Department for Education

Analysis on the use of face coverings in secondary schools and COVID-19 absence rates

Extension of analysis published in January 2022

November 2022

Contents

This document is an extension and enhancement of an analysis exploring the use of face covering policies in schools and COVID-19 absence rates that was published in January 2022[1], based on limited Autumn 2021 data, including incorporated changes recommended by the UK Health Security Agency (UKHSA)[2] and changes recommended from an internal review[3] of the analysis.

[1] The previous iteration of this analysis was published in Annex A of Coronavirus (COVID-19) and the use of face coverings in education settings (publishing.service.gov.uk)

[2] The changes made as a result of recommendations by UKHSA were: incorporating variables to account for local case rates, lengthening the treatment period to the full half term and increasing the number of schools in the control and treatment groups. A further variable relating to SEN has also been included given potential interaction with COVID-19 vulnerability, and a linear rather than logistic regression has been used for the difference-in-differences analysis to simplify interpretation.

[3] An internal review of the methodology was carried out by DfE analysts with experience in a range of quasi-experimental and econometric methods, allowing us to critically assess the analysis including the suitability of the model chosen for the analysis.

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Summary

- Absence rates due to COVID-19 in the first half of Autumn term 2021 were examined in in two groups of secondary schools: one group reporting the introduction of a face covering policy[4], and the other not doing so.
- Because the characteristics of the schools in these two groups were different, weightings were applied to make the two groups more comparable.
- Subsequent analysis demonstrated that COVID-19 absence rates in both groups rose over the period examined, but the increase was 0.5 percentage points larger in schools that did not report introducing a policy of face coverings (see **Figure 3** in the **Results** section), and this difference between the two groups was statistically significant. Across the secondary school population, 0.5 percentage points of absence is equivalent to around 17,500 pupils[5].

[4] Please note that, for this analysis, we have assumed that a school requesting face coverings be worn is synonymous with that school having a face mask policy, and that the impacts associated with a school using a face mask policy may have direct or indirect implications on COVID-19 absence (for example, a face mask policy could contribute towards a culture within a school of greater awareness of COVID-19, having impacts beyond the use of face coverings themselves: for example more thorough hand washing, which could contribute towards a change in COVID-19 absence).

[5] In January 2021 there were around 3.5 million pupils single or main registered in state-funded secondary schools. https://explore-education-statistics.service.gov.uk/data-tables/permalink/48cf3a23-455d-4638-a52e-d3c0515bd2dd

Methodology

DfE collected administrative data about face coverings directly from schools through the Educational Settings form between 26th August 2021 and 6th March 2022. Between the start of Autumn term 2021 and 28th November 2021, there was no national advice on face coverings in schools, meaning that schools could set their own face covering policies with advice from their local authority public health team, DfE or UKHSA. Therefore, this provides a period of time over which COVID-19 absence rates can be observed in schools that reported requesting face coverings be worn early in Autumn term 2021 versus those that did not, during which there was one dominant variant of COVID-19 (avoiding regional heterogeneity from the Omicron variant at the end of term).

As with most observational studies it should be noted that causality cannot be assessed, i.e., whether the use of face coverings resulted in X% absence rate, however an observational study using Educational Settings data was considered to be most appropriate given the nature of the intervention as a population health measure already in widespread use and that Educational Settings data was already being collected (so avoiding putting any additional burden on schools).

The following methodological steps were followed:

1. Using data from the Educational Settings form, COVID-19 absence rates were calculated across the latter part of the first half term of the 2021/22 academic year. For this analysis, COVID-19 absence rate is defined as the proportion of pupils who were recorded by their school as being absent due to suspected or confirmed COVID-19 cases, attendance restrictions to manage an outbreak at the setting, self-isolation as required by NHS Test and Trace[6], and 'other' reasons relating to COVID-19[7]. For each school, a weekly average of this absence rate was calculated.

2. Treatment and control groups of schools were compiled using the following criteria[8]:

    a. All schools that reported requesting face coverings be worn, or requesting face coverings be worn alongside an enhanced communications policy[9] [10], at any point between 6th September and 3rd October, were added to the treatment

[6] This reason for absence was negligible because it only applied to unvaccinated pupils aged more than 18 years and 6 months and attending secondary school settings at the time.
[7] This definition of COVID-19 absence differs from the January 2022 version of the analysis, which only included absences due to suspected and confirmed COVID-19 cases.
[8] This methodology differs from the January 2022 version of this analysis because the earlier version used data from over a shorter time period in the middle of term (2-3 weeks from 1st October) and used daily COVID-19 absence rates rather than weekly.
[9] Schools that introduced other interventions (e.g. additional testing) in combination with a face coverings policy were excluded from the analysis.
[10] It should be noted that enhanced communications could have been used to prompt at-home testing or to remind of common symptoms of COVID-19 and so could be considered as an intervention.

group. This time period was chosen in order to allow time for any effect of a school face coverings policy to be observed. For example, if a school introduced a face coverings policy towards the end of the half term, there would not be enough time to observe any potential impact on COVID-19 absences, so the treatment group was composed of schools reporting the use of face coverings for the first time early in the Autumn term. Using a treatment period starting at the beginning of term also minimised variation in initial COVID-19 absence rates between schools. **Figure 1** of the **Figures and tables** section demonstrates that variation in COVID-19 absence rates across all schools was smallest at the start of the term.

b. Any school not reporting that they had used face coverings between 30th August 2021 and 31st October were added to the control group. This wider time period was used to ensure that only schools that did not report any face covering policy in the whole half term (for most Local Authorities) were included.

3. The average COVID-19 absence rates in each of these schools in the weeks commencing 6th September and 18th October were used as the outcome variables.

4. Examination of the COVID-19 absence rates at the end of the 2020/21 academic year (prior to the time period used for this analysis) showed that absence rates in the two groups of schools followed a similar prior trajectory. However, there was a small difference between the initial COVID-19 case rates and other characteristics in the treatment and control group. For this reason, entropy balancing[11,12,13,14] was applied to the two groups to make them more comparable. Several configurations of entropy balancing were tried with different combinations of variables and levels of moments. The results in this paper are based on the configuration with the highest sample size, which was achieved when the means of the following characteristics were balanced: initial COVID-19 absence rate, headcount[15], percentages of pupils eligible for free school meals, of a minority ethnic background[16], or with special educational needs, the

[11] Hainmueller, J., 2012. Entropy balancing for causal effects: a multivariate reweighting method to produce balanced samples. *Political Analysis* **20**, 25-46. https://web.stanford.edu/~jhain/Paper/PA2012.pdf
in Observational Studies
[12] Parish, W.J. *et al.*, 2017. Using entropy balancing to strengthen an observational cohort study design: lessons learned from an evaluation of a complex multi-state federal demonstration. *Health Services Outcomes Research Methodology* **18**, 17–46. https://link.springer.com/article/10.1007/s10742-017-0174-z
[13] Harvey R.A. *et al*. 2017. A comparison of entropy balance and probability weighting methods to generalize observational cohorts to a population: a simulation and empirical example. Pharmacoepidemiol Drug Safety **26**(4), 368-377. https://pubmed.ncbi.nlm.nih.gov/27859943/
[14] Matschinger, H. *et al.* 2020. A comparison of matching and weighting methods for causal inference based on routine health insurance data, or: what to do if an RCT is impossible. *Das Gesundheitswesen* **82**.S 02: S139-S150. https://www.thieme-connect.com/products/ejournals/html/10.1055/a-1009-6634#N69991
[15] Schools were grouped by headcount into the following categories: 50-249, 250-499, 500-749, 750-999, 1000-1249, 1250-1499,1500+. Schools with a headcount of lower than 50 were removed from the dataset.
[16] Pupils who were of any origin other than White British were defined as being of minority ethnic background for this analysis.

COVID-19 case rate of 10-14 year olds in the local authority (LA) of the school near the start and middle of the half term[17], and whether the school was still reporting a phased return at the start of the analysis period. The impact of the balancing on the covariates of the variables used in the analysis is shown in **Figure 2** of the **Figures and tables** section.

5. A difference-in-differences analysis was undertaken to compare the change in COVID-19 absence rates between the two groups. This was conducted via a linear regression[18] of treatment (face coverings or no face coverings) and time (week commencing 6th September or 18th October) against COVID-19 absence rate. The resulting coefficient, p value and confidence intervals are shown in **Table 1**.

[17] The rolling rates of new COVID-19 cases by specimen date as at 12th September and 3rd October 2021. These rates capture the average over the 1st and 4th week of the 6-week analysis period. This differs from the previous analysis which did not include COVID-19 case rates as a covariate to balance. Although for this analysis COVID-19 case rates are assumed to be driving COVID-19 absences generally, the link between LA-level case rates and school-level COVID-19 absences is weak, likely due to local variation in cases.

[18] The January 2022 version of this analysis used a logistic regression. A linear regression is now used because it is easier to interpret in the context of a difference-in-differences analysis. This analysis assumes that OLS regression is unbiased for the data.

Figures and tables

Table 1 contains some descriptive statistics on the group of schools that reported requesting face coverings be worn and the weighted group of schools that did not. After weighting, a total of 217 schools reported requesting face coverings be worn whereas 1,311 schools did not, and these groups accounted for 6.3% and 37.9% of all secondary schools in England respectively. After weighting, initial weekly COVID-19 absence rates in the two groups (in the week commencing 6th September) were the same, at 1.4%, but 6 weeks later schools that reported requesting face coverings be worn saw a 0.5 percentage point lower increase in weekly COVID-19 absences (reaching 2.9% rather than 3.5%).

Table 1: Descriptive statistics and COVID-19 absence rates

	Schools using face coverings	**Weighted control group schools**
Number of schools[19]	217	1311
Proportion of schools[20]	6.3%	37.9%
Initial average COVID-19 absence rate	1.4%	1.4%
Average COVID-19 absence rate 6 weeks later	2.9%	3.5%

Table 2 contains the regression results for the difference-in-differences analysis of the weighted data. The effect size (indicating a 0.5 percentage point reduction) is the central estimate of the difference in the change (i.e. difference-in-differences) of COVID-19 absence rates between the two groups of schools over the period, with a 95% confidence interval indicating true difference as being between 0.1 and 0.9 percentage points. The significance (p) value is the probability that this data could be observed in a scenario where there is no true difference between the two groups (i.e. the chance of falsely rejecting the null hypothesis). A (p) value of 0.05 or lower is commonly used to define statistical significance in public health literature, so the (p) value of 0.009 indicated below can be interpreted as a statistically significant result.

[19] The previous (January 2022) iteration of this analysis was done with a smaller sample of schools: 123 schools that reported requesting face masks be worn and 1192 schools that did not.
[20] Number of secondary schools taken from Schools, Pupils and their Characteristics, 2021.

Table 2: Regression results

Coefficient (effect size)	-0.516
P-value	0.009
Lower CI of coefficient (2.5%)	-0.906
Upper CI of coefficient (97.5%)	-0.126

Figure 1 shows the distribution of COVID-19 absence rates in all schools nationally across the first half of the Autumn term of the 2021/22 Academic year. Variation in COVID-19 absence rates across all schools was smallest at the start of the term, informing our decision to use a treatment period starting at the beginning of term.

Figure 1: Median and interquartile range of COVID-19 absence rate in all schools

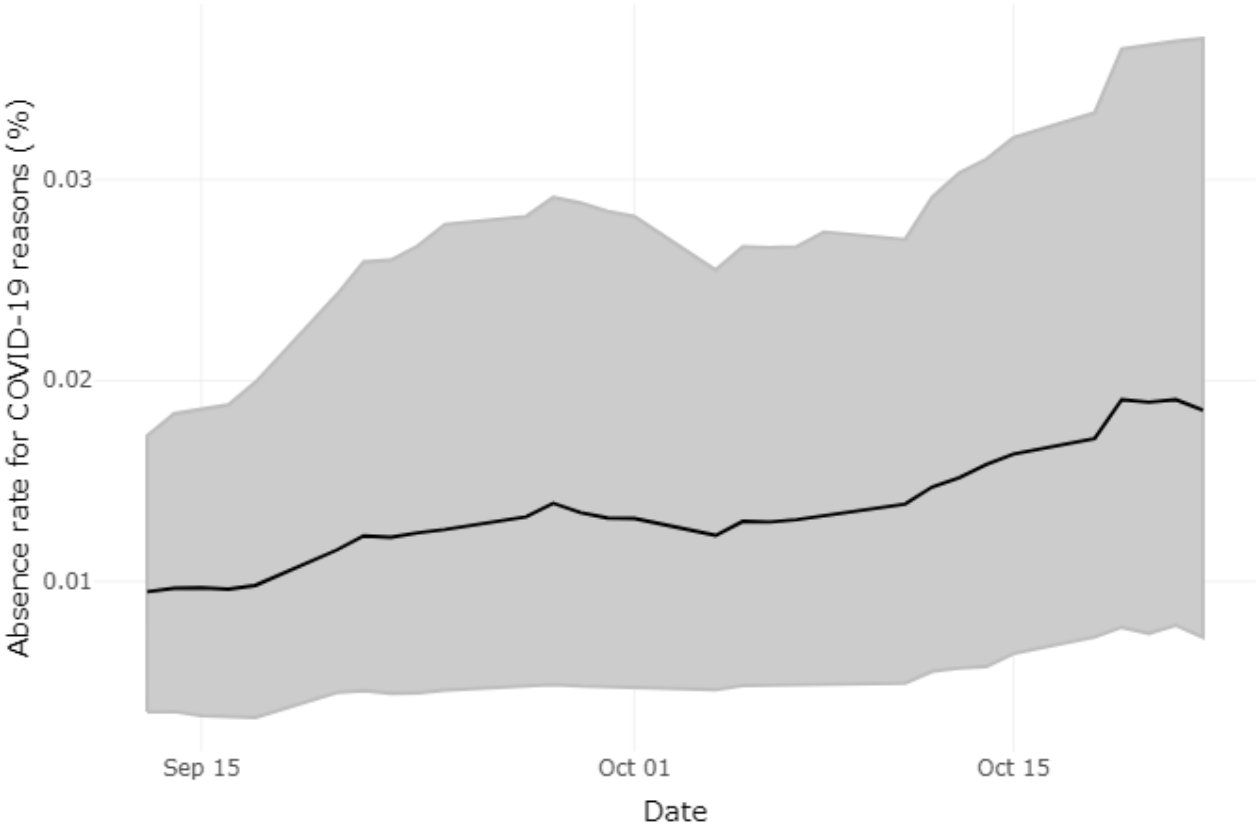
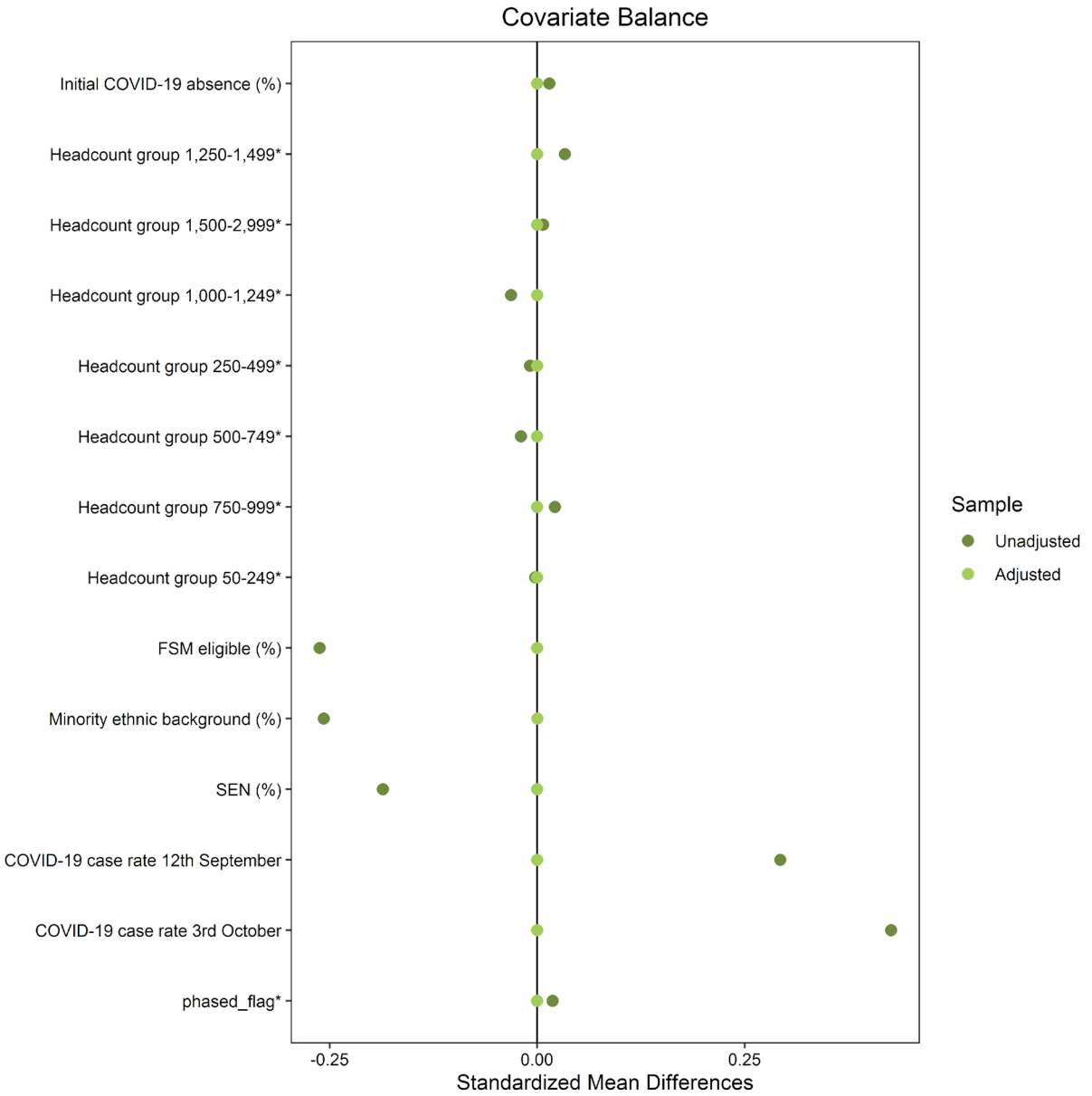


Figure 2 shows the balance across all the covariates before and after applying entropy balancing. The unadjusted dataset is relatively balanced between the treatment and control groups on initial COVID-19 absence rate, headcount, and whether or not schools were using phased returns. The treatment and control groups were unbalanced on

percentage of pupils eligible for free school meals, from a minority ethnic background and with SEN, and on COVID-19 case rates. After applying entropy balancing, all of these covariates are balanced across the two groups, allowing for a more like-for-like comparison between control and treatment groups.

Figure 2: Mean differences or standardised mean differences of covariates before and after entropy balancing



Results

- In a weighted sample of secondary schools that did not report requesting face coverings be worn, the weekly average COVID-19 absence rate[21] rose by 2.1 percentage points between the weeks commencing 6th September and 18th October 2021, from 1.4% to 3.5%. This is equivalent to a 150% increase over the 6 weeks.

- In the weighted sample of secondary schools that reported requesting face coverings be worn[22] at any point in the first half term of Autumn 2021 (either face coverings only or a combination of face coverings and additional communications), the weekly average COVID-19 absence rate rose by 1.6[23] percentage points over the same period, from 1.4% to 2.9%. This is equivalent to a 103% increase over the 6 weeks.

- The increase suggests that the increase in COVID-19 absence was 0.5 percentage points less (or 29% smaller) in schools that reported requesting face coverings be worn compared to similar schools that did not over a 6 week period[24]. This difference is statistically significant[25] and is shown in **Figure 3.**

- These results are comparable with those in the first published iteration of this study from January 2022 (which saw a 0.6 percentage point larger fall in COVID-19 absences in schools reporting using face coverings) – however, in the current analysis the difference in COVID-19 absence **is statistically significant.** This change in significance level may result from reformulating the analysis to use less restrictive definition of intervention, resulting in a larger sample size.

Figure 3 shows the percentage point change in COVID-19 absence in schools that requested face coverings be worn (the treatment group) and those that did not (the control group). Both groups had initially low levels of COVID-19 absence, rising across

[21] For the purposes of this analysis, COVID-19 related absence is being used as an outcome (which can help to quantify the amount of the learning lost due to pupils being ill with COVID-19), rather than as a way to understand transmission of COVID-19 within the community. Transmission of COVID-19 within the community is dependent on a number of factors (including but not limited to: age profiles of people infected at different times in the outbreak, transmission rates between different age groups, school, catchment areas and fluctuating levels of testing); these factors are outside the scope of the model, which is intended to give an indication of the association between the use of face masks within schools and COVID-19 absence rates (which are an indication of lost learning).

[22] The use of face coverings is self-reported as an additional control measure by schools in the Educational Settings form. The data does not differentiate between face coverings being used in communal areas or classrooms or both.

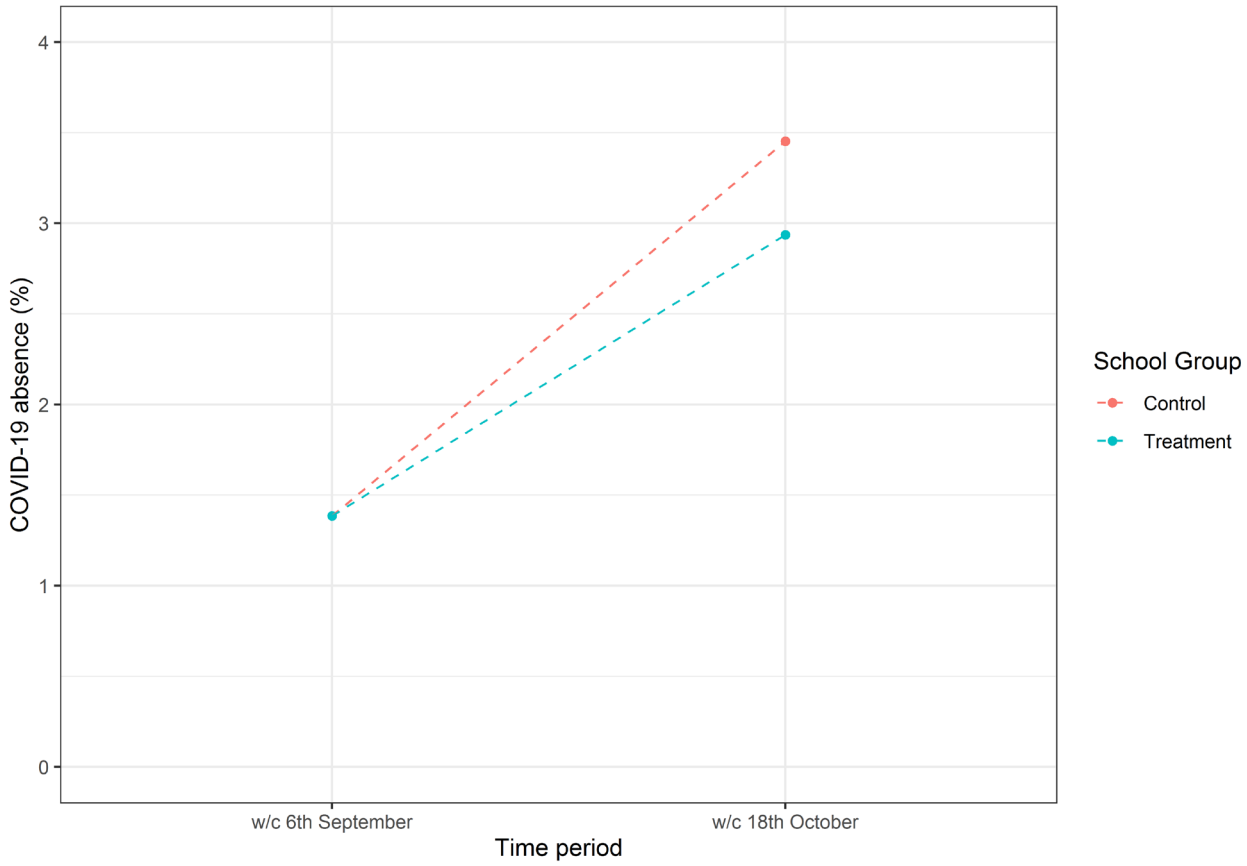
[23] Note that totals may not sum due to rounding.

[24] The observed impact on transmission is likely dynamic in nature and the analysis is unable to determine how this result may have contributed to the overall epidemic.

[25] With a (p) value of 0.009. A (p) value of 0.05 or less is widely accepted in academic literature as the threshold for statistical significance.

the half term treatment period at a lower rate in the treatment group. The figure illustrates the 0.5 percentage point difference in absence rates at the end of the treatment period.

Figure 3: Difference-in-differences of COVID-19 absence rate shows a 0.5 percentage point difference in COVID-19 absence post-treatment



Assumptions

Assumption	Rationale
Responses to the Educational Settings form accurately reflect additional COVID-19 measures and absences due to COVID-19 in schools.	Administrative data has been used because it is already available and adds no additional burden on schools.
The two groups of schools had parallel trends in COVID-19 absence rate prior to the implementation of a face coverings policy.	COVID-19 absence rates from the previous term in the two groups of schools followed a similar path (i.e. both in direction and absence level).
Face coverings policies can be represented as a treatment at a single point in time.	Face covering policies were introduced by schools at different points in the half term and not every school returned the Educational Settings form every day, so continuous information about 'treatment' (face covering policies) was not available. Therefore schools introducing a face covering policy between 6th September and 3rd October were considered 'treated' and added to the treatment group.
Entropy balancing adequately corrects for all differences in the mean characteristics of the two groups of schools, allowing for them to be more comparable.	The impact of COVID-19 is known to vary across different ethnic groups[26]. **Figure 2** in the **Figures and Tables** section shows that mean percentage of minority ethnic pupils, pupils eligible for FSM and pupils identified with SEN varied between the two groups of schools, as well as headcount, COVID-19 absence rate and LA-level COVID-19 case rate before and after entropy balancing. Schools in the two groups were weighted to obtain balance on these characteristics between the two groups making them more comparable.
The uptake of start-of-term and biweekly asymptomatic COVID-19 testing was the same across	Potential variation in testing has not been included in the analysis.

[26] Links to a collation of UK Government statistics can be found here: https://www.ethnicity-facts-figures.service.gov.uk/covid-19

both groups of schools.	
No other changes in the transmission of COVID-19 occurred at the same time as the introduction of face mask guidance that affected absence rates in the treatment and control groups asymmetrically.	We excluded from this analysis schools which used other interventions (for example increased testing) in addition to a face mask or face mask and enhanced communications policy, to minimise any impact of other factors which could affect COVID-19 in schools. We also used data from the first half term of 2021/22 so as to not include any Omicron data (therefore, reflecting the longest period of time that had a broadly consistent national COVID-19 policy and consistent administrative data collection of face covering use, without the appearance of a new variant, which spread asymmetrically across the country).
The adoption of a treatment in the treatment group does not affect absence rates in the control group (for example, we have assumed that the presence of a face mask policy in one school does not impact the COVID-19 absence rate in nearby schools without face mask policies).	The nature of the analysis using administrative data meant that transmission between control and treatment groups was not able to be controlled for. However, discussion with public health specialists at UKHSA suggests that this is not the biggest concern as this would only reduce the observed effect of the treatment. Also, any spillover effect on transmission in schools in the control group would be likely to be very small compared to those in the treatment group.
Face masks were used consistently between different settings.	The data from the Educational Settings form was chosen for this observational analysis as it contains COVID-19 absence information which has already been collected and so does not add an additional burden on schools, but this data source did not differentiate between whether face coverings were used in classrooms or communal areas for this period. However, it should be noted that this reflects real-world usage of face coverings – and any impact would only serve to reduce the observed effect.
Schools that reported the use of	Uptake of a faced mask policy within a school would

a face mask policy in isolation and schools that reported the use of a face mask policy in combination with enhanced communications have equivalent interventions or treatments.	likely involve communications with parents and pupils, for example regarding COVID-19 and the importance of wearing a mask, so where a school has indicated within Educational Settings data that they have enhanced communications alongside a face mask policy we have included these schools within the control group. However it should be noted that enhanced communications could have additional effects such as prompting in-home testing or greater awareness of symptoms.

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