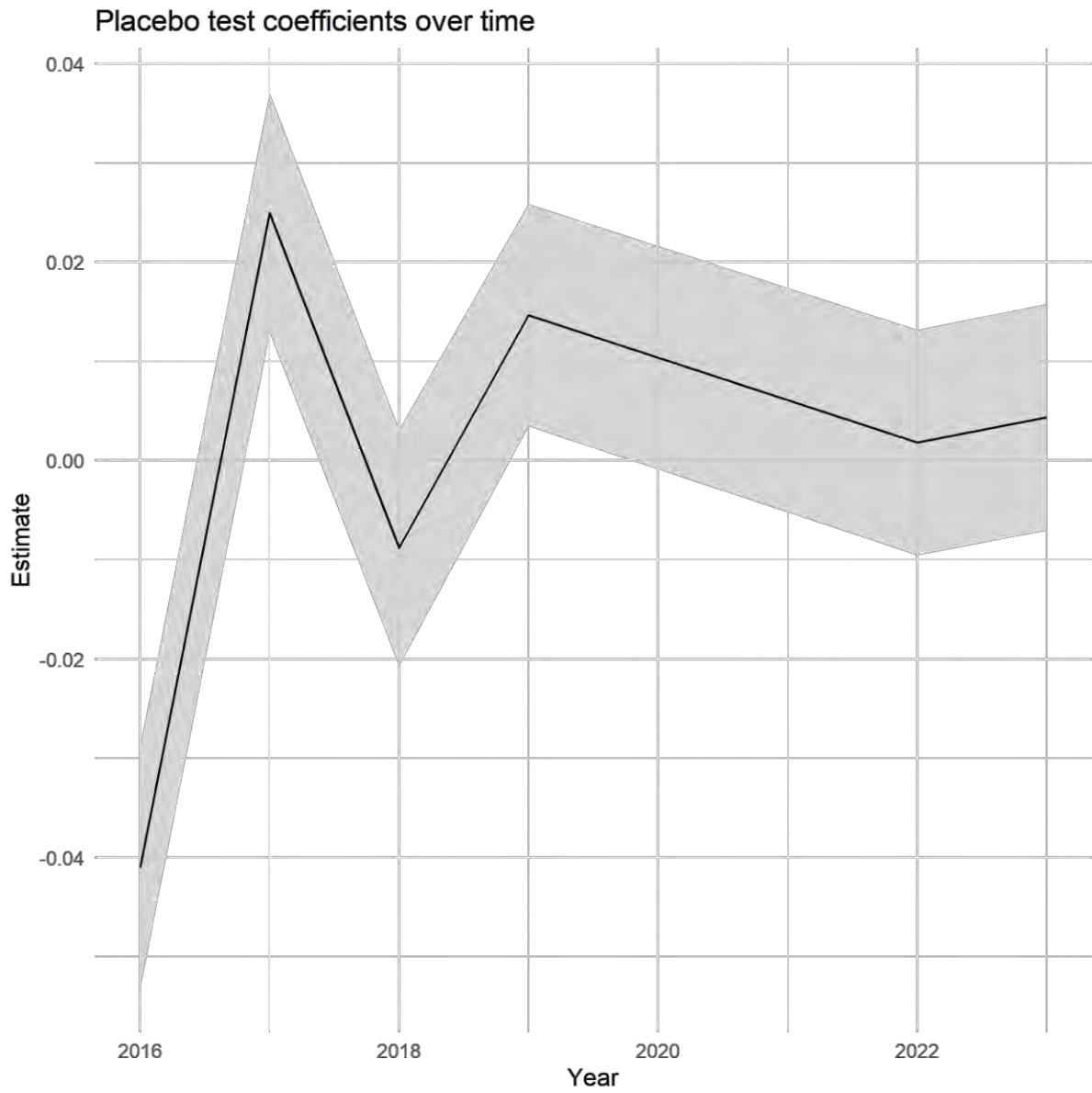
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 195 Model.docx.

Figure 196. Conditional secondary outcome pre-trends for difference-in-differences



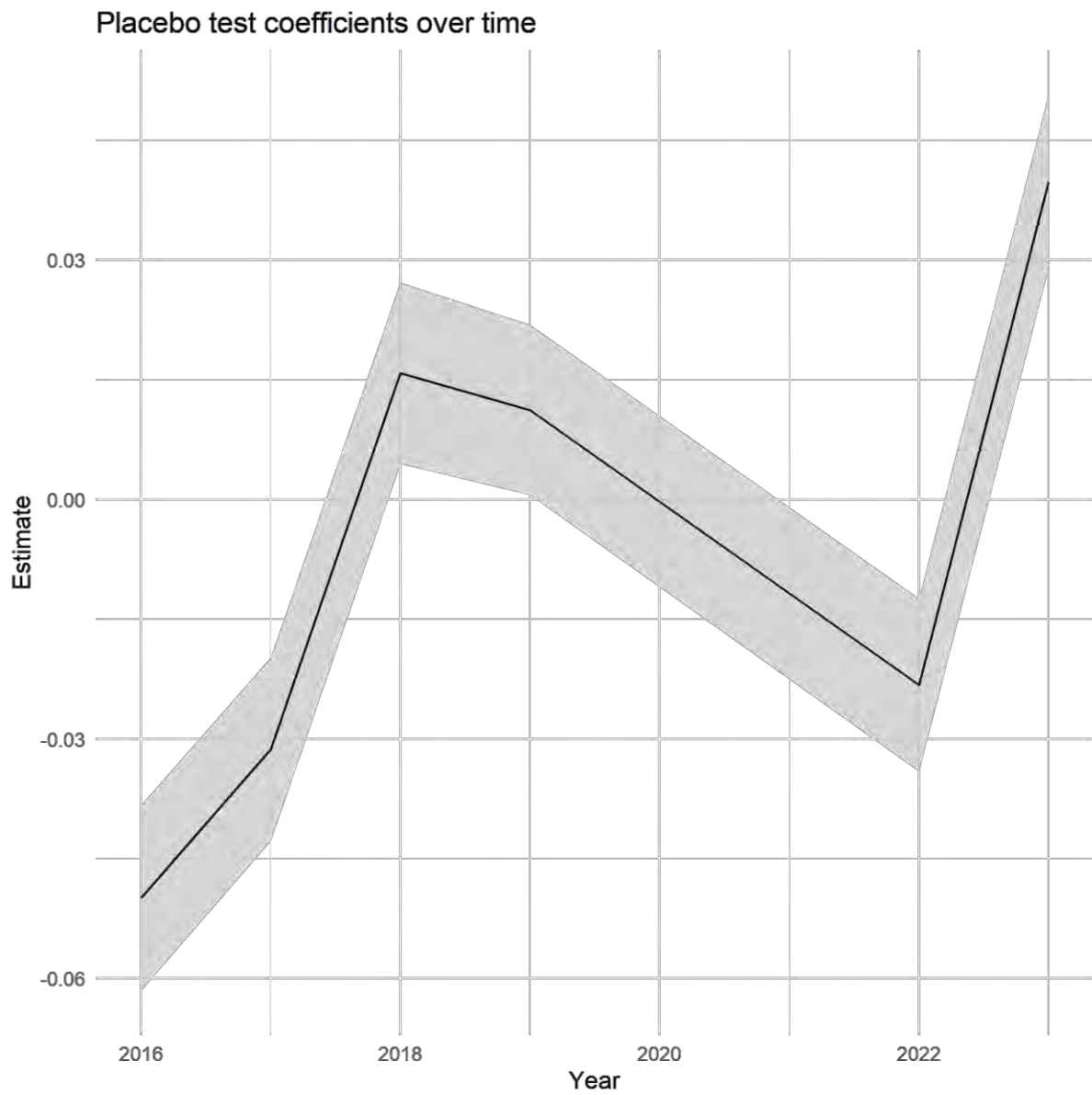
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 196 Model.docx

Figure 197. Placebo test estimates for primary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 197 Models.csv

Figure 198. Placebo test estimates for secondary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 198 Models.csv

## Appendix 19. Within-London analysis: already-eligible sample

Table 84. Difference in differences estimates for primary outcome

---

Treatment estimate	-0.020 [-0.079, 0.039]
Num.Obs.	192830
R2	0.357
R2 Adj.	0.351
R2 Within	0.296
R2 Within Adj.	0.296
AIC	460231.9
BIC	477835.5
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	192791

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

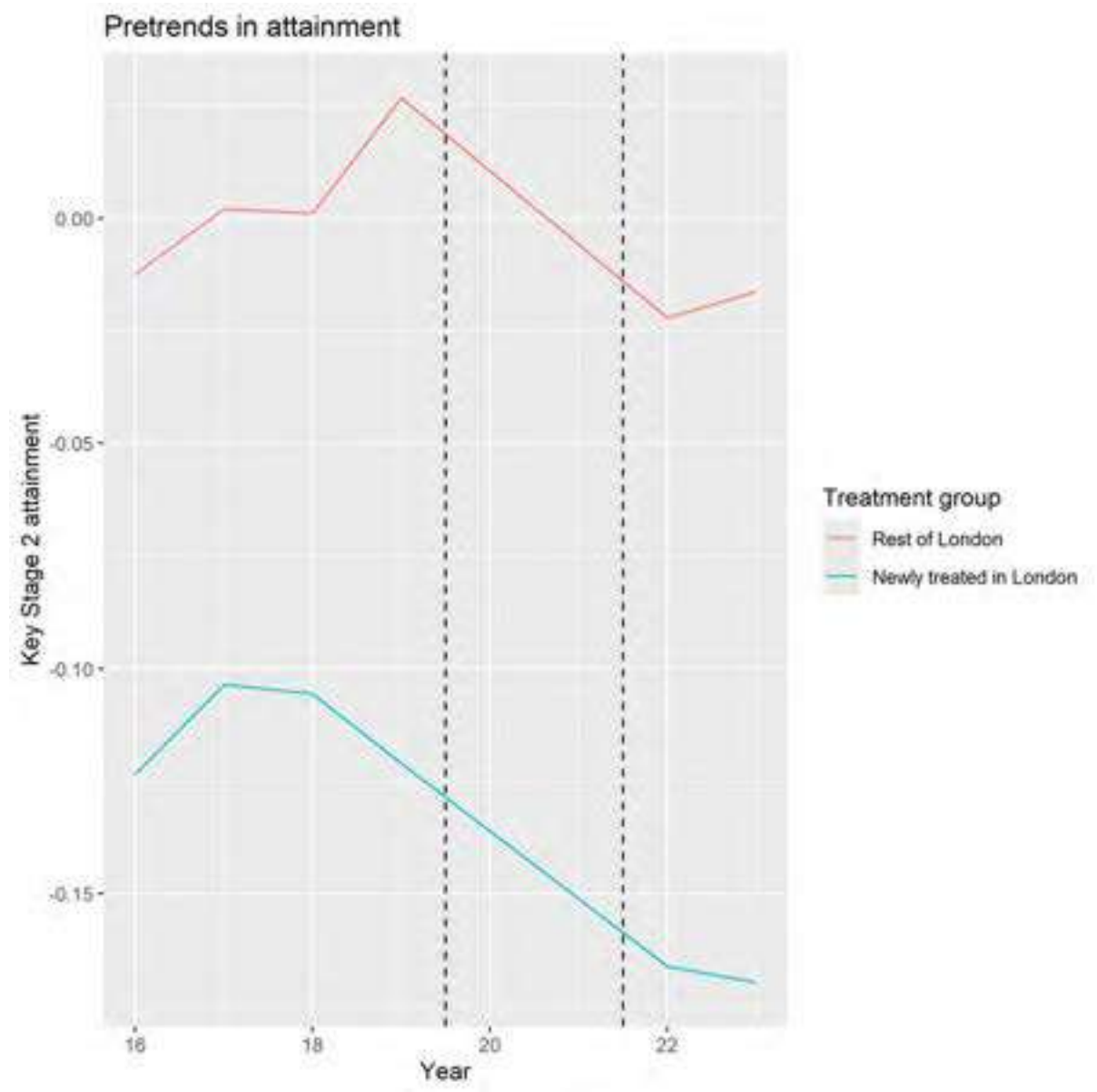
Table 85. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.013 [-0.023, 0.050]
Num.Obs.	192502
R2	0.095
R2 Adj.	0.087
R2 Within	0.059
R2 Within Adj.	0.059
AIC	517935.1
BIC	535535.7
RMSE	0.92
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	192463

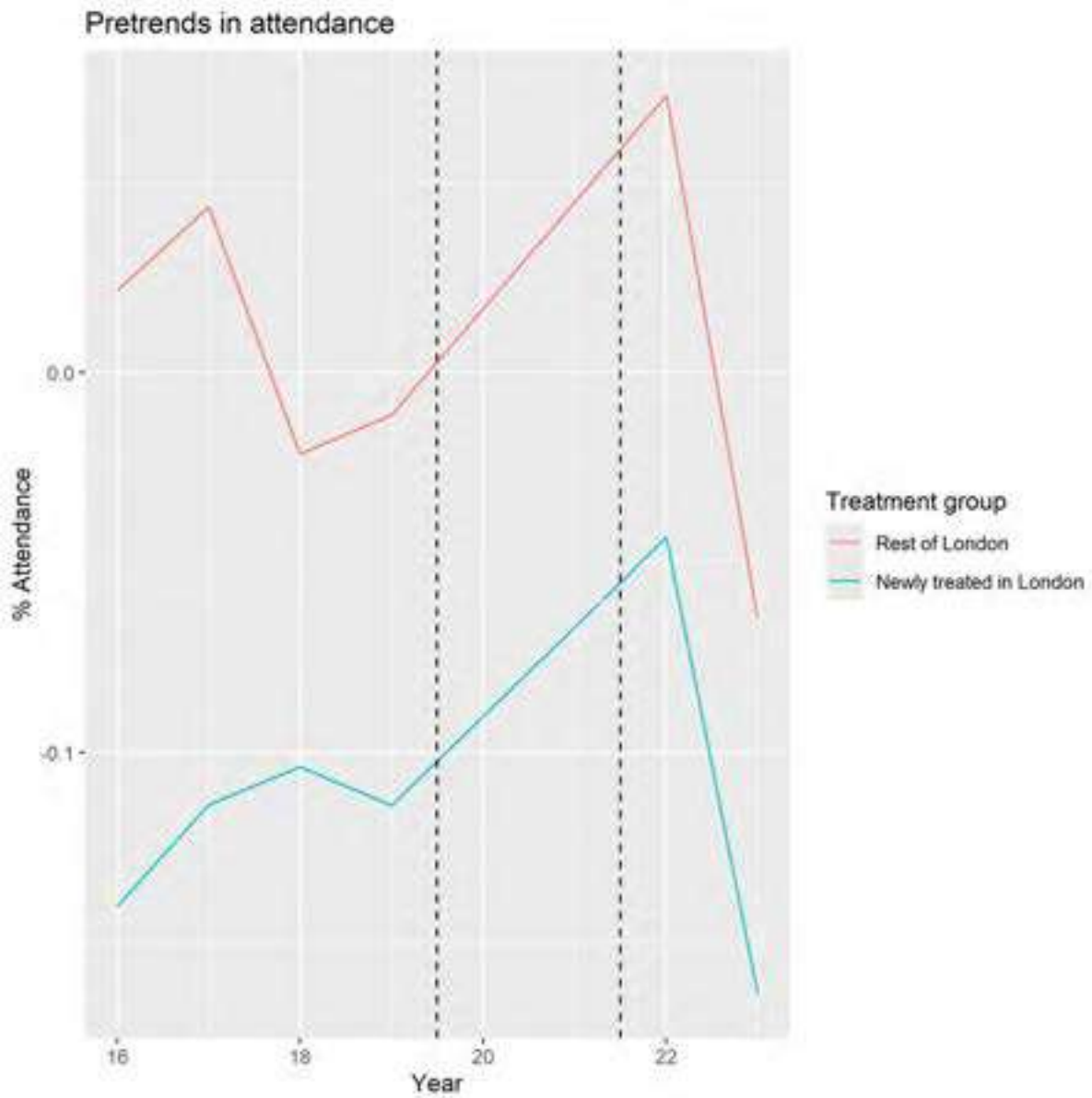
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 199. Raw pre-trends in primary outcome for difference-in-differences



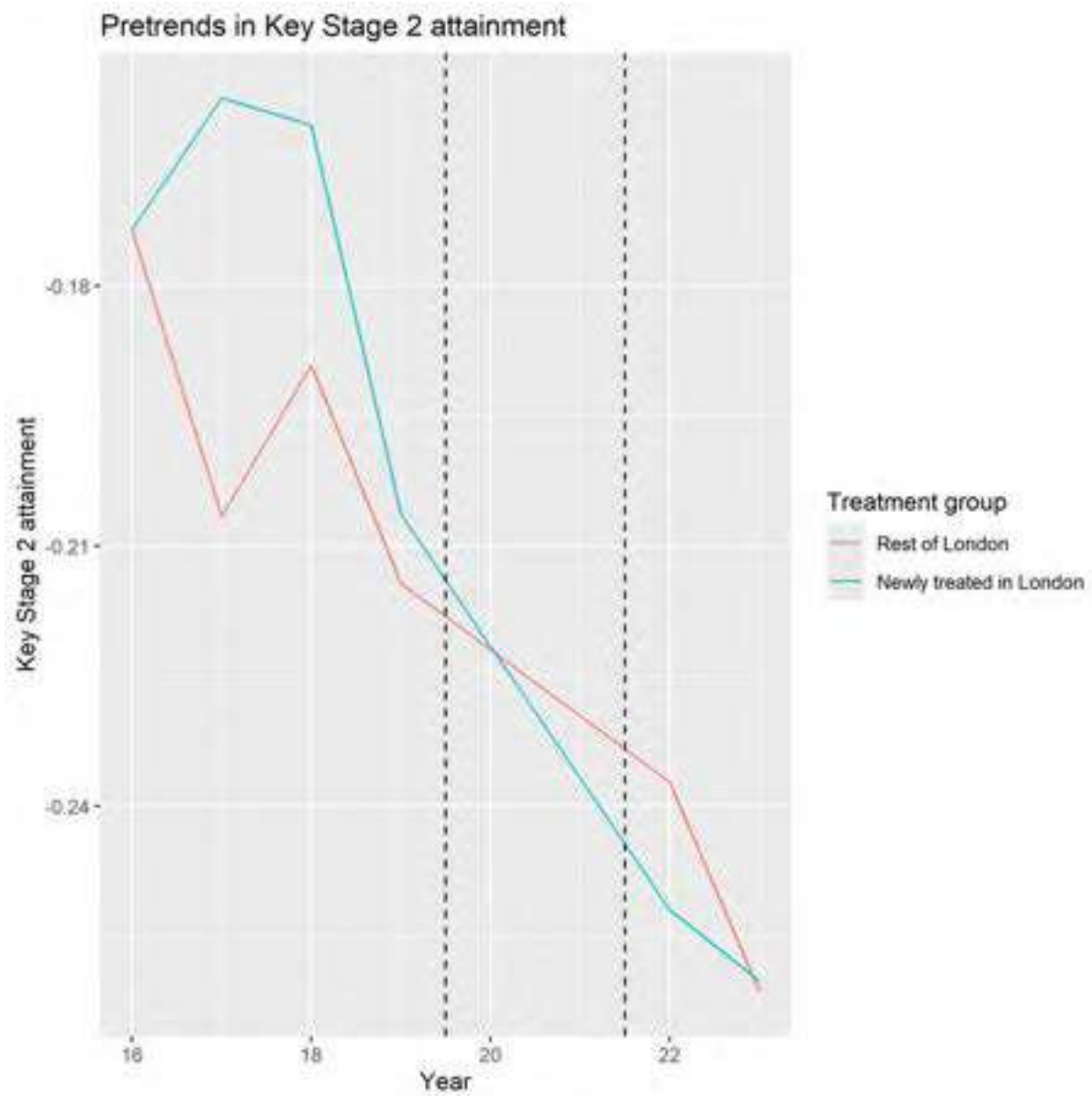
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 199 Counts.csv.

Figure 200. Raw pre-trends in secondary outcome for difference-in-differences



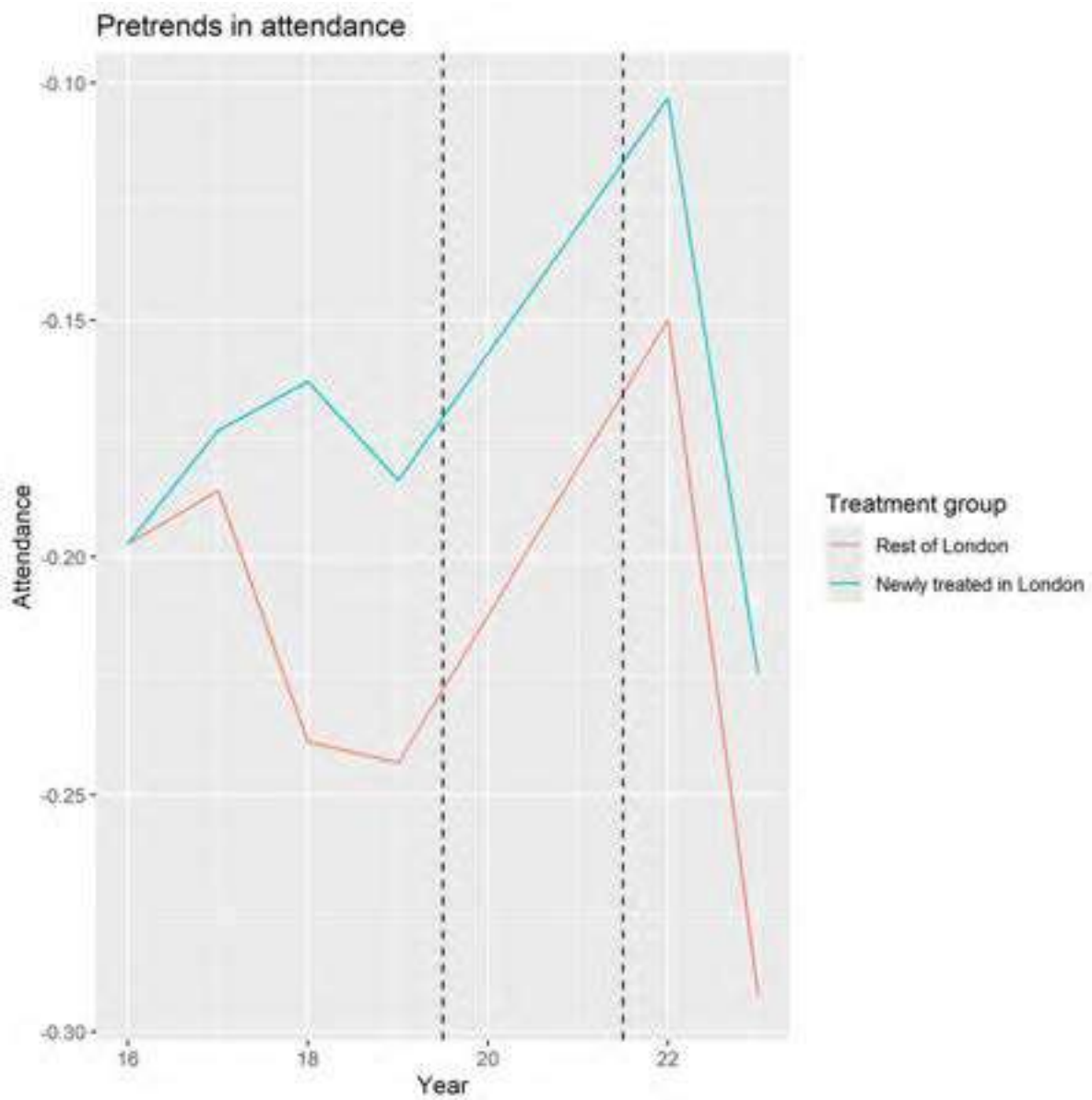
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 200 Counts.csv.

Figure 201. Conditional primary outcome pre-trends for difference-in-differences



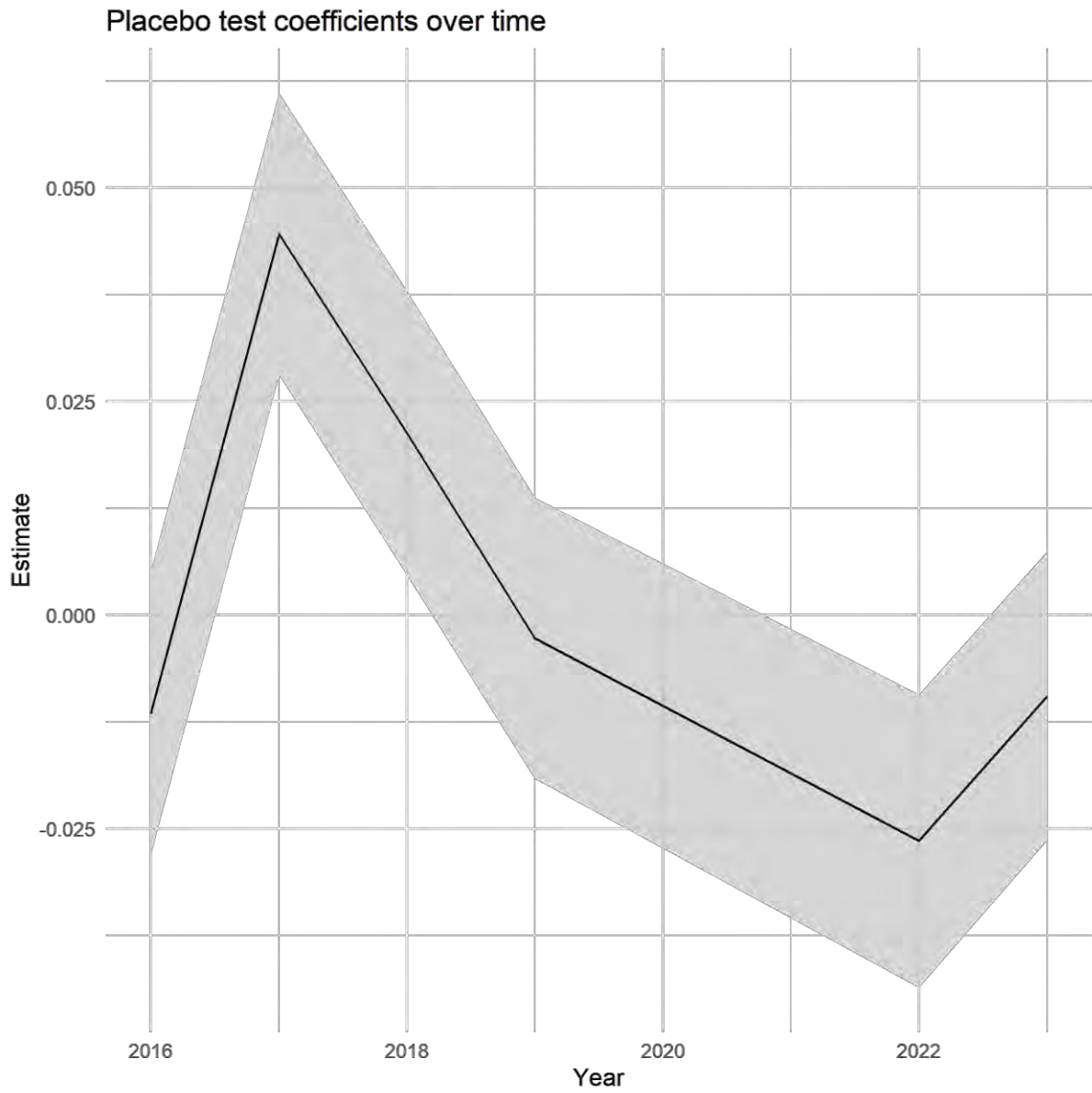
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 201 Model.docx.

Figure 202. Conditional secondary outcome pre-trends for difference-in-differences



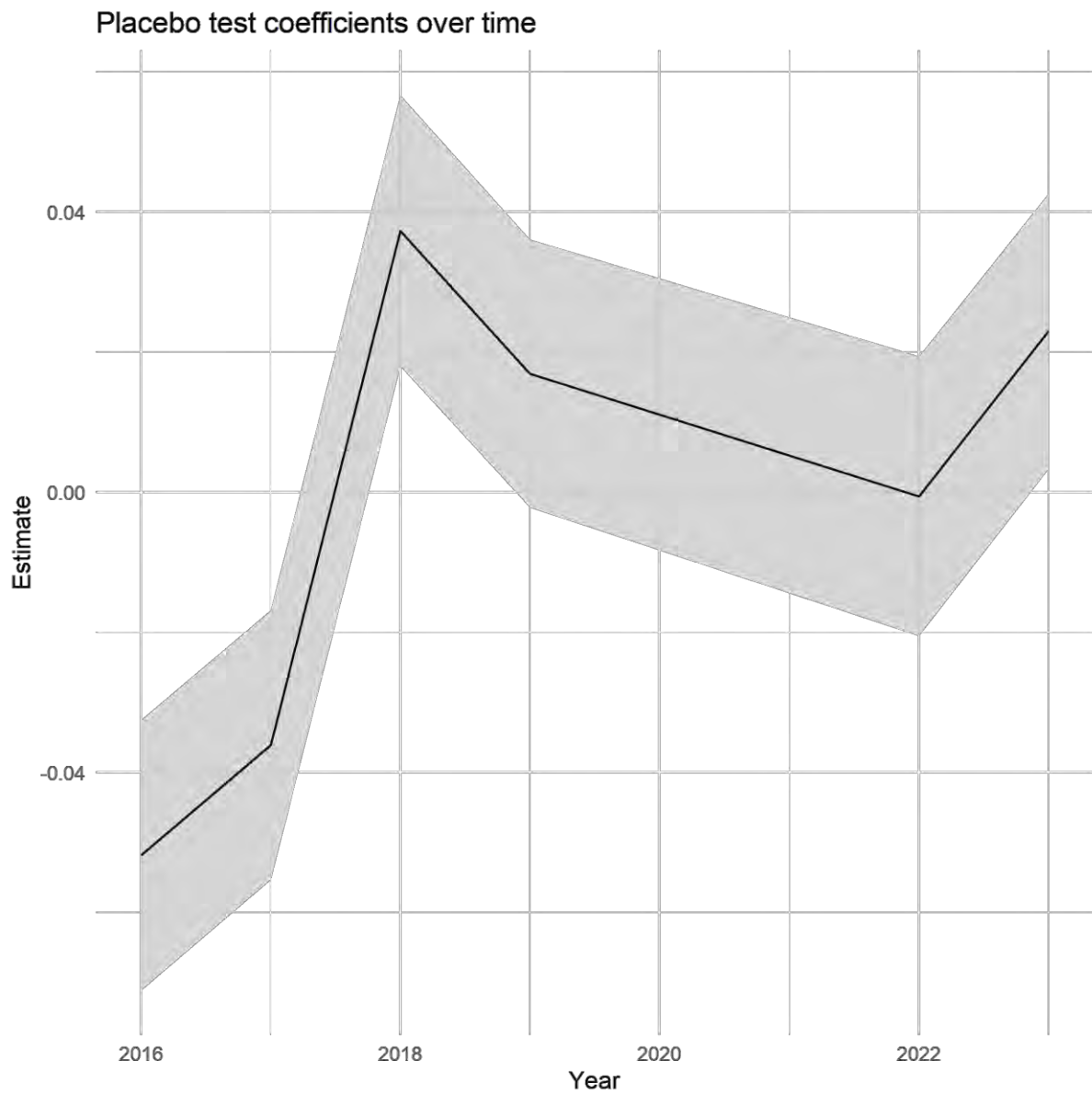
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 202 Model.docx

Figure 203. Placebo test estimates for primary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 203 Models.csv

Figure 204. Placebo test estimates for secondary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 204 Models.csv

## Appendix 20. Within-London analysis: newly-eligible sample

Table 86. Difference in differences estimates for primary outcome

---

Treatment estimate	0.003 [-0.045, 0.051]
Num.Obs.	372981
R2	0.331
R2 Adj.	0.328
R2 Within	0.274
R2 Within Adj.	0.274
AIC	865704.1
BIC	884406.3
RMSE	0.77
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	372941

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

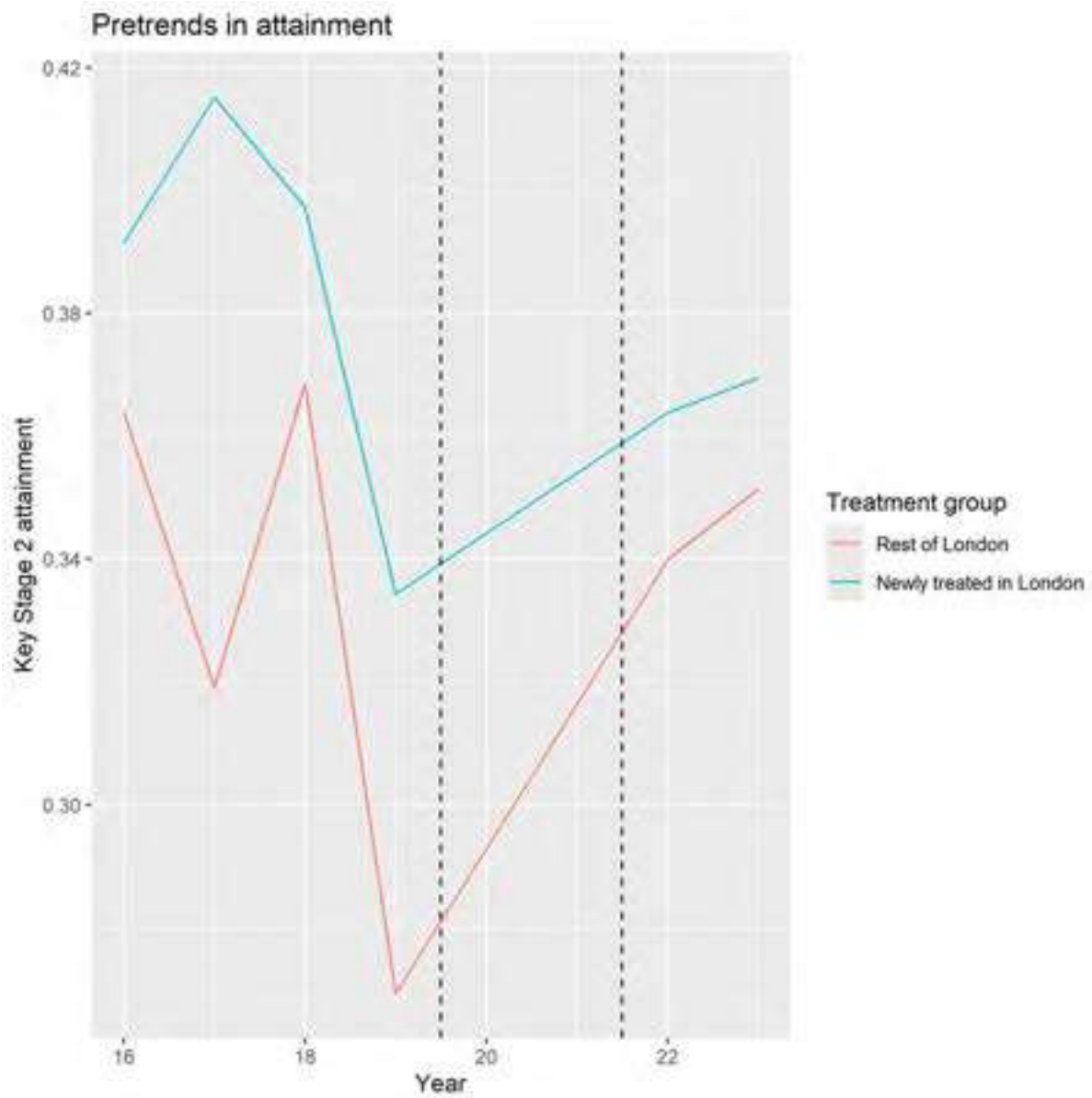
Table 87. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.037 [0.007, 0.068]
Num.Obs.	372397
R2	0.051
R2 Adj.	0.046
R2 Within	0.024
R2 Within Adj.	0.024
AIC	705991.7
BIC	724680.4
RMSE	0.62
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	372357

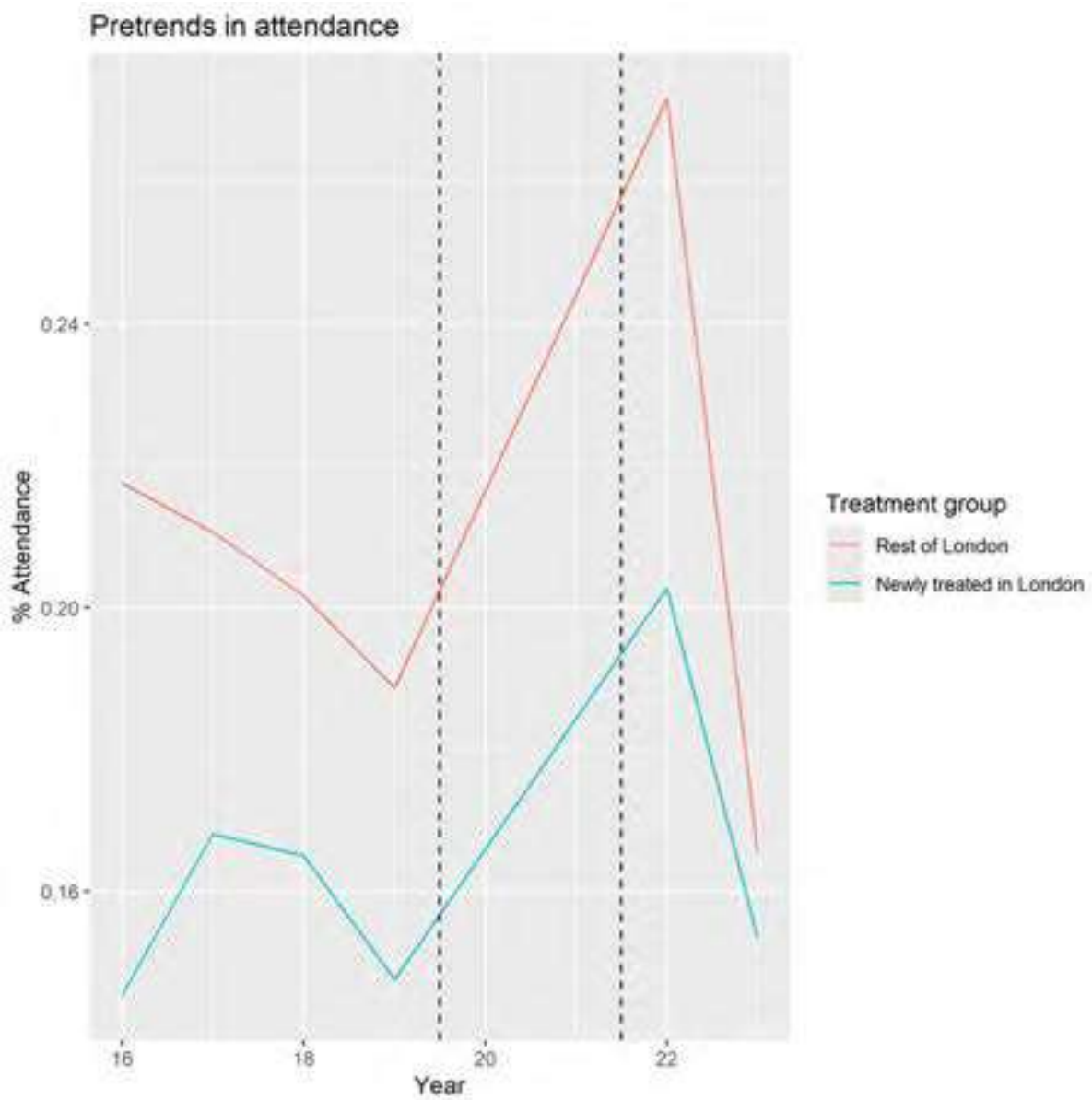
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 205. Raw pre-trends in primary outcome for difference-in-differences



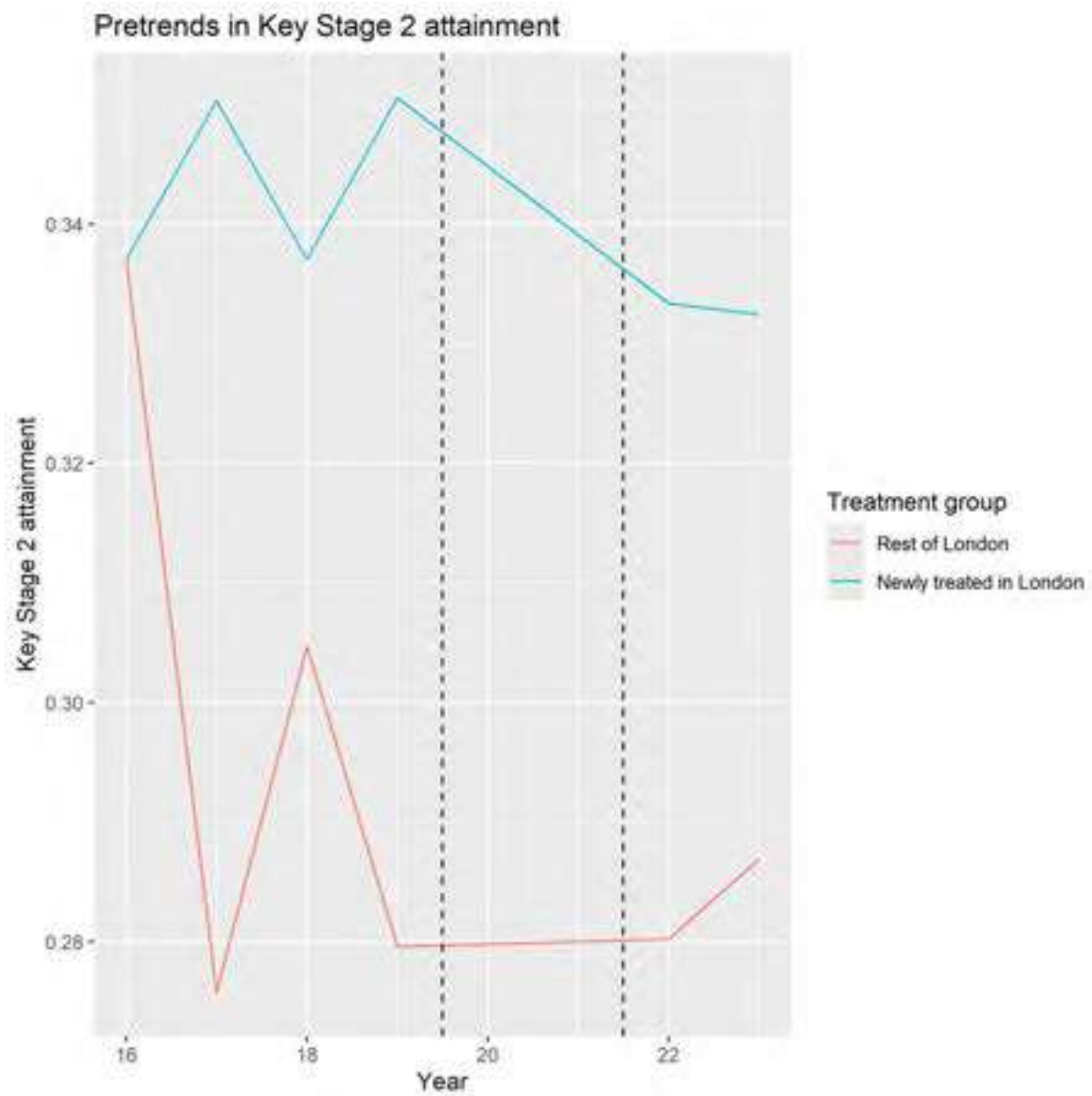
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 205 Counts.csv.

Figure 206. Raw pre-trends in secondary outcome for difference-in-differences



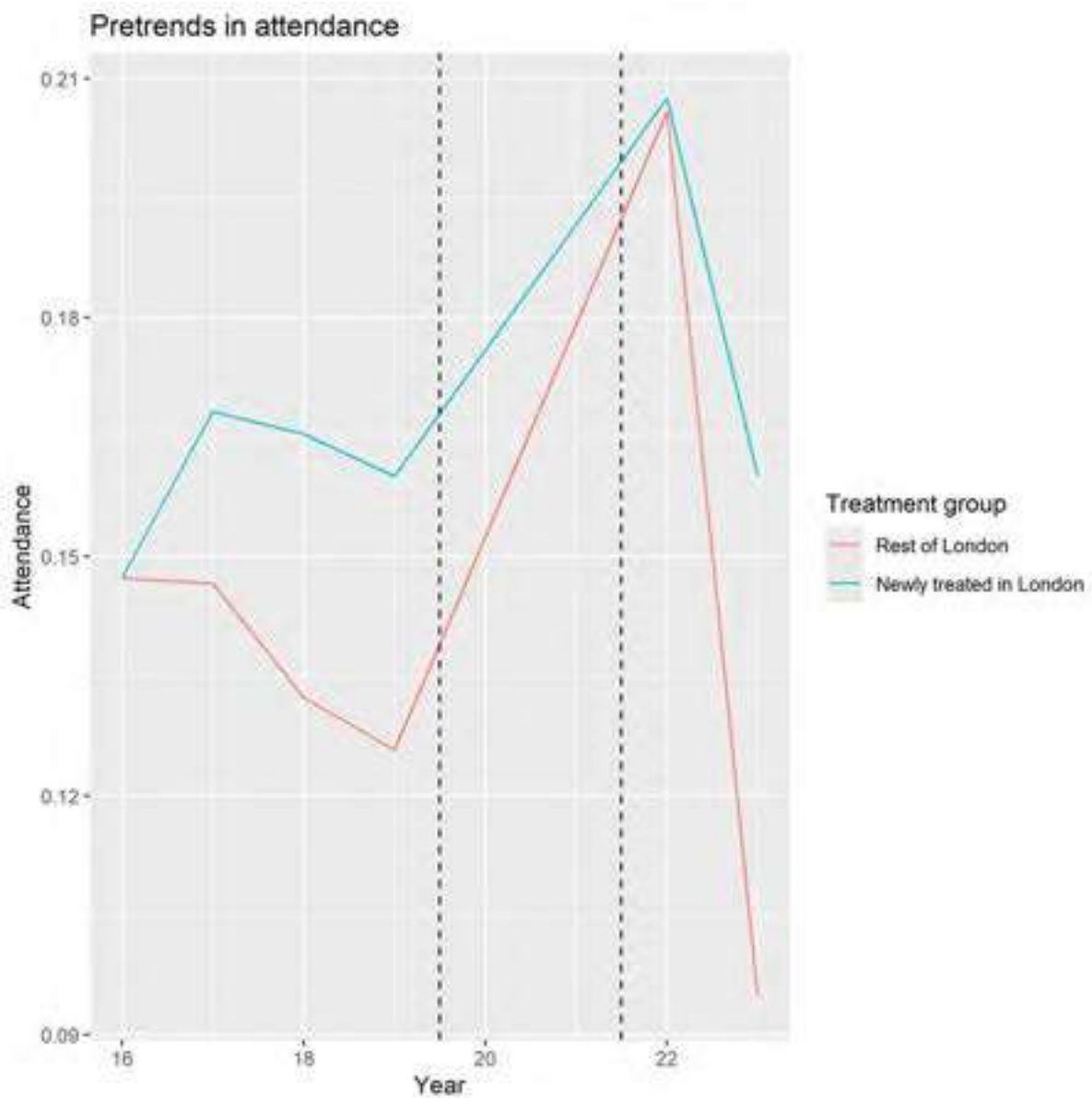
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 206 Counts.csv.

Figure 207. Conditional primary outcome pre-trends for difference-in-differences



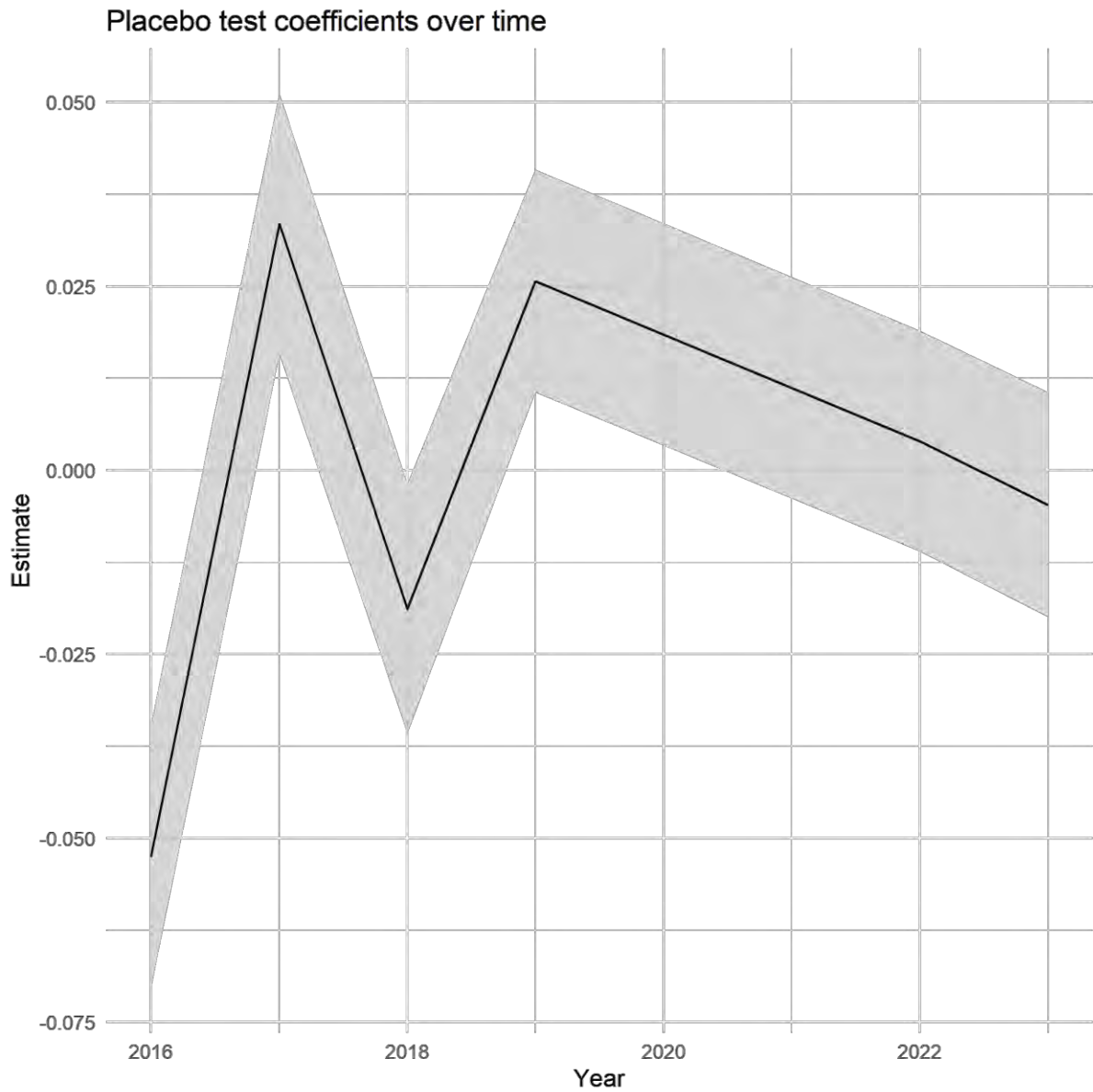
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 207 Model.docx.

Figure 208. Conditional secondary outcome pre-trends for difference-in-differences



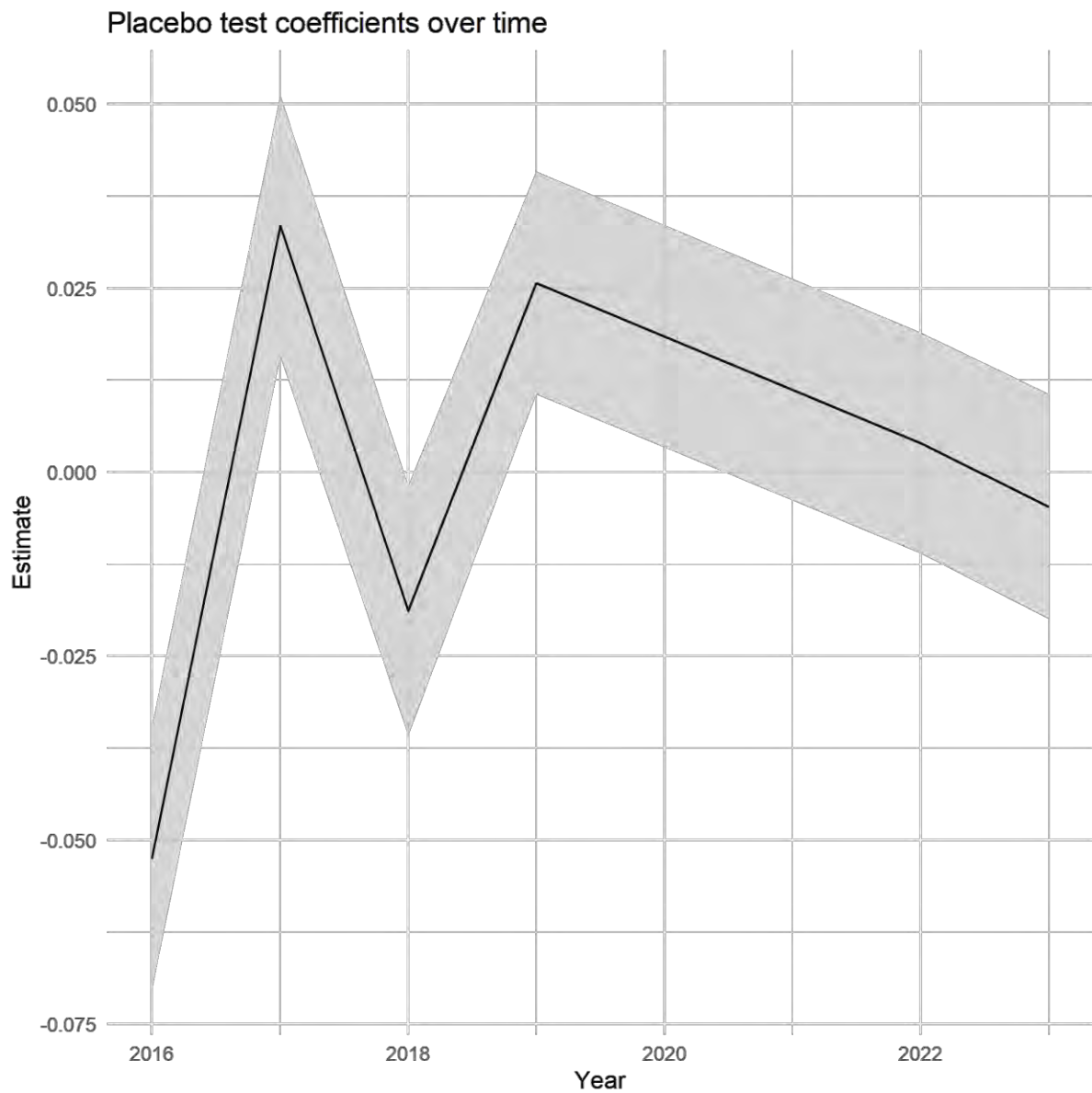
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 208 Model.docx

Figure 209. Placebo test estimates for primary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 209 Models.csv

Figure 210. Placebo test estimates for secondary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 210 Models.csv

## Appendix 21. Within-London analysis: Black sample

Table 88. Difference in differences estimates for primary outcome

---

Treatment estimate	-0.010 [-0.076, 0.057]
Num.Obs.	112854
R2	0.350
R2 Adj.	0.340
R2 Within	0.277
R2 Within Adj.	0.277
AIC	262748.2
BIC	278952.4
RMSE	0.76
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	112817

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

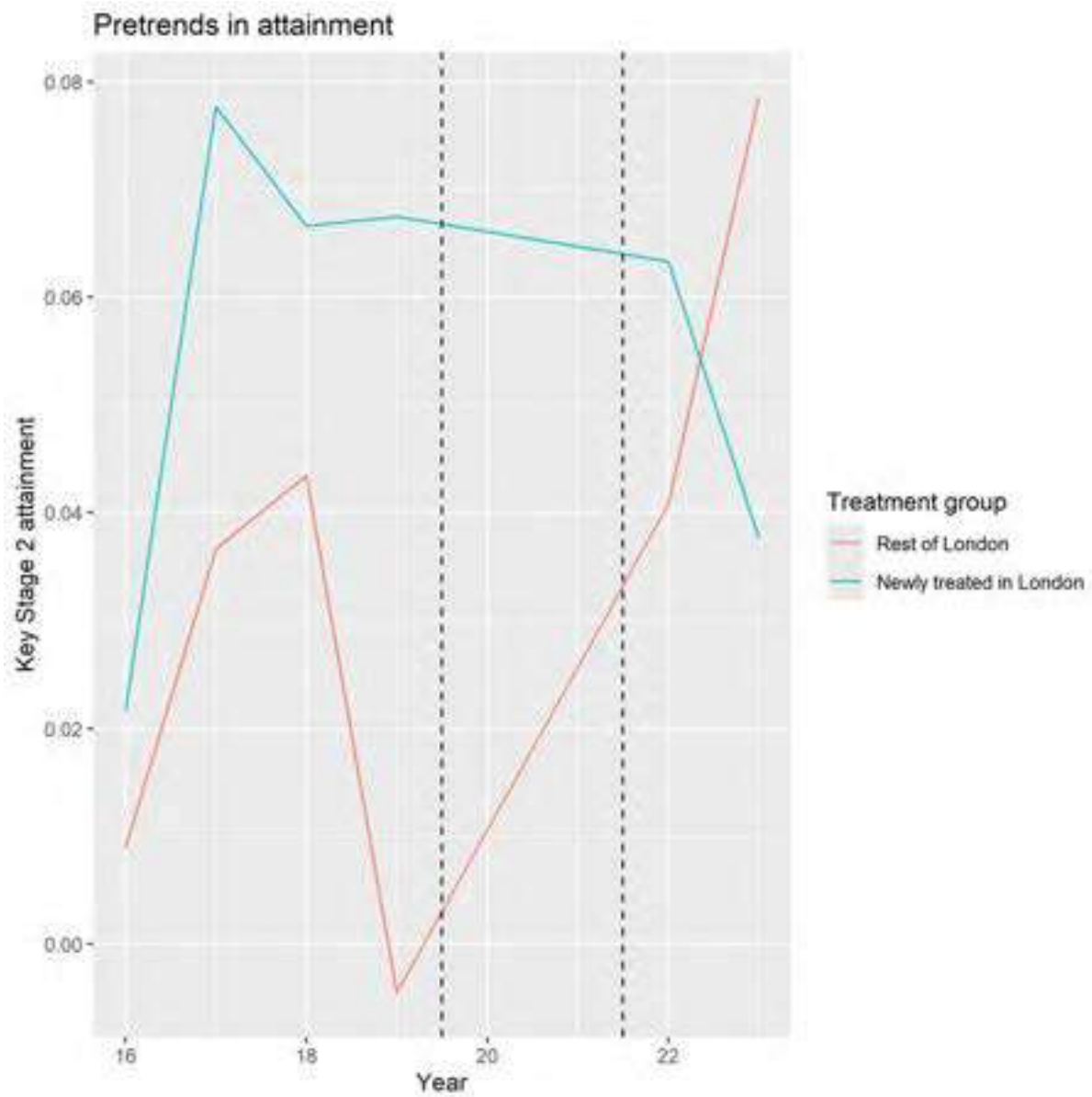
Table 89. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.008 [-0.030, 0.046]
Num.Obs.	112587
R2	0.076
R2 Adj.	0.062
R2 Within	0.023
R2 Within Adj.	0.022
AIC	233335.0
BIC	249525.5
RMSE	0.67
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	112550

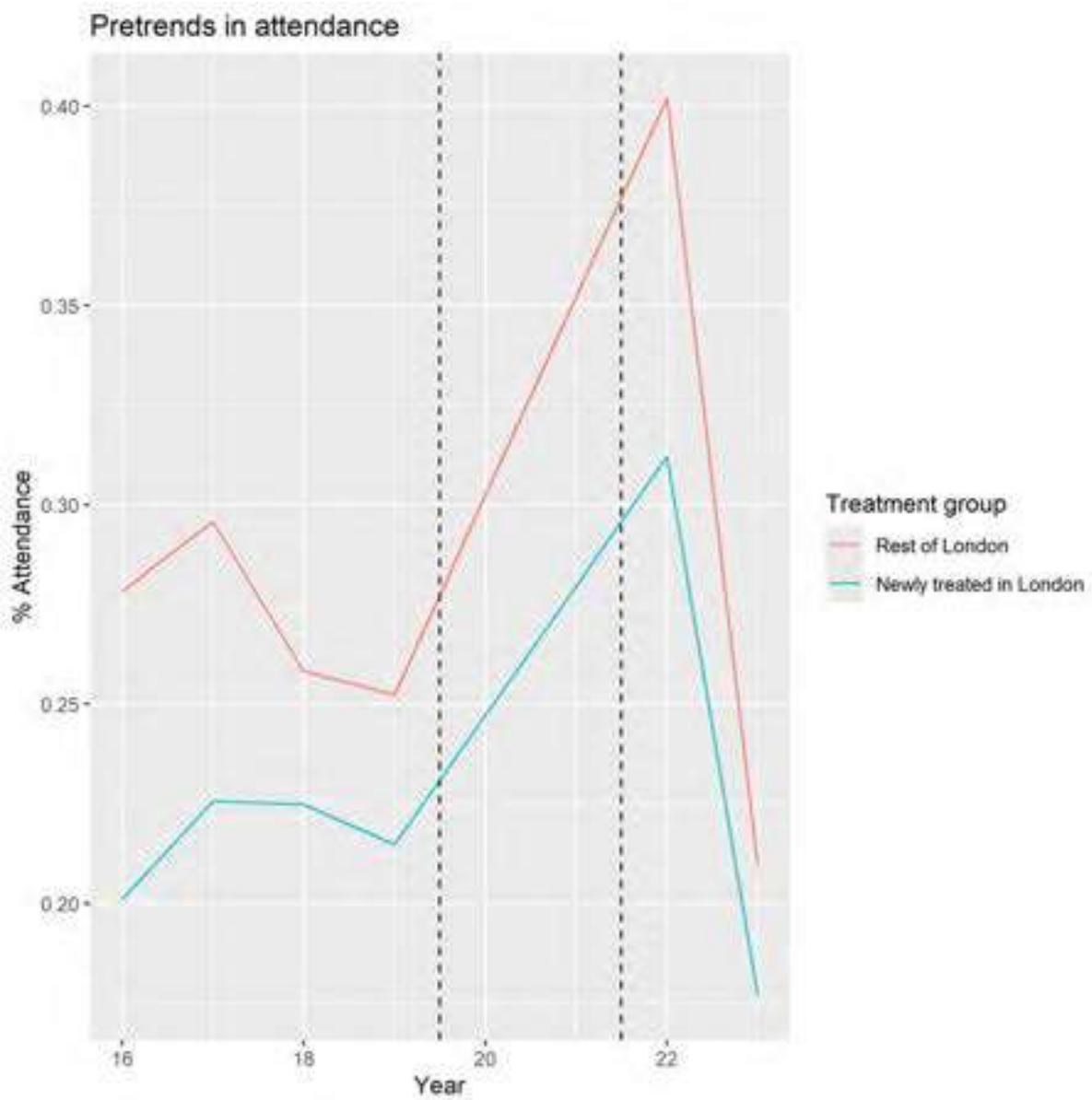
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 211. Raw pre-trends in primary outcome for difference-in-differences



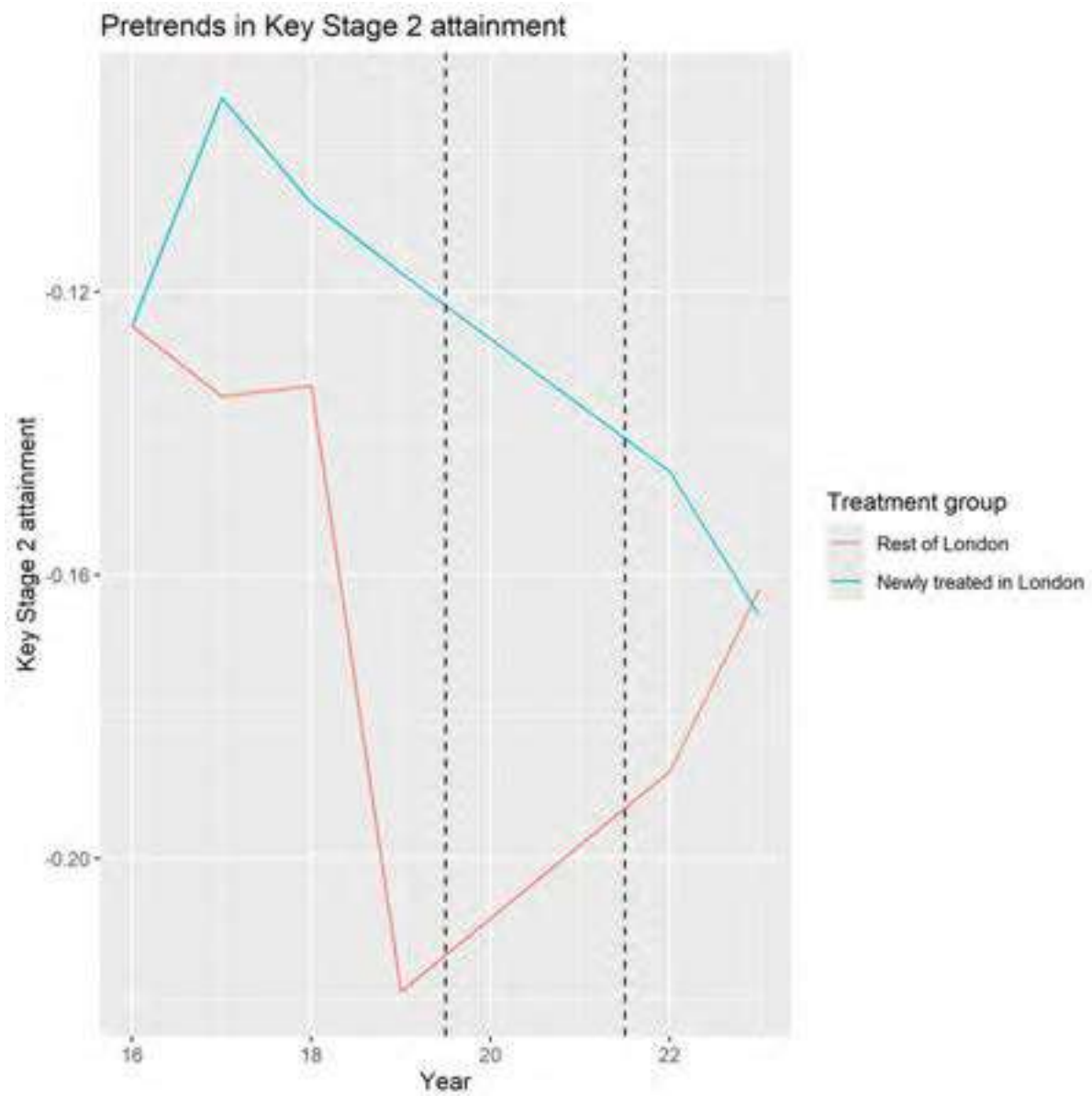
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 211 Counts.csv.

Figure 212. Raw pre-trends in secondary outcome for difference-in-differences



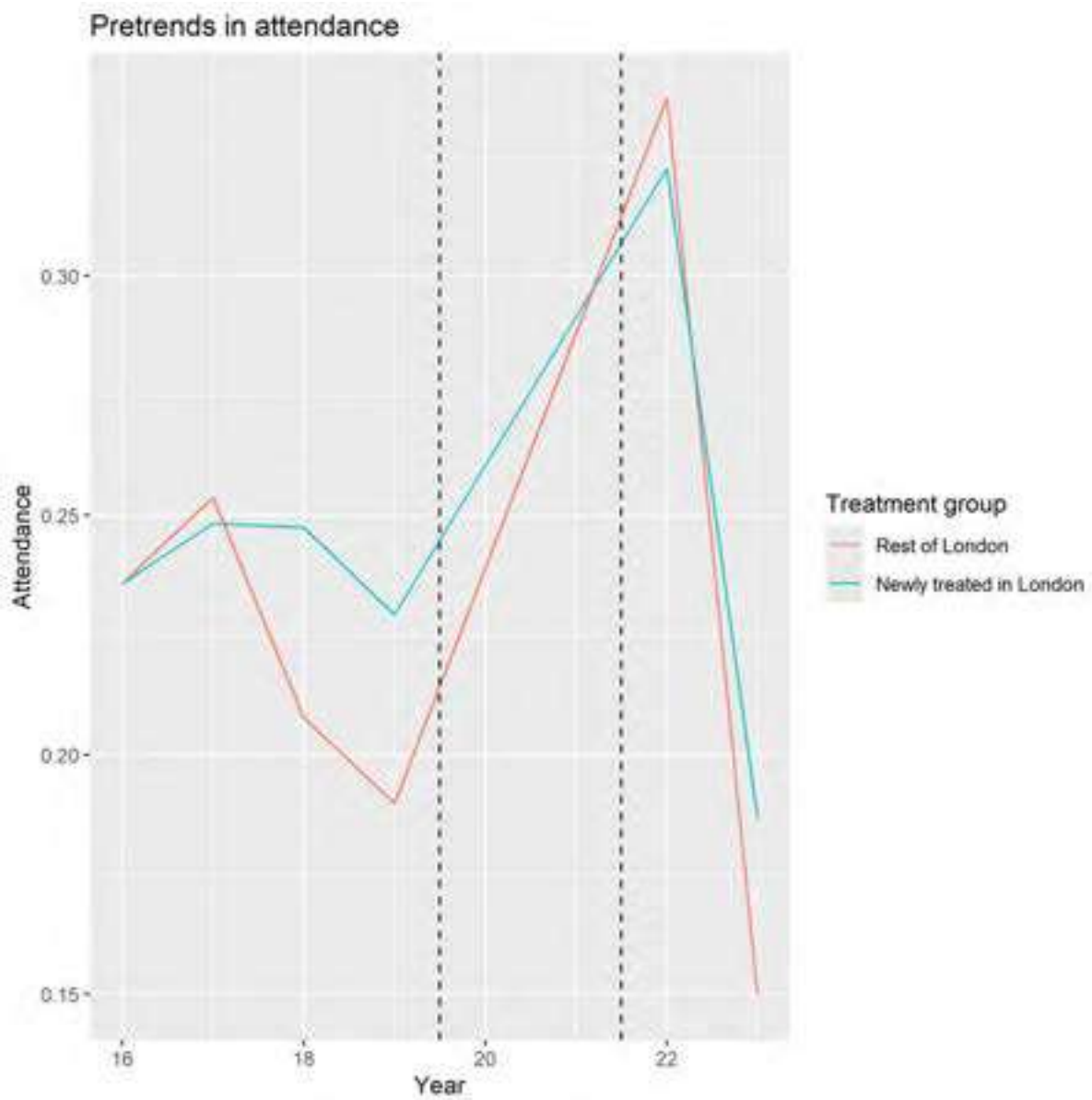
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 212 Counts.csv.

Figure 213. Conditional primary outcome pre-trends for difference-in-differences



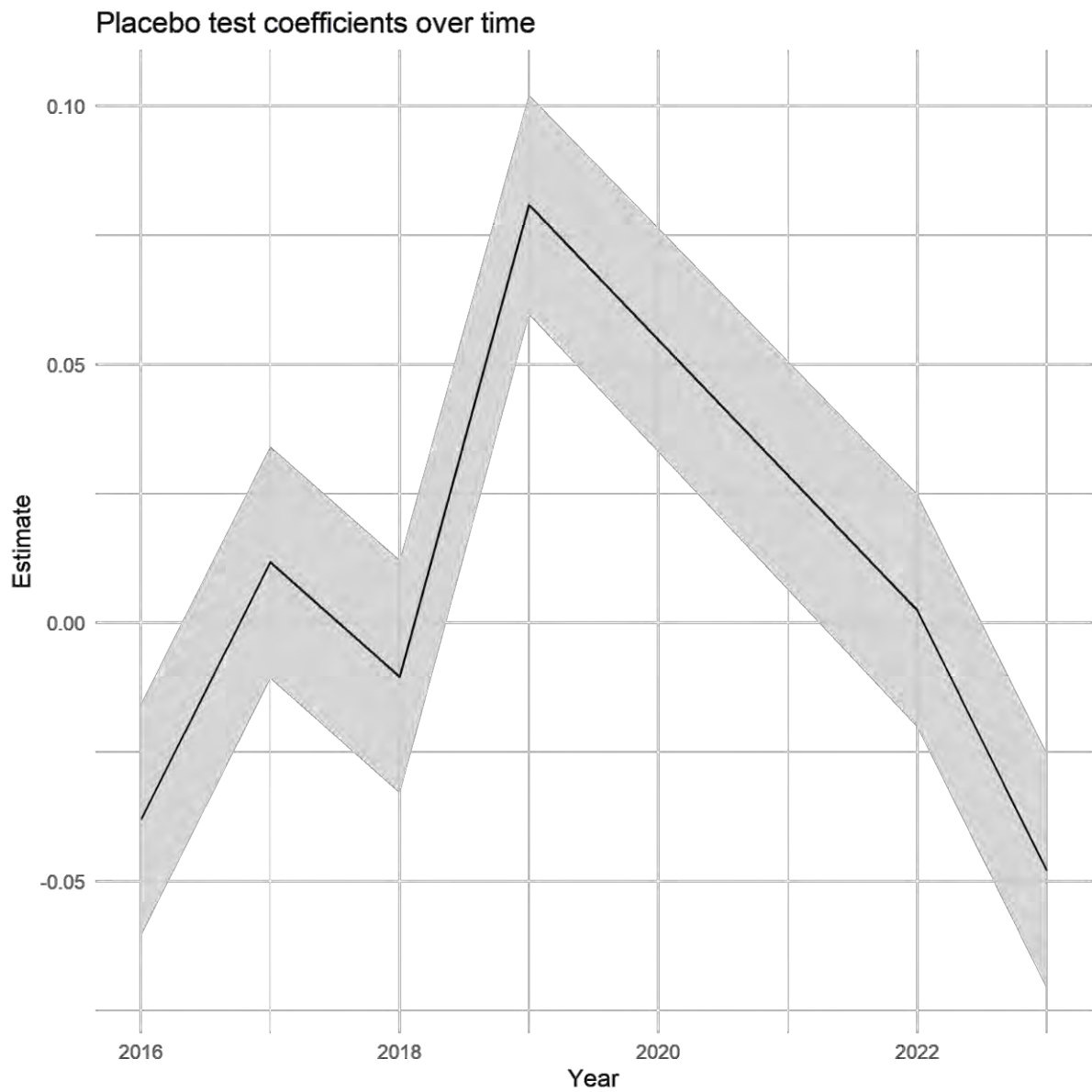
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 213 Model.docx.

Figure 214. Conditional secondary outcome pre-trends for difference-in-differences



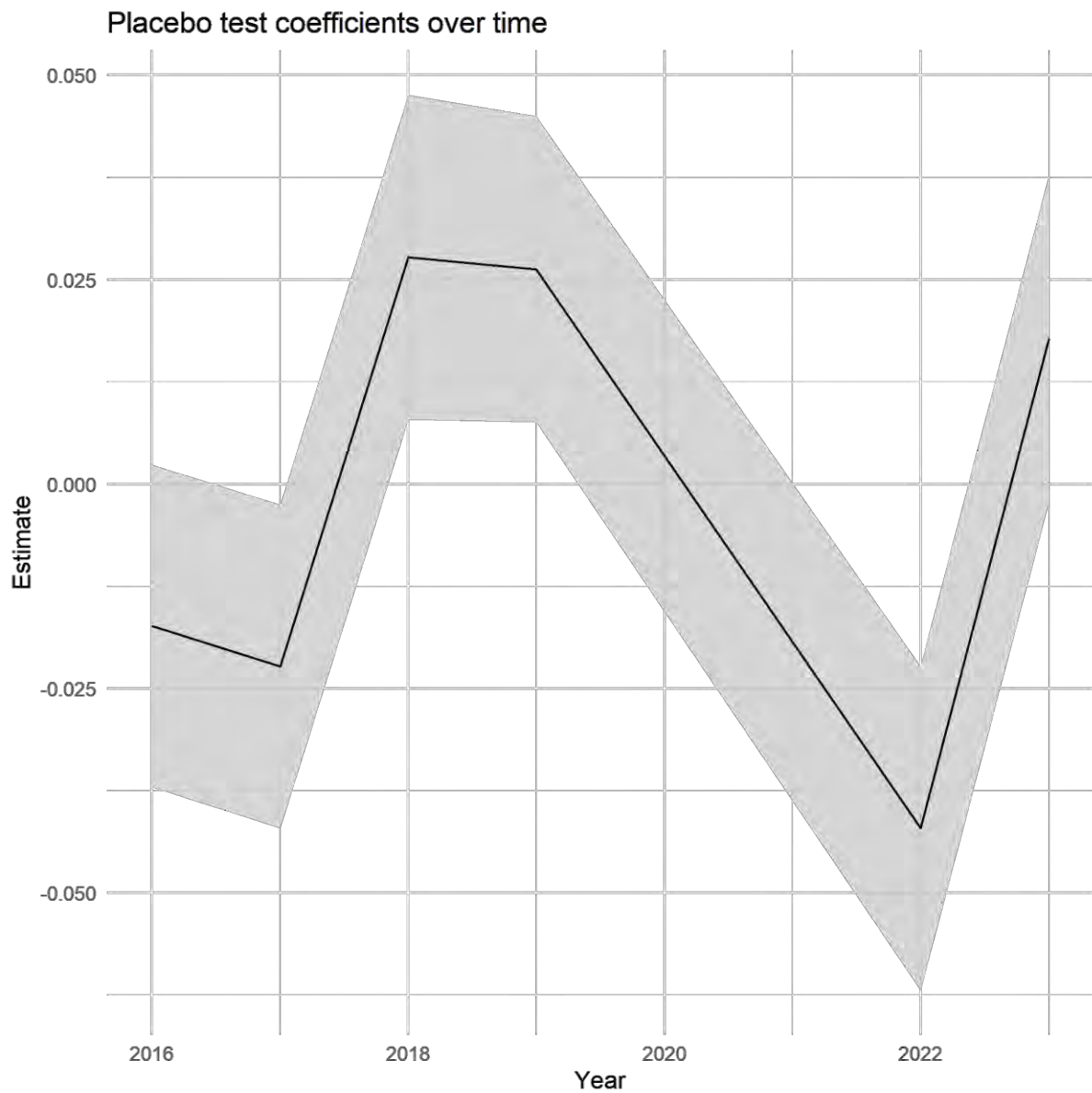
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 214 Model.docx

Figure 215. Placebo test estimates for primary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 215 Models.csv

Figure 216. Placebo test estimates for secondary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 216 Models.csv

## Appendix 22. Within-London analysis: Asian sample

Table 90. Difference in differences estimates for primary outcome

---

Treatment estimate	0.005
	[-0.058, 0.069]
Num.Obs.	122184
R2	0.327
R2 Adj.	0.318
R2 Within	0.253
R2 Within Adj.	0.253
AIC	288293.9
BIC	304456.8
RMSE	0.78
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	122147

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

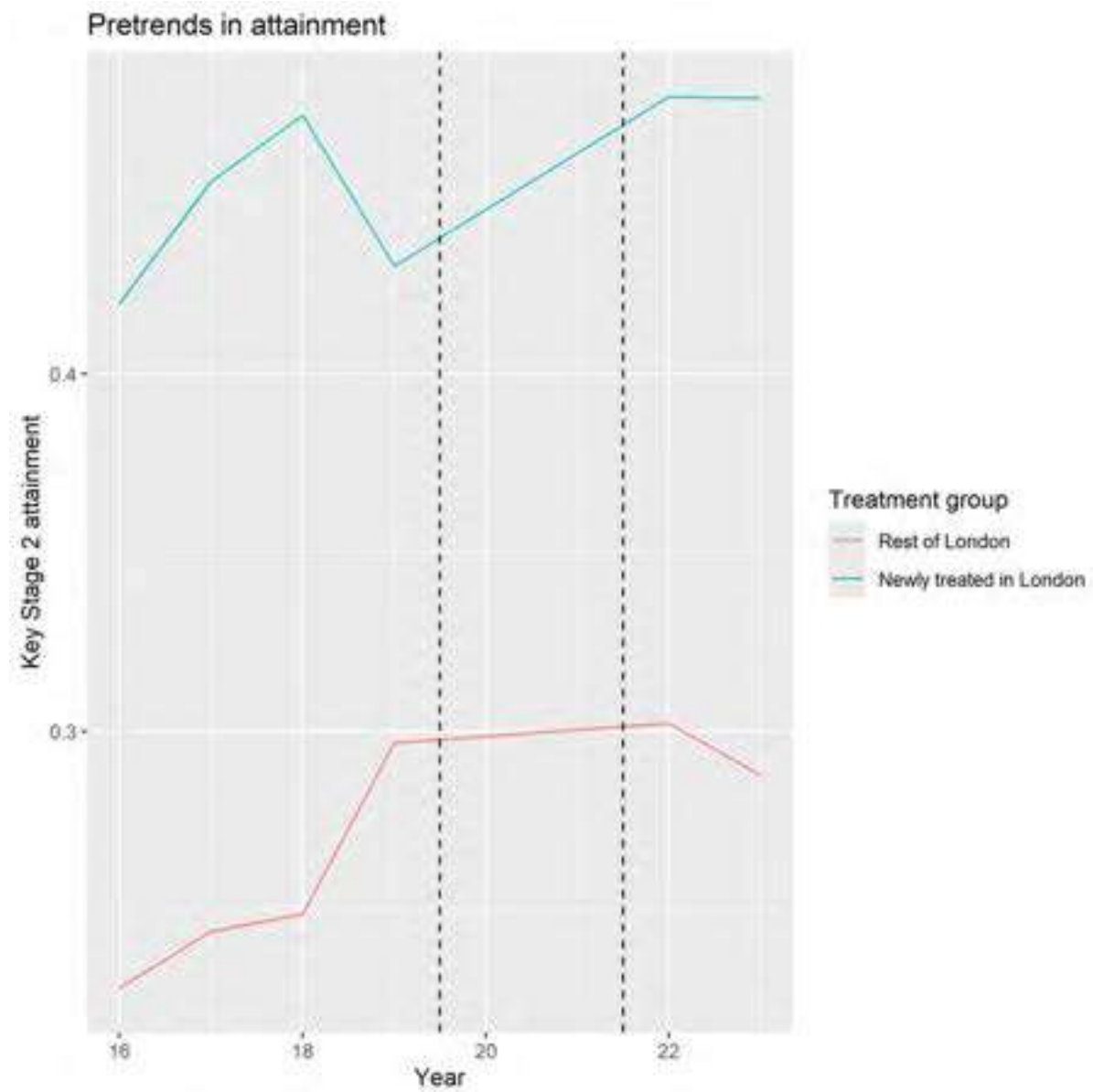
Table 91. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.055
	[0.020, 0.089]
Num.Obs.	122009
R2	0.049
R2 Adj.	0.035
R2 Within	0.010
R2 Within Adj.	0.010
AIC	248768.8
BIC	264909.9
RMSE	0.66
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	121973

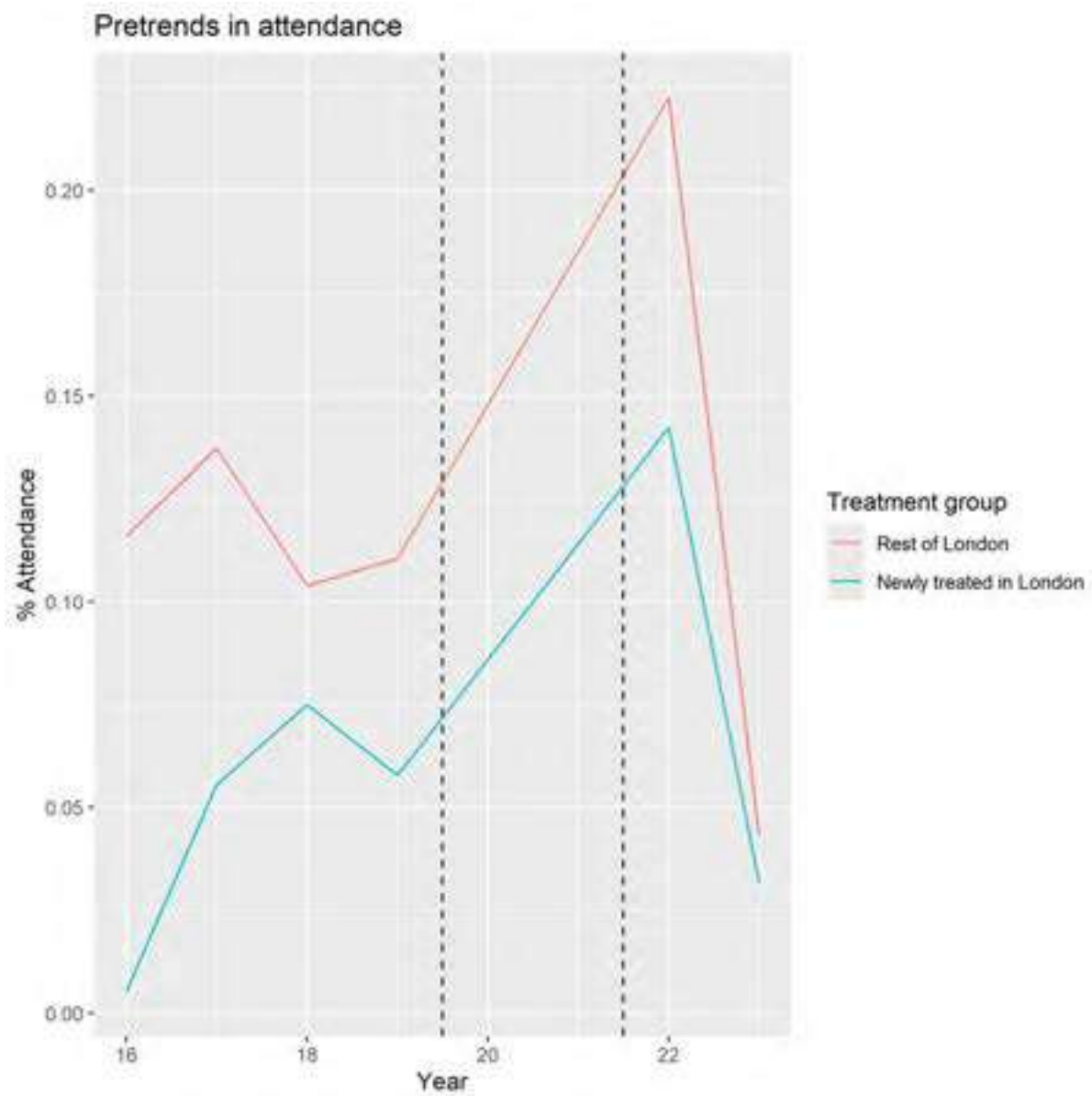
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 217. Raw pre-trends in primary outcome for difference-in-differences



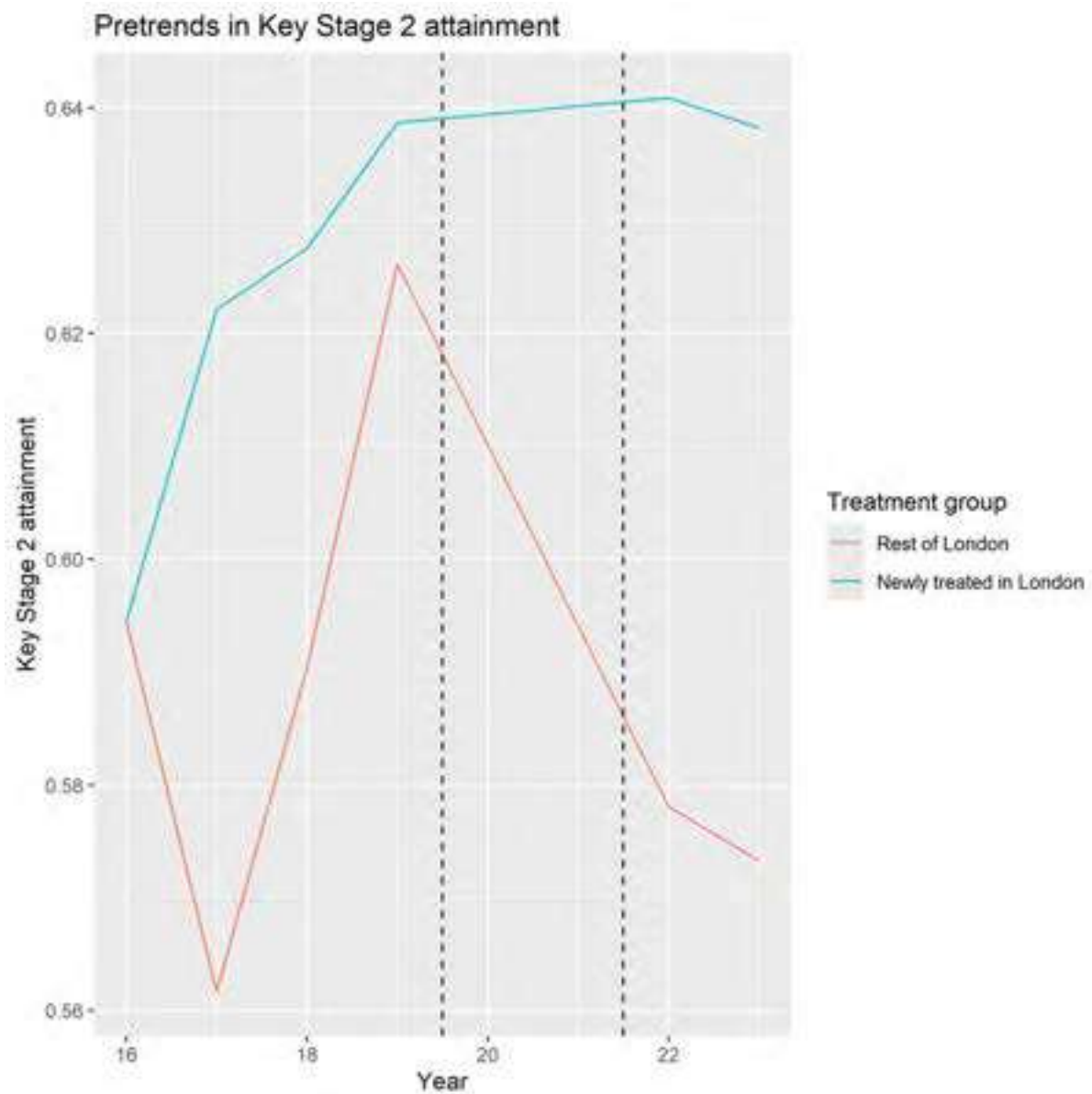
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 217 Counts.csv.

Figure 218. Raw pre-trends in secondary outcome for difference-in-differences



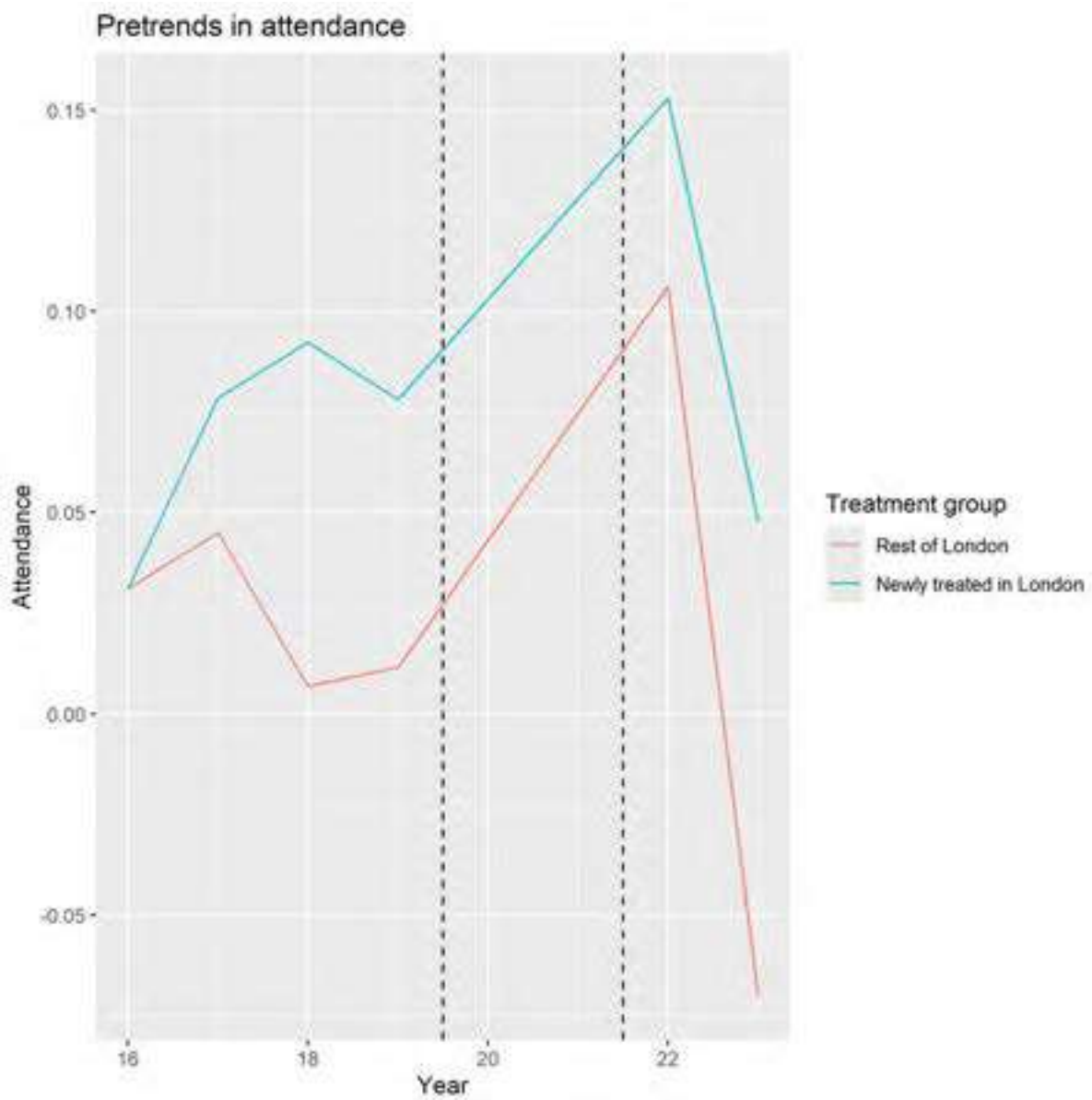
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 218 Counts.csv.

Figure 219. Conditional primary outcome pre-trends for difference-in-differences



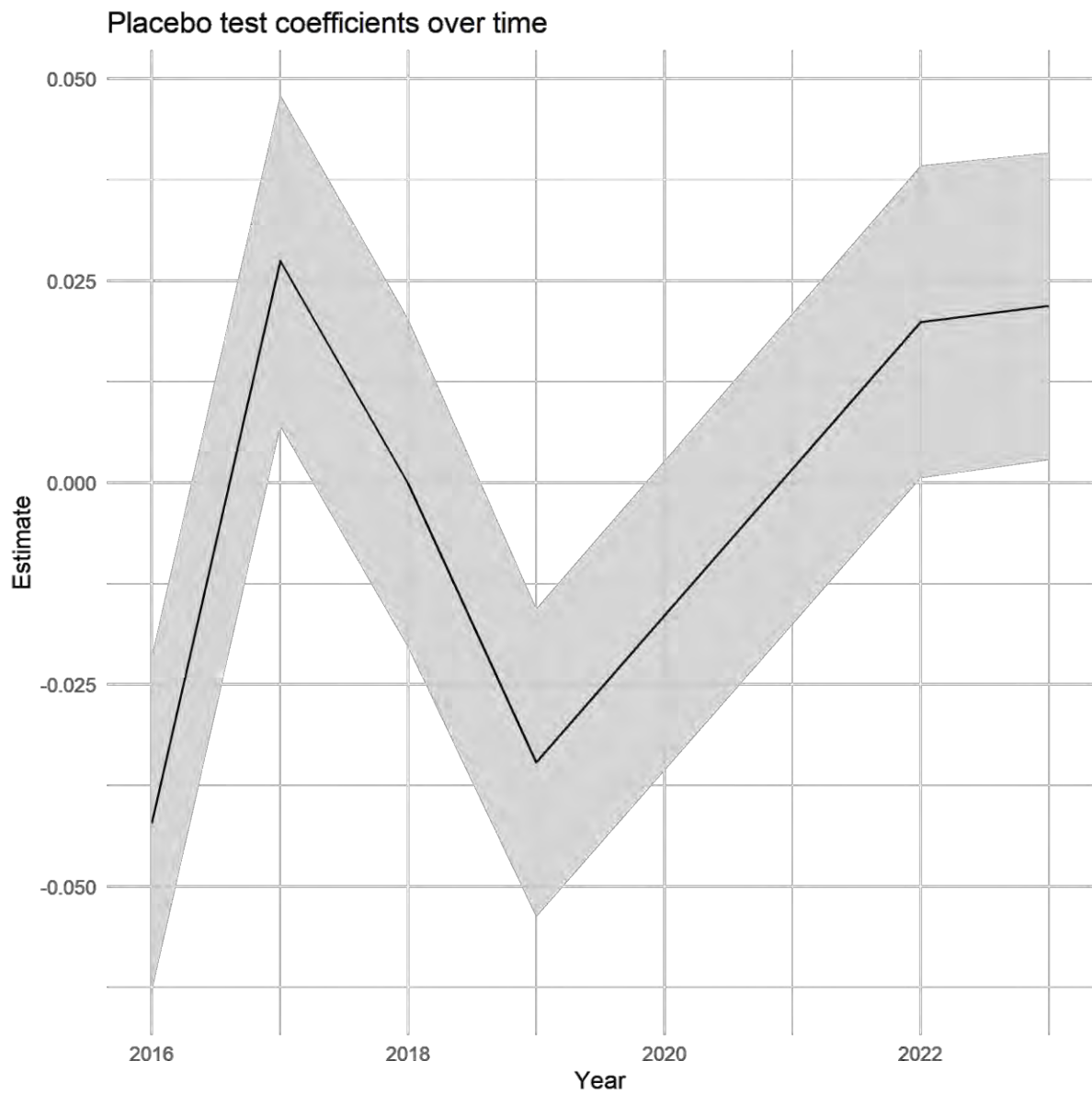
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 219 Model.docx.

Figure 220. Conditional secondary outcome pre-trends for difference-in-differences



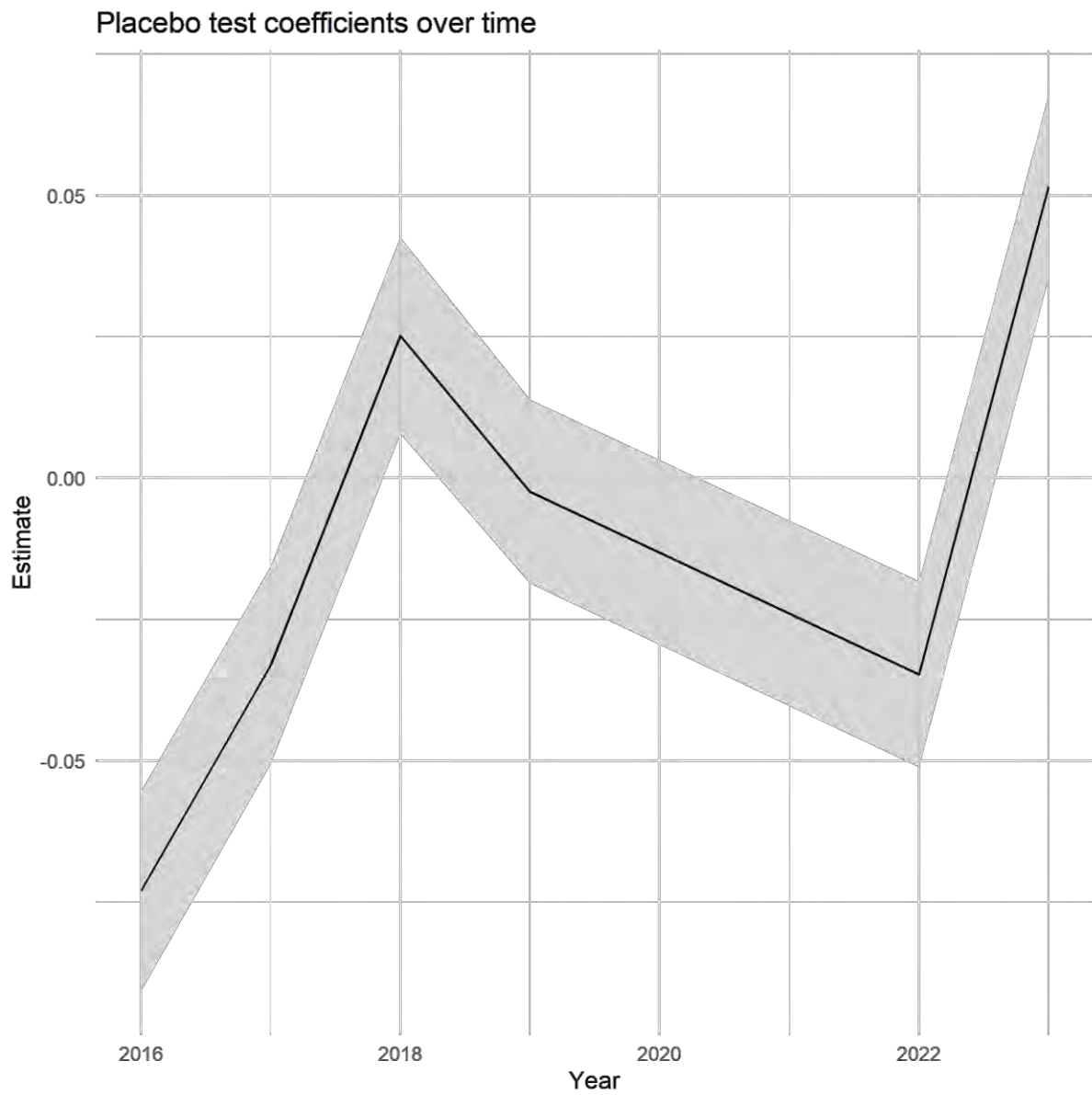
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 220 Model.docx

Figure 221. Placebo test estimates for primary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 221 Models.csv

Figure 222. Placebo test estimates for secondary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 222 Models.csv

## Appendix 23. Within-London analysis: White sample

Table 92. Difference in differences estimates for primary outcome

---

Treatment estimate	0.044
	[-0.039, 0.127]
Num.Obs.	232297
R2	0.390
R2 Adj.	0.386
R2 Within	0.296
R2 Within Adj.	0.296
AIC	546916.6
BIC	564707.9
RMSE	0.78
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	232261

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

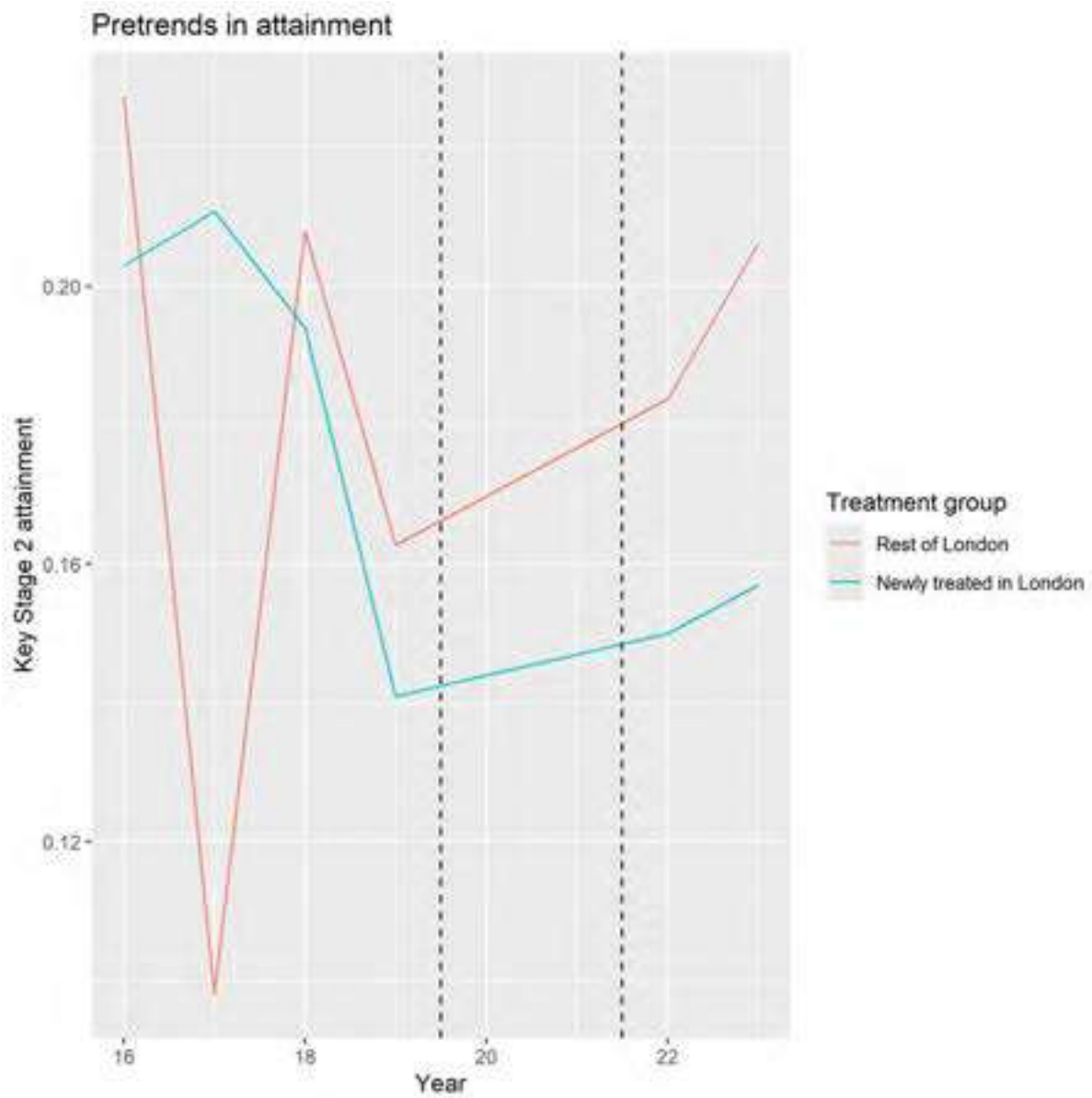
Table 93. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.011
	[-0.040, 0.063]
Num.Obs.	231965
R2	0.086
R2 Adj.	0.079
R2 Within	0.036
R2 Within Adj.	0.036
AIC	556099.3
BIC	573888.0
RMSE	0.80
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	231929

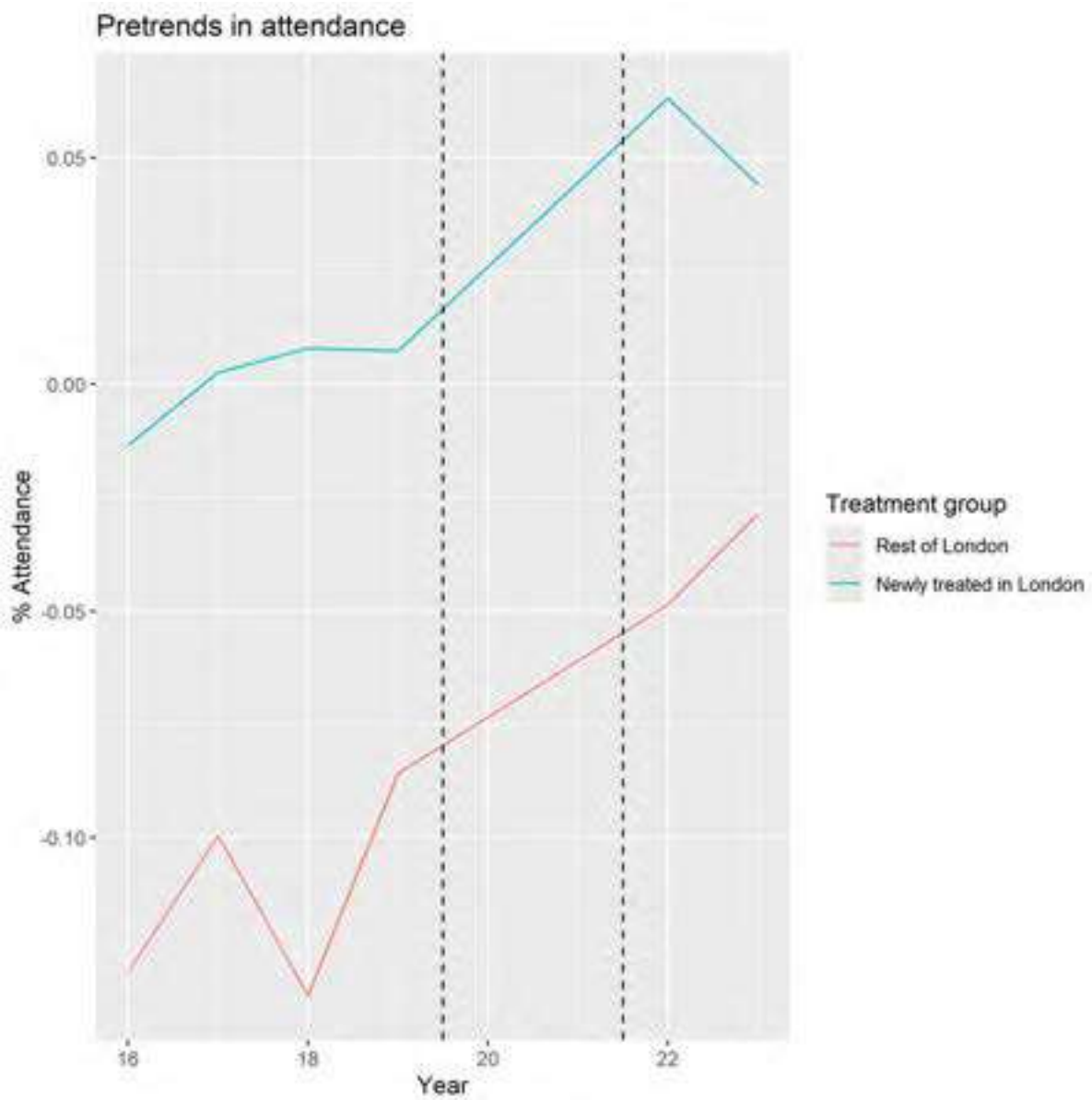
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 223. Raw pre-trends in primary outcome for difference-in-differences



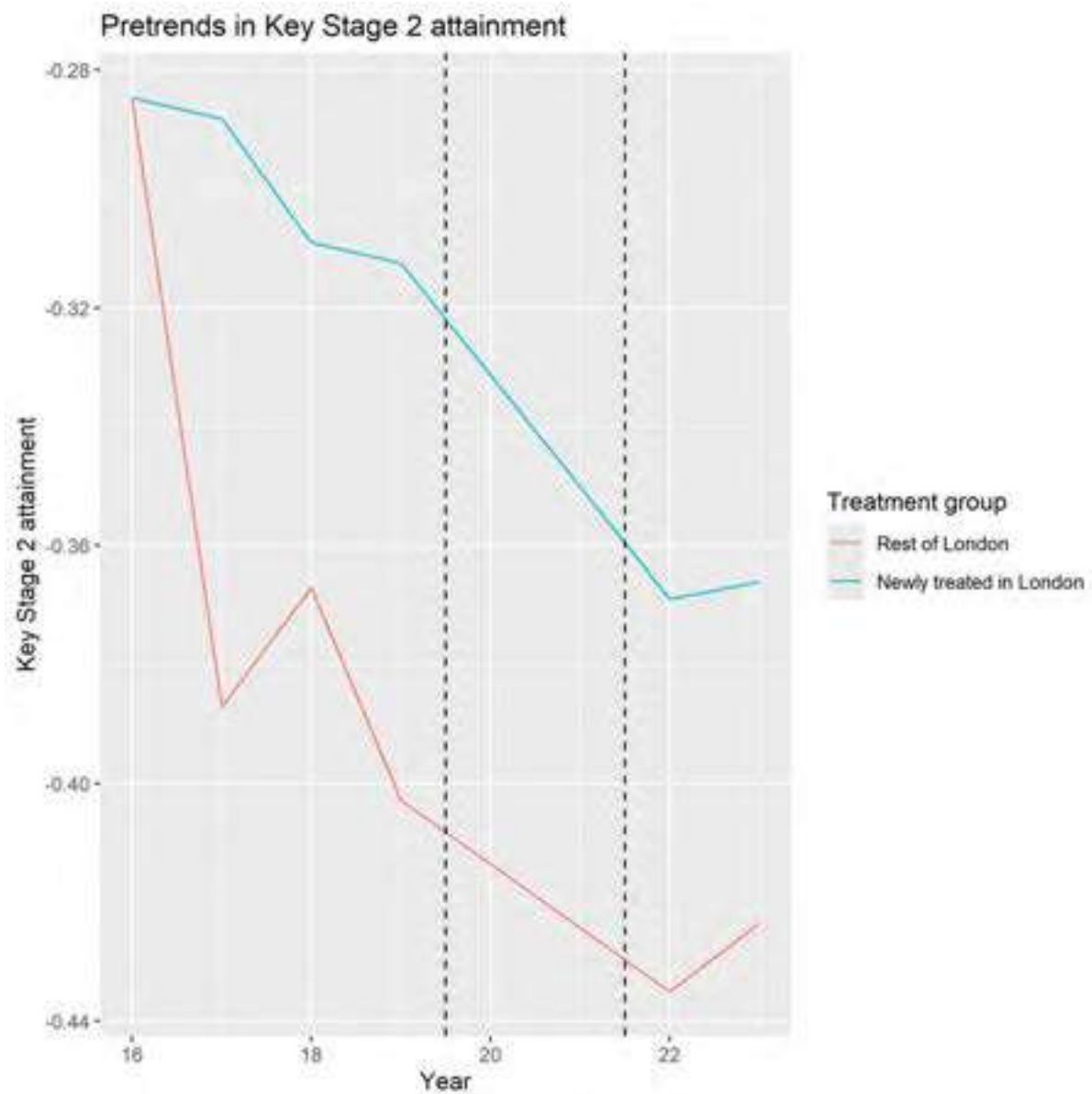
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 223 Counts.csv.

Figure 224. Raw pre-trends in secondary outcome for difference-in-differences



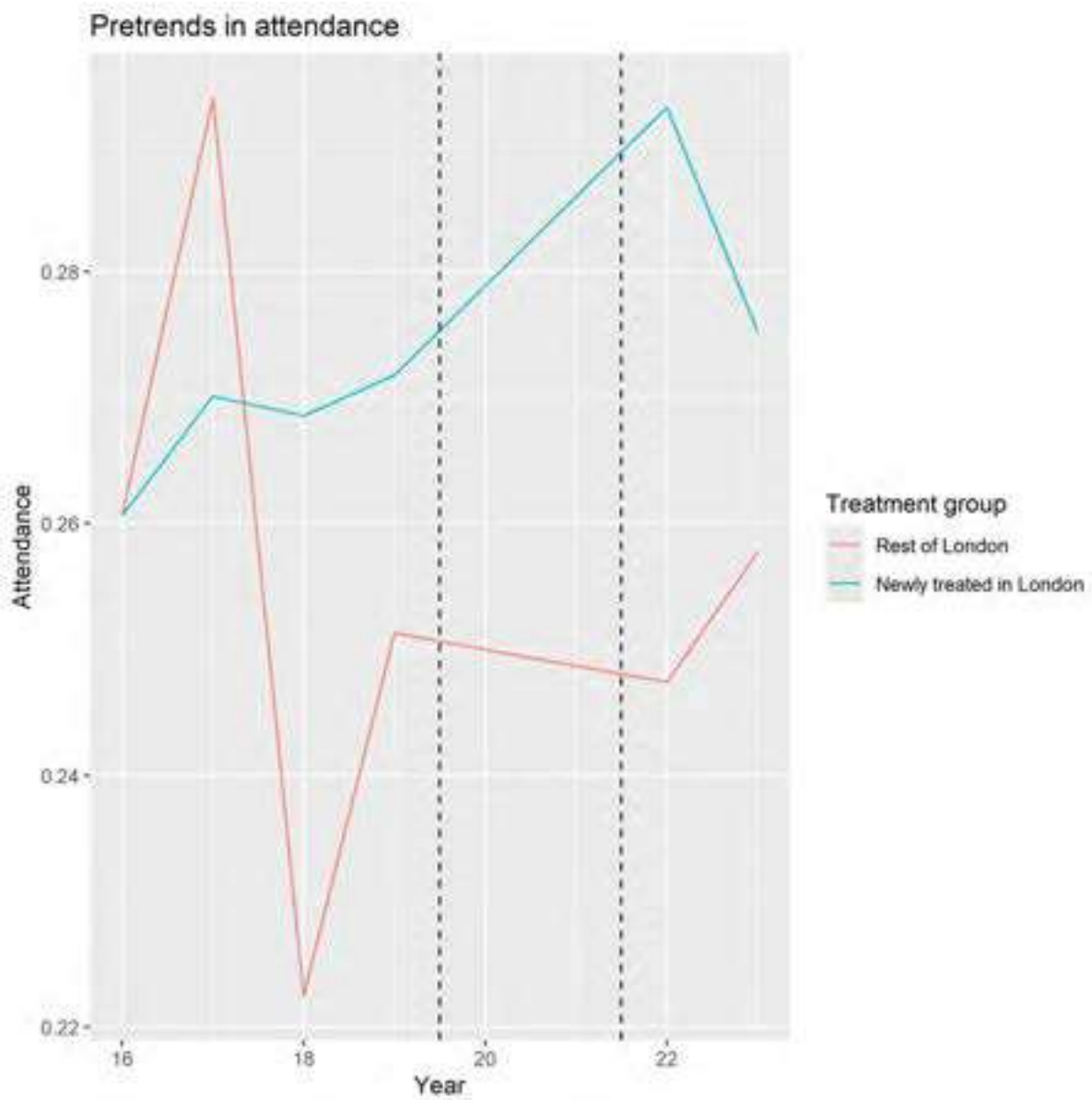
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 224 Counts.csv.

Figure 225. Conditional primary outcome pre-trends for difference-in-differences



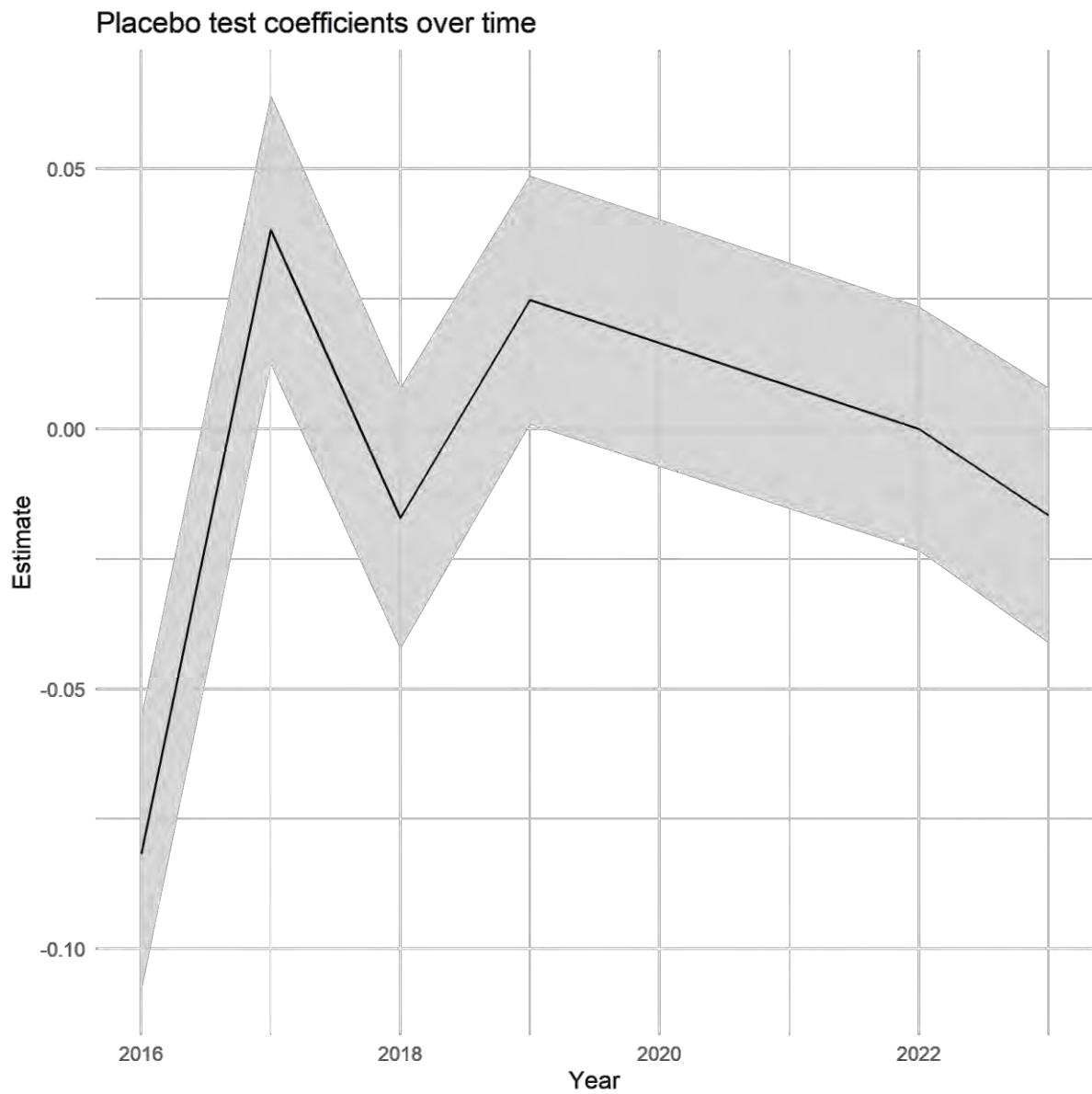
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 225 Model.docx.

Figure 226. Conditional secondary outcome pre-trends for difference-in-differences



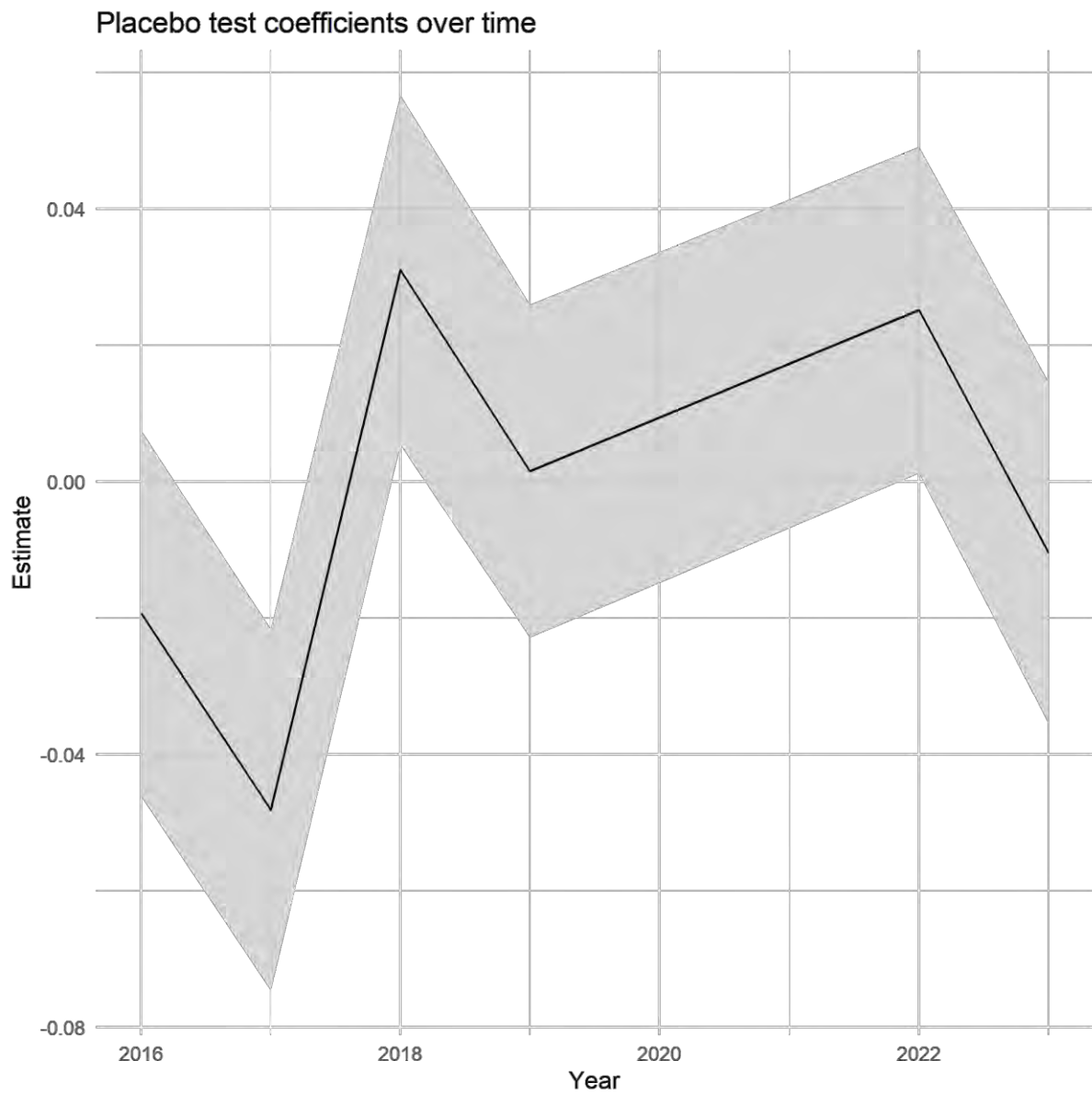
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 226 Model.docx

Figure 227. Placebo test estimates for primary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 227 Models.csv

Figure 228. Placebo test estimates for secondary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 228 Models.csv

## Appendix 24. Within-London analysis: Other ethnicity sample

Table 94. Difference in differences estimates for primary outcome

---

Treatment estimate	-0.019 [-0.094, 0.056]
Num.Obs.	98476
R2	0.354
R2 Adj.	0.343
R2 Within	0.278
R2 Within Adj.	0.278
AIC	237144.1
BIC	253384.9
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	98439

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

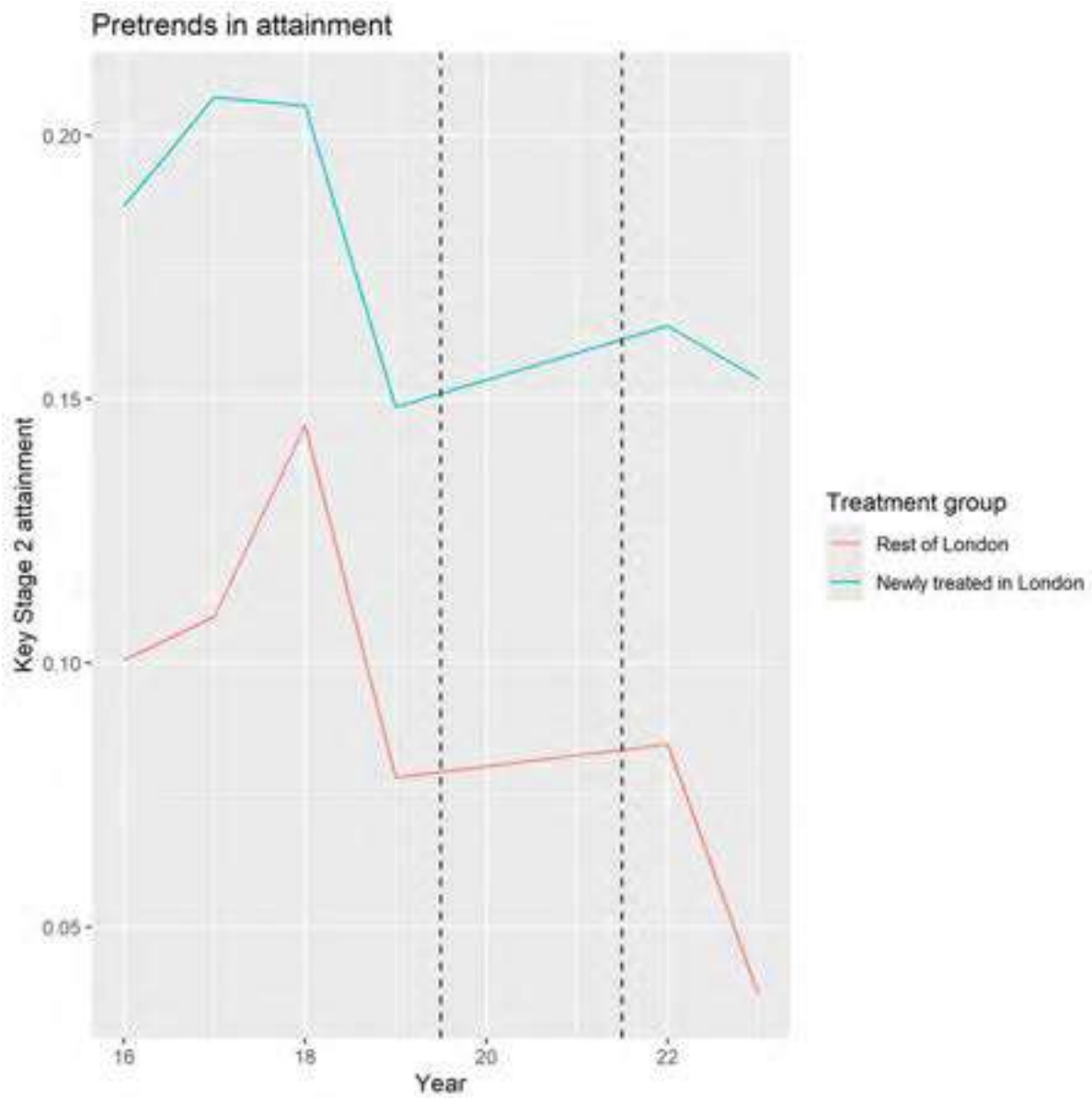
Table 95. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.016 [-0.046, 0.079]
Num.Obs.	98338
R2	0.069
R2 Adj.	0.053
R2 Within	0.025
R2 Within Adj.	0.025
AIC	235400.1
BIC	251638.5
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	98301

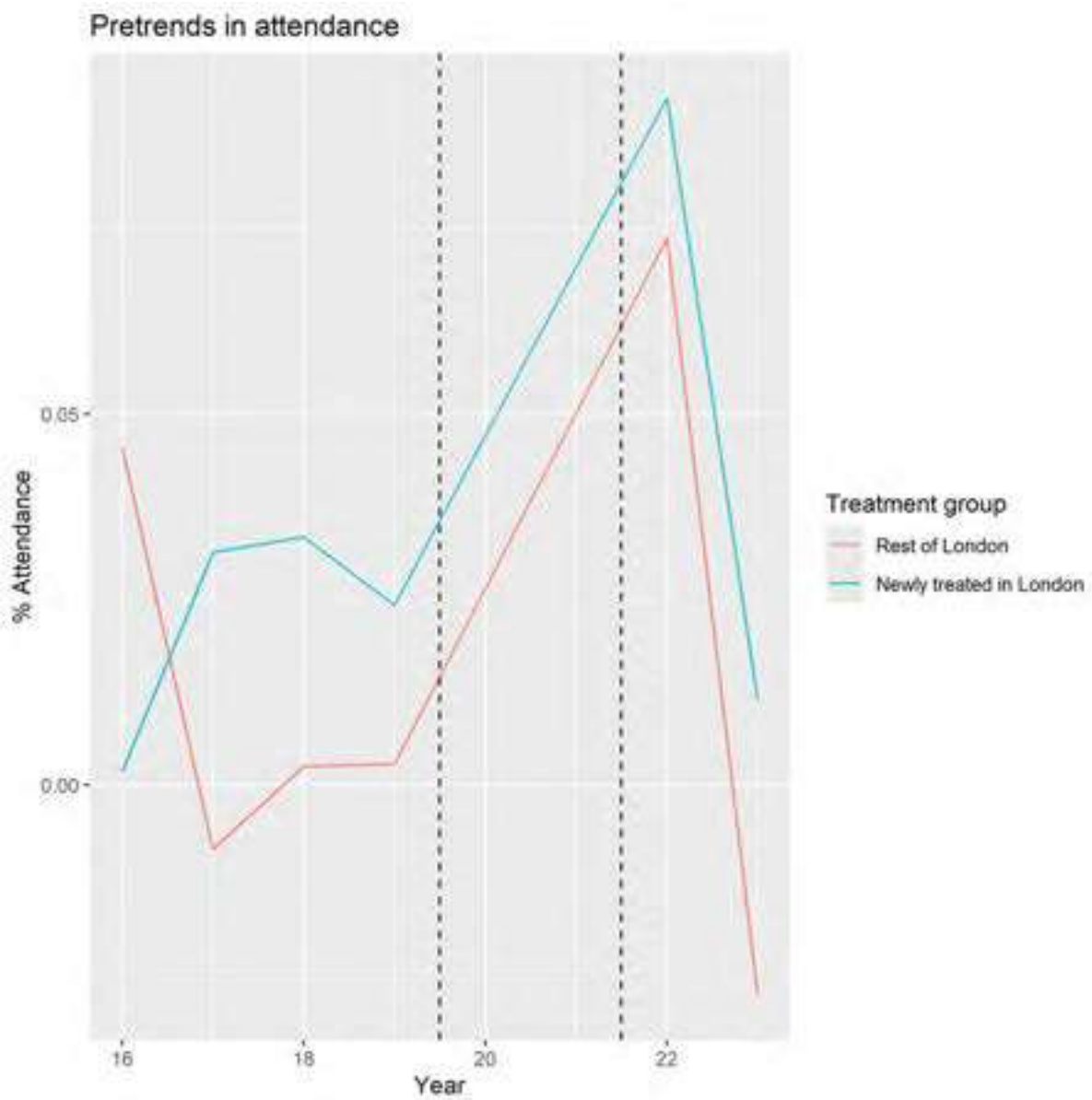
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 229. Raw pre-trends in primary outcome for difference-in-differences



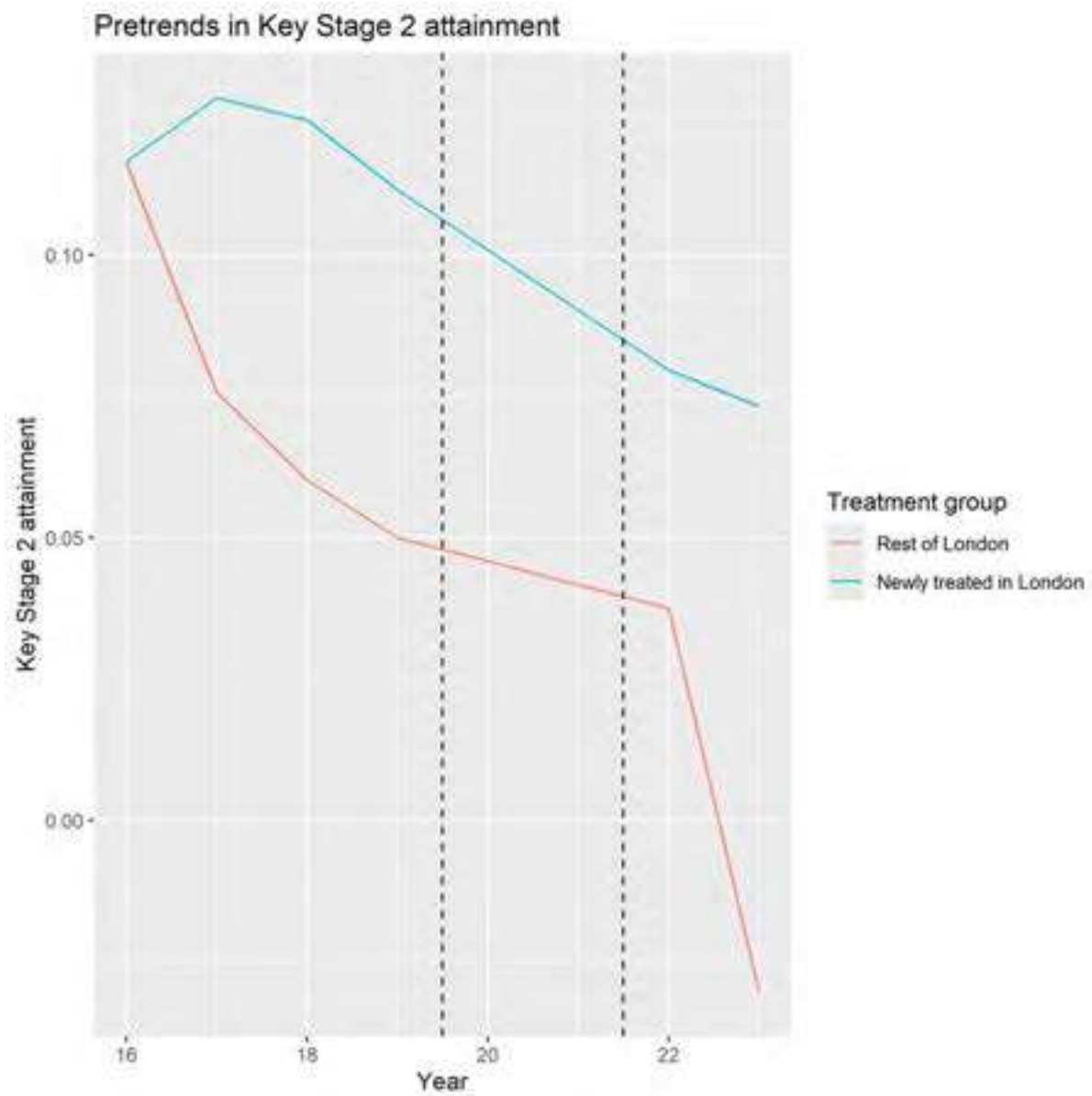
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 229 Counts.csv.

Figure 230. Raw pre-trends in secondary outcome for difference-in-differences



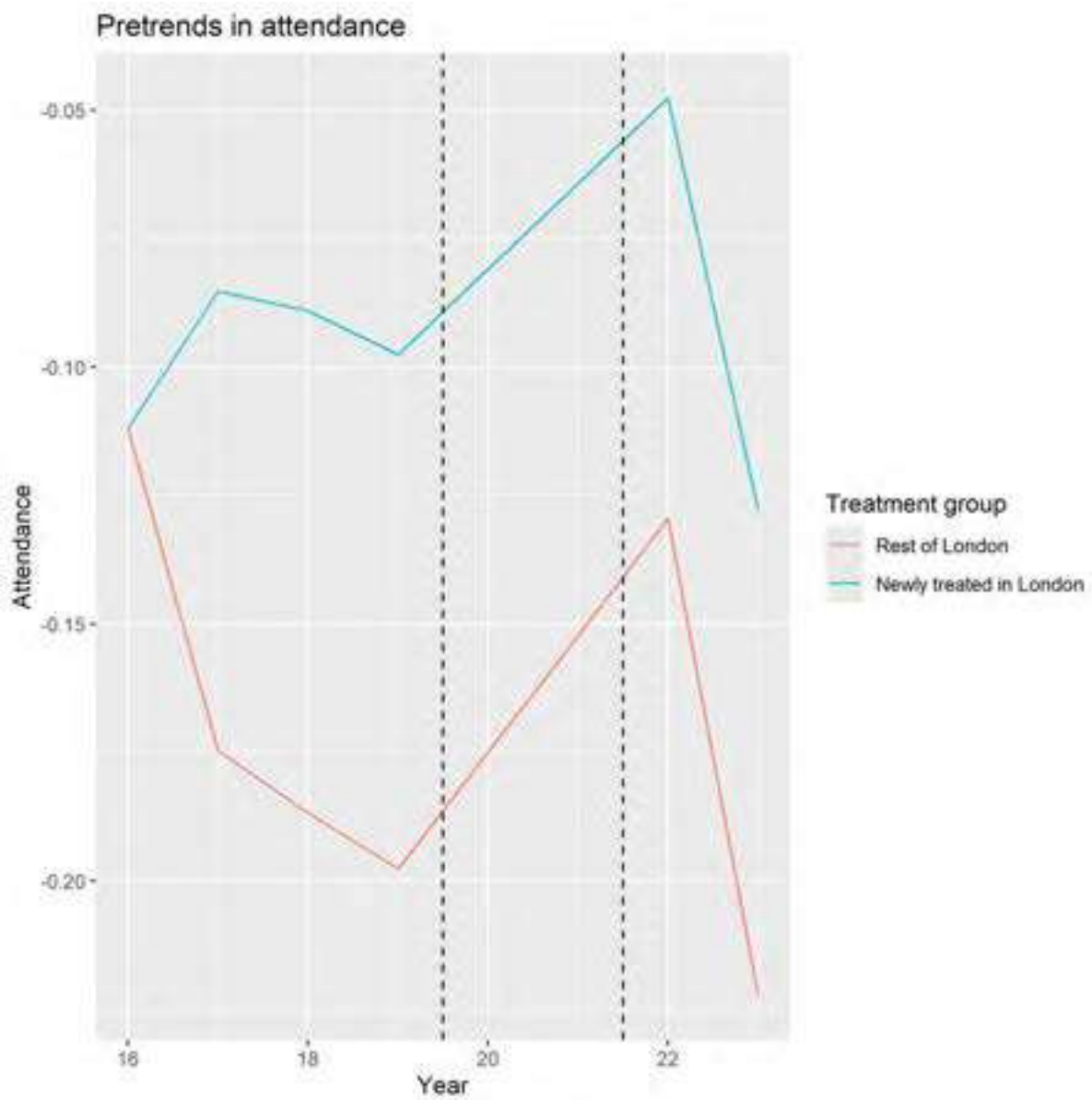
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 230 Counts.csv.

Figure 231. Conditional primary outcome pre-trends for difference-in-differences



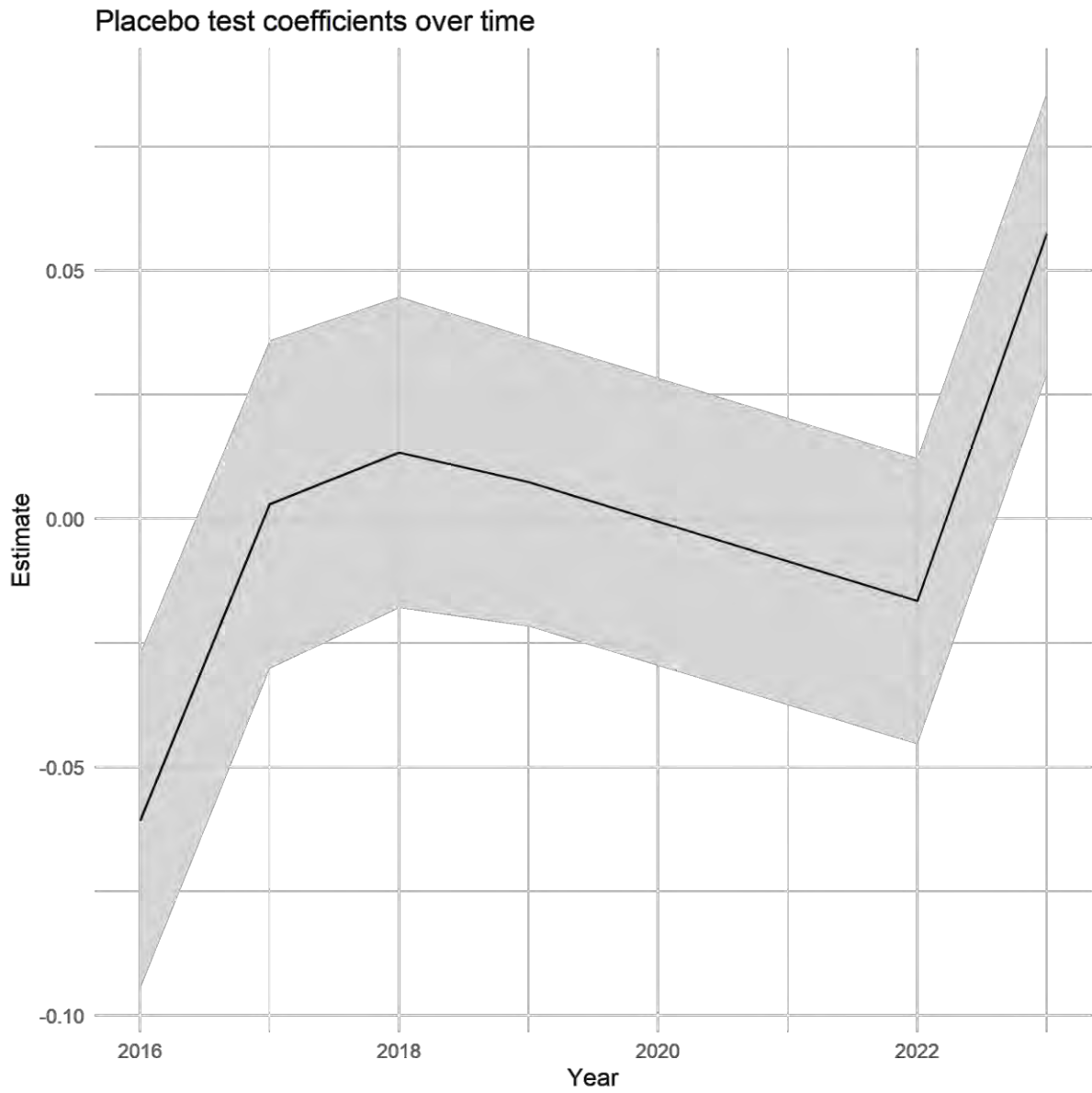
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 231 Model.docx.

Figure 232. Conditional secondary outcome pre-trends for difference-in-differences



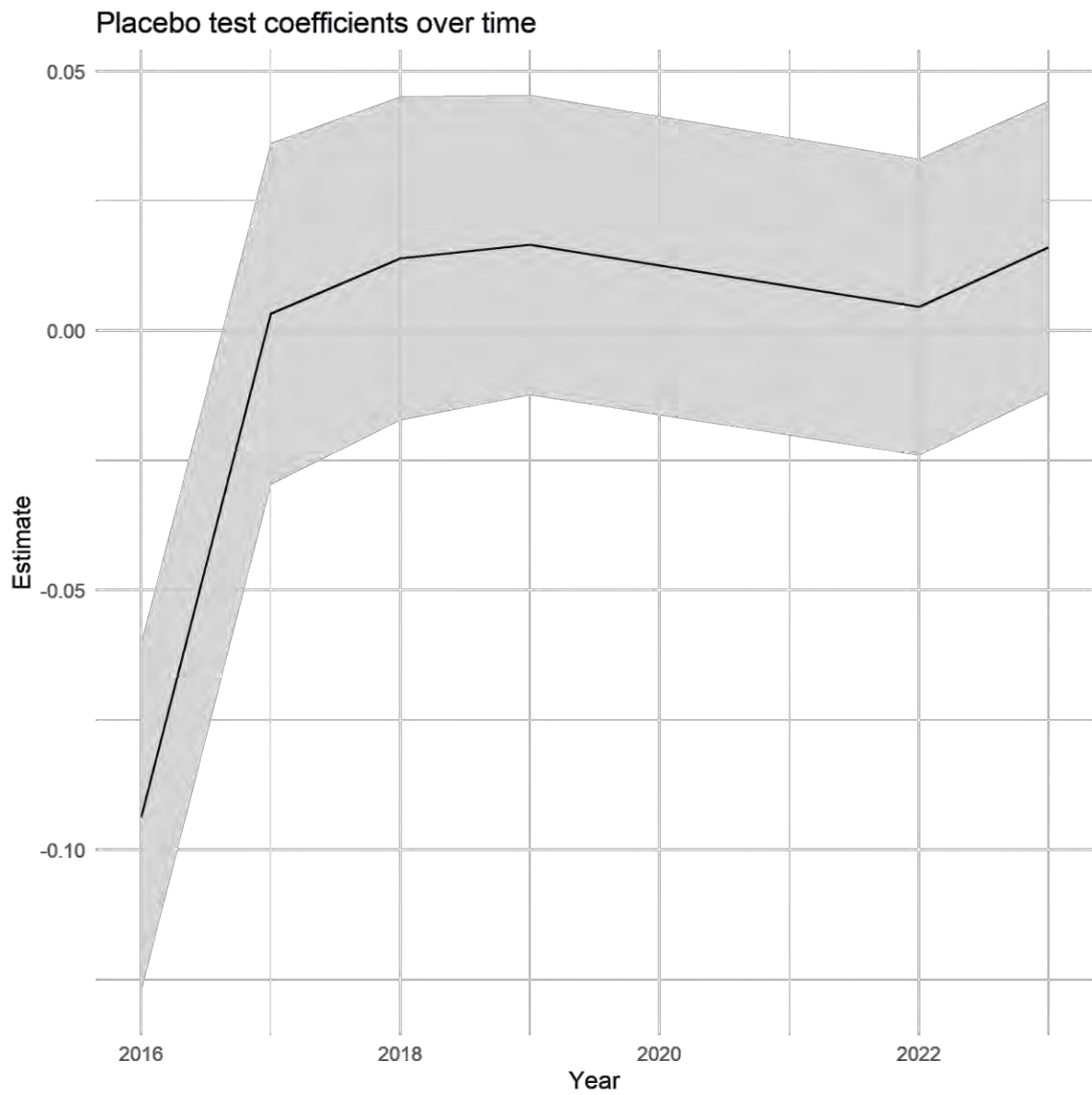
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 232 Model.docx

Figure 233. Placebo test estimates for primary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 233 Models.csv

Figure 234. Placebo test estimates for secondary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 234 Models.csv

## Appendix 25. Within-London analysis: IDAC11 sample

Table 96. Difference in differences estimates for primary outcome

---

Treatment estimate	-0.012 [-0.076, 0.052]
Num.Obs.	133106
R2	0.371
R2 Adj.	0.363
R2 Within	0.307
R2 Within Adj.	0.306
AIC	314127.8
BIC	330638.9
RMSE	0.78
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	133074

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

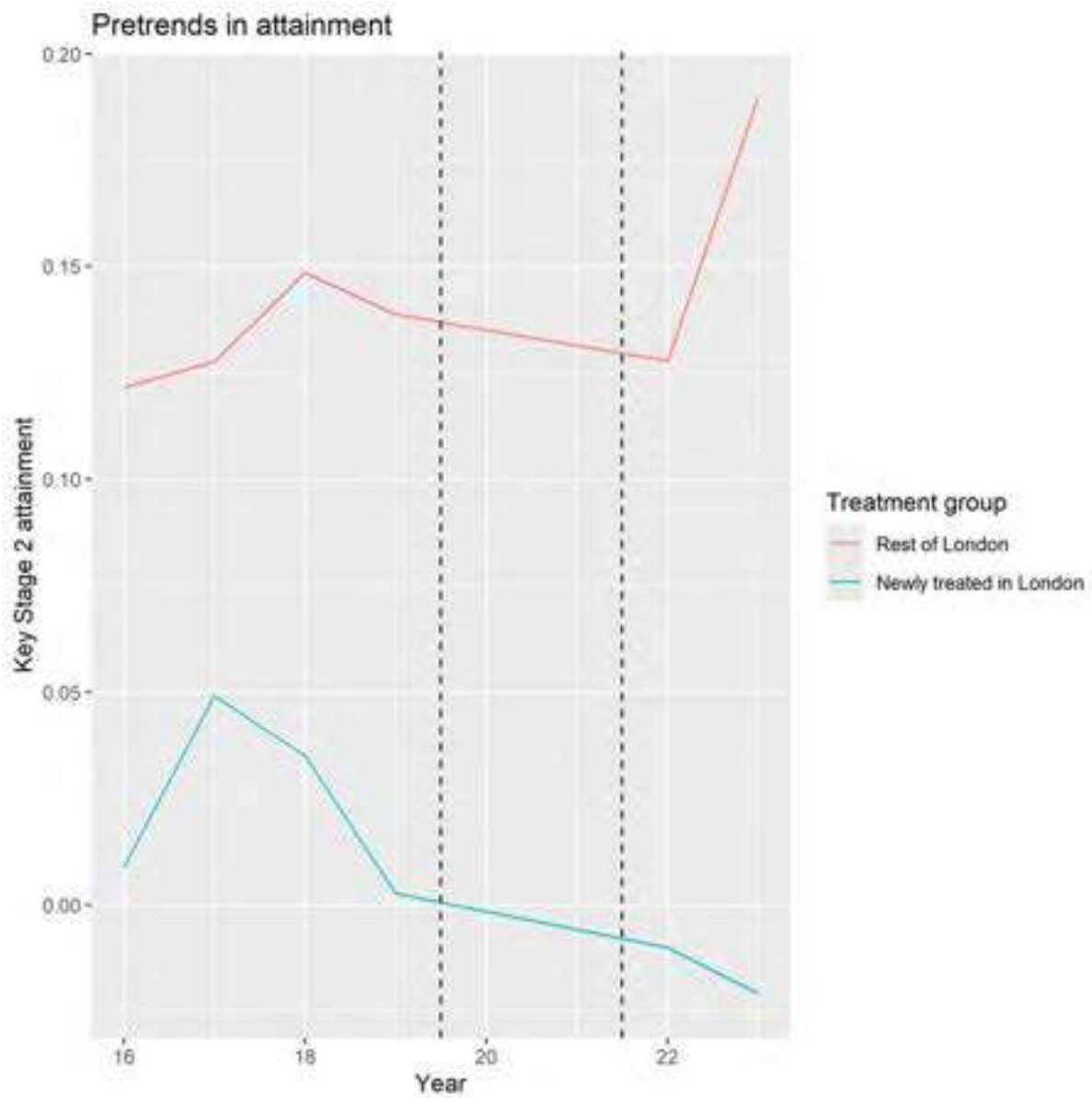
Table 97. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.017 [-0.019, 0.053]
Num.Obs.	132847
R2	0.104
R2 Adj.	0.093
R2 Within	0.061
R2 Within Adj.	0.061
AIC	324943.9
BIC	341442.0
RMSE	0.81
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	132815

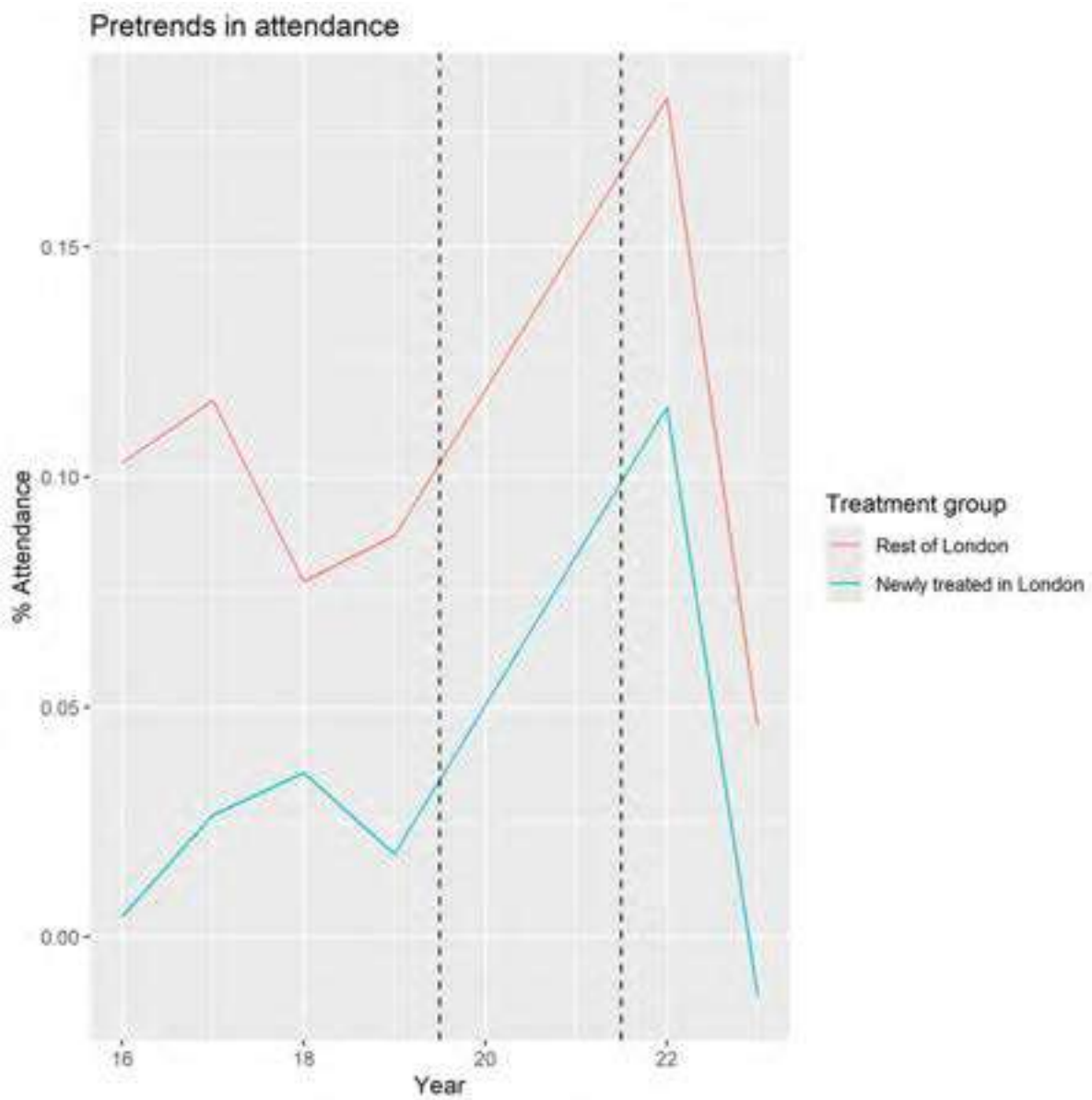
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 235. Raw pre-trends in primary outcome for difference-in-differences



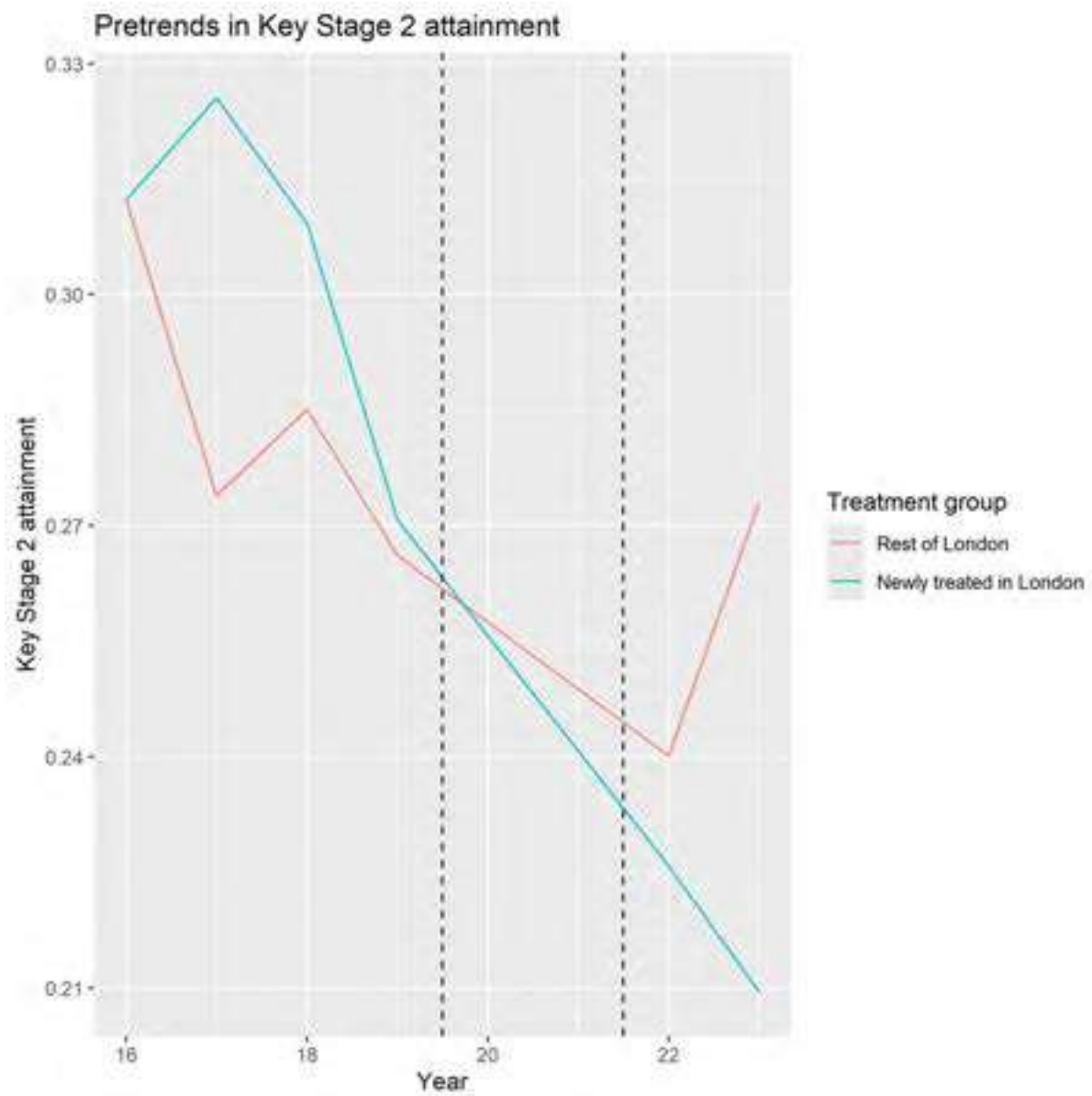
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 235 Counts.csv.

Figure 236. Raw pre-trends in secondary outcome for difference-in-differences



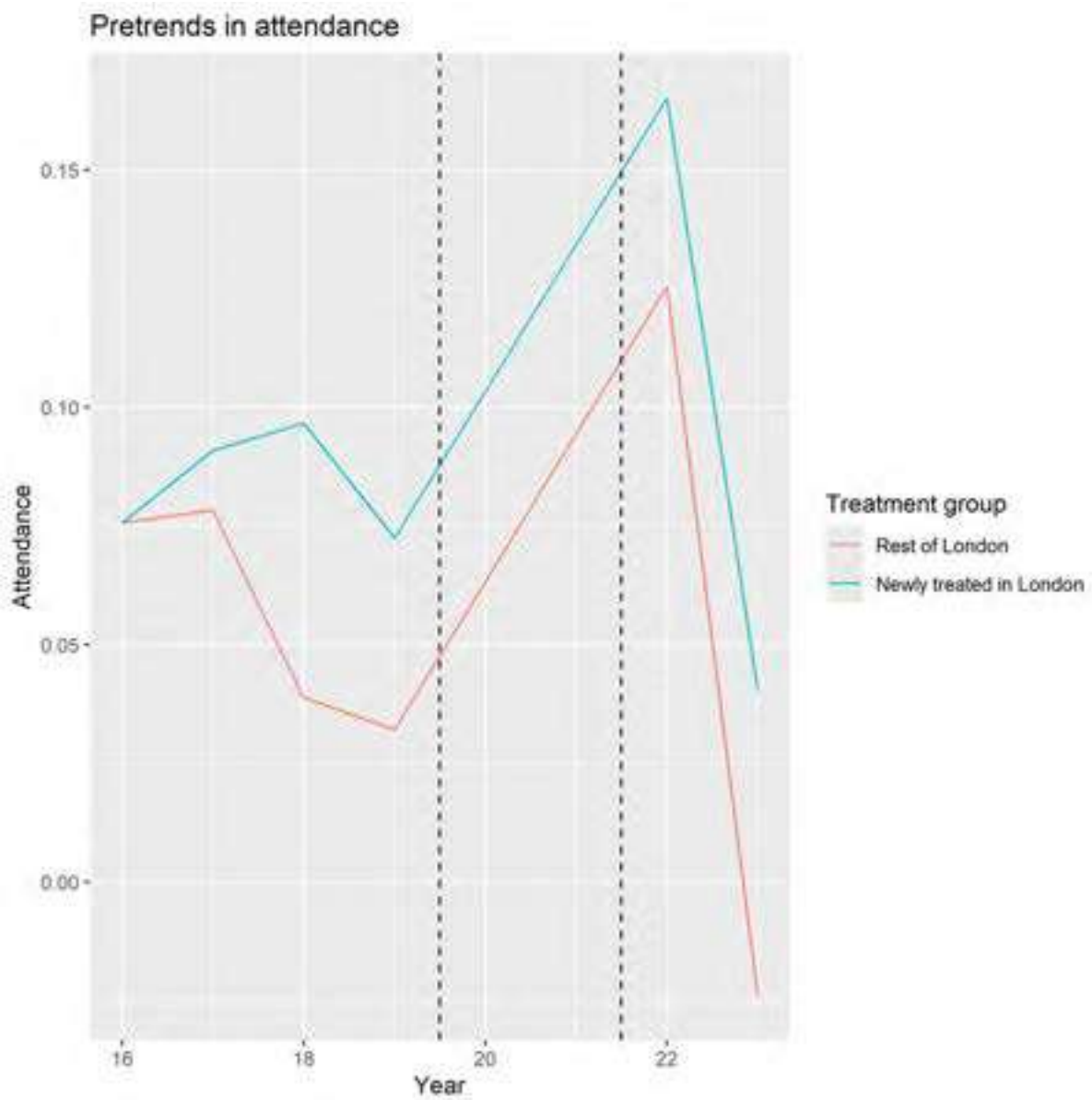
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 236 Counts.csv.

Figure 237. Conditional primary outcome pre-trends for difference-in-differences



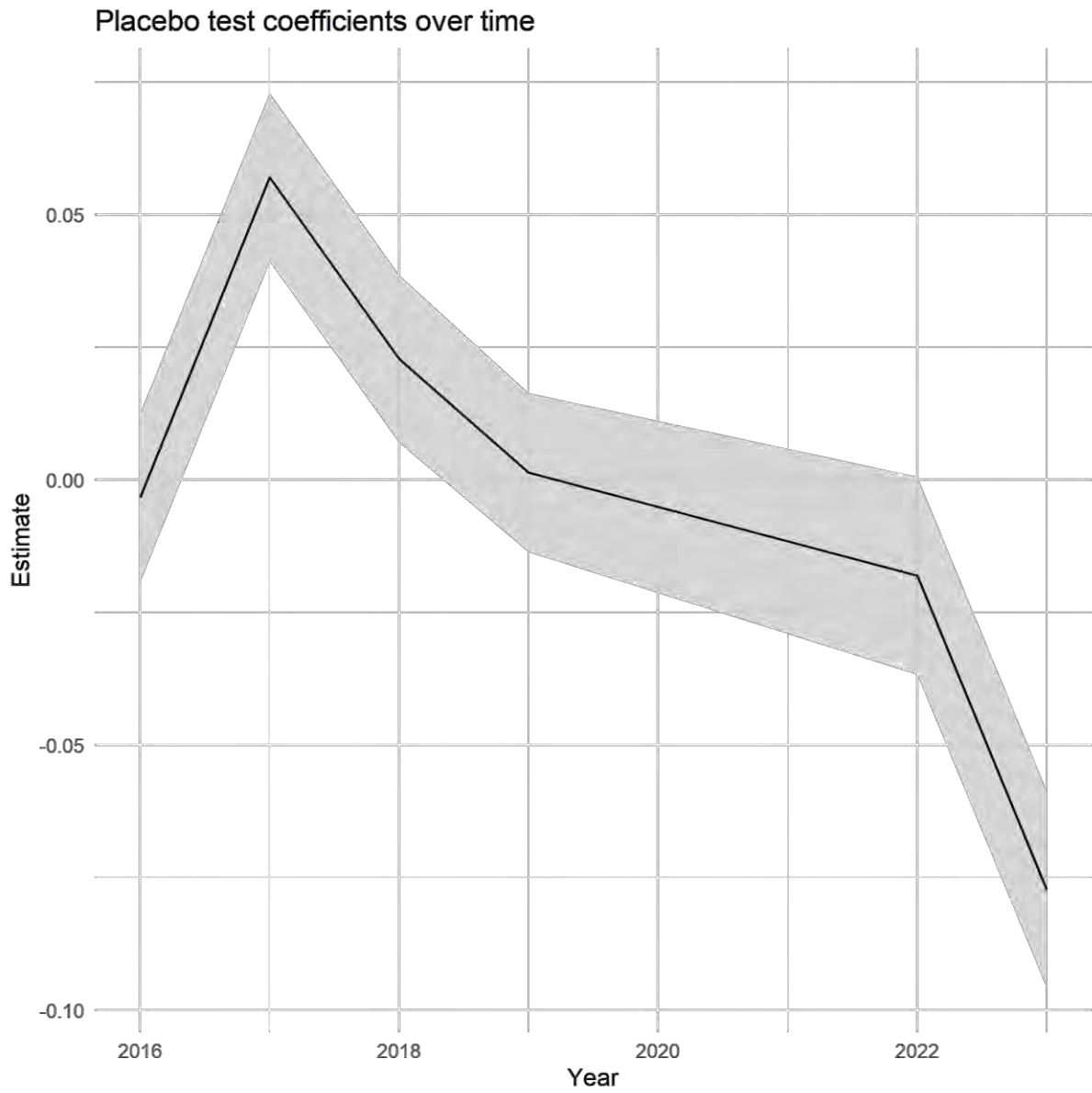
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 237 Model.docx.

Figure 238. Conditional secondary outcome pre-trends for difference-in-differences



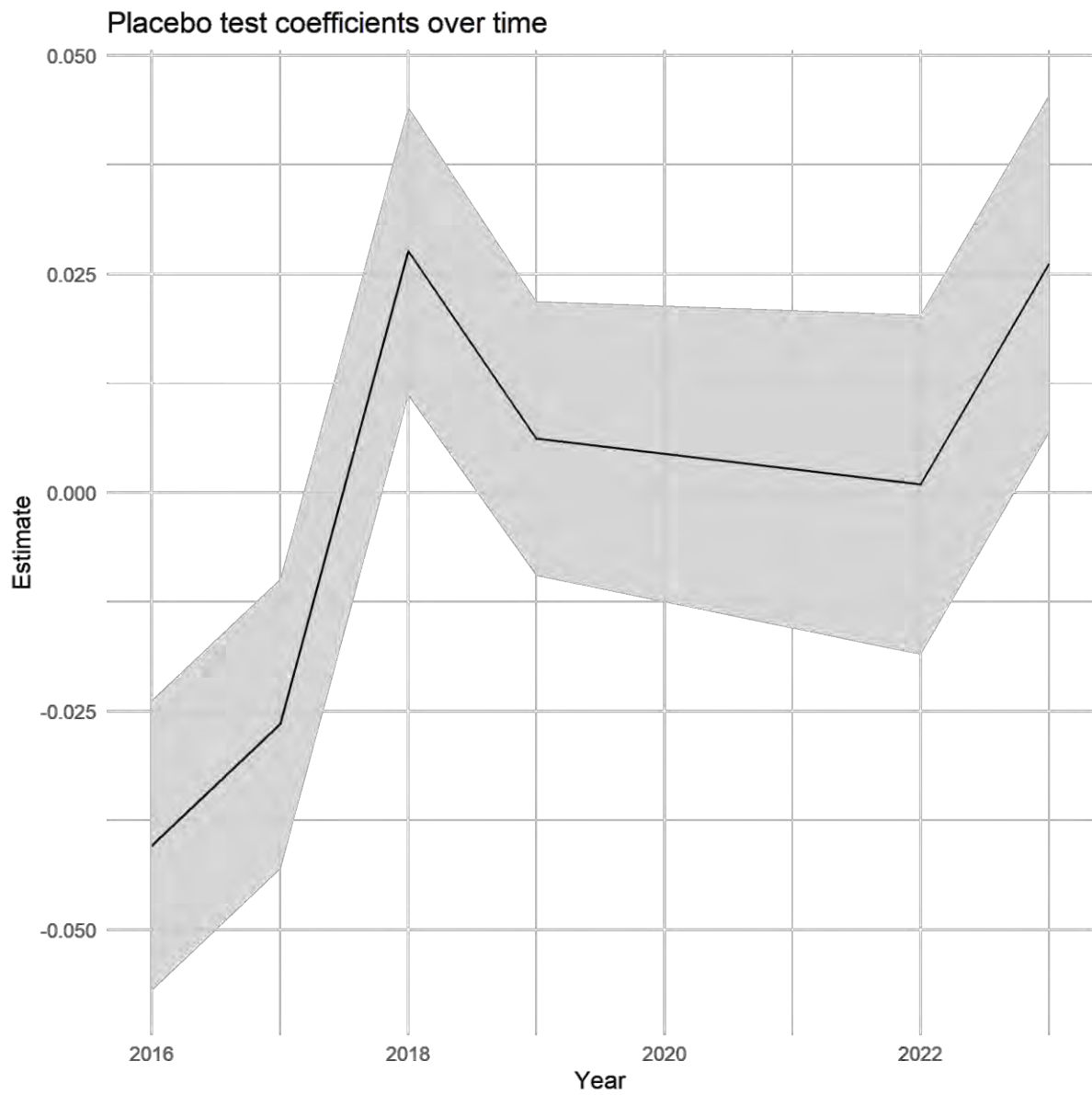
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 238 Model.docx

Figure 239. Placebo test estimates for primary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 239 Models.csv

Figure 240. Placebo test estimates for secondary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 240 Models.csv

## Appendix 26. Within-London analysis: IDAC12 sample

Table 98. Difference in differences estimates for primary outcome

---

Treatment estimate	0.006
	[-0.045, 0.057]
Num.Obs.	160877
R2	0.350
R2 Adj.	0.343
R2 Within	0.295
R2 Within Adj.	0.294
AIC	387750.2
BIC	404860.3
RMSE	0.80
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	160846

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

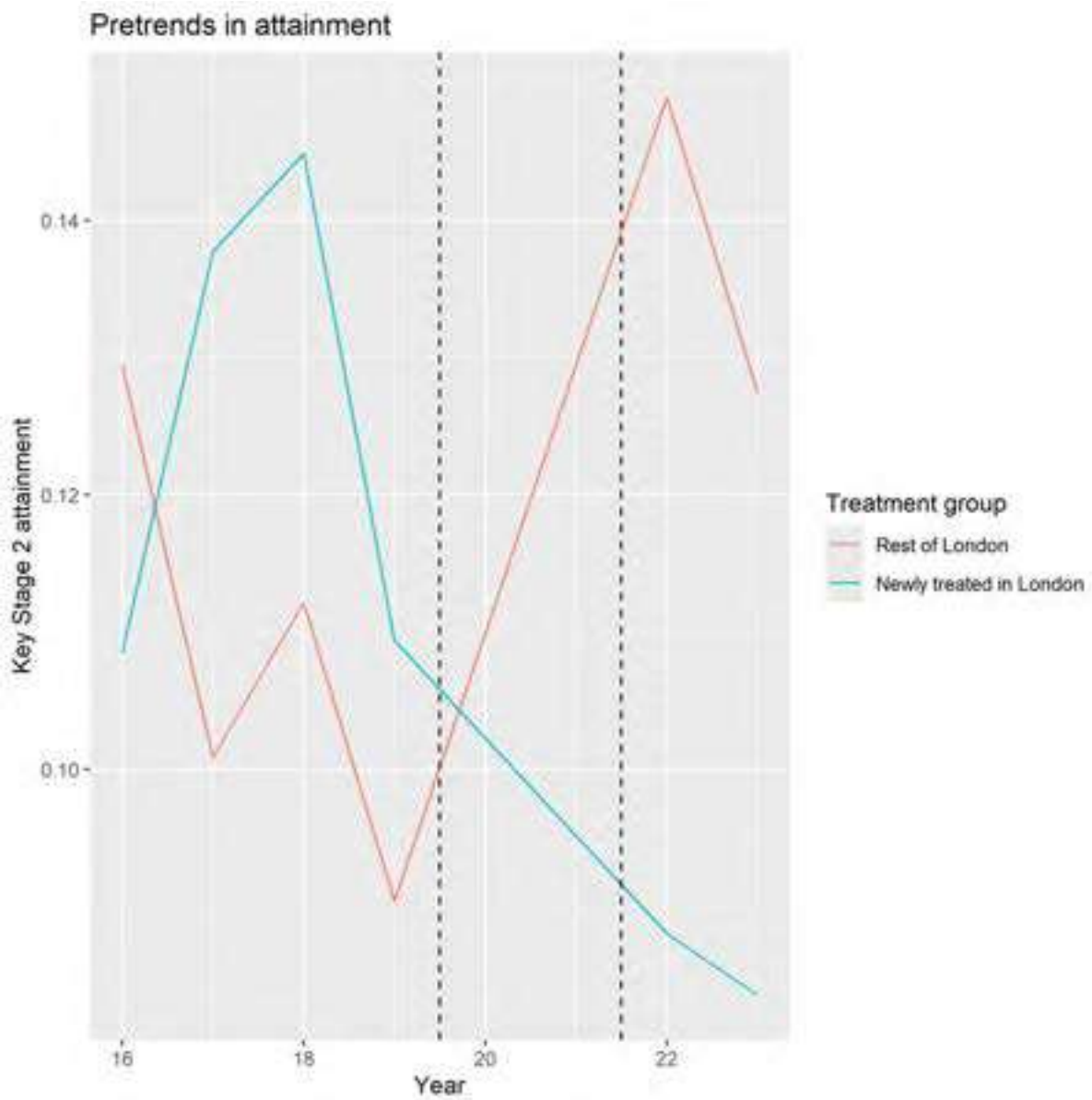
Table 99. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.025
	[-0.009, 0.058]
Num.Obs.	160623
R2	0.084
R2 Adj.	0.074
R2 Within	0.044
R2 Within Adj.	0.043
AIC	377745.7
BIC	394853.1
RMSE	0.78
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	160592

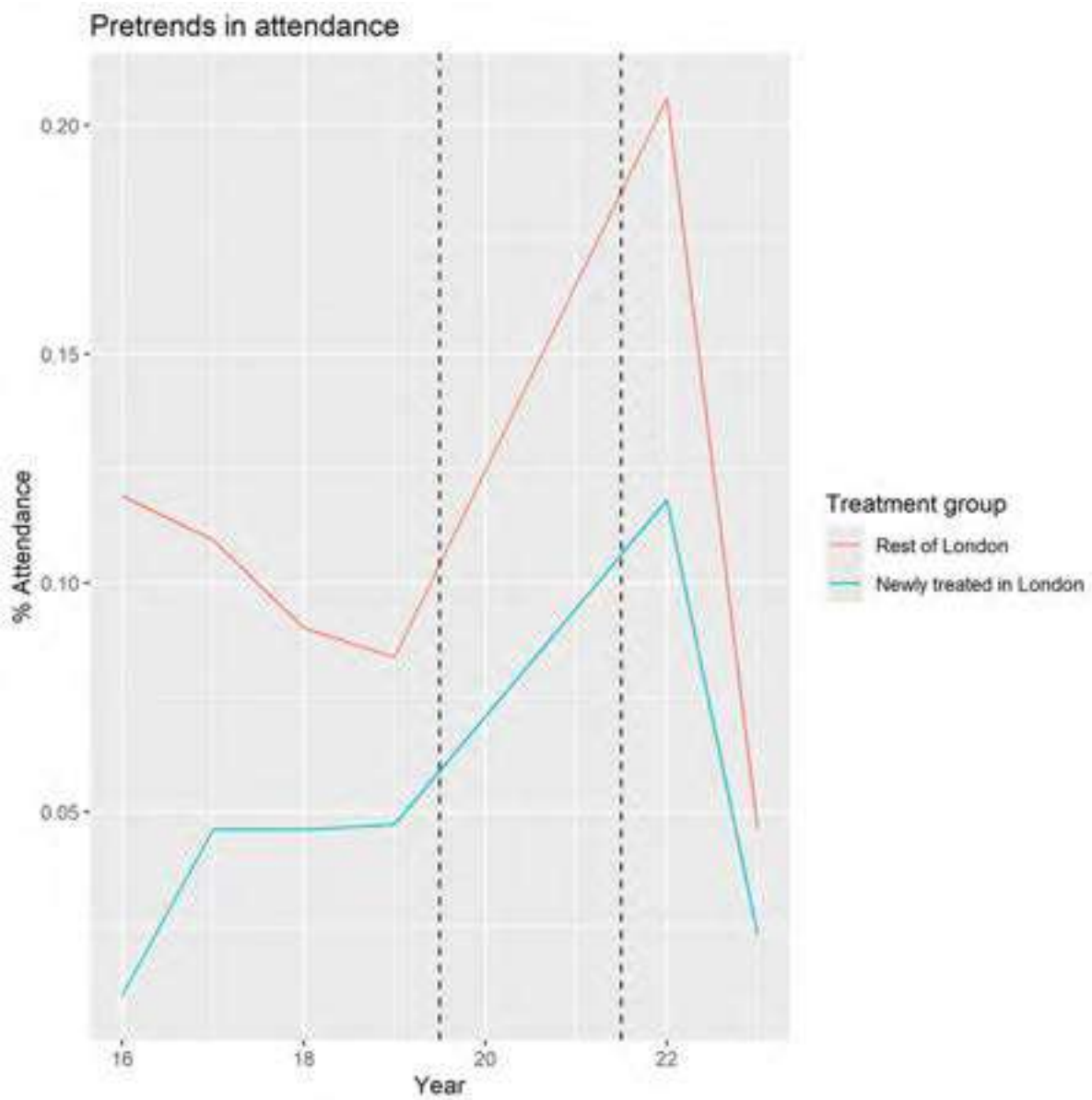
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 241. Raw pre-trends in primary outcome for difference-in-differences



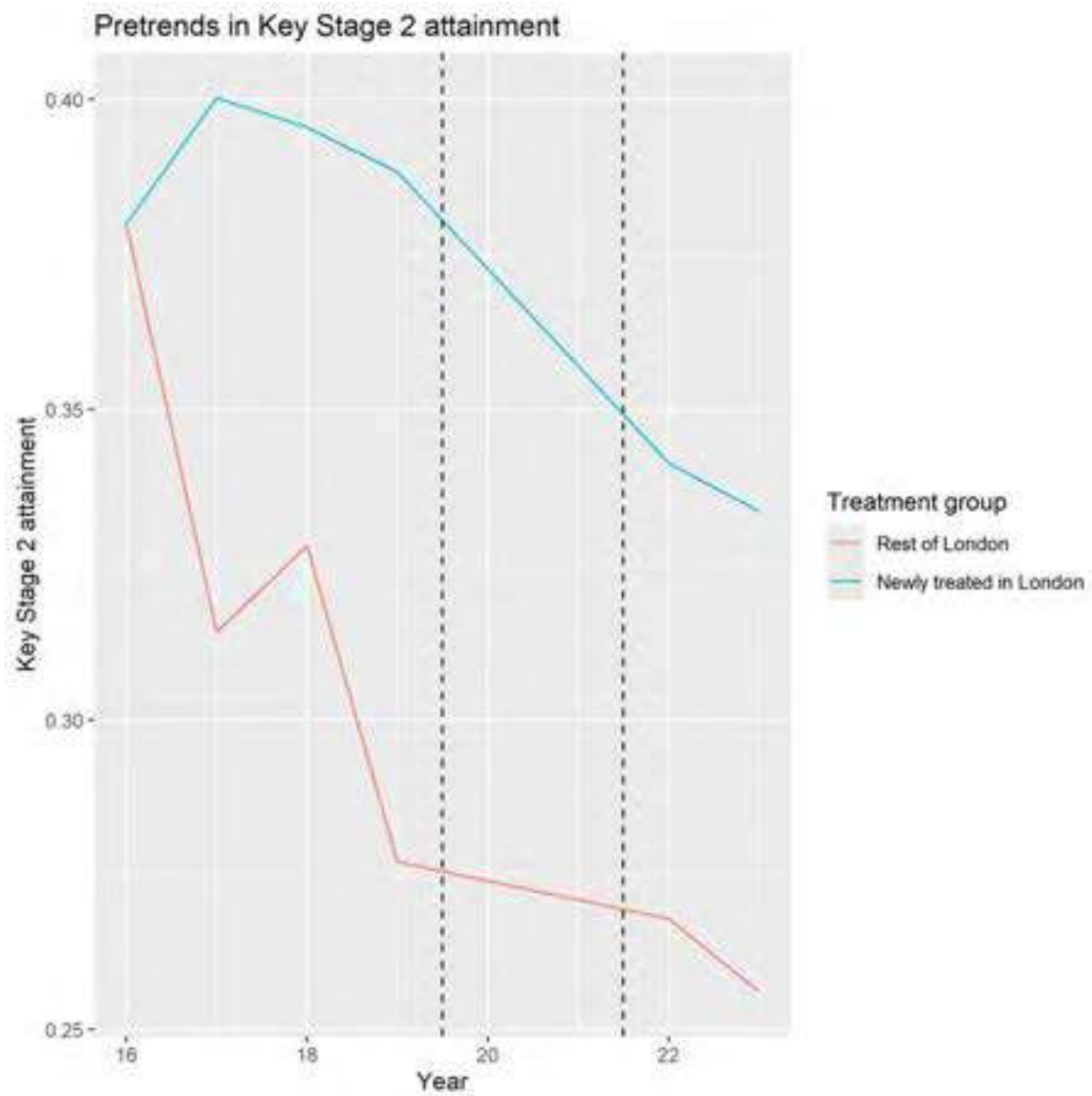
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 241 Counts.csv.

Figure 242. Raw pre-trends in secondary outcome for difference-in-differences



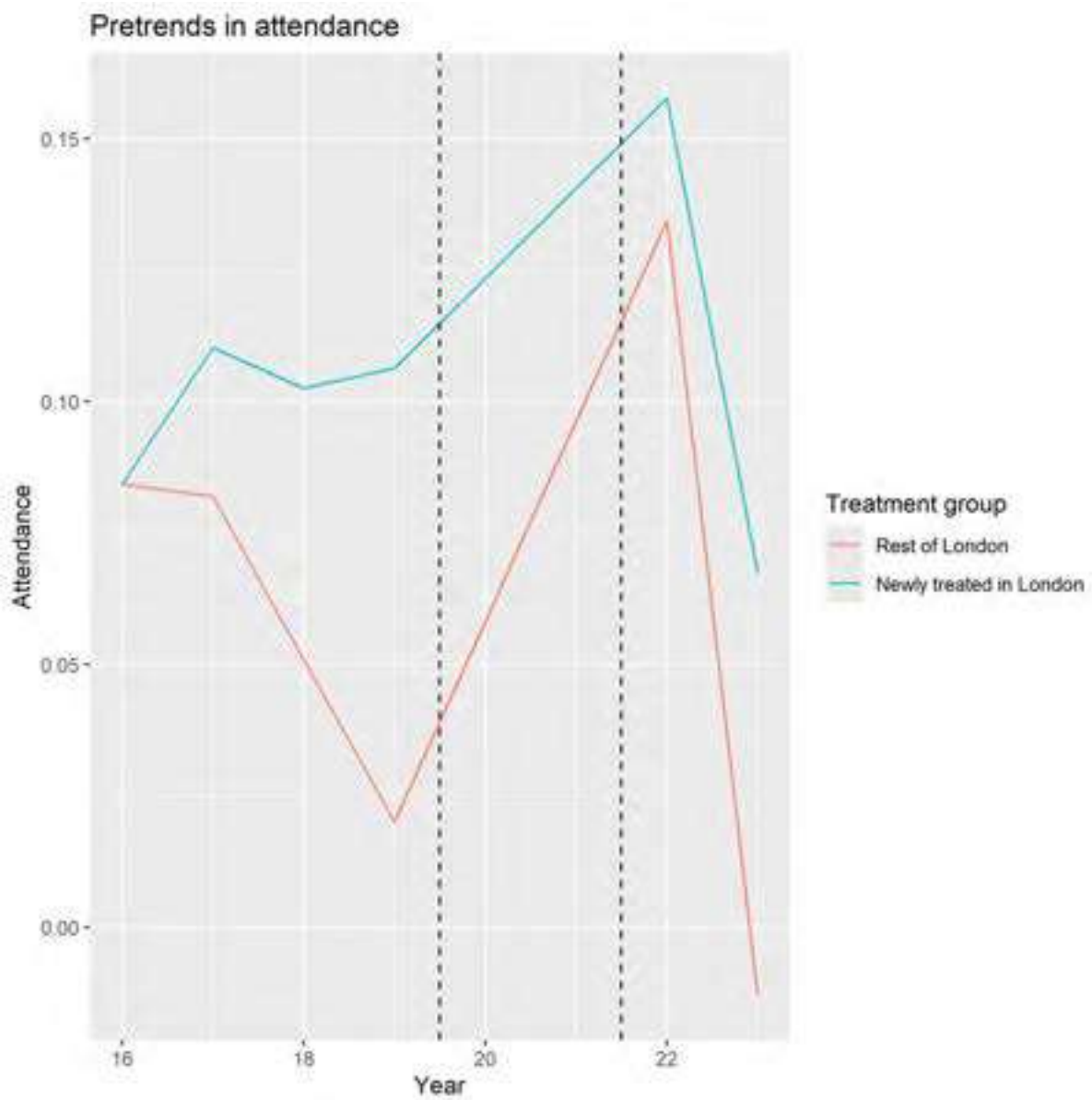
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 242 Counts.csv.

Figure 243. Conditional primary outcome pre-trends for difference-in-differences



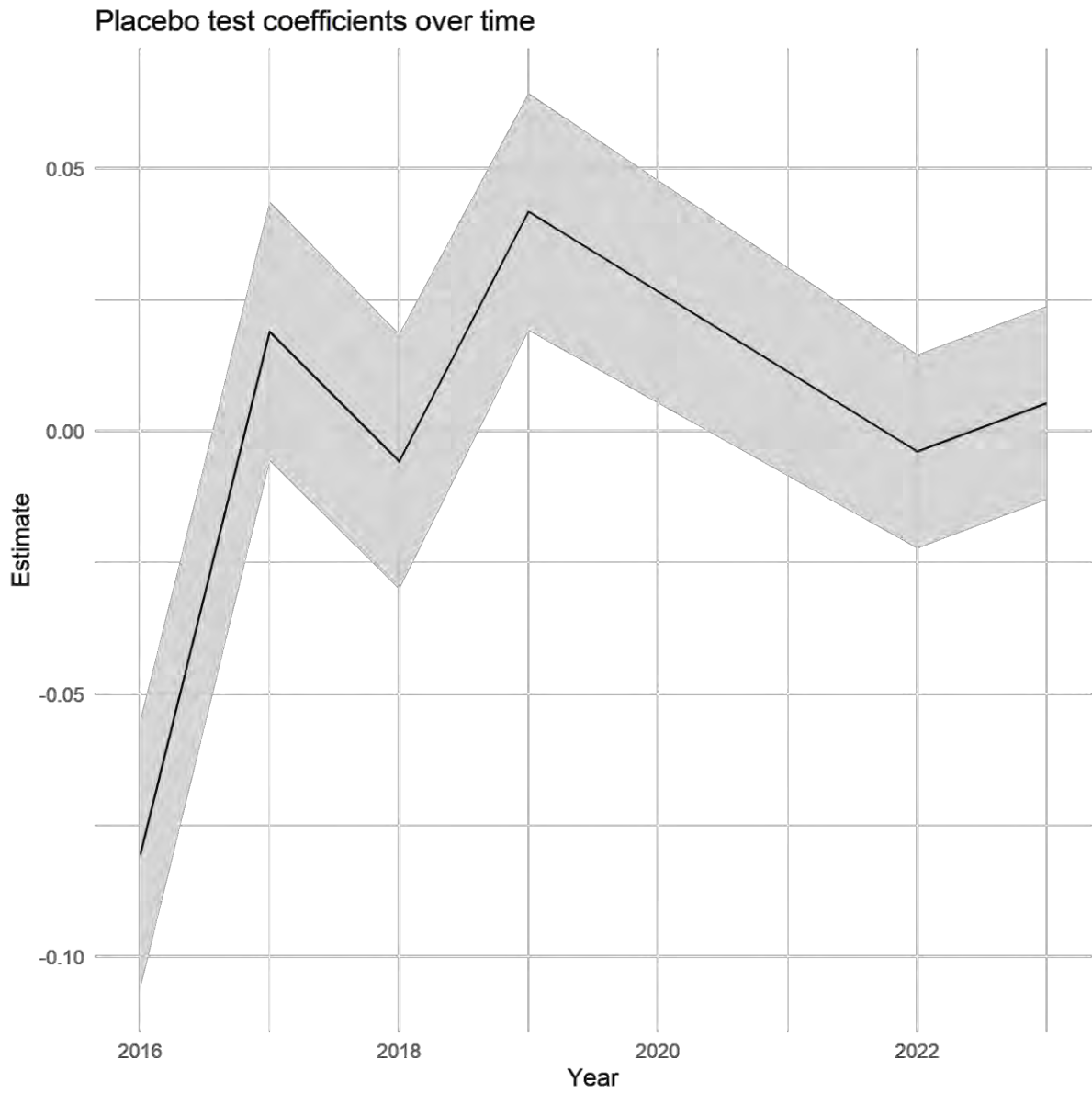
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 243 Model.docx.

Figure 244. Conditional secondary outcome pre-trends for difference-in-differences



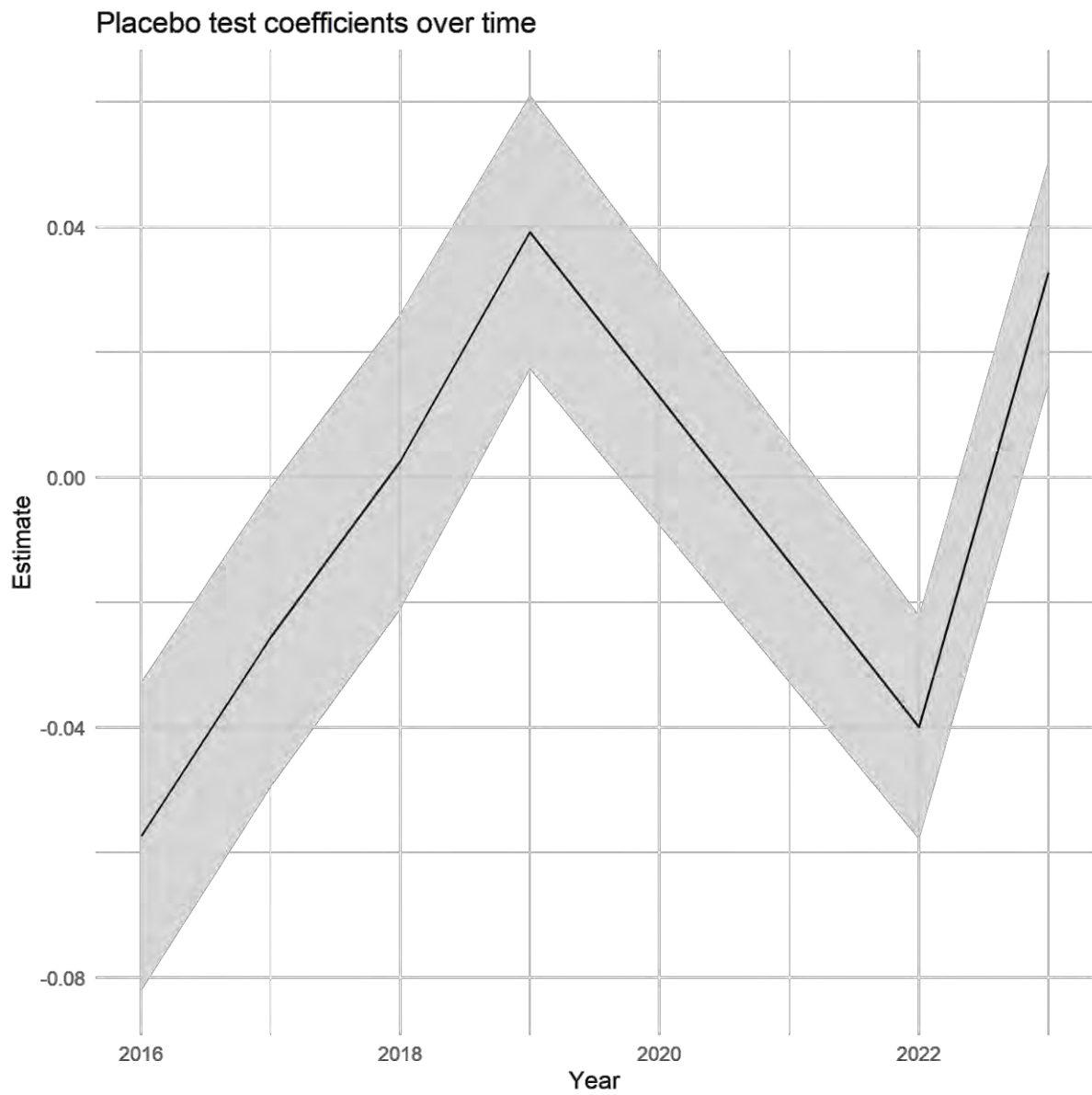
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 244 Model.docx

Figure 245. Placebo test estimates for primary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 245 Models.csv

Figure 246. Placebo test estimates for secondary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 246 Models.csv

## Appendix 27. Within-London analysis: IDAC13 sample

Table 100. Difference in differences estimates for primary outcome

---

Treatment estimate	-0.040 [-0.152, 0.072]
Num.Obs.	127770
R2	0.345
R2 Adj.	0.336
R2 Within	0.287
R2 Within Adj.	0.287
AIC	305716.4
BIC	322353.8
RMSE	0.79
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	127738

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

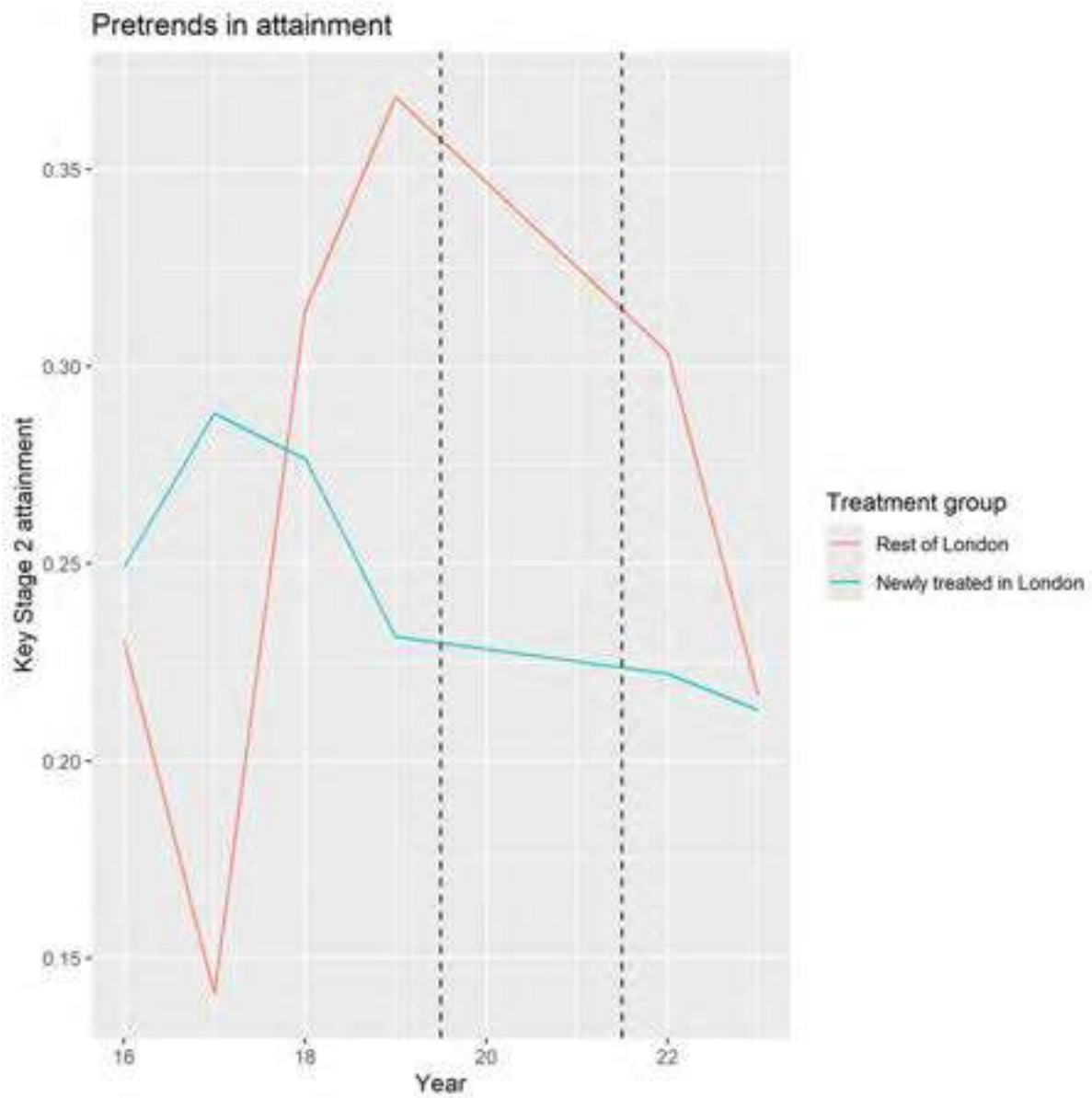
Table 101. Difference in differences estimates for secondary outcome

---

Treatment estimate	0.086 [-0.018, 0.190]
Num.Obs.	127577
R2	0.059
R2 Adj.	0.046
R2 Within	0.023
R2 Within Adj.	0.023
AIC	286792.2
BIC	303427.0
RMSE	0.73
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	127545

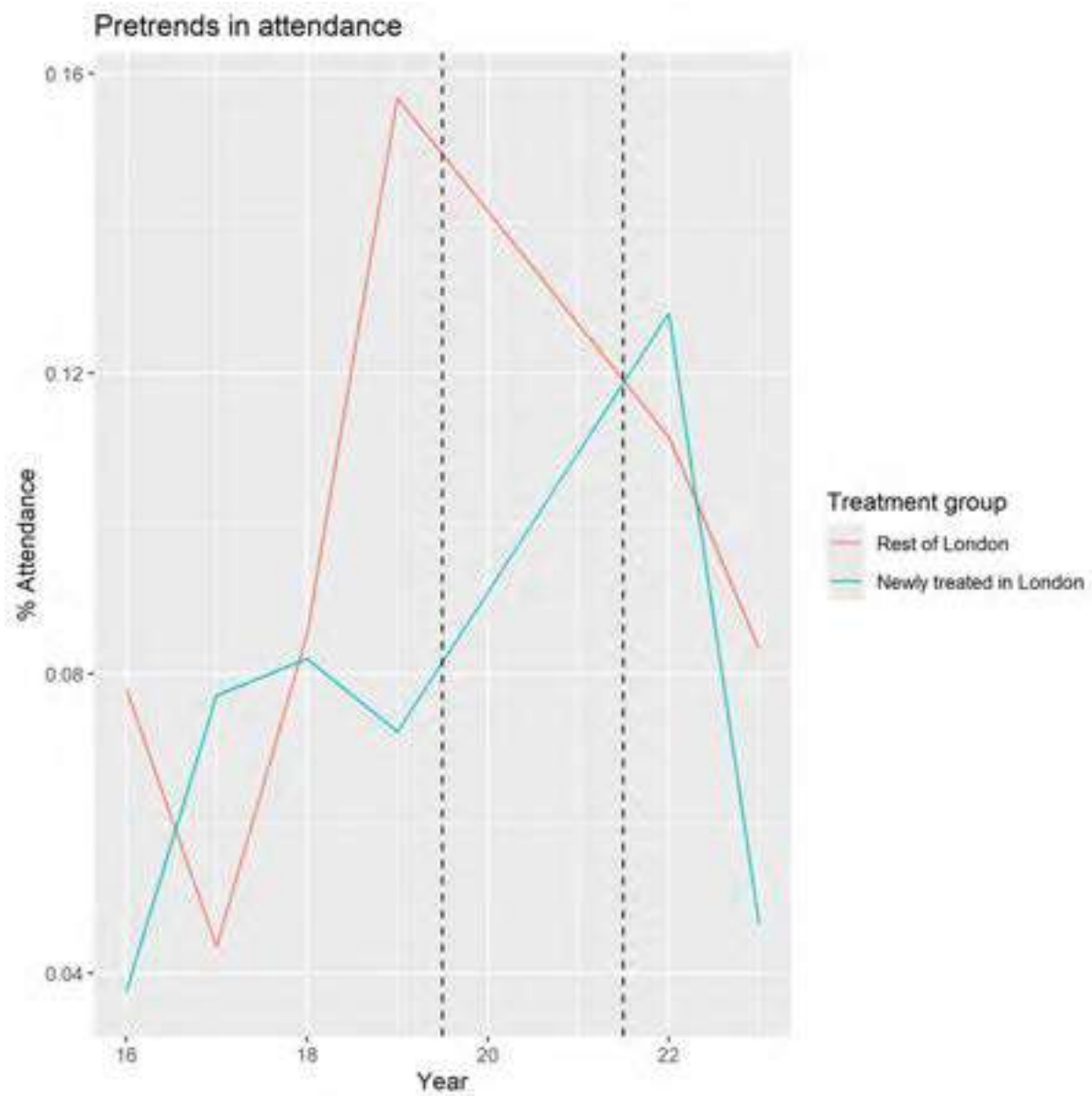
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 247. Raw pre-trends in primary outcome for difference-in-differences



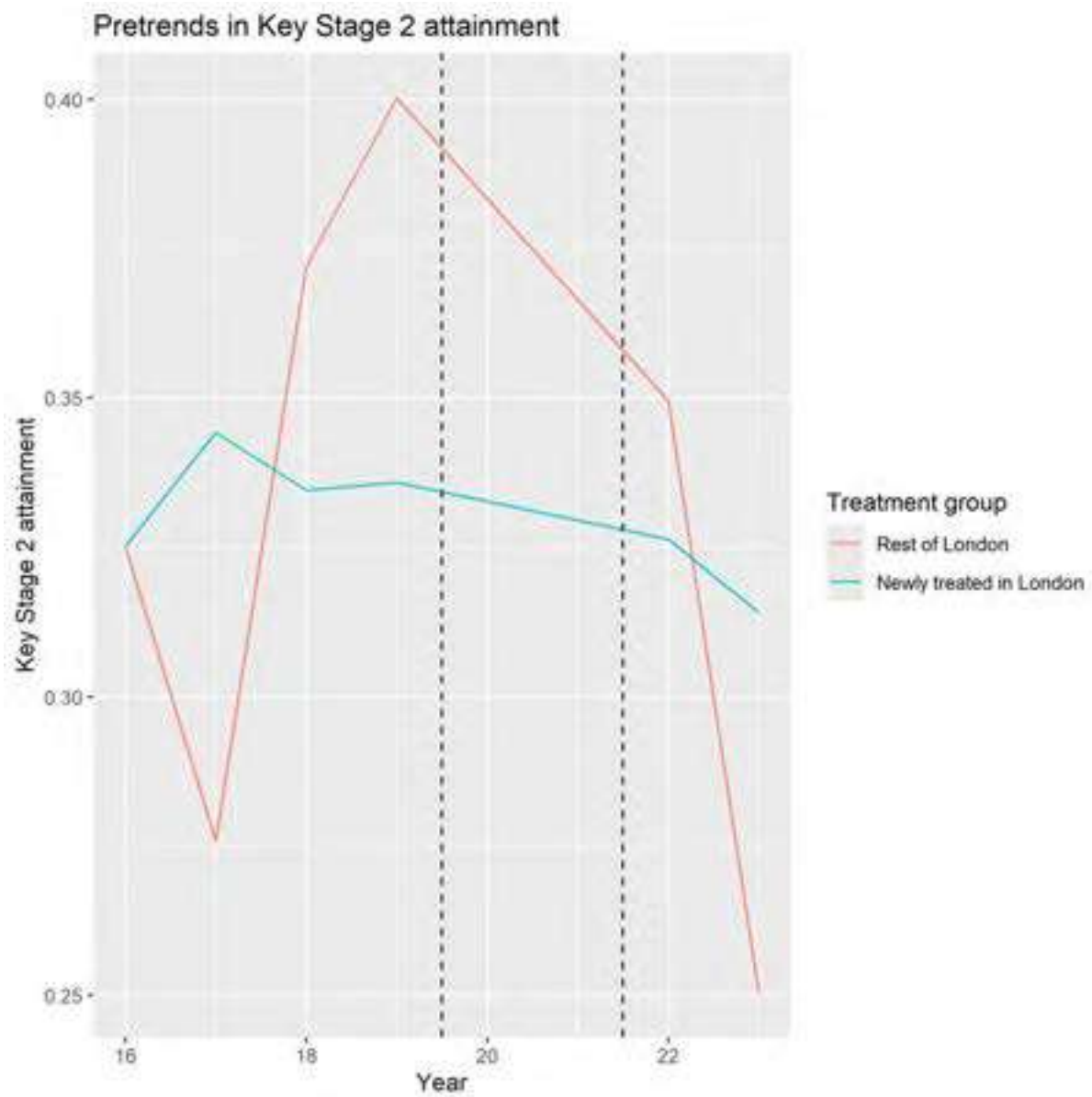
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 247 Counts.csv.

Figure 248. Raw pre-trends in secondary outcome for difference-in-differences



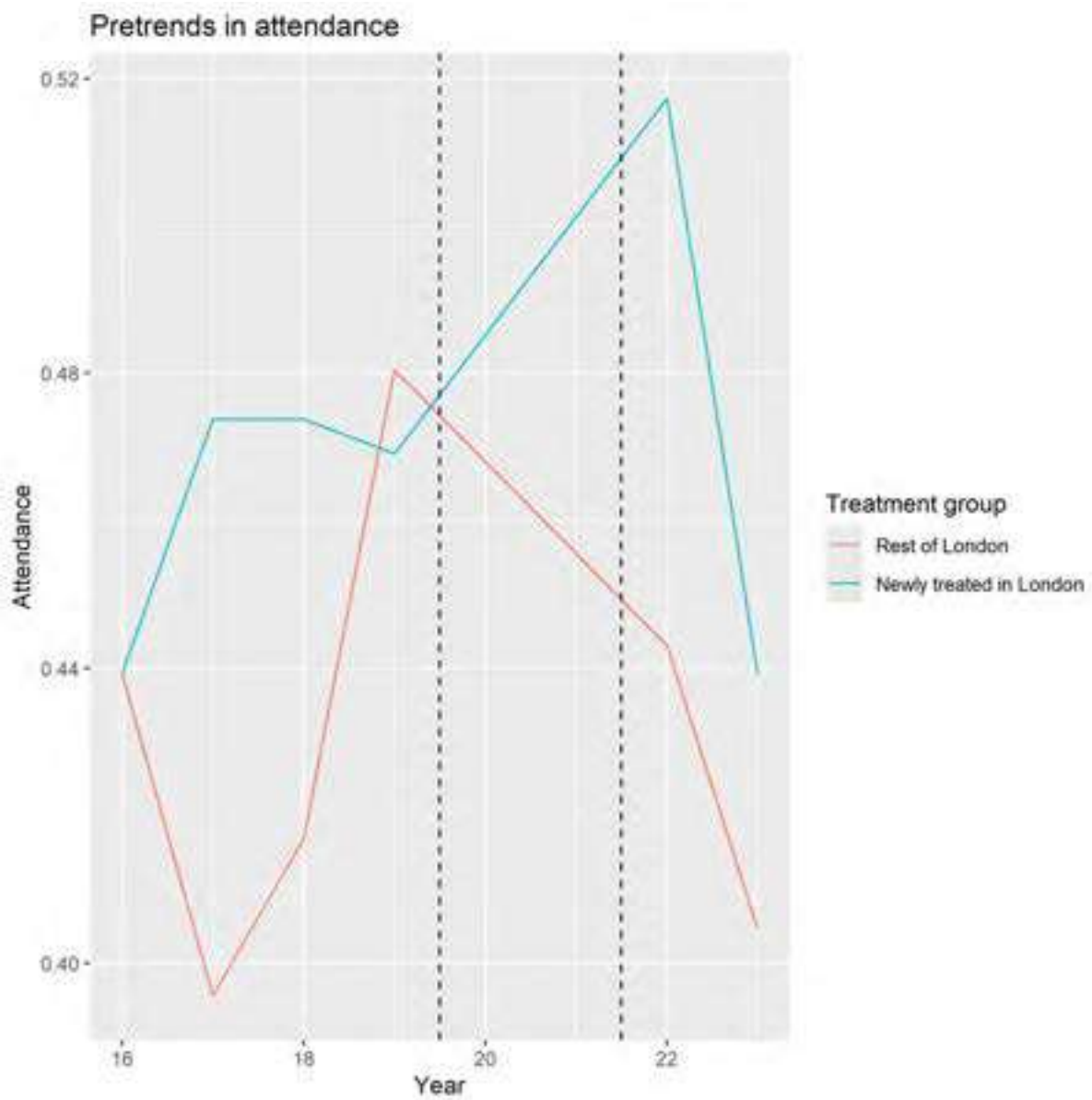
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 248 Counts.csv.

Figure 249. Conditional primary outcome pre-trends for difference-in-differences



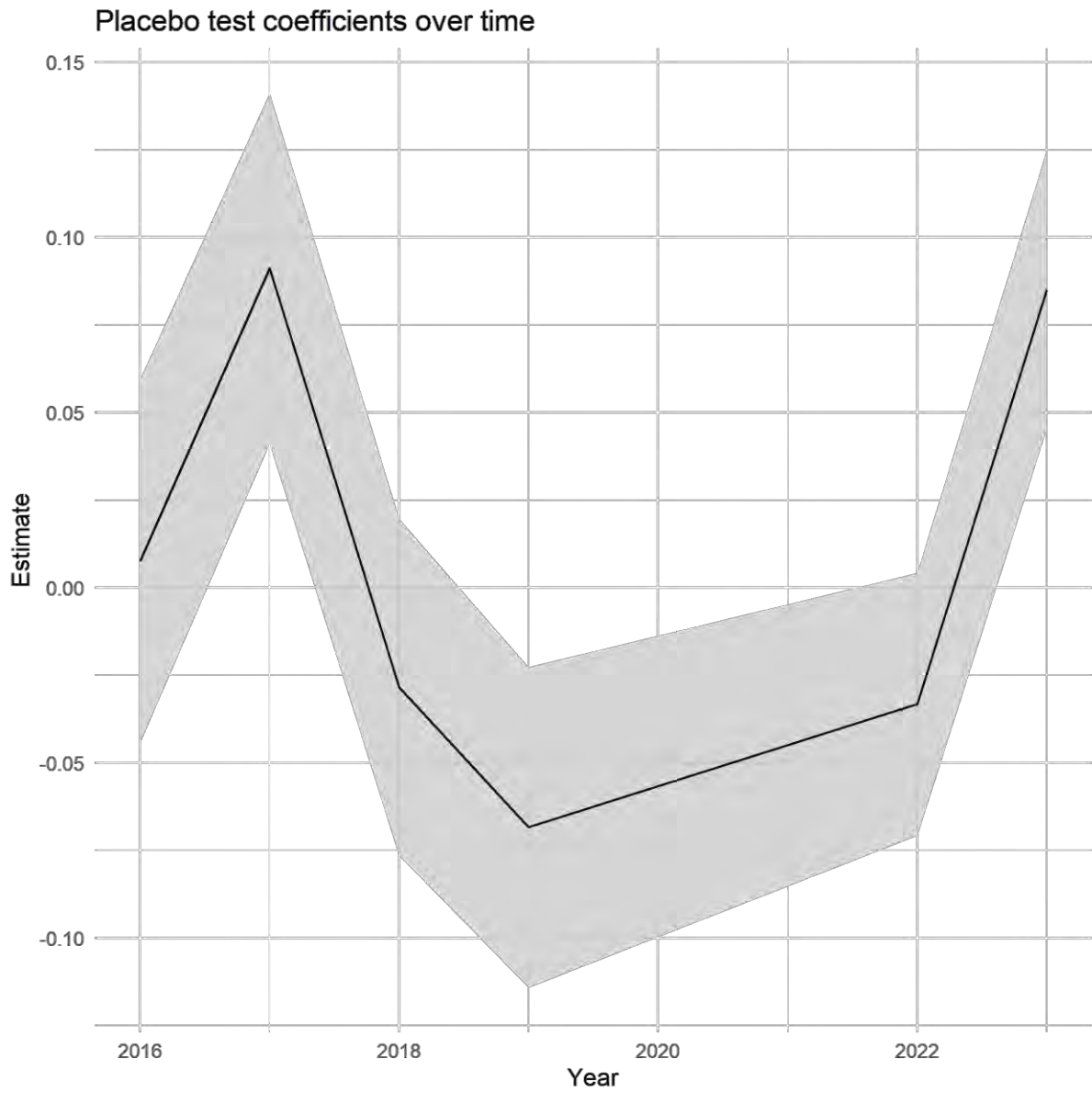
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 249 Model.docx.

Figure 250. Conditional secondary outcome pre-trends for difference-in-differences



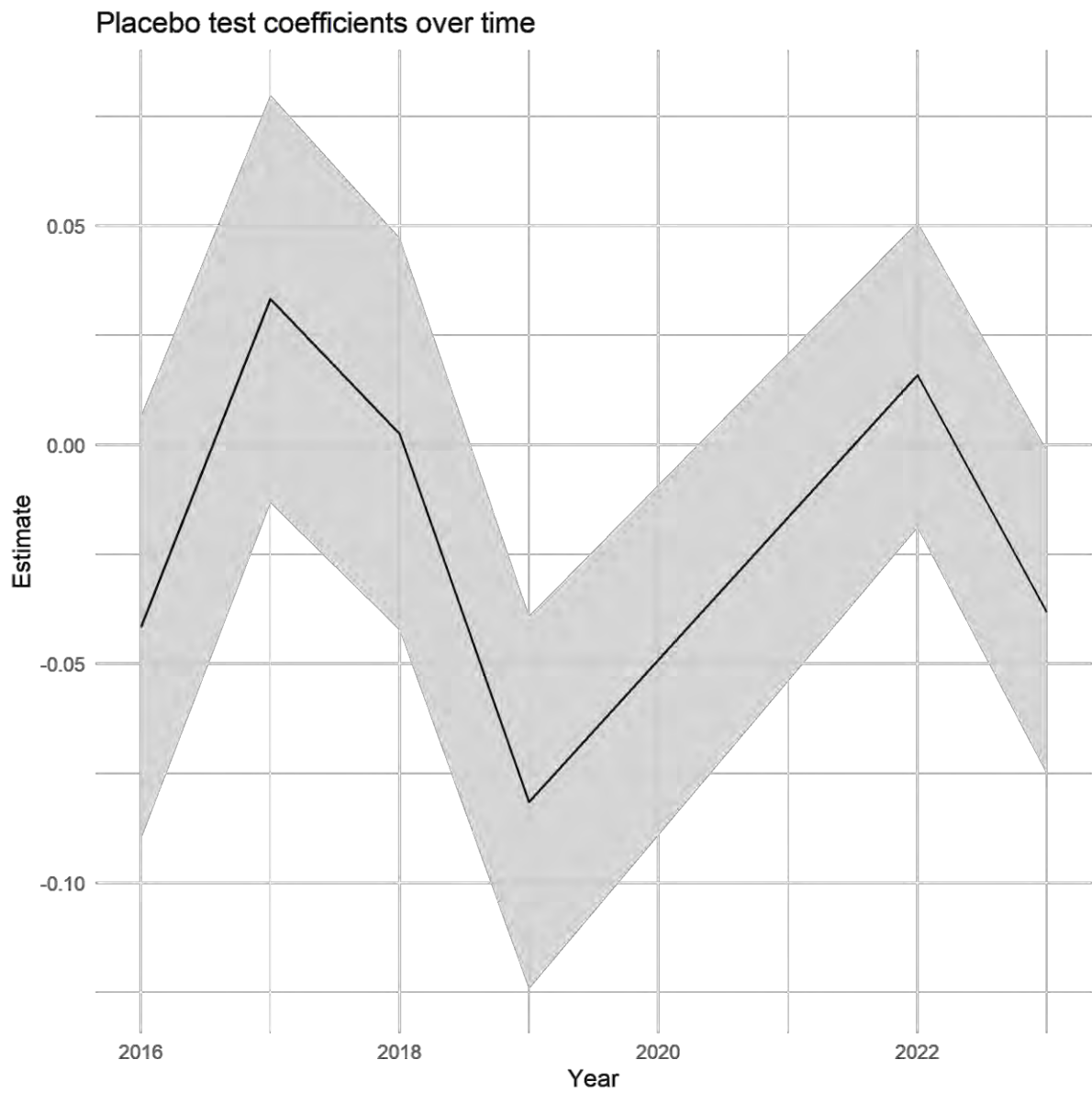
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 250 Model.docx

Figure 251. Placebo test estimates for primary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 251 Models.csv

Figure 252. Placebo test estimates for secondary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 252 Models.csv

## Appendix 28. Within-London analysis: IDAC14 sample

Table 102. Difference in differences estimates for primary outcome

---

Treatment estimate	-0.029 [-0.151, 0.092]
Num.Obs.	85916
R2	0.339
R2 Adj.	0.326
R2 Within	0.276
R2 Within Adj.	0.276
AIC	203489.9
BIC	218767.3
RMSE	0.78
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	85885

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

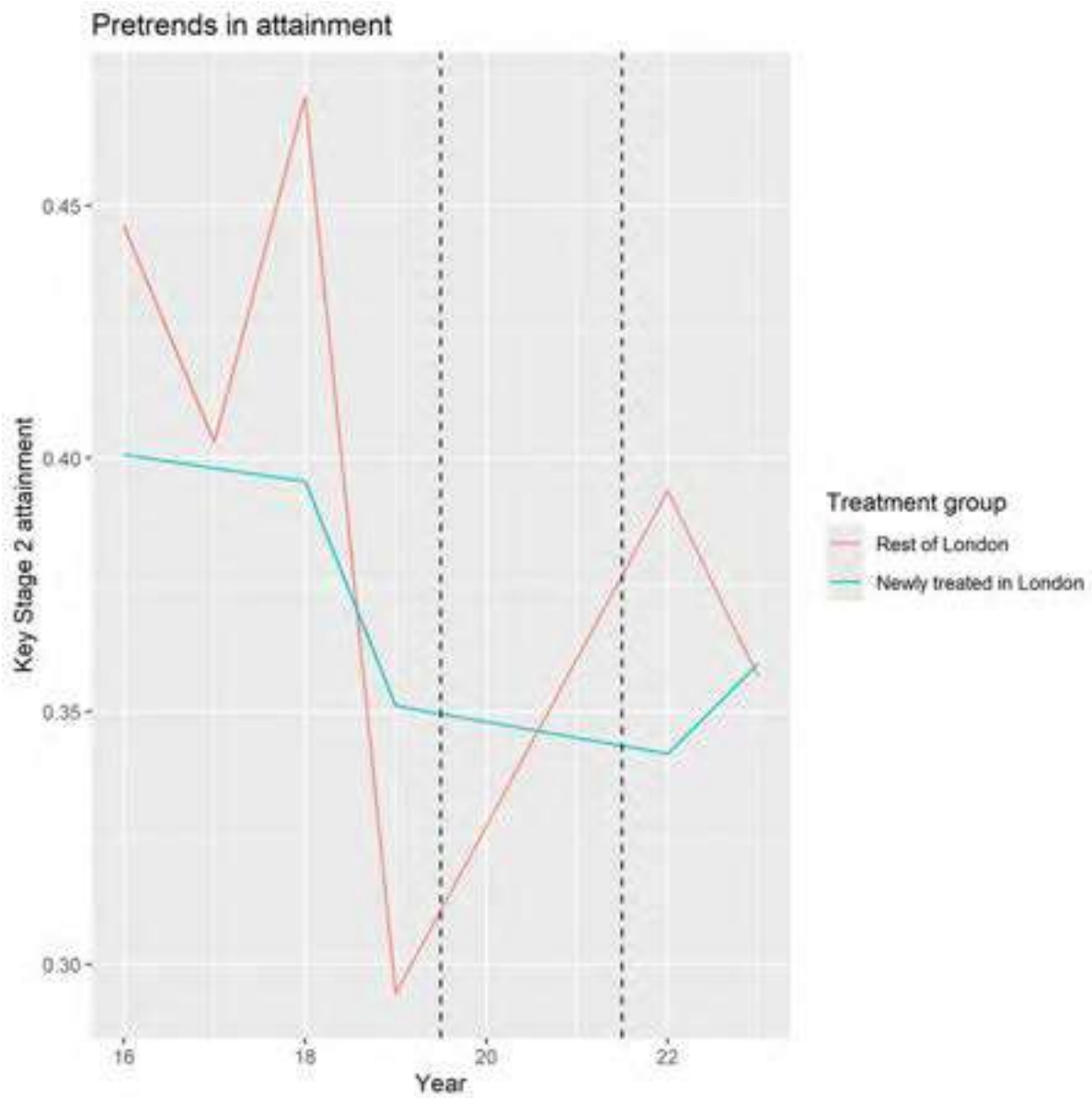
Table 103. Difference in differences estimates for secondary outcome

---

Treatment estimate	-0.041 [-0.129, 0.046]
Num.Obs.	85792
R2	0.062
R2 Adj.	0.044
R2 Within	0.019
R2 Within Adj.	0.019
AIC	175340.1
BIC	190615.1
RMSE	0.66
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	85761

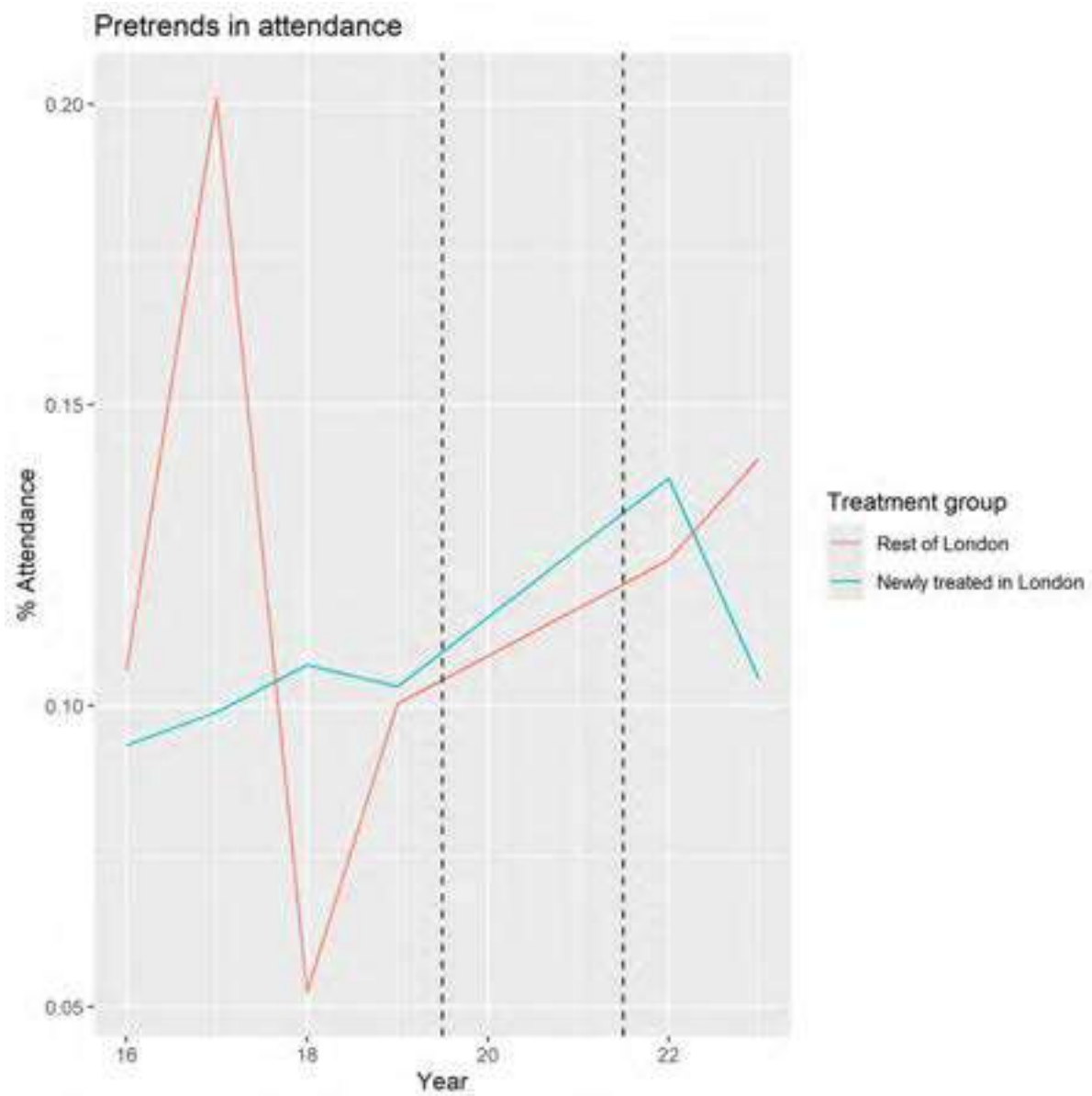
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 253. Raw pre-trends in primary outcome for difference-in-differences



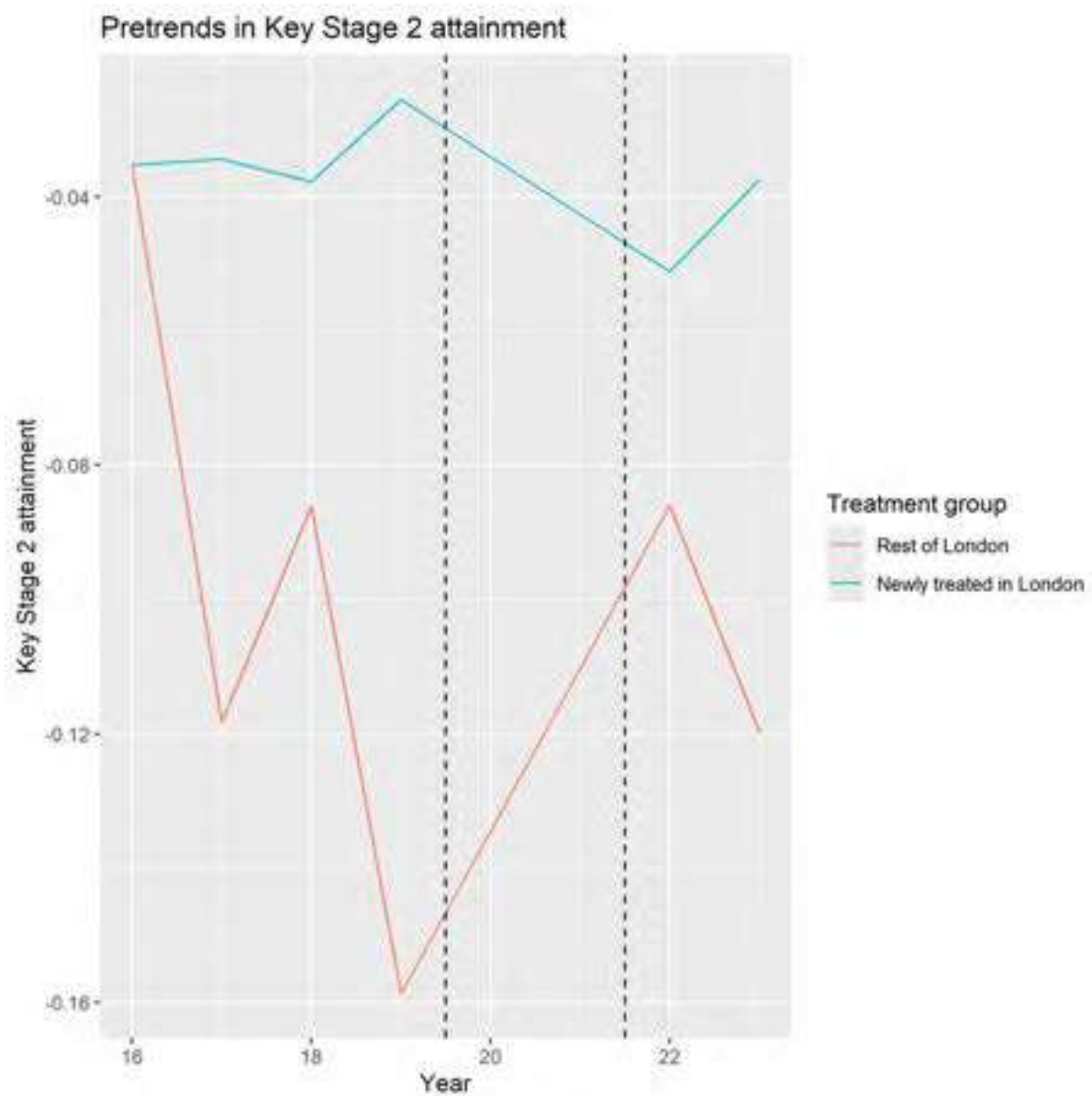
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 253 Counts.csv.

Figure 254. Raw pre-trends in secondary outcome for difference-in-differences



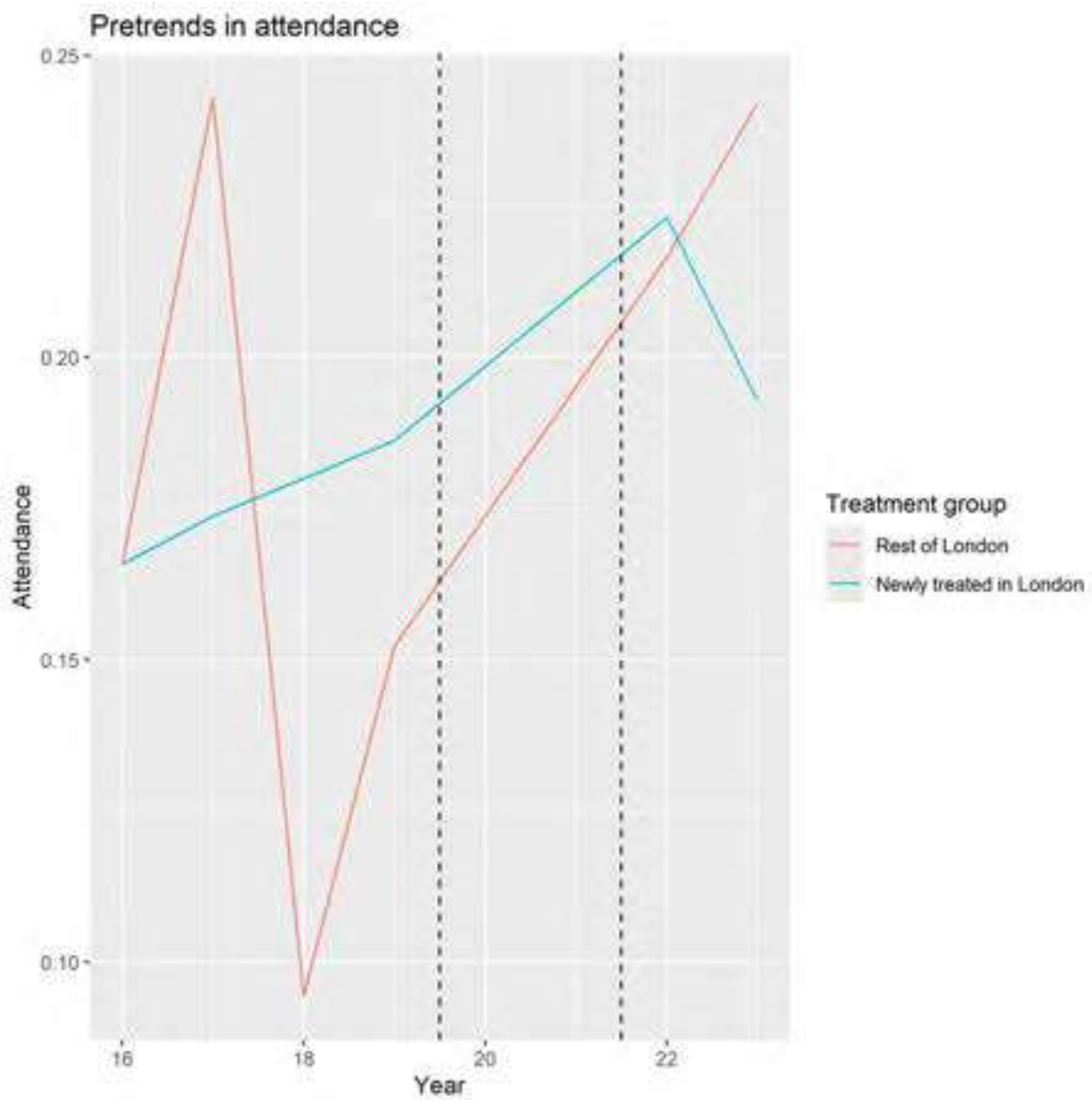
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 254 Counts.csv.

Figure 255. Conditional primary outcome pre-trends for difference-in-differences



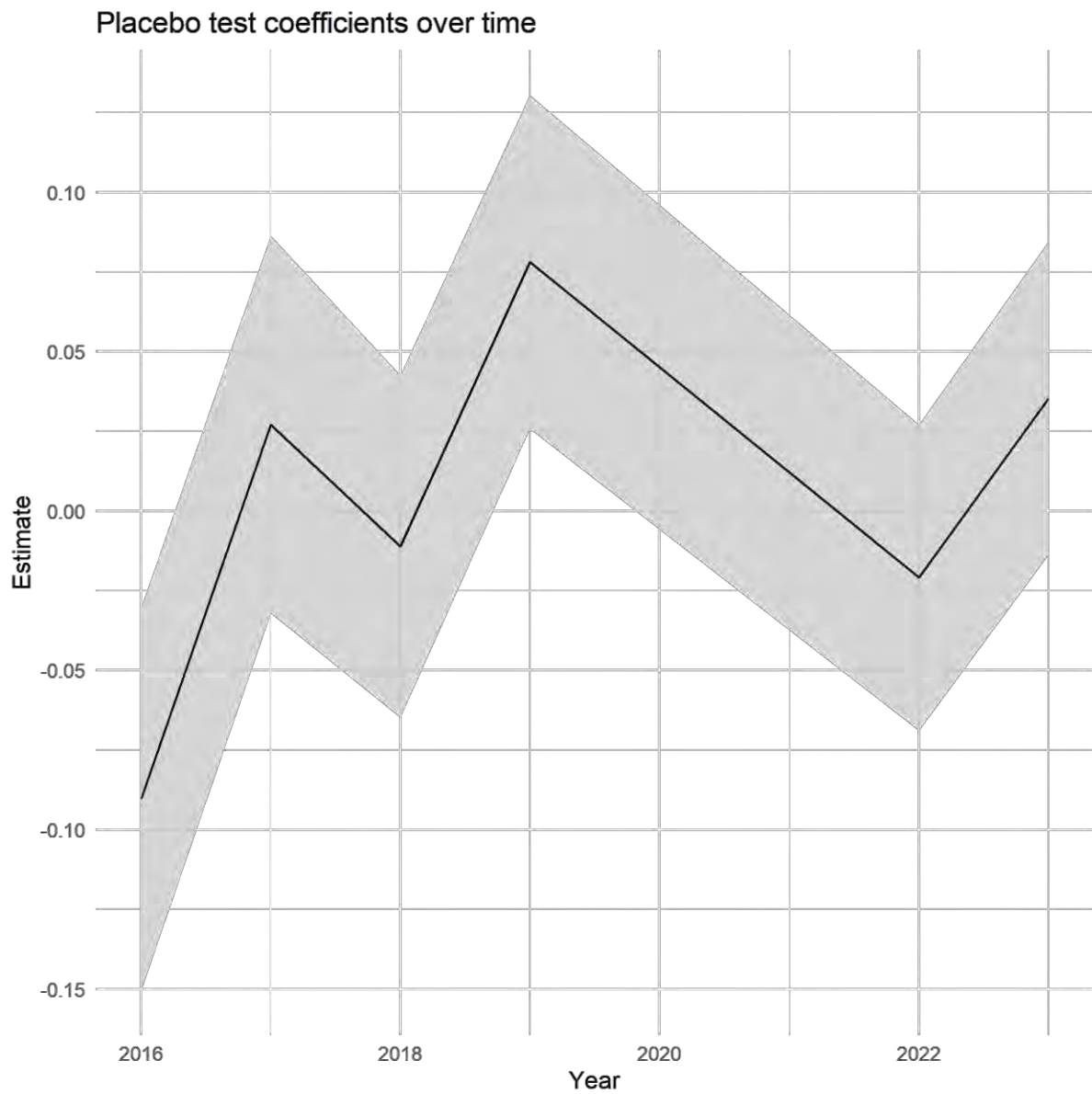
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 255 Model.docx.

Figure 256. Conditional secondary outcome pre-trends for difference-in-differences



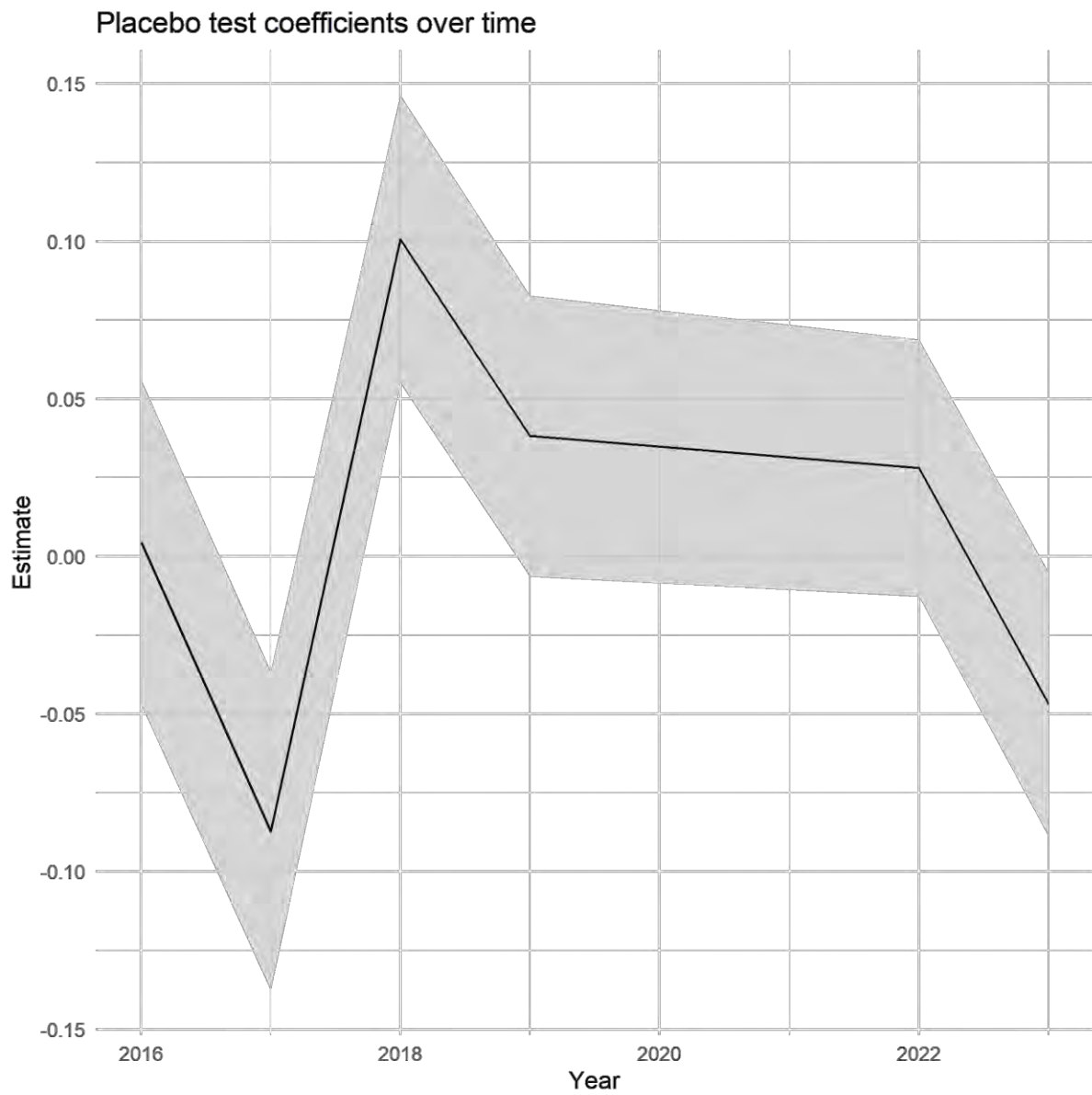
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 256 Model.docx

Figure 257. Placebo test estimates for primary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 257 Models.csv

Figure 258. Placebo test estimates for secondary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 258 Models.csv

## Appendix 29. Within-London analysis: IDAC15 sample

Table 104. Difference in differences estimates for primary outcome

---

Treatment estimate	-0.011 [-0.206, 0.184]
Num.Obs.	58142
R2	0.332
R2 Adj.	0.316
R2 Within	0.264
R2 Within Adj.	0.264
AIC	132685.9
BIC	144607.9
RMSE	0.74
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	58110

Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

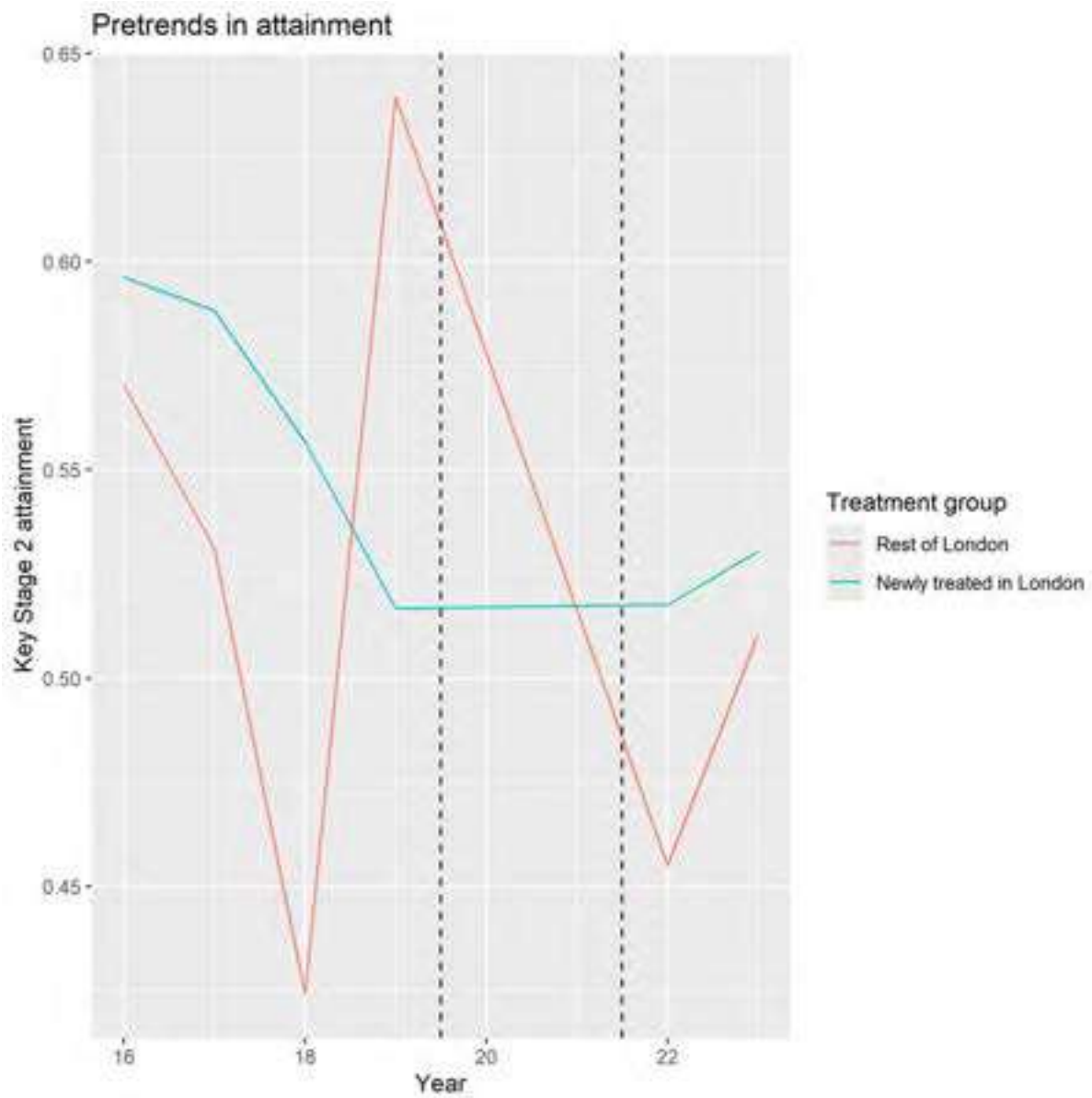
Table 105. Difference in differences estimates for secondary outcome

---

Treatment estimate	-0.098 [-0.239, 0.042]
Num.Obs.	58060
R2	0.079
R2 Adj.	0.058
R2 Within	0.017
R2 Within Adj.	0.016
AIC	111458.3
BIC	123378.4
RMSE	0.62
Std.Errors	by: schoolid
FE: schoolid	X
Residual.DoF	58028

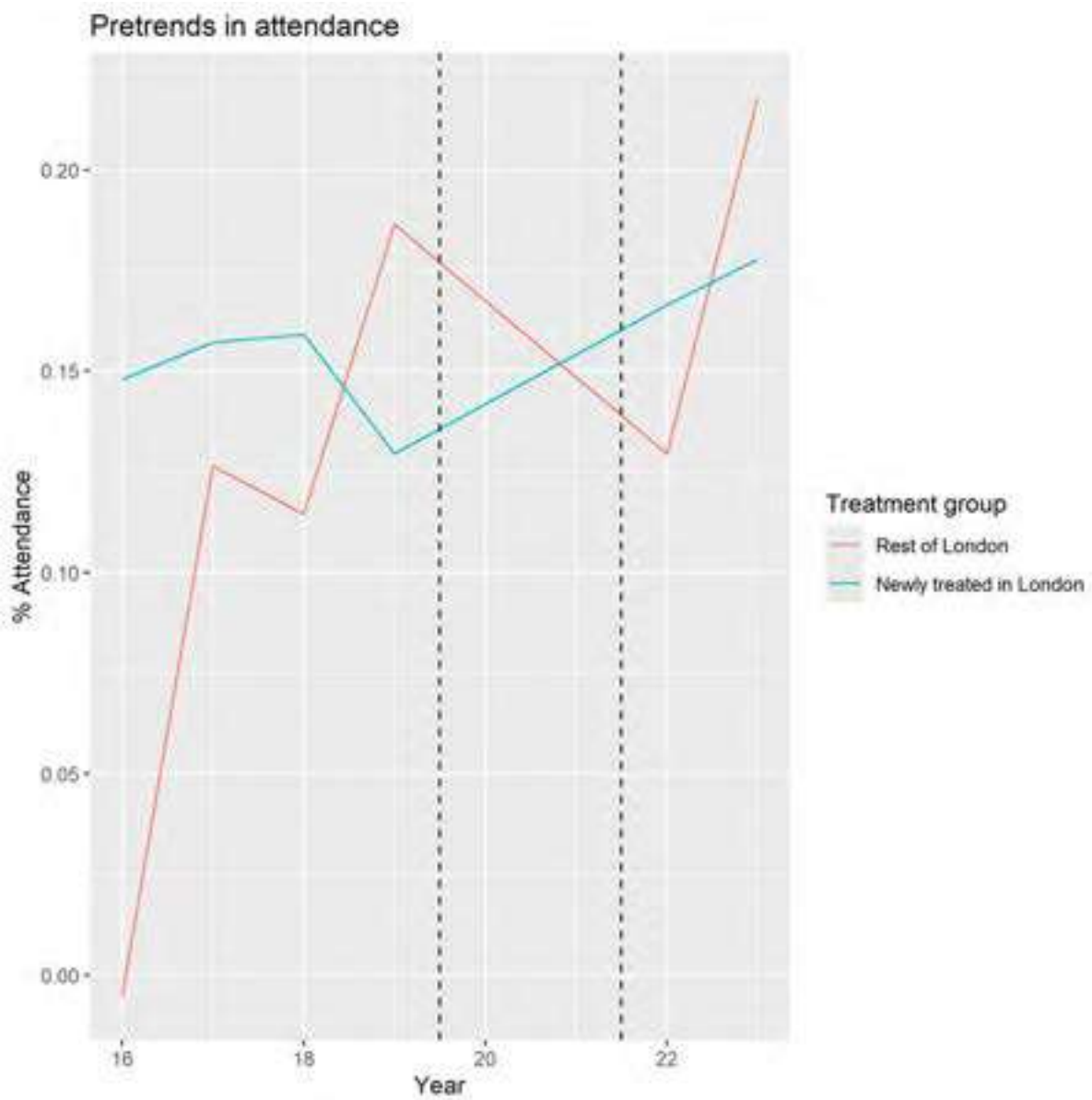
Notes. Estimates obtained from linear regression model with confidence intervals constructed from standard errors clustered by schools.

Figure 259. Raw pre-trends in primary outcome for difference-in-differences



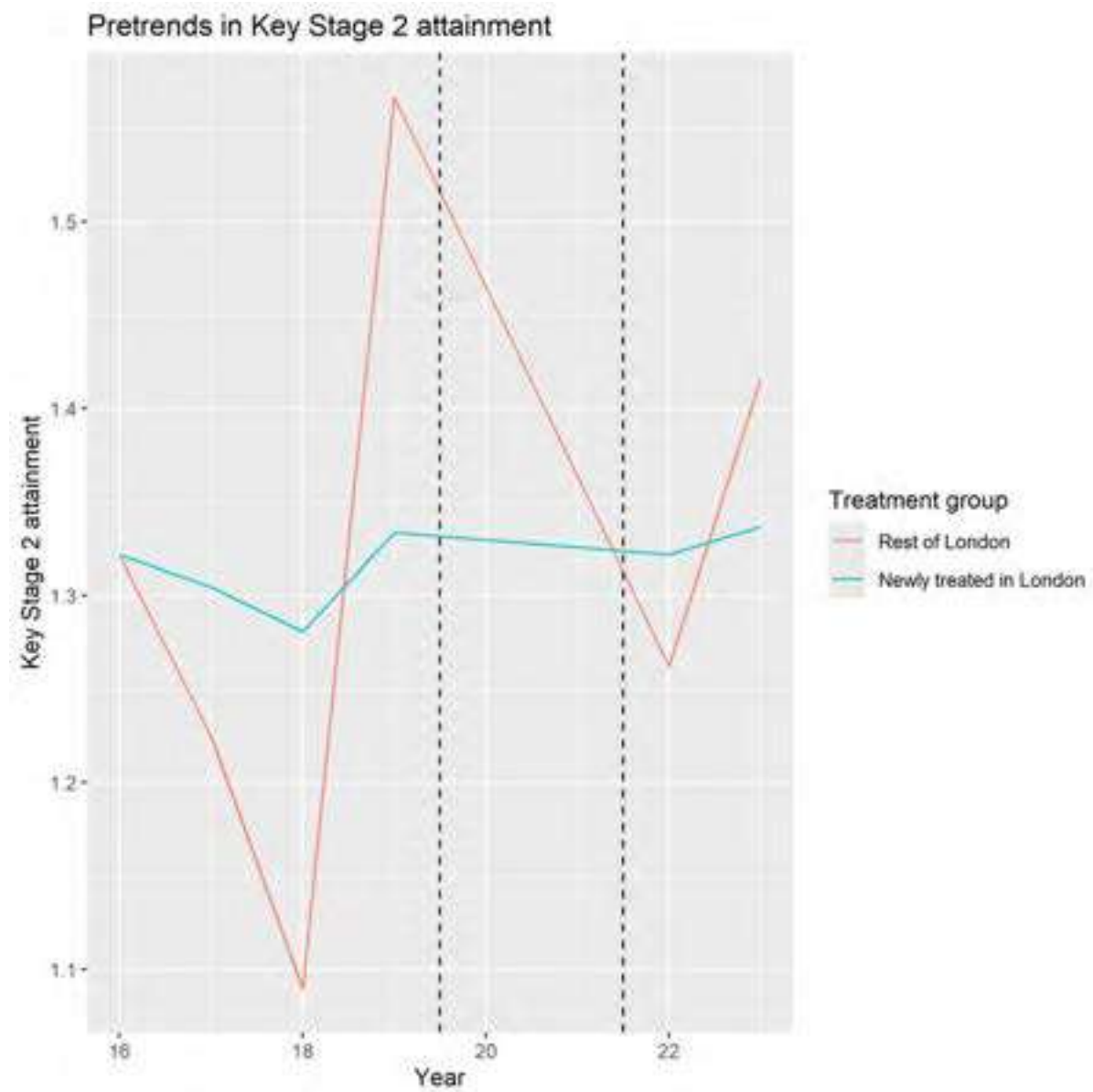
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 259 Counts.csv.

Figure 260. Raw pre-trends in secondary outcome for difference-in-differences



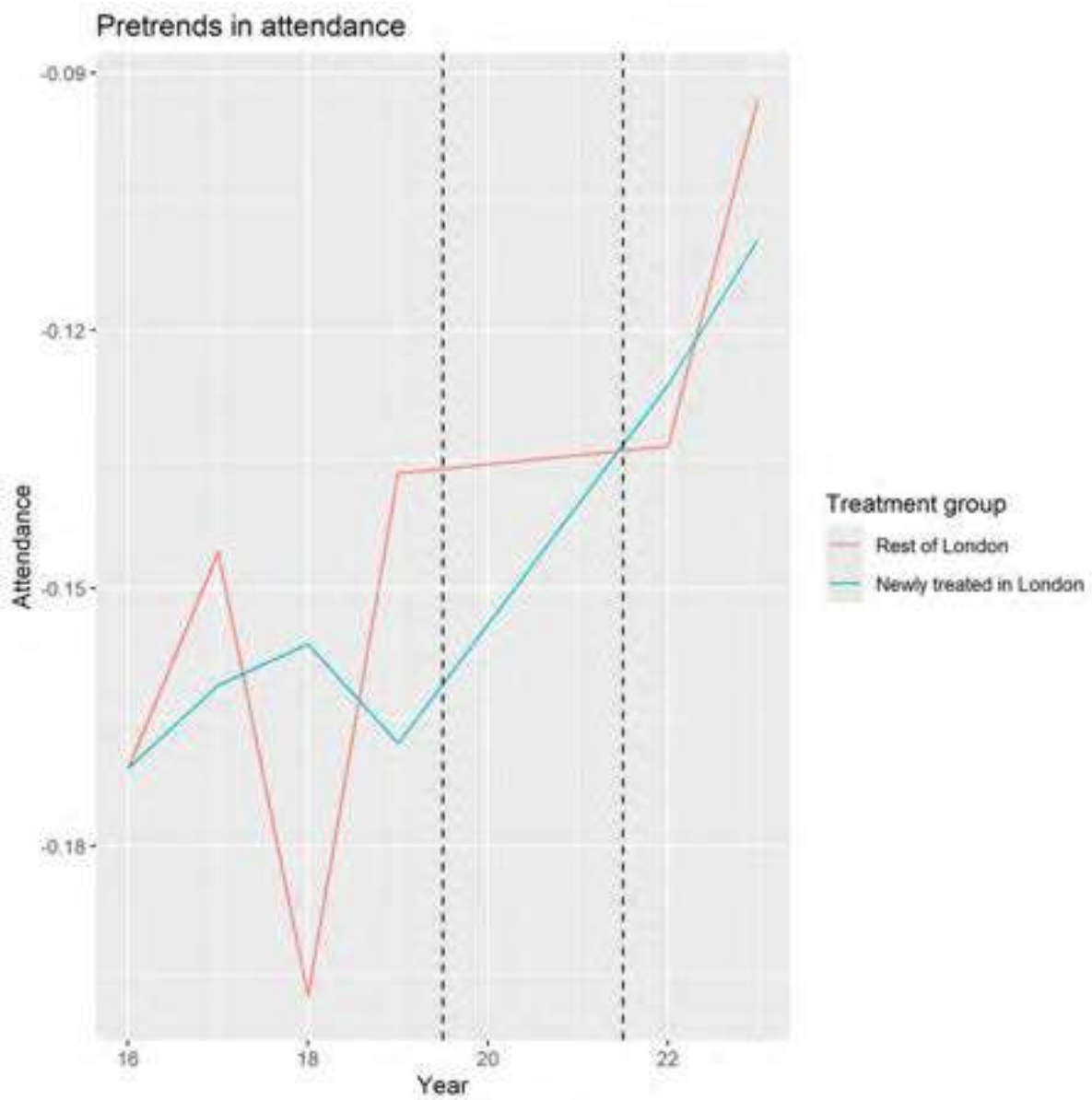
Notes. Means of outcome measures in pre-treatment years by treatment group. Note that there are no estimates in 2020 and 2021 (between the dotted vertical lines) due to COVID-19 pandemic disruption. Underlying counts for group means reported in Figure 260 Counts.csv.

Figure 261. Conditional primary outcome pre-trends for difference-in-differences



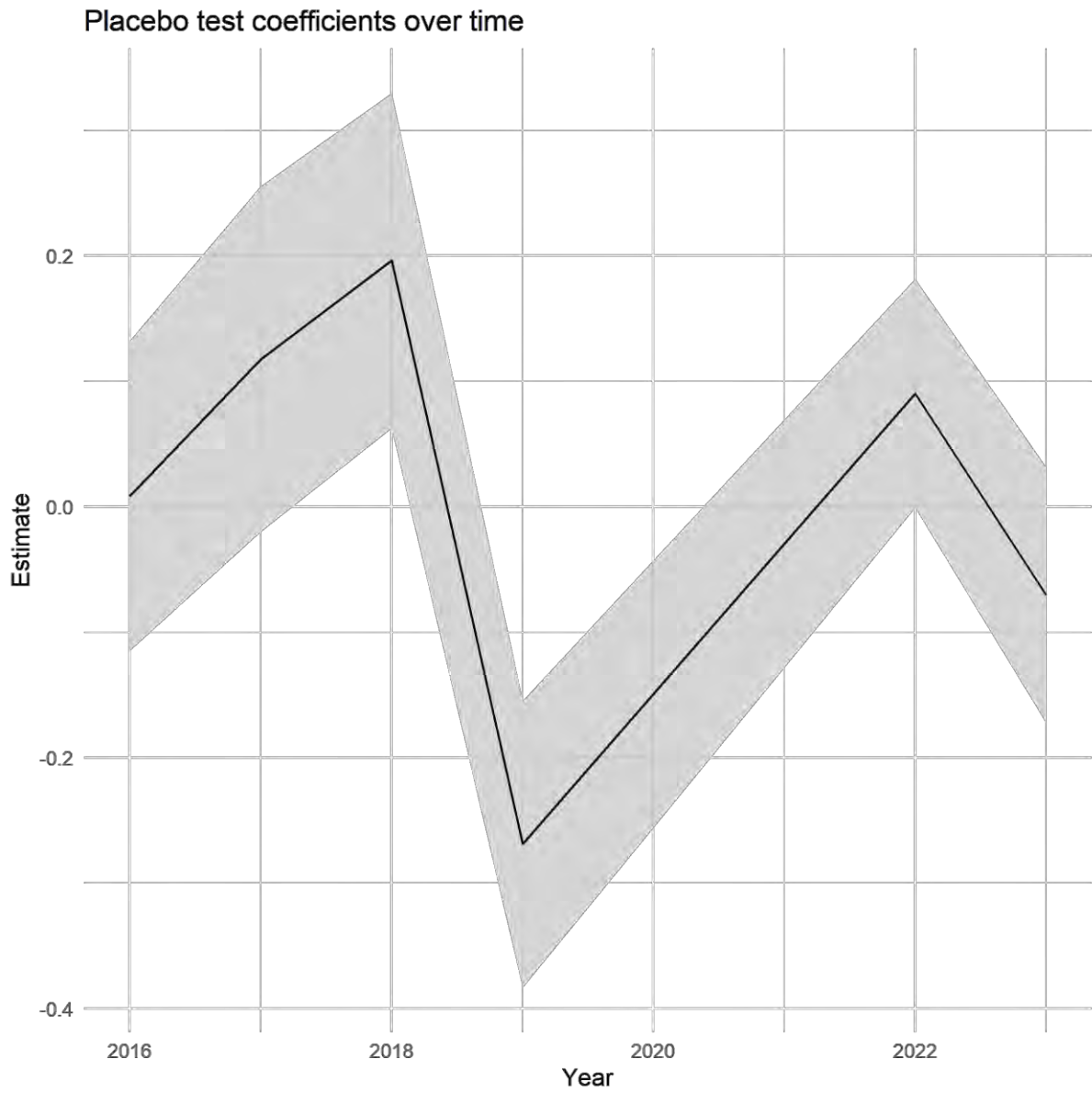
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 261 Model.docx.

Figure 262. Conditional secondary outcome pre-trends for difference-in-differences



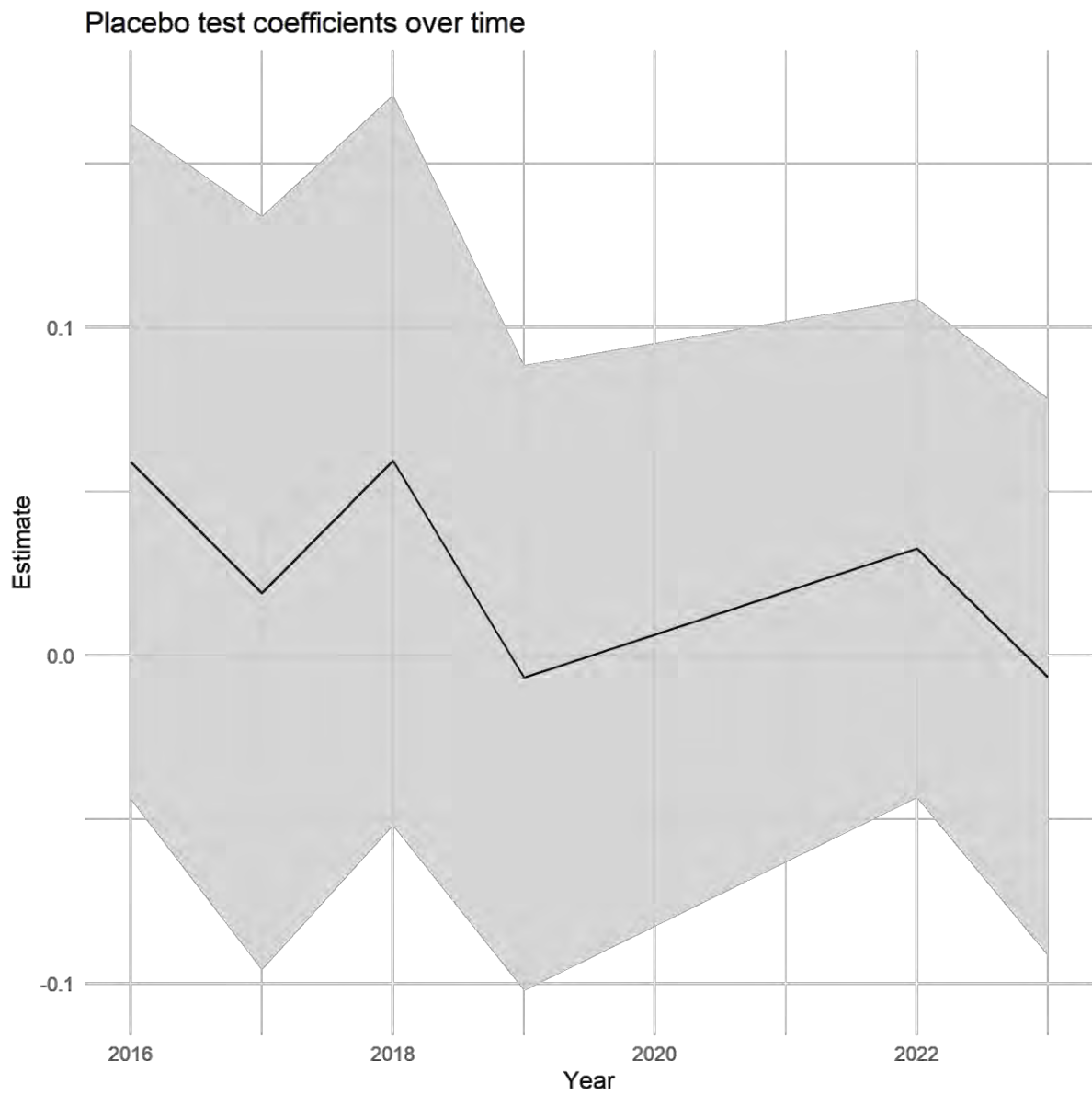
Notes. Conditional pre-trends estimates from linear regression model of outcome measure in pre-treatment adjusting for same covariates as those included in our impact estimate model, including school- and year-level fixed effects (hence, estimates are all relative and constrained to be equal in baseline year of 2016). Underlying model reported in Figure 262 Model.docx

Figure 263. Placebo test estimates for primary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 263 Models.csv

Figure 264. Placebo test estimates for secondary outcome for difference in differences



Notes. Placebo test estimates obtained from same linear regression model as impact estimate, except with change to treatment dummy to estimate 'impact' during a pre-treatment year. Underlying models for each pre-treatment year reported in Figure 264 Models.csv