Self-reported long COVID after two doses of a coronavirus (COVID-19) vaccine in the UK: 26 January 2022

Odds ratios for symptoms reported at least 12 weeks after coronavirus (COVID-19) infection, comparing Coronavirus (COVID-19) Infection Survey participants who had received two doses of a COVID-19 vaccine before infection with those who were unvaccinated.

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Next release:
To be announced

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1 . Main points

- In a sample of UK adults aged 18 to 69 years, receiving two doses of a coronavirus (COVID-19) vaccine at least two weeks before a first test-confirmed COVID-19 infection was associated with a 41.1% decrease in the odds of self-reported long COVID at least 12 weeks later, relative to socio-demographically similar study participants who were not vaccinated when infected (Figure 1).

- This analysis was based on data to 30 November 2021, and longer follow-up time is needed to assess the impact of booster doses and the Omicron variant; furthermore, the observational nature of the analysis means that we cannot say whether COVID-19 vaccination caused subsequent changes in the likelihood of self-reported long COVID.

- Long COVID symptoms of any severity were reported by 9.5% of double-vaccinated study participants, compared with 14.6% of socio-demographically similar participants who were unvaccinated when infected; the corresponding estimates for long COVID symptoms severe enough to result in limitation to day-to-day activities were 5.5% and 8.7% respectively.

- There was no statistical evidence that the relationship between vaccination status at the time of infection and the likelihood of subsequently reporting long COVID symptoms differed by whether participants received adenovirus vector (Oxford/AstraZeneca) or mRNA (Pfizer/BioNTech or Moderna) vaccines.

Figure 1: Receiving two doses of a COVID-19 vaccine before infection was associated with a 41% decrease in the odds of reporting long COVID symptoms, relative to being unvaccinated when infected, in adults aged 18 to 69 years

Adjusted odds ratios for self-reported long COVID (any severity and activity-limiting) at least 12 weeks after infection, comparing study participants who were double-vaccinated with a matched control group who were unvaccinated (reference group) at the time of infection, UK: 26 April 2020 to 30 November 2021

Notes:

1. Double-vaccinated and unvaccinated participants were 1:1 propensity-score matched on socio-demographic characteristics (age, sex, White or non-White ethnicity, country and region, area deprivation quintile group and health status) and time from infection to follow-up for long COVID at least 12 weeks later.

2. Adenovirus vector vaccines comprised Oxford/AstraZeneca ChAdOx1 nCoV-19 (AZD1222). Messenger ribonucleic acid (mRNA) vaccines comprised Pfizer/BioNTech BNT162b2 and Moderna mRNA-1273.

3. Odds ratios for unvaccinated study participants (the reference group) are equal to 1.

Download the data

.xlsx

If you are worried about new or ongoing symptoms four or more weeks after having COVID-19, there are resources available to help: see the NHS webpage on the long-term effects of coronavirus and the Your COVID Recovery website, which can help you to understand what has happened and what you might expect as part of your recovery. The time it takes to recover from COVID-19 is different for everyone, and the length of your recovery is not necessarily related to the severity of your initial illness or whether you were in hospital.

This is analysis of new, recently collected data, and our understanding of it and its quality will improve over time. Long COVID is an emerging phenomenon that is not yet fully understood. The estimates presented in this release are experimental; these are series of statistics that are in the testing phase and not yet fully developed.

2 . Self-reported long COVID after two doses of a coronavirus (COVID-19) vaccine in the UK data

[All data relating to self-reported long COVID after two doses of a coronavirus (COVID-19) vaccine in the UK](#)
Dataset | Released 26 January 2022
Odds ratios for symptoms reported at least 12 weeks after coronavirus (COVID-19) infection, comparing Coronavirus (COVID-19) Infection Survey participants who had received two doses of a COVID-19 vaccine before infection with those who were unvaccinated.

3 . Measuring the data

Study data

This analysis was based on data from the UK [Coronavirus (COVID-19) Infection Survey](#) (CIS). Vaccination information for participants in England was obtained from self-reported CIS responses and linked National Immunisation Management System (NIMS) records, with the latter being prioritised where they conflicted with self-reports. Administrative records were not available for participants in Wales, Scotland and Northern Ireland, so vaccination data for these individuals were obtained from the CIS alone.

The CIS comprises a large sample of private households randomly sampled from the UK population (excluding communal establishments such as hospitals, care homes, schools, halls of residence and prisons). All household members aged two years or over from sampled households are invited to enrol. Since the CIS began in April 2020, over 500,000 individuals from over 250,000 households have participated in the study. All CIS participants, whether positive or negative for COVID-19, or whether experiencing symptoms or not, are asked to provide swab samples at every follow-up visit. This analysis is therefore applicable to all participants with positive COVID-19 test results and not just those with symptoms during the acute phase of the infection.

CIS enrolment rates have changed over time, which could introduce bias into this analysis if the likelihood of enrolment is related to long COVID symptoms. Enrolment rates can be found in Tables 2a to 2f of the [CIS technical dataset](#), and additional information on response rates can be found in the [CIS methods article](#). Bias may also be introduced if missed visits following COVID-19 infection are related to long COVID, for example, participants being more willing, or less able, to continue in the study because of their symptoms.

Analysis methods

The analysed sample comprised 6,180 CIS participants aged 18 to 69 years who tested positive for COVID-19 (either by polymerase chain reaction test using swabs obtained at study visits, or any swab test in national testing programmes as self-reported by study participants) for the first time between 26 April 2020 and 30 November 2021. We excluded CIS participants who suspected they first had COVID-19 or tested positive for antibodies more than two weeks before their first positive swab, or who had self-reported long COVID at any time before their first positive swab.

Long COVID status was reported according to the CIS question: "Would you describe yourself as having 'long COVID', that is, you are still experiencing symptoms more than 4 weeks after you first had COVID-19, that are not explained by something else?" Participants were also asked whether their symptoms limited their ability to undertake daily activities. We considered participants' first response at least 12 weeks after their first test-confirmed infection. We excluded participants who had never responded to the survey question on long COVID since it was introduced on 3 February 2021 or without at least 12 weeks of post-infection follow-up by 30 November 2021.

We matched study participants who had received at least two doses of a COVID-19 vaccine at least two weeks before their first test-confirmed infection to control participants who were unvaccinated when infected, and remained so at their first follow-up visit at least 12 weeks later. Participants who were single-vaccinated when infected were excluded. Double-vaccinated and unvaccinated participants were 1:1 propensity-score matched on socio-demographic characteristics (age, sex, White or non-White ethnicity, country and region, area deprivation quintile group and health status) and time from infection to follow-up for long COVID at least 12 weeks later. Continuous variables were modelled as restricted cubic splines. Using a caliper width of 0.1 points of the propensity score, we successfully matched 3,090 double-vaccinated participants (92.7%) to a control participant who was unvaccinated when infected.

Because the CIS question on long COVID was not introduced until 3 February 2021, shortly after the start of mass COVID-19 vaccination in the UK, it was not possible to match double-vaccinated and unvaccinated study participants on calendar time of first test-confirmed infection. On average, participants who were double-vaccinated when infected received their first positive test for COVID-19 238 days later than those who were unvaccinated. Differences in the likelihood of developing long COVID symptoms between double-vaccinated and unvaccinated participants may therefore partly reflect differences in the dominant COVID-19 variant at the time of infection or other temporal effects.

Adjusted odds ratios for long COVID symptoms at least 12 weeks after infection were estimated from logistic regression models including all covariates from the matching set, comparing double-vaccinated with unvaccinated (reference group) participants. We tested for effect modification by vaccine type, comparing adenovirus vector and messenger ribonucleic acid (mRNA) vaccines.

Collaboration

This analysis was produced in collaboration with: Professor Sarah Walker and Doctor Koen Pouwels from the University of Oxford; Doctor Nisreen Alwan from the University of Southampton; and Professor Kamlesh Khunti and Doctor Francesco Zaccardi from the University of Leicester.

4 . Related links

Coronavirus (COVID-19) vaccination and self-reported long COVID in the UK: 25 October 2021
Bulletin | Released 25 October 2021
Estimates of the association between coronavirus (COVID-19) vaccination and self-reported long COVID in people infected prior to vaccination, using data from the UK Coronavirus (COVID-19) Infection Survey.

Prevalence of ongoing symptoms following coronavirus (COVID-19) infection in the UK
Bulletin | Updated monthly
Estimates of the prevalence of self-reported long COVID and associated activity limitation, using UK Coronavirus (COVID-19) Infection Survey data.

Updated estimates of the prevalence of post-acute symptoms among people with coronavirus (COVID-19) in the UK: 26 April 2020 to 1 August 2021
Technical article | Released 16 September 2021
Experimental estimates from three approaches to estimating the percentage of people testing positive for coronavirus (COVID-19) and who experience symptoms four or more weeks after infection, broken down by demographic and viral characteristics, using UK Coronavirus (COVID-19) Infection Survey data.

Coronavirus (COVID-19) Infection Survey, UK
Bulletin | Updated weekly
Estimates forEngland, Wales, Northern Ireland and Scotland.This survey is being delivered in partnership with the University of Oxford, University of Manchester, Public Health England andWellcomeTrust. This study is jointly led by the ONS and the Department for Health and Social Care (DHSC) working with the University of Oxford and Lighthouse laboratory to collect and test samples.

COVID-19 Infection Survey: methods and further information
Methodology article | Last updated 24 August 2021
Information on the methods used to collect the data, process it, and calculate the statistics produced from the Coronavirus (COVID-19) Infection Survey.

Coronavirus (COVID-19) latest insights
Interactive tool | Updated as and when data become available
Explore the latest data and trends about the coronavirus (COVID-19) pandemic from the ONS and other official sources.