UK Health Security Agency

Effectiveness of non-pharmaceutical interventions to reduce transmission of COVID-19 in the UK

A rapid mapping review

Supplementary material

List of abbreviations

ABM	Agent based model
app	application
ASHRAE	American Society of Heating, Refrigeration and Air-Conditioning Engineers
BBSRC	Biotechnology and Biological Sciences Research Council
CMMID	Centre for Mathematical Modelling of Infectious Diseases
CMO	Chief Medical Officer
CQC	Care Quality Commission
COVID-19	Coronavirus-19
CTA	Contact tracing application
DHSC	Department for Health and Social Care
EPSRC	Engineering and Physical Sciences Research Council
GP	General practitioner or general practice
HMPPS	Her Majesty's Prison and Probation Service
HPRU	Health Protection Research Unit
ICU	Intensive care unit
IMD	Index or indices of multiple deprivation
JUNIPER	Joint UNIversities Pandemic and Epidemiological Research
LFD	lateral flow device
LFT	lateral flow test(s) or testing
LSHTM	London School of Hygiene and Tropical Medicine
LTLA	Lower tier local authorities
MRC	Medical Research Council
MSOA	Middle layer super output area
NIHR	National Institute for Health and Care Research
NHS	National Health Service
NHSTT	NHS Test and Trace
NI	Northern Ireland
NPI	Non-pharmaceutical intervention
ONS	Office for National Statistics

OxCGRT	Oxford COVID-19 Government Response Tracker
PCR	polymerase chain reaction
PHE	Public Health England
QALY	Quality adjusted life year
R (number)	reproduction (number)
ROI	Republic of Ireland
RT-LAMP	reverse transcription loop-mediated isothermal amplification
RT-PCR	reverse transcription polymerase chain reaction
SAGE	Scientific Advisory Group for Emergencies
SARS-CoV-2	severe acute respiratory syndrome coronavirus 2
SEAIR	Susceptible, exposed, asymptomatic infectious, recovered/removed
SEIR	Susceptible, exposed, infectious, recovered/removed
SEIR-D	Susceptible, exposed, infectious, recovered/removed, dead
SEIR-T	Susceptible, exposed, infectious, recovered/removed, tracing
SEIIR	Susceptible, infected, infectious (symptomatic), infected (asymptomatic), recovered/removed
SGSS	Second Generation laboratory Surveillance System
SIR	Susceptible, infectious/infected, recovered/removed
TTI	Test trace isolate
UKHSA	UK Health Security Agency
UKRI	United Kingdom Research and Innovation
UN	United Nations
UTLA	Upper tier local authorities
WHO	World Health Organization

Table S.1. Characteristics of included studies – experimental studies

[A] For “funding”, we only reported how the specific research work was funded, as declared in the publications; in cases where some authors had declared individual grants or other fundings not directly linked to the work but had not reported funding for the work, we reported ‘no specific funding for this work declared’, as opposed to ‘no funding’ when the authors had declared that no funding had been received for the work. We recorded any mention to NIHR HPRUs as author affiliations.

Reference	Study design	Methods	Funding [A]
Love and others, 2022 (1) ‘Daily use of lateral flow devices by contacts of confirmed COVID-19 cases to enable exemption from isolation compared with standard self-isolation to reduce onward transmission of SARS-CoV-2 in England: a randomised, controlled, non-inferiority trial’ Linked publication: Denford 2022 (2) (in-depth qualitative study with a subset of participants)	Study design: two-arm, non-blinded, randomised controlled, non-inferiority trial Objective: to investigate whether daily use of lateral flow devices (LFDs) to test for COVID-19, with the removal of self-isolation for 24 hours if negative in contacts of COVID-19 cases, could be a safe alternative to self-isolation as a means to minimise onward transmission Setting: England Participants: daily contact testing (intervention group) n=26,123 (52.6%) and self-isolation (control group) n=23,500 (47.4%) Study time period: participants were enrolled in the study from 29 April to 28 July 2021 To note that the feasibility and acceptability of the intervention was first tested on a smaller participants group, see Love and others (3), Denford and others (4) and Martin (5).	Non-pharmaceutical intervention (NPI): • Test and release strategies Intervention: • Daily self-test using LFD on the 7 days following contact notification. Polymerase Chain Reaction (PCR) test was done in response to LFD-positive result or on the last day of testing if all LFD tests were negative. Intervention group participants were not required to self-isolate other than in response to a positive PCR test Control group: • Self-isolation for 10 days following exposure to a COVID-19 case Outcomes: • COVID-19 transmission (attack rates) • Compliance or adherence (feasibility and acceptability of each strategy assessed by measuring uptake and compliance with testing) • Lost time (school or work) – intervention group only	Funding: UK Government Department of Health and Social Care (DHSC) Research group (first author): UK Health Security Agency (UKHSA); 9 out of 14 authors with an UKHSA affiliation (including first and last authors), and 8 with a National Institute for Health and Care Research (NIHR) Health Protection Research Unit (HPRU) affiliation (Behavioural Science and Evaluation, and Emergency Preparedness and Response)
Young and others, 2021 (6) ‘Daily testing for contacts of individuals with SARS-CoV-2 infection and attendance and SARS-CoV-2 transmission in English secondary schools and colleges: an open-label, cluster-randomised trial’ Linked publication included: Denford 2022 (7) (qualitative study of the feasibility and	Study design: open-label, cluster randomised controlled trial Objective: to assess whether daily testing of COVID-19 contacts in secondary schools resulted in a similar control of COVID-19 transmission and increased school attendance compared to self-isolating school-based COVID-19 contacts Setting: England (secondary schools and further education colleges) Participants	NPI: • Test and release strategies Intervention: students and staff conducted daily self-administered LFD testing for 7 days after contact with a school-based COVID-19 case. Those who tested negative were released from isolation and permitted to attend school that day but were asked to self-isolate after school and on non-testing days. Control group: students or staff contacts of LFD or PCR positive COVID-19 cases self-isolated for 10 days	Funding: UK Government DHSC Research group (joint first authors): one Nuffield Department of Medicine and one NIHR Oxford Biomedical Research Center and NIHR HPRU Healthcare Associated Infections and Antimicrobial Resistance; 11 of 31 authors affiliated to the DHSC; 2 of 31 to Public Health England (PHE), and 3 of 31 to NIHR HPRUs (Healthcare Associated

Reference	Study design	Methods	Funding [A]
acceptability of the test and release strategy)	• Control group: n=99 schools (n=102,859 students, n=11,798 staff); students: 47.1% aged 11 to 14 years, 48.1% aged 15 to 18 years • Intervention group: n=102 schools (n=111,693 students, n=12,229 staff); students: 45.1% aged 11 to 14 years, 46.7% aged 15 to 18 years No restriction on age: students aged 19 years or more attended further education colleges (less than 0.1% in both the control and intervention group) Study time period: 10-week study starting between 19 April to 10 May 2021, to 27 June 2021	Outcomes: • COVID-19 transmission (rate of symptomatic PCR-positive infection, controlled for community case rates) • Lost time (school or work) Other methodological information of relevance: Randomisation stratified by school type and size, presence of sixth form, presence of residential students and proportion of students eligible for free school meals.	Infections and Antimicrobial Resistance, and Behavioural Science and Evaluation)

Table S.2. Characteristics of included studies – observational studies (individual-level)

[A] For “funding”, we only reported how the specific research work was funded, as declared in the publications; in cases where some authors had declared individual grants or other fundings not directly linked to the work but had not reported funding for the work, we reported ‘no specific funding for this work declared’, as opposed to ‘no funding’ when the authors had declared that no funding had been received for the work. We recorded any mention to NIHR HPRUs as author affiliations.

Reference	Study design	Methods	Funding [A]
Aggarwal and others, 2021 (8) medRxiv PREPRINT, (posted 17 March 2021) ‘An integrated analysis of contact tracing and genomics to assess the efficacy of travel restrictions on SARS-CoV-2 introduction and transmission in England from June to September, 2020’	Study design: cross-sectional study Objective: to assess the efficacy of travel restrictions on SARS-CoV-2 introduction and transmission Setting: England Participants: highly probable or probable international travel-associated COVID-19 cases and their contacts Study period: 27 May 2020 to 13 September 2020	NPI: • Travel restrictions Intervention or exposure: advice against non-essential worldwide travel was in place from 17 March to 4 July 2020. Travel corridors to countries at low risk for COVID-19 disease were in place from 4 July 2020 to 1 February 2021 (returning travellers no longer required to self-isolate). Outcomes: • COVID-19 transmission (number of contacts per case) Other methodological information of relevance: Study combines contact-tracing data for probable importation cases from NHS Test and Trace with genomic data via COVID-19 Genomics UK consortium (which received samples from NHS hospital and mass community testing laboratories). Confounders: negative binomial regression analysis considered the effects of travel restrictions by age group, gender of index case, and calendar date. Ethnic group and travel destination included as covariates	Funding: no specific funding for this work declared Research group (first author): University of Cambridge and PHE; 15 out of 20 authors with a PHE affiliation (now UKHSA), including first and last author
Blackmore and others, 2022 (9) ‘Testing for COVID-19 during an outbreak within a large UK prison: an evaluation of mass testing to inform outbreak control’	Study design: prospective longitudinal study (no comparator group) Objective: to describe the implementation and results of a mass asymptomatic testing strategy for COVID-19 in a male prison in England following the declaration of an outbreak Setting: a Category B (second-highest level of security) closed male prison in the North West of England with a capacity of 750 residents	NPI: • Asymptomatic testing Intervention or exposure: mass testing was mobilised using PCR tests. Residents were tested at intervals: 0 days (start of mass testing), 5 and 7 days, and day 28 (changed to 14 days during the study). Staff were encouraged to test twice a week with LFD and once a week with PCR. Outcomes: COVID-19 cases (number of positive tests)	Funding: no funding Research group (first author): Centre for Environmental Health and Sustainability, University of Leicester and UKHSA; 4 out of 5 authors UKHSA affiliated including first and last author

Reference	Study design	Methods	Funding [A]
	Participants: prison staff (n= 182) and residents (n=851) Study period: November to December 2020		
Coleman and others, 2022 (10) 'Implementation of novel and conventional outbreak control measures in managing COVID-19 outbreaks in a large UK prison'	Study design: prospective longitudinal study (no comparator group) Objective: to describe how a public health approach, based on UK guidance published early in the pandemic (April 2020) and introduced across the UK prison estate was effective in controlling the spread of COVID-19 Setting: prison (UK Category A men's prison) Participants: n=910 staff and n=950 prisoners Study period: 23 March 2020 to 22 January 2021 (2 outbreaks; outbreak control teams were convened on 23 March 2020 and on 20 November 2020)	NPI: • Shielding • Isolation of cases • Isolation of contacts • Cohorting (isolation of new prison admissions, referred to as 'reverse cohorting') Intervention or exposure: Shielding unit set up 6 March 2020 (35 prisoners with chronic medical conditions), reverse cohorting unit (14 days isolation of new prison admissions) from 10 April 2020. Isolation of cases (7 days) and close contacts (cell sharers of cases; 14 days) occurred in a protective isolation unit. All symptomatic prisoners were tested 12 May 2020. Outcomes: • COVID-19 cases (possible, probable or confirmed cases; possible defined as with upper respiratory tract symptoms but not typical of COVID-19 symptoms; probable with symptoms typical of COVID-19; confirmed cases were individuals with a positive SARS-CoV-2 test result)	Funding: University of Birmingham (supported the Open Access fees) Research group (first author): Warwick Medical School, University of Warwick, and UKHSA; 8 out of 12 authors with UKHSA affiliation including first and last authors
Davies and others, 2022 (11) SSRN PREPRINT with The Lancet (posted 28 February 2022) 'Risk assessed daily contact testing enabling elite sporting events during the COVID-19 pandemic: a prospective cohort study'	Study design: prospective longitudinal study (no comparator group) Objective: to develop and implement a risk assessment and daily testing approach in elite sporting events for individuals who would otherwise be excluded by having to self-isolate as a contact of a positive COVID-19 case Setting: elite sporting events in the UK; grass court tennis season, Union of European Football Associations football finals at Wembley, International cricket, The British Grand Prix, British Horseracing Authority Events, Professional Squash Association World Tour in Manchester, and Golf events including European Tour Group and Ladies European Tour	NPI: • Asymptomatic testing Intervention or exposure: daily lateral flow testing of contacts Outcomes: • COVID-19 cases (testing positive on lateral flow test)	Funding: no funding Research group (first author): Institute of Sports, Exercise and Health, University College, London; 5 out of 9 authors with UKHSA affiliation including last author

Reference	Study design	Methods	Funding [A]
	Participants: 126 athletes aged 16 years and over and key staff for the events, including international travellers and UK-based individuals who were identified as SARS-CoV-2 contacts, were asymptomatic, and assessed as low risk of potential transmission from their contact Study period: 1 June 2021 to 20 August 2021		
Fetzer and Graeber 2021 (12) 'Measuring the scientific effectiveness of contact tracing: Evidence from a natural experiment' (Findlater and others (13) reported on the same incident)	Study design: retrospective longitudinal study (with comparator group) Objective: to study the causal effect of contact tracing Setting: England Participants: approximately 48,000 contacts of 15,841 individuals who tested positive for COVID-19 in England, who had not been contacted in a timely manner Study period: September to October 2020	NPI: • Contact tracing Intervention or exposure: delay in contact tracing due to a spreadsheet error Outcomes: • COVID-19 cases • COVID-19 related mortality Other methodological information of relevance: Comparator for the predicted impact of the delay in contact tracing based on positive case data for the 315 Lower Tier Local Authorities (LTLAs) in England between 20 and 27 September 2020 and reported on or after 3 October.	Funding: no funding Research group (first author): Department of Economics, University of Warwick
Findlater and others, 2022 (13) medRxiv PREPRINT (posted 19 May 2022) 'Evaluating the impact on health outcomes of an event that resulted in a delay in contact tracing of COVID-19 cases' (Fetzer and Graeber 2021 (12) reported on the same incident)	Study design: retrospective longitudinal study (with comparator group) Objective: to use Contact Tracing Advisory Service (CTAS) data to determine the impact of a delay in contact tracing on health outcomes Setting: England Participants: 15,861 individuals testing positive for SARS-CoV-2 and their reported contacts, whose records failed to upload from the Second Generation Laboratory Surveillance System Study period: 30 September to 5 October 2020 inclusive	NPI: • Contact tracing Intervention or exposure: delay in contact tracing for an average of 3 days (average of 6 days in the delay group versus 3 days on the control group) Outcomes: • COVID-19 transmission (secondary attack rate) • COVID-19 hospitalisation • COVID-19 related mortality Other methodological information of relevance: Comparator group with timely contact tracing (average of 3 days)	Funding: no specific funding for this work declared Research group (first author): NIHR HPRU in Behavioural Science and Evaluation at University of Bristol; 9 of 13 authors UKHSA affiliated including last author

Reference	Study design	Methods	Funding [A]
Francis and others 2023 (14) 'Non-pharmaceutical interventions and risk of COVID-19 infection: survey of U.K. public from November 2020 – May 2021'	Study design: cross-sectional study (online survey) Objective: explore the relationship between self-reported use of NPIs and COVID-19 infection with the aim to better inform public health advice Setting: UK, community Participants: 27,758 UK participants aged 16 and above (part of an international online survey, the Retrospective Treatment and Outcomes study on COVID-19: RTO-COVID-19) Study period: November 2020 to May 2021	NPI: • Hand hygiene (self-reported hand washing) • Physical distancing • Cleaning (environmental) • Face coverings • Limitation of social contacts Intervention or exposure: Participants reported frequency of hand hygiene, physical distancing, cleaning, and use of face coverings on a five-point Likert scale. Limitation of social contacts (frequency of attending crowded places in the previous 2 weeks) was assessed using the categories never, 1 or 2 times, 3 or 4 times, 5 or 6 times, 7 to 9 times or 10 or more times. Outcomes: • COVID-19 cases (self-reported test result)	Funding: NIHR School for Primary Care Research Research group (first author): University of Southampton; one author affiliated to the NIHR HPRU in Behavioural Science and Evaluation
Gillam and others, 2021 (15) 'Norwich COVID-19 testing initiative pilot: evaluating the feasibility of asymptomatic testing on a university campus'	Study design: cross-sectional study Objective: to pilot mass COVID-19 testing of staff and students on a university research park, and assess its feasibility and acceptability Setting: university research park in the East of England, Norwich, UK (which includes the University of East Anglia and other businesses and research institutions) Participants: n=5,625 staff and students eligible to participate; n=1,053 registered to participate, of whom 798 (76%) provided at least one swab test result. Post-testing survey completed by 458 (57%) of 798 participants Study period: two-week period in 2020 (unclear of month)	NPI: • Asymptomatic testing Intervention or exposure: All participants living or working on the Norwich Research Park were invited to join the study via an email cascade to staff and students. Participants were offered 4 self-administered PCR swab tests over 2 weeks. Acceptability was assessed by inviting email comments and via a survey. Outcomes: • Perceptions and attitudes (acceptability of testing)	Funding: UK Research and Innovation (UKRI) Biotechnology and Biological Sciences Research Council (BBSRC) Core Capability Grant, Quadram Institute, John Innes Centre, and the University of East Anglia, supported by local charities and philanthropists. The CyVerse UK cloud is funded by the BBSRC National Capability award Research group (first author): Faculty of Medicine and Health Sciences, University of East Anglia, Norwich
Jani and others, 2021 (16) 'Comparison of COVID-19 outcomes among shielded and non-shielded populations'	Study design: retrospective longitudinal study (with comparator group) Objective: to evaluate the effectiveness of shielding of people presumed to be at high-risk from COVID-19 to protect them and	NPI: • Shielding Intervention or exposure	Funding: no funding Research group (first author): Institute of Health and Wellbeing, University of Glasgow

Reference	Study design	Methods	Funding [A]
	reduce healthcare demand by comparing COVID-19 outcomes among shielded and non-shielded individuals Setting: Greater Glasgow and Clyde Participants: n= 1,315,071 registered with family practitioners in National Health Service (NHS) Greater Glasgow and Clyde in the West of Scotland; n=26,747 on shielding list Study period: unclear; states data covered the period shielding was in place	Family practitioners sent letters recommending individuals considered at high risk (list compiled using data from general practitioner [GP], hospital admission, disease registry and medication data) to shield Outcomes: • COVID-19 cases (testing positive) • COVID-19 hospitalisation (hospital admission and intensive care unit [ICU] admission) • COVID-19 related mortality (case fatality) Other methodological information of relevance: Poisson regression models were used to compare risk ratios for COVID-related outcomes for shielding individuals (as defined in the UK Vulnerable Patient List) to individuals in the low-risk category. Analysis was adjusted for sex, Scottish Index of Multiple Deprivation quintile and 'other risk categories'. Analysis was not adjusted for age.	
Jarvis and others, 2020 (17) 'Quantifying the impact of physical distance measures on the transmission of COVID-19 in the UK'	Study design: cross-sectional study (online survey) Objective: to evaluate the contact behaviour and patterns of compliance to physical distancing measures in the UK, and to examine the impact of these measures on COVID transmission (part of the CoMix study) Setting: UK Participants: 1,356 UK participants; average age 47.2 years and 45% female Study period: Tuesday 24 to Friday 27 March 2020 inclusive	NPI: • Lockdown Intervention or exposure: physical distancing in terms of quarantine, isolation, or limited time in workplace or school Outcomes: • COVID-19 transmission (Reproduction [R] number) • compliance or adherence (number of reported contacts made) Other methodological information of relevance: Compared the contact patterns or behaviours during the lockdown to those pre-lockdown using data from POLYMOD survey.	Funding: European Union's Horizon 2020 Research and Innovations Programme (Project EpiPose) Research group (joint first authors): Centre for Mathematical Modelling of Infectious Diseases (CMMID), Department of Infectious Disease Epidemiology, London School of Hygiene and Tropical Medicine (LSHTM); one author affiliated to the NIHR HPRU in Emergency Preparedness and Response; CMMID COVID-19 modelling group also contributed to this work
Kumari and others, 2021 (18) Research Square PREPRINT	Study design: prospective longitudinal study (with comparator group) embedded in the longitudinal, nationally representative study of UK households Understanding Society	NPI: • Shielding	Funding: Economic and Social Research Council and the Health Foundation

Reference	Study design	Methods	Funding [A]
(posted 17 May 2021) 'Targeted Shielding and Coronavirus Symptoms Among Adults in the UK'	Objective: to evaluate the impact of receiving a letter from government advising individuals to shield, on reporting of COVID-19 symptoms, testing positive and on mental health and loneliness Setting: UK Participants: n=13,750 adults asked if they, or anyone in their household, had received a letter or text advising them to shield (participants of the UK households Understanding Society study who took part in a monthly COVID-19 survey for 4 months) Study period: from April to July 2020	Intervention or exposure: receiving a shielding letter or text from the NHS or Chief Medical Officer Outcomes: • COVID-19 cases (self-reported symptoms or positive tests) Other methodological information of relevance: Logistic regression analysis conducted to examine associations between shielding status and cases for the total number of participants (the proportion shielding is not reported). Controlled for social and demographic factors, but no further details on how confounders were adjusted for.	Research group (first author): University of Essex
Love and others, 2022 (3) 'The acceptability of testing contacts of confirmed COVID-19 cases using serial, self-administered lateral flow devices as an alternative to self-isolation' Linked publications: Denford and others, 2021 (4), Martin and others, 2021 (5)	Study design: prospective longitudinal study (with comparator group) Objective: to assess the feasibility and acceptability of a 'test to enable' strategy for contacts of confirmed COVID-19 cases using LFD testing in the first 7 days of isolation Setting: England Participants: asymptomatic adults (aged 18 years or older) identified from the NHS test and trace records. n=882 consented to contact; n=812 LFD kits posted to participants; n=570 daily LFD tests performed and results reported Study period: December 2020 to January 2021 To note that this feasibility study was then followed by a randomised controlled trial, see Love and others (1) and Denford and others (2).	NPI: • Test and release strategies (referred to as 'test to enable approach') Intervention or exposure: Asymptomatic adults who had been exposed to a confirmed COVID-19 case were offered daily lateral flow testing during the first 7 days post-exposure. Outcomes: • COVID-19 transmission (secondary attack rate) • Compliance or adherence (proportion of participants who reported at least one LFD result, and of these, proportions who reported until the end of the seven-day period) Other methodological information of relevance: Comparator group: all adult cases reported to NHS Test and Trace who had previously been asymptomatic contacts but were not included in the study, who were exposed to a confirmed case of COVID-19 between December 2020 and January 2021, and had self-isolated.	Funding: no specific funding for this work declared (LFDs provided by DHSC) Research group (first author): UKHSA; 5 authors out of 7 with UKHSA affiliation including first and last authors, and 3 out of 7 with a NIHR HPRU affiliation (Behavioural Science and Evaluation, Healthcare Associated Infections and Antimicrobial Resistance, and Emergency Preparedness and Response)
Marchant and others, 2021 (19)	Study design: cross-sectional study (descriptive survey)	NPI: • Asymptomatic testing	Funding: PHE Research group (first author): UK

Reference	Study design	Methods	Funding [A]
'Determining the acceptability of testing contacts of confirmed COVID-19 cases to improve secondary case ascertainment'	Objective: to investigate the acceptability of COVID-19 testing among contacts of confirmed cases as an integral part of the contact tracing process Setting: England Participants: n=1,523 were contacted, n=602 consented to testing, n=240 self-collected and returned a swab for testing Study period: recruitment 24 September to 19 October 2020; tests sent between 25 September 2020 and 21 October 2020; swabs received in lab 29 September 2020 to 2 November 2020	Intervention or exposure: Contacts of confirmed cases on NHS test and trace were sent self-swabs for PCR testing. Samples were returned to labs for testing and participants notified of results. Positive tests were advised via NHS Test and Trace. Outcomes: • Compliance or adherence • Perceptions and attitudes (acceptability of the testing programme) • COVID-19 cases (number of positive tests)	Field Epidemiology Training Programme, Global Public Health Division PHE; 4 of 6 authors (including first and last) with PHE affiliation, one author affiliated to NIHR HPRU in Behavioural Science and Evaluation, one author to NHS Test and Trace
Marchant and others, 2022 (20) 'COVID-19 mitigation measures in primary schools and association with infection and school staff wellbeing: An observational survey linked with routine data in Wales, UK'	Study design: cross sectional study (online survey) Objective: to examine the association of positive COVID-19 cases within primary schools and the school-based mitigation measures implemented aligned to government guidance Setting: primary schools in Wales, UK Participants: n=353 school staff from 59 primary schools located in 15 local authorities in Wales Study period: 9 October to 16 December 2020	NPI: • Face coverings • Physical distancing • School bubbles Intervention or exposure: school staff wearing face coverings in school; keeping 2 metres from pupils and other staff members; whether mixing of classes occurred during class time, breakfast club or extra-curricular activities, and whether teaching outdoors was applied Outcomes: • COVID-19 cases Other methodological information of relevance: Content analysis of open-ended questions, and linkage of responses with routine data. NPI compared to no NPI using regression analysis (for example reporting wearing a face covering compared to reporting of wearing no face covering) and adjusting for confounders (school size, eligibility for free school meals as an indicator for deprivation).	Funding: the Economic and Social Research Council funded the development of the HAPPEN network (which this study was conducted through) Research group (first author): Population Data Science, Medical School, Swansea University
Marsden and others, 2022 (21) 'Daily testing of contacts of SARS-CoV-2 infected cases	Study design: prospective longitudinal study (no comparator group) (incorporating quantitative and qualitative research methods)	NPI: • Test and release strategies Intervention or exposure	Funding: part funded by DHSC and NIHR with further funding from Liverpool City Council, Engineering and Physical

Reference	Study design	Methods	Funding [A]
as an alternative to quarantine for key workers in Liverpool: A prospective cohort study' Linked publication: Zhang and others, 2022 (22)	Objective: to evaluate daily lateral flow testing of asymptomatic close contacts as an alternative to 10 to 14 days isolation, and to understand experience and compliance as well as viability of this strategy Setting: Liverpool city, UK Participants: n=1,657 key workers (Police, Fire and rescue, health care, local authority) contacts of positive COVID-19 cases Study period: 4 December 2020 to 16 August 2021 To note that this is a nested study in the SMART community-wide testing Liverpool study (22).	Daily lateral flow tests for key worker contacts of confirmed SARS-CoV-2 cases, from day 1 to day 7 following the last contact with a positive case. PCR tests were undertaken for all participants on day 7. Outcomes: • Compliance or adherence (assessed by comparing the number of tests taken vs the number expected to be taken) • Perceptions and attitudes (acceptability of programme by participating organisations and stakeholders) • Lost time (school or work)	Sciences Research Council, Medical Research Council (MRC) Research group (first author): Public Health Department, Liverpool City Council
Martin and others, 2021 (5) 'Engagement with daily testing instead of self-isolating in contacts of confirmed cases of SARS-CoV-2' Linked publications: Denford and others, 2021 (4), Love and others, 2022 (3)	Study design: cross-sectional study (online survey) Objective: to evaluate the acceptability of and engagement with a 'test to enable' strategy for contacts of confirmed COVID-19 cases, and adherence to rules associated with test results Setting: England Participants: of 1,760 individuals offered daily testing, 923 consented to taking part in this survey. Of these, useable data were available for 319 individuals Study period: participants recruited between 11 to 23 December 2020 and 4 to 12 January 2021	NPI: • Test and release strategies Intervention or exposure: LFD testing using a throat and nose swab in the first 7 days of isolation rather than a 10 to 14 day isolation period. PCR test undertaken at the end of the home-testing period. Outcomes: • Compliance or adherence (to isolation rules; uptake) • Perceptions and attitudes (preferences for testing or isolation) Other methodological information of relevance: The 857 individuals who were eligible for inclusion in this study but could not take part for capacity reasons were also sent the questionnaire (usable data from 205 individuals). This group was matched to those who were offered daily testing.	Funding: NIHR HPRUs in Emergency Preparedness and Response, and Behavioural Science and Evaluation Research group (2 joint first authors): one NIHR HPRU in Emergency Preparedness and Response and Department of Psychology at King's College London, and one NIHR HPRU Behavioural Science and Evaluation and Population Health Science at University of Bristol; 5 out of 8 authors affiliated to one of the 2 NIHR HPRUs, and 4 out of 8 authors affiliated to PHE
Mensah and others, 2021 (23) 'SARS-CoV-2 infections in children following the full re-opening of schools and the impact of national lockdown: Prospective, national	Study design: prospective longitudinal study (with comparator group) Objective: to evaluate risks and trends in SARS-CoV-2 infections in school-aged children from the summer holidays in 2020 to the end of the year, and assess the impact of restrictions whilst schools were open in November 2020	NPI: • School closures • Lockdown • Multiple NPIs	Funding: surveillance funded by PHE Research group (first author): Immunisation and Countermeasures Division, National Infection Service, PHE; 8

Reference	Study design	Methods	Funding [A]
observational cohort surveillance, July-December 2020, England'	Setting: community, England Participants: school-aged children from Nursery (aged 2 to 3 years) to secondary school (up to 18 years) Study period: 13 July 2020 to 27 December 2020	Intervention or exposure: school closures during October 2020 half-term holidays (week of 26 October); national lockdown implemented 5 November 2020 to 2 December 2020 with schools remaining open Outcomes: • COVID-19 cases (PCR-confirmed case rate per 100,000; estimated from PHE data) Other methodological information of relevance: SARS-CoV-2 infection rates in school-aged children were compared with all adults (aged 16 to 64 years) and with young adults (aged 18 to 29 years). Confounders: some regions of England were subject to tiered restrictions from 12 October 2020 (schools remained open in all tiers)	out of 9 authors (including first and last) affiliated to PHE
Panchal and others, 2021 (24) 'Analysis of the factors affecting the adoption and compliance of the NHS COVID-19 mobile application: a national cross-sectional survey in England'	Study design: cross sectional study (online survey) Objective: to evaluate adult perceptions on the usability and functions of the NHS COVID-19 app post the app's release Setting: England Participants: n=1,036 responses from participants aged 18 years or older Study period: December 2020 to January 2021	NPI: • contact tracing Intervention or exposure: the NHS COVID-19 app Outcomes: • Perceptions and attitudes (views on privacy, security and usefulness of the app, views on information content provided by the app, views on usability of the app, and understanding of the functions of the app) • Compliance or adherence (how often users use specific functions)	Funding: no funding Research group (all): Department of Electrical and Electronic Engineering, Imperial College London
Smith and others, 2022 (25) 'Who is engaging with lateral flow testing for COVID-19 in the UK? The COVID-19 Rapid Survey of Adherence to Interventions and Responses (CORSAIR) study'	Study design: cross-sectional study (online survey) Objective: to evaluate LFD testing uptake and reporting of results, and the psychological, contextual, and socioeconomic factors associated with testing Setting: England and Scotland Participants: n=6,646 adults aged 16 or over (mean age: 49.4 years, standard deviation: 16.6), 54.2% female, 45.5% male, 0.3% other or prefer not to say	NPI: • Asymptomatic testing Intervention or exposure: testing using an LFD twice per week Outcomes: • Compliance or adherence (testing uptake) • Perceptions and attitudes (views on testing) Other methodological information of relevance	Funding: NIHR Health Services and Delivery Research programme and the DHSC Research group (first author): King's College London and NIHR HPRU Emergency Preparedness and Response; one out of 6 authors with UKHSA affiliation, and 3 with NIHR HPRU affiliation (Emergency Preparedness and Response)

Reference	Study design	Methods	Funding [A]
	Study period: data collected from 19 April 2021 to 2 June 2021 (4 fortnightly online cross-sectional surveys) To note that this study is embedded in a wider study, the CORSAIR study which consists of a series of weekly or biweekly cross-sectional surveys conducted throughout the COVID-19 pandemic.	Socioeconomic factors, vaccination status, presence of COVID-19 symptoms, prior testing history, health status, language spoken, and region of residence were assessed in relation to testing uptake. Data was collected in the weeks that followed the DHSC guidance for adults to test twice weekly.	
Smith and others, 2021 (26) 'Adherence to the test, trace, and isolate system in the UK: Results from 37 nationally representative surveys'	Study design: cross-sectional study (a series of 37 cross-sectional studies – CORSAIR surveys) Objective: to evaluate adherence to the UK's test trace and isolate system Setting: UK Participants: n=45,957 participants, 74,699 responses Study period: 2 March 2020 to 27 January 2021	NPI: • Contact tracing • Isolation of cases • Symptomatic testing Intervention or exposure: Official government guidance for a person to self-isolate if they had COVID-19 symptoms, to request a test to confirm if they had COVID-19, and if they tested positive, to provide details of close contacts to a dedicated service. Outcomes: • Compliance or adherence	Funding: surveys commissioned and funded by DHSC Research group (first author): Department of Psychological Medicines, Institute for Psychiatry, King's College London; 2 out of 6 authors affiliated to PHE and 3 to NIHR HPRU in Emergency Preparedness and Response (one of whom also affiliated to NIHR HPRU in Behavioural Science and Evaluation)
Smith and others, 2021 (27) 'COVID-19 and Ventilation in the Home; Investigating Peoples' Perceptions and Self-Reported Behaviour (the COVID-19 Rapid Survey of Adherence to Interventions and Responses [CORSAIR] Study)'	Study design: cross-sectional study (part of the CORSAIR surveys; published as a letter to editor) Objective: to investigate self-reported rates of opening windows to improve ventilation, self-efficacy in relation to this, and its perceived effectiveness Setting: England Participants: n=10,199 participants, 10,207 responses Study period: data collected 26 October to 2 December 2020	NPI: • Ventilation Intervention or exposure: opening windows to improve ventilation at home Outcomes: • Perceptions and attitudes (perceived effectiveness) • Compliance or adherence (self-reported rates) Other methodological information of relevance: The survey coincided with a marketing campaign from DHSC in England on 18 November 2020 to highlight the importance of ventilation to reduce the spread of COVID-19.	Funding: DHSC funded data collection Research group (first author): Institute of Psychiatry, Psychology and Neuroscience, King's College London; first author and 2 others affiliated to NIHR HPRU in Emergency Preparedness and Response; one out of 6 authors affiliated to PHE
Wallis and others, 2020 (28)	Study design: cross-sectional survey	NPI: • Symptomatic testing	Funding: no specific funding for this work declared

Reference	Study design	Methods	Funding [A]
'Experience of a novel community testing programme for COVID-19 in London: Lessons learnt'	Objective: to evaluate a London-wide community testing programme for people with suspected COVID-19 (set up by 4 NHS Trusts) Setting: London Participants: n= 865 were tested, survey distributed to the first 333 participants, and completed by 96 (29% response rate) Study period: 25 January 2020 to 13 March 2020	Intervention or exposure: People with suspected COVID-19 referred to community testing hubs (based in secondary care) by NHS 111, London Ambulance Service or other healthcare professionals. Testing completed within 24 to 48 hours of referral in the individual's home or in a drive-through. Written information regarding self-isolation was given. Outcomes: • Perceptions and attitudes (acceptability) • Compliance to adherence (to information received about self-isolation)	Research group (first author): London North West University Healthcare NHS Trust

Table S.3. Characteristics of included studies – ecological studies (population-level)

[A] For “funding”, we only reported how the specific research work was funded, as declared in the publications; in cases where some authors had declared individual grants or other fundings not directly linked to the work but had not reported funding for the work, we reported ‘no specific funding for this work declared’, as opposed to ‘no funding’ when the authors had declared that no funding had been received for the work. We recorded any mention to NIHR HPRUs as author affiliations.

Reference	Study design	Methods	Funding [A]
Bernal and others, 2021 (29) ‘The impact of social and physical distancing measures on COVID-19 activity in England: findings from a multi-tiered surveillance system’	Study design: ecological study Objective: to describe the impact of social and physical distancing measures on COVID-19 activity as detected through the different surveillance systems Setting: England Population: data gathered from community and primary care surveillance, population surveys (Flusurvey), web search queries, and PHE real-time syndromic surveillance, primary care sentinel swabbing, data on respiratory outbreaks from PHE Health Protection Teams) Study period: week 1 of 2020 to week 18 of 2020 (lockdown introduced week 13)	NPI: • Lockdown Intervention or exposure: lockdown in England introduced on 23 March 2020 Outcomes: • COVID-19 cases (positive samples, positivity rate) • COVID-19 hospitalisations (daily new hospitalisations and critical care admissions for COVID-19) • COVID-19 related mortality (excess all-cause mortality and death after lab confirmed COVID-19) Other methodological information of relevance: The timing of peaks in COVID-19 activity was compared with expected lags from introducing the stated NPI measures.	Funding: no specific funding for this work declared Research group (first author): PHE (COVID-19 surveillance cell); 21 out of 29 authors with a PHE affiliation, including first and last authors
Gianino and others, 2021 (30) ‘Evaluation of the Strategies to control COVID-19 Pandemic in Four European Countries’	Study design: ecological study Objective: to investigate the correlation between specific NPIs and incident cases during the second COVID-19 wave Setting: UK, Spain, Germany and Italy Population: population-based so nationwide within each country Study period: 1 October 2020 to 10 January 2021	NPI: • Limitation of social contacts • School closures • Workplace closure or work from home • Travel restrictions (international and local) • Contact tracing Intervention or exposure: Oxford COVID-19 Government Response Tracker (OxCGRT) was used to identify control measures in each country. Of the 19 measures outlined in the OxCGRT, 13 specific indicators were analysed: 8 related to closures and containment measures and 5 to health measures. Outcomes: • COVID-19 transmission (Granger causality test of reduction in infection growth)	Funding: no specific funding for this work declared Research group (first author): Department of Public Health and Paediatrics, University of Torino

Reference	Study design	Methods	Funding [A]
		Other methodological information of relevance: Data from OxCGRT database. Vector autoregression analysis and Granger Causality test undertaken.	
Hounsome and others, 2022 (31) medRxiv PREPRINT (posted 30 November 2022) 'Epidemiological impact of a large number of incorrect negative SARS-CoV-2 test results in South West England during September and October 2021'	Study design: ecological study Objective: to investigate an incident of reporting 'false negative' results at a testing laboratory in England during September and October 2021, and estimate the additional infections, cases, hospitalisations and deaths that could have occurred as a result of increased transmission due to the misclassification of tests Setting: England Population: test data and death data sourced from UKHSA COVID-19 dashboard and the National Pathology Exchange (NPEx) database Study period: 2 September to 12 October 2021	NPI: • Symptomatic testing Intervention or exposure: PCR based testing Outcomes: • COVID-19 cases (additional infections) • COVID-19 hospitalisations • COVID-19 related deaths Other methodological information of relevance: The test results from the laboratory in which the incident occurred were compared with other labs which were combined into a synthetic control. Causal impact analysis using a Bayesian structural time series model undertaken.	Funding: no funding Research group (all): Data, Analytics and Surveillance, UKHSA, including first and last authors
Hunter and others, 2021 (32) medRxiv PREPRINT (posted 4 January 2021) 'The Impact of the November 2020 English National Lockdown on COVID-19 case counts'	Study design: ecological study Objective: to assess the impact of the November 2020 lockdown on case count, particularly in the tiered regions Setting: England Population: England regions (local authorities) Study period: 14 October to 8 December 2020	NPI: • Lockdown Intervention or exposure: National lockdown 5 November to 12 December 2020: people were instructed to stay at home except for specific purposes; non-essential retail was closed, but schools and universities remained open. Outcomes: • COVID-19 cases (new cases) • COVID-19 transmission (R number) Other methodological information of relevance: Data on daily numbers of new cases of COVID-19 were downloaded from the English Department of Health and social care daily COVID-19 dashboard, for 315 local authorities across England. R number estimated by comparing seven-day case numbers with the previous 7	Funding: no specific funding for this work declared Research group (all authors): University of East Anglia (The Norwich Medical School, and School of Environmental Science); 2 of 3 authors affiliated to NIHR HPRU in Emergency Preparedness and Response

Reference	Study design	Methods	Funding [A]
		days. The impact of lockdown is also evaluated on different Tiers in place at the beginning of the lockdown (Tiers 1, 2, and 3).	
Jeffrey and others, 2020 (33) 'Anonymised and aggregated crowd level mobility data from mobile phones suggests that initial compliance with COVID-19 social distancing interventions was high and geographically consistent across the UK'	Study design: ecological study Objective: to assess the changes in mobility within the UK population during the implementation of social distancing policies that formed the first 2020 lockdown Setting: UK Population: UK, data collected from Facebook Data for Good on number and lengths of trips. Data collected from O2 mobile network on mast data for trips starting in each UK local authority Study period: Facebook Data for Good collected for 10 March to 22 May 2020. O2 mobile network data collected for 1 February to 5 May 2020	NPI: • Lockdown Intervention or exposure: Lockdown was implemented on 16 March 2020, including all non-essential contact and travel stopped, work from home, contact and household isolation, closure of schools and all hospitality settings. Government messaging from 23 March 2020: "you must stay at home". Outcomes: • Compliance or adherence (mobility data as a proxy for adherence to lockdown) Other methodological information of relevance: The percentage change in mobility was calculated by comparing the data with a baseline level of mobility (mean daily number of trips per local authority district in the week 10 to 16 March 2020).	Funding: Wellcome Trust Investigator Award and a Wellcome Trust Collaborator Award. Also supported by other organisations including the NIHR HPRU Research group (first author): MRC Centre for Global Infectious Disease Analysis, Abdul Latif Jameel Institute for Disease and Emergency Analytics, Imperial College London; one out of 25 authors affiliated to NIHR HPRU in Healthcare Associated Infections and Antimicrobial Resistance
Kendall and others, 2020 (34) 'Epidemiological changes on the Isle of Wight after the launch of the NHS Test and Trace programme: a preliminary analysis'	Study design: ecological study Objective: to make a preliminary assessment of the epidemiological impact of the Test and Trace programme (including version 1 of the NHS contact tracing app) using publicly available data Setting: Isle of Wight Population: users of the test and trace app on the Isle of Wight Study period: 5 May to 29 June 2020	NPI: • Contact tracing Intervention or exposure: The test and trace programme was launched on the Isle of Wight, including version 1 of the NHS contact tracing app. The app used Bluetooth to detect close proximity contacts, and was configured for people to report a cough and or fever, characteristic symptoms of COVID-19, then provided links to generic health advice and details about testing. Outcomes: • COVID-19 cases (per capita incidence) • COVID-19 transmission (R number) Other methodological information of relevance: Daily case data used from PHE. Bayesian estimation of the instantaneous R number was undertaken. Results from the Isle of	Funding: Li Ka Shing Foundation and a UK Economic and Social Research Council grant Research groups (first author): Big Data Institute, Li Ka Shing Centre for Health Information and Discovery, Nuffield Department of Medicine, University of Oxford

Reference	Study design	Methods	Funding [A]
		Wight were compared to 150 other Upper Tier Local Authorities (UTLAs) in England using a synthetic control approach.	
Kendall and others, 2023 (35) 'Epidemiological impacts of the NHS COVID-19 app in England and Wales throughout its first year'	Study design: ecological study Objective: to describe and evaluate the NHS COVID-19 app during its first active year, from its launch date of 24 September 2020. Particularly to assess user engagement and impact on COVID-19 cases, hospitalisations and deaths averted Setting: England and Wales Population: proportion of NHS COVID-19 app users for each LTLA in England and Wales Study period: 24 September 2020 to 24 September 2021	NPI: • Contact tracing Intervention or exposure: NHS COVID-19 app Outcomes: • COVID-19 cases (averted) • COVID-19 hospitalisation (averted) • COVID-19 related mortality (deaths averted) • compliance or adherence Other methodological information of relevance: Confounders: immunity via prior infection and vaccination. The stated outcomes were estimated based on a modelling approach by Wymant and others (36) (included in this review).	Funding: Li Ka Shing Foundation award and research grant funding from the DHSC, and NIHR HPRU in Genomics and Enabling Data Research group (first author): Department of Statistics, University of Warwick; 2 out of 8 authors affiliated to UKHSA; 2 affiliated to the NIHR HPRU in Genomics and Enabling Data
Meo and others, 2020 (37) 'Impact of lockdown on COVID-19 prevalence and mortality during 2020 pandemic: observational analysis of 27 countries'	Study design: ecological study Objective: to assess the impact of 15 days before, 15 days during, and 15 days after the lockdown on the trends in the prevalence and mortality in 27 countries during COVID-19 pandemic Setting: 27 countries across the world including UK Population: population of the 27 countries, information obtained on population from World Bank Study period: 15 days before, 15 days during, and 15 days after the lockdown (UK lockdown date: 23 March 2020)	NPI: • Lockdown Intervention or exposure: enforced lockdown policies Outcomes: • COVID-19 cases (prevalence) • COVID-19 related mortality (number of deaths) Other methodological information of relevance: World Health Organization (WHO) data on COVID-19 prevalence and mortality for each country was used in the analysis.	Funding: King Saud University Research group (first author): Department of Physiology, College of Medicine, King Saud University, Saudi Arabia
Muegge and others, 2023 (38) 'National lockdowns in England: The same restrictions for all, but do the impacts on	Study design: ecological study Objective: to investigate the effectiveness of the 3 national lockdowns in England on mortality rates in local authority regions; specifically looking at how long after the implementation of lockdowns did mortality risk reduce and did this risk differ by	NPI: • Lockdown Intervention or exposure: Defines lockdown as ''a temporary condition imposed by governmental authorities in which people are required to stay in their	Funding: no specific funding for this work declared Research group (all): School of Mathematics and Statistics, University of Glasgow

Reference	Study design	Methods	Funding [A]
COVID-19 mortality risks vary geographically?'	region, as well as looking for similarities in mortality risk across regions Setting: 312 local authority districts in England Population: population demographics based on Office for National Statistics (ONS) 2019 data for England, and an average local authority district population size of 179,945 Study period: 1 February 2020 to 14 May 2021	homes and refrain from or limit activities outside the home involving public contact''. Outcomes: • COVID-19 related mortality (mortality risk) Other methodological information of relevance ONS provided data on population demographics and number of deaths. Poisson log-linear model used to analyse temporal and regional trends in COVID-19 mortality risk.	
Wymant and others, 2021 (36) 'The epidemiological impact of the NHS COVID-19 app'	Study design: ecological study Objective: to evaluate the impact of the NHS contact tracing app on the COVID-19 pandemic Setting: 307 LTLAs in England Population: local authorities in England Study period: 3 phases; before app launch, from 1 October to early November 2020 (version 1 of app) and from early November to 31 December 2020 ('improved version' of the app)	NPI: • Contact tracing (NHS COVID-19 App) Outcomes: • COVID-19 cases (cases averted) • COVID-19 related mortality (deaths averted) Other methodological information of relevance: Publicly available date on COVID-19 cases numbers used. LTLA population data from ONS. Modelling and statistical analysis used to estimate the number of cases averted.	Funding: Li Ka Shing Foundation award and research grant funding from the DHSC Research group (first author): Big Data Institute, Li Ka Shing Centre for Health Information and Discovery, University of Oxford
Zhang and others, 2022 (22) 'Impact of community asymptomatic rapid antigen testing on COVID-19 related hospital admissions: synthetic control study'	Study design: ecological study Objective: to analyse the impact of voluntary rapid testing for SARS-CoV-2 antigen on COVID-19 related hospital admissions Setting: Liverpool city (community-wide) Population: general population of Liverpool without COVID-19 symptoms (n=498,042) Study period: 6 November 2020 to 2 January 2021	NPI: • Asymptomatic testing Intervention or exposure: rapid antigen testing in open access supervised self-testing centres (COVID-SMART: systematic meaningful asymptomatic repeated testing) Outcomes: • COVID-19 hospitalisations (weekly hospital admissions with a main diagnosis, or clinical diagnosis of COVID-19) Other methodological information of relevance: A synthetic control analysis was conducted which compared hospital admissions for small areas in the intervention population (Liverpool city) with groups of control areas from the rest of England which were	Funding: DHSC Research group (first author): Department of Public Health, University of Liverpool; 3 out of 8 authors affiliated to NIHR HPRU in Gastrointestinal Infections

Reference	Study design	Methods	Funding [A]
		weighted for similarity of past COVID-19 related hospital admission rates and sociodemographic factors. Confounders: the start of the testing programme coincided with the second national lockdown	
Zhang and others, 2022 (39) 'Evaluating the impacts of tiered restrictions introduced in England, during October and December 2020 on COVID-19 cases: A synthetic control study'	Study design: ecological study Objective: to evaluate and compare the impact of tier 2 and tier 3 restrictions on COVID-19 cases during October and December 2020 Setting: Middle Layer Super Output Areas (MSOAs) in England (nationwide) Population: tier 2 October 2020 (n= 25,272,230); tier 3 October 2020 (n=3,068,261); tier 2 December 2020 (n=31,682,197); tier 3 December 2020 (n=23,347,218) Study period: 4 weeks before and 4 weeks after 19 October 2020; and 4 weeks before and 4 weeks after 7 December 2020	NPI: • Tiered restrictions (tier 2 and 3 restrictions) Outcomes: • COVID-19 cases (weekly infections) Other methodological information of relevance: Data sources: the English Indices of Multiple Deprivation (IMD); Care Quality Commission; ONS; 2011 Census; UK Government COVID-19 dashboard; Open data institute. The outcomes for areas under Tier 3 restrictions were compared to a synthetic control group (areas under Tier 2 restrictions).	Funding: NIHR HPRU in Gastrointestinal Infections Research group (first author): Department of Public Health, Policy and Systems, University of Liverpool

Table S.4. Characteristics of included studies – mixed methods studies

[A] For "funding", we only reported how the specific research work was funded, as declared in the publications; in cases where some authors had declared individual grants or other fundings not directly linked to the work but had not reported funding for the work, we reported 'no specific funding for this work declared', as opposed to 'no funding' when the authors had declared that no funding had been received for the work. We recorded any mention to NIHR HPRUs as author affiliations.

Reference	Study design	Methods	Funding [A]
Blake and others, 2021 (40) 'Perceptions and experiences of the University of Nottingham pilot SARS-CoV-2 asymptomatic testing service: a mixed-methods study' Linked publication: Blake and others, 2021 (41) (qualitative)	Study design: mixed methods study (online survey, interviews, focus groups) Objective: to explore uptake, adherence, acceptability, and experiences of testing; to assess students' anxiety and risk perceptions, and to explore perceptions of testing implementation Setting: University of Nottingham Participants • Testing offered to all 150 first year students, 65 final year students going out into practice, and 70 university staff having face-to-face contact with students; post-evaluation survey completed by 99 of 215 students (84.8% female, 70% first year; 93.9% of testing participants) • Interviews and focus groups: n= 41 (21 first year students, 10 final-year students, 10 staff) Study period: July 2020 to October 2020	NPI: • Asymptomatic testing Intervention: weekly asymptomatic PCR testing offered for 12 weeks (10 swab tests, 2 saliva tests) Outcomes: • Compliance or adherence (test uptake, number of tests completed) • Perceptions and attitudes (views on testing, acceptability, risk perceptions) Other methodological information of relevance: Participants were also offered antibody tests on alternate weeks during the 12-week period.	Funding: University of Nottingham Research group (all): University of Nottingham
Dallera and others, 2022 (42) 'Evaluating the feasibility and acceptability of a safety protocol to mitigate SARS-CoV-2 transmission risks when participating in full-capacity live mass events: a cross-sectional survey and interview-based study'	Study design: mixed methods study (a cross-sectional survey, interviews and a focus group) Objective: to investigate the views and perceptions of attendees of a music festival on the feasibility and acceptability of the CAPACITY protocol (part of the UK government's Events Research Programme) Setting: Standon Calling Festival, Hertfordshire, England. Participants: n=1,093 (women 65%, men 35%) responded to survey; n=11 were interviewed) Study period: November 2021 to January 2022 (festival: July	NPI: • Restrictions of large gatherings Intervention: CAPACITY protocol combining professionally witnessed home-based videoed pre-event lateral flow testing taken within 48 hours of entering the venue of a full-capacity mass event Outcomes: • Perceptions and attitudes (views on testing, acceptability and feasibility of the protocol)	Funding: no specific funding for this work declared Research group (all): Department of Primary Care and Public Health, Imperial College London, London, UK

Reference	Study design	Methods	Funding [A]
	2021, survey: November 2021, focused groups: December 2021 to January 2022)		
French and others, 2022 (43) 'Low uptake of COVID-19 lateral flow testing among university students: a mixed methods evaluation'	Study design: mixed methods study (quantitative analysis of test uptake, qualitative analysis of views of testing measured by online survey and qualitative interviews) Objective: to evaluate uptake of COVID-19 lateral flow testing among asymptomatic university students, explore acceptability, feasibility, barriers and facilitators to uptake and implementation Setting: University of Bristol, UK Participants • n=36,054 students enrolled at the University • n=8,025 students tested at least once • n=436 students completed the survey • n=21 students interviewed Study period: 30 November 2020 to 18 December 2020	NPI: • Asymptomatic testing (lateral flow test [LFT]) Intervention: 2 LFT tests 3 days apart before travelling home for winter break as per government recommendation; tests provided by University of Bristol but done by students themselves Outcomes: • Compliance or adherence (test uptake, including demographic variations) • Perceptions and attitudes (experience on acceptability, feasibility, barriers and facilitators)	Funding: NIHR HPRU in Behavioural Science and Evaluation Research group (all): University of Bristol and NIHR HPRU Behavioural Science and Evaluation; one out of 5 authors with UKHSA affiliation
Hirst and others, 2021 (44) 'Feasibility and Acceptability of Community Coronavirus Disease 2019 Testing Strategies (FACTS) in a University Setting' Linked publication: Wanat and others, 2021 (45) which reports on the qualitative element in more detail	Study design: mixed methods study (smartphone App, survey and interviews); qualitative element reported separately in Wanat and others, 2021 (45) Objective: to determine the feasibility and acceptability of implementing mass regular asymptomatic self-testing for COVID-19 Setting: University of Oxford Participants • Of the 2,195 students and staff eligible, 664 attended training, and 551 participated in testing (plus 183 from an additional site, making total sample size 734) • 18 participants interviewed Study period: 29 October 2020 to 18 January 2021; survey responses between 1 December 2020 and 7 January 2021;	NPI: • Asymptomatic testing Intervention: weekly lateral flow test self-testing (the Innova Rapid SARS-CoV-2 Antigen Test Kit, Innova Medical Group) Outcomes: • Compliance or adherence • Perceptions and attitudes (acceptability of asymptomatic self-testing)	Funding: Oxford University Medical Sciences Division Research group (first author): Nuffield Department of Primary Care Health Sciences, University of Oxford, and NIHR Oxford Biomedical Research Centre; one author out of 16 affiliated to NIHR HPRU in Healthcare Associated Infections and Antimicrobial Resistance

Reference	Study design	Methods	Funding [A]
	interviews between 11 December 2020 and 18 January 2021		
Zhang and others, 2021 (46) 'Public health information on COVID-19 for international travellers: lessons learned from a mixed-method evaluation'	Study design: mixed methods study (questionnaire survey and follow up interviews); qualitative element reported separately in Cai and others, 2022 (47) Objective: to evaluate the effectiveness of communication materials containing advice for travellers arriving at UK ports Setting: London Heathrow airport, UK Participants • Eligible participants: passengers arriving in London Heathrow on 4 March 2021 from Singapore, and on 12 and 13 March 2021 from China • Survey response: n=117 (median age=53 and 40% male) • Interviews: n=15 (5 men and 10 women, age ranging from 21 to 80 years) Study period: 4, 12 and 14 March 2021	NPI: • Border measures Intervention: communication materials containing advice on self-isolation, COVID-19 symptoms and testing for passengers arriving at London Heathrow Outcomes: • Perceptions and attitudes	Funding: NIHR on behalf of the DHSC Research group (first author): Population Health Sciences, Bristol Medical School, University of Bristol; 4 out of 13 authors affiliated to NIHR HPRUs (Behavioural Science and Evaluation, Emerging and Zoonotic Infections, Gastrointestinal Infections); 5 out of 13 authors PHE affiliated

Table S.5. Characteristics of included studies – qualitative studies

[A] For "funding", we only reported how the specific research work was funded, as declared in the publications; in cases where some authors had declared individual grants or other fundings not directly linked to the work but had not reported funding for the work, we reported 'no specific funding for this work declared', as opposed to 'no funding' when the authors had declared that no funding had been received for the work. We recorded any mention to NIHR HPRUs as author affiliations.

Reference	Study design	Methods	Funding [A]
Blake and others, 2021 (41) 'Students' views towards SARS-CoV-2 mass asymptomatic testing, social distancing and self-isolation in a university setting during the COVID-19 pandemic: A qualitative study' Linked publication: Blake and others, 2021 (40)	Study design: qualitative study (4 online focus groups); part of the mixed methods study by Blake and others, 2021 (40) Objective: to explore university students' perceptions and experiences of SARS-CoV-2 asymptomatic testing, social distancing and self-isolation, during the COVID-19 pandemic Setting: University of Nottingham Participants: n = 25 (mean age 23 years [18 to 51], 64% female, 36% male, 32% living on campus, 52% not tested, 44% symptomatic testing, 4% asymptomatic testing, 72% had previously self-isolated) Study period: October 2020 (two-week period)	NPI: • Asymptomatic testing • Limitation of social contacts • Isolation of cases • Isolation of contacts Intervention: limitation of social contacts and self-isolation rules as per government restrictions in place at the time (including no households mix indoor, rule of 6 outdoors and remote studying), and a mass asymptomatic testing programme implemented at the university at the time Outcomes: • Perceptions and attitudes Other methodological information of relevance: Confounders: Nottingham was in 'tier 2 high alert' at the time of the study.	Funding: MRC and the Institute for Policy and Engagement at the University of Nottingham Research group (all): University of Nottingham
Cai and others, 2022 (47) 'Learning about COVID-19 across borders: public health information and adherence among international travellers to the UK' Linked publication: Zhang and others, 2021 (46)	Study design: qualitative study (telephone interviews); part of the mixed methods study by Zhang and others, 2021 (46) Objective: to investigate risk assessment processes, decision-making and adherence to official advice among international travellers, to provide evidence for future policy on the provision of public health information to facilitate safer international travel Setting: Heathrow Airport, London Participants: n=15 international air passengers arriving at the London Heathrow Airport on scheduled flights from China and Singapore (ranging from 20 to 80 years, 5 males and 10 females)	NPI: • Border measures Intervention: border measures in place at time of study (including a broadcast message made inflight to encourage passengers to report symptoms, leaflets and or posters giving COVID-19 related public health advice in flight or at the airport) Outcomes: • Perceptions and attitudes (views of COVID-19 public health information [border measures in place])	Funding: NIHR on behalf of the DHSC Research group (first author): University of Bristol; 4 out of 12 authors with PHE affiliation, and 8 with a NIHR HPRU affiliation (Behavioural Science and Evaluation, Emergency Preparedness and Response, Emerging and Zoonotic infections, and Gastrointestinal infections)

Reference	Study design	Methods	Funding [A]
	Study period: March 2020 to April 2020		
Denford and others, 2021 (4) 'Engagement With Daily Testing Instead of Self-Isolating in Contacts of Confirmed Cases of SARS-CoV-2: A Qualitative Analysis' Linked publications: Love and others, 2022 (3) and Martin and others, 2021 (5)	Study design: qualitative study (interviews) Objective: to evaluate factors influencing uptake of asymptomatic testing as an alternative to 10 days isolation as a contact, and the impact of test results on behaviour (within a feasibility study of testing versus isolation in contacts) Setting: UK, community, targeting participants who declined testing, and people from ethnic minority groups Participants: n=52 adults aged 18 to 73 years; 18 from ethnic minority groups Study time period: 11 December to 23 December 2020, and 4 January to 12 January 2021 To note that this feasibility study was then followed by a randomised controlled trial, see Love and others (1) and Denford and others (2).	NPI: • Test and release strategies Intervention: Daily lateral flow testing at home for up to 6 days, as an alternative to self-isolation. A negative test permitted the individual to resume normal activities within the limits of COVID-19 restrictions in place. Outcomes: • Perceptions and attitudes (factors influencing acceptance of testing, and impact of test results)	Funding: NIHR HPRUs in Emergency Preparedness and Response, and Behavioural Science and Evaluation Research group (first author): University of Bristol and NIHR HPRU Behavioural Science and Evaluation; 4 out of 8 authors with an UKHSA affiliation, and 7 with a NIHR HPRU affiliation (Behavioural Science and Evaluation, and Emergency Preparedness and Response)
Denford and others, 2022 (2) 'A qualitative process analysis of daily contact testing as an alternative to self-isolation following close contact with a confirmed carrier of SARS-CoV-2' Linked publication: Love and others 2022 (1)	Study design: qualitative study (online or telephone interviews) Objective: to understand factors influencing the use of daily lateral flow tests, interpretation of test results and associated behaviours, to support the interpretation of findings of a RCT of daily contact testing versus self-isolation (included linked publication Love 2022 (1)) Setting: UK Participants: 60 participants, all contacts of a COVID-19 case (42 randomised to daily contact testing and 18 randomised to self-isolation) Study period: interviews conducted between 24 June 2021 and 8 July 2021	NPI: • Test and release strategies Intervention: Participants had been randomised to daily lateral flow testing or to 10 days self-isolation following close contact with a confirmed SARS-CoV-2 case, see Love and others, 2022 (1). Outcomes: • Compliance or adherence (testing uptake) • Perceptions and attitudes (views on testing, test results)	Funding: NIHR HPRU in Emergency Preparedness and Response, and Behavioural Science and Evaluation Research group (first author): University of Bristol and NIHR HPRU Behavioural Science and Evaluation; 3 out of 12 authors with UKHSA affiliations, and 10 with a NIHR HPRU affiliation (Behavioural Science and Evaluation, and Emergency Preparedness and Response)

Reference	Study design	Methods	Funding [A]
	To note that the feasibility and acceptability of the intervention was first tested on a smaller participants group, see Love and others (3), Denford and others (4) and Martin (5).		
Denford and others, 2022 (7) 'Feasibility and acceptability of daily testing at school as an alternative to self-isolation following close contact with a confirmed case of COVID-19: a qualitative analysis' Linked publication: Young and others, 2022 (6)	Study design: qualitative study (online or telephone interviews) Objective: to improve understanding of compliance with isolation, reasons for participating in testing, and behaviour based on test results of people enrolled in a RCT of daily contact testing versus isolation (6) Setting: a sample of schools enrolled in the RCT across England (6) Participants: n=63 (15 staff, 24 students, 24 parents); of which 2 staff and 6 students had not participated in testing, and 7 parents were parents of children who had not participated in testing Study period: RCT was undertaken from 19 April to 10 May 2021 to 27 June 2021	NPI: • Test and release strategies Intervention: daily lateral flow testing or isolation Outcomes: • Perceptions and attitudes (acceptability of daily testing, interpretation of and confidence in test results) • Compliance or adherence (adherence to avoiding contact and behaviour during the testing period)	Funding: UK government DHSC, DfE, ONS; also supported by NIHR, NIHR HPRU in Healthcare Associated Infections and Antimicrobial Resistance; the NIHR HPRU in Behavioural Science and Evaluation Research group (first author): University of Bristol and NIHR HPRU Behavioural Science and Evaluation; 4 out of 8 authors with the NIHR HPRU affiliation
Marshall and others, 2022 (48) F1000Research PREPRINT (published 6 September 2022, awaiting peer review) 'Public perceptions and interactions with UK COVID-19 Test, Trace and Isolate policies, and implications for pandemic infectious disease modelling'	Study design: qualitative study (interviews) Objective: to investigate the public's perceptions of test, trace and isolate systems and their interactions with these tools and policies (data related to a third objective, to investigate how COVID-19 academic modellers reflect this information in their test, trace, and isolate (TTI) models was also evaluated as part of this study, not extracted) Setting: UK Participants: n=20 members of public aged 18 or older interviewed; n=9 pandemic modellers involved in modelling TTI policies in the UK Study period: 1 July to 26 July 2021	NPI: • Contact tracing Intervention: test, trace and isolate policies implemented in the UK Outcomes: • Perceptions and attitudes	Funding: MRC through the UKRI/NIHR SARS-CoV-2 Rapid Response scheme Research group (first author): Department of Computer Science, University of Manchester; one out of 13 authors affiliated to the NIHR HPRU in Behavioural Science

Reference	Study design	Methods	Funding [A]
O'Donnell and others, 2022 (49) 'Widening or narrowing inequalities? The equity implications of digital tools to support COVID-19 contact tracing: A qualitative study'	Study design: qualitative study (semi-structured interviews and focus groups) Objective: to seek the views of a wide range of people, but focusing on marginalised or disadvantaged communities, on the Test and Protect programme and the digital contact tracing tool Setting: Scotland Participants: n=42 (13 key informants from organisations who support people in marginalised circumstances, and 29 members of the public) Study period: June and July 2020 (whilst the app was in development)	NPI: • Contact tracing Intervention: the national, digital 'Protect Scotland' app, part of the NHS's 'Test and Protect' programme in Scotland (launched in September 2020) Outcomes: • Perceptions and attitudes	Funding: Digital Health and Care Innovation Centre Research group (first author): School of Health and Wellbeing, University of Glasgow
Robin and others, 2022 (50) 'Local Community Response to Mass Asymptomatic COVID-19 Testing in Liverpool, England: Social Media Analysis' Linked publications: Marsden and others (21) and Zhang and others (22)	Study design: qualitative study (thematic analysis of local community narratives on social media) Objective: to evaluate the acceptability of asymptomatic testing and identify barriers and facilitators to testing uptake Setting: Liverpool Participants: n=1,096 comments sampled from an online newspaper (n=219), the city council Facebook page (n=472) and twitter (n=405) Study period: 2 November to 8 November 2020	NPI: • Asymptomatic testing Outcomes: • Perceptions and attitudes	Funding: no specific funding for this work declared Research group (all): UKHSA Behavioural Science and Insights Unit
Wanat and others, 2021 (45) 'Perceptions on undertaking regular asymptomatic self-testing for COVID-19 using lateral flow tests: a qualitative study of university students and staff'	Study design: qualitative study (semi-structured remote interviews and qualitative survey responses); part of larger mixed methods study by Hirst and others, 2021 (44) Objective: to examine the experiences and behaviours of university students and staff of regular asymptomatic self-testing using LFTs	NPI: • Asymptomatic testing Intervention: Lateral flow self-testing, using the Innova Rapid SARS-CoV-2 Antigen Test Kit (Innova Medical Group). Participants were required to repeat testing weekly.	Funding: University of Oxford Research group (first author): Nuffield Department of Primary Care Health Sciences, University of Oxford; one out of 14 authors affiliated to NIHR HPRU Healthcare Associated Infections and Antimicrobial

Reference	Study design	Methods	Funding [A]
Linked publication: Hirst and others, 2021 (44)	Setting: University of Oxford Participants: interviewed 18 and surveyed 214 students and staff members (of those surveyed, 62 provided additional free text comments) Study period: survey responses between 1 December 2020 and 7 January 2021; interviews took place between 11 December 2020 and 18 January 2021	Outcomes: • Compliance or adherence (to testing) • Perceptions and attitudes (acceptability, understanding and implications of test results)	Resistance
Watson and others, 2022 (51) 'How do we engage people in testing for COVID-19? A rapid qualitative evaluation of a testing programme in schools, GP surgeries and a university'	Study design: qualitative study (interviews and focus groups) Objective: to explore the experiences of individuals who participated or declined to participate in COVID-19 pilot testing surveillance programme in educational and healthcare settings (the Southampton COVID-19 Saliva Testing Programme) Setting: educational (schools and a university) and healthcare settings (GP surgeries) in Southampton, England Participants: 223 staff, students, and household members from 2 general practices, the University of Southampton, and from one infant school, one junior school, one primary and one secondary school in the city Study period:4 June to 7 November 2020	NPI: • Asymptomatic testing Intervention: Participants self-collected saliva samples weekly. Samples were reverse transcription loop-mediated isothermal amplification (RT-LAMP) tested in a laboratory. Outcomes: • Perceptions and attitudes (participants were asked how engagement with the programme could have been improved, and the impacts of the programme on engagement with testing)	Funding: DHSC Research group (first author): School of Human Development and Health, Global Health Research Institute, University of Southampton

Table S.6. Characteristics of included studies – modelling studies

[A] For “funding”, we only reported how the specific research work was funded, as declared in the publications; in cases where some authors had declared individual grants or other fundings not directly linked to the work but had not reported funding for the work, we reported ‘no specific funding for this work declared’, as opposed to ‘no funding’ when the authors had declared that no funding had been received for the work. We recorded any mention to NIHR HPRUs as author affiliations.

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
Abernethy and others, 2022 (52) ‘Optimal COVID-19 lockdown strategies in an age-structured SEIR model of Northern Ireland’	Study objective: to identify optimal timings of short-term lockdowns that enable long-term pandemic exit strategies by clearing the threshold for herd immunity or achieving time for vaccine development with minimal excess deaths Setting: Northern Ireland Model: a susceptible-exposed-subclinical infectious-clinical infectious-hospitalised-recovered-deceased (SEIIR variation) model Data: hypothetical based on age distribution of Northern Ireland population, epidemiological data sourced from the Department of Health and the ONS; data on deaths from March to May 2020 taken from Imperial College COVID-19 Response Team Study period: model simulated the pandemic from throughout 2020 and early 2021	NPI: • Lockdown Outcomes: • COVID-19 transmission (Rt value) • COVID-19 related mortality (total deaths) • COVID-19 cases (number of cases) • COVID-19 hospitalisations (number of hospitalisations or ICU admissions) Scenarios: • A 1,000 day simulation comparing blanket restrictions on the entire population with restrictions for vulnerable older age groups • A 2,000 day simulation of hospital occupancy as a trigger for lockdown	Funding: no funding Research group (first author): Sheffield Hallam University
Albi and others, 2021 (53) ‘Modelling lockdown measures in epidemic outbreaks using selective socio-economic containment with uncertainty’	Study objective: to assess the impact of lockdown measures aimed at controlling SARS-CoV2 Setting: Germany, France, Italy, Spain, the UK and the United States Model: a susceptible-exposed-infectious, recovered-deceased (SEIRD) model Data: number of infected, recovered and deaths from Johns Hopkins University Github repository. Country population demographics from United Nations World Populations Prospects	NPI: • Lockdown (relaxation of measures) Outcomes: • COVID-19 transmission (R number and expected cases) Scenarios: • Relaxing lockdown measures at 2 different time points (11 May 2020 or 1 June 2020) • Different extent of relaxing lockdown (school and work activities) – but results only reported for Germany, France, Italy and Spain • Relaxing lockdown in a progressive way in 3 phases – but results only reported for Germany, France, Italy and Spain	Funding: no specific funding for this work declared Research group (first author): University of Verona – no UK authors and no UK involvement, but UK was one of the countries studied in the model

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
	Study period: first wave of infection, March 2020 to 1 July 2020		
Almagor and others, 2020 (54) 'Exploring the effectiveness of a COVID-19 contact tracing app using an agent-based model'	Study objective: to explore the effectiveness of a COVID-19 contact tracing app Setting: urban area (simulated), designed to be representative of Glasgow, Scotland Model: an agent-based model Data: synthetic population of 103,000 generated from 2011 UK Census data Study period: unclear	NPI: • Contact tracing (contact tracing app [CTA]) • Symptomatic testing (availability of testing, testing prioritisation of symptomatic people) Outcomes: • COVID-19 transmission (infection prevalence) Scenarios: Simulate the impact on viral spread of various combinations of: • proportion of CTA users in the population • levels of testing capacity • levels of compliance with self-isolation on the part of CTA users • testing policy	Funding: MRC, Chief Scientist Office Research group (all): Social and public health science unit, University of Glasgow
Alsing and others, 2020 (55) medRxiv PREPRINT (posted 28 May 2020) 'Containing COVID-19 outbreaks with spatially targeted short-term lockdowns and mass-testing'	Study objective: to evaluate the effects of a targeted two-week lockdown and asymptomatic testing when contact tracing and social distancing alone has suppressed but not contained SARS-CoV-2 spread Setting: England and Wales Model: branching process network transmission model embedded on a network interaction model Data: 2011 UK census data for commuter flows Study period: unclear	NPI: • Lockdown (spatially targeted local lockdowns) • Asymptomatic testing Outcomes: • COVID-19 transmission (R number) • COVID-19 cases (number of active infections) Scenarios: • Baseline of contact tracing and modest social distancing • Baseline plus targeted mass asymptomatic testing with case isolation • Baseline plus targeted lockdowns	Funding: no funding Research group (first author): Department of Physics, Stockholm University, Stockholm
Arnold and others, 2022 (56) 'Estimating the effects of lockdown timing on COVID-19 cases and deaths in England: A counterfactual modelling study'	Study objective: to estimate the number of cases and deaths that would have occurred in England by 1 June 2020 if social distancing and mandatory lockdown measures had been implemented one or 2 weeks earlier, and the impact on the required duration of lockdown Setting: England Model: stochastic simulation model (specific model not	NPI: • Lockdown Outcomes: • COVID-19 cases (incident cases) • COVID-19 related mortality Scenarios: • Natural growth: social distancing and lockdown as implemented	Funding: no specific funding for this work declared Research group (first author): Leeds Institute for Data Analytics, University of Leeds

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
	reported) Data: data on incidence and lab-confirmed cases of COVID-19 obtained from the government website; data on deaths from NHS England and ONS Study period: March to June 2020	• Counterfactual growth: social distancing and lockdown one week earlier • Counterfactual growth: social distancing and lockdown 2 weeks earlier	
Aspinall and others, 2020 (57) medRxiv PREPRINT (posted 6 August 2020) 'Quantifying threat from COVID-19 infection hazard in Primary Schools in England'	Study objective: to evaluate effects of school reopening on societal risk, operational risk, and individual risk associated with COVID-19 infection Setting: primary schools in England Model: Bayesian belief network model Data: UK government data on primary schools and daily attendance from Department for Education. COVID-19 prevalence data, and population data at UTLA level from ONS. Incidence data at UTLA level from PHE Study period: 1 June 2020 to September 2020	NPI: • School closures (return to school) Outcomes: • COVID-19 cases (counts of infected children, teachers and support staff) Scenarios: • Baseline: 1 June 2020 when schools reopened to nursery, reception, year 1 and year 6 children when around 1 in 3 children attended school • Full return of all children in nursery, reception, year 1 and year 6 in June 2020 • Return of all primary school children in September 2020	Funding: no funding Research group (first author): School of Earth Sciences, University of Bristol, UK
Banks and others, 2022 (58) 'SCoVMod – a spatially explicit mobility and deprivation adjusted model of first wave COVID-19 transmission dynamics'	Study objective: to estimate the impact of measures that impose severe restrictions on mobility on the spread of COVID-19, and to assess the impact of measures of deprivation in order to estimate its impact on COVID-19 related deaths Setting: Scotland Model: an agent-based model Data: various data sources; Scottish census data from National Records for Scotland and COVID-19 data from Public Health Scotland, Scottish Index of Multiple Deprivation and Google mobility data Study period: March to May 2020	NPI: • Lockdown Outcomes: • COVID-19 related mortality Scenarios: unclear	Funding: Wellcome; the Roslin ISP2 (theme 3); the BBSRC; the Strategic Blue Cloud Fund to Fight COVID-19 grant; Defra projects Research group (first author): Roslin Institute, University of Edinburgh

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
Bassolas and others, 2021 (59) 'Optimising the mitigation of epidemic spreading through targeted adoption of contact tracing apps'	Study objective: to determine which people should install a contact tracing app to optimise effect of contact tracing Setting: high school, hospital, art gallery and workplace Model: a susceptible-infectious-recovered (SIR) model Data: hypothetical Study period: unclear	NPI: • Contact tracing (contact tracing app) Outcomes: • COVID-19 transmission (R number) Scenarios: • Baseline, asking all to install a contact tracing app (uniform random installation) • Targeting potential super-spreaders (degree-based installation) • Distributed targeted installation	Funding: no specific funding for this work declared Research group (first author): Queen Mary, University of London
Bays, 2021 (60) 'Insights gained from early modelling of COVID-19 to inform the management of outbreaks in UK prisons'	Study objective: to evaluate impact of isolating symptomatic cases, shielding and isolation of incoming prisoners on COVID-19 infection in a prison setting Setting: prison (Her Majesty's Prison and Probation Service in the UK (HMPPS)) containing 678 prisoners, with 1.2% designated as extremely clinically vulnerable Model: 2 models – 1. In-prison disease model (with deterministic and stochastic evaluations) and 2. Monte Carlo simulation model Data: based on data from HMPPS Study period: unclear	NPI: • Isolation of cases • Shielding • Cohorting (isolation of new prison admissions, referred to as 'reverse cohorting') Outcomes: • COVID-19 transmission (infection rates) • COVID-19 hospitalisations Scenarios: Different models varied the "force of infection" which was various levels of social distancing, hand washing and mask wearing assumed to lead to different reductions in infection rates. Different numbers of days to isolate new entrants to the prison (cohorting) were also modelled, also with and without isolation of positive cases and shielding.	Funding: no specific funding for this work declared Research group (first author): PHE (now UKHSA) Joint Modelling Cell; UKHSA first and last authors
Bays and others, 2021 (61) 'What effect might border screening have on preventing importation of COVID-19 compared with other infections? A modelling study'	Study objective: to look at the impact on disease importation of requiring travellers to test at the point of entry Setting: inbound air travellers, no specific country Model: Monte Carlo simulation model Data: unclear Study period: not reported	NPI: • Border measures (travellers have a single on-arrival test at airports) Outcomes: • COVID-19 cases (detection rates of COVID-19) Scenarios: unclear	Funding: no specific funding for this work declared Research group (all): PHE (including UKHSA first and last authors)

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
Bays and others, 2022 (62) 'What effect might border screening have on preventing importation of COVID-19 compared with other infections?: considering the additional effect of post-arrival isolation'	Study objective: to evalute the effectiveness of COVID-19 testing after an enforced period of self-isolation post-arrival Setting: unclear Model: Monte Carlo simulation model Data: unclear Study period: unclear	NPI: • Border measures (period of self-isolation prior to post-arrival test) Outcomes: • COVID-19 cases (detection rates of COVID-19 after arrival to country) Scenarios: • Considered isolation periods of 1 to 14 days, exposure window, length of flight	Funding: no specific funding for this work declared Research group (all): UKHSA (including first and last authors)
Bays and others, 2022 (63) medRxiv PREPRINT (posted 25 January 2022) 'Mitigating isolation: further comparing the effect of LFD testing for early release from self-isolation for COVID-19 cases'	Study objective: to compare the benefits and risks of using a single LFD negative result with multiple sequential LFD negative results to permit early release from self-isolation Setting: 500,000 simulated individuals; confirmed COVID-19 cases who self-isolate for up to a maximum of 10 days Model: Monte Carlo simulation model Data: unclear Study period: unclear	NPI: • Test and release strategies Outcomes: • COVID-19 transmission (proportion released still infectious, and time spent infectious after early release) • Lost time (school or work) (excess time spent in isolation) Scenarios: • Comparison: no testing in place, individuals released from isolation after a fixed period of up to 14 days • Varying minimum isolation periods of 1 to 8 days, with one, 2 or 3 sequential negative tests	Funding: no specific funding for this work declared Research group (all): UKHSA (including first and last authors)
Biglarbeigi and others, 2021 (64) 'Sensitivity analysis of the infection transmissibility in the UK during the COVID-19 pandemic'	Study objective: to evaluate the effect of removing workplace restrictions and its effect on the reproduction number Setting: UK Model: epidemiological transmission model (EpiEstim) Data: daily UK COVID-19 case numbers used to estimate the instantaneous R number Study period: 10 February to 7 September 2020	NPI: • Workplace closure or work from home Outcomes: • COVID-19 transmission (R number) Scenarios: 7 exit scenarios for different occupational sectors returning to their normal working environment	Funding: no funding Research group (all): University of Ulster
Bittihn and others, 2021 (65)	Study objective: to determine the efficacy of regional containment strategies		Funding: Max Planck Society

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
'Local measures enable COVID-19 containment with fewer restrictions due to cooperative effects'	Setting: Germany, Italy, England, New York State and Florida (United States) Model: a susceptible-infectious-recovered (SIR) model Data: real-world data (COVID-19 infection numbers as of June 2020 for Germany, Italy, England, New York State and Florida, and country population sizes obtained from census data to define individual regions) Study period: June 2020	NPI: • Tiered restrictions (regional containment strategy versus the country-wide) Outcomes: • COVID-19 transmission (R value) Scenarios: Local containment strategies, where contact restrictions are triggered locally in individual regions upon crossing critical infection number thresholds, to determine under which conditions the regional containment strategy can outperform the country-wide one or vice versa.	Research group (all): Max Planck Institute for Dynamics and Self-Organization, Gottingen, Germany
Boldea and others, 2023 (66) 'Disentangling the effect of measures, variants, and vaccines on SARS-CoV-2 Infections in England: A dynamic intensity model'	Study objective: to quantify the impact of the Omicron BA.1/BA.2 sub-variants and of the waning of immunity from vaccines or boosters on the COVID-19 epidemic in England, and to assess the timing and intensity of NPIs and further booster campaigns that may be required in 2022 Setting: England Model: a dynamic density model Data: variant data from ONS, UK COVID-19 dashboard Study period: 3 May 2020 to 22 January 2022	NPI: • Lockdown Outcomes: • COVID-19 cases (daily infections) Scenarios: counterfactual analysis varying timing and intensity of booster campaigns and NPIs	Funding: no specific funding for this work declared Research group (first author): Tilburg University, Netherlands
Brooks-Pollock and others, 2021 (67) 'Mapping social distancing measures to the reproduction number for COVID-19'	Study objective: to estimate the impact of social distancing policies on the reproduction number Setting: UK Model: epidemiological transmission model Data: real-world data (social contact data from the social contact survey; community mobility reports from google mobility data; death data between 13 March 2020 and 30 March 2020)	NPI: • School closures • Contact tracing • Face coverings • Limitation of social contacts Outcomes: • COVID-19 transmission (R number) Scenarios: unclear	Funding: part supported by the NIHR HPRU in Evaluation of Interventions; The Alan Turing Institute, MRC, and Engineering and Physical Sciences Research Council Research group (first author): University of Bristol. One NIHR HPRU affiliated author (Behavioural Science and Evaluation)

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
	Study period: unclear; from 23 March 2020 implied		
Cheetham and others, 2021 (68) 'Determining the level of social distancing necessary to avoid future COVID-19 epidemic waves: a modelling study for North East London'	Study objective: to evaluate the daily number of social contacts per person to control the COVID-19 epidemic in North East London without exceeding healthcare capacity Setting: North East London boroughs of Hackney, Tower Hamlets, Newham, Waltham Forest, Barking and Dagenham, Havering, Redbridge, and the City of London Model: a susceptible-exposed-infectious-recovered (SEIR) model Data: real-world data (hospitalisation, ICU bed, daily discharges obtained from COVID-19 dashboard data, NHS England hospital deaths data) Study period: February 2020 to February 2021 (shown in graphs)	NPI: • Limitation of social contacts Outcomes: • COVID-19 hospitalisations (number of hospitalisations, ICU admissions) • COVID-19 related mortality (daily deaths within hospitals from COVID-19) Scenarios: daily contact rate varied from 3 to 6, and from 7 to 12 from 4 July 2020	Funding: NHS North East London Commissioning Alliance Research group (first author): NHS North East London Commissioning Alliance
Chen and others, 2021 (69) ArXiv PREPRINT (submitted 7 April 2020, last revised 4 June 2021, version 3) 'Scenario analysis of non-pharmaceutical interventions on global COVID-19 transmissions'	Study objective: to evaluate the impact of NPIs on COVID-19 transmission dynamics Setting: Italy, Spain, Germany, France, the UK, Singapore, South Korea, China, and the United States Model: a susceptible-infectious-recovered (SIR) model Data: real-world data (COVID-19 data from Centre for systems science and Engineering at John Hopkins University including number of infections, recoveries, deaths; NPI collected from country government websites, public health authorities and major newspapers) Study period: data from 22 January to 3 April 2020 used	NPI: • Travel restrictions • Face coverings • Lockdown • Limitation of social contacts • School closures Outcomes: • COVID-19 cases (estimated number of COVID-19 cases) Scenarios: combination of face coverings, school closures, and centralised isolation with or without lockdown	Funding: NSF CAREER Award and a Simons Fellowship Research group (first author): Department of Statistics at University of Illinois at Urbana-Champaign and Institute for Data, System, and Society (IDSS) at Massachusetts Institute of Technology
Chin and others, 2021 (70) 'Effect estimates of COVID-19 non-pharmaceutical	Study objective: to compare the inferences regarding the effectiveness of various NPIs for COVID-19 obtained from 3 different SIR models	NPI: • Lockdown • Restrictions of large gatherings • School closures • Isolation of cases	Funding: no funding Research group (first author): Australian Research Council Training Centre in Data

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
interventions are non-robust and highly model-dependent'	Setting: 14 European countries (Austria, Belgium, Denmark, France, Germany, Italy, Norway, Spain, Sweden, Switzerland, United Kingdom, Netherlands, Portugal, and Greece) Model: a susceptible-infectious-recovered (SIR) model Data: real-world data (used data available for each country, Google's COVID-19 Community Mobility Report) Study period: 2 time periods (4 March to 5 May and 4 March to 12 July – year not stated)	• Physical distancing Outcomes: • COVID-19 transmission (R number) • COVID-19 cases (daily number of infections) • COVID-19 related mortality (daily deaths) Scenarios: Different SIR models compared: 2 models developed by Imperial College that considered only NPIs without accounting for mobility (model 1) or only mobility (model 2), and a model accounting for the combination of mobility and NPIs (model 3)	Analytics for Resources and Environments, Sydney; School of Mathematics and Statistics, The University of Sydney
Clifford and others, 2020 (71) 'Effectiveness of interventions targeting air travellers for delaying local outbreaks of SARS-CoV-2'	Study objective: to assess the effectiveness of screening travellers at departure and or arrival, and traveller sensitisation to COVID-19-like symptoms with the aim to trigger rapid self-isolation and reporting on symptom onset to enable contact tracing Setting: cross-country borders, no specified countries Model: Poisson probability model (for infected traveller arrivals) Data: hypothetical Study period: not reported	NPI: • Border measures Outcomes: • COVID-19 transmission (outbreak delay in number of days) Scenarios 3 screening scenarios: • no screening • screening on exit only • screening on exit and entry 2 traveller sensitisation scenarios (the % of individuals symptomatically infected with SARS-CoV-2 who self-report upon onset of symptoms): • 0% • 25%	Funding: mixed sources, including NIHR, and NIHR HPRU for mathematical modelling Research group (all): Centre for Mathematical Modelling of Infectious Diseases, Department of Infectious Disease Epidemiology, LSHTM
Clifford and others, 2021 (72) 'Strategies to reduce the risk of SARS-CoV-2 importation from international travellers: modelling estimations for the United Kingdom, July 2020'	Study objective: to investigate the effectiveness of testing and isolation strategies (pre-SARS-CoV-2 vaccination) to reduce onward transmission from arriving international air travelers Setting: international travel into the UK from the EU and US Model: epidemiological transmission model Data: real-world data on travellers from Civil Aviation Authority for April and May 2020; estimates of COVID-19 infection	NPI: • Border measures Outcomes: • COVID-19 transmission (total person-days of infectiousness spent in the community)	Funding: mixed sources, including NIHR and MRC Research group (first author): Centre for Mathematical Modelling of Infectious Diseases, LSHTM. Named authors partly funded by NIHR and Bill and Melinda Gates foundation. Funding of working

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
	prevalence derived from reported cases and death time series data Study period: 20 July to 26 July 2020	Scenarios: Baseline of syndromic screening and no isolation or testing on arrival • Varying isolation duration (0, 3, 5, 7, 9, or 14 days), with or without testing on the final day of isolation • Varying the timing and number of PCR tests (0, 1 or 2 tests)	group authors by UK public health rapid support team, NTD modelling consortium, DFID, Wellcome trust, NIHR HPRUs
Cuesta and others, 2021 (73) medRxiv PREPRINT (posted 13 September 2021) 'Vaccinations or Non-pharmaceutical Interventions: Safe Reopening of Schools in England'	Study objective: to assess the reopening of schools under a vaccination programme and the implementation of NPIs to examine the impact on COVID-19 cases and COVID-19-related deaths Setting: primary and secondary schools, England Model: an agent-based model Data: census data (2011), ONS data, OpenTable data Study period: 10 July 2021 to 1 February 2022	NPI: • Isolation of cases • Isolation of contacts • Limitation of social contacts Outcomes: • COVID-19 cases (number of infections) • COVID-19 related mortality (number of deaths) Scenarios 2 scenarios: • class quarantine - whole classroom isolates at home for 10 days when a pupil develops symptoms (representing isolation of cases and isolation of contacts) • social schools - variations in the intensity of contacts between individuals in schools to mimic the effect of policies such as mask wearing, social distancing and isolation between year groups. The social school simulation was applied to secondary schools only Vaccination coverage also simulated (not extracted as out of review scope)	Funding: no specific funding for this work declared Research group (first author): Institute for Data Science, Durham University
Davies and others, 2020 (74) 'Effects of non-pharmaceutical interventions on COVID-19 cases, deaths, and demand for hospital services in the UK: a modelling study'	Study objective: to evaluate how the timing, duration and intensity of different NPI measures impacts COVID-19 outcomes including new cases, transmission, deaths and use of hospital services Setting: UK Model: a susceptible-exposed-infectious-recovered (SEIR) model	NPI: • Physical distancing • Isolation of cases • School closures • Shielding (people aged 70 year or older) • Lockdown Outcomes: • COVID-19 transmission (R value) • COVID-19 cases (clinical cases)	Funding: MRC Research group (all authors): Department of Infectious Disease Epidemiology, LSHTM

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
	Data: published UK social mixing patterns and COVID-19 deaths; ONS population data; case fatality ratios estimated using case data from China up to 11 February 2020 Study period: start date of model 29 January 2020; scenarios simulated from February to October 2020; lockdown and intensive intervention scenarios ran January 2020 to December 2021	• COVID-19 hospitalisations (ICU beds required) • COVID-19 related mortality Scenarios: • Physical distancing, isolation of cases, school closures, shielding assessed individually and all 4 NPIs in combination, timed to centre on the peak of the unmitigated epidemic • The interventions implemented at county level or nationally, and with 2-, 4- or 8-week shifts (delays) in the introduction of NPI measures • In addition, workplace closures or working from home simulated in combination with the other 4 NPIs (‘intensive interventions’) • Adding periods of lockdown to ‘intensive interventions’	
Davies and others, 2021 (75) ‘Association of tiered restrictions and a second lockdown with COVID-19 deaths and hospital admissions in England: a modelling study’	Study objective: to evaluate the impact of tiered restrictions in England, and lockdown in Northern Ireland and Wales, on SARS-CoV-2 transmission Setting: England (the 7 NHS England region), Northern Ireland and Wales Model: epidemiological transmission model (specified as a dynamic compartmental model) Data: real-world data – data on hospital admissions and hospital bed occupancy (ISARIC4C/COVID-19 Clinical Information Network, NHS England); seroprevalence (ONS, UK Biobank, REACT-2 study); virology (REACT-1 study), and deaths (PHE); mobility (Google Community Mobility) and social contact (CoMix study) Study period: 1 March 2020 to 13 October 2020	NPI: • Lockdown • School closures • Tiered restrictions Outcomes: • COVID-19 transmission (R number) • COVID-19 hospitalisations (hospital bed and ICU bed occupancy) • COVID-19 related mortality Scenarios: • Tier 2 • Tier 3 • Lockdown – with schools closed or open, and varying duration and timing of lockdown	Funding: The European Union Horizon 2020 Research and Innovation programme, the MRC and the NIHR HPRU in Immunisation (other part funders mentioned) Research group (first author): Department of Infectious Disease Epidemiology, LSHTM. Other author NIHR HPRU affiliated (Emerging and Zoonotic Infections)
Davis and others, 2021 (76) ‘Contact tracing is an imperfect tool for controlling COVID-19 transmission and relies on population adherence’	Study objective: to evaluate the limitations of contact tracing and how to maximise its effectiveness by extending an existing branching process contact tracing model, adding diagnostic testing and refining parameter estimates Setting: UK	NPI: • Contact tracing Outcomes: • COVID-19 transmission (R number) • COVID-19 cases (probability of a large outbreak [more than 2,000 cases])	Funding: Bill and Melinda Gates Foundation; MRC COVID-19 UKRI/DHSC Rapid Response grant and Joint UNIversities Pandemic and Epidemiological Research (JUNIPER) Consortium. Other funders include the European Union’s

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
	Model: branching process transmission model Data: real-world data (from a UK-based survey; CORSAIR study) Study period: unclear	Scenarios A range of self-reporting, adherence and contact tracing rates, and test sensitivity including: • instant or delayed (by 2 days) testing and tracing • 11.9% or 50% self-reporting rate • 11.9% or 70% isolation on symptoms • 10.9% or 65% isolation on tracing • test sensitivity of 65% or 95%	Horizon 2020 research and innovation programme, Royal Society and Wellcome Trust Research group (first author): Big Data Institute, University of Oxford
Didelot and others, 2023 (77) 'Model design for non-parametric phylodynamic inference and applications to pathogen surveillance' To note that this article was initially identified as a preprint	Study objective: to estimate the impact of the first national lockdown in the UK on the epidemic reproduction number Setting: England Model: unclear (combining non-parametric models and latent process models) Data: real-world data (data from the first epidemic wave spanning the spring of 2020; phylogenetic data; Google mobility data 1 November 2020 to 13 February 2021) Study period: Spring 2020; and November 2020 to February 2021	NPI: • Lockdown Outcomes: • COVID-19 transmission (R number) Scenarios: unclear	Funding: no specific funding for this work declared Research group (first author): University of Warwick. One author affiliated to NIHR HPRU in Genomics and Enabling Data and MRC
Dong and others, 2022 (78) 'Deep recurrent reinforced learning model to compare the efficacy of targeted local versus national measures on the spread of COVID-19 in the UK'	Study objective: to evaluate and predict the effects of a combination of control measures on COVID-19 cases and mortality at the local authority and national scale in England Setting: England, nationwide and at local authority level Model: a deep recurrent reinforced learning model Data: ONS and other government accessible data Study period: week 5 to 46 of 2020	NPI: • Lockdown • School closures • Limitation of social contacts • Travel restrictions (international) Outcomes: • COVID-19 cases • COVID-19 related mortality Scenario: • No lockdown versus lockdown (LD) and social distancing (SD) • LD_SD versus full national lockdown (FLD) • LD_SD versus LD_SD with 50% reduction in international travel • LD_SD versus LD_SD with closing school reduced by 50%	Funding: NIHR Biomedical Research Centre at University Hospitals Bristol and Weston NHS Foundation Trust and the University of Bristol, and the British Heart Foundation Research group (all authors): University of Bristol

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
		• LD_SD with travel quarantine • LD_SD with 100% pubs open versus LD_SD with 50% reduction in pubs • LD_SD with 100% food and accommodation services open versus LD_SD with 50% food and accommodation services open • LD_SD with 50% retail services open versus LD_SD with 100% retail services open	
Donnat and others, 2021 (79) 'Predicting COVID-19 Transmission to Inform the Management of Mass Events: Model-Based Approach'	Study objective: to evaluate the risk of transmission for individuals attending a live concert in a large venue with various safety protocols in place Setting: simulation of a live 3-hour concert at the Royal Albert Hall, London Model: Monte Carlo simulation model Data: people assumed to be a representative cross-section of the British population; negative COVID-19 antigen test result within 2 days prior to the event required for entry into the concert Study period: simulations for 3 time periods: August 2020, January 2021, and March 2021	NPI: • Face coverings • Restrictions of large gatherings Outcomes: • COVID-19 cases (number of infections) Scenarios: The event run on 3 different dates with different COVID-19 prevalence (stable low prevalence 20 August 2020, medium declining prevalence 20 March 2021, high prevalence peak 20 January 2021), and with: • 0%, 50% or 100% participants wearing face coverings in a 3-hour concert at full capacity (n=5,000) • 100% wearing face coverings at half capacity (n=2,500) with concert duration 1.5 hours or 3 hours	Funding: no funding Research group (first author): University of Chicago, US (to note that 4 out of 8 authors had UK affiliation)
Drakesmith and others, 2022 (80) 'Cost-effectiveness of a whole-area testing pilot of asymptomatic SARS-CoV-2 infections with lateral flow devices: a modelling and economic analysis study'	Study objective: to assess the impact of a whole area asymptomatic SARS-CoV-2 testing pilot by modelling the number of onward infections and healthcare burdens prevented, with economic analysis to estimate healthcare costs averted and QALYs gained Setting: borough of Merthyr Tydfil, Wales Model: a time-lagged regression model Data: real-world data (PCR-tested case counts for the local authority and data collected as part of a mass testing pilot in Merthyr Tydfil; lateral flow testing of asymptomatic individuals aged 11 years or over, living or working in the area)	NPI: • Asymptomatic testing (mass testing) Outcomes: • COVID-19 cases (infections prevented; mean daily incidence rate) • COVID-19 hospitalisations (prevented) • COVID-19 related mortality (prevented) Scenarios: original, worst, and best-case scenarios	Funding: no funding Research group (first author): Communicable Disease Surveillance Centre, Public Health Wales

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
	Study period: testing from 21 November 2020 to 20 December 2020		
Endo and others, 2020 (81) 'Implication of backward contact tracing in the presence of overdispersed transmission in COVID-19 outbreaks'	Study objective: to explore the effectiveness of combining backward tracing with conventional forward tracing in the presence of overdispersion in SARS-CoV-2 transmission Setting: not specified Model: branching process transmission model Data: hypothetical Study period: not specified	NPI: • Contact tracing Outcomes: • COVID-19 transmission (number of transmissions from primary case) Scenarios: • Forward tracing only • Forward and backward tracing combined	Funding: no specific funding for this work declared Research group (first author): Department of Infectious Disease Epidemiology, LSHTM
Farkas and Chatzopoulos, 2021 (82) 'Assessing the Impact of (Self)-Quarantine through a Basic Model of Infectious Disease Dynamics'	Study objective: to assess the impact of self-isolation of symptomatic infectious individuals on COVID-19 disease dynamics Setting: UK Model: a susceptible-exposed-asymptomatic-infectious-recovered (SEAIR) model Data: real-world data (UK publicly available COVID-19 test data) Study period: March 2020 to July 2020 (first wave)	NPI: • Isolation of cases Outcomes: • COVID-19 cases (number of infectious cases) • COVID-19 transmission Scenarios: unclear	Funding: no funding Research group (all): Division of Computing Science and Mathematics, University of Stirling
Ferretti and others, 2021 (83) medRxiv PREPRINT (posted 8 August 2021) 'Modelling the effectiveness and social costs of daily lateral flow antigen tests versus quarantine in preventing onward	Study objective: to evaluate under what circumstances daily lateral flow testing of traced contacts for 7 days is most effective at reducing onward SARS-CoV-2 transmission compared with a 10-day isolation policy Setting: UK Model: epidemiological transmission model (with Bayesian parameter inference)	NPI: • Test and release strategies Outcomes: • COVID-19 transmission (transmission averted per contact) • Lost time (school or work) Scenarios: • Varying adherence to isolation from 30% to 90% in vaccinated and unvaccinated populations	Funding: Li Ka Shing Foundation award and the UK Department of Health and Social Care Research group (first author): Big Data Institute, Li Ka Shing Centre for Health Information and Discovery, Nuffield Department of Medicine, University of Oxford

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
transmission of COVID-19 from traced contacts'	Data: real-world data (data from other studies on adherence including the COVID-19 Social Study, ONS experimental statistics) Study period: unclear		
Fitz-Simon and others, 2023 (84) 'Understanding the role of mask-wearing during COVID-19 on the island of Ireland' To note that this article was initially identified as a preprint	Study objective: to evaluate whether a mask-wearing intervention predicted the spread of SARS-CoV-2 on the island of Ireland, focusing on the potential for inter-individual infectious contact over time as the outcome Setting: Northern Ireland (NI) and the Republic of Ireland (ROI) Model: a linear regression model Data: data on physical contact between people from COVID-19 Google Community Mobility reports; behavioural data from behavioural surveys (started in March 2020 in ROI and April 2020 in NI) published by the Irish Department of Health, and the Northern Ireland Statistics Research Agency Study period: first year of the pandemic: 5 March 2020 to 28 February 2021	NPI: • Face coverings Outcomes: • COVID-19 hospitalisations (number of hospital admissions) Scenarios: A counterfactual scenario of a hypothetical intervention where 90% of the population were wearing masks during the early part of the pandemic up to the date of the mask mandate (10 August 2020)	Funding: no funding Research group (first author): HRB Clinical Research Facility, National University of Ireland Galway, Ireland
Fyles and others, 2021 (85) 'Using a household-structured branching process to analyse contact tracing in the SARS-CoV-2 pandemic'	Study objective: to explore the potential impact of contact tracing (with isolation of contacts and cases) on epidemic growth, considering a range of social contact, transmission, tracing performance and population adherence assumptions Setting: UK Model: branching process transmission model Data: real-world data from PHE; NHS Test and trace Study period: May to June 2020; isolation rules at the time were 10 days for cases and 14 days for contacts (from the date of case symptom onset)	NPI: • Contact tracing Outcomes: • COVID-19 transmission (growth rate) • Compliance or adherence Scenarios Simulated scenarios included: • effects of household structure and contact tracing strategies and parameters on growth rates • extinction times and probabilities with contact tracing • backwards contact tracing, with recall delay and digital contact tracing	Funding: no specific funding for this work declared Research group (first author): Department of Mathematics, University of Manchester, The Alan Turing Institute, London. One of the other authors PHE affiliated, and one affiliated to the NIHR HPRU (Emergency Preparedness and Response)
Galanis and others, 2021 (86)	Study objective: to estimate the effect of people's behaviour on the epidemic curve and the effectiveness of NPIs implemented	NPI: • Lockdown	Funding: no specific funding for this work declared

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
'The effectiveness of non-pharmaceutical interventions in reducing the COVID-19 contagion in the UK, an observational and modelling study'	Setting: UK Model: behavioural susceptible-exposed-infectious-recovered (SEIR) model Data: real-world data (WHO dashboard, Google's 'COVID-19 Community Mobility Reports') Study period: unclear	Outcomes: • COVID-19 transmission (R number) • COVID-19 cases (number infected) Scenarios: unclear	Research group (first author): University of London
Ghoroghi and others, 2022 (87) 'Impact of ventilation and avoidance measures on SARS-CoV-2 risk of infection in public indoor environments'	Study objective: to evaluate the effectiveness of protective measures (face coverings, hand hygiene and vaccination coverage) and ventilation on the spread of SARS-CoV-2 in an indoor environment Setting: the Forum, a zone within the Queen's Buildings, with an area of 323 metres squared, home to the Engineering Department of Cardiff University with mechanical or natural (window opening) ventilation Model: a computational fluid dynamics model and a discrete event simulation model Data: unclear. States parameters are based on 'existing literature findings' Study period: not specified	NPI: • Face coverings • Hand hygiene • Ventilation Outcomes: • COVID-19 transmission (probability of secondary infection) Scenarios: • Baseline of 3 different ventilation scenarios: mechanical ventilation with no optimisation, mixed (mechanical and natural) ventilation with no optimisation, mixed ventilation with optimisation (fans added) • Each of the 3 ventilation scenarios with between 50% and 100% of people wearing face coverings • Each of the ventilation scenarios with between 50% and 100% individuals performing hand hygiene (using hand sanitiser) • Vaccination coverage also simulated but not extracted as out of review scope	Funding: UK Engineering and Physical Sciences Research Council Research group (all): School of Engineering, Cardiff University
Gog and others, 2021 (88) 'Epidemic interventions: insights from classic results'	Study objective: to assess the impact of NPIs on transmission of COVID-19, including the introduction of measures part way through a breakout and in the context of partial population immunity Setting: UK Model: a susceptible-infectious-recovered (SIR) model	NPI: • Lockdown Outcomes: • COVID-19 transmission (transmission reduction) Scenarios: unclear	Funding: UKRI through the JUNIPER modelling consortium Research group (first author): Department of Applied Mathematics and Theoretical Physics, University of Cambridge

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
	Data: R value from the literature Study period: 2020 but unclear on specific dates		
Goldberg and others, 2021 (89) 'Increasing efficacy of contact-tracing applications by user referrals and stricter quarantining'	Study objective: to study the efficacy of contact-tracing applications such as the mobile phone contact-tracing applications that have been introduced during the COVID-19 epidemic Setting: not specified Model: a susceptible-exposed-infectious-recovered (SEIR) model Data: hypothetical data Study period: unclear	NPI: • Contact tracing Outcomes: • COVID-19 hospitalisations Scenarios Study compares 4 scenarios for the uptake of contact-tracing applications (CTAs) combined with different symptom thresholds for isolation: • the proportion of individuals that use the CTA are chosen randomly • a set of randomly chosen users who each recommends the CTA to a single uniformly chosen connection who also uses it • a set of randomly chosen users who each recommends the CTA to their connections, of whom around 50% use it • an idealised scenario in which CTA users are individuals with the highest number of connections	Funding: no funding Research group (first author): Department of Computer Science, University of Oxford
Gosce and others, 2020 (90) 'Modelling SARS COV2 Spread in London: Approaches to Lift the Lockdown'	Study objective: to model the spread of COVID-19 in London and the epidemiological impact of different NPIs and combination of NPI measures Setting: London, UK Model: a susceptible-exposed-infectious-recovered (SEIR) model Data: data on cases and deaths from PHE and NHS, data for mobility from Transport for London Study period: March to November 2020	NPI: • Asymptomatic testing • Shielding • Lockdown (lifting lockdown) Outcomes: • COVID-19 transmission (R number) • COVID-19 cases (number of infections) • COVID-19 related mortality Scenarios Five scenarios were run, compared to a baseline of prolonged lockdown; 3 were relevant to this review (where NPI effectiveness for single NPI was identified): • lifting lockdown 8 May with no additional intervention • shielding those older than 60 years	Funding: no funding Research group (all authors): UCL Institute for Global Health

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
		• universal testing in the context of no lockdown and less stringent social distancing guidelines	
Grassly and others, 2020 (91) 'Comparison of molecular testing strategies for COVID-19 control: a mathematical modelling study'	Study objective: to investigate the potential impact of different testing and isolation strategies on transmission of SARS-CoV-2 Setting: UK Model: epidemiological transmission model Data: real-world data (information on SARS-CoV-2 transmission and PCR test sensitivity from published literature; data on PCR specificity based on performance data reported by the Foundation for Innovative New Diagnostics) Study period: unclear	NPI: • Asymptomatic testing • Symptomatic testing • Isolation of cases • Isolation of contacts • Contact tracing Outcomes: • COVID-19 transmission (R number) Scenarios: • Isolation following onset of symptoms • PCR testing of symptomatic individuals • PCR testing of high risk individuals (with or without symptoms) such as health and social care workers • Isolation of contacts • Contact tracing with varying coverage of 50%, 80% or 100%, and 12, 24 or 48 hours delay to isolation	Funding: UK MRC Research group (all): the Imperial College COVID-19 Response Team)
He and others, 2021 (92) 'Effectiveness and resource requirements of test, trace and isolate strategies for COVID in the UK'	Study objective: to evaluate the effectiveness and resource requirements of various TTI strategies for reducing the spread of SARS-CoV-2, in relation to different TTI scenarios and with varying levels of other NPIs (social restrictions) Setting: UK Model: an agent-based model Data: real-world data (BBC Pandemic data of 40,162 participants in the UK; recent research on the timeline of COVID-19 infections) Study period: simulated to what might be expected during summer months (June to August 2020)	NPI: • Contact tracing Outcomes: • COVID-19 transmission (R number) Scenarios TTI strategies analysed and compared to no TTI (and with varying App uptake, adherence to isolation, and delays in test/trace): • symptom-based TTI (contact tracing and isolation of contacts start as soon as primary contact reports COVID-19-like symptoms) • test-based TTI (contact tracing and isolation of contacts start on confirmation that a primary case has tested positive) • test-based TTI with contact testing (as test-based TTI plus testing of contacts of a confirmed primary case)	Funding: no specific funding for this work declared Research group (first author): Department of Statistics, University of Oxford, Oxford, UK

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
		For each strategy (including no TTI), cases and household contacts are assumed to isolate in line with UK government guidelines Study considered the impact of TTI strategies in the context of a range of scenarios with varying stringencies for other NPIs such as: • lockdown (up to 9 May 2020) • slightly relaxed work and social restrictions • moderately relaxed work and social restrictions • strongly relaxed work and social restrictions • no social restrictions but isolation of household contacts remains in place	
Heald and others, 2021 (93) 'Modelling the impact of the mandatory use of face coverings on public transport and in retail outlets in the UK on COVID-19-related infections, hospital admissions and mortality'	Study objective: to examine the number of infections, hospital admissions and hospital deaths potentially prevented by the use of face coverings in retail outlets and on public transport Setting: UK Model: a simulation model (specific model not reported but used a sequential assessment process) Data: real-world data (UK ONS Population Survey data for baseline number of community-derived infections; published evidence on time spent on daily activities, other parameters such as R values) Study period: unclear but ONS data for week 13 to 19 July 2020 used in the model; 3-month projections modelled	NPI: • Face coverings Outcomes: • COVID-19 cases (number of infections avoided) • COVID-19 hospitalisations (avoided) • COVID-19 related mortality (COVID-19 hospital mortality avoided) Scenarios Fifteen scenarios: 20%, 40%, 60%, 80% estimated reduction in infection risk by face coverings, or no face covering use, at each of 3 R values (0.8, 1, and 1.2)	Funding: no specific funding for this work declared Research group (first author): Department of Diabetes and Endocrinology, Salford Royal NHS Foundation Trust, Salford, UK and The School of Medicine, Manchester Academic Health Sciences Centre, The University of Manchester
Hellewell and others, 2020 (94) 'Feasibility of controlling COVID-19 outbreaks by isolation of cases and contacts'	Study objective: to assess the ability of isolation and contact tracing to control disease (COVID-19) outbreaks in areas without widespread transmission using a mathematical model Setting: unclear Model: branching process transmission model	NPI: • Isolation of cases • Contact tracing Outcomes: • COVID-19 transmission (new outbreaks) Scenarios: • Short and long delay between symptom onset and isolation	Funding: Wellcome Trust, Global Challenges Research Fund, and Health Data Research UK Research group (all authors): Centre for the Mathematical Modelling of Infectious Diseases, Department of Infectious Disease

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
	Data: some parameter values for the model informed by the literature, some assumed Study period: unclear	• Varying contacts traced from 0% to 100% in 20% intervals (1,000 simulations ran with variations in the number of R0, the proportion of transmission before symptom onset, onset-to-isolation delay, the number of initial cases, and the probability that a contact was traced)	Epidemiology, LSHTM
Hemani and others, 2021 (95) Wellcome Open Research PREPRINT (posted 30 March 2021) 'Modelling pooling strategies for SARS-CoV-2 testing in a university setting'	Study objective: to evaluate the effectiveness of different asymptomatic testing strategies within a university setting Setting: UK university setting (student numbers in living circles and halls of residence based on undergraduates at the University of Bristol) Model: an agent-based model Data: samples from the University of Bristol Study period: 2020 to 2021 academic year	NPI: • Asymptomatic testing Outcomes: • COVID-19 cases (positive tests) Scenarios: 486 simulation scenarios repeated 100 times, evaluating different testing strategies (per individual, or pooled testing based on random pools of students or based on living circles), at different infection prevalence, R values and under different 'containment' levels (restrictions on social mixing).	Funding: no specific funding for this work declared Research group (first author): MRC Integrative Epidemiology Unit, University of Bristol. Two authors affiliated to the NIHR HPRU in Behavioural Science and Evaluation
Hill and others, 2021 (96) 'Modelling SARS CoV-2 transmission in a UK university setting'	Study objective: to capture the interactions of a student-based population and investigate the impact of adherence to isolation and test and trace measures; room isolation of symptomatic students; and supplementary mass testing Setting: a UK University - overall student population of 25,000, with 7,155 students resident on-campus and the remainder off campus Model: an agent-based network model Data: data for group or cohort and dynamic social contact layers from UK Social Contact Survey Study period: the autumn term of the 2020 to 2021 academic year (total of 77-day period)	NPI: • Asymptomatic testing • Isolation of cases • Contact tracing Outcomes: • COVID-19 cases (proportion infected) Scenarios: unclear	Funding: Engineering and Physical Sciences Research Council through the MathSys CDT, the MRC through the COVID-19 Rapid Response Rolling Call, and UKRI through the JUNIPER modelling consortium Research group (all authors): The Zeeman Institute for Systems Biology and Infectious Disease Epidemiology Research, School of Life Sciences and Mathematics Institute, University of Warwick
Hill and others, 2021 (97) 'A network modelling approach to assess non-	Study objective: to evaluate the impact of interventions targeted towards working practices on transmission of SARS-CoV-2 in the workplace (41 industrial sectors)	NPI: • Contact tracing (adherence to isolation, test and trace measures) • Workplace closures or working from home	Funding: mixed including the MRC, the Engineering and Physical Sciences Research Council, the UKRI through the

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
pharmaceutical disease controls in a worker population: An application to SARS-CoV-2’	Setting: UK Model: an agent-based network model Data: real-world data (UK data such as 2011 census, 2020 edition of the ONS ‘UK business: activity, size and location database; the University of Warwick Social Contact Survey) Study period: unclear (noting that isolation guidelines used in the model were 10 days for cases and 14 days for household contacts [in place up to 14 December 2020])	• Limitation of social contacts (limiting workplace contacts or changing working patterns) Outcomes: • COVID-19 transmission (outbreak size) Scenarios: • 35% of the workforce working from home (based on the different proportions of the workforce working from home per sector) • synchronous or asynchronous working patterns at usual workplace • team sizes of 2, 5, or 10 • varying adherence to test and trace Study ran all simulations with a population of 10,000 workers and a simulation time corresponding to 365 days.	JUNIPER modelling consortium Research group (all authors): The Zeeman Institute for Systems Biology and Infectious Disease Epidemiology Research, School of Life Sciences and Mathematics Institute, University of Warwick, Coventry, United Kingdom, and JUNIPER
Hill, 2023 (98) ‘Modelling the epidemiological implications for SARS-CoV-2 of Christmas household bubbles in England’	Study objective: to evaluate implications for SARS-CoV-2 of Christmas household bubbles in England Setting: England Model: a susceptible-exposed-infectious-recovered (SEIR) Data: real-world data (UK data such as 2011 census) Study period: scenarios based on 23 to 27 December 2020	NPI: • Limitation of social contacts (Christmas bubbles) Outcomes: • COVID-19 cases (daily incidence) Scenarios Compared a set of household bubble scenarios: • no change to household bubble guidance (only support bubbles allowed to meet each day) • short duration fixed exclusive bubbles (same 3 households meet each day between 25 to 26 December, and no overlapping of bubbles) • fixed exclusive bubbles (same 3 households meet each day between 23 to 27 December, and no overlapping of bubbles) • fixed non-exclusive bubble (each household meets 2 other households each day between 23 and 27 December, bubbles may overlap) • daily change in household triplets (between 23 and 27 December)	Funding: no specific funding for this work declared Research group (first [only] author): The Zeeman Institute for Systems Biology and Infectious Disease Epidemiology Research, School of Life Sciences and Mathematics Institute, University of Warwick, Coventry, United Kingdom, and JUNIPER
Hilton and others, 2022 (99)	Study objective: to evaluate impact of use of NPIs such as limitation of social contacts during the COVID-19 pandemic	NPI: • Limitation of social contacts	Funding: UK Foreign, Commonwealth and

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
'A computational framework for modelling infectious disease policy based on age and household structure with applications to the COVID-19 pandemic'	while accounting for the highly heterogeneous risk profile of COVID-19, using age- and household-structured model Setting: UK Model: 2 models - 1. susceptible-exposed-prodromal-infectious-recovered (SEPIR) model and 2. susceptible-exposed-infectious-recovered (SEIR) model Data: real-world data (ONS COVID-19 Infection Survey, England and Wales 2011 census data) Study period: unclear	Outcomes: • COVID-19 transmission Scenarios: unclear; included consideration of support bubbles and temporary relaxation of lockdown to allow short-term Christmas bubbles (December 2020)	Development Office (FCDO) and Wellcome Trust-funded CIMEA grant, and NIHR Global Health Research Research group (first author): University of Warwick
Hinch and others, 2022 (100) 'Estimating SARS-CoV-2 variant fitness and the impact of interventions in England using statistical and geo-spatial agent-based models'	Study objective: to understand the spatial-temporal characteristics and spread of 2 COVID-19 variants (B.1.177 and Alpha) in England during the implementation of lockdown Setting: England Model: an agent-based meta-population model Data: COG-UK data, ONS data and Google mobility data Study period: simulation from September 2020 ('second epidemic wave')	NPI: • Lockdown Outcomes: • COVID-19 cases (weekly cases per 100,000) • COVID-19 related deaths (weekly deaths) Scenarios Three different scenarios modelled: • no vaccinations, but the second (November 2020) and third (January 2021) national lockdowns as they occurred • starting the third national lockdown immediately after the second, but having it last only one month • starting the third lockdown immediately after the second lockdown finished, keeping it at the same length as the actual third lockdown	Funding: Computational aspects supported by Wellcome Trust Core Award and NIHR Oxford BRC Research group (first author): Big Data Institute, Li Ka Shing Centre for Health Information and Discovery, Nuffield Department of Medicine
Kaiser and others, 2021 (101) 'Social network based cohorting to reduce the spread of SARS-CoV-2 in secondary schools: A simulation study in classrooms of four European countries'	Study objective: to evaluate the effectiveness of different strategies for dividing classrooms to reduce the spread of SARS-CoV-2 Setting: England, Germany, the Netherlands and Sweden Model: an agent-based network model	NPI: • School bubbles Outcomes: • COVID-19 transmission (proportion of infected students) Scenarios Different cohorting strategies to form school bubbles:	Funding: no specific funding for this work declared Research group (first author): INCITE, Columbia University

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
	Data: real-world student network data was used from the Children of Immigrants Longitudinal Study in Four European Countries (CILS4EU) project collected in 2010 to 2011. Sample consisted of data from 12,291 students aged 14 to 15 years from 507 classrooms. Study period: not reported	• random cohorting – random allocation to bubble (half/ half) • gender-split cohorting – girls allocated to one bubble and boys allocated to the other • optimised cohorting - 2 equally sized bubbles are formed based on reported out-of-school contacts to minimise the number of cross-bubble contacts • network chain cohorting - an initial student names all of her out-of-school contacts, who themselves name their out-of-school contacts and so on until the resulting set of students comprises half of the classroom. This set of students forms the first bubble, the remainder the second bubble	
Kamiya and others, 2023 (102) 'Estimating time-dependent contact: a multi-strain epidemiological model of SARS-CoV-2 on the island of Ireland'	Study objective: to estimate the change in infectious contact over time, comparing the 2 jurisdictions on the island of Ireland (Northern Ireland and the Republic of Ireland), and to explore the effects of lockdown on cumulative hospitalisation and assess the impact of a novel variant (Alpha strain) Setting: Northern Ireland (NI) and Republic of Ireland (ROI) Model: a multi-strain model Data: daily COVID-19 hospital admissions in ROI (as reported by Central Statistics Office) and NI (as reported by NI Department of Health) Study period: the first year of the pandemic: from 5 March 2020 to the end of February 2021	NPI: • Lockdown Outcomes: • COVID-19 hospitalisations (number of hospital admissions) Scenarios: Counterfactual analysis introducing lockdowns 7 or 14 days earlier compared with the observed data.	Funding: a Science Foundation Ireland COVID-19 Rapid Response Grant Research group (first author): University of Galway, and Centre for Interdisciplinary Research in Biology, College de France, Universite PSL, Paris
Keeling and others, 2021 (103) 'Precautionary breaks: Planned, limited duration circuit breaks to control the prevalence of SARS-CoV2 and the burden of COVID-19 disease'	Study objective: to investigate the impact of precautionary breaks on the trajectory of COVID-19 infection and subsequent numbers of COVID 19 hospitalisation and deaths Setting: UK Model: epidemiological transmission model Data: real-world data (UK data from the COVID-19 Hospitalisation in England Surveillance System [CHESS] and	NPI: • Lockdown Outcomes: • COVID-19 cases (new infections) • COVID-19 hospitalisations • COVID-19 related mortality	Funding: UKRI through the COVID-19 Rapid Response Rolling Call funding the JUNIPER modelling consortium, UK, and the Biotechnology and Biological sciences Research Council, UK through the Midlands Integrative Biosciences Training Partnership

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
	PHE for hospital admissions and occupancy, ICU occupancy, deaths within 28-days of a positive COVID-19 test, age-structured serology from blood donors and the proportion of community tests that are positive) Study period: unclear, but states focus was on second wave of infection in late 2020	Scenarios: Five different intensities of precautionary breaks (lockdown) at different growth rates.	Research group (first author): The Zeeman Institute for Systems Biology and Infectious Disease Epidemiology Research, School of Life Sciences and Mathematics Institute, University of Warwick. One author affiliated to the NIHR HPRU in Gastrointestinal Infections, and one to the NIHR HPRU in Genomics and Enabling Data
Keeling and others, 2021 (104) 'The impact of school reopening on the spread of COVID-19 in England'	Study objective: to evaluate different strategies for reopening both primary and secondary schools in England Setting: primary and secondary schools, England Model: a susceptible-exposed-infectious-recovered (SEIR) model Data: UK case data from COVID-19 CHESS database; UK death data from PHE Study period: reopening schools from 1 June 2020	NPI: • School closures (reopening) Outcomes: • COVID-19 transmission (R number) • COVID-19 cases ('clinical cases') • COVID-19 hospitalisation (ICU admissions) • COVID-19 related mortality Scenarios Eight different reopening strategies examined: • reception (year 0), year 1 and year 6 (full class sizes) • reception, year 1 and year 6 (half class sizes) • all primary schools • reception, years 1, 6, 10 and 12 (full class sizes) • reception, years 1, 6, 10 and 12 (half class sizes) • primary schools plus year groups 10 and 12 • all secondary schools • all schools	Funding: Engineering and Physical Sciences Research Council, the MRC through the COVID-19 Rapid Response Rolling Call and supported by UKRI through the JUNIPER modelling consortium Research group (all authors): the University of Warwick. Other affiliations: JUNIPER
Kucharski and others, 2020 (105) 'Effectiveness of isolation, testing, contact tracing, and physical distancing on reducing transmission of SARS-CoV-2 in different	Study objective: to evaluate the effectiveness of various NPIs including testing, isolation, and contact tracing on COVID-19 transmission, under different scenarios Setting: UK (included different settings in UK) Model: epidemiological transmission model	NPI: • Asymptomatic testing • Contact tracing • Isolation of cases • Isolation of contacts • Limitation of social contacts	Funding: Wellcome Trust, UK Engineering and Physical Sciences Research Council, European Commission, Royal Society, MRC Research group (first author): Centre for Mathematical

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
settings: a mathematical modelling study’	Data: real-world contacts data (BBC Pandemic data from 40,162 UK participants) Study period: unclear	Outcomes: • COVID-19 transmission (R number and number of contacts isolated) Scenarios: Several scenarios were considered both individually and in combination including no control, self-isolation of symptomatic cases, household quarantine (isolation of contacts), contact tracing, mass testing of 5% of the population every week with or without limitation of social contacts.	Modelling of Infectious Diseases, LSHTM
Kunzmann and others, 2022 (106) ‘The how matters: simulation-based assessment of the potential contributions of lateral flow device tests for keeping schools open and COVID-safe in England’ To note that this article was initially identified as a preprint	Study objective: to assess the use of asymptomatic lateral flow device tests in the reopening of schools in England Setting: primary schools, England Model: an agent-based model Data: unclear Study period: March 2021	NPI: • Asymptomatic testing • Test and release strategies • School bubbles Outcomes: • COVID-19 transmission (proportion infected) • Lost time (school or work) Scenarios: • School bubbles baseline (all contacts in a bubble isolate) • Once weekly asymptomatic testing • Twice weekly asymptomatic testing • Test and release (contacts in the school bubble test daily) • Entire school closed on Thursdays and Fridays	Funding: no specific funding for this work declared Research group (all authors): MRC Biostatistics Unit, University of Cambridge
Lau and others, 2022 (107) ‘Predicting the spatio-temporal infection risk in indoor spaces using an efficient airborne transmission model’	Study objective: to determine the spatially dependent concentration of airborne particles carrying COVID-19 and the corresponding probability or risk of infection in a classroom Setting: average classroom 8 metres by 8 metres by 3 metres Model: a susceptible-infectious-removed (SIR) model (described as a Wells–Riley model) Data: hypothetical data Study period: unclear	NPI: • Ventilation Outcomes: • COVID-19 transmission (probability of infection) Scenarios: • Very poor ventilation • Poor ventilation • ASHRAE (American Society of Heating, Refrigeration and Air-Conditioning Engineers) recommended minimum ventilation setting for classrooms	Funding: no specific funding for this work declared Research group (first author): School of Mathematics, Cardiff University

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
		• A ventilation setting better than the ASHRAE recommended minimum	
Laydon and others, 2021 (108) 'Modelling the impact of the tier system on SARS- CoV-2 transmission in the UK between the first and second national lockdowns'	Study objective: to assess the effects of tier restrictions on SARS-CoV-2 transmission in the UK between the first and second national lockdowns Setting: UK LTLAs Model: Bayesian hierarchical model Data: NPI data from government information. Data on observed deaths, cases and serological data collected from survey data. Study period: 1 July to 5 November 2020	NPI: • Tiered restrictions Outcomes: • COVID-19 transmission (R number) Scenarios Not applicable: R estimated the day before tier system was introduced and 2 weeks after.	Funding: no specific funding for this work declared Research group (first author): Department of Infectious Disease Epidemiology, Imperial College London. Five out of 8 authors affiliated to the NIHR HPRU in Modelling Methodology and Community Jameel
Leng and others, 2020 (109) 'The effectiveness of social bubbles as part of a COVID-19 lockdown exit strategy, a modelling study'	Study objective: to assess the impact of social bubbles on COVID-19 transmission and mortality risk, using the UK as a case study Setting: UK Model: an individual-based model Data: the synthetic population for the study was constructed from the 2011 census in England and Wales Study period: May 2020	NPI: • Limitation of social contacts Outcomes: • COVID-19 transmission (R number) • COVID-19 related mortality (number of deaths) Scenarios Six different contact clustering strategies: • households with children younger than 10-years-old pair up • households with children younger than 20-years-old pair up • single occupancy households pair up with another single occupancy household • adults who live alone or with dependent children only pair up with another household of any size in a 'support bubble' • combination of scenarios 1 and 3 • all households pair up with one other household	Funding: mixed sources including the Wellcome Trust through a Sir Henry Dale Fellowship, and partly by NIHR Research group (first author: the Zeeman Institute for Systems Biology and Infectious Disease Epidemiology Research, University of Warwick
Leng and others, 2022 (110) 'Assessing the impact of lateral flow testing strategies on within-school SARS-CoV-2 transmission and absences: A modelling study'	Study objective: to assess the impact of lateral flow device testing strategies and isolation of contacts in a secondary school setting Setting: secondary schools in England; simulated schools consisted of 5 year groups (aged 11 to 16 years) and each year group containing 200 pupils	NPI: • Asymptomatic testing • School bubbles Outcomes: • COVID-19 transmission (number of infections)	Funding: no specific funding for this work declared Research group (all authors): the Zeeman Institute for Systems Biology and Infectious Disease Epidemiology

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
	Model: an individual-based model Data: no primary data used Study period: half of a term (7 weeks)	• Lost time (number of days absent from school) Scenarios: • Isolation of year group bubble • Twice weekly asymptomatic (mass) testing and isolation of year group bubbles on identification of a positive case • Serial contact testing (daily for 7 days) • Twice weekly asymptomatic testing and serial contact testing • Twice weekly asymptomatic testing • No school-level testing or isolation of year group	Research, University of Warwick
Leng and others, 2022 (111) 'Quantifying pupil-to-pupil SARS-CoV-2 transmission and the impact of lateral flow testing in English secondary schools'	Study objective: to evaluate the impact of measures to reduce the infectiousness of individuals in schools on SARS-CoV-2 transmission and school attendance Setting: England, secondary schools formed of exclusive year-group bubbles Model: an individual-based model Data source: Department for Education data on school absences and close contact group sizes, testing data from PHE Study period: 31 August 2020 to 23 May 2021 (assessing the impact of asymptomatic testing from 8 March 2021 to 23 May 2021)	NPI: • Asymptomatic testing (mass LFT testing) • Isolation of contacts • Test and release strategies Outcomes: • COVID-19 transmission (R number) • lost time (school or work) Scenarios Four strategies compared: • mass lateral flow testing with confirmatory PCR testing and isolation of all close contacts of an infected case • isolation of close contacts only • asymptomatic testing only asymptomatic testing and serial contact testing (daily testing of contacts for 7 days)	Funding: Engineering and Physical Sciences Research Council via the MathSys CDT, and MRC through the COVID-19 Rapid Response Rolling Call Research group (all authors): The Zeeman Institute for Systems Biology and Infectious Disease Epidemiology Research, University of Warwick. One author affiliated to the NIHR HPRU in Gastrointestinal Infections, and to the NIHR HPRU in Genomics and Enabling Data
Leng and others, 2022 (112) 'The effect of notification window length on the epidemiological impact of COVID-19 contact tracing mobile applications'	Study objective: to estimate the expected number of secondary cases infected from primary cases reported to the NHS COVID-19 app, and to explore the effectiveness of app notifications on reducing transmission within a 5-day and a 2-day notification window Setting: England and Wales Model: epidemiological transmission model Data: unclear	NPI: • Contact tracing Outcomes: • COVID-19 transmission (R number) Scenarios: • 5-day notification window in the 5 days before 2 August 2021 • 2-day notification in the 2 days after 2 August 2021 • also looked at varying % of active app users within the 2 notification windows	Funding: no specific funding for this work declared Research group (all authors): The Zeeman Institute for Systems Biology and Infectious Disease Epidemiology Research, School of Life Sciences and Mathematics Institute, University of Warwick. One author affiliated to NIHR HPRU in Gastrointestinal

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
	Study period: a 5-day window before 2 August 2021, and a 2-day window after 2 August 2021		Infections, and to the NIHR HPRU in Genomics and Enabling Data
Li and others, 2021 (113) 'Elementary effects analysis of factors controlling COVID-19 infections in computational simulation reveals the importance of social distancing and mask usage'	Study objective: to investigate the effectiveness of masks, social distancing, lockdown, and self-isolation on reducing COVID-19 transmission Setting: based on simulated population of 10,000 Model: an agent-based model based on a susceptible-infected-recovered-dead model Data: hypothetical data results compared to real-world data from UK, Hong Kong and Italy (provided by United Nations) Study period: unclear	NPI: • Face coverings • Physical distancing • Lockdown • Isolation of cases Outcomes: • COVID-19 cases (number and % of infected) Scenarios: Four NPIs were simulated and compared to data in UK, Hong Kong and Italy.	Funding: no specific funding for this work declared Research group (first author): Department of Computer Science, University of Warwick
Lovell-Read and others, 2022 (114) 'Estimating local outbreak risks and the effects of non pharmaceutical interventions in age-structured populations: SARS CoV-2 as a case study'	Study objective: to investigate the effects of NPIs that reduce the numbers of contacts between individuals on the risk of a local outbreak Setting: UK Model: branching process transmission model Data: age demographic data (from United Nations, 2019) and contact data for the UK Study period: unclear	NPI: • Limitation of social contacts • Isolation of cases • School closures • Workplace closures or working from home Outcomes: • COVID-19 transmission (probability of outbreak) Scenarios 3 scenarios: • susceptibility to infection and the proportion of hosts who experience a fully asymptomatic course of infection are independent of age • susceptibility assumed to vary with age, but the proportion of asymptomatic infections is independent of age • both susceptibility and the asymptomatic proportion vary with age	Funding: no specific funding for this work declared Research group (first author): Mathematical Institute, University of Oxford
Lucas and others, 2021 (115)	Study objective: to examine the trade-offs between self-isolation duration and self-isolation probability with self-reporting rates to explore which aspects of contact tracing adherence should be prioritised	NPI: • Isolation of cases	Funding: Bill and Melinda Gates Foundation and European Union's Horizon 2020 research and innovation programme project EpiPose.

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
'Engagement and adherence trade offs for SARS-CoV-2 contact tracing'	Setting: nationwide Model: a branching process transmission model Data: data from the literature used for the infection profile of COVID-19 Study period: unclear	Outcomes: • COVID-19 transmission (outbreak risk) Scenarios: • Different self-isolation times (1, 4, 7, and 14 days) with different self-reporting rates (case self-reporting to test and trace) of 10%, 30%, 50%, 70% • Different self-isolation probability (10%, 30%, 50%, 70%) with different self-reporting rates (10%, 30%, 50%, 70%) • Trade-off between self-isolation probability and test sensitivity	Research group (first author): Big Data Institute, Li Ka Shing Centre for Health Information and Discovery, University of Oxford. One author out of 11 affiliated to the NIHR HPRU for Behavioural Science and Evaluation
Makris, 2021 (116) 'COVID and social distancing with a heterogenous population'	Study objective: to understand the impact of lockdown policies and social distancing on UK death toll Setting: UK Model: a susceptible-infectious-recovered (SIR) model Data: UK data on reported deaths Study period: 24 March 2020 to 30 May 2020	NPI: • Lockdown • Limitation of social contacts Outcomes: • COVID-19 related mortality (number of deaths) Scenarios: Minimal level of social distancing (40% reduction in all individuals' contacts), and maximal level of social distancing (lockdown) are simulated but details of the scenarios unclear.	Funding: no funding Research group (first [only] author): University of Kent
Megarbane and others, 2021 (117) 'Is Lockdown Effective in Limiting SARS-CoV-2 Epidemic Progression? a Cross-Country Comparative Evaluation Using Epidemiokinetic Tools'	Study objective: to evaluate the effects of lockdown on time to reach the plateau of the COVID-19 pandemic and its length in countries with various lockdown scenarios Setting: 9 countries including the UK Model: a susceptible-infectious-recovered (SIR) model Data: WHO Coronavirus (COVID-19) Dashboard as source of case data Study period: 23 February to 14 June 2020	NPI: • Lockdown Outcomes: • COVID-19 transmission (rate of new SARS-CoV-2 infected individuals) Scenarios: unclear	Funding: no funding Research group: (first author): Department of Medical and Toxicological Critical Care, Lariboisiere Hospital, Paris, France
Miller and others, 2022 (118) 'Modeling the factors that influence exposure to SARS-	Study objective: to evaluate the effectiveness of environmental and behavioural factors including prevalence of the virus in the population, number of people traveling, ventilation rate, and	NPI: • Face coverings • Ventilation	Funding: Department of Transport, UK Government; Engineering and Physical Sciences Research Council

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
CoV-2 on a subway train carriage’	mask wearing, in the transmission of COVID-19 in train carriages Setting: focus on a “subway carriage” or a “given carriage within an underground system” Model: an agent-based model Data: London Underground data from 2015 used for modelling boarding and alighting behaviours Study period: not reported	Outcomes: • COVID-19 transmission (viral dose) Scenarios: unclear	Research group (first author): Defence Science and Technology Laboratory, Salisbury, UK
Mintram and others, 2022 (119) ‘CALMS: Modelling the long-term health and economic impact of COVID-19 using agent-based simulation’	Study objective: to evaluate the long-term health and economic impact of COVID-19 and associated preventive and therapeutic interventions, and the impact of delivering government interventions over a period of time Setting: UK Model: an agent-based model Data source: 2012 Health Survey for England, CoMix survey used for number of contacts during lockdown, government data on COVID-19 hospital admissions and deaths Study period: lockdown modelled from 24 March 2020	NPI: • Lockdown Outcomes: • COVID-19 hospitalisation (hospital admissions and ICU admissions) • COVID-19 related mortality (COVID-19 deaths) Scenarios Five scenarios evaluated, 2 of relevance to NPI: • periodic lockdowns (full lockdown triggered once hospitalisations reach a defined threshold, based on proportion of population in England in hospital during each of the 3 national lockdowns 2020 to 2021) • periodic lockdowns with a vaccination programme for the whole population (where vaccination starts on day 270 after the virus is introduced)	Funding: no specific funding for this work declared Research group (first author): Modelling and Simulation Group, Department of Computer Science, Brunel University, London
Moore and others, 2021 (120) ‘A General Computational Framework for COVID-19 Modelling with Applications to Testing Varied Interventions in Education Environments’	Study objective: to evaluate how NPIs influence the spread of infection in educational settings Setting: secondary schools, further education settings and higher education settings Model: an individual-based model	NPI: • Face coverings • Ventilation • Asymptomatic testing Outcomes: • COVID-19 cases (number of infections) • Lost time (school or work) (average number of days in isolation)	Funding: Just One Giant Lab (JOGL) Research group (first author): School of Mathematics, Cardiff University

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
	Data: DHSC data on R number Study period: not reported	Scenarios: used across a wide range of complex scenarios	
Munday and others, 2021 (121) 'Estimating the impact of reopening schools on the reproduction number of SARS-CoV-2 in England, using weekly contact survey data'	Study objective: to evaluate the potential impact of reopening schools on COVID-19 transmission Setting: England Model: epidemiological transmission model Data: contact data from the CoMix survey; susceptibility and infectiousness profiles taken from other studies and ONS reports Study period: projecting the impact of reopening schools in March 2021	NPI: • School closures (school reopening under a period of lockdown and face-to-face schooling) Outcomes: • COVID-19 transmission (R number) Scenarios: comparison of schools open and schools closed during lockdown periods; and scenarios involving varying vaccination coverage with schools reopening	Funding: mixed sources including Horizon 2020, NIHR, and Global Challenges Research Fund Research group (all authors): Centre for Mathematical Modelling of Infectious Disease, LSHTM, London. NIHR HPRU Modelling Methodology author affiliation
Munday and others, 2021 (122) 'Implications of the school-household network structure on SARS-CoV-2 transmission under school reopening strategies in England'	Study objective: to evaluate the risk of COVID-19 transmission in schools under different re-opening strategies Setting: state-funded primary and secondary schools in England Model: epidemiological transmission model Data: school attendance data from Department for Education (2019) Study period: not reported	NPI: • School closures (reopening) Outcomes: • COVID-19 transmission (probability of an outbreak) Scenarios: Six reopening scenarios (fully reopening schools, or different combinations of year-groups returning to school)	Funding: mixed sources including European Union's Horizon 2020 research and innovation programme project EpiPose, and NIHR Research group (first author): Centre for Mathematical Modelling of Infectious Diseases, LSHTM. NIHR HPRU Modelling Methodology author affiliation
Nadim and others, 2021 (123) 'Short-term predictions and prevention strategies for COVID-19: A model-based study'	Study objective: to evaluate the impact of control measures implemented in the UK on COVID-19 transmission Setting: UK Model: a susceptible-exposed-infectious-recovered (SEIR) model Data: UK COVID-19 data from Worldometer	NPI: • Isolation of cases • Isolation of contacts Outcomes: • COVID-19 transmission (R number and control R number) Scenarios: unclear	Funding: no specific funding for this work declared Research group (first author): Agricultural and Ecological Research Unit, Indian Statistical Institute

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
	Study period: 1 July 2020 to 4 December 2020		
Novakovic and others, 2022 (124) 'The CP-ABM approach for modelling COVID-19 infection dynamics and quantifying the effects of non-pharmaceutical interventions'	Study objective: to describe the model and assessed which of the NPIs affected the observed changes to COVID-19 infection rates Setting: Northern Ireland Model: an agent-based model Data source: based on NI data on confirmed COVID-19 cases Study period: 9 March and 15 November 2020	NPI: • Face coverings • Lockdown (2 national lockdowns and one regional lockdown) Outcomes: • COVID-19 cases Scenarios: unclear	Funding: Queen's University Belfast Research group (first author): School of Mathematics and Physics, Queen's University Belfast
Panovska-Griffiths and others, 2020 (125) 'Determining the optimal strategy for reopening schools, the impact of test and trace interventions, and the risk of occurrence of a second COVID-19 epidemic wave in the UK: a modelling study'	Study objective: to evaluate the impact of 2 possible school reopening strategies from September 2020 in combination with 3 different test tract isolate scenarios Setting: UK Model: an agent-based model (Covasim) Data: publicly available data; cases and deaths from UK Government's COVID-19 dashboard; Google movement data Study period: modelled from September 2020 to 31 December 2021	NPI: • School closures (reopening) Outcomes: • COVID-19 cases (new infections) • COVID-19 related mortality • COVID-19 transmission (R number) Scenarios Full time or part time (using a rota system) school reopening with 3 different contact tracing scenarios: • 68% contacts are traced with no testing scale-up • 68% contacts are traced with testing scaled up to avoid a second COVID-19 wave • 40% contacts are traced with testing scaled up to avoid a second wave	Funding: no funding Research group (first author): Department of Applied Health Research and Institute for Global Health, University College London and The Queens College, University of Oxford
Panovska-Griffiths and others, 2021 (126) 'Modelling the potential impact of mask use in schools and society on COVID-19 control in the UK'	Study objective: to evaluate the potential impact of mandatory masks on the control of COVID-19 Setting: UK, nationwide in community and school settings Model: an agent-based -model (Covasim)	NPI: • Face coverings Outcomes: • COVID-19 cases (cumulative infections)	Funding: no specific funding for this work declared Research group (first author): Department of Applied Health Research, University College London

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
	Data: hypothetical population of 100,000. Real-world data used to inform parameters (UK COVID-19 dashboard and Test and Tract data) Study period: 1 September to 23 October 2020	Scenarios: Varying levels of community mask-wearing and test and trace strategies were modelled to determine the optimal levels needed to prevent a resurgence of COVID-19 following the reopening of schools in the UK (September 2020). The following scenarios were tested: • masks in community not in secondary schools with low compliance • masks in community not in secondary schools with high compliance • masks in community and in secondary schools with low compliance • masks in community and in secondary schools with high compliance	
Panovska-Griffiths and others, 2022 (127) 'Modelling the impact of reopening schools in the UK in early 2021 in the presence of the alpha variant and with roll-out of vaccination against SARS-CoV-2'	Study objective: to evaluate the impact of different strategies for reopening schools compared to a full and continued lockdown on COVID-19 transmission Setting: UK Model: an agent-based model (Covasim) Data: real-world data (NHS Test and Trace Data) Study period: 4 January 2021 to 30 April 2021	NPI: • School closures (reopening of schools) Outcomes: • COVID-19 transmission (R number) • COVID-19 related mortality (cumulative deaths) • COVID-19 cases (new daily cases) Scenarios Full national lockdown compared with 4 different scenarios for reopening schools with partial lockdown in place: • primary schools and years 11 and 13 returning on 8 March 2021 and other school years on 15 March • full return of primary and secondary schools on 15 March 2021 • primary schools and years 11 and 13 returning on 8 March 2021 and other school years on 19 April • full primary school return on 8 March with 2-week alternating rota of school or home-based learning for secondary schools	Funding: no funding Research group (first author): The Big Data Institute, Nuffield Department of Medicine, Oxford
Post and others, 2021 (128) 'How did governmental interventions affect the spread of COVID-19 in European countries?'	Study objective: to examine the effects of social distancing measures on COVID-19 transmission (the effective contact rate) Setting: Italy, Spain, Germany, the Netherlands, Belgium, Sweden, and the UK	NPI: • Lockdown	Funding: no funding Research group (all authors): Department of Mathematics and Computer science, Eindhoven University of Technology

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
	Model: a susceptible-exposed-infectious-recovered (SEIR) model Data: real-world data (case data collected from the John Hopkins University Worldometers dashboard) Study period: February to 9 April 2020	Outcomes: • COVID-19 transmission (effective contact rate – the mean number of daily contacts for an infectious person to transmit COVID-19) Scenarios: Model was used to compare the change points in the daily effective contact rates to the time periods in which NPIs were implemented.	
Quilty and others, 2021 (129) 'Quarantine and testing strategies in contact tracing for SARS-CoV-2: a modelling study'	Study objective: to evaluate the efficacy of testing contacts to control onward transmission and replace or reduce the length of isolation for uninfected contacts Setting: UK Model: an agent-based model Data: real-world data (viral load data obtained from published literature, contact tracing data obtained from the National Health Service test and trace data) Study period: unclear. The isolation period at the time of the study was 14 days	NPI: • Test and release strategies Outcomes: • COVID-19 transmission (onward transmission prevented) Scenarios: • Isolation based strategy: different isolation durations of 0, 3, 5, 7, 10 and 14 days post exposure to the index case with no testing, PCR testing or lateral flow testing on the final day of isolation • Testing-based strategy: lateral flow testing every day for 1, 3, 5, 7, 10 or 14 days after being traced (no isolation unless symptoms develop or test positive) • Baseline scenario assumed 50% adherence to isolation of contacts and 67% adherence to isolation of cases; contact tracing delays and varied adherence to quarantine and isolation on each strategy was also modelled.	Funding: partly funded by the NIHR, UK Research and Innovation, Wellcome Trust, EU Horizon 2021, and the Bill and Melinda Gates Foundation Research group (all authors): Centre for the Mathematical Modelling of Infectious Diseases, LSHTM
Quilty and others, 2022 (130) medRxiv PREPRINT (posted 5 January 2022) 'Test to release from isolation after testing positive for SARS-CoV-2'	Study objective: to evaluate the effectiveness of test to release policies compared with a fixed 10-day isolation policy Setting: UK, with Omicorn variant circulating Model: an individual-based model Data: a hypothetical sample population of 10,000 was created using real-world published viral load trajectory data Study period: unclear but refers to December 2021 testing policy for contacts	NPI: • Test and release strategies (2 negative consecutive LFD tests) Outcomes: • Lost time (school or work) • COVID-19 transmission (infectious days in the community) Scenarios: • Combination of 3, 5, or 7 days' waiting until testing and 1, 2, or 3 days of consecutive negative tests required for release	Funding: no specific funding for this work declared Research group (first author): Centre for Mathematical Modelling of Infectious Diseases, LSHTM

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
Rice and others, 2020 (131) 'Effect of school closures on mortality from coronavirus disease 2019: old and new predictions'	Study objective: to replicate the modelling of NPIs undertaken for the UK government in March 2020 Setting: UK Model: an agent-based model (CovidSim) Data: data from Imperial College Report 9 that was used to inform the UK's national response to the COVID-19 pandemic Study period: March 2020	NPI: • Isolation of cases • Isolation of contacts • Limitation of social contacts • School closures • Shielding Outcomes: • COVID-19 cases • COVID-19 hospitalisations • COVID-19 related mortality Scenarios Different NPI scenarios and triggers based on ICU admissions: • school and university closures • case isolation • case isolation and isolation of household contacts • case isolation, contact isolation, and reducing contacts outside household, school, or workplace by 75% (with workplace contacts reduced by 25%, household contacts increase by 25%, school contacts unchanged) • case isolation, and reduced contacts • cases isolation, contact isolation, and shielding of people aged over 70 years • school closures, case isolation, contact isolation and shielding	Funding: UKRI grant under COVID-19 initiative Research group (all): School of Physics and astronomy, University of Edinburgh
Robles-Zurita 2023 (132) 'Reducing the basic reproduction number of COVID-19: a model simulation focused on QALYs, hospitalisation, productivity costs and optimal (soft) lockdown'	Study objective: to evaluate lockdown interventions in four European countries Setting: UK, France, Italy, and Spain Model: a susceptible-infectious-recovered (SIR) model Data: real-world data (all parameters used in the model were obtained from real-world evidence published in the literature and cumulative death data was collected from the European Centre for Disease Prevention and Control for each country) Study period: March to July 2020	NPI: • Lockdown Outcomes: • COVID-19 cases (cumulative severe cases) • COVID-19 related mortality (cumulative deaths, deaths avoided) • COVID-19 hospitalisations (hospitalisation cases avoided, actual hospitalisations avoided) Scenarios: Lockdown compared to no change, with unlimited versus limited hospital capacity. Duration of lockdown (swift lockdown continued	Funding: no specific funding for this work declared Research group (first [only] author): University of Glasgow

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
		lockdown and no lockdown) and time to availability of vaccination was simulated.	
Ruget and others, 2021 (133) Research Square PREPRINT posted 12 August 2021 'Risk of COVID-19 Introduction into the Scottish Hebrides and Strategies for Control'	Study objective: to evaluate the risk of COVID-19 introduction into the Hebridean islands due to flow of people, and assess movement restrictions to mitigate this Setting: the Hebridean islands off the west coast of mainland Scotland Model: a network meta-population model Data: real-world data (The Census Flow, The Civil Aviation Authority, The Ferry Company and Transport Scotland was used to collect movement data. POLYMOD was used to collect contact data rates – not specific to the study setting, Public Health Scotland PCT testing data was used for COVID-19 cases) Study period: unclear (data collected between January 2019 and December 2020)	NPI: • Travel restrictions (movements from the mainland reduced) Outcomes: • COVID-19 transmission (probability of introduction of cases, and probability of total number of individual infected) Scenarios Compared to baseline of summer of 2020 when the mean number of contacts per individual was 6: • no reduction in movement (mean number of contacts 3) • movements from the mainland reduced by 50% and 70% (mean contacts 3) • all movements reduced by 50% (mean contacts 2.6)	Funding: Scottish Government Rural and Environment Science and Analytical Services Division Research group (first author): The Roslin Institute, University of Edinburgh
Sandmann and others, 2020 (134) 'Optimizing Benefits of Testing Key Workers for Infection with SARS-CoV-2: A Mathematical Modeling Analysis'	Study objective: to assess the effect of COVID-19 testing keyworkers on absence from work and risk of transmission Setting: 1,000 keyworkers and their households Model: a decision-analytic model Data: real-world data (unclear source) Study period: unclear	NPI: • Asymptomatic testing • Symptomatic testing Outcomes: • COVID-19 transmission (risk of workplace transmission) • Lost time (school or work) Scenarios The model explored the impact of 3 testing strategies compared with a baseline of no testing and self-isolating based on COVID-19 symptoms alone: • testing keyworkers who were isolating with COVID-19 symptoms • testing keyworkers who were self-isolating without symptoms, but with exposure to symptomatic household contacts • one-time testing of all keyworkers regardless of exposure or symptom status	Funding: PHE Research group (first author): National Infection Service, PHE (including UKHSA first and last authors). Two out of 4 authors affiliated to the NIHR HPRU in Modelling and Health Economics

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
Silva and others, 2023 (135) 'The role of regular asymptomatic testing in reducing the impact of a COVID-19 wave' To note that this article was initially identified as a preprint	Study objective: to investigate the impact of regular asymptomatic LFD testing on the peak and total number of COVID-19 infections during an emerging wave Setting: population representative of a UK town Model: an agent-based model (Covasim) Data: hypothetical population (n=100,000) simulated (based on real-world data on contact-behaviours collected from the UK CoMix survey and European POLYMOD contact survey); high proportion vaccinated (67%) Study period: from Autumn 2021	NPI: • Asymptomatic testing • Symptomatic testing • Isolation of cases • Contact tracing Outcomes: • COVID-19 cases (total number of infections) Scenarios: • Asymptomatic LFD testing at various frequencies (once per week, twice per week, or every 2 days) at 100% and 50% adherence to other rules (self-isolation, PCR testing when symptomatic, % contact uptake of PCR testing) • Symptomatic testing (self-isolation, PCR testing when symptomatic, % contact uptake of PCR testing) – different uptakes of the 3 elements considered from 0% to 100% in increments of 20%. PCR and LFD tests compared in the simulations of symptomatic testing and their traced contacts	Funding: UKRI MRC grant Research group (first author): The University of Manchester. One out of 7 authors UKHSA affiliated
Skittrall 2021 (136) 'SARS-CoV-2 screening: Effectiveness and risk of increasing transmission'	Study objective: to investigate the impact of different asymptomatic testing strategies on SARS-CoV-2 transmission Setting: whole population level Model: epidemiological transmission model Data: lab turnaround data from public health lab in Cambridge (April to June 2020) Study period: unclear	NPI: • Asymptomatic testing Outcomes: • COVID-19 transmission (proportion of infections averted) Scenarios Testing at 5-day intervals for between 5 and 30 days in the following scenarios: • for the whole population • half the population (who have twice the risk of being infected) prioritised for testing • half the population are healthcare workers in contact with vulnerable patients • 2 cities with different infection prevalence	Funding: Mason Medical Research Foundation Research group (first [only] author): University of Cambridge
Smith and others, 2022 (137)	Study objective: to evaluate the effectiveness of shielding the most vulnerable to COVID-19 whilst allowing the infection to spread among the wider population	NPI: • Shielding	Funding: no specific funding for this work declared Research group (all): University

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
'Critical weaknesses in shielding strategies for COVID-19'	Setting: model based on an idealised large city in England, of one million people, 7% being at higher risk of mortality from COVID-19 (and 10% of these in long term care facilities) Model: a susceptible-exposed-infectious-recovered (SEIR) model Data source: Apple mobility data Study period: unclear but refers to case data from April 2021 when shielding advice ended (the evaluation is retrospective)	Outcomes: • COVID-19 cases (per 100,000) • COVID-19 hospitalisation (ICU) • COVID-19 related mortality (deaths per 100,000) Scenarios: • No shielding • Imperfect shielding (partial reduction in contacts for higher-risk individuals) • Perfect shielding (no contacts for higher risk individuals) • With shielding restrictions lifted when cases fall below a certain threshold	of Bath
Sonabend and others, 2021 (138) 'Non-pharmaceutical interventions, vaccination, and the SARS-CoV-2 delta variant in England: a mathematical modelling study'	Study objective: to evaluate the impact of England's four-step roadmap for lifting NPI restrictions on the epidemic in the presence or absence of the delta variant, vaccine effectiveness, varying cross protection, and waning immunity, and the impact of delaying step 4 from not before 21 June 2021 to 19 July 2021 Setting: England Model: epidemiological transmission model (using Bayesian methods for parameter estimation) Data: surveillance data for England Study period: data up to 8 March 2021 used in the model; model projections from 8 March 2021 to 1 January 2022	NPI: • Hospitality setting closures (reopening of outdoor hospitality and non-essential retail, reopening indoor hospitality; lifting all remaining restrictions) • School closures (reopening) Outcomes: • COVID-19 cases (daily infections) • COVID-19 hospitalisation • COVID-19 related mortality (daily and cumulative deaths) • COVID-19 transmission (R number) Scenarios: Three levels of mixing following lifting of restrictions: baseline scenario assumes contacts increase gradually over an 11-week period after step 4 to a maximum of 40% (low mixing), 70% (moderate mixing), or 100% (high mixing).	Funding: Wellcome Trust; Department for International Development; NIHR HPRU in Modelling Methodology, MRC Research group (all authors): MRC Centre for Global Infectious Disease Analysis, Imperial College London. Five out of 17 authors affiliated to the NIHR HPRU in Modelling Methodology
Stocks and others, 2021 (139) medRxiv PREPRINT (posted 14 November 2021) 'Limited impact of contact tracing in a University setting for COVID-19 due to	Study objective: to evaluate the effectiveness of contact tracing on SARS-CoV-2 transmission in a university setting Setting: UK, University setting Model: an agent-based network model Data: social contact data from British surveys (Social Contact Survey, and the University of Bristol Coronavirus Questionnaire	NPI: • Contact tracing Outcomes: • COVID-19 transmission (secondary cases) Scenarios Contact tracing or no contact tracing at different transmission rates when the index case:	Funding: no specific funding for this work declared Research group (all authors): University of Bristol. One author affiliated to the NIHR HPRU in Behavioural Science and Evaluation

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
asymptomatic transmission and social distancing'	[CON-QUEST]) Study period: unclear	• is symptomatic • is asymptomatic • has a probability of being asymptomatic dependent on their age	
Taylor and others, 2020 (140) medRxiv PREPRINT (posted 9 September 2020) 'The risk of introducing SARS-CoV-2 to the UK via international travel in August 2020'	Study objective: to evaluate the impact of border measures on importation of COVID-19 into the UK Setting: arrivals into UK airports, focusing on the top 25 countries that fly commercial aircraft into the UK (with arrivals from 12 of the countries required to self-isolate for 14 days on arrival; no restrictions for arrivals from the other 13 countries) Model: unclear Data source: PHE (data on worldwide cases, deaths and tests for COVID-19 from 13 August 2020) Study period: August 2020	NPI: • Border measures Outcomes: • COVID-19 cases Scenarios: Alternatives to self-isolation, including health checks and thermal imaging scanners at airports, self-isolation for 7, 10 or 14 days, and PCR tests on arrival (with isolation until a negative test result) with or without a further test after 4 days	Funding: PHE Research group (first author): Animal and Plant Agency, UK
van Bunnik and others, 2021 (141) 'Segmentation and shielding of the most vulnerable members of the population as elements of an exit strategy from COVID-19 lockdown'	Study objective: to evaluate the impact of a proposed exit strategy ('segmentation and shielding') from lockdown Setting: UK Model: a susceptible-infectious-resistant-susceptible (SIRS) metapopulation model Data: published data including NHS digital shielding patients list and ONS population estimates Study period: analyses undertaken between 1 April 2020 and 20 May 2020	NPI: • Shielding Outcomes: • COVID-19 transmission (R number) Scenarios: • Baseline: 20% total population is vulnerable, and assumed 1:1 ratio of shielders to vulnerable 20% is shielding and 60% not in either category • 3 alternative scenarios (showing % vulnerable, shielding, and neither): 2:2:96, 8:8:84, and 14:14:72	Funding: European Union; Novo Nordisk Foundation; Wellcome Trust Research group (first author): University of Edinburgh
Violato and others, 2021 (142) 'Impact of the stringency of lockdown measures on COVID-19: A theoretical model of a pandemic'	Study objective: to evaluate the impact of lockdown on the control of COVID-19 transmission Setting: UK, Austria, Belgium, France, Germany, Italy, Netherlands and Spain	NPI: • lockdown Outcomes: • COVID-19 related mortality (total deaths per million)	Funding: no funding Research group (first author): University of Minnesota Medical School

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
	Model: structural equation modelling; latent variable path analysis Data: Our World in Data (Johns Hopkins University) COVID-19 cases and deaths Study period: 31 December 2019 to 1 June 2020		
Wang and others, 2020 (143) 'A four-compartment model for the COVID-19 infection – implications on infection kinetics, control measures and lockdown exit strategies'	Study objective: to evaluate the potential effectiveness of COVID-19 infection control interventions and make projections on the optimal approach to exit the lockdowns which were in place during the study period Setting: UK, United States, Italy Model: a susceptible-quarantined-infectious-recovered (SQIR) model Data: real-word data (source of UK data is unclear) Study period: unclear	NPI: • Lockdown (nationwide) Outcomes: • COVID-19 cases (case count trajectory, and estimated number of cases on lockdown exit) • COVID-19 hospitalisations (critical care bed usage) Scenarios: For the UK, the modelled case trajectory was defined for 2 periods (before and after the nationwide lockdown was implemented on 23 March).	Funding: The National Key Research and Development Program of China Research group (first author): Peking University People's Hospital, Beijing
Warne and others, 2021 (144) Research Square PREPRINT (posted 20 May 2021) 'Feasibility and efficacy of mass testing for SARS-CoV-2 in a UK university using swab pooling and PCR'	Study objective: to implement and evaluate asymptomatic testing strategies in a UK university, to quantify the effects of mass testing on transmission Setting: student facilities and accommodation at The University of Cambridge, England Model: a susceptible-exposed-asymptomatic-infectious-recovered (SEAIR) network model Data: parameters from the pilot asymptomatic testing programme were used in the model, based on 3,094 student households (mean household members n=5), of which n=12,781 students participated in the weekly asymptomatic screening programme Study period: 5 October to 6 December 2020	NPI: • Asymptomatic testing Intervention or exposure: • students' self-collected nasal and throat swabs weekly. Swabs for up to 10 students were pooled and PCR tested (testing pools generally corresponded with student households) Outcomes: • COVID-19 cases (confirmed symptomatic cases) • COVID-19 transmission (R0) Scenarios Weekly testing compared with more frequent testing.	Funding: The University of Cambridge Research group (first author): The University of Cambridge

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
Wells and others, 2020 (145) 'Disease control across urban-rural gradients'	Study objective: to assess the efficacy of different NPIs across an urban-rural gradient in Wales Setting: Wales (4 counties: Pembrokeshire, Carmarthenshire, Swansea, Neath Port Talbot) Model: an individual-based metapopulation model Data source: real-world data (demographic data collected from the UK 2011 census, ONS and published COVID-19 prevalence data) Study period: unclear	NPI: • Contact tracing (trace all or symptomatic cases only) • Lockdown (regional lockdown) Outcomes: • COVID-19 transmission (epidemic size) Scenario Interventions modelled included: • test-and-trace control strategy – all infectious individuals isolated based on successful tracing, and only symptomatic individuals isolated as a control strategy • regional lockdown – regional lockdown strategies in response to regional outbreaks and lockdown stringency and duration	Funding: Welsh Government, Supercomputing Wales project Research group (first author): Swansea University
Whitfield and others, 2022 (146) 'Modelling the impact of non-pharmaceutical interventions on workplace transmission of SARS-CoV-2 in the home-delivery sector'	Study objective: to evaluate the potential efficacy of NPIs against transmission within the parcel delivery and logistics sector Setting: workplaces in the UK Model: an agent-based network model Data source: data collection via interviews with company representatives from July 2020 to June 2021 (on working patterns and contacts); published contact survey of UK delivery drivers; community COVID-19 incidence data for March to June 2020 Study period: unclear	NPI: • Asymptomatic testing (twice weekly voluntary and mandatory LFD testing) • Physical distancing • Isolation of cases • Isolation of contacts • Cohorting • Workplace closure or working from home Outcomes: • COVID-19 transmission (secondary cases and probability of outbreaks) Scenarios: • Symptom isolation only • Improved isolation • Physical distancing (2 metres) • Cohort size reduction • House share isolation • Fixed-pairings • Office staff working from home • Twice weekly lateral flow testing • Mandatory testing • Care share isolation	Funding: UKRI and NIHR COVID-19 Rapid Response call Research group (first author): University of Manchester. Two out of 10 authors UKHSA affiliated (including last author)

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
		• Cohort isolation	
Woodhouse and others, 2022 (147) 'Alternative COVID-19 mitigation measures in school classrooms: analysis using an agent-based model of SARS-CoV-2 transmission'	Study objective: to assess and quantify the effectiveness of interventions to control COVID-19 transmission and limit public absence in primary schools Setting: primary schools, England Model: an agent-based model Data: real-world data obtained from a study of 36 primary schools which collected data on close contact between students and staff; infection prevalence data from ONS Study period: model was applied to the autumn school term in 2020	NPI: • School bubbles (isolation at home of classrooms or bubbles of students) • Asymptomatic testing (lateral flow testing with and without confirmatory PCR testing) Outcomes: • COVID-19 transmission (number of infected students in each classroom) • Lost time (school or work) Scenarios The mitigation measured modelled included: • bubble isolation of classrooms • asymptomatic testing (LFD testing twice per week, with confirmatory PCR testing) • asymptomatic testing (LFD testing twice per week, without confirmatory PCR testing) • daily LFD asymptomatic testing (with confirmatory PCR testing) • daily LFD asymptomatic testing (no PCR testing)	Funding: MRC Research group (first author): UK MRC Integrative Epidemiology Unit at the University of Bristol
Yakob and others, 2021 (148) 'Isolation thresholds for curbing SARS-CoV-2 resurgence'	Study objective: to calculate reactive isolation thresholds that consider the uncertainties associated with the latent and pre-patent periods of COVID-19 infection, as well as the proportion of people with COVID-19 who accurately recognise and respond to symptoms Setting: England Model: threshold-based susceptible-infectious recovered (SIR) model Data: hypothetical Study period: unclear	NPI: • Isolation of cases Outcomes: • COVID-19 transmission (R number) Scenarios: unclear	Funding: no funding Research group (first [only] author): LSHTM
Ying and others, 2021 (149)	Study objective: to estimate the number of in-store infections that could be prevented by implementing various mitigation methods to limit social contacts	NPI: • Limitation of social contacts (restricting the number of customers in a store, reducing customer arrival rate)	Funding: no specific funding for this work declared

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
'Modelling COVID-19 transmission in supermarkets using an agent-based model'	Setting: hypothetical supermarket, UK Model: an agent-based model Data source: primarily hypothetical data. Parameters of baskets per store, arrival rate and waiting time using UK data Study period: unclear	• Face coverings (in-store face mask policy) • Physical distancing (one-way aisle layout) Outcomes: • COVID-19 cases (number of infections per day) Scenarios Customer movement was modelled based on the quantity of time a customer spent in close proximity to infectious customers. Scenarios included: • one-way aisle layout • restricting the maximum number of customers in store • reducing the customer arrival rates (rate at which customers enter the store) • implementing a face mask policy in store	Research group (first author): G-Research, London
Zhang and others, 2022 (150) 'Evaluating the impact of stay-at-home and quarantine measures on COVID-19 spread'	Study objective: to evaluate the effectiveness of stay at home and quarantine measures to control the transmission of COVID-19 Setting: Wuhan, New York, Milan, and London (community-wide) Model: a susceptible-exposed-infectious-recovered (SEIR) model Data: real-world data (daily confirmed cases in each city; from 6 March to 23 March 2020 for London) Study period: 6 March to 10 May 2020 (for London only)	NPI: • Isolation of cases • Isolation of contacts Outcomes: • COVID-19 transmission (Re number) Scenarios: Epidemiological parameters before lockdown in each city and the impact of isolation rates were estimated. The minimal isolation rates required to reduce the effective reproductive number below 1 was then estimated.	Funding: no specific funding for this work declared Research group (first author): school of Mathematical Sciences, Dalian University of Technology
Ziauddeen and others, 2021 (151) 'Modelling the impact of lockdown easing measures on cumulative COVID-19 cases and deaths in England'	Study objective: to assess the potential impacts of successive lockdown-easing measures in England, at a point in the COVID-19 pandemic when community transmission levels were relatively high Setting: England Model: Monte Carlo simulation model	NPI: • Lockdown (modelled lockdown easing) Outcomes: • COVID-19 cases (excess cumulative cases) • COVID-19 deaths (excess cumulative deaths)	Funding: no specific funding for this work declared Research group (first author): The University of Cambridge

Reference	Model characteristics	Scenarios and outcome measures	Funding [A]
	Data: real-world data on the number of incident deaths by date of occurrence from the Office for National Statistics up to 12 June 2020 Study period: model simulated the pandemic over a 90-day period from 1 June to 29 August 2020	Scenarios: Ninety-day simulation forecasting excess cases and deaths in simulated scenarios of plausible increases in R after successive lockdown easing, compared with a baseline scenario where R remained constant.	

Table S.7. List of excluded studies

Author	Year	Title
Not UK n=86		
Abbey and others	2022	Exploring the effects of activity-preserving time dilation on the dynamic interplay of airborne contagion processes and temporal networks using an interaction-driven model
Aganovic and others	2022	Modeling the impact of indoor relative humidity on the infection risk of five respiratory airborne viruses
Ahmed and others	2021	Mechanistic modelling of COVID-19 and the impact of lockdowns on a short-time scale
Amuedo-Dorantes and others	2021	Early adoption of non-pharmaceutical interventions and COVID-19 mortality
Ashcroft and others	2022	Test-trace-isolate-quarantine (TTIQ) intervention strategies after symptomatic COVID-19 case identification
Bandyopadhyay and others	2021	Learning versus habit formation: Optimal timing of lockdown for disease containment
Bartolucci and others	2022	How distant? An experimental analysis of students' COVID-19 exposure and physical distancing in university buildings
Bhoi and others	2021	Communicable Disease Pandemic: A Simulation Model Based on Community Transmission and Social Distancing
Biala and others	2021	How Efficient is Contact Tracing in Mitigating the Spread of COVID-19? A Mathematical Modeling Approach
Bongiorno and others	2021	A multi-layer network model to assess school opening policies during the COVID-19 vaccination campaign
Bonnet and others	2023	Is there a role for RDTs as we live with COVID-19? An assessment of different strategies
Boyer and others	2022	Infectious disease dynamics and restrictions on social gathering size
Burman and others	2021	A Flexible Agent-Based Model to Study COVID-19 Outbreak -- A Generic Approach
Cao and others	2021	A COVID-19 Spread Model of the Discrete Grid to Assess the Potential of Non-pharmaceutical Interventions
Chowdhury and others	2022	Incorporating the mutational landscape of SARS-COV-2 variants and case-dependent vaccination rates into epidemic models
Chowell and others	2021	Harnessing testing strategies and public health measures to avert COVID-19 outbreaks during ocean cruises
Cotman and others	2021	Factors affecting aerosol SARS-CoV-2 transmission via HVAC systems; a modeling study
Daghriri and others	2021	Quantifying the effects of social distancing on the spread of COVID-19
Das and others	2021	COVID-19: Analytic results for a modified SEIR model and comparison of different intervention strategies
Dave and others	2021	When Do Shelter-in-Place Orders Fight COVID-19 Best? Policy Heterogeneity across States and Adoption Time
David and others	2021	Assessing COVID prevention strategies to permit the safe opening of college campuses in fall 2021
Duives and others	2021	The multi-dimensional challenges of controlling SARS-CoV-2 transmission in indoor spaces: Insights from the linkage of a microscopic pedestrian simulation and virus transmission models
Egeren and others	2022	No magic bullet: limiting in-school transmission in the face of variable SARS-CoV-2 viral loads
Endo and others	2022	Simulating respiratory disease transmission within and between classrooms to assess pandemic management strategies at schools
Favero and others	2022	Modelling preventive measures and their effect on generation times in emerging epidemics
Foncea and others	2021	Optimal Testing Strategies to Monitor COVID-19 Traced Contacts

Author	Year	Title
Foncea and others	2022	Replacing quarantine of COVID-19 contacts with periodic testing is also effective in mitigating the risk of transmission
Frieswijk and others	2021	Modelling the Effect of Vaccination and Human Behaviour on the Spread of Epidemic Diseases on Temporal Networks
Gandolfi and others	2022	A new threshold reveals the uncertainty about the effect of school opening on diffusion of COVID-19
Gazquez and others	2021	Poster as Tool to Improve Hand Hygiene Among Health Science Students: Case-control Study
Godoy and others	2023	Implementation and spillovers of local non-pharmaceutical interventions
Goldsztejn and others	2020	Public policy and economic dynamics of COVID-19 spread: A mathematical modeling study
Grimm and others	2021	Extensions of the SEIR model for the analysis of tailored social distancing and tracing approaches to cope with COVID-19
Gugole and others	2021	Uncertainty quantification and sensitivity analysis of COVID-19 exit strategies in an individual-based transmission model
Gunaratne and others	2021	Evaluating Efficacy of Indoor Non-Pharmaceutical Interventions against COVID-19 Outbreaks with a Coupled Spatial-SIR Agent-Based Simulation Framework
Han and others	2021	Modeling of suppression and mitigation interventions in the COVID-19 epidemics
Harmon and others	2022	The Facility Infection Risk EstimatorTM: A web application tool for comparing indoor risk mitigation strategies by estimating airborne transmission risk
Hasan and others	2022	Data-driven modeling and forecasting of COVID-19 outbreak for public policy making
Huang and others	2022	Airborne transmission of the Delta variant of SARS-CoV-2 in an auditorium
James and others	2021	Successful contact tracing systems for COVID-19 rely on effective quarantine and isolation
Jin and others	2022	A SEIRD+V Model for the Effect of Vaccination and Social Distancing on SARS-CoV-2 Infection and Mortality
Johnson and others	2022	Robust models of SARS-CoV-2 heterogeneity and control
Kearney and others	2022	Compliance with local travel restrictions and face masks during first phase of COVID-19 pandemic in Ireland: a national survey
Kennedy and others	2021	Modeling aerosol transmission of SARS-CoV-2 in multi-room facility
Khatami and others	2022	Deep reinforcement learning framework for controlling infectious disease outbreaks in the context of multi-jurisdictions
Kiang and others	2021	Routine asymptomatic testing strategies for airline travel during the COVID-19 pandemic: a simulation study
Klimek and others	2022	Small coverage effect in epidemic network models shows that masks can become more effective with less people wearing them
Kotil	2021	Emergent effects of contact tracing robustly stabilize outbreaks
Kuhfeldt and others	2022	Minimal SARS-CoV-2 classroom transmission at a large urban university experiencing repeated into campus introduction
Kurnitski and others	2021	Respiratory infection risk-based ventilation design method
Leon and others	2021	Nonpharmaceutical Interventions Remain Essential to Reducing COVID-19 Burden Even in a Well-Vaccinated Society: A Modeling Study
Liu and others	2021	Continuous Learning and Inference of Individual Probability of SARS-CoV-2 Infection Based on Interaction Data
Mahmood and others	2021	Contextual Contact Tracing based on StochasticÂ Compartment Modeling and Spatial Risk Assessment
Maiorana and others	2021	Effectiveness of isolation measures with app support to contain COVID-19 epidemics: a parametric approach

Author	Year	Title
Mairanowski and others	2021	Functional dependence of COVID-19 growth rate on lockdown conditions and rate of vaccination
Majeed and others	2022	Variant-specific interventions to slow down replacement and prevent outbreaks
Mancastroppa and others	2022	Sideward contact tracing and the control of epidemics in large gatherings
McAloon and others	2022	Potential application of Rapid Antigen Diagnostic Tests for the detection of infectious individuals attending mass gatherings - a simulation study
McGee and others	2021	Model-driven mitigation measures for reopening schools during the COVID-19 pandemic
Mendoza and others	2021	Implementation of a pooled surveillance testing program for asymptomatic SARS-CoV-2 infections in K-12 schools and universities
Mohammadi and others	2022	Human behaviour, NPI and mobility reduction effects on COVID-19 transmission in different countries of the world
Moritz and others	2021	The risk of indoor sports and culture events for the transmission of COVID-19
Pang and others	2022	Quantification of how mechanical ventilation influences the airborne infection risk of COVID-19 and HVAC energy consumption in office buildings
Perepi and others	2022	Predictive analysis of COVID-19 disease based on mathematical modelling and machine learning techniques
Pettit and others	2021	Optimized Post-Vaccination Strategies and Preventative Measures for SARS-CoV-2
Plank and others	2022	Potential reduction in transmission of COVID-19 by digital contact tracing systems: a modelling study
Pung and others	2022	Using high-resolution contact networks to evaluate SARS-CoV-2 transmission and control in large-scale multi-day events
Quilty and others	2021	Quarantine and testing strategies to reduce transmission risk from imported SARS-CoV-2 infections: a global modelling study
Raymenants and others	2022	Empirical evidence on the efficiency of backward contact tracing in COVID-19
Reyna-Lara and others	2021	Virus spread versus contact tracing: 2 competing contagion processes
Ridenti and others	2022	Mathematical Modeling and Investigation on the Role of Demography and Contact Patterns in Social Distancing Measures Effectiveness in COVID-19 Dissemination
Robinson and others	2021	Pilot evaluation of risk assessment and enhanced protocols regarding contacts at an international professional golf event
Rocha-Melogno and others	2021	Quantitative risk assessment of COVID-19 aerosol transmission indoors: a mechanistic stochastic web application
Seaman and others	2023	Decision Making across Adulthood during Physical Distancing
Shayak and others	2022	Contact Tracing Can Explain Counter-Intuitive COVID-19 Trajectories, Mitigate Disease Transmission and Provide an Early Warning Indicator - A Mathematical Modeling Study
Shiva and others	2022	The Luxury of Lockdown
Sobolik and others	2021	Controlling risk of SARS-CoV-2 infection in essential workers of enclosed food manufacturing facilities
Stabile and others	2021	Ventilation procedures to minimize the airborne transmission of viruses in classrooms
Supatgiat	2021	Effects of control measures and their impacts on COVID-19 transmission dynamics

Author	Year	Title
Szczuka and others	2023	Handwashing adherence during the COVID-19 pandemic: A longitudinal study based on protection motivation theory
Tavori and others	2021	Super-Spreaders Out, Super-Spreading In: The Effects of Infectiousness Heterogeneity and Lockdowns on Herd Immunity
Torneri and others	2022	Controlling SARS-CoV-2 in schools using repetitive testing strategies
Vanni and others	2021	Human Mobility and Epidemic Evolution
Villers and others	2022	SARS-CoV-2 aerosol transmission in schools: the effectiveness of different interventions
Yasutaka and others	2021	Assessment of COVID-19 risk and prevention effectiveness among spectators of mass gathering events
Yeung and others	2021	Machine learning-based prediction of growth in confirmed COVID-19 infection cases in 114 countries using metrics of nonpharmaceutical interventions and cultural dimensions: Model development and validation
Not COVID-19 n=13		
Ahmadzadeh and others	2021	Passenger exposure to respiratory aerosols in a train cabin: Effects of window, injection source, output flow location
Arsene and others	2021	Viral kinetic modeling and clinical trial simulation predicts disruption of respiratory disease trials by non-pharmaceutical COVID-19 interventions
Bandiera and others	2020	Face coverings and respiratory tract droplet dispersion
Beale and others	2020	Hand Hygiene Practices and the Risk of Human Coronavirus Infections in a UK Community Cohort
Best and others	2021	The impact of varying class sizes on epidemic spread in a university population
Coyle and others	2021	Reduction of exposure to simulated respiratory aerosols using ventilation, physical distancing, and universal masking
Edwards and others	2021	Reducing COVID-19 Airborne Transmission Risks on Public Transportation Buses: An Empirical Study on Aerosol Dispersion and Control
Fierce and others	2021	High efficacy of layered controls for reducing transmission of airborne pathogens
Kong and others	2021	Localized and Whole-Room Effects of Portable Air Filtration Units on Aerosol Particle Deposition and Concentration in a Classroom Environment
Lindsley and others	2021	Efficacy of universal masking for source control and personal protection from simulated cough and exhaled aerosols in a room
Motamedi and others	2022	CFD modeling of airborne pathogen transmission of COVID-19 in confined spaces under different ventilation strategies
Park and others	2021	Natural ventilation strategy and related issues to prevent coronavirus disease 2019 (COVID-19) airborne transmission in a school building
Sinha and others	2021	Mass testing and proactiveness affect epidemic spreading
Health or social care settings n=6		
Ahmad and others	2022	Benefits of inpatient contact tracing and illustration of social inequalities and their relation to increasing risk of hospitalisation by COVID-19
Alhakmi and others	2022	Exploring COVID-19 lateral flow testing engagement and compliance in selected Imperial College Healthcare Trust wards
Guo and others	2021	Using portable air purifiers to reduce airborne transmission of infectious respiratory viruses – a computational fluid dynamics study

Author	Year	Title
Hellewell and others	2021	Estimating the effectiveness of routine asymptomatic PCR testing at different frequencies for the detection of SARS-CoV-2 infections
Higham and others	2022	Rapid qualitative analysis in a mixed-methods evaluation of an infection prevention intervention in a UK hospital setting during the COVID-19 pandemic: A discussion of the CLEAN study methodology
Micocci and others	2021	COVID-19 testing in English care homes and implications for staff and residents
Wrong exposure n=155		
Adamson and others	2022	A large outbreak of COVID-19 in a UK prison, October 2020 to April 2021
Aganovic and others	2021	Estimating the impact of indoor relative humidity on SARS-CoV-2 airborne transmission risk using a new modification of the Wells-Riley model
Agrawal and others	2022	SUTRA: A Novel Approach to Modelling Pandemics with Applications to COVID-19
Ainsworth and others	2021	Infection control behavior at home during the COVID-19 pandemic: Observational study of a web-based behavioral intervention (Germ defence)
Akindeinde and others	2021	Fractional SEIRP model for COVID-19 dynamics incorporating social distancing and environment
Amaral and others	2021	An epidemiological model with voluntary quarantine strategies governed by evolutionary game dynamics
Anderson and others	2021	How much leeway is there to relax COVID-19 control measures?
Armitage and others	2021	Identifying targets for interventions to support public adherence to government instructions to reduce transmission of SARS-CoV-2
Ashby and others	2021	Non-pharmaceutical interventions and the emergence of pathogen variants
Bajaj and others	2021	Context-specific emergence and growth of the SARS-CoV-2 Delta variant
Banks and others	2022	Modelling plausible scenarios for the Omicron SARS-CoV-2 variant from early-stage surveillance
Basellini and others	2021	Linking excess mortality to mobility data during the first wave of COVID-19 in England and Wales
Batteux and others	2022	Impact of residual risk messaging to reduce false reassurance following test-negative results from asymptomatic coronavirus (SARS-CoV-2) testing: An online experimental study of a hypothetical test
Bin and others	2021	Hysteresis-based supervisory control with application to non-pharmaceutical containment of COVID-19
Birrell and others	2021	Real-time nowcasting and forecasting of COVID-19 dynamics in England: the first wave
Blomquist and others	2021	Risk of symptomatic COVID-19 due to aircraft transmission: a retrospective cohort study of contact-traced flights during England's containment phase
Bondaronek and others	2022	User feedback on the NHS Test & Trace Service during COVID-19: the use of machine learning to analyse free-text data from 37,914 UK adults
Brooks-Pollock and others	2023	Voluntary risk mitigation behaviour can reduce impact of SARS-CoV-2: a real-time modelling study of the January 2022 Omicron wave in England
Brown and others	2021	Inactivation of SARS-CoV-2 in chlorinated swimming pool water
Buchan and others	2021	Improved estimates of 222 nm far-UVC susceptibility for aerosolized human coronavirus via a validated high-fidelity coupled radiation-CFD code
Cano and others	2020	COVID-19 modelling: The effects of social distancing

Author	Year	Title
Carvalho and others	2021	Analysis and Forecasting Incidence, Intensive Care Unit Admissions, and Projected Mortality Attributable to COVID-19 in Portugal, the UK, Germany, Italy, and France: Predictions for four Weeks Ahead
Chalkiadakis and others	2021	Infection rate models for COVID-19: Model risk and public health news sentiment exposure adjustments
Challen and others	2021	Estimates of regional infectivity of COVID-19 in the United Kingdom following imposition of social distancing measures
Chudik and others	2021	COVID-19 Time-varying Reproduction Numbers Worldwide: An Empirical Analysis of Mandatory and Voluntary Social Distancing
Coccia	2022	Restriction policies and effects of COVID-19 pandemic in environment: analysis and role of sustainable technology to cope with future pandemics
Collier and others	2022	Point of care SARS-CoV-2 nucleic acid testing in schools improves school attendance
Congdon	2021	Mid-Epidemic Forecasts of COVID-19 Cases and Deaths: A Bivariate Model Applied to the UK
Conroy and others	2022	Very small effects of an imagery-based randomised trial to promote adherence to wearing face coverings during the COVID-19 pandemic and identification of future intervention targets
Cordery and others	2022	Transmission of SARS-CoV-2 by children to contacts in schools and households: a prospective cohort and environmental sampling study in London
Davies and others	2023	Observed and self-reported COVID-19 health protection behaviours on a university campus and the impact of a single simple intervention
Demis and others	2021	A semi-continuous model for transmission of SARS-CoV-2 and other respiratory viruses in enclosed spaces via multiple pathways to assess risk of infection and mitigation strategies
Dimarco and others	2021	Optimal control of epidemic spreading in presence of social heterogeneity
Ding and others	2021	Factors affecting adherence to non-pharmaceutical interventions for COVID-19 infections in the first year of the pandemic in the UK
Docquier and others	2021	Are Travel Bans the Answer to Stopping the Spread of COVID-19 Variants? Lessons from a Multi-Country SIR Model
Donnat and others	2021	Modeling the Heterogeneity in COVID-19's Reproductive Number and its Impact on Predictive Scenarios
Drakesmith and others	2021	Developing a population data science approach to assess increased risk of COVID-19 associated with attending large events
Drews and others	2022	Model-based ensembles: Lessons learned from retrospective analysis of COVID-19 infection forecasts across 10 countries
du and others	2021	Establishment and lineage dynamics of the SARS-CoV-2 epidemic in the UK
Duran-Olivencia and others	2021	Understanding Soaring Coronavirus Cases and the Effect of Contagion Policies in the UK
Dutta and others	2021	Using mobility data in the design of optimal lockdown strategies for the COVID-19 pandemic
Dye and others	2020	The scale and dynamics of COVID-19 epidemics across Europe
Edmunds and others	2021	The COVID University Challenge: A Hazard Analysis of Critical Control Points Assessment of the Return of Students to Higher Education Establishments
Ellis and others	2021	The course of the UK COVID-19 pandemic; no measurable impact of new variants
Fair and others	2021	Population behavioural dynamics can mediate the persistence of emerging infectious diseases
Febres	2021	Assessing the impact of social activity permissiveness on the COVID-19 infection curve of several countries

Author	Year	Title
Feng and others	2021	Removal of SARS-CoV-2 using UV+Filter in built environment
Fierce and others	2021	Simulating near-field enhancement in transmission of airborne viruses with a quadrature-based model
Fisher and others	2021	Experiences of the coronavirus disease-19 (COVID-19) pandemic from the perspectives of young people: Rapid qualitative study
Foat and others	2022	Modeling the effect of temperature and relative humidity on exposure to SARS-CoV-2 in a mechanically ventilated room
Fokas and others	2021	COVID-19: predictive mathematical formulae for the number of deaths during lockdown and possible scenarios for the post-lockdown period
Freeman and others	2021	Communicating personalised risks from COVID-19: guidelines from an empirical study
Fujii and others	2021	Public perceptions, individual characteristics, and preventive behaviors for COVID-19 in six countries: a cross-sectional study
Gallic and others	2021	Optimal lockdowns for COVID-19 pandemics: Analyzing the efficiency of sanitary policies in Europe
Gartland and others	2023	Experiences, Perceptions of Risk, and Lasting Impacts of COVID-19 for Employees in the Public Transport Sector
Gerli and others	2021	Forecasting COVID-19 infection trends and new hospital admissions in England due to SARS-CoV-2 Variant of Concern Omicron
Gerli and others	2021	Forecasting COVID-19 infection trends in the EU-27 countries, the UK and Switzerland due to SARS-CoV-2 Variant of Concern Omicron
Gomes and others	2022	Individual variation in susceptibility or exposure to SARS-CoV-2 lowers the herd immunity threshold
Griette and others	2021	What can we learn from COVID-19 data by using epidemic models with unidentified infectious cases?
Griffith and others	2022	Continuing inequalities in COVID-19 mortality in England and Wales, and the changing importance of regional, over local, deprivation
Guerstein and others	2021	The interplay between vaccination and social distancing strategies affects COVID-19 population-level outcomes
Guimaraes	2021	Antibody tests: They are more important than we thought
Habib and others	2021	Non-linear spatial linkage between COVID-19 pandemic and mobility in ten countries: A lesson for future wave
Hansen and others	2021	Nudging hand hygiene compliance: a large-scale field experiment on hospital visitors
Haroon and others	2020	Estimating The Possible Role Of Testing Capacity And Social Distancing In Predicting The Growth Rate Of Daily COVID-19 Cases
Howerton and others	2021	Synergistic interventions to control COVID-19: Mass testing and isolation mitigates reliance on distancing
Hubert and others	2022	The effects of organizational climate on adherence to guidelines for COVID-19 prevention
Huberts and others	2023	Optimal timing of non-pharmaceutical interventions during an epidemic
Iddon and others	2022	A population framework for predicting the proportion of people infected by the far-field airborne transmission of SARS-CoV-2 indoors
Issakhov and others	2022	Assessment of airborne transmission from coughing processes with thermal plume adjacent to body and radiators on effectiveness of social distancing
Jones and others	2021	Modelling uncertainty in the relative risk of exposure to the SARS-CoV-2 virus by airborne aerosol transmission in well mixed indoor air
Keeling and others	2020	Efficacy of contact tracing for the containment of the 2019 novel coronavirus (COVID-19)
Keeling and others	2021	Predictions of COVID-19 dynamics in the UK: Short-term forecasting and analysis of potential exit strategies

Author	Year	Title
Keeling and others	2022	Comparison of the 2021 COVID-19 roadmap projections against public health data in England
Kerr and others	2022	Common protocol for validation of the QCOVID algorithm across the four UK nations
Khataee and others	2021	Effects of social distancing on the spreading of COVID-19 inferred from mobile phone data
Kraemer and others	2021	Spatiotemporal invasion dynamics of SARS-CoV-2 lineage B.1.1.7 emergence
Laha and others	2023	A multi-type branching process model for epidemics with application to COVID-19
Laroze and others	2021	COVID-19 does not stop at open borders: Spatial contagion among local authority districts during England's first wave
Lecouturier and others	2021	Public understanding of COVID-19 antibody testing and test results: A qualitative study conducted in the U.K. early in the pandemic
Lee and others	2021	Computational modelling of COVID-19: A study of compliance and superspreaders
Lee and others	2022	Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Infectivity by Viral Load, S Gene Variants and Demographic Factors, and the Utility of Lateral Flow Devices to Prevent Transmission
Leeman and others	2022	Effect of Returning University Students on COVID-19 Infections in England, 2020
Lewandowsky and others	2021	Public acceptance of privacy-encroaching policies to address the COVID-19 pandemic in the United Kingdom
Li and others	2021	The association of community mobility with the time-varying reproduction number (R) of SARS-CoV-2: a modelling study across 330 local UK authorities
Liu and others	2021	Transmission dynamics of the COVID-19 epidemic in England
Lopez and others	2021	Impact of isolating COVID-19 patients in a supervised community facility on transmission reduction among household members
Madden and others	2022	Smart Hand Sanitisers in the Workplace: A Survey of Attitudes towards an Internet of Things Technology
Manca and others	2023	Impact of perceptions and attitudes on air travel choices in the post-COVID-19 era: A cross-national analysis of stated preference data
Mansab and others	2021	Performance of national COVID-19 symptom checkers': A comparative case simulation study
Margraf and others	2020	Behavioral measures to fight COVID-19: An 8-country study of perceived usefulness, adherence and their predictors
Margraf and others	2021	Adherence to behavioral COVID-19 mitigation measures strongly predicts mortality
Mazzoli and others	2021	Interplay between mobility, multi-seeding and lockdowns shapes COVID-19 local impact
McGoldrick and others	2022	Surveillance of COVID-19 cases associated with dental settings using routine health data from the East of Scotland with a description of efforts to break chains of transmission from October 2020 to December 2021
McAleavey and others	2022	Outbreak of SARS-CoV-2 in a teenage discotheque in Northern Ireland-November 2021
Miles and others	2021	Assessing the spread of the novel coronavirus in the absence of mass testing
Mishra and others	2021	Comparing the responses of the UK, Sweden and Denmark to COVID-19 using counterfactual modelling
Moore and others	2021	Vaccination and non-pharmaceutical interventions for COVID-19: a mathematical modelling study
Morgan and others	2021	Optimizing time-limited non-pharmaceutical interventions for COVID-19 outbreak control
Morrissey and others	2021	Area level deprivation and monthly COVID-19 cases: The impact of government policy in England

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Morton and others	2021	Infection control in the home: A qualitative study exploring perceptions and experiences of adhering to protective behaviours in the home during the COVID-19 pandemic
Mowbray and others	2021	Is My Cough a Cold or COVID? A Qualitative Study of COVID-19 Symptom Recognition and Attitudes Toward Testing in the UK
Muis and others	2022	Flattening the COVID-19 curve: Emotions mediate the effects of a persuasive message on preventive action
Nashebi and others	2022	Using a real-world network to model the tradeoff between stay-at-home restriction, vaccination, social distancing and working hours on COVID-19 dynamics
Nightingale and others	2021	The importance of saturating density dependence for population-level predictions of SARS-CoV-2 resurgence compared with density-independent or linearly density-dependent models, England, 23 March to 31 July 2020
Niu and others	2022	Ranking the effectiveness of non-pharmaceutical interventions to counter COVID-19 in UK universities with vaccinated population
Pellis and others	2021	Challenges in control of COVID-19: short doubling time and long delay to effect of interventions
Pesaran and others	2022	Matching theory and evidence on COVID-19 using a stochastic network SIR model
Picchiotti and others	2021	COVID-19 pandemic: a mobility-dependent SEIR model with undetected cases in Italy, Europe and US
Raja and others	2022	Investigation of a SARS-CoV-2 Outbreak at an Automotive Manufacturing Site in England
Recchia and others	2021	How do the UK public interpret COVID-19 test results? Comparing the impact of official information about results and reliability used in the UK, USA and New Zealand: A randomised controlled trial
Ricks and others	2021	Quantifying the potential value of antigen-detection rapid diagnostic tests for COVID-19: a modelling analysis
Riley and others	2021	REACT-1 round 9 interim report: downward trend of SARS-CoV-2 in England in February 2021 but still at high prevalence
Riley and others	2021	REACT-1 round 8 interim report: SARS-CoV-2 prevalence during the initial stages of the third national lockdown in England
Rinaldi and others	2022	Epidemiological model based periodic intervention policies for COVID-19 mitigation in the United Kingdom
Rose and others	2021	Analysing COVID-19 outcomes in the context of the 2019 Global Health Security (GHS) Index
Ross and others	2021	Household visitation during the COVID-19 pandemic
Rossberg and others	2020	How will this continue? Modelling interactions between the COVID-19 pandemic and policy responses
Routledge and others	2021	Management of a large outbreak of COVID-19 at a British Army training centre: lessons for the future
Ruktanonchai and others	2020	Assessing the impact of coordinated COVID-19 exit strategies across Europe
Sachak-Patwa and others	2021	The risk of SARS-CoV-2 outbreaks in low prevalence settings following the removal of travel restrictions
Samartsidis and others	2021	Evaluating the impact of local tracing partnerships on the performance of contact tracing for COVID-19 in England
Sartorius and others	2021	Modelling and predicting the spatio-temporal spread of COVID-19, associated deaths and impact of key risk factors in England
Schmidtke and others	2021	A cross-sectional survey assessing the influence of theoretically informed behavioural factors on hand hygiene across seven countries during the COVID-19 pandemic
Secco and others	2022	To lockdown or not to lockdown: Analysis of the EU lockdown performance vs. COVID-19 outbreak

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Sereno and others	2021	Model predictive control for optimal social distancing in a type SIR-switched model
Silk and others	2022	Observations and conversations: how communities learn about infection risk can impact the success of non-pharmaceutical interventions against epidemics
Sk and others	2022	The impact of a power law-induced memory effect on the SARS-CoV-2 transmission
Sloof and others	2022	Impact of supplementary air filtration on airborne particulate matter in a UK hospital ward
Smith and others	2020	Factors associated with adherence to self-isolation and lockdown measures in the UK: a cross-sectional survey
Smith and others	2022	Public health impact of mass sporting and cultural events in a rising COVID-19 prevalence in England
Spiliotis and others	2021	Optimal vaccine roll-out strategies with respect to social distancing measures for SARS-CoV-2 pandemic
Taylor and others	2021	Cross sectional investigation of a COVID-19 outbreak at a London Army barracks: Neutralising antibodies and virus isolation
Taylor and others	2022	Retrospective spatial analysis of cases of COVID-19 in a single military accommodation block corridor, RMAS, January-March 21
Taylor and others	2023	A SARS-CoV-2 outbreak associated with five air force bases and a nightclub following the lifting of COVID-19-related social restrictions, United Kingdom, July-to-September 2021
Thom and others	2021	Exploratory comparison of Healthcare costs and benefits of the UK's COVID-19 response with four European countries
Treneman-Evans and others	2022	The Rapid Adaptation and Optimisation of a Digital Behaviour-Change Intervention to Reduce the Spread of COVID-19 in Schools
Vandrevala and others	2022	Willingness of the UK public to volunteer for testing in relation to the COVID-19 pandemic
Venigalla and others	2021	SurviveCovid-19 -- An Educational Game to Facilitate Habituation of Social Distancing and Other Health Measures for COVID-19 Pandemic
Walker and others	2021	Remote data collection during COVID-19 restrictions: an example from a refugee and asylum-seeker participant group in the UK
Wang and others	2021	Heterogeneous interventions reduce the spread of COVID-19 in simulations on real mobility data
Ward and others	2021	Growth, reproduction numbers and factors affecting the spread of SARSCoV-2 novel variants of concern in the UK from October 2020 to July 2021: A modelling analysis
Weber	2021	Assessing the lockdown effect from excess mortalities
Welsh and others	2021	The effects of the first national lockdown in England on geographical inequalities in the evolution of COVID-19 case rates: An ecological study
Wey and others	2021	The benefits of peer transparency in safe workplace operation post pandemic lockdown
Whittaker and others	2023	Uncertainty and error in SARS-CoV-2 epidemiological parameters inferred from population-level epidemic models
Wilburn and others	2021	COVID-19 within a large UK prison with a high number of vulnerable adults, March to June 2020: An outbreak investigation and screening event
Williams and others	2020	Public perceptions and experiences of social distancing and social isolation during the COVID-19 pandemic: a UK-based focus group study
Wood and others	2022	Turn Up the Lights, Leave them On and Shine them All Around-Numerical Simulations Point the Way to more Efficient Use of Far-UVC Lights for the Inactivation of Airborne Coronavirus
Wright and others	2020	What predicts adherence to COVID-19 government guidelines? Longitudinal analyses of 51,000 UK adults

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Yang and others	2021	The effect of multiple interventions to balance healthcare demand for controlling COVID-19 outbreaks: a modelling study
Yang and others	2022	Critical policies disparity of the first and second waves of COVID-19 in the United Kingdom
Young and others	2021	Interplay between COVID-19 vaccines and social measures for ending the SARS-CoV-2 pandemic
Younie and others	2020	Improving young children's handwashing behaviour and understanding of germs: The impact of A Germ's Journey educational resources in schools and public spaces
Zhao and others	2022	The global transmission of new coronavirus variants
Wrong outcomes n=95		
Adenaiye and others	2021	Infectious SARS-CoV-2 in Exhaled Aerosols and Efficacy of Masks During Early Mild Infection
Adzic and others	2022	A post-occupancy study of ventilation effectiveness from high-resolution CO_2 monitoring at live theatre events to mitigate airborne transmission of SARS-CoV-2
Aiano and others	2021	Feasibility and acceptability of SARS-CoV-2 testing and surveillance in primary school children in England: Prospective, crosssectional study
Amin-Chowdhury and others	2022	Parents' and teachers' attitudes to and experiences of the implementation of COVID-19 preventive measures in primary and secondary schools following reopening of schools in autumn 2020: a descriptive cross-sectional survey
Atchison and others	2023	Validity of Self-testing at Home With Rapid Severe Acute Respiratory Syndrome Coronavirus 2 Antibody Detection by Lateral Flow Immunoassay
Bachtiger and others	2020	Belief of having had unconfirmed COVID-19 infection reduces willingness to participate in app-based contact tracing
Berg-Beckhoff and others	2022	Political stringency, infection rates, and higher education students' adherence to government measures in the Nordic countries and the UK during the first wave of the COVID-19 outbreak
Berry and others	2022	Facilitators and barriers to social distancing for young people during the COVID-19 pandemic
Bowman and others	2021	Public perceptions and preventive behaviours during the early phase of the COVID-19 pandemic: a comparative study between Hong Kong and the United Kingdom
Brooks-Pollock and others	2021	The population attributable fraction of cases due to gatherings and groups with relevance to COVID-19 mitigation strategies
Buhler and others	2021	Stay Out of the Blast Radius: Influence of Surgical Masks on Virtual Pedestrian Interactions
Burridge and others	2022	Public efforts to reduce disease transmission implied from a spatial game
Bushnaq and others	2021	Control of COVID-19 dynamics through a fractional-order model
Carter and others	2021	Experiences of supported isolation in returning travellers during the early COVID-19 response: A qualitative interview study
Cheng and others	2022	Human mobility variations in response to restriction policies during the COVID-19 pandemic: An analysis from the Virus Watch community cohort in England, UK
Cox and others	2022	Mixed-methods exploration of views on choice in a university asymptomatic COVID-19 testing programme
Davies and others	2021	Acceptability, Usability, and Performance of Lateral Flow Immunoassay Tests for Severe Acute Respiratory Syndrome Coronavirus 2 Antibodies: REACT-2 Study of Self-Testing in Nonhealthcare Key Workers
den Daas and others	2022	An experimental COVID-19 messaging study in a representative sample of the Scottish population: Increasing physical distancing intentions through self-efficacy

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Dennis and others	2022	The social media response to twice-weekly mass asymptomatic testing in England
Dowthwaite and others	2021	Public adoption of and trust in the NHS COVID-19 contact tracing app in the united kingdom: Quantitative online survey study
Dowthwaite and others	2022	The relationship between trust and attitudes towards the COVID-19 digital contact-tracing app in the UK
Eales and others	2022	Trends in SARS-CoV-2 infection prevalence during England's roadmap out of lockdown, January to July 2021
Edelman and others	2021	Network analysis of England’s single parent household COVID-19 control policy impact: a proof-of-concept study
Egan and others	2021	Evaluating the effect of infographics on public recall, sentiment and willingness to use face masks during the COVID-19 pandemic: a randomised internet-based questionnaire study
Emerson and others	2021	The impact of disability on employment and financial security following the outbreak of the 2020 COVID-19 pandemic in the UK
Eshareturi and others	2021	An exploration of the impact of SARS-CoV-2 (COVID-19) restrictions on marginalised groups in the UK
Essa and others	2021	What is the effect of lockdown upon hospitalisation because of COVID-19 amongst patients from a heart failure registry?
Fenton and others	2021	A Bayesian network model for personalised COVID-19 risk assessment and contact tracing
Ferguson and others	2021	Validation testing to determine the sensitivity of lateral flow testing for asymptomatic SARSCoV-2 detection in low prevalence settings: Testing frequency and public health messaging is key
Filho and others	2021	A Transnational and Transregional Study of the Impact and Effectiveness of Social Distancing for COVID-19 Mitigation
Foad and others	2021	The limitations of polling data in understanding public support for COVID-19 lockdown policies
Green and others	2021	Evaluating social and spatial inequalities of large scale rapid lateral flow SARS-CoV-2 antigen testing in COVID-19 management: An observational study of Liverpool, UK (November 2020 to January 2021)
Green and others	2022	Trends in inequalities in avoidable hospitalisations across the COVID-19 pandemic: A cohort study of 23.5 million people in England
Hajdu and others	2022	Contextual factors predicting compliance behavior during the COVID-19 pandemic: A machine learning analysis on survey data from 16 countries
Halford and others	2022	Understanding reported COVID-19 cases in England following changes to testing, between November 2021 and April 2022
Harris	2021	Experiences with testing, self-isolation and vaccination in north east England during the COVID pandemic
Haw and others	2021	The costs of keeping schools open during the COVID-19 pandemic
Henriques and others	2022	Modelling airborne transmission of SARS-CoV-2 using CARA: risk assessment for enclosed spaces
Ho and others	2021	Spatiotemporal droplet dispersion measurements demonstrate face masks reduce risks from singing: results from the COvid aNd FacEmaSkS Study (CONFESS)
Horvath and others	2022	Adoption and continued use of mobile contact tracing technology: Multilevel explanations from a three-wave panel survey and linked data
Howard	2022	The relations between age, face mask perceptions and face mask wearing
Iqbal and others	2021	The pilot, proof of concept REMOTE-COVID trial: remote monitoring use in suspected cases of COVID-19 (SARS-CoV 2)
Isherwood and others	2021	Challenges to self-isolation among contacts of cases of COVID-19: a national telephone survey in Wales

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Jaspal and others	2022	Social support, perceived risk and the likelihood of COVID-19 testing and vaccination: cross-sectional data from the United Kingdom
Jayes and others	2022	Perspectives of attenders and non-attenders to SARS-CoV-2 asymptomatic community testing in England: a qualitative interview study
Jones and others	2021	Durham University students' experiences of asymptomatic COVID-19 testing: A qualitative study
Jones and others	2021	To Use or Not to Use a COVID-19 Contact Tracing App: Mixed Methods Survey in Wales
Juul and others	2022	Comparing the efficiency of forward and backward contact tracing
Kale and others	2022	Patterns and predictors of adherence to health-protective measures during COVID-19 pandemic in the UK: cross-sectional and longitudinal findings from the HEBECO study
Keyworth and others	2021	What challenges do UK adults face when adhering to COVID-19-related instructions? Cross-sectional survey in a representative sample
Kim and others	2021	Automated Contact Tracing: a game of big numbers in the time of COVID-19
Ladhani and others	2021	SARS-CoV-2 infection and transmission in primary schools in England in June-December, 2020 (sKIDs): an active, prospective surveillance study
Lasseter and others	2022	Exploring the impact of shielding advice on the wellbeing of individuals identified as clinically extremely vulnerable amid the COVID-19 pandemic: a mixed-methods evaluation
Lawson and others	2021	An evaluation of the hand hygiene behaviour and compliance of the general public when using public restrooms in Northern Ireland (NI) during the initial weeks of the novel coronavirus (COVID-19) pandemic
Lee and others	2021	The association between socioeconomic status and mobility reductions in the early stage of England's COVID-19 epidemic
Lin and others	2021	Public Attitudes and Factors of COVID-19 Testing Hesitancy in the United Kingdom and China: Comparative Infodemiology Study
Lloyd and others	2021	Delay discounting and under-valuing of recent information predict poorer adherence to social distancing measures during the COVID-19 pandemic
Mancastroppa and others	2021	Stochastic sampling effects favor manual over digital contact tracing
Marchant and others	2021	Primary school staff perspectives of school closures due to COVID-19, experiences of schools reopening and recommendations for the future: A qualitative survey in Wales
Megna	2021	Inferring a cause-effect relationship between lockdown restrictions and COVID-19 pandemic trend during the first wave
Miles and others	2021	"Stay at Home, Protect the National Health Service, Save Lives": A cost benefit analysis of the lockdown in the United Kingdom
Moshe and others	2021	SARS-CoV-2 lateral flow assays for possible use in national COVID-19 seroprevalence surveys (React 2): Diagnostic accuracy study
Osterrieder and others	2021	Economic and social impacts of COVID-19 and public health measures: results from an anonymous online survey in Thailand, Malaysia, the UK, Italy and Slovenia
Palmateer and others	2021	National population prevalence of antibodies to SARS-CoV-2 in Scotland during the first and second waves of the COVID-19 pandemic
Pepper and others	2022	Understanding Trust and Changes in Use After a Year With the NHS COVID-19 Contact Tracing App in the United Kingdom: Longitudinal Mixed Methods Study

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Perez-Guzman and others	2023	Epidemiological drivers of transmissibility and severity of SARS-CoV-2 in England
Persing and others	2022	Evaluation of ventilation, indoor air quality, and probability of viral infection in an outdoor dining enclosure
Peto and others	2021	COVID-19: Rapid antigen detection for SARS-CoV-2 by lateral flow assay: A national systematic evaluation of sensitivity and specificity for mass-testing
Powell and others	2022	Secondary attack rates in primary and secondary school bubbles following a confirmed case: Active, prospective national surveillance, November to December 2020, England
Prosser and others	2023	Estimating the risk reduction of isolation on COVID-19 nonhousehold transmission and severe/critical illness in nonimmune individuals: September to November 2021
Purves and others	2023	Attending sporting mega events during COVID-19: mitigation and messaging at UK EURO 2020 matches
Rencken and others	2021	Patterns of SARS-CoV-2 Aerosol Spread in Typical Classrooms
Robin and others	2022	Understanding adherence to self-isolation in the first phase of COVID-19 response
Robinson and others	2022	How effective are face coverings in reducing transmission of COVID-19?
Rusu and others	2021	Modelling digital and manual contact tracing for COVID-19. Are low uptakes and missed contacts deal-breakers?
Rutter and others	2022	Using FaceReader to explore the potential for harnessing emotional reactions to motivate hand hygiene
Scarabel and others	2021	A renewal equation model to assess roles and limitations of contact tracing for disease outbreak control
Schneiders and others	2022	The impact of COVID-19 non-pharmaceutical interventions on the lived experiences of people living in Thailand, Malaysia, Italy and the United Kingdom: A cross-country qualitative study
Senior	2023	Self-completed online contact tracing for COVID-19 is associated with reporting fewer contacts: an observational study
Smith and others	2022	Tiered restrictions for COVID-19 in England: knowledge, motivation and self-reported behaviour
Smith and others	2022	Intention to adhere to test, trace, and isolate during the COVID-19 pandemic (the COVID-19 Rapid Survey of Adherence to Interventions and Responses study)
Smith and others	2022	Mask communication: The development of the face covering as a semiotic resource through government public health posters in England and Wales
Sturniolo and others	2021	Testing, tracing and isolation in compartmental models
Sundaram and others	2021	Implementation of preventive measures to prevent COVID-19: a national study of English primary schools in summer 2020
Sweeney and others	2021	Exploring equity in health and poverty impacts of control measures for SARS-CoV-2 in six countries
Taamouti	2021	COVID-19 Control and the Economy: Test, Test, Test
Thomas and others	2021	Social, demographic and behavioural determinants of SARS-CoV-2 infection: A case-control study carried out during mass community testing of asymptomatic individuals in South Wales, December 2020
Thorneloe and others	2022	Adherence to behaviours associated with the test, trace, and isolate system: an analysis using the theoretical domains framework
Tildesley and others	2022	Optimal health and economic impact of non-pharmaceutical intervention measures prior and post vaccination in England: a mathematical modelling study
Tupper and others	2020	Event-specific interventions to minimize COVID-19 transmission

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Welsh and others	2022	Inequalities in the evolution of the COVID-19 pandemic: an ecological study of inequalities in mortality in the first wave and the effects of the first national lockdown in England
Williams and others	2021	Public perceptions of non-adherence to pandemic protection measures by self and others: A study of COVID-19 in the United Kingdom
Woodland and others	2022	What influences whether parents recognise COVID-19 symptoms, request a test and self-isolate: A qualitative study
Wright and others	2021	Do predictors of adherence to pandemic guidelines change over time? A panel study of 22,000 UK adults during the COVID-19 pandemic
Zarif and others	2021	The impact of primary care supported shielding on the risk of mortality in people vulnerable to COVID-19: English sentinel network matched cohort study
Wrong study design n=107		
Abdeen and others	2021	An approximate analytical formula for estimating the weight of factors affecting the spread of COVID-19: a case study of the first wave
Agius and others	2021	Protection from COVID-19 at work: Health and safety law is fit for purpose
Alfano	2022	The Effects of School Closures on COVID-19: A Cross-Country Panel Analysis
An and others	2021	Effects of Early Mask Mandates and Other Policy Interventions on COVID-19 Infections
Anjum and others	2022	IoT-Based COVID-19 Diagnosing and Monitoring Systems: A Survey
Anonymous	2021	COVID-19: How the UK is using lateral flow tests in the pandemic
Anonymous	2022	Correction: Who is engaging with lateral flow testing for COVID-19 in The UK? The COVID-19 Rapid Survey of Adherence to Interventions and Responses (CORSAIR) study
Aravindakshan and others	2021	The Impact of Mask-Wearing in Mitigating the Spread of COVID-19 During the Early Phases of the Pandemic
Bandyopadhyay	2021	Institutional racism and national lockdowns - Author's reply
Banerjee and others	2022	Data driven COVID-19 spread prediction based on mobility and mask mandate information
Banholzer and others	2021	Estimating the effects of non-pharmaceutical interventions on the number of new infections with COVID-19 during the first epidemic wave
Barros and others	2022	A causal inference approach for estimating effects of non-pharmaceutical interventions during COVID-19 pandemic
Bendavid and others	2021	Assessing mandatory stay-at-home and business closure effects on the spread of COVID-19
Bianconi and others	2020	Efficiency of COVID-19 mobile contact tracing containment by measuring time-dependent doubling time
Bikbov and others	2021	Maximum incubation period for COVID-19 infection: Do we need to rethink the 14-day quarantine policy?
Boesch	2021	Lockdown benefit varies among countries and sub-national units: a reanalysis of the data by Bendavid et al. (2021)
Brauner and others	2021	Inferring the effectiveness of government interventions against COVID-19
Briggs and others	2021	Is NHS Test and Trace exacerbating COVID-19 inequalities?
Buonsenso and others	2021	Schools closures during the COVID-19 pandemic
Burg and others	2023	Trajectories of COVID-19: a longitudinal analysis of many nations and subnational regions
Burns and others	2021	Border control and SARS-CoV-2: An opportunity for generating highly policy-relevant, real-world evidence

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Chattopadhyay and others	2021	Infection kinetics of COVID-19 and containment strategy
Chen and others	2021	Exploring the Drivers and Barriers to Uptake for Digital Contact Tracing
Chung and others	2021	Impact of physical distancing policy on reducing transmission of SARS-CoV-2 globally: Perspective from government's response and residents' compliance
Chung and others	2021	Effects of government policies on the spread of COVID-19 worldwide
Conway and others	2021	Epidemiology of COVID-19 and public health restrictions during the first wave of the pandemic in Ireland in 2020
Costa and others	2022	Impact of non-pharmaceutical interventions on COVID-19 incidence and deaths: cross-national natural experiment in 32 European countries
De Leo	2021	Impact of COVID-19 Testing Strategies and Lockdowns on Disease Management Across Europe, South America, and the United States: Analysis Using Skew-Normal Distributions
Deeks and others	2022	SARS-CoV-2 antigen lateral flow tests for detecting infectious people: linked data analysis
Dickens and others	2020	Strategies at points of entry to reduce importation risk of COVID-19 cases and reopen travel
Drury and others	2021	Re-opening live events and large venues after COVID-19 'lockdown': Behavioural risks and their mitigations
Dyson	2022	Modelling results on the impact of COVID-19 testing in schools
Fearon and others	2021	SARS-CoV-2 antigen testing: weighing the false positives against the costs of failing to control transmission
Fedele and others	2022	COVID-19 NHS infection control strategy: Errare humanum est, perseverare autem diabolicum
Feeney and others	2022	Self-testing for COVID-19: Adding oropharyngeal to nasal sampling is not the answer to underperforming tests
Flaxman and others	2020	Estimating the effects of non-pharmaceutical interventions on COVID-19 in Europe
Fountoulakis and others	2020	Factors determining different death rates because of the COVID-19 outbreak among countries
Galanti and others	2021	Social distancing remains key during vaccinations
Ge and others	2021	Untangling the changing impact of non-pharmaceutical interventions and vaccination on European COVID-19 trajectories
Ghosh and others	2021	Global-scale analysis and longitudinal assessment of COVID-19 incidence in the first six months
Harris and others	2021	Safe management of full-capacity live/mass events in COVID-19 will require mathematical, epidemiological and economic modelling
Hassan and others	2021	Efficacy the of Confinement Policies on the COVID-19 Spread Dynamics in the Early Period of the Pandemic
Hunter and others	2021	Impact of non-pharmaceutical interventions against COVID-19 in Europe in 2020: a quasi-experimental non-equivalent group and time series design study
Ibrahim and others	2021	Variational-LSTM autoencoder to forecast the spread of coronavirus across the globe
Ilyin	2021	A Recursive Model of the Spread of COVID-19: Modelling Study
Islam and others	2020	Physical distancing interventions and incidence of coronavirus disease 2019: natural experiment in 149 countries
Jain and others	2022	The global response: How cities and provinces around the globe tackled COVID-19 outbreaks in 2021
Jamison and others	2021	Comparing the impact on COVID-19 mortality of self-imposed behavior change and of government regulations across 13 countries

Author	Year	Title
Jayasinghe and others	2021	Bio-Politics and Calculative Technologies in COVID-19 Governance: Reflections From England
Kannoth and others	2021	The Association between Early Country-level Testing Capacity and Later COVID-19 Mortality Outcomes
Koh and others	2020	Estimating the impact of physical distancing measures in containing COVID-19: an empirical analysis
Kohanovski and others	2022	Inferring the effective start dates of non-pharmaceutical interventions during COVID-19 outbreaks
Kumar and others	2021	Infection vulnerability stratification risk modelling of COVID-19 data: a deterministic SEIR epidemic model analysis
Lai and others	2021	Assessing the Effect of Global Travel and Contact Restrictions on Mitigating the COVID-19 Pandemic
Leech and others	2022	Mask wearing in community settings reduces SARS-CoV-2 transmission
Li and others	2021	The temporal association of introducing and lifting non-pharmaceutical interventions with the time-varying reproduction number (R) of SARS-CoV-2: a modelling study across 131 countries
Li and others	2021	Forecasting COVID-19 and Analyzing the Effect of Government Interventions
Liang and others	2021	COVID-19 case doubling time associated with non-pharmaceutical interventions and vaccination: A global experience
Liu and others	2021	The impact of non-pharmaceutical interventions on SARS-CoV-2 transmission across 130 countries and territories
Mader and others	2022	The Effects of Non-pharmaceutical Interventions on COVID-19 Mortality: A Generalized Synthetic Control Approach Across 169 Countries
Majeed	2022	It's time for more targeted use of lateral flow tests for COVID-19
Martin and others	2021	Appropriate Usage of Face Masks to Prevent SARS-CoV-2: Sharpening the Messaging Amid the COVID-19 Pandemic
Mayor	2022	COVID-19: Warning over transmission risk as self-isolation is cut to five days in England
Meier and others	2022	Travel restrictions and variants of concern: global health laws need to reflect evidence
Meintrup and others	2022	A Comparison of Germany and the United Kingdom Indicates That More SARS-CoV-2 Circulation and Less Restrictions in the Warm Season Might Reduce Overall COVID-19 Burden.
Mercer and others	2022	The Coronavirus Standards Working Group's roadmap for improved population testing
Mezencev and others	2021	Stringency of the containment measures in response to COVID-19 inversely correlates with the overall disease occurrence over the epidemic wave
Munro and others	2022	Face coverings have little utility for young school-aged children
Nam and others	2021	Early centralized isolation strategy for all confirmed cases of COVID-19 remains a core intervention to disrupt the pandemic spreading significantly
Nikolaeva and others	2022	Analytical observational study evaluating global pandemic preparedness and the effectiveness of early COVID-19 responses in Ethiopia, Nigeria, Singapore, South Korea, Sweden, Taiwan, UK and USA
Olumoyin and others	2021	Data-Driven Deep-Learning Algorithm for Asymptomatic COVID-19 Model with Varying Mitigation Measures and Transmission Rate
Page and others	2022	Computational Simulation Is a Vital Resource for Navigating the COVID-19 Pandemic
Pan and others	2021	The new UK SARS-CoV-2 variant and lockdown - causes and consequences
Peeling and others	2021	Rolling out COVID-19 antigen rapid diagnostic tests: the time is now

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Pei and others	2022	Adaptive Multi-Factor Quantitative Analysis and Prediction Models: Vaccination, Virus Mutation and Social Isolation on COVID-19
Peto	2021	Weekly population testing could stop this pandemic and prevent the next
Piovani and others	2021	Effect of early application of social distancing interventions on COVID-19 mortality over the first pandemic wave: An analysis of longitudinal data from 37 countries
Prestige and others	2022	COVID lockdowns in the UK: Estimating their effects on transmission
Pugh and others	2022	Sense and sensitivity: can an inaccurate test be better than no test at all?
Puspita and others	2021	Effectiveness of lockdown in reducing the spread of COVID-19
Rehms and others	2022	A Bayesian hierarchical approach to account for reporting uncertainty, variants of concern and vaccination coverage when estimating the effects of non-pharmaceutical interventions on the spread of infectious diseases
Robertson	2021	Did people's behavior after receiving negative COVID-19 tests contribute to the spread?
Russell and others	2021	Effect of internationally imported cases on internal spread of COVID-19: a mathematical modelling study
Sameni	2021	Model-based Prediction and Optimal Control of Pandemics by Non-pharmaceutical Interventions
Sarma and others	2021	Country-specific Optimization Strategy for Testing Through Contact Tracing Can Help Maintain a Low Reproduction Number (R_0) During Unlock
Savage and others	2021	Social Intervention by the Numbers: Evidence behind the Specific Public Health Guidelines in the COVID-19 Pandemic
Sharma and others	2021	Understanding the effectiveness of government interventions in Europe’s second wave of COVID-19
Shiraef and others	2022	Did border closures slow SARS-CoV-2?
Sleat and others	2021	Are vaccine passports and COVID passes a valid alternative to lockdown?
Soljak and others	2022	Reducing the COVID-19 isolation period in England: a policy change that needs careful evaluation
Sopory and others	2022	Quarantine acceptance and adherence: qualitative evidence synthesis and conceptual framework
Stokel-Walker	2021	COVID-19: Why test and trace will fail without support for self-isolation
Stokes and others	2022	The relative effects of non-pharmaceutical interventions on wave one COVID-19 mortality: natural experiment in 130 countries
Sun and others	2022	Quantifying the Effect of Public Activity Intervention Policies on COVID-19 Pandemic Containment Using Epidemiologic Data From 145 Countries
Tanner and others	2021	Increase in circulation of non-SARS-CoV-2 respiratory viruses following easing of social distancing is associated with increasing hospital attendance
Thu and others	2020	Effect of the social distancing measures on the spread of COVID-19 in 10 highly infected countries
Voko and others	2020	The effect of social distance measures on COVID-19 epidemics in Europe: an interrupted time series analysis
Walker and others	2021	Airborne transmission of COVID-19: Reduce the viral load in inhaled air
Wells and others	2022	Quarantine and testing strategies to ameliorate transmission due to travel during the COVID-19 pandemic: a modelling study
Wen and others	2022	Non-pharmacological interventions of travel restrictions and cancelation of public events had a major reductive mortality affect during pre-vaccination coronavirus disease 2019 period
Wibbens and others	2021	Which COVID policies are most effective? A Bayesian analysis of COVID-19 by jurisdiction

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Wilasang and others	2021	Reduction in effective reproduction number of COVID-19 is higher in countries employing active case detection with prompt isolation
Wilson	2020	Face coverings now required
Wood and others	2021	Was R < 1 before the English lockdowns? On modelling mechanistic detail, causality and inference about COVID-19
Yu and others	2021	What Matters among Non-pharmaceutical Interventions on COVID-19 in Europe?
Zhang and others	2022	Rethinking Lockdown Policies in the Pre-Vaccine Era of COVID-19: A Configurational Perspective
Zhu and others	2021	Evolution of disease transmission rate during the course of SARS-COV-2: Patterns and determinants
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Berger and others	2021	Phase 2 of the Norwich COVID-19 testing initiative: an evaluation
Brophy	2022	SARS-CoV-2 testing in travellers: Can we be smarter?
Department for Digital, Culture, Media and Sport	2021	Events Research Programme. Phase I findings
Ferguson and others	2020	Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand
Fu and others	2021	Mathematical Modelling of Lockdown Policy for COVID-19
Godlee	2021	Caution, vaccines, testing: The only way forward
Guest and others	2022	COVID-19 Detection Using the NHS Lateral Flow Test Kit
Hinch and others	2020	Effective configurations of a digital contact tracing app: a report to NHSX
Kyle and others (for Public Health Wales)	2021	Self-isolation confidence, adherence and challenges: behavioural insights from contacts of cases of COVID-19 starting and completing self-isolation in Wales
McNally	2022	COVID-19 testing in the UK was not a “shambles” in 2020
Rutherford and others (for the Scottish Government)	2021	COVID-19 support study: experiences and compliance with self-isolation
Scientific Pandemic Influenza Group on Behaviours (SPI-B) for the UK government	2020	The impact of financial and other targeted support on rates of self-isolation or quarantine
University of Liverpool	2021	COVID-SMART asymptomatic testing pilot in Liverpool City region: quantitative evaluation

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