COVID-19 Living Evidence Synthesis 16.1a: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

Executive summary

Question

- What is the effectiveness of measures to reduce contacts in reducing transmission of COVID-19 and other respiratory illnesses (e.g., influenza, respiratory syncytial virus (RSV) in non-healthcare community-based settings?

Background

- As COVID-19 spread around the world in early 2020, several non-pharmaceutical interventions were put in place to curb the spread of the virus, prevent hospitalizations and deaths, and reduce the strain on the healthcare system. One group of measures were those aimed at reducing contacts, to limit the number of secondary infections that may result from an unknown case interacting with others. An important lesson to be learned from the data collected is what measures were most effective in reducing transmission of COVID-19 specifically, and other respiratory illnesses generally, in preparation for future pandemics.

Key points

- Gathering restrictions, school closures (particularly in the first wave of the pandemic) and stay-at-home orders appear to be associated with reduced transmission of COVID-19.
- There was inconsistent evidence for a significant association between cancelling public events, closing public transit, and workplace and business closures and reduced transmission of COVID-19; when these interventions were found to be effective, the magnitudes of the effect sizes were highly variable.
- Curfews were associated with reduced transmission of COVID-19, although the magnitude of the effect appears very small.
- Stay-at-home orders had the strongest evidence for reduction in deaths; there is inconsistent evidence for impact of gathering restrictions, school, and workplace closures. Limited data were identified for the impact of curfews, cancelling events, and closing public transit on deaths. All studies collected most, if not all, of the data prior to widespread availability of vaccines.
- Several of the included studies also examined the role of individual measures on the risk of transmission of respiratory viruses other than COVID-19, however very limited evidence exists on these outcomes.
- The effect of single interventions is difficult to disentangle due to the simultaneous application of many public health measures within regions, especially during the first wave of the COVID-19 pandemic. While some studies used advanced statistical techniques to attempt to account for this, many included studies do not.
- While these studies report on the overall effectiveness of interventions in terms of population-level change in COVID-19 incidence, hospitalization, and deaths, it does not address the potential impact of interventions on individuals at increased risk of serious COVID-19 (e.g., immunocompromised individuals), nor does the evidence consider the impact of measures on equity-deserving groups. While the magnitude of the reduction in transmission due to certain interventions may be small at a population level, it is not known how this is distributed across populations, and whether some groups benefit substantially more than others from these measures.
- Not all jurisdictions applied interventions consistently. For example, among studies exploring the impact of gathering restrictions, the number of individuals allowed to gather varied from 5 to 100 or more.
- An important consideration in understanding the effectvienss of these types of interventions is the ability and willingness of individauls to adhere to interventions, which was not considered in the included studies.

Key points (con't)

- Across studies the high degree of inconsistency in: measures of COVID-19 transmission (e.g., absolute cases vs. cases per 100 000, Rt on a specific day or week vs. average over a time period, new cases on a specific day or week vs. cumulative cases over a time period, etc.), lag-periods used to assess for effects (e.g., immediately after implementing intervention, 7-days later, 14-days later), statistical analysis techniques, and control for potential confounding factors (e.g., demographics, other measures in place), made cross study comparisons difficult.
- When small effects were found, it is not clear if these interventions are not effective, or if they need to be layered with other measures, such as mask-wearing to achieve impact.

Suggested Tweet

- Gathering restrictions, stay-at-home orders, and initial school closures may have reduced transmission of COVID-19, particularly during the first wave.

Date of last literature search: 3 March 2023

Suggested citation: Neil-Sztramko SE, Hagerman L, Thai A, Traynor R, Hopkins S, Stoby K, Sala N, Kostopoulos A, Choudhry N, Dobbins M, COVID-END PHSM LES Working Group. COVID-19 Living Evidence Synthesis 16.3a: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings. The National Collaborating Centre for Methods and Tools, 24 March 2023.

Please note: This living evidence synthesis (LESs) is part of a suite of LESs of the best-available evidence about the effectiveness of six PHSMs (masks, quarantine and isolation, ventilation, physical distancing and reduction of contacts, hand hygiene and respiratory etiquette, cleaning, and disinfecting), as well as combinations of and adherence to these measures, in preventing transmission of COVID-19 and other respiratory infectious diseases in non-health care community-based setting. The next update to this and other LESs in the series is to be determined, but the most up-to-date version of this and other LESs in the suite are available on the COVID-END website.

Box 1: Context for synthesizing evidence about public health and social measures (PHSMs)

This series of living evidence syntheses was commissioned to understand the effects of PHSMs during a global pandemic to inform current and future use of PHSMs.

General considerations for identifying, appraising and synthesizing evidence about PHSMs

- PHSMs are population-level interventions and typically evaluated in observational studies.
  - Many PHSMs are interventions implemented at a population level, rather than at the level of individuals or clusters of individuals such as in clinical interventions.
  - Since it is typically not feasible and/or ethical to randomly allocate entire populations to different interventions, the effects of PHSMs are commonly evaluated using observational study designs that evaluate PHSMs in real-word settings.
  - As a result, a lack of evidence from RCTs does not necessarily mean the available evidence in this series of LESs is weak.
- Instruments for appraising the risk of bias in observational studies have been developed; however, rigorously tested and validated instruments are only available for clinical interventions.
  - Such instruments generally indicate that a study has less risk of bias when it was possible to directly assess outcomes and control for potential confounders for individual study participants.
  - Studies assessing PHSMs at the population level are not able to provide such assessments for all relevant individual-level variables that could affect outcomes, and therefore cannot be classified as low risk of bias.
- Given feasibility considerations related to synthesizing evidence in a timely manner to inform decision-making for PHSMs during a global pandemic, highly focused research questions and inclusion criteria for literature searches were required.
  - As a result, we acknowledge that this series of living evidence syntheses – about the effectiveness of specific PHSMs (i.e., quarantine and isolation; mask use, including unintended consequences; ventilation, reduction of contacts, physical distancing, hand hygiene and cleaning and disinfecting measures), interventions that promote adherence to PHSMs, and the effectiveness of combinations of PHSMs – does not incorporate all existing relevant evidence on PHSMs.
  - Ongoing work on this suite of products will allow us to broaden the scope of this review for a more comprehensive understanding of the effectiveness of PHSMs.
  - Decision-making with the best available evidence requires synthesizing findings from studies conducted in real-world settings (e.g., with people affected by misinformation, different levels of adherence to an intervention, different definitions and uses of the interventions, and in different stages of the pandemic, such as before and after availability of COVID-19 vaccines).

Our approach to presenting findings with an appraisal of risk of bias (ROB) of included studies

To ensure we used robust methods to identify, appraise and synthesize findings and to provide clear messages about the effects of different PHSMs, we:

- acknowledge that a lack of evidence from RCTs does not mean the evidence available is weak
- assessed included studies for ROB using the approach described in the methods box
- typically introduce the ROB assessments only once early in the document if they are consistent across sub-questions, sub-groups and outcomes, and provide insight about the reasons for the ROB assessment findings (e.g., confounding with other complementary PHSMs) and sources of additional insights (e.g., findings from LES 20 in this series that evaluates combinations of PHSMs)
- note where there are lower levels of ROB where appropriate
- note where it is likely that risk of bias (e.g., confounding variables) may reduce the strength of association with a PHSM and an outcome from the included studies

- identify when little evidence was found and when it was likely due to literature search criteria that prioritized RCTs over observational studies.

Implications for synthesizing evidence about PHSMs

Despite the ROB for studies conducted at the population level that are identified in studies in this LES and others in the series, they provide the best-available evidence about the effects of interventions in real life. Moreover, ROB (and GRADE, which was not used for this series of LESs) were designed for clinical programs, services and products, and there is an ongoing need to identify whether and how such assessments and the communication of such assessments, need to be adjusted for public-health programs, services and measures and for health-system arrangements.

Findings

- In this version a total of 56 studies were included, 46 that reported data on our primary outcome (reducing transmission of COVID-19) and 21 that reported data on secondary outcomes (hospitalizations, deaths, transmission of other respiratory viruses). The number of studies identified in the search and included in the final report can be found in Figure 1.
- Overall, studies were of moderate to critical risk of bias. This is partly due to the nature of the interventions that were considered, as real-world population-level interventions. Across studies, major risk of bias was due to lack of control for confounding, and appropriateness of statistical analyses used.

Summary of findings about the primary outcome: Reducing transmission of COVID-19

Ten syntheses and 36 single studies were included that report on reducing transmission of COVID-19 as an outcome. The characteristics, findings, and assessment of risk of bias for each synthesis is presented in Table 1, and single studies in Tables 1 and 2A-2G.

5 single studies reported the impact of curfews on COVID-19 transmission. While curfews appeared to be associated with a reduction in transmission of COVID-19, the magnitude of effect is small, ranging from a decrease of 0.9 to 13%. The magnitude of the effect is smallest in studies with a lower risk of bias, which attempted to control for confounders.

1 synthesis and 6 single studies reported the impact of cancelling public events on COVID-19 transmission. Most of the studies did not find an effect of cancelling public events on COVID-19 transmission. One study suggested that the impact is only seen when the most stringent definition of cancelling public events is applied.

Box 2: Our approach

We retrieved candidate studies by searching: 1) PubMed via COVID-19+ Evidence Alerts; and 2) pre-print servers. Searches were conducted for studies reported in English, conducted with humans, and published since 1 January 2020 (to coincide with the emergence of COVID-19 as a global pandemic). Our detailed search strategy is included in **Appendix 1**.

Studies that report on empirical data with a comparator were considered for inclusion, with modelling studies, simulation studies, case reports, case series, and press releases excluded. A full list of included studies is provided in **Tables 1-4**. Studies excluded at the last stages of reviewing are provided in **Appendix 2**.

Population of interest: All population groups that report data related to all COVID-19 variants and sub-variants.

Intervention and control/comparator: Measures designed to limit the number of individuals that a case could transmit an infectious disease to, defined as curfews, cancelling public events, closing public transit, restricting gathering sizes, school closures, stay-at-home orders, and workplace or business closures.

Primary outcome: Reduction in transmission of COVID-19 (e.g., incidence, reproductive number (R_t), case growth rate); **Secondary outcomes**: Reduction in COVID-19 associated hospitalizations and deaths, and transmission of other respiratory infections.

Data extraction: Data extraction was conducted by one team member and checked for accuracy and consistency by another using the template provided in **Appendix 3**.

Critical appraisal: Risk of Bias (ROB) of individual studies was assessed using validated ROB tools. For observational studies, we used an adapted ROBINS-I (Linkins, 2023) and the Joanna Briggs Institute (JBI) Checklist for Analytical Cross Sectional Studies. Judgements for the domains within these tools were decided by consensus within the synthesis team. Systematic reviews were assessed using AMSTAR 1. ROB was assessed by one reviewer and verified by a second.

Summaries: We summarized the evidence by presenting narrative evidence profiles across studies by outcome measure.

The next update to this document is to be determined.

1 synthesis and 4 single studies reported the impact of closing public transit on COVID-19 transmission. Closing public transit was consistently associated with a small decrease in transmission of COVID-19. In studies that reported effect estimates, the decrease ranged from a decrease in Rt of 0.11 over 90-days to a 10% decrease in Rt; the other two studies reported p-values only.

3 syntheses and 20 single studies reported the impact of gathering restrictions on COVID-19 transmission. Gathering restrictions appeared to be effective in reducing transmission of COVID-19, with larger effects seen with stricter application of guidelines (e.g., restricting gatherings to groups of 10 vs. groups of 100). Wide variation was seen in effect sizes across studies, from a 42% decrease to a 32% increase in infections.

7 syntheses and 22 single studies reported the impact of school closures on COVID-19 transmission. School closures were consistently associated with reductions in COVID-19 transmission in the first wave of the pandemic, with effects sizes ranging from 4 to 42% reduction; data on subsequent time periods was inconsistent.

5 syntheses and 22 single studies reported the impact of stay-at-home orders on COVID-19 transmission. Stay-at-home orders were consistently associated with the largest reductions in COVID-19 transmission, especially in studies with lower risk of bias and in the first wave of the pandemic; effect sizes ranged from a 4% to 54% reduction in cases.

4 syntheses and 20 single studies reported the impact of workplace closures on COVID-19 transmission. Inconsistent findings were observed related to closing of workplaces on COVID-19 transmission, which may be in part due to the wide variation in definition of business closures considered across jurisdictions within studies, and across studies.

Summary of findings about secondary outcome 1: Reducing COVID-19 associated hospitalizations and deaths

2 syntheses and 15 single studies were included that report on reducing COVID-19 associated hospitalizations and deaths as an outcome. The characteristics, findings, and assessment of risk of bias for each study is presented in Tables 3 and 4A-4G. All studies collect most, if not all, of the data prior to widespread availability of vaccines.

One single study each found a reduction in COVID-19 associated deaths associated with curfews ((-0.59 (SE: 0.12) in death growth rate) and cancelling public events (-5.9% (95% CI: -9.8, -2.0) in percent change in deaths). A single study found no association between closing public transit and COVID-19 associated deaths.

7 single studies reported the impact of gathering restrictions on COVID-19 associated deaths. Gathering restrictions were typically not associated with case fatality rate, death rate, or cumulative deaths.

1 synthesis and 10 single studies reported the impact of school closures on COVID-19 associated deaths. School closures do not appear to be associated with COVID-19 associated deaths. 2 studies reported the impact on hospitalizations, with inconsistent findings.

1 synthesis and 11 single studies reported the impact of stay-at-home orders on COVID-19 associated deaths. Inconsistent findings were reported with respect to the impact of stay-at-home orders on COVID-19 associated deaths; while stay-at-home orders may not impact weekly death rate, they may reduce cumulative deaths. 1 study found that stay-at-home orders were moderately correlated with hospitalizations.

1 synthesis and 11 single studies reported the impact of workplace closures on COVID-19 associated deaths, and one study reported the impact of workplace closures on hospitalizations. Overall, workplace closures may not be associated with COVID-19 associated deaths, although highly heterogeneous categories of workplaces were examined within studies. 1 study found that workplace closures were moderately correlated with hospitalizations.

Summary of findings about secondary outcome 2: Reducing transmission of other respiratory infections

Four single studies were included that reported on reducing transmission of other respiratory infections as an outcome. The characteristics, findings, and assessment of risk of bias for each study is presented in Table 5. Overall, studies found that school closures during the first wave of the pandemic decreased transmission of Influenza A and RSV, but not bronchiolitis. Workplace closures, cancelling public events, gathering restrictions and closing public transit were not associated with decrease odds of epidemic influenza in Asia in one study.

Summary of findings about secondary outcome 3: Negative impacts of measures to reduce contacts

The citations identified in the original search were re-screened at the title and abstract level to identify potential syntheses to address secondary outcomes of negative impacts of measures to reduce contacts. A total of 298 syntheses were identified that may fit our eligibility criteria related to negative impacts of measures to reduce contacts. A list of these syntheses can be found in Table 6. These include 109 which address mental health, 2 which address personal finance, employment status or school attendance, 8 which address incidence of family violence or intimate partner violence, 72 which address health behaviours, 43 which address inequitable and disproportionate effects on certain populations, 4 which address functioning of workforce or essential services, and 60 which may fall into more than one category.

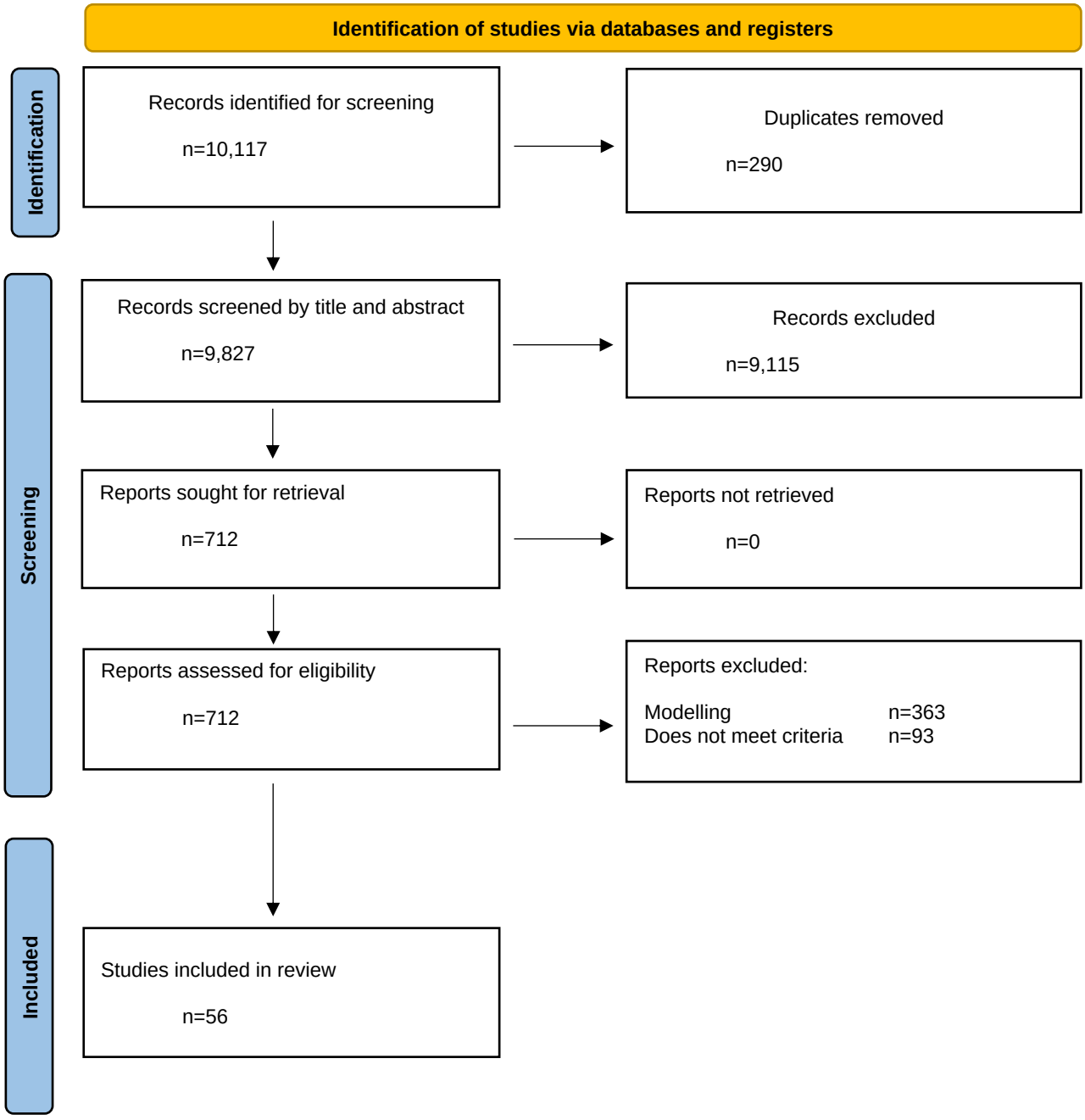

Figure 1. PRISMA diagram of new studies identified.

Table 1: Summary of syntheses reporting on effectiveness of measures to reduce contacts for preventing COVID-19 infections

Reference	Date released	Setting and search date	Study characteristics	Summary of key findings in relation to the outcome	Quality Rating
Previously reported evidence					
Khosravizadeh, O., Ahadinezhad, B., Maleki, A., Najafpour, Z., & Golmohammadi, R. (2022). Social distance capacity to control the COVID-19 pandemic: A systematic review on time series analysis. *The International journal of risk & safety in medicine*, *33*(1), 5–22.	22 May 2022	Global March 2021	**Design:** Systematic review **Interventions:** Gathering restrictions, school closures **Sample:** 13 interrupted time series analysis on social distancing measures **Key outcomes:** NR **VOCs assessed:** NR	The authors recommend school closures and limiting crowded places as policies to control the pandemic.	Low
Sun, K.S., Lau, T.S.M., Yeoh, E.K., Chung, V.C.H., Leung, Y.S., Yam, C.H.K., & Hung, C.T. (2022). Effectiveness of different types and levels of social distancing measures: a scoping review of global evidence from earlier stage of COVID-19 pandemic. *BMJ open*, *12*(4), e053938.	11 April 2022	Global Inception - 30 September 2020	**Design:** Scoping review **Interventions:** Closing public transport, School closures, Workplace closures **Sample:** 41 articles, 5 modeling studies. Articles' data gathered between 2019 and 2020 **Key outcomes:** transmission reduction, infection rate, mortality rate, time to reach peak, distance travelled No units specified **VOCs assessed:** Original	School closure may have benefits during the early phases of the pandemic, but the effectiveness was mixed when considering different level of closures and the lack of effect seen when reopening There was limited evidence on the benefits of workplace closures on COVID-19 transmission. There was no evidence on the role of restricting public transport on COVID-19 transmission.	Moderate

Reference	Date released	Setting and search date	Study characteristics	Summary of key findings in relation to the outcome	Quality Rating
Iezadi, S., Gholipour, K., Azami-Aghdash, S., Ghiasi, A., Rezapour, A., Pourasghari, H., & Pashazadeh, F. (2021). Effectiveness of non-pharmaceutical public health interventions against COVID-19: A systematic review and meta-analysis. *PloS one*, *16*(11), e0260371.	23 November 2021	Global December 2019 - 1 February 2021	**Design:** Systematic review and meta-analysis **Intervention:** Stay-at-home orders **Sample:** 5 studies on stay-at-home orders from 2020. **Key outcomes:** Daily case growth rate (%) **VOCs assessed:** NR	Stay-at-home orders were associated with a decrease in daily case growth rate -4.42% (95% CI: -6.85, -2.00), I^2= 99.8%	Moderate
Vardavas, C.I., Nikitara, K., Aslanoglou, K., Hilton-Boon, M., Phalkey, R., Leonardi-Bee, J., … Suk, J.E. (2021). Effectiveness of non-pharmaceutical measures (NPIs) on COVID-19 in Europe: A systematic literature review. *Preprint.*	21 November 2021	European Union, United Kingdom, and the European Economic area January 2020 - 14 April 2021	**Design:** Systematic review **Intervention:** School closures **Sample:** Of 45 studies included in the review, 2 addressed school closures **Key outcomes:** Daily Rt **VOCs assessed:** NR	Two modelling studies provided evidence for an association between school closures and Rt	Moderate ***PREPRINT***

Reference	Date released	Setting and search date	Study characteristics	Summary of key findings in relation to the outcome	Quality Rating
Talic, S., Shah, S., Wild, H., Gasevic, D., Maharaj, A., Ademi, Z., … Ilic, D. (2021). Effectiveness of public health measures in reducing the incidence of covid-19, SARS-CoV-2 transmission, and covid-19 mortality: systematic review and meta-analysis. *BMJ, 375*, e068302.	21 October 2021	Global up to June 7, 2021	**Design:** Systematic review and meta-analysis **Interventions:** School closures, Business closures **Sample:** 18 studies, no modelling **Key outcomes:** COVID-19 Incidence, Rt, new cases) **VOCs assessed:** NR	There are conflicting results with school closures and COVID-19 incidence, with one study showing an effect and the other not. ROB is moderate There are conflicting results on school closures and COVID-19 transmission using the Rt, with some studies showing an effect and others not. ROB is moderate Business closure resulted in a reduction in COVID-19 transmission. ROB is moderate	High
Girum, T., Lentiro, K., Geremew, M., Migora, B., Shewamare, S., & Shimbre, M. S. (2021). Optimal strategies for COVID-19 prevention from global evidence achieved through social distancing, stay at home, travel restriction and lockdown: a systematic review. *Archives of public health, 79*(1), 150.	21 August 2021	Global 13 January 2020- 5 June, 2020. Date NR	**Design:** Systematic review **Intervention:** Stay-at-home order **Sample:** 12 studies total; 3 on stay-at-home orders **Key outcomes:** COVID-19 transmission (infection rates) **VOCs assessed:** NR	Three observational studies that aimed to assess the effect of stay-at-home measures in Ethiopia and USA reported the benefit of stay-at-home measures. Study quality was rated as moderate.	Moderate

Reference	Date released	Setting and search date	Study characteristics	Summary of key findings in relation to the outcome	Quality Rating
Walsh, S., Chowdhury, A., Braithwaite, V., Russell, S., Birch, J.M., Ward, J.L., & Mytton, O. T. (2021). Do school closures and school reopenings affect community transmission of COVID-19? A systematic review of observational studies. *BMJ open*, *11*(8), e053371.	17 August 2021	Global 2020-2021	**Design:** Systematic review **Intervention:** School closures **Sample:** 40 studies, all data collected in 2020. Modeling studies excluded. **Key outcomes:** Community infection rates, hospital admissions, mortality No units specified **VOCs assessed:** NR	Among the higher quality studies, with some adjustment for confounding, 6 out of 14 reported no effect on transmission, 6 reported an association with reductions in transmission, and 2 reported mixed findings.	Moderate
Mendez-Brito, A., El Bcheraoui, C., & Pozo-Martin, F. (2021). Systematic review of empirical studies comparing the effectiveness of non-pharmaceutical interventions against COVID-19. *The Journal of infection*, *83*(3), 281–293.	20 June 2021	Global 20 January - 9 March 2021	**Design:** Systematic review **Intervention:** Cancellation of public events, gathering restrictions, School closures, Stay-at-home order, Workplace closures **Sample:** Scientific databases were searched up until 4 March 2021; preprints were searched up to 9 March 2021. 34 ecological population level studies were included (28 published, 6 pre-prints). **Key outcomes:** Overall effectiveness as measured by Rt, epidemic growth and daily incidence **VOCs assessed:** NR	• School closures were found to be effective in 14/24 (58%) studies. Reduction in Rt range from 39% to 73%. • Workplace closures were associated with an improvement in 12/14 (86%) studies. Among studies that ranked interventions, workplace closures were consistently found to be one of the most effective measures (values NR). • The evidence for cancellation of public events was mixed; 6/12 (50%) studies found it was predictive of the outcome (not specified) reaching peak effect of 25% reduction in Rt 28 days after implementation (values NR). • The evidence on gathering restrictions was generally consistent; mass gathering bans were associated with reduction in incidence in 7/14 (73%) studies while group restrictions were found to be more effective than mass gather bans in studies of higher and intermediate quality. • 30 studies were rated moderate-high quality, 4 low quality	Moderate

Reference	Date released	Setting and search date	Study characteristics	Summary of key findings in relation to the outcome	Quality Rating
Ayouni, I., Maatoug, J., Dhouib, W., Zammit, N., Fredj, S.B., Ghammam, R., & Ghannem, H. (2021). Effective public health measures to mitigate the spread of COVID-19: a systematic review. *BMC public health*, *21*(1), 1015.	29 May 2021	Global Inception – 16 March 2021	**Design**: Systematic review **Intervention**: Gathering restriction, School closures, Stay-at-home order **Sample**: 18 Articles included, no modeling studies **Key outcomes**: COVID-19 transmission **VOCs assessed**: NR	7 studies found that mass gathering restrictions reduced the transmission of COVID-19. • Majority of included studies ranked as moderate quality, grade level C. No modeling studies included. Two studies showed school closures were effective in mitigating the spread of COVID-19 with other measures in place. • Majority of included studies ranked as moderate quality, grade level C. No modeling studies included. 7 studies found that city stay-at-home orders were effective in reducing transmission, however, were more effective with other mitigation measures in place. • Majority of included studies ranked as moderate quality, grade level C. No modeling studies included.	Moderate
Ryan, J., Okeibunor, J., Talisuna, A., & Wiysonge, C.S. (2020). Setting up and relaxation of public health social and physical distancing measures for COVID-19: a rapid review. *The Pan African medical journal*, *35*(Suppl 2), 76.	12 June 2020	Global 2020	**Design:** Rapid review **Intervention:** Stay-at-home order, Workplace closures **Sample:** 10 articles, 5 modeling articles and 5 correspondence/commentary **Key outcomes:** Infection rates (no units) **VOCs assessed:** NR	The authors conclude that timely initiation of social and physical distancing measures to limit the spread of virus transmission is important, followed by a phased approach when relaxing these public health measures. Based on commentary and modeling articles. No quality assessment completed.	Low

Table 2A: Summary of studies reporting on effectiveness of curfews in preventing COVID-19 infections

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
New evidence reported on March 24, 2023					
Apel, J., Rohde, N., & Marcus, J. (2023). The effect of a nighttime curfew on the spread of COVID-19. *Health policy*, *129*, 104712.	25 January 2023	Hamburg, Germany 1 February 2021 - 30 April 2021	**Design**: Quasi-experimental study; difference in difference **Intervention**: Curfews **Sample**: Observation across 89 days (February 2021 - April 2021) in Hamburg (n = 1) and other cities as controls (n = 35) for a total of 3204 observations; from the German Federal Ministry for Economic Affairs and Climate Action. **Key outcomes**: Weekly COVID-19 incidence, cases per 100 000 **VOCs assessed**: B.1.1.7 (Alpha)	Curfews were associated with a decrease in weekly COVID-19 incidence of -25.9, SE: 5.4 cases per 100 000 per week ($p < 0.01$).	Critical
Previously reported evidence					
Sharma, M., Mindermann, S., Rogers-Smith, C., Leech, G., Snodin, B., Ahuja, J., … Brauner, J.M. (2021). Understanding the effectiveness of government interventions against the resurgence of COVID-19 in Europe. *Nature communications*, *12*(1), 5820.	05 October 2021	Europe 1 August 2020 - 9 January 2021	**Design**: Interrupted time series **Intervention**: Curfews **Sample**: Publicly available COVID-19 data for 114 regions in 7 European countries (total of >5500 observations) up to 3 months post implementation **Key outcomes**: Reduction in Rt (%) **VOCs assessed**: NR	Nighttime curfews were associated with a reduction in Rt = 13% (95% CI: 6, 20).	Critical

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Kaimann, D., & Tanneberg, I. (2021). What containment strategy leads us through the pandemic crisis? An empirical analysis of the measures against the COVID-19 pandemic. *PloS one*, *16*(6), e0253237.	21 June 2021	Global 22 January 2020 - 24 May 2020	**Design**: Quasi-experimental **Intervention**: Curfews **Sample**: 6,941 daily observations from a sample of 68 countries, Puerto Rico and the 50 states of the US, 4 states of Australia, and 8 federal states of Canada; each country observation starts from first confirmed case and ends either on May 24 or when one measure was first lifted. COVID-19 data from John Hopkins Coronavirus Resource Center; data on measures from country and state governments and local health authorities. **Key outcomes**: COVID-19 daily growth rate **VOCs assessed**: No VoCs circulating	National curfew was associated with a decrease in growth rate after a 5-day time delay (-0.9%, SE: 0.2, $p<0.001$)	Serious
Lansiaux, E., Caut, J., Forget, J., & Pébaÿ, P.P. (2021): Assessing the efficiency of COVID-19 NPIs in France: a retrospective study using a novel methodology. *Preprint.*	13 April 2021	France 1 March 2020 - 30 January 2021	**Design**: Retrospective cohort **Intervention**: Curfews **Sample**: Metropolitan France ministry data (total number of observations NR), at a minimum of 90 days post implementation **Key outcomes**: Daily number of COVID-19 hospitalizations, daily number of COVID-19 ICU admissions and Rt **VOCs assessed**: No VoCs circulating	Curfews were correlated with Rt, Pearson's correlation coefficients ranging from 0.09 to 0.11 across regions ($p<0.05$).	Critical ***PREPRINT***

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Wong, C.K.H., Wong, J.Y.H., Tang, E.H.M., Au, C.H., Lau, K.T.K., & Wai, A.K.C. (2020). Impact of National Containment Measures on Decelerating the Increase in Daily New Cases of COVID-19 in 54 Countries and 4 Epicenters of the Pandemic: Comparative Observational Study. *Journal of medical Internet research*, *22*(7), e19904.	22 July 2020	Global 23 January, 2020 -11 April 11, 2020	**Design**: Quasi-experimental **Intervention**: Curfews **Sample**: Our World in Data (open, crowdsourced, daily-updated data), 7 days before to 30 days after the intervention started. All data were available up to June 20, 2020. **Key outcomes**: COVID-19 transmission (daily new cases (percentage)) **VOCs assessed**: No VoCs circulating	In countries implementing curfews, there was a consistent decrease in daily percent change in new cases from 11.4 (95% CI: 10.9-11.9) at baseline (statistical significance NR): • Day 7= 5.93 (95% CI: 5.61-6.26) • Day 14= 3.73 (95% CI: 3.47-3.98) • Day 21= 2.60 (95% CI: 2.38-2.81) • Day 30= 1.89 (95% CI: 1.71-2.07)	Moderate

Table 2B: Summary of studies reporting on the effectiveness of cancellation of public events in preventing COVID-19 infections

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Previously reported evidence					
Xiu, Z., Feng, P., Yin, J., & Zhu, Y. (2022). Are Stringent Containment and Closure Policies Associated with a Lower COVID-19 Spread Rate? *Global Evidence, 19*(3), 1725.	02 February 2022	Global (210 countries) 1 January - 22 May 2022	**Design**: Interrupted time series **Intervention**: Cancellation of public events **Sample**: Our World in Data COVID-19 case counts for 210 countries (total of 6684 observations) paired with the Oxford COVID-19 Government Response Tracker (it is not clear if or how long the interventions were followed. The authors indicate that May 22 was an arbitrary date and had no significance to the data collection) **Key outcomes**: Daily new cases of COVID-19 (%) **VOCs assessed**: No VoCs circulating	Cancelling public events was not associated with a change in daily case growth rate (8.31%, p>0.05) after controlling for other restrictions and confounders.	Serious
Li, H., Wang, L., Zhang, M., Lu, Y., & Wang, W. (2022). Effects of vaccination and non-pharmaceutical interventions and their lag times on the COVID-19 pandemic: Comparison of eight countries. *PLoS neglected tropical diseases*, *16*(1), e0010101.	13 January 2022	Global January 2020 - August 2021	**Design**: Cohort **Intervention**: Cancellation of public events **Sample**: 8 countries (Australia, Israel, India, Japan, Singapore, South Korea, UK, US); policy responses from the Oxford COVID-19 Government Response Tracker; proportion of Delta variant from public Github database **Key outcomes**: Effective Rt, lag time **VOCs assessed**: Delta	Cancelling public events was protective for most countries (RR<1), but harmful for the United States and India (RR>1) (no further data provided).	Critical

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Sun, J., Zheng, Y., Liang, W., Yang, Z., Zeng, Z., Li, T… Zhong, N. (2022). Quantifying the Effect of Public Activity Intervention Policies on COVID-19 Pandemic Containment Using Epidemiologic Data From 145 Countries. *Value in health*, *25*(5), 699–708.	08 December 2021	Global 31 December 2019 - 01 July 2020	**Design**: Quasi-experimental **Intervention**: Cancellation of public events **Sample**: Daily confirmed cases of COVID-19 for 145 countries from Oxford COVID-19 Government Response Tracker **Key outcomes**: Estimated cumulative infections per million population for each country on July 1, 2020, correlated with policy start date, stringency (e.g., strictness), and duration (correlation coefficient, r); COVID-19 time-varying Rt **VOCs assessed**: No VoCs circulating	Public events cancellation was associated with a decrease in Rt, the average effect over 90-days was -0.39 (95% CI: -0.52, -0.27).	Serious
Liang, L.L., Kao, C.T., Ho, H.J., & Wu, C.Y. (2021). COVID-19 case doubling time associated with non-pharmaceutical interventions and vaccination: A global experience. *Journal of global health*, *11*, 05021.	04 September 2021	Global 01 January 2020 - 13 June 2021	**Design**: Interrupted Time Series **Intervention**: Cancellation of public events **Sample**: Observations from 137 countries over 18 months (January 2020 - June 2021) or 42,102 country-days, since the first reported case in each country; data were collected on 19 June 2021 from Oxford COVID-19 Government Response Tracker, World Development Indicators, and Worldwide Governance Indicators **Key outcomes**: COVID-19 case doubling time (daily basis, per country) **VOCs assessed**: NR	Cancellation of public events was not associated with COVID-19 doubling time (0.21%, 95% CI: -0.06, 0.47)	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Liu, Y., Morgenstern, C., Kelly, J., Lowe, R., CMMID COVID-19 Working Group, & Jit, M. (2021). The impact of non-pharmaceutical interventions on SARS-CoV-2 transmission across 130 countries and territories. *BMC medicine*, *19*(1), 40.	05 February 2021	Global 1 January - 22 June 2020	**Design**: Interrupted time series **Intervention**: Cancellation of public events **Sample**: EpiForecasts data paired with OxCGRT data (total # observations NR) for 130 countries (follow up time NR) **Key outcomes**: Rt **VOCs assessed**: No VoC circulating	Data suggest that cancelling public events were only effective when more stringently applied ($p < 0.01$, data NR). Authors note high degree of overlap amongst implementation of interventions may make it difficult statistically to obtain an accurate interpretation of effect size.	Serious
Olney, A.M., Smith, J., Sen, S., Thomas, F., & Unwin, H.J.T. (2021). Estimating the Effect of Social Distancing Interventions on COVID-19 in the United States. American journal of epidemiology, 190(8), 1504–1509.	07 January 2021	United States 29 February 2020 - 25 April 2020	**Design**: Interrupted Time Series **Intervention**: Cancelling public events **Sample**: Data on COVID-19 cases were obtained from the New York Times public repository for all US states. **Key outcomes**: Rt was derived from case counts. **VOCs assessed**: None	Cancelling public events was not associated with a meaningful change in Rt (-9.8%, 95% CI: -31.5, 0.0). Banning of sporting events was not associated with a meaningful change in Rt (-2.1%, 95% CI: -9.7, 0.0)	Serious

Table 2C: Summary of studies reporting on effectiveness of closing public transport in preventing COVID-19 infections

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Previously reported evidence					
Xiu, Z., Feng, P., Yin, J., & Zhu, Y. (2022). Are Stringent Containment and Closure Policies Associated with a Lower COVID-19 Spread Rate? *Global Evidence, 19*(3), 1725.	02 February 2022	Global (210 countries) 1 January - 22 May 2022	**Design**: Interrupted time series **Intervention**: Closing public transport **Sample**: Our World in Data COVID-19 case counts for 210 countries (total of 6684 observations) paired with the Oxford COVID-19 Government Response Tracker (it is not clear if or how long the interventions were followed. The authors indicate that May 22 was an arbitrary date and had no significance to the data collection) **Key outcomes**: Daily new cases of COVID-19 (%) **VOCs assessed**: NR	Closing public transport was associated with a decrease in daily case growth rate of -9.76% ($p<0.001$) after controlling for other restrictions and confounders.	Serious
Li, H., Wang, L., Zhang, M., Lu, Y., & Wang, W. (2022). Effects of vaccination and non-pharmaceutical interventions and their lag times on the COVID-19 pandemic: Comparison of eight countries. *PLoS neglected tropical diseases*, *16*(1), e0010101.	13 January 2022	Global January 2020 - August 2021	**Design**: Cohort **Intervention**: Closing public transport **Sample**: 8 countries (Australia, Israel, India, Japan, Singapore, South Korea, UK, US); policy responses from the Oxford COVID-19 Government Response Tracker; proportion of Delta variant from public Github database **Key outcomes**: Effective Rt, lag time **VOCs assessed**: Delta	Closing public transport was harmful for most countries (RR>1) and ineffective in the United Kingdom (RR 0.98~1.02) (no further data provided)	Critical

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Sun, J., Zheng, Y., Liang, W., Yang, Z., Zeng, Z., Li, T… Zhong, N. (2022). Quantifying the Effect of Public Activity Intervention Policies on COVID-19 Pandemic Containment Using Epidemiologic Data From 145 Countries. *Value in health*, *25*(5), 699–708.	08 December 2021	Global 31 December 2019 - 01 July 2020	**Design**: Quasi **Intervention**: Closing public transport **Sample**: Daily confirmed cases of COVID-19 for 145 countries from Oxford COVID-19 Government Response Tracker **Key outcomes**: Estimated cumulative infections per million population for each country on July 1, 2020, correlated with policy start date, stringency (e.g., strictness), and duration (correlation coefficient, r); COVID-19 time-varying Rt **VOCs assessed**: NR	Public transport closures were associated with a decrease in Rt, the average effect over 90-days was -0.11, 95% CI: -0.20, -0.03.	Serious
Liu, Y., Morgenstern, C., Kelly, J., Lowe, R., CMMID COVID-19 Working Group, & Jit, M. (2021). The impact of non-pharmaceutical interventions on SARS-CoV-2 transmission across 130 countries and territories. *BMC medicine*, *19*(1), 40.	05 February 2021	Global 1 January - 22 June 2020	**Design**: Interrupted time series **Intervention**: Closing public transport **Sample**: EpiForecasts data paired with OxCGRT data (total # observations NR) for 130 countries (follow up time NR) **Key outcomes**: Rt **VOCs assessed**: NR	Closing public transit was associated with reductions in Rt ($p<0.01$, data NR). Authors note high degree of overlap amongst implementation of interventions may make it difficult statistically to obtain an accurate interpretation of effect size.	Serious

Table 2D: Summary of studies reporting on effectiveness of gathering restrictions in preventing COVID-19 infections

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Previously reported evidence					
Hayashi, K., Kayano, T., Anzai, A., Fujimoto, M., Linton, N., Sasanami, M., … Nishiura, H. (2022). Assessing Public Health and Social Measures Against COVID-19 in Japan From March to June 2021. *Frontiers in medicine, 9*, 937732.	12 July 2022	Japan 01 March 2021 - 30 June 2021	**Design**: Quasi-experimental **Intervention**: Gathering restrictions **Sample**: Incidence of confirmed COVID-19 cases from the Health Center Real-Time Information-sharing System on COVID-19 **Key outcomes**: Effective Rt; effectiveness of "pre-emergency measures" and "state of emergency" was calculated by comparing the change in Rt value, i) 7 or 14 days prior to intervention, and ii) first 7 or total days of intervention. Relative and absolute risk reductions in secondary transmission. **VOCs assessed**: B.1.1.7	Gathering restrictions were associated with a statistically significant reduction in absolute and relative Rt ($p<0.05$, data NR).	Critical
Ahlers, M.J., Aralis, H.J., Tang, W.L., Sussman, J.B., Fonarow, G.C., & Ziaeian, B. (2021). Non-pharmaceutical interventions and covid-19 burden in the United States: retrospective, observational cohort study. *BMJ Medicine, 1*, e000030.	05 July 2022	United States 19 January 2020 - 7 March 2021	**Design**: Retrospective cohort **Intervention**: Indoor gathering bans **Sample**: State level COVID-19 Tracking Project data for the US population (total of 31,721,888 observations; 26,602,830 cases and 511,899 deaths) paired with publicly available information on adoption and discontinuation of NPIs from 21 (cases) to 35 (deaths) days after implementation. **Key outcomes**: Change in COVID-19 case and deaths rates (in each state) **VOCs assessed**: B.1.1.7 (Alpha) at the end of the observation period	Less stringent indoor gathering bans (>10 people) were associated with decreased odds of a decrease in case growth rate (i.e., greater growth) (AOR: 0.46, 95% CI: 0.34, 0.61) compared to no gathering restrictions. Strict indoor gathering bans (<10 people) were not associated with odds of a decreased growth rate (AOR: 1.38, 95% CI: 0.97, 1.95).	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Xiu, Z., Feng, P., Yin, J., & Zhu, Y. (2022). Are Stringent Containment and Closure Policies Associated with a Lower COVID-19 Spread Rate? *Global Evidence, 19*(3), 1725.	02 February 2022	Global (210 countries) 1 January - 22 May 2022	**Design**: Interrupted time series **Intervention**: Gathering restrictions **Sample**: Our World in Data COVID-19 case counts for 210 countries (total of 6684 observations) paired with the Oxford COVID-19 Government Response Tracker (it is not clear if or how long the interventions were followed. The authors indicate that May 22 was an arbitrary date and had no significance to the data collection) **Key outcomes**: Daily new cases of COVID-19 (%) **VOCs assessed**: NR	Gathering restrictions were not associated with a change in daily case growth rate (-2.2%, p>0.05) after controlling for other restrictions and confounders.	Serious
Li, H., Wang, L., Zhang, M., Lu, Y., & Wang, W. (2022). Effects of vaccination and non-pharmaceutical interventions and their lag times on the COVID-19 pandemic: Comparison of eight countries. *PLoS neglected tropical diseases*, *16*(1), e0010101.	13 January 2022	Global January 2020 - August 2021	**Design**: Cohort **Intervention**: Gathering restrictions **Sample**: 8 countries (Australia, Israel, India, Japan, Singapore, South Korea, UK, US); policy responses from the Oxford COVID-19 Government Response Tracker; proportion of Delta variant from public Github database **Key outcomes**: Effective Rt, lag time **VOCs assessed**: Delta	Restrictions on mass gatherings was protective for the majority of countries (RR<1), harmful for Israel (RR>1) and the United Kingdom, and ineffective for India (RR 0.99~1.02) (no further data provided).	Critical

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Sun, J., Zheng, Y., Liang, W., Yang, Z., Zeng, Z., Li, T… Zhong, N. (2022). Quantifying the Effect of Public Activity Intervention Policies on COVID-19 Pandemic Containment Using Epidemiologic Data From 145 Countries. *Value in health*, *25*(5), 699–708.	08 December 2021	Global 31 December 2019 - 01 July 2020	**Design**: Quasi-experimental **Intervention**: Gathering restrictions **Sample**: Daily confirmed cases of COVID-19 for 145 countries from Oxford COVID-19 Government Response Tracker, both for the period of 31 December 2019 - 1 July 2020) **Key outcomes**: Estimated cumulative infections per million population for each country on July 1, 2020, correlated with policy start date, stringency (e.g., strictness), and duration (correlation coefficient, r); COVID-19 time-varying Rt **VOCs assessed**: NR	Gathering restrictions were associated with a decrease in Rt, the average effect over 90-days was -0.24 (95% CI: -0.35, -0.14).	Serious
An, B.Y., Porcher, S., Tang, S.Y., & Kim, E.E. (2021). Policy Design for COVID-19: Worldwide Evidence on the Efficacies of Early Mask Mandates and Other Policy Interventions. *Public administration review*, *81*(6), 1157–1182.	09 November 2021	Global January 1 - July 15 2020	**Design**: Interrupted time series **Intervention**: Mass gathering bans **Sample**: Johns Hopkins Coronavirus Resource Centre global data (total of 24,684 observations) paired with Response2covid19 dataset for 164 nations up to 30-day post intervention **Key outcomes**: Rate of new cases (new cases/total cases) Total cumulative cases per million inhabitants Log of averaged cases per million habitants per day between 90th - 120th day post first case per country **VOCs assessed**: NR	Mass gathering bans were associated with reducing the rate of new cases to: • 5 days (-0.542, SE: 0.197, $p<0.05$) • 9 days (-0.650, SE: 0.236, $p<0.05$) • 12 days (-0.774, SE: 0.235, $p<0.05$) • 21 days (-0.923, SE: 0.232, $p<0.01$) • 30 days (-0.275, SE: 0.108, $p<0.05$) Mass gathering bans were not associated with cumulative infections (ln average infections -0.101, SE: 0.487, $p>0.05$)	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Sharma, M., Mindermann, S., Rogers-Smith, C., Leech, G., Snodin, B., Ahuja, J., … Brauner, J.M. (2021). Understanding the effectiveness of government interventions against the resurgence of COVID-19 in Europe. *Nature communications*, *12*(1), 5820.	05 October 2021	Europe 1 August 2020 - 9 January 2021	**Design**: Interrupted time series **Intervention**: Gathering restrictions **Sample**: Publicly available COVID-19 data for 114 regions in 7 European countries (total of >5500 observations) up to 3 months post implementation **Key outcomes**: Reduction in Rt (%) **VOCs assessed**: NR	Banning mass gatherings decreased Rt by 26% (95% CI: 13, 32).	Critical
Liang, L.L., Kao, C.T., Ho, H.J., & Wu, C.Y. (2021). COVID-19 case doubling time associated with non-pharmaceutical interventions and vaccination: A global experience. *Journal of global health*, *11*, 05021.	04 September 2021	Global 01 January 2020 - 13 June 2021	**Design**: Quasi (ITT) **Intervention**: Gathering restrictions **Sample**: Observations from 137 countries over 18 months (January 2020 - June 2021) or 42,102 country-days, since the first reported case in each country; from Oxford COVID-19 Government Response Tracker, World Development Indicators, and Worldwide Governance Indicators **Key outcomes**: COVID-19 case doubling time (daily basis, per country) **VOCs assessed**: NR	Gathering size restrictions were not associated with COVID-19 doubling time (0.30, 95% CI: -0.00, 0.61).	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Hunter, P.R., Colón-González, F.J., Brainard, J., & Rushton, S. (2021). Impact of non-pharmaceutical interventions against COVID-19 in Europe in 2020: a quasi-experimental non-equivalent group and time series design study. *Euro surveillance*, *26*(28), 2001401.	15 July 2021	30 European Countries Up to 24 April 2020	**Design**: Quasi-experimental, interrupted time series **Intervention**: Gathering restrictions **Sample**: European Centre for Disease Prevention and Control **Key outcomes**: 7-day rolling average new cases, adjusted to number of tests reported per 1 million population **VOCs assessed**: First (no variant)	Mass gathering restrictions were associated with an increase in new cases at 1-7 days (IRR: 1.32, 1.10-1.57) post-implementation, but not 8-14 days (IRR: 1.13, 0.88-1.43), 15-21 days (IRR: 0.99, 0.73-1.34), 22-28 days (IRR: 0.80, 0.56-1.15), 29-35 days (IRR: 0.74, 0.48-1.13), or 36 days or over (IRR: 0.66, 0.40-1.09);	Moderate
Kaimann, D., & Tanneberg, I. (2021). What containment strategy leads us through the pandemic crisis? An empirical analysis of the measures against the COVID-19 pandemic. *PloS one*, *16*(6), e0253237.	21 June 2021	Global 22 January 2020 - 24 May 2020	**Design**: Quasi-experimental **Intervention**: Gathering restrictions **Sample**: 6,941 daily observations from a sample of 68 countries, Puerto Rico and the 50 states of the US, 4 states of Australia, and 8 federal states of Canada; each country observation starts from first confirmed case and ends either on May 24 or when one measure was first lifted. COVID-19 data from John Hopkins Coronavirus Resource Center; data on measures from country and state governments and local health authorities. **Key outcomes**: COVID-19 daily growth rate **VOCs assessed**: NR	Gathering restrictions were associated with a decrease in growth rate after a 5-day time delay (-2.7%, SE: 0.7, $p < 0.001$)	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Banholzer, N., van Weenen, E., Lison, A., Cenedese, A., Seeliger, A., Kratzwald, B., … Vach, W. (2021). Estimating the effects of non-pharmaceutical interventions on the number of new infections with COVID-19 during the first epidemic wave. *PloS one*, *16*(6), e0252827.	02 June 2021	Canada, USA, Australia, the EU-15 countries, Norway and Switzerland February - May 2020	**Design**: Interrupted time series **Intervention**: Large gathering bans **Sample**: Johns Hopkins Coronavirus Resource Centre data for 20 Western countries representing +/- 0.8 billion people (total of +/-3.3 million observations) up to 3 days after implementation **Key outcomes**: Daily number of new COVID-19 cases per 100,000 people (rolling 7-day mean) **VOCs assessed**: NR	Large gathering bans were associated with a 37% (95% CI: 21, 50) reduction in 7-day rolling mean new COVID-19 infections 3-days after implementation.	Serious
Kharya, P., Koparkar, A.R., Dixit, A.M., Joshi, H.S., & Rath, R.S. (2021). Impact of Nonpharmacological Public Health Interventions on Epidemiological Parameters of COVID-19 Pandemic in India. *Cureus, 13*(6), e15393.	02 June 2021	India January 2020 – June 2020	**Design**: Quasi-experimental **Intervention**: Gathering restrictions **Sample**: COVID-19 case data from government of India data, pre-lockdown (January – March 2020), lockdown (April – May 2020), and post-lockdown (June 2020). **Key outcomes**: Role of individual interventions on COVID-19 median doubling time and basic Rt (RT; calculated for a rolling 7-day period) **VOCs assessed**: NR	Prior to lockdown gathering restrictions were not associated with median doubling time (0.2639, p >0.05), or decrease in Rt (-1.35e14, p>0.05).	Critical

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Brauner, J.M., Mindermann, S., Sharma, M., Johnston, D., Salvatier, J., Gavenčiak, T., … Kulveit, J. (2021). Inferring the effectiveness of government interventions against COVID-19. *Science*, *371*(6531), eabd9338.	19 February 2021	Global 22 January 2020 – 30 May 2020	**Design**: Cohort **Intervention**: Gathering restrictions **Sample**: Data on confirmed COVID-19 cases and deaths from the Johns Hopkins CSSE COVID-19 Dataset for 41 countries. **Key outcomes**: % reduction in Rt **VOCs assessed**: NR	Gathering restrictions were associated with reductions in Rt: • Limiting gatherings to < 1000 people: -23% (95% CI: -40, 0) • Limiting gatherings to < 100 people: -34% (95% CI: -52, -12) • Limiting gatherings to < 10 people: -42% (95% CI: -60, -17)	Critical
Liu, Y., Morgenstern, C., Kelly, J., Lowe, R., CMMID COVID-19 Working Group, & Jit, M. (2021). The impact of non-pharmaceutical interventions on SARS-CoV-2 transmission across 130 countries and territories. *BMC medicine*, *19*(1), 40.	05 February 2021	Global 1 January – 22 June 2020	**Design**: Interrupted time series **Intervention**: Gathering restrictions **Sample**: EpiForecasts data paired with OxCGRT data (total # observations NR) for 130 countries (follow up time NR) **Key outcomes**: Rt **VOCs assessed**: NR	Data suggest that gathering restrictions were only effective when more stringently applied ($p < 0.01$, data NR). Authors note high degree of overlap amongst implementation of interventions may make it difficult statistically to obtain an accurate interpretation of effect size.	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Dreher, N., Spiera, Z., McAuley, F.M., Kuohn, L., Durbin, J.R., Marayati, N.F., … Choudhri, T.F. (2021). Policy Interventions, Social Distancing, and SARS-CoV-2 Transmission in the United States: A Retrospective State-level Analysis. *The American journal of the medical sciences*, *361*(5), 575–584.	08 January 2021	United States January - 30 April 2020	**Design**: Interrupted time series **Intervention**: Limiting mass gatherings **Sample**: Johns Hopkins Coronavirus Resource Centre global data (total of 4,645,184 observations in 49 territories) paired with territory level estimates of the virus's daily effective Rt data in the week following the territories' 500th case. **Key outcomes**: Average weekly Rt after a territory's 500th case Doubling time from 500 to 1000 cases **VOCs assessed**: NR	There was no difference in 7-day average Rt between states that did and did not limit mass gatherings in days 1-7 (-0.08, 95% CI: -0.20, 0.04) or 8-14 (-0.05, 95% CI: -0.13, 0.03) following the 500th case. Limiting mass gatherings did not decrease time to 1000th case (HR: 0.63, 95% CI: 0.28, 1.42).	Serious
Bendavid, E., Oh, C., Bhattacharya, J., & Ioannidis, J.P.A. (2021). Assessing mandatory stay-at-home and business closure effects on the spread of COVID-19. *European journal of clinical investigation*, *51*(4), e13484.	24 December 2020	Global Spring 2020	**Design**: Cohort **Intervention**: Gathering restrictions **Sample**: Subnational administrative regions (e.g., provinces, states, counties, regions) of 10 countries; compared countries (England, France, Germany, Iran, Italy, Netherlands, Spain, US) that implemented more restrictive NPIs (e.g., mandatory stay-at-home orders, business closures) to those (South Korea, Sweden) that only implemented less restrictive NPIs, for a total of 16 comparisons. **Key outcomes**: COVID-19 transmission (daily case growth rate) **VOCs assessed**: NR	Results presented for 10 countries total. Gathering bans decreased transmission in five of six countries that reported gathering bans.	Critical

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Guo, S., An, R., McBride, T.D., Yu, D., Fu, L., & Yang, Y. (2021). Mitigation Interventions in the United States: An Exploratory Investigation of Determinants and Impacts. *Research on Social Work Practice, 31*(1), 26–41.	21 September 2020	United States 11 March 2020 - 15 April 2020	**Design**: Quasi-experimental **Intervention**: Gathering restrictions **Sample**: Data were obtained from Johns Hopkins University Coronavirus DataStream in 2020. The study employed daily counts on each of the nine outcome measures from March 11 to April 15, 2020. **Key outcomes**: Cumulative cases per 10,000 population, cumulative new cases per 10,000 population. **VOCs assessed**: None	Large gathering bans were associated with an increase in daily new cases per 10 000 (0.161, 95% CI: 0.015, 0.307), but not daily cumulative cases per 10 000 (0.023, 95% CI: -0.080, 0.126).	Serious
Jalali, A.M., Khoury, S.G., See, J.W, Gulsvig, A.M., Peterson, B.M., Gunasekera, R.S., & Galbadage, T. (2020). Delayed Interventions, Low Compliance, and Health Disparities Amplified the Early Spread of COVID-19. *Preprint.*	04 August 2020	USA (California, Florida, New York, and Texas) 1 March - May 31, 2020	**Design**: Cohort **Intervention**: Gathering restrictions **Sample**: Johns Hopkins Coronavirus Resource Centre data for 30 of the most heavily populated counties in the USA (total of 24 observations) paired with county level public health intervention data on 10-May 2022 **Key outcomes**: COVID-19 daily case rate **VOCs assessed**: NR	Mass gathering restriction duration was not associated with a decrease in daily COVID-19 case rates (-2.8, SE: 12.81) (p=0.83).	Serious ***PREPRINT***

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Fellows, I.E., Slayton, R.B., & Hakim, A.J. (2020). The COVID-19 Pandemic, Community Mobility and the Effectiveness of Non-pharmaceutical Interventions: The United States of America, February to May 2020. *Preprint.*	06 June 2020	United States 22 January - 25 April 2020	**Design**: Interrupted time series **Intervention**: Gathering restrictions **Sample**: COVID Tracking Project data (total # observations NR) for 51 states up. Follow-up time NR. **Key outcomes**: % reduction in Rt (7-day rolling average) **VOCs assessed**: None	Gathering restrictions were not associated with a decrease in Rt (-5%, 95% CI: -12, 4)	Critical ***PREPRINT***
Jüni, P., Rothenbühler, M., Bobos, P., Thorpe, K.E., da Costa, B.R., Fisman, D.N., … Gesink, D. (2020). Impact of climate and public health interventions on the COVID-19 pandemic: a prospective cohort study. *Canadian Medical Association journal, 192*(21), E566–E573.	08 May 2020	Global 20 Mar 2020 - 27 Mar 2020	**Design**: Cohort **Intervention**: Gathering restrictions **Sample**: 144 geopolitical areas worldwide (375,609 cases) with at least 10 COVID-19 cases and local transmission by Mar. 20, 2020, excluding China, South Korea, Iran and Italy **Key outcomes**: Epidemic growth (rate ratio [RRR] comparing cumulative count of confirmed COVID-19 cases on March 27, 2020 with the cumulative counts on March 20, 2020) **VOCs assessed**: NR	Mass gathering restrictions were associated with a reduction in epidemic growth (RRR: 0.65, 95% CI: 0.53, 0.79).	Serious

Table 2E: Summary of studies reporting on effectiveness of school closures in preventing COVID-19 infections

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Previously reported evidence					
Consolazio, D., Sarti, S., Terraneo, M., Celata, C., & Russo, A.G. (2022). The impact of school closure intervention during the third wave of the COVID-19 pandemic in Italy: Evidence from the Milan area. *PloS one*, *17*(7), e0271404.	12 July 2022	Lombardy, Italy 1 February 2021 - 5 April 2021	**Design**: Interrupted time series **Intervention**: School closures **Sample**: Data from the Agency for Health Protection of the Metropolitan City of Milan covering 193 municipalities containing 3.48 million people, excluding the municipality of Bollate; 32 days before and after school closures. **Key outcomes**: COVID-19 transmission (daily COVID-19 incident cases, positivity rate) Incidence rate ratio **VOCs assessed**: B.1.1.7	School closures were associated with a decrease in cases in 3–11-year-olds (IRR: 0.96; CI: 0.94–0.99), 12–19-year-olds (IRR: 0.96; CI: 0.94–0.99) and aged 20 or more (IRR: 0.97; CI: 0.96–0.98); other measures were put in place at the same time.	Moderate
Hayashi, K., Kayano, T., Anzai, A., Fujimoto, M., Linton, N., Sasanami, M., … Nishiura, H. (2022). Assessing Public Health and Social Measures Against COVID-19 in Japan From March to June 2021. *Frontiers in medicine, 9*, 937732.	12 July 2022	Japan 01 March 2021 - 30 June 2021	**Design**: Quasi-experimental **Intervention**: School closures **Sample**: Incidence of confirmed COVID-19 cases from the Health Center Real-Time Information-sharing System on COVID-19 (March to 27 May 2021) **Key outcomes**: Effective Rt; effectiveness of "pre-emergency measures" and "state of emergency" was calculated by comparing the change in Rt value, i) 7 or 14 days prior to intervention, and ii) first 7 or total days of intervention. Relative and absolute risk reductions in secondary transmission. **VOCs assessed**: B.1.1.7	School closures were associated with a statistically significant reduction in absolute and relative Rt ($p<0.05$, data NR).	Critical

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Torres, A.R., Rodrigues, A.P., Sousa-Uva, M., Kislaya, I., Silva, S., Antunes, L., … Nunes, B. (2022). Impact of stringent non-pharmaceutical interventions applied during the second and third COVID-19 epidemic waves in Portugal, 9 November 2020 to 10 February 2021: an ecological study. *Euro surveillance*, *27*(23), 2100497.	09 June 2022	Portugal 26 December 2020 - 10 February 2021	**Design**: Interrupted time series analysis **Intervention**: School closures **Sample**: Surveillance data were acquired from the Directorate General of Health in Portugal (n = 372,680). Data were categorized into three periods: (i) pre-lockdown (26 December 2020 - 14 January 2021), (ii) lockdown without school closure (15 January 2021 - 21 January 2021), and (iii) lockdown with school closure (22 January 2021 - 10 February 2021). **Key outcomes**: % reduction in incident cases of COVID-19 and countrywide IRRs. **VOCs assessed**: NR	School closures were associated with a reduction in incidence (IRR: 0.928, 95% CI: 0.904, 0.953), accounting for a 5-day lag period.	Critical
Xiu, Z., Feng, P., Yin, J., & Zhu, Y. (2022). Are Stringent Containment and Closure Policies Associated with a Lower COVID-19 Spread Rate? *Global Evidence, 19*(3), 1725.	02 February 2022	Global (210 countries) 1 January - 22 May 2022	**Design**: Interrupted time series **Intervention**: School closures **Sample**: Our World in Data COVID-19 case counts for 210 countries (total of 6684 observations) paired with the Oxford COVID-19 Government Response Tracker (it is not clear if or how long the interventions were followed. The authors indicate that May 22 was an arbitrary date and had no significance to the data collection) **Key outcomes**: Daily new cases of COVID-19 (%) **VOCs assessed**: NR	School closures were not associated with a change in daily case growth rate (1.96%, p>0.05) after controlling for other restrictions and confounders.	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Li, H., Wang, L., Zhang, M., Lu, Y., & Wang, W. (2022). Effects of vaccination and non-pharmaceutical interventions and their lag times on the COVID-19 pandemic: Comparison of eight countries. *PLoS neglected tropical diseases*, *16*(1), e0010101.	13 January 2022	Global January 2020 - August 2021	**Design**: Cohort **Intervention**: School closures **Sample**: 8 countries (Australia, Israel, India, Japan, Singapore, South Korea, UK, US); policy responses from the Oxford COVID-19 Government Response Tracker; proportion of Delta variant from public Github database **Key outcomes**: Effective Rt, lag time **VOCs assessed**: Delta	School closures were protective for most countries (RR<1), harmful for the United States and South Korea (RR>1), and ineffective for the United Kingdom (RR 1.00~1.02).	Critical
Alfano, V. (2022). The Effects of School Closures on COVID-19: A Cross-Country Panel Analysis. *Applied health economics and health policy*, *20*(2), 223–233.	10 December 2021	Europe 1 January - 30 September 2020	**Design:** Interrupted time series **Intervention:** School closures **Sample:** Oxford COVID-19 Government Response Tracker dataset for 40 countries (274 daily observations per country for a total of 10,960 observations) up to 100 days after school closure. **Key outcomes:** Daily number of new COVID-19 cases (in each country) **VOCs assessed:** Not reported	After controlling for stringency of other non-pharmaceutical measures, school closure was associated with a reduction in the number of daily new COVID-19 cases at: 10 days (-255.2 cases/day, SE: -8.325), 20 days (-387.0, cases/day, SE: -14.52), 30 days (-443.4 cases/day, SE: -18.28) and 40 days (-459.6 cases/day, SE: -20.04); all p<0.01. After 100 days the effect of school closure is still present and statistically significant, but less strong (values NR).	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Sun, J., Zheng, Y., Liang, W., Yang, Z., Zeng, Z., Li, T… Zhong, N. (2022). Quantifying the Effect of Public Activity Intervention Policies on COVID-19 Pandemic Containment Using Epidemiologic Data From 145 Countries. *Value in health*, *25*(5), 699–708.	08 December 2021	Global 31 December 2019 - 01 July 2020	**Design**: Quasi-experimental **Intervention**: Schools closures **Sample**: Daily confirmed cases of COVID-19 for 145 countries from Oxford COVID-19 Government Response Tracker, both for the period of 31 December 2019 - 1 July 2020) **Key outcomes**: Estimated cumulative infections per million population for each country on July 1, 2020, correlated with policy start date, stringency (e.g., strictness), and duration (correlation coefficient, r); COVID-19 time-varying Rt **VOCs assessed**: NR	School closures were associated with a decrease in Rt, the average effect over 90-days was -0.29 (95% CI: -0.40, -0.19).	Serious
An, B.Y., Porcher, S., Tang, S.Y., & Kim, E.E. (2021). Policy Design for COVID-19: Worldwide Evidence on the Efficacies of Early Mask Mandates and Other Policy Interventions. *Public administration review*, *81*(6), 1157–1182.	09 November 2021	Global January 1 - July 15 2020	**Design**: Interrupted time series **Intervention**: School closures **Sample**: Johns Hopkins Coronavirus Resource Centre global data (total of 24,684 observations) paired with Response2covid19 dataset for 164 nations up to 30-day post intervention **Key outcomes**: Rate of new cases (new cases/total cases) Log of averaged cases per million habitants per day between 90th - 120th day post first case per country **VOCs assessed**: NR	School closures were associated with the rate of new cases at 9 days (-0.312, SE: 0.173, p <0.05), 12 days (-0.486, SE: 0.160, p <0.001), 21 days (-0.716, SE: 0.147, p<0.001), but not 30 days (-0.0106, SE: 0.0973, p>0.05). School closures were not associated with cumulative infections (ln average infections -0.342, SE: 1.033, p>0.05).	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Sharma, M., Mindermann, S., Rogers-Smith, C., Leech, G., Snodin, B., Ahuja, J., … Brauner, J.M. (2021). Understanding the effectiveness of government interventions against the resurgence of COVID-19 in Europe. *Nature communications*, *12*(1), 5820.	05 October 2021	Europe 1 August 2020 - 9 January 2021	**Design**: Interrupted time series **Intervention**: School closures **Sample**: Publicly available COVID-19 data for 114 regions in 7 European countries (total of >5500 observations) up to 3 months post implementation **Key outcomes**: Reduction in Rt (%) **VOCs assessed**: NR	School closures (including primary, secondary, and post-secondary) were associated with a reduction in Rt by 7% (95% CI: 4,10).	Critical
Liang, L.L., Kao, C.T., Ho, H.J., & Wu, C.Y. (2021). COVID-19 case doubling time associated with non-pharmaceutical interventions and vaccination: A global experience. *Journal of global health*, *11*, 05021.	04 September 2021	Global 01 January 2020 - 13 June 2021	**Design**: Interrupted time series **Intervention**: School closures **Sample**: Observations from 137 countries over 18 months (January 2020 - June 2021) or 42,102 country-days, since the first reported case in each country; data were collected on 19 June 2021 from Oxford COVID-19 Government Response Tracker, World Development Indicators, and Worldwide Governance Indicators **Key outcomes**: COVID-19 case doubling time (daily basis, per country) **VOCs assessed**: NR	For each day of partial school closures, the COVID-19 case doubling time increased by 1.38% (95% CI: 0.95, 1.81). For each day of full school closures, the COVID-19 case doubling time increased by 0.40% (95% CI: 0.12, 0.68).	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Hunter, P.R., Colón-González, F.J., Brainard, J., & Rushton, S. (2021). Impact of non-pharmaceutical interventions against COVID-19 in Europe in 2020: a quasi-experimental non-equivalent group and time series design study. *Euro surveillance*, *26*(28), 2001401.	15 July 2021	30 European Countries Up to 24 April 2020	**Design**: Quasi-experimental, interrupted time series **Intervention**: School closures **Sample**: European Centre for Disease Prevention and Control (up to 24 April 2020) **Key outcomes**: 7-day rolling average new cases, adjusted to number of tests reported per 1 million population **VOCs assessed**: First (no variant)	Closing educational facilities was associated with an increase in new cases: 1-7 days (IRR: 1.47, 1.22-1.79), 8-14 days (IRR: 1.38, 1.05-1.80) post-implementation but not, 15-21 days (IRR: 0.95, 0.67-1.33). Closing educational facilities was associated with a decrease in new cases at 22-28 days (IRR: 0.52, 0.35-0.78), 29-35 days (IRR: 0.26, 0.16-0.42), 36 days or over (IRR: 0.14, 0.08-0.25) post-implementation.	Moderate
Kaimann, D., & Tanneberg, I. (2021). What containment strategy leads us through the pandemic crisis? An empirical analysis of the measures against the COVID-19 pandemic. *PloS one*, *16*(6), e0253237.	21 June 2021	Global 22 January 2020 - 24 May 2020	**Design**: Quasi-experimental **Intervention**: School closures **Sample**: 6,941 daily observations from a sample of 68 countries, Puerto Rico and the 50 states of the US, 4 states of Australia, and 8 federal states of Canada; each country observation starts from first confirmed case and ends either on May 24 or when one measure was first lifted. COVID-19 data from John Hopkins Coronavirus Resource Center; data on measures from country and state governments and local health authorities. **Key outcomes**: COVID-19 daily growth rate **VOCs assessed**: NR	School closures were associated with an increase in growth rate after 5 days (1.8%, SE: 0.5, $p < 0.001$) and a decrease by 11 (-1.3%, SE: 0.002, $p < 0.001$) and 15 (-1.9%, SE: 0.1, $p < 0.001$) days.	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Banholzer, N., van Weenen, E., Lison, A., Cenedese, A., Seeliger, A., Kratzwald, B., … Vach, W. (2021). Estimating the effects of non-pharmaceutical interventions on the number of new infections with COVID-19 during the first epidemic wave. *PloS one*, *16*(6), e0252827.	02 June 2021	Canada, USA, Australia, the EU-15 countries, Norway and Switzerland February - May 2020	**Design**: Interrupted time series **Intervention**: School closures **Sample**: Johns Hopkins Coronavirus Resource Centre data for 20 Western countries representing +/- 0.8 billion people (total of +/-3.3 million observations) up to 3 days after implementation **Key outcomes**: Daily number of new COVID-19 cases per 100,000 people (rolling 7-day mean) **VOCs assessed**: NR	School closures were associated with a 17% (95% CI: -2, 36) reduction in 7-day rolling mean of new COVID-19 infections 3-days after implementation.	Serious
Brauner, J.M., Mindermann, S., Sharma, M., Johnston, D., Salvatier, J., Gavenčiak, T., … Kulveit, J. (2021). Inferring the effectiveness of government interventions against COVID-19. *Science*, *371*(6531), eabd9338.	19 February 2021	Global 22 January 2020 - 30 May 2020	**Design**: Cohort **Intervention**: School and university closures **Sample**: Data on confirmed COVID-19 cases and deaths from the Johns Hopkins CSSE COVID-19 Dataset for 41 countries. **Key outcomes**: % reduction in Rt **VOCs assessed**: NR	School closures were associated with reductions in Rt (-38%, 95% CI: -54, -16)	Critical

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Liu, Y., Morgenstern, C., Kelly, J., Lowe, R., CMMID COVID-19 Working Group, & Jit, M. (2021). The impact of non-pharmaceutical interventions on SARS-CoV-2 transmission across 130 countries and territories. *BMC medicine*, *19*(1), 40.	05 February 2021	Global 1 January - 22 June 2020	**Design**: Interrupted time series **Intervention**: School closures **Sample**: EpiForecasts data paired with OxCGRT data (total # observations NR) for 130 countries (follow up time NR) **Key outcomes**: Rt **VOCs assessed**: NR	Data suggest that school closures were associated with reductions in Rt ($p<0.01$, data NR). Authors note high degree of overlap amongst implementation of interventions may make it difficult statistically to obtain an accurate interpretation of effect size.	Serious
Dreher, N., Spiera, Z., McAuley, F.M., Kuohn, L., Durbin, J.R., Marayati, N.F., … Choudhri, T.F. (2021). Policy Interventions, Social Distancing, and SARS-CoV-2 Transmission in the United States: A Retrospective State-level Analysis. *The American journal of the medical sciences*, *361*(5), 575–584.	08 January 2021	United States January - 30 April 2020	**Design**: Interrupted time series **Intervention**: School closures **Sample**: Johns Hopkins Coronavirus Resource Centre global data (total of 4,645,184 observations in 49 territories) paired with territory level estimates of the virus's daily effective Rt data in the week following the territories' 500th case. **Key outcomes**: Average weekly Rt after a territory's 500th case Doubling time from 500 to 1000 cases Case fatality rate (CFR) **VOCs assessed**: NR	7-day average Rt was lower in states that closed educational facilities in days 1-7 (-0.17, 95% CI: -0.30, -0.05) and 8-14 (-0.12, 95% CI: -0.21, -0.04) following the 500th case, compared to states that did not close educational facilities. Educational closures did not decrease time to 1000 cases (HR: 0.62, 95% CI: 0.25, 1.63).	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Olney, A.M., Smith, J., Sen, S., Thomas, F., & Unwin, H.J.T. (2021). Estimating the Effect of Social Distancing Interventions on COVID-19 in the United States. *American journal of epidemiology, 190*(8), 1504–1509.	07 January 2021	United States 29 February 2020 - 25 April 2020	**Design**: Interrupted Time Series **Intervention**: School closures **Sample**: Data on COVID-19 cases were obtained from the New York Times public repository for all US states between February 29, 2020 to April 25, 2020. The overall sample size was not reported. Source for state-level intervention data were not described. **Key outcomes**: Rt was derived from case counts. **VOCs assessed**: None	Closures of schools and universities were associated with a reduction in Rt (-23.7%, 95% CI: -40.4, -0.7).	Serious
Bendavid, E., Oh, C., Bhattacharya, J., & Ioannidis, J.P.A. (2021). Assessing mandatory stay-at-home and business closure effects on the spread of COVID-19. *European journal of clinical investigation*, *51*(4), e13484.	24 December 2020	Global Spring 2020	**Design**: Cohort **Intervention**: School closures **Sample**: Subnational administrative regions (e.g., provinces, states, counties, regions) of 10 countries; compared countries (England, France, Germany, Iran, Italy, Netherlands, Spain, US) that implemented more restrictive NPIs (e.g., mandatory stay-at-home orders, business closures) to those (South Korea, Sweden) that only implemented less restrictive NPIs, for a total of 16 comparisons. **Key outcomes**: COVID-19 transmission (daily case growth rate) **VOCs assessed**: NR	Results presented for 10 countries separately. School closures only reduced case growth rate in one of six countries that reported school closures.	Critical

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Guo, S., An, R., McBride, T.D., Yu, D., Fu, L., & Yang, Y. (2021). Mitigation Interventions in the United States: An Exploratory Investigation of Determinants and Impacts. *Research on Social Work Practice, 31*(1), 26–41.	21 September 2020	United States 11 March 2020 - 15 April 2020	**Design**: Quasi-experimental **Intervention**: School closures **Sample**: Data were obtained from Johns Hopkins University Coronavirus DataStream in 2020. The study employed daily counts on each of the nine outcome measures from March 11 to April 15 2020. **Key outcomes**: Cumulative cases per 10,000 population, cumulative new cases per 10,000 population. **VOCs assessed**: None	Public school closures were not associated with daily cumulative cases per 10 000 (-0.080, 95% CI: -0.263, 0.103) or daily new cases per 10 000 (-0.137, 95% CI: -0.399, 0.125).	Serious
Auger, K.A., Shah, S.S., Richardson, T., Hartley, D., Hall, M., Warniment, A., … Thomson, J. E. (2020). Association Between Statewide School Closure and COVID-19 Incidence and Mortality in the US. *JAMA*, *324*(9), 859–870.	29 July 2020	United States 9 March - 7 May 2020	**Design:** Cohort **Intervention:** School closures **Sample:** Publicly available data from all 50 states a minimum of 6 weeks after school closures. **Key outcomes:** Daily COVID-19 incidence per 100,000 residents in each state. **VOCs assessed:** None	School closure was associated with a significant decline in COVID-19 incidence of 423.9 cases per 100 000 over 26 days (95% CI: 375.0, 463.7). The effect was smallest in states with the highest incidence at time of closure.	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Fellows, I.E., Slayton, R.B., & Hakim, A.J. (2020). The COVID-19 Pandemic, Community Mobility and the Effectiveness of Non-pharmaceutical Interventions: The United States of America, February to May 2020. *Preprint.*	06 June 2020	United States 22 January - 25 April 2020	**Design**: Interrupted time series **Intervention**: School closures **Sample**: COVID Tracking Project data (total # observations NR) for 51 states up. Follow-up time NR. **Key outcomes**: % reduction in Rt (7-day rolling average) **VOCs assessed**: None	School closures were not associated with a statistically significant decrease in Rt (-5%, 95% CI: -11, 1)	Critical ***PREPRINT***
Jüni, P., Rothenbühler, M., Bobos, P., Thorpe, K.E., da Costa, B.R., Fisman, D.N., … Gesink, D. (2020). Impact of climate and public health interventions on the COVID-19 pandemic: a prospective cohort study. *Canadian Medical Association journal, 192*(21), E566–E573.	08 May 2020	Global 20 Mar 2020 - 27 Mar 2020	**Design**: Cohort **Intervention**: School closures **Sample**: 144 geopolitical areas worldwide (375,609 cases) with at least 10 COVID-19 cases and local transmission by Mar. 20, 2020, excluding China, South Korea, Iran and Italy **Key outcomes**: Epidemic growth (rate ratio [RRR] comparing cumulative count of confirmed COVID-19 cases on March 27, 2020 with the cumulative counts on March 20, 2020) **VOCs assessed**: NR	School closures were associated with a reduction in epidemic growth (RRR: 0.63, 95% CI: 0.52, 0.78).	Serious

Table 2F: Summary of studies reporting on effectiveness of stay-at-home orders in preventing COVID-19 infections

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Previously reported evidence					
Ahlers, M.J., Aralis, H.J., Tang, W.L., Sussman, J.B., Fonarow, G.C., & Ziaeian, B. (2021). Non-pharmaceutical interventions and covid-19 burden in the United States: retrospective, observational cohort study. *BMJ Medicine, 1*, e000030.	05 July 2022	United States 19 January 2020 - 7 March 2021	**Design**: Retrospective cohort **Intervention**: Stay-at-home order **Sample**: State level COVID-19 Tracking Project data for the US population (total of 31,721,888 observations; 26,602,830 cases and 511,899 deaths) paired with publicly available information on adoption and discontinuation of NPIs from 21 (cases) to 35 (deaths) days after implementation. **Key outcomes**: Change in COVID-19 case rates (in each state) **VOCs assessed**: B.1.1.7 (Alpha) at the end of the observation period	Implementing stay-at-home orders was associated with increased odds of a decrease in case growth rate (i.e., greater growth), AOR: 1.47 (95% CI: 1.04, 2.07).	Serious
Ofori, S.K., Ogwara, C.A., Kwon, S., Hua, X., Martin, K.M., Mallhi, A.K., & Fung, I.C. (2022). SARS-CoV-2 transmission potential and rural-urban disease burden disparities across Alabama, Louisiana, and Mississippi, March 2020 - May 2021. *Annals of epidemiology*, *71*, 1–8.	25 April 2022	Alabama, Louisiana & Mississipi, USA 9 March 2020-17 May 2021	**Design**: Interrupted time series **Intervention**: Stay-at-home order **Sample**: Cumulative incidence data from The New York Times GitHub data repository **Key outcomes**: COVID-19 transmission (time-varying Rt) **VOCs assessed**: NR	Stay-at-home orders were associated with minimum of 20% decline in Rt in all three states: Louisiana (-37.82%, 95% CrI: -39.80, -35.76), Alabama (-25.81%, 95% CrI: -28.78%, -22.69%), Mississippi (-20.05%, 95% CrI: -23.27, -15.96).	Critical

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Hwang, N., Chatterjee, S., Di, Y., & Bhattacharyya, S. (2022). Observational Study of the Effect of the Juvenile Stay-At-Home Order on SARS-CoV-2 Infection Spread in Saline County, Arkansas. *Statistics and Public Policy, 9*(1), 74-84.	09 March 2022	Saline County, Arkansas, United States 28 March 2020 - 31 May 2020	**Design**: Quasi-experimental studies; difference in differences **Intervention**: Juvenile stay-at-home order **Sample**: Number of cases per day before and after juvenile stay-at-home order in counties that did and did not implement. **Key outcomes**: COVID-19 cases per day **VOCs assessed**: NR	The daily reported infection rates for a county implementing a juvenile stay-at-home order (anyone under 18 is not allowed to leave the house unless accompanied by an adult) grew at a slower rate than other counties without a juvenile stay-at-home order (DID: -152.1 cases per 100 000, $p<0.001$).	Serious
Xiu, Z., Feng, P., Yin, J., & Zhu, Y. (2022). Are Stringent Containment and Closure Policies Associated with a Lower COVID-19 Spread Rate? *Global Evidence, 19*(3), 1725.	02 February 2022	Global (210 countries) 1 January - 22 May 2022	**Design**: Interrupted time series **Intervention**: Stay-at-home order **Sample**: Our World in Data COVID-19 case counts for 210 countries (total of 6684 observations) paired with the Oxford COVID-19 Government Response Tracker (it is not clear if or how long the interventions were followed. The authors indicate that May 22 was an arbitrary date and had no significance to the data collection) **Key outcomes**: Daily new cases of COVID-19 (%) **VOCs assessed**: NR	Stay-at home orders were not associated with a change in daily case growth rate (-5.09, $p>0.05$) after controlling for other restrictions and confounders.	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Li, H., Wang, L., Zhang, M., Lu, Y., & Wang, W. (2022). Effects of vaccination and non-pharmaceutical interventions and their lag times on the COVID-19 pandemic: Comparison of eight countries. *PLoS neglected tropical diseases*, *16*(1), e0010101.	13 January 2022	Global January 2020 - August 2021	**Design**: Cohort **Intervention**: Stay-at-home order **Sample**: 8 countries (Australia, Israel, India, Japan, Singapore, South Korea, UK, US); policy responses from the Oxford COVID-19 Government Response Tracker; proportion of Delta variant from public Github database **Key outcomes**: Effective Rt, lag time **VOCs assessed**: Delta	Stay-at-home orders were protective for the majority of countries (RR<1), harmful for South Korea (RR>1), and ineffective for India (RR 1.00~1.03)	Critical
Sun, J., Zheng, Y., Liang, W., Yang, Z., Zeng, Z., Li, T… Zhong, N. (2022). Quantifying the Effect of Public Activity Intervention Policies on COVID-19 Pandemic Containment Using Epidemiologic Data From 145 Countries. *Value in health*, *25*(5), 699–708.	08 December 2021	Global 31 December 2019 - 01 July 2020	**Design**: Quasi-experimental **Intervention**: Stay-at-home orders **Sample**: Daily confirmed cases of COVID-19 for 145 countries from https://ourworldindata.org and country-based time-series policy data from the Oxford COVID-19 Government Response Tracker, both for the period of 31 December 2019 - 1 July 2020) **Key outcomes**: Estimated cumulative infections per million population for each country on July 1, 2020, correlated with policy start date, stringency (e.g., strictness), and duration (correlation coefficient, r); COVID-19 time-varying Rt **VOCs assessed**: NR	Stay-at-home orders were associated with a decrease in Rt, the average effect over 90-days was -0.17, 95% CI: -0.25, -0.08.	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
An, B.Y., Porcher, S., Tang, S.Y., & Kim, E.E. (2021). Policy Design for COVID-19: Worldwide Evidence on the Efficacies of Early Mask Mandates and Other Policy Interventions. *Public administration review*, *81*(6), 1157–1182.	09 November 2021	Global January 1 - July 15 2020	**Design**: Interrupted time series **Intervention**: Stay-at-home order **Sample**: Johns Hopkins Coronavirus Resource Centre global data (total of 24,684 observations) paired with Response2covid19 dataset for 164 nations up to 30 day post intervention **Key outcomes**: Rate of new cases (new cases/total cases) Log of averaged cases per million habitants per day between 90th - 120th day post first case per country **VOCs assessed**: NR	Stay-at-home orders were not associated with rate of new cases until 30 days (-0.641, SE: 0.135, $p < 0.001$) and were not associated with cumulative infections (ln average infections 0.531, SE: 0.309, $p > 0.05$)	Serious
Liang, L.L., Kao, C.T., Ho, H.J., & Wu, C.Y. (2021). COVID-19 case doubling time associated with non-pharmaceutical interventions and vaccination: A global experience. *Journal of global health*, *11*, 05021.	04 September 2021	Global 01 January 2020 - 13 June 2021	**Design**: Quasi-experimental (ITT) **Intervention**: Stay-at-home order **Sample**: Observations from 137 countries over 18 months (January 2020 - June 2021) or 42,102 country-days, since the first reported case in each country; data were collected on 19 June 2021 from Oxford COVID-19 Government Response Tracker, World Development Indicators, and Worldwide Governance Indicators **Key outcomes**: COVID-19 case doubling time (daily basis, per country) **VOCs assessed**: NR	Stay-at-home orders were not associated with COVID-19 doubling time (0.15%, 95% CI: -0.19, 0.50).	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Hunter, P.R., Colón-González, F.J., Brainard, J., & Rushton, S. (2021). Impact of non-pharmaceutical interventions against COVID-19 in Europe in 2020: a quasi-experimental non-equivalent group and time series design study. *Euro surveillance*, *26*(28), 2001401.	15 July 2021	30 European Countries Up to 24 April 2020	**Design**: Quasi-experimental, interrupted time series **Intervention**: Stay-at-home order **Sample**: European Centre for Disease Prevention and Control (up to 24 April 2020) **Key outcomes**: 7-day rolling average new cases, adjusted to number of tests reported per 1 million population **VOCs assessed**: First (no variant)	Stay-at-home order/advisory was not associated with new cases at 1-7 days (IRR: 1.19, 0.97-1.47) post-implementation but was associated with an increase in new cases at 8-14 days (IRR: 1.95, 1.56-2.44), 15-21 days (IRR: 2.28, 1.79-2.90), 22-28 days (IRR: 2.55, 1.94-3.35), 29-35 days (IRR: 2.49, 1.78-3.48), 36 days or over (IRR: 2.39, 1.49-3.84).	Moderate
Fowler, J.H., Hill, S.J., Levin, R., & Obradovich, N. (2021). Stay-at-home orders associate with subsequent decreases in COVID-19 cases and fatalities in the United States. *PloS one*, *16*(6), e0248849.	10 June 2021	United States 24 March 2020-7 May 2020	**Design**: Quasi-experimental; difference in differences **Intervention**: Stay-at-home order **Sample**: Data was collected from New York Times webpage. Data was assessed from the initial date order went into effect until 21 days post. A total of 2,647 counties with stay-at-home orders were compared to 386 counties without **Key outcomes**: % change in weekly confirmed cases at 7, 14, 21 days **VOCs assessed**: NR	Stay-at-home orders were associated with a reduction in weekly change in incident cases at day 7 (-30.2%, 95% CI: - 10.5, -45.6), day 14 (-40.0%, 95% CI: -22.9, -53.2) and 21 days (-48.8%, 95% CI: -35.8, -62.5).	Critical

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Banholzer, N., van Weenen, E., Lison, A., Cenedese, A., Seeliger, A., Kratzwald, B., … Vach, W. (2021). Estimating the effects of non-pharmaceutical interventions on the number of new infections with COVID-19 during the first epidemic wave. *PloS one*, *16*(6), e0252827.	02 June 2021	Canada, USA, Australia, the EU-15 countries, Norway and Switzerland February - May 2020	**Design**: Interrupted time series **Intervention**: Stay-at-home order **Sample**: Johns Hopkins Coronavirus Resource Centre data for 20 Western countries representing +/- 0.8 billion people (total of +/-3.3 million observations) up to 3 days after implementation **Key outcomes**: Daily number of new COVID-19 cases per 100,000 people (rolling 7-day mean) **VOCs assessed**: NR	Stay-at-home orders were associated with a 4% (95% CI: -6, 17) reduction in 7-day rolling mean new COVID-19 infections 3-days after implementation.	Serious
Lansiaux, E., Caut, J., Forget, J., & Pébaÿ, P.P. (2021): Assessing the efficiency of COVID-19 NPIs in France: a retrospective study using a novel methodology. *Preprint.*	13 April 2021	France 1 March 2020 - 30 January 2021	**Design**: Interrupted time series **Intervention**: Stay-at-home order **Sample**: Metropolitan France ministry data (total number of observations NR), at a minimum of 90 days post implementation **Key outcomes**: Rt **VOCs assessed**: No VoCs circulating	There was no significant correlation between stay-at-home orders and Rt ($r=0.09$) ($p<0.05$).	Critical ***PREPRINT***

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Boesch, L. (2021). Lockdown benefit varies among countries and sub-national units: a reanalysis of the data by Bendavid et al. *Preprint*.	09 March 2021	Global 18 February 2020 - 06 April 2020	**Design**: Cohort [secondary analysis of Bendavid et al. 2021] **Intervention**: Stay-at-home order **Sample**: 5324 observations, from 209 sub-national units within 10 countries (England, France, Germany, Iran, Italy, Netherlands, Spain, US, South Korea, Sweden) [Note: this is a secondary analysis of Bendavid et al. 2021, that looked at pairwise comparisons with fixed-effects regression models; this analysis used one mixed-effects regression model] **Key outcomes**: Daily COVID-19 case growth rate **VOCs assessed**: NR	Mandatory stay-at-home orders were associated with a decrease in COVID-19 growth rates (-0.216 (units unknown), SE: 0.048, p=0.026).	Critical ***PREPRINT***
Dreher, N., Spiera, Z., McAuley, F.M., Kuohn, L., Durbin, J.R., Marayati, N.F., … Choudhri, T.F. (2021). Policy Interventions, Social Distancing, and SARS-CoV-2 Transmission in the United States: A Retrospective State-level Analysis. *The American journal of the medical sciences*, *361*(5), 575–584.	08 January 2021	United States January - 30 April 2020	**Design**: Interrupted time series **Intervention**: Stay-at-home order **Sample**: Johns Hopkins Coronavirus Resource Centre global data (total of 4,645,184 observations in 49 territories) paired with territory level estimates of the virus's daily effective Rt data in the week following the territories' 500th case. **Key outcomes**: Average weekly Rt after a territory's 500th case Doubling time from 500 to 1000 cases **VOCs assessed**: NR	7-day average Rt was lower in states that implemented a stay-at-home order in days 1-7 (-0.15, 95% CI: -0.23, -0.07) and 8-14 (-0.09, 95% CI: -0.15, -0.04) following the 500th case, compared to states without a stay-at-home order. Stay-at-home orders decreased time to 1000th cases (HR: 0.32, 95% CI: 0.16, 0.66).	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Olney, A.M., Smith, J., Sen, S., Thomas, F., & Unwin, H.J.T. (2021). Estimating the Effect of Social Distancing Interventions on COVID-19 in the United States. *American journal of epidemiology, 190*(8), 1504–1509.	07 January 2021	United States 29 February 2020 - 25 April 2020	**Design**: Interrupted Time Series **Intervention**: Stay-at-home order **Sample**: Data on COVID-19 cases were obtained from the New York Times public repository for all US states between February 29, 2020 to April 25, 2020. The overall sample size was not reported. Source for state-level intervention data were not described. **Key outcomes**: Rt was derived from case counts. **VOCs assessed**: None	Stay-at-home orders were associated with a reduction in Rt (-54.4%, 95% CI: -62.7, -44.7).	Serious
Sagripanti, J.L. (2021) Seasonal Effect of Sunlight on COVID-19 among Countries with and without Lock-Downs. *Open Journal of Epidemiology*, *11*, 303-325.	21 December 2020	Global 29 May 2020 - 26 October 2020	**Design**: Cross-sectional study **Intervention**: Stay-at-home order **Sample**: Freely available John's Hopkins data extracted for select countries and US states that did and did not mandate nation-wide lockdowns on four specific dates. **Key outcomes**: Cumulative infections per million, mortality rates and total deaths per million. **VOCs assessed**: NR	The author selected countries that did and did not mandate stay-at-home orders and compared them using a t-test; no statistically significant differences were found (data NR). Selected states from the United States that did (n = 4) and did not (n = 4) mandate stay-at-home orders found no statistically significant difference in infections ($p > 0.01$). Only descriptive data are reported, and it is not clear which pairwise comparisons were made or why.	Critical *(Cross-sectional study)*

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Padalabalanarayanan, S., Hanumanthu, V.S., & Sen, B.P. (2020). Association of State Stay-at-Home Orders and State-Level African American Population With COVID-19 Case Rates. *JAMA Network Open, 3*(10), e2026010.	23 October 2020	United States 1 March 2020 - 4 May 2020	**Design**: Ecological study **Intervention**: Stay-at-home order **Sample**: COVID Tracking Project using state-level data. The final sample included 3023 state-day observations. **Key outcomes**: Cumulative cases per 100,000 per day. **VOCs assessed**: None	There was a negative association between stay-at-home orders on cumulative COVID-19 case rates ($\beta = -1.166$; 95% CI: -1.484, -0.847). Having no stay-at-home order, compared with a fully implemented stay-at-home order was associated with a mean of 218.9% (95% CI, 134.0, 339.3) higher cumulative cases over the study period. A higher proportion of African American population was associated with higher COVID-19 case rates ($\beta = 0.045$; 95% CI: 0.014, 0.077). Converted to percentage changes, this implied that a 1% increase in a state's African American population was associated with a mean of 4.6% (95% CI: 1.4, 8.0) higher cumulative cases.	Critical
Guo, S., An, R., McBride, T.D., Yu, D., Fu, L., & Yang, Y. (2021). Mitigation Interventions in the United States: An Exploratory Investigation of Determinants and Impacts. *Research on Social Work Practice, 31*(1), 26–41.	21 September 2020	United States 11 March 2020 - 15 April 2020	**Design**: Quasi-experimental **Intervention**: Stay-at-home order **Sample**: Data were obtained from Johns Hopkins University Coronavirus DataStream in 2020. The study employed daily counts on each of the nine outcome measures from March 11 to April 15 2020. **Key outcomes**: Cumulative cases per 10,000 population, cumulative new cases per 10,000 population,. **VOCs assessed**: None	Stay-at-home orders were associated with an increase in daily cumulative cases per 10 000 (0.170, 95% CI: 0.054, 0.286), and no difference in new cases per 10 000 (0.143, 95% CI: -0.023, 0.308).	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Jalali, A.M., Khoury, S.G., See, J.W, Gulsvig, A.M., Peterson, B.M., Gunasekera, R.S., Galbadage, T. (2020). Delayed Interventions, Low Compliance, and Health Disparities Amplified the Early Spread of COVID-19. *Preprint.*	04 August 2020	USA (California, Florida, New York and Texas) 1 March - May 31, 2020	**Design**: Cohort **Intervention**: Stay-at-home order **Sample**: Johns Hopkins Coronavirus Resource Centre data for 30 of the most heavily populated counties in the USA (total of 24 observations) paired with county level public health intervention data on 10-May 2022 **Key outcomes**: The three outcome variables included were daily case rates, confirmed COVID-19 cases, and COVID-19 deaths. All are calculated per 100,000 people, and data was included up to May 24 2020. **VOCs assessed**: None	Stay-at-home restriction duration was not associated with a decrease in daily COVID-19 case rates (-11.05, SE: 13.7) (p=0.43).	Serious ***PREPRINT***
Wong, C.K.H., Wong, J.Y.H., Tang, E.H.M., Au, C.H., Lau, K.T.K., & Wai, A.K.C. (2020). Impact of National Containment Measures on Decelerating the Increase in Daily New Cases of COVID-19 in 54 Countries and 4 Epicenters of the Pandemic: Comparative Observational Study. *Journal of medical Internet research*, *22*(7), e19904.	22 July 2020	Global 23 January, 2020 -11 April 11, 2020	**Design**: Cross-sectional **Intervention**: Stay-at-home order **Sample**: Our World in Data (open, crowdsourced, daily-updated data), 7 days before to 30 days after the intervention started. All countries initiated their containment policies after March 9, 2020, except for China (January 23, 2020) **Key outcomes**: COVID-19 transmission (daily new cases (percentage)) **VOCs assessed**: NR	In countries implementing stay-at-home orders, there was a consistent decrease in daily percent change in new cases from 26.9 (95% CI: 25.7%-28.0%) at baseline (statistical significance NR): • Day 7= 20.3 (95% CI: 19.8%-20.7%), • Day 14= 12.8(95% CI: 12.6%-13.0%), • Day 21= 7.29 (95% CI: 7.17%-7.41%), • Day 30= 4.03 (95% CI: 3.96%-4.10%)	Moderate (Cross-sectional study)

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Giannouchos, T., Giannouchos, A., Christodoulou, I., Steletou, E., & Souliotis, K. (2020). Shelter in place order contained COVID-19 growth rate in Greece. *Preprint.*	09 June 2020	Greece 26 February - 4 May 2020	**Design**: Interrupted time series **Intervention**: Stay-at-home order **Sample**: National Greek government COVID-19 data (total of 2632 observations) up to 69 days after restrictions were imposed (69, non-essential business closures; 62, lockdown) **Key outcomes**: Daily COVID-19 case growth rate **VOCs assessed**: NR	Stay-at-home orders were associated with a decrease in the daily growth rate of COVID-19; -0.17 (95% CI: -0.33, -0.07)	Moderate ***PREPRINT***
Fellows, I.E., Slayton, R.B., & Hakim, A.J. (2020). The COVID-19 Pandemic, Community Mobility and the Effectiveness of Non-pharmaceutical Interventions: The United States of America, February to May 2020. *Preprint.*	06 June 2020	United States 22 January - 25 April 2020	**Design**: Interrupted time series **Intervention**: Stay-at-home order **Sample**: COVID Tracking Project data (total # observations NR) for 51 states up. Follow-up time NR. **Key outcomes**: % reduction in Rt (7-day rolling average) **VOCs assessed**: None	Stay-at-home orders were associated with a decrease in Rt of -13% (95% CI: -22, -3)	Critical ***PREPRINT***

Table 2G: Summary of studies reporting on effectiveness of workplace opening/closure in preventing COVID-19 infections

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Previously reported evidence					
Ahlers, M.J., Aralis, H.J., Tang, W.L., Sussman, J.B., Fonarow, G.C., & Ziaeian, B. (2021). Non-pharmaceutical interventions and covid-19 burden in the United States: retrospective, observational cohort study. *BMJ Medicine, 1*, e000030.	05 July 2022	United States 19 January 2020 - 7 March 2021	**Design**: Retrospective cohort **Intervention**: Indoor dining closures **Sample**: State level COVID-19 Tracking Project data for the US population (total of 31,721,888 observations; 26,602,830 cases and 511,899 deaths) paired with publicly available information on adoption and discontinuation of NPIs from 21 (cases) to 35 (deaths) days after implementation. **Key outcomes**: Change in COVID-19 case and deaths rates (in each state) **VOCs assessed**: B.1.1.7 (Alpha) at the end of the observation period	Restrictions on indoor dining were not associated with increased odds of a decrease in case growth rate (i.e., reduced transmission, AOR: 1.47, 95% CI: 0.96, 2.26).	Serious
Xiu, Z., Feng, P., Yin, J., & Zhu, Y. (2022). Are Stringent Containment and Closure Policies Associated with a Lower COVID-19 Spread Rate? *Global Evidence, 19*(3), 1725.	02 February 2022	Global (210 countries) 1 January - 22 May 2022	**Design**: Interrupted time series **Intervention**: Workplace closures **Sample**: Our World in Data COVID-19 case counts for 210 countries (total of 6684 observations) paired with the Oxford COVID-19 Government Response Tracker (it is not clear if or how long the interventions were followed. The authors indicate that May 22 was an arbitrary date and had no significance to the data collection) **Key outcomes**: Daily new cases of COVID-19 (%) **VOCs assessed**: NR	Workplace closures were not associated with a change in daily case growth rate (-2.28%, p>0.05) after controlling for other restrictions and confounders.	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Li, H., Wang, L., Zhang, M., Lu, Y., & Wang, W. (2022). Effects of vaccination and non-pharmaceutical interventions and their lag times on the COVID-19 pandemic: Comparison of eight countries. *PLoS neglected tropical diseases*, *16*(1), e0010101.	13 January 2022	Global January 2020 - August 2021	**Design**: Cohort **Intervention**: Workplace closures **Sample**: 8 countries (Australia, Israel, India, Japan, Singapore, South Korea, UK, US); policy responses from the Oxford COVID-19 Government Response Tracker; proportion of Delta variant from public Github database **Key outcomes**: Effective Rt, lag time **VOCs assessed**: Delta	Workplace closures were protective for the majority of countries (RR<1), but harmful for Japan and the United Kingdom (RR>1).	Critical
McHugh, M., Tian, Y., Maechling, C.R., Farley, D., & Holl, J.L. (2021). Closure of Anchor Businesses Reduced COVID-19 Transmission During the Early Months of the Pandemic. *Journal of occupational and environmental medicine*, *63*(12), 1019–1023.	12 December 2021	United States 1 March 2020 - 31 May 2020	**Design**: Interrupted time series **Intervention**: Workplace closures **Sample**: Daily cases from publicly available county-level data 20 days before, 40 days after business closures **Key outcomes**: Adjusted daily incidence; cases/100, 000) **VOCs assessed**: NR	IRR (anchor business closures vs. non-closure): 0.93 ($p<0.001$); equivalent to an estimated 142 cases per 100,000 over a 40-day period	Critical

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Sun, J., Zheng, Y., Liang, W., Yang, Z., Zeng, Z., Li, T… Zhong, N. (2022). Quantifying the Effect of Public Activity Intervention Policies on COVID-19 Pandemic Containment Using Epidemiologic Data From 145 Countries. *Value in health*, *25*(5), 699–708.	08 December 2021	Global 31 December 2019 - 01 July 2020	**Design**: Quasi-experimental **Intervention**: Workplace closures **Sample**: Daily confirmed cases of COVID-19 for 145 countries from https://ourworldindata.org and country-based time-series policy data from the Oxford COVID-19 Government Response Tracker, both for the period of 31 December 2019 - 1 July 2020) **Key outcomes**: Estimated cumulative infections per million population for each country on July 1, 2020, correlated with policy start date, stringency (e.g., strictness), and duration (correlation coefficient, r); COVID-19 time-varying Rt **VOCs assessed**: NR	Workplace closures were associated with a decrease in Rt, the average effect over 90-days was -0.29 (95% CI: -0.38, -0.20).	Serious
An, B.Y., Porcher, S., Tang, S.Y., & Kim, E.E. (2021). Policy Design for COVID-19: Worldwide Evidence on the Efficacies of Early Mask Mandates and Other Policy Interventions. *Public administration review*, *81*(6), 1157–1182.	09 November 2021	Global January 1 - July 15 2020	**Design**: Interrupted time series **Intervention**: Restaurant closures **Sample**: Johns Hopkins Coronavirus Resource Centre global data (total of 24,684 observations) paired with Response2covid19 dataset for 164 nations up to 30 day post intervention **Key outcomes**: Rate of new cases (new cases/total cases) Log of averaged cases per million habitants per day between 90th - 120th day post first case per country **VOCs assessed**: NR	Restaurant closures were not associated with a decrease in rate of new cases until 30 days (-0.821, SE: 0.0969, p <0.01) and were not associated with cumulative infections (ln average infections 0.438, SE: 0.440, p >0.05).	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Sharma, M., Mindermann, S., Rogers-Smith, C., Leech, G., Snodin, B., Ahuja, J., … Brauner, J.M. (2021). Understanding the effectiveness of government interventions against the resurgence of COVID-19 in Europe. *Nature communications*, *12*(1), 5820.	05 October 2021	Europe 1 August 2020 - 9 January 2021	**Design**: Interrupted time series **Intervention**: Workplace closures **Sample**: Publicly available COVID-19 data for 114 regions in 7 European countries (total of >5500 observations) up to 3 months post implementation **Key outcomes**: Reduction in Rt (%) **VOCs assessed**: NR	All business closures combined were associated with an overall reduction in Rt by 35% (95% CI: 29, 41). Specific closures reduced Rt including restaurants (12%, 95% CI: 8,17), night clubs (12%, 95% CI: 8,17), retail and personal care businesses (12%, 95% CI: 7,18), but not leisure and entertainment (3%, 95% CI: -1,10).	Critical
Liang, L.L., Kao, C.T., Ho, H.J., & Wu, C.Y. (2021). COVID-19 case doubling time associated with non-pharmaceutical interventions and vaccination: A global experience. *Journal of global health*, *11*, 05021.	04 September 2021	Global 01 January 2020 - 13 June 2021	**Design**: Quasi-experimental (ITT) **Intervention**: Workplace closures **Sample**: Observations from 137 countries over 18 months (January 2020 - June 2021) or 42,102 country-days, since the first reported case in each country; data were collected on 19 June 2021 from Oxford COVID-19 Government Response Tracker, World Development Indicators, and Worldwide Governance Indicators **Key outcomes**: COVID-19 case doubling time (daily basis, per country) **VOCs assessed**: NR	For each day of closure of nonessential workplaces, the COVID-19 case doubling time increased by 1.41% (95% CI: 0.88, 1.95)	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Hunter, P.R., Colón-González, F.J., Brainard, J., & Rushton, S. (2021). Impact of non-pharmaceutical interventions against COVID-19 in Europe in 2020: a quasi-experimental non-equivalent group and time series design study. *Euro surveillance*, *26*(28), 2001401.	15 July 2021	30 European Countries Up to 24 April 2020	**Design**: Quasi-experimental, interrupted time series **Intervention**: Workplace closures, Non-essential services closed **Sample**: European Centre for Disease Prevention and Control (up to 24 April 2020) **Key outcomes**: 7-day rolling average new cases, adjusted to number of tests reported per 1 million population **VOCs assessed**: First (no variant)	Initial business closures were not associated with a change in new cases: 1-7 days (IRR: 1.18, 0.96-1.46), 8-14 days (IRR: 0.87, 0.66-1.15). Initial business closures were associated with a decrease in new cases 15-21 days (IRR: 0.69, 0.49-0.96), 22-28 days (IRR: 0.61, 0.41-0.91), 29-35 days (IRR: 0.47, 0.29-0.76), and 36 days or over (IRR: 0.32, 0.18-0.56) post-implementation. Non-essential services closed were not associated with new cases (vs. prior to implementation) at 1-7 days (IRR: 1.14, 0.92-1.41), 8-14 days (IRR: 1.15, 0.90-1.47), 15-21 days (IRR: 1.02, 0.78-1.33), 22-28 days (IRR: 0.83, 0.60-1.13), 29-35 days (IRR: 0.76, 0.52-1.10), 36 days or over (IRR: 0.76, 0.46-1.26).	Moderate

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Kaimann, D., & Tanneberg, I. (2021). What containment strategy leads us through the pandemic crisis? An empirical analysis of the measures against the COVID-19 pandemic. *PloS one*, *16*(6), e0253237.	21 June 2021	Global 22 January 2020 - 24 May 2020	**Design**: Quasi-experimental **Intervention**: Workplace closures **Sample**: 6,941 daily observations from a sample of 68 countries, Puerto Rico and the 50 states of the US, 4 states of Australia, and 8 federal states of Canada ; each country observation starts from first confirmed case and ends either on May 24 or when one measure was first lifted. COVID-19 data from John Hopkins Coronavirus Resource Center; data on measures from country and state governments and local health authorities. **Key outcomes**: COVID-19 daily growth rate **VOCs assessed**: NR	Workplace closures were associated with a decrease in growth rate after a 5-day time delay (-3.0%, SE: 0.2, $p < 0.001$)	Serious
Banholzer, N., van Weenen, E., Lison, A., Cenedese, A., Seeliger, A., Kratzwald, B., … Vach, W. (2021). Estimating the effects of non-pharmaceutical interventions on the number of new infections with COVID-19 during the first epidemic wave. *PloS one*, *16*(6), e0252827.	02 June 2021	Canada, USA, Australia, the EU-15 countries, Norway and Switzerland February - May 2020	**Design**: Interrupted time series **Intervention**: Workplace/business closures **Sample**: Johns Hopkins Coronavirus Resource Centre data for 20 Western countries representing +/- 0.8 billion people (total of +/-3.3 million observations) up to 3 days after implementation **Key outcomes**: Daily number of new COVID-19 cases per 100,000 people (rolling 7-day mean) **VOCs assessed**: NR	Venue closures (restaurants, bars, shops, non-essential businesses and recreational facilities etc.) were associated with a 18% (95% CI = -4,40) reduction in 7-day rolling mean of new COVID-19 infections 3-days after implementation. Work from home orders were associated with a 1% (95% CI = -8, 12) reduction in 7-day rolling mean new COVID-19 infections 3-days after implementation.	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Lansiaux, E., Caut, J., Forget, J., & Pébaÿ, P.P. (2021): Assessing the efficiency of COVID-19 NPIs in France: a retrospective study using a novel methodology. *Preprint.*	13 April 2021	France 1 March 2020 - 30 January 2021	**Design**: Interrupted time series **Intervention**: Workplace closures **Sample**: Metropolitan France ministry data (total number of observations NR), at a minimum of 90 days post implementation **Key outcomes**: Rt **VOCs assessed**: No VoCs circulating	No association was seen between workplace closures and the Rt ($r=0.09$) ($p<0.05$).	Critical ***PREPRINT***
Boesch, L. (2021). Lockdown benefit varies among countries and sub-national units: a reanalysis of the data by Bendavid et al. *Preprint.*	09 March 2021	Global 18 February 2020 - 06 April 2020	**Design**: Cohort [secondary analysis of Bendavid et al. 2021] **Intervention**: Workplace closures **Sample**: 5324 observations, from 209 sub-national units within 10 countries (England, France, Germany, Iran, Italy, Netherlands, Spain, US, South Korea, Sweden) [Note: this is a secondary analysis of Bendavid et al. 2021, that looked at pairwise comparisons with fixed-effects regression models; this analysis used one mixed-effects regression model] **Key outcomes**: Daily COVID-19 case growth rate **VOCs assessed**: NR	Business closures were not associated with COVID-19 growth rates (-0.100 (units unknown), SE: 0.046, $p=0.148$).	Critical ***PREPRINT***

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Bendavid, E., Oh, C., Bhattacharya, J., & Ioannidis, J.P.A. (2021). Assessing mandatory stay-at-home and business closure effects on the spread of COVID-19. *European journal of clinical investigation*, *51*(4), e13484.	24 December 2020	Global Spring 2020	**Design**: Cohort **Intervention**: Workplace closures **Sample**: Subnational administrative regions (e.g., provinces, states, counties, regions) of 10 countries; compared countries (England, France, Germany, Iran, Italy, Netherlands, Spain, US) that implemented more restrictive NPIs (e.g., mandatory stay-at-home orders, business closures) to those (South Korea, Sweden) that only implemented less restrictive NPIs, for a total of 16 comparisons. **Key outcomes**: COVID-19 transmission (daily case growth rate) **VOCs assessed**: NR	Results presented for 10 countries separately. Workplace closures decreased transmission in one of three countries that reported closing workplaces.	Critical
Brauner, J.M., Mindermann, S., Sharma, M., Johnston, D., Salvatier, J., Gavenčiak, T., … Kulveit, J. (2021). Inferring the effectiveness of government interventions against COVID-19. *Science*, *371*(6531), eabd9338.	19 February 2021	Global 22 January 2020 - 30 May 2020	**Design**: Cohort **Intervention**: Workplace closures **Sample**: Data on confirmed COVID-19 cases and deaths from the Johns Hopkins CSSE COVID-19 Dataset for 41 countries. **Key outcomes**: % reduction in Rt **VOCs assessed**: NR	Business closures did not significantly reduce Rt: • Closing high-risk face-to-face businesses: -18% (95% CI: -40, 8) • Closing most nonessential face-to-face businesses: -27% (95% CI: -49, 3)	Critical

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Liu, Y., Morgenstern, C., Kelly, J., Lowe, R., CMMID COVID-19 Working Group, & Jit, M. (2021). The impact of non-pharmaceutical interventions on SARS-CoV-2 transmission across 130 countries and territories. *BMC medicine*, *19*(1), 40.	05 February 2021	Global 1 January - 22 June 2020	**Design**: Interrupted time series **Intervention**: Workplace closures **Sample**: EpiForecasts data paired with OxCGRT data (total # observations NR) for 130 countries (follow up time NR) **Key outcomes**: Rt **VOCs assessed**: NR	Data suggest that workplace closures were associated with restrictions in Rt ($p<0.01$, data NR). Authors note high degree of overlap amongst implementation of interventions may make it difficult statistically to obtain an accurate interpretation of effect size.	Serious
Dreher, N., Spiera, Z., McAuley, F.M., Kuohn, L., Durbin, J.R., Marayati, N.F., … Choudhri, T.F. (2021). Policy Interventions, Social Distancing, and SARS-CoV-2 Transmission in the United States: A Retrospective State-level Analysis. *The American journal of the medical sciences*, *361*(5), 575–584.	08 January 2021	United States 1 January 2020 - 30 April 2020	**Design**: Interrupted time series **Intervention**: Workplace closures **Sample**: Johns Hopkins Coronavirus Resource Centre global data (total of 4,645,184 observations in 49 territories) paired with territory level estimates of the virus's daily effective Rt data in the week following the territories' 500th case. **Key outcomes**: Average weekly Rt after a territory's 500th case; Doubling time from 500 to 1000 cases **VOCs assessed**: NR	7-day average Rt was lower in states that closed businesses in days 1-7 (-0.13, 95% CI: -0.20, -0.01) and 8-14 (-0.05, 95% CI: -0.13, -0.03) following the 500th case, compared to states that did not close businesses. Closing businesses did not decrease time to 1000th cases (HR: 0.50, 95% CI: 0.25, 1.10).	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Guo, S., An, R., McBride, T.D., Yu, D., Fu, L., & Yang, Y. (2021). Mitigation Interventions in the United States: An Exploratory Investigation of Determinants and Impacts. *Research on Social Work Practice, 31*(1), 26–41.	21 September 2020	United States 11 March 2020 - 15 April 2020	**Design**: Quasi-experimental **Intervention**: Workplace closures **Sample**: Data were obtained from Johns Hopkins University Coronavirus DataStream in 2020. The study employed daily counts on each of the nine outcome measures from March 11 to April 15, 2020. **Key outcomes**: Cumulative cases per 10,000 population, cumulative new cases per 10,000 population. **VOCs assessed**: None	Non-essential business bans were associated with a decrease in daily cumulative cases per 10 000 (-0.138, 95% CI: -0.244, -0.031) but not daily new cases per 10 000 (-0.092, 95% CI: -0.244, 0.060),	Serious
Giannouchos, T., Giannouchos, A., Christodoulou, I., Steletou, E., & Souliotis, K. (2020). Shelter in place order contained COVID-19 growth rate in Greece. *Preprint.*	09 June 2020	Greece 26 February - 4 May 2020	**Design**: Interrupted time series **Intervention**: Closing non-essential shopping **Sample**: National Greek government COVID-19 data (total of 2632 observations) up to 69 days after restrictions were imposed (69, non-essential business closures; 62, lockdown) **Key outcomes**: Daily COVID-19 case growth rate **VOCs assessed**: NR	Closing non-essential shopping was associated with a decrease in daily growth rate of COVID-19; -0.90, 95% CI: -1.54, -0.26	Moderate ***PREPRINT***

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Fellows, I.E., Slayton, R.B., & Hakim, A.J. (2020). The COVID-19 Pandemic, Community Mobility and the Effectiveness of Non-pharmaceutical Interventions: The United States of America, February to May 2020. *Preprint.*	06 June 2020	United States 22 January - 25 April 2020	**Design**: Interrupted time series **Intervention**: Workplace closures **Sample**: COVID Tracking Project data (total # observations NR) for 51 states up. Follow-up time NR. **Key outcomes**: % reduction in Rt (7-day rolling average) **VOCs assessed**: None	Business closures were not associated with a decrease in Rt (-2%, 95% CI: -11, 8)	Critical ***PREPRINT***

Table 3: Summary of syntheses reporting on effectiveness of measures to reduce contacts for preventing COVID-19 hospitalizations and deaths

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Quality Rating
Previously reported evidence					
Iezadi, S., Gholipour, K., Azami-Aghdash, S., Ghiasi, A., Rezapour, A., Pourasghari, H., & Pashazadeh, F. (2021). Effectiveness of non-pharmaceutical public health interventions against COVID-19: A systematic review and meta-analysis. *PloS one*, *16*(11), e0260371.	23 November 2021	Global December 2019 - 1 February 2021	**Design:** Systematic review and meta-analysis **Intervention:** Stay-at-home orders **Sample:** 35 studies included total; modeling studies excluded. All studies from 2020. **Key outcomes:** Daily Mortality growth rate (%) **VOCs assessed:** NR	Stay-at-home orders (2 studies) were associated with a decrease in daily mortality growth rate -1.42% (-2.46, -0.37), I2= 0%	Moderate
Talic, S., Shah, S., Wild, H., Gasevic, D., Maharaj, A., Ademi, Z., … Ilic, D. (2021). Effectiveness of public health measures in reducing the incidence of covid-19, SARS-CoV-2 transmission, and covid-19 mortality: systematic review and meta-analysis. *BMJ*, *375*, e068302.	21 October 2021	Global up to June 7, 2021	**Design:** Systematic review and meta-analysis **Interventions:** School closures, Business closures **Sample:** 18 studies, no modelling. June 7, 2021. **Key outcomes:** COVID-19 associated deaths **VOCs assessed:** NR	There were conflicting results with school closures and COVID-19-associated deaths, with one study showing an effect and the other not. Risk of bias of included studies was moderate	High

Table 4A: Summary of studies reporting on effectiveness of curfews for reducing COVID-19 associated hospitalizations and deaths

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Previously reported evidence					
Kalra, A., & Novosad, P. (2021). Impacts of regional lockdown policies on COVID-19 transmission in India in 2020. *Preprint.*	10 August 2021	India March - August 2020	**Design**: Interrupted time series **Intervention**: Curfews **Sample**: District level COVID-19 data for six states (total # of observations NR) up to 7 days after implementation. **Key outcomes**: COVID-19 growth in death rate 14-days after NPI implementation. **VOCs assessed**: No VoCs circulating	Curfews were associated with a decrease in death growth rate (-0.59, SE: 0.12, p<0.001) 14 days after policy implementation.	Critical ***PREPRINT***

Table 4B: Summary of studies reporting on effectiveness of cancellation of public events for reducing COVID-19 associated hospitalizations and deaths

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Previously reported evidence					
Jamison, J.C., Bundy, D., Jamison, D.T., Spitz, J., & Verguet, S. (2021). Comparing the impact on COVID-19 mortality of self-imposed behavior change and of government regulations across 13 countries. *Health services research*, *56*(5), 874–884.	28 June 2021	Global - Western Europe March - May 2020	**Design**: Quasi-experimental **Intervention**: Cancellation of public events **Sample**: Daily confirmed COVID-19 associated deaths, from the European Centre for Disease Prevention and Control, for the 13 Western European countries with greater than 500 COVID-19 deaths as of 16 May, all of which had 7–11 weeks of data; government-imposed "containment and closure" policies from Oxford COVID-19 Government Response Tracker. **Key outcomes**: Rate of change in COVID-19 associated deaths, per day, 16–20 days post-interventions **VOCs assessed**: No VoCs circulating	Canceling public events was associated with a decrease in percent change in deaths per day (-5.9%, 95% CI: -9.8, -2.0).	Serious

Table 4C: Summary of studies reporting on effectiveness of closing public transport for reducing COVID-19 associated hospitalizations and deaths

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Previously reported evidence					
Jamison, J.C., Bundy, D., Jamison, D.T., Spitz, J., & Verguet, S. (2021). Comparing the impact on COVID-19 mortality of self-imposed behavior change and of government regulations across 13 countries. *Health services research*, *56*(5), 874–884.	28 June 2021	Global - Western Europe March - May 2020	**Design**: Quasi-experimental **Intervention**: Closing public transport **Sample**: Daily confirmed COVID-19 associated deaths, from the European Centre for Disease Prevention and Control, for the 13 Western European countries with greater than 500 COVID-19 deaths as of 16 May, all of which had 7–11 weeks of data; government-imposed ""containment and closure"" policies from Oxford COVID-19 Government Response Tracker. **Key outcomes**: Rate of change in COVID-19 associated deaths, per day, 16–20 days post-interventions **VOCs assessed**: NR	Closing public transport did not reduce the percent change in deaths per day (2.5%, 95% CI: -1.7, 6.6)	Serious

Table 4D: Summary of studies reporting on effectiveness of gathering restrictions for reducing COVID-19 associated hospitalizations and deaths

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Previously reported evidence					
Ahlers, M.J., Aralis, H.J., Tang, W.L., Sussman, J.B., Fonarow, G.C., & Ziaeian, B. (2021). Non-pharmaceutical interventions and covid-19 burden in the United States: retrospective, observational cohort study. *BMJ Medicine, 1*, e000030.	05 July 2022	United States 19 January 2020 - 7 March 2021	**Design**: Retrospective cohort **Intervention**: Indoor gathering bans **Sample**: State level COVID-19 Tracking Project data for the US population (total of 31,721,888 observations; 26,602,830 cases and 511,899 deaths) paired with publicly available information on adoption and discontinuation of NPIs from 21 (cases) to 35 (deaths) days after implementation. **Key outcomes**: Change in COVID-19 deaths rates (in each state) **VOCs assessed**: B.1.1.7 (Alpha) at the end of the observation period	Indoor gathering bans were not associated with decreased death rate whether mild (>10 people, AOR: 0.78, 95% CI: 0.56, 1.09) or strict (<10 people, AOR: 1.08, 95% CI: 0.72, 2.17).	Serious
Stokes, J., Turner, A.J., Anselmi, L., Morciano, M., & Hone, T. (2022). The relative effects of non-pharmaceutical interventions on wave one Covid-19 mortality: natural experiment in 130 countries. *BMC public health*, *22*(1), 1113.	03 June 2022	Global January 2020 - 1 June 2020	**Design**: Interrupted time series **Intervention**: Gathering restrictions **Sample**: European Centre for Disease Prevention and Control (ECDC) COVID-19 data for 130 countries paired with Oxford COVID-19 Government Tracker (total of 3150 observations) 0-24 and 14-38 days after the first COVID-19 death. **Key outcomes**: Daily COVID-19 deaths per 1,000,000 people **VOCs assessed**: NR	Mass gathering bans were not associated with COVID-19 deaths from days 1-24 or 14-38 (0.132, 95% CI: -0.017, 0.280; 0.328, 95% CI: -0.021, 0.677 deaths per million per day respectively).	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
An, B.Y., Porcher, S., Tang, S.Y., & Kim, E.E. (2021). Policy Design for COVID-19: Worldwide Evidence on the Efficacies of Early Mask Mandates and Other Policy Interventions. *Public administration review*, *81*(6), 1157–1182.	09 November 2021	Global January 1 - July 15 2020	**Design**: Interrupted time series **Intervention**: Mass gathering bans **Sample**: Johns Hopkins Coronavirus Resource Centre global data (total of 24,684 observations) paired with Response2covid19 dataset for 164 nations up to 30-day post intervention **Key outcomes**: Mortality rate **VOCs assessed**: NR	Mass gathering bans were only associated with rate of new deaths at 21 days (-1.228, 0.420, p <0.01).	Serious
Hunter, P.R., Colón-González, F.J., Brainard, J., & Rushton, S. (2021). Impact of non-pharmaceutical interventions against COVID-19 in Europe in 2020: a quasi-experimental non-equivalent group and time series design study. *Euro surveillance*, *26*(28), 2001401.	15 July 2021	30 European Countries Up to 24 April 2020	**Design**: Quasi-experimental, interrupted time series **Intervention**: Gathering restrictions **Sample**: European Centre for Disease Prevention and Control (up to 24 April 2020) **Key outcomes**: 7-day rolling average deaths, adjusted to number of tests reported per 1 million population **VOCs assessed**: First (no variant)	Mass gathering restrictions were not associated with a change in deaths: 1-7 days (IRR: 0.76, 0.55-1.03) post-implementation but were associated with a decrease in deaths, 8-14 days (IRR: 0.58, 0.41-0.84), 15-21 days (IRR: 0.59, 0.38-0.92), 22-28 days (IRR: 0.56, 0.33-0.93), 29-35 days (IRR: 0.50, 0.28-0.91), 36 days or over (IRR: 0.49, 0.25-0.98).	Moderate

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Jamison, J.C., Bundy, D., Jamison, D.T., Spitz, J., & Verguet, S. (2021). Comparing the impact on COVID-19 mortality of self-imposed behavior change and of government regulations across 13 countries. *Health services research*, *56*(5), 874–884.	28 June 2021	Global - Western Europe March - May 2020	**Design**: Quasi-experimental **Intervention**: Gathering restrictions **Sample**: Daily confirmed COVID-19 associated deaths, from the European Centre for Disease Prevention and Control, for the 13 Western European countries with greater than 500 COVID-19 deaths as of 16 May, all of which had 7–11 weeks of data; government-imposed ""containment and closure"" policies from Oxford COVID-19 Government Response Tracker. **Key outcomes**: Rate of change in COVID-19 associated deaths, per day, 16–20 days post-interventions **VOCs assessed**: NR	Restricting gathering size was associated with an increase in percent change in deaths per day (3.1 pp, 95% CI: 1.0, 5.2).	Serious
Dreher, N., Spiera, Z., McAuley, F.M., Kuohn, L., Durbin, J.R., Marayati, N.F., … Choudhri, T.F. (2021). Policy Interventions, Social Distancing, and SARS-CoV-2 Transmission in the United States: A Retrospective State-level Analysis. *The American journal of the medical sciences*, *361*(5), 575–584.	08 January 2021	United States January - 30 April 2020	**Design**: Interrupted time series **Intervention**: Limiting mass gatherings **Sample**: Johns Hopkins Coronavirus Resource Centre global data (total of 4,645,184 observations in 49 territories) paired with territory level estimates of the virus's daily effective Rt data in the week following the territories' 500th case. **Key outcomes**: Case fatality rate (CFR) **VOCs assessed**: NR	Limiting mass gatherings did not impact on case fatality rate (data NR).	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Guo, S., An, R., McBride, T.D., Yu, D., Fu, L., & Yang, Y. (2021). Mitigation Interventions in the United States: An Exploratory Investigation of Determinants and Impacts. *Research on Social Work Practice, 31*(1), 26–41.	21 September 2020	United States 11 March 2020 - 15 April 2020	**Design**: Quasi-experimental **Intervention**: Gathering restrictions **Sample**: Data were obtained from Johns Hopkins University Coronavirus DataStream in 2020. The study employed daily counts on each of the nine outcome measures from March 11 to April 15 2020. **Key outcomes**: Cumulative deaths per 10,000 population, cumulative new deaths per 10,000 population, and death rate. **VOCs assessed**: None	Large gathering bans were associated with a reduction in death rates (-37.4%, 95% CI: -52.2, -22.7) but not daily cumulative deaths per 10 000 (0.027, 95% CI: -0.105, -.158), daily new deaths per 10 000 (0.013, 95% CI: -0.151, 0.177).	Serious

Table 4E: Summary of studies reporting on effectiveness of school closures for reducing COVID-19 associated hospitalizations and deaths

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Previously reported evidence					
Stokes, J., Turner, A.J., Anselmi, L., Morciano, M., & Hone, T. (2022). The relative effects of non-pharmaceutical interventions on wave one Covid-19 mortality: natural experiment in 130 countries. *BMC public health*, *22*(1), 1113.	03 June 2022	Global January 2020 - 1 June 2020	**Design**: Interrupted time series **Intervention**: School closures **Sample**: European Centre for Disease Prevention and Control (ECDC) COVID-19 data for 130 countries paired with Oxford COVID-19 Government Tracker (total of 3150 observations) 0-24 and 14-38 days after the first COVID-19 death. **Key outcomes**: Daily COVID-19 deaths per 1,000,000 people **VOCs assessed**: NR	Earlier/stricter school closures were not associated with deaths from days 1-24 (-0.119 deaths per million per day, 95% CI: -0.297, 0.059) but reductions were observed from days 14-38 (-1.238 deaths per million per day, 95% CI: -2.203, -0.273).	Serious
An, B.Y., Porcher, S., Tang, S.Y., & Kim, E.E. (2021). Policy Design for COVID-19: Worldwide Evidence on the Efficacies of Early Mask Mandates and Other Policy Interventions. *Public administration review*, *81*(6), 1157–1182.	09 November 2021	Global January 1 - July 15, 2020	**Design**: Interrupted time series **Intervention**: School closures **Sample**: Johns Hopkins Coronavirus Resource Centre global data (total of 24,684 observations) paired with Response2covid19 dataset for 164 nations up to 30 day post intervention **Key outcomes**: Mortality rate **VOCs assessed**: NR	School closures were only associated with rate of new deaths at 21 days (-1.279, SE: 0.473, $p < 0.05$).	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Simetin, I.P., Svajda, M., Ivanko, P., Dimnjakovic, J., Belavic, A., Istvanovic, A., & Poljicanin, T. (2021). COVID-19 incidence, hospitalizations and mortality trends in Croatia and school closures. *Public health*, *198*, 164–170.	03 August 2021	Croatia 25 February 2020-14 March 2021	**Design**: Quasi experimental **Intervention**: School closures **Sample**: National-level surveillance data **Key outcomes**: COVID-19 associated hospitalizations; COVID-19 associated deaths % average change **VOCs assessed**: NR	Average % change in weekly change in COVID-19 associated hospitalizations observed over school holidays across age groups (7-14 years: 42.08, p <0.001; 5-18 years: 51.96, p <0.001; 19-25 years: 24.82, p < 0.001; 26-65 years: 32.67, p < 0.001; 66+ years: 21.76, p <0.001); however these started prior to school closures.	Critical
Hunter, P.R., Colón-González, F.J., Brainard, J., & Rushton, S. (2021). Impact of non-pharmaceutical interventions against COVID-19 in Europe in 2020: a quasi-experimental non-equivalent group and time series design study. *Euro surveillance*, *26*(28), 2001401.	15 July 2021	30 European Countries Up to 24 April 2020	**Design**: Quasi-experimental, interrupted time series **Intervention**: School closures **Sample**: European Centre for Disease Prevention and Control (up to 24 April 2020) **Key outcomes**: 7-day rolling average deaths, adjusted to number of tests reported per 1 million population **VOCs assessed**: First (no variant)	Closing educational facilities was associated with an increase in deaths: 1-7 days (IRR: 2.51, 1.89-3.34), 8-14 days (IRR: 3.14, 2.14-4.62), 15-21 days (IRR: 2.76, 1.74-4.37), 22-28 days (IRR: 2.02, 1.19-3.43) post-implementation but not 29-35 days (IRR: 1.10, 0.60-2.01), 36 days or over (IRR: 0.55, 0.28-1.10)	Moderate

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Jamison, J.C., Bundy, D., Jamison, D.T., Spitz, J., & Verguet, S. (2021). Comparing the impact on COVID-19 mortality of self-imposed behavior change and of government regulations across 13 countries. *Health services research*, *56*(5), 874–884.	28 June 2021	Global - Western Europe March - May 2020	**Design**: Quasi-experimental **Intervention**: School closures **Sample**: Daily confirmed COVID-19 associated deaths, from the European Centre for Disease Prevention and Control, for the 13 Western European countries with greater than 500 COVID-19 deaths as of 16 May, all of which had 7–11 weeks of data; government-imposed ""containment and closure"" policies from Oxford COVID-19 Government Response Tracker. **Key outcomes**: Rate of change in COVID-19 associated deaths, per day, 16–20 days post-interventions **VOCs assessed**: NR	Closing schools did not reduce the percent change in deaths per day (-2.9 %, 95% CI: -6.4, 0.62)	Serious
Diaz-Quijano, F.A., Ribeiro, T.B., Viana da Rosa, A., Reis, R., Aith, F., Ventura, D.F.L. (2021). The Impact of Legislation on Covid-19 Mortality in a Brazilian Federative Unit was Mediated by Social Isolation. *Preprint.*	24 June 2021	Ceará, Brazil 16 March 2020 - 26 July 2020	**Design**: Ecological study **Intervention**: School closures **Sample**: Data included March 16 to July 26 2020 from regions within the state of Ceará, Brazil. Number of regions, and sample size were not reported. Counts of COVID-19 deaths were obtained from the Brazilian Ministry of Health. **Key outcomes**: Deaths due to COVID-19 (#). **VOCs assessed**: NR	Three weeks after implementation, school closures were not associated with COVID-19 mortality (RR: 0.92, 95% CI: 0.84, 1.01).	Critical ***PREPRINT***

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
McCafferty, S., & Ashley, S. (2021). Covid-19 Social Distancing Interventions by Statutory Mandate and Their Observational Correlation to Mortality in the United States and Europe. *Pragmatic and observational research*, *12*, 15–24.	27 April 2021	United Sates; Europe NR - June 17, 2020	**Design**: Cross-sectional study **Intervention**: School closures **Sample**: The study was conducted using the Institute for Health Metrics and Evaluation openly published data on COVID-19 infections by individual states in the United States. All US states with more than a maximum mortality rate of 10 COVID-19 deaths per day were selected for inclusion (n = 27). European countries were selected based on developed healthcare standards (n = 12). **Key outcomes**: Peak mortality rate (highest recorded daily deaths over a 7-day average) **VOCs assessed**: None	School closures were not associated with peak mortality rate (-1146.40 deaths/trillion/day, = 0.3416), or mortality on date of peak (444.00 deaths/trillion/day, = 0.8194).	Low *(Cross-sectional study)*
Dreher, N., Spiera, Z., McAuley, F.M., Kuohn, L., Durbin, J.R., Marayati, N.F., … Choudhri, T.F. (2021). Policy Interventions, Social Distancing, and SARS-CoV-2 Transmission in the United States: A Retrospective State-level Analysis. *The American journal of the medical sciences*, *361*(5), 575–584.	08 January 2021	United States January - 30 April 2020	**Design**: Interrupted time series **Intervention**: School closures **Sample**: Johns Hopkins Coronavirus Resource Centre global data (total of 4,645,184 observations in 49 territories) paired with territory level estimates of the virus's daily effective Rt data in the week following the territories' 500th case. **Key outcomes**: Case fatality rate (CFR) **VOCs assessed**: NR	Closing educational facilities did not impact on case fatality rate (data NR).	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Guo, S., An, R., McBride, T.D., Yu, D., Fu, L., & Yang, Y. (2021). Mitigation Interventions in the United States: An Exploratory Investigation of Determinants and Impacts. *Research on Social Work Practice, 31*(1), 26–41.	21 September 2020	United States 11 March 2020 - 15 April 2020	**Design**: Quasi-experimental **Intervention**: School closures **Sample**: Data were obtained from Johns Hopkins University Coronavirus DataStream in 2020. The study employed daily counts on each of the nine outcome measures from March 11 to April 15 2020. **Key outcomes**: Cumulative deaths per 10,000 population, cumulative new deaths per 10,000 population, and death rate. **VOCs assessed**: None	Public school closures were not associated with daily cumulative deaths per 10 000 (-0.002, 95% CI: -0.236, 0.232), daily new deaths per 10 000 (-0.078, 95% CI: -0.370, 0.213) or death rate (-0.098, 95% CI: -0.363, 0.166).	Serious
Auger, K.A., Shah, S.S., Richardson, T., Hartley, D., Hall, M., Warniment, A., … Thomson, J. E. (2020). Association Between Statewide School Closure and COVID-19 Incidence and Mortality in the US. *JAMA*, *324*(9), 859–870.	29 July 2020	United States 9 March - 7 May 2020	**Design:** Cohort **Intervention:** School closures **Sample:** Publicly available data from all 50 states a minimum of 6 weeks after school closures. **Key outcomes:** Daily COVID-19 mortality per 100,000 residents in each state. **VOCs assessed:** None	School closure was associated with a significant decline in COVID-19 mortality of 12.6 deaths per 100 000 over 16 days (95% CI: 11.8, 13.6). The effect was smallest in states with the highest incidence at time of closure.	Serious

Table 4F: Summary of studies reporting on effectiveness of stay-at-home orders for reducing COVID-19 associated hospitalizations and deaths

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Previously reported evidence					
Ahlers, M.J., Aralis, H.J., Tang, W.L., Sussman, J.B., Fonarow, G.C., & Ziaeian, B. (2021). Non-pharmaceutical interventions and covid-19 burden in the United States: retrospective, observational cohort study. *BMJ Medicine, 1*, e000030.	05 July 2022	United States 19 January 2020 - 7 March 2021	**Design**: Retrospective cohort **Intervention**: Stay-at-home order **Sample**: State level COVID-19 Tracking Project data for the US population (total of 31,721,888 observations; 26,602,830 cases and 511,899 deaths) paired with publicly available information on adoption and discontinuation of NPIs from 21 (cases) to 35 (deaths) days after implementation. **Key outcomes**: Change in COVID-19 death rates (in each state) **VOCs assessed**: B.1.1.7 (Alpha) at the end of the observation period	Implementing stay-at-home orders was associated with increased odds of a decrease in death rate (i.e., reduced death, AOR: 1.89 (95% CI: 1.25, 2.87)).	Serious
Stokes, J., Turner, A.J., Anselmi, L., Morciano, M., & Hone, T. (2022). The relative effects of non-pharmaceutical interventions on wave one Covid-19 mortality: natural experiment in 130 countries. *BMC public health*, *22*(1), 1113.	03 June 2022	Global January 2020 - 1 June 2020	**Design**: Interrupted time series **Intervention**: Stay-at-home order **Sample**: European Centre for Disease Prevention and Control (ECDC) COVID-19 data for 130 countries paired with Oxford COVID-19 Government Tracker (total of 3150 observations) 0-24 and 14-38 days after the first COVID-19 death. **Key outcomes**: Daily COVID-19 deaths per 1,000,000 people **VOCs assessed**: NR	Stay-at-home orders were not associated with COVID-19 deaths from days 1-24 or 14-38 (0.095, 95% CI: -0.224, 0.413; 0.506, 95% CI: -0.380, 1.392 deaths per million per day, respectively)	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
An, B.Y., Porcher, S., Tang, S.Y., & Kim, E.E. (2021). Policy Design for COVID-19: Worldwide Evidence on the Efficacies of Early Mask Mandates and Other Policy Interventions. *Public administration review*, *81*(6), 1157–1182.	09 November 2021	Global January 1 - July 15 2020	**Design**: Interrupted time series **Intervention**: Stay-at-home order **Sample**: Johns Hopkins Coronavirus Resource Centre global data (total of 24,684 observations) paired with Response2covid19 dataset for 164 nations up to 30 day post intervention **Key outcomes**: Mortality rate **VOCs assessed**: NR	Stay-at-home orders were associated with rate of new deaths at 12 days (-0.898, SE: 0.324, p <0.01) and 21 days (-1.317, SE: 0.298, p <0.01).	Serious
Hunter, P.R., Colón-González, F.J., Brainard, J., & Rushton, S. (2021). Impact of non-pharmaceutical interventions against COVID-19 in Europe in 2020: a quasi-experimental non-equivalent group and time series design study. *Euro surveillance*, *26*(28), 2001401.	15 July 2021	30 European Countries Up to 24 April 2020	**Design**: Quasi-experimental, interrupted time series **Intervention**: Stay-at-home order **Sample**: European Centre for Disease Prevention and Control (up to 24 April 2020) **Key outcomes**: 7-day rolling average new deaths, adjusted to number of tests reported per 1 million population **VOCs assessed**: First (no variant)	Stay-at-home order was not associated with deaths at 1-7 days (IRR: 1.30, 0.96-1.76) or 36 days or more (IRR: 1.84, 0.70-2.10) post-implementation, but was associated with an increase in deaths at 8-14 days (IRR: 2.01, 1.45-2.77), 15-21 days (IRR: 2.23, 1.58-3.14), 22-28 days (IRR: 1.99, 1.36-2.89), 29-35 days (IRR: 1.84, 1.19-2.83).	Moderate

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Jamison, J.C., Bundy, D., Jamison, D.T., Spitz, J., & Verguet, S. (2021). Comparing the impact on COVID-19 mortality of self-imposed behavior change and of government regulations across 13 countries. *Health services research*, *56*(5), 874–884.	28 June 2021	Global - Western Europe March - May 2020	**Design**: Quasi-experimental **Intervention**: Stay-at-home order **Sample**: Daily confirmed COVID-19 associated deaths, from the European Centre for Disease Prevention and Control, for the 13 Western European countries with greater than 500 COVID-19 deaths as of 16 May, all of which had 7–11 weeks of data; government-imposed ""containment and closure"" policies from Oxford COVID-19 Government Response Tracker. **Key outcomes**: Rate of change in COVID-19 associated deaths, per day, 16–20 days post-interventions **VOCs assessed**: NR	Imposing stay-at-home orders did not reduce the percent change in deaths per day (-3.7 %, 95% CI: -11.8, 4.4).	Serious
Fowler, J.H., Hill, S.J., Levin, R., & Obradovich, N. (2021). Stay-at-home orders associate with subsequent decreases in COVID-19 cases and fatalities in the United States. *PloS one*, *16*(6), e0248849.	10 June 2021	United States 24 March 2020-7 May 2020	**Design**: Quasi-experimental; difference in differences **Intervention**: Stay-at-home order **Sample**: Data was collected from New York Times webpage. Data was assessed from the initial date order went into effect until 21 days post. A total of 2,647 counties with stay-at-home orders were compared to 386 counties without **Key outcomes**: % change in weekly fatalities at 21 days **VOCs assessed**: NR	Stay-at-home orders were associated with a reduction in weekly change in fatalities at 21 days (-59.8%, 95% CI: 32.3, -76.1).	Critical

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
McCafferty, S., & Ashley, S. (2021). Covid-19 Social Distancing Interventions by Statutory Mandate and Their Observational Correlation to Mortality in the United States and Europe. *Pragmatic and observational research*, *12*, 15–24.	27 April 2021	United Sates; Europe NR - June 17, 2020	**Design**: Cross-sectional study **Intervention**: Stay-at-home order **Sample**: The study was conducted using the Institute for Health Metrics and Evaluation openly published data on COVID-19 infections by individual states in the United States. All US states with more than a maximum mortality rate of 10 COVID-19 deaths per day were selected for inclusion (n = 27). European countries were selected based on developed healthcare standards (n = 12). **Key outcomes**: Peak mortality rate (highest recorded daily deaths over a 7-day average) **VOCs assessed**: None	Stay-at-home order was not associated with peak mortality rate (-443.95 deaths/trillion/day, = 0.4375), or mortality on date of peak (-1146.50 deaths/trillion/day, = 0.2540).	Low *(Cross-sectional study)*
Lansiaux, E., Caut, J., Forget, J., & Pébaÿ, P.P. (2021): Assessing the efficiency of COVID-19 NPIs in France: a retrospective study using a novel methodology. *Preprint.*	13 April 2021	France 1 March 2020 - 30 January 2021	**Design**: Interrupted time series **Intervention**: Stay-at-home order **Sample**: Metropolitan France ministry data (total number of observations NR), at a minimum of 90 days post implementation **Key outcomes**: Daily number of COVID-19 hospitalizations, daily number of COVID-19 ICU admissions **VOCs assessed**: No VoCs circulating	Stay-at-home orders were associated with a moderate positive correlation with COVID-19 hospitalizations (r=0.29) and ICU admissions (r=0.31).	Critical ***PREPRINT***

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Dreher, N., Spiera, Z., McAuley, F.M., Kuohn, L., Durbin, J.R., Marayati, N.F., … Choudhri, T.F. (2021). Policy Interventions, Social Distancing, and SARS-CoV-2 Transmission in the United States: A Retrospective State-level Analysis. *The American journal of the medical sciences*, *361*(5), 575–584.	08 January 2021	United States January - 30 April 2020	**Design**: Interrupted time series **Intervention**: Stay-at-home order **Sample**: Johns Hopkins Coronavirus Resource Centre global data (total of 4,645,184 observations in 49 territories) paired with territory level estimates of the virus's daily effective Rt data in the week following the territories' 500th case. **Key outcomes**: Case fatality rate (CFR) **VOCs assessed**: NR	Stay-at-home orders had no impact on case fatality rate (data NR).	Serious
Padalabalanarayanan, S., Hanumanthu, V.S., & Sen, B.P. (2020). Association of State Stay-at-Home Orders and State-Level African American Population With COVID-19 Case Rates. *JAMA Network Open, 3*(10), e2026010.	23 October 2020	United States 1 March 2020 - 4 May 2020	**Design**: Ecological study **Intervention**: Stay-at-home order **Sample**: COVID Tracking Project using state-level data. The final sample included 3023 state-day observations. **Key outcomes**: Cumulative fatality rates. **VOCs assessed**: None	There was a negative association between stay-at-home orders and COVID-19 fatality rates (β = −0.204; 95% CI: −0.294, −0.113). Having no stay-at-home order, compared with a fully implemented stay-at-home order was associated with a mean of 22.1% (95% CI: 12.1, 34.3) higher cumulative fatalities over the study period. A higher proportion of African American population was associated with higher COVID-19 fatality rates (β = 0.068; 95% CI: 0.044, 0.091). Converted to percentage changes, this implied that a 1% increase in a state's African American population was associated with a mean of 7.0% (95% CI: 4.5, 9.5) higher fatalities.	Critical

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Guo, S., An, R., McBride, T.D., Yu, D., Fu, L., & Yang, Y. (2021). Mitigation Interventions in the United States: An Exploratory Investigation of Determinants and Impacts. *Research on Social Work Practice, 31*(1), 26–41.	21 September 2020	United States 11 March 2020 - 15 April 2020	**Design**: Quasi-experimental **Intervention**: Stay-at-home order **Sample**: Data were obtained from Johns Hopkins University Coronavirus DataStream in 2020. The study employed daily counts on each of the nine outcome measures from March 11 to April 15 2020. **Key outcomes**: Cumulative deaths per 10,000 population, cumulative new deaths per 10,000 population, and death rate. **VOCs assessed**: None	Stay-at-home orders were not associated with daily cumulative deaths per 10 000 (0.046, 95% CI: -0.102, 0.194), new deaths per 10 000 (0.93, 95% CI: -0.093, 0.278) or death rate (0.037, 95% CI: -0.130, 0.203)	Serious

Table 4G: Summary of studies reporting on effectiveness of workplace opening/closure for reducing COVID-19 associated hospitalizations and deaths

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Previously reported evidence					
Ahlers, M.J., Aralis, H.J., Tang, W.L., Sussman, J.B., Fonarow, G.C., & Ziaeian, B. (2021). Non-pharmaceutical interventions and covid-19 burden in the United States: retrospective, observational cohort study. *BMJ Medicine, 1*, e000030.	05 July 2022	United States 19 January 2020 - 7 March 2021	**Design**: Retrospective cohort **Intervention**: Indoor dining closures **Sample**: State level COVID-19 Tracking Project data for the US population (total of 31,721,888 observations; 26,602,830 cases and 511,899 deaths) paired with publicly available information on adoption and discontinuation of NPIs from 21 (cases) to 35 (deaths) days after implementation. **Key outcomes**: Change in COVID-19 case and deaths rates (in each state) **VOCs assessed**: B.1.1.7 (Alpha) at the end of the observation period	Restrictions on indoor dining were not associated with increased odds of a decrease in death rate (i.e., fewer deaths, AOR: 1.15, 95% CI: 0.76, 1.74).	Serious
Stokes, J., Turner, A.J., Anselmi, L., Morciano, M., & Hone, T. (2022). The relative effects of non-pharmaceutical interventions on wave one Covid-19 mortality: natural experiment in 130 countries. *BMC public health*, *22*(1), 1113.	03 June 2022	Global January 2020 - 1 June 2020	**Design**: Interrupted time series **Intervention**: Workplace closures **Sample**: European Centre for Disease Prevention and Control (ECDC) COVID-19 data for 130 countries paired with Oxford COVID-19 Government Tracker (total of 3150 observations) 0-24 and 14-38 days after the first COVID-19 death. **Key outcomes**: Daily COVID-19 deaths per 1,000,000 people **VOCs assessed**: NR	Earlier/stricter workplace closures were associated with fewer COVID-19 deaths from days 1-24 (-0.26 deaths per million per day, 95% CI: -0.46, -0.05) but not 14-38 (-0.313 deaths per million per day, 95% CI: -0.861, 0.234)	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
An, B.Y., Porcher, S., Tang, S.Y., & Kim, E.E. (2021). Policy Design for COVID-19: Worldwide Evidence on the Efficacies of Early Mask Mandates and Other Policy Interventions. *Public administration review*, *81*(6), 1157–1182.	09 November 2021	Global January 1 - July 15 2020	**Design**: Interrupted time series **Intervention**: Restaurant closures **Sample**: Johns Hopkins Coronavirus Resource Centre global data (total of 24,684 observations) paired with Response2covid19 dataset for 164 nations up to 30 day post intervention **Key outcomes**: Mortality rate **VOCs assessed**: NR	Restaurant closures were associated with rate of new deaths at 5 days (-1.086, SE: 0.428, p <-0.05), 9 days (-1.532, SE: 0.394, p <0.01), 12 days (-1.739, SE: 0.448, p<0.01), 21 days (-0.869, SE: 0.375, p<0.05), and 30 days (-2.388, SE: 0.391, p <0.001).	Serious
Kalra, A., & Novosad, P. (2021). Impacts of regional lockdown policies on COVID-19 transmission in India in 2020. *Preprint.*	10 August 2021	India March - August 2020	**Design**: Interrupted time series **Intervention**: Workplace closures **Sample**: District level COVID-19 data for six states (total # of observations NR) up to 7 days after implementation. **Key outcomes**: COVID-19 growth in death rate 14-days after NPI implementation. **VOCs assessed**: NR	Specific non-essential business closures were associated with decreases in death growth rate 14-days after policy implementation; retail (-0.2, SE: 0.04, p<0.001); industry (-0.15, SE: 0.1, p <0.00); temples (-0.31, SE: 0.03, p <0.001).	Critical ***PREPRINT***

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Hunter, P.R., Colón-González, F.J., Brainard, J., & Rushton, S. (2021). Impact of non-pharmaceutical interventions against COVID-19 in Europe in 2020: a quasi-experimental non-equivalent group and time series design study. *Euro surveillance*, *26*(28), 2001401.	15 July 2021	30 European Countries Up to 24 April 2020	**Design**: Quasi-experimental, interrupted time series **Intervention**: Workplace closures, non-essential services closed **Sample**: European Centre for Disease Prevention and Control (up to 24 April 2020) **Key outcomes**: 7-day rolling average deaths, adjusted to number of tests reported per 1 million population **VOCs assessed**: First (no variant)	Initial business closures were not associated with deaths at 1-7 days (IRR: 1.07, 0.80-1.43), 8-14 days (IRR: 1.07, 0.75-1.54), 15-21 days (IRR: 0.72, 0.47-1.11), but were associated with a decrease in deaths 22-28 days (IRR: 0.50, 0.29-0.83), 29-35 days (IRR: 0.42, 0.22-0.77), 36 days or over (IRR: 0.37, 0.18-0.77). Non-essential service closures were associated with an increase in deaths 1-7 days (IRR: 1.40, 1.03-1.90) and 8-14 days (IRR: 1.41, 1.00-1.97) post-implementation. Non-essential service closures were not associated with deaths at 15-21 days (IRR: 1.42, 0.99-2.03), 22-28 days (IRR: 1.44, 0.95-2.17), 29-35 days (IRR: 1.04, 0.65-1.68), 36 days or over (IRR: 0.77, 0.42-1.39) post-implementation.	Moderate

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Jamison, J.C., Bundy, D., Jamison, D.T., Spitz, J., & Verguet, S. (2021). Comparing the impact on COVID-19 mortality of self-imposed behavior change and of government regulations across 13 countries. *Health services research*, *56*(5), 874–884.	28 June 2021	Global - Western Europe March - May 2020	**Design**: Quasi-experimental **Intervention**: Workplace closures **Sample**: Daily confirmed COVID-19 associated deaths, from the European Centre for Disease Prevention and Control, for the 13 Western European countries with greater than 500 COVID-19 deaths as of 16 May, all of which had 7–11 weeks of data; government-imposed ""containment and closure"" policies from Oxford COVID-19 Government Response Tracker. **Key outcomes**: Rate of change in COVID-19 associated deaths, per day, 16–20 days post-interventions **VOCs assessed**: NR	Closing nonessential workplaces decreased percent change in deaths per day (-4.0 %, 95% CI: -7.4, -0.5).	Serious
Diaz-Quijano, F.A., Ribeiro, T.B., Viana da Rosa, A., Reis, R., Aith, F., Ventura, D.F.L. (2021). The Impact of Legislation on Covid-19 Mortality in a Brazilian Federative Unit was Mediated by Social Isolation. *Preprint.*	24 June 2021	Ceará, Brazil 16 March 2020 - 26 July 2020	**Design**: Ecological study **Intervention**: Workplace closures **Sample**: Data included March 16 to July 26 2020 from regions within the state of Ceará, Brazil. Number of regions, and sample size were not reported. Counts of COVID-19 deaths were obtained from the Brazilian Ministry of Health. **Key outcomes**: Deaths due to COVID-19 (#). **VOCs assessed**: NR	Three weeks after implementation: • Closures of restaurants/bars were not associated with COVID-19 mortality (RR: 0.96 (0.90-1.03). • Closure of specific healthcare stores were not associated with COVID-19 mortality (RR: 0.99 (0.96-1.02). • Closures of general commerce were not associated with COVID-19 mortality (RR: 0.95 (0.88-1.03) • Gym closures were not associated with COVID-19 mortality (RR: 1.03 (0.95-1.14). • Closure of religious activities were not associated with COVID-19 mortality (RR: 0.96 (0.90-1.03).	Critical ***PREPRINT***

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
McCafferty, S., & Ashley, S. (2021). Covid-19 Social Distancing Interventions by Statutory Mandate and Their Observational Correlation to Mortality in the United States and Europe. *Pragmatic and observational research*, *12*, 15–24.	27 April 2021	United Sates; Europe NR - June 17, 2020	**Design**: Cross-sectional study **Intervention**: Workplace closing **Sample**: The study was conducted using the Institute for Health Metrics and Evaluation openly published data on COVID-19 infections by individual states in the United States. All US states with more than a maximum mortality rate of 10 COVID-19 deaths per day were selected for inclusion (n = 27). European countries were selected based on developed healthcare standards (n = 12). **Key outcomes**: Peak mortality rate (highest recorded daily deaths over a 7-day average) **VOCs assessed**: None	Closure of non-essential businesses was not associated with peak mortality rate (-168.55 deaths/trillion/day, = 0.8399), or mortality on date of peak (-702.00 deaths/trillion/day, = 0.6226).	Low *(Cross-sectional study)*
Lansiaux, E., Caut, J., Forget, J., & Pébaÿ, P.P. (2021): Assessing the efficiency of COVID-19 NPIs in France: a retrospective study using a novel methodology. *Preprint.*	13 April 2021	France 1 March 2020 - 30 January 2021	**Design**: Interrupted time series **Intervention**: Workplace closures **Sample**: Metropolitan France ministry data (total number of observations NR), at a minimum of 90 days post implementation **Key outcomes**: Daily number of COVID-19 hospitalizations, daily number of COVID-19 ICU admissions **VOCs assessed**: No VoCs circulating	Workplace closures (i.e., non-essential businesses) was associated with a moderate positive correlation with both hospitalizations (r=0.29) and ICU admissions (r=0.31).	Critical ***PREPRINT***

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Dreher, N., Spiera, Z., McAuley, F.M., Kuohn, L., Durbin, J.R., Marayati, N.F., … Choudhri, T.F. (2021). Policy Interventions, Social Distancing, and SARS-CoV-2 Transmission in the United States: A Retrospective State-level Analysis. *The American journal of the medical sciences*, *361*(5), 575–584.	08 January 2021	United States 1 January 2020 - 30 April 2020	**Design**: Interrupted time series **Intervention**: Workplace closures **Sample**: Johns Hopkins Coronavirus Resource Centre global data (total of 4,645,184 observations in 49 territories) paired with territory level estimates of the virus's daily effective Rt data in the week following the territories' 500th case. **Key outcomes**: Case fatality rate (CFR) **VOCs assessed**: NR	Closing businesses did not impact on case fatality rate (data NR).	Serious
Guo, S., An, R., McBride, T.D., Yu, D., Fu, L., & Yang, Y. (2021). Mitigation Interventions in the United States: An Exploratory Investigation of Determinants and Impacts. *Research on Social Work Practice, 31*(1), 26–41.	21 September 2020	United States 11 March 2020 - 15 April 2020	**Design**: Quasi-experimental **Intervention**: Workplace closures **Sample**: Data were obtained from Johns Hopkins University Coronavirus DataStream in 2020. The study employed daily counts on each of the nine outcome measures from March 11 to April 15, 2020. **Key outcomes**: Cumulative deaths per 10,000 population, cumulative new deaths per 10,000 population, and death rate. **VOCs assessed**: None	Non-essential business bans were associated with an increase in death rate (46.0%, 95% CI: 30.6, 61.4) but not daily cumulative deaths per 10 000 (0.047, 95% CI: -0.0.89, 0.183), daily new deaths per 10 000 (-0.029, 95% CI: -0.200, 0.141) or death rate (0.460, 95% CI: 0.3).	Serious

Table 5: Summary of studies reporting on effectiveness of measures to reduce contacts for reducing other respiratory infections

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Previously reported evidence					
Billard, M.N., van de Ven, P.M., Baraldi, B., Kragten-Tabatabaie, L., Bont, L.J., & Wildenbeest, J.G. (2022). International changes in respiratory syncytial virus (RSV) epidemiology during the COVID-19 pandemic: Association with school closures. *Influenza and other respiratory viruses*, *16*(5), 926–936.	22 June 2022	Global November 2020 - February 2021	**Design**: Ecological study **Intervention**: School closures, stay-at-home orders, cancellation of public events, gathering restrictions, workplace closures **Sample**: A total of 11 countries (Brazil, Chile, South Africa, Canada, United States, France, the Netherlands, Israel, Japan, South Korea, and Taiwan) with publicly available respiratory syncytial virus (RSV) surveillance data were selected. Data sources for RSV percent positivity rate were extracted from community clinic networks and laboratory networks. Non-pharmaceutical intervention data were retrieved from the Oxford COVID-19 Government Response Tracker, ranging from November 2020 - February 2021. **Key outcomes**: Percent change in RSV activity (i.e., difference between expected and observed proportions of weekly RSV detections) **VOCs assessed**: N/A	School closures were associated with a 1.31% decrease in RSV activity ($p=0.04$) after controlling for stay-at-home orders. Stay-at-home orders, public transit closures, gathering restrictions, public event cancellations, and workplace closures were not associated with a change in RSV activity (data NR, $p>0.05$)	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Davis, W.W., Mott, J.A., & Olsen, S.J. (2022). The role of non-pharmaceutical interventions on influenza circulation during the COVID-19 pandemic in nine tropical Asian countries. *Influenza and other respiratory viruses*, *16*(3), 568–576.	08 January 2022	Global 2020 - 2021	**Design**: Interrupted time series **Intervention**: School closures, cancelling public events, closing public transport, gathering restrictions, stay at home orders, workplace closures **Sample**: Data from 9 tropical Asian countries (Bangladesh, Indonesia, India, Cambodia, Lao People's Democratic Republic, Malaysia, Singapore, Thailand, Vietnam) that consistently reported (>50% weeks) influenza surveillance data were retrieved from the World Health Organization FluMart global repository and laboratory surveillance data between January 2016 to June 2021. Data on non-pharmaceutical interventions (NPIs) were retrieved from the Oxford School of Government and based on the Oxford Stringency Index (OSI) and were categorized into three steps: no measures, recommend canceling locally/nationally, and require canceling locally/nationally. **Key outcomes**: Presence of seasonal influenza epidemic **VOCs assessed**: N/A	School closures were associated with reduced likelihood of a seasonal influenza epidemic (IRR: 0.57, 95% CI: 0.34, 0.95) Workplace closures were not associated with likelihood of a seasonal influenza epidemic (IRR: 0.86, 95% CI: 0.64, 1.14). Cancelling public events was not associated with likelihood of a seasonal influenza epidemic (IRR: 0.81, 95% CI: 0.56, 1.17). Gathering restrictions were not associated with likelihood of a seasonal influenza epidemic (IRR: 0.91, 95% CI: 0.76, 1.09). Closing public transport was not associated with likelihood of a seasonal influenza epidemic (IRR: 0.69, 95% CI: 0.34, 1.38).	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Lenglart, L., Ouldali, N., Honeyford, K., Bognar, Z., Bressan, S., Buonsenso, D., … Zurl, C. (2022). Respective role of non-pharmaceutical interventions on bronchiolitis outbreaks, an interrupted time series analysis based on a multinational surveillance system. *The European respiratory journal, 61*(2).	10 November 2022	Global 1 January 2018 - 31 March 2021	**Design**: Interrupted time series **Intervention**: School closures, business closures, gathering restrictions, gathering limits **Sample**: A total of 42,916 children aged <1 year old were included for bronchiolitis outbreaks across 14 European countries (Austria, France, Germany, Hungary, Ireland, Israel, Italy, Latvia, Lithuania, Portugal, Spain, the Netherlands, Turkey, and United Kingdom). Data on bronchiolitis were retrieved from 27 pediatric emergency centres between January 2018 to March 2021. Data on non-pharmaceutical interventions were retrieved from the European Centre for Disease Prevention and Control (ECDC) database. **Key outcomes**: Physician-diagnosed cases of bronchiolitis (#) **VOCs assessed**: N/A	Secondary school closures were associated with a reduced incidence of bronchiolitis cases among children (IRR = 0.33, 95% CI: 0.20, 0.52) adjusting for full lockdown, university closure, face masks indoors and outdoors, teleworking, and business closures. University closures were associated with an increased incidence of bronchiolitis cases among children (IRR = 4.72, 95% CI: 2.68, 8.48), adjusting for lockdown, secondary school closure, face masks indoors and outdoors, teleworking, and business closure. Business closures were associated with an increased incidence of bronchiolitis cases among children (IRR = 1.61, 95% CI: 1.08, 2.37), adjusting for lockdown, secondary school closure, university closure, face masks indoors and outdoors, and teleworking. Preschool closures, primary school closures, limiting gathering sizes were not associated with bronchiolitis cases (data NR).	Serious

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Cowling, B.J., Ali, S.T., Ng, T.W.Y., Tsang, T.K., Li, J.C. M., Fong, M.W., … Leung, G.M. (2020). Impact assessment of non-pharmaceutical interventions against coronavirus disease 2019 and influenza in Hong Kong: an observational study. *The Lancet Public health*, *5*(5), e279–e288.	17 April 2020	Hong Kong 2019 - 2020	**Design**: Cohort **Intervention**: School closures **Sample**: Surveillance data from Hong Kong Centre for Health Protection **Key outcomes**: Daily Rt (Ro) of influenza A **VOCs assessed**: N/A	The estimated Rt changed from 1.28 (95% CI: 1.26, 1.30) during the 2-week period before school closures to 0.72 (95% CI: 0.70, 0.74) 2 weeks after school closures; - 44% (95% CI: -34, -53). The Rt calculated from hospitalization (vs. positive test) data was 1.10 (95% CI: 1.06, 1.12) before school closures and 0.73 (95% CI: 0.68, 0.77) after school closures; -33% (95% CI: -24, -43).	Moderate

Table 6: Syntheses reporting on secondary outcomes

Author	Title	Doi
Previously reported evidence		
Mental health (n=109)		
Tan, W.	School closures were over-weighted against the mitigation of COVID-19 transmission: A literature review on the impact of school closures in the United States	10.1186/s13052-021-00960-6
Goncalves Cerejeira, J., Santos Carrasco, I., Capella Meseguer, C., Rodriguez Vazquez, E., Oscar, M., Queipo De Llano, M., Guerra Valera, G., Gonzaga Ramirez, A.	Covid 19, lockdown and brief psychotic disorders	
Bonati, M., Campi, R., Segre, G.	Psychological impact of the quarantine during the COVID-19 pandemic on the general European adult population: a systematic review of the evidence	10.2196/39676
Both, L. M., Zoratto, G., Calegaro, V. C., Ramos-Lima, L. F., Negretto, B. L., Hauck, S., Freitas, L. H. M.	COVID-19 pandemic and social distancing: economic, psychological, family, and technological effects	10.1017/s0033291722001891
Castaldelli Maia, Joao M., Marziali, Megan E., Lu, Ziyin, Martins, Silvia S.	Investigating the effect of national government physical distancing measures on depression and anxiety during the COVID-19 pandemic through meta-analysis and meta-regression	10.1101/2020.08.28.20184119
Chiesa, Valentina, Antony, Gabriele, Wismar, Matthias, Rechel, Bernd	COVID-19 pandemic: health impact of staying at home, social distancing and 'lockdown' measuresâ€"a systematic review of systematic reviews	10.1093/pubmed/fdab102
de MacÃªdo Rocha, Daniel, Soares e. Silva, Joyce, Moura de Abreu, Ingrid, la Martins Mendes, Prisci, Carvalho Santos Leite, Hilda Dandara, Santos Ferreira, Maria do Carmo	Psychosocial effects of social distancing during coronavirus infections: integrative review	10.37689/acta-ape/2021ART1141
Dettmann, L. M., Adams, S., Taylor, G.	Investigating the prevalence of anxiety and depression during the first COVID-19 lockdown in the United Kingdom: Systematic review and meta-analyses	10.3390/ijerph18084060
Donovan, N. J., Blazer, D.	Social Isolation and Loneliness in Older Adults: Review and Commentary of a National Academies Report	10.1177/0020731422110488 7
Ferreira, S. R., Pereira, D., Firmino, H.	THE IMPACT of COVID-19 PANDEMIC on ELDERLY'S MENTAL HEALTH	https://dx.doi.org/10.1017/S1041610221002519
Gorenko, J. A., Moran, C., Flynn, M., Dobson, K., Konnert, C., Shah, B. N., Schlosshan, D., McConkey, H. Z. R., Buch, M. H., Marshall, A. J., Cartwright, N., Dobson, L. E., Allen, C., Campbell, B., Khan, P., Savill, P. J., Briffa, N. P., Chambers, J. B., Li, J., Verteramo Chiu, L. J., GÃ³mez, M. I., Bills, N. L.	Social Isolation and Psychological Distress Among Older Adults Related to COVID-19: A Narrative Review of Remotely-Delivered Interventions and Recommendations Outpatient management of heart valve disease following the COVID-19 pandemic: implications for present and future care Strategies to reduce risk perception among grocery shoppers in the US: A survey study	10.1017/s2045796021000019 10.1177/0733464820958550 10.1136/heartjnl-2020-317600

Author	Title	Doi
Hosseinzadeh, Pouya, Zareipour, Mordali, Baljani, Esfandyar, Moradali, Monireh Rezaee	Social Consequences of the COVID-19 Pandemic. A Systematic Review	10.17533/udea.iee.v40n1e10
Johnson, M. S., Skjerdingstad, N., Ebrahimi, O. V., Hoffart, A., Johnson, S. U., Chu, I. Y., Alam, P., Larson, H. J., Lin, L.	Parenting in a Pandemic: Parental stress, anxiety and depression among parents during the government-initiated physical distancing measures following the first wave of COVID-19 Social consequences of mass quarantine during epidemics: a systematic review with implications for the COVID-19 response	10.1002/jia2.25904 10.1002/smi.3120
Lazzari, C., Rabottini, M., Narici, M., Vito, G., Franchi, M., Paoli, A., Moro, T., Marcolin, G., Grassi, B., Baldassarre, G., Zuccarelli, L., Biolo, G., di Girolamo, F. G., Fiotti, N., Dela, F., Greenhaff, P., Maganaris, C., Leite, J. S., Feter, N., Caputo, E. L., Doring, I. R., Cassuriaga, J., Reichert, F. F., Silva, M. C. D., Rombaldi, A. J., Izquierdo-DomÃnguez, A., Rojas-Lechuga, M. J., Alobid, I.	COVID-19, loneliness, social isolation and risk of dementia in older people: a systematic review and meta-analysis of the relevant literature Impact of sedentarism due to the COVID-19 home confinement on neuromuscular, cardiovascular and metabolic health: Physiological and pathophysiological implications and recommendations for physical and nutritional countermeasures Managing noncommunicable diseases during the COVID-19 pandemic in Brazil: findings from the PAMPA cohort Management of Allergic Diseases During COVID-19 Outbreak	10.25100/cm.v51i2.4266 10.1080/13651501.2021.1959616 10.1080/17461391.2020.1761076 10.1590/1413-81232021263.39232020
Lee, H. J., Park, B. M.	Feelings of Entrapment during the COVID-19 Pandemic Based on ACE Star Model: A Concept Analysis	10.1017/s1754470x20000161
Mallet, J., Massini, C., Dubreucq, J., Padovani, R., Fond, G., Guessoum, S. B.	Mental health during the Covid pandemic, a narrative review	https://dx.doi.org/10.1016/j.amp.2022.07.019
Morina, N., Kip, A., Hoppen, T. H., Priebe, S., Meyer, T.	Potential impact of physical distancing on physical and mental health: a rapid narrative umbrella review of meta-analyses on the link between social connection and health	10.11604/pamj.supp.2020.37.2.25183
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Wana, Hika, Kudhama, Gezahang, Tadesse, Bona	COVID-19 and The Livelihood of the Poor Peoples in some sub-Saharan Africa	10.21203/rs.3.rs-216055/v1
Spencer, N.,Markham, W.,Johnson, S.,Arpin, E.,Nathawad, R.,Gunnlaugsson, G.,Homaira, N.,Rubio, M. L. M.,Trujillo, C. J.	The Impact of COVID-19 Pandemic on Inequity in Routine Childhood Vaccination Coverage: A Systematic Review	
Gnocchi, M.,D'Alvano, T.,Lattanzi, C.,Messina, G.,Petraroli, M.,Patianna, V. D.,Esposito, S.,Street, M. E.	Current evidence on the impact of the COVID-19 pandemic on paediatric endocrine conditions	
Vasiliu, O.	Quality of life impairments in bipolar patients during COVID-19 pandemic	
Izquierdo-Pujol, J.,Moron-Lopez, S.,Dalmau, J.,Gonzalez-Aumatell, A.,Carreras-Abad, C.,Mendez, M.,Rodrigo, C.,Martinez-Picado, J.	Post COVID-19 Condition in Children and Adolescents: An Emerging Problem	
Kumar, N.,Singh, A. K.	Impact of COVID-19 on Gender Equality, Sexual and Reproductive Health Rights of Adolescent Girls and Young Women: A Narrative Review	
Eberle, C.,Stichling, S.	Impact of COVID-19 lockdown on glycemic control in patients with type 1 and type 2 diabetes mellitus: a systematic review	
Hughes, M. C.,Liu, Y.,Baumbach, A.	Impact of COVID-19 on the Health and Well-being of Informal Caregivers of People with Dementia: A Rapid Systematic Review	
La Fauci, G.,Montalti, M.,Di Valerio, Z.,Gori, D.,Salomoni, M. G.,Salussolia, A.,SoldÃ, G.,Guaraldi, F.	Obesity and COVID-19 in Children and Adolescents: Reciprocal Detrimental Influence-Systematic Literature Review and Meta-Analysis	
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Chutiyami, Muhammad, Bello, Umar Muhammad, Salihu, Dauda, Ndwiga, Dorothy, Kolo, Mustapha Adam, Maharaj, Reshin, Naidoo, Kogi, Devar, Liza, Pratitha, Pratitha, Kannan, Priya	COVID-19 pandemic-related mortality, infection, symptoms, complications, comorbidities, and other aspects of physical health among healthcare workers globally: An umbrella review	10.1016/j.ijnurstu.2022.104211
Feiz Arefi, M., Babaei-Pouya, A., Poursadeqiyan, M., Moum, K. M., Moum, B., Opheim, R., Arlt, W., Baldeweg, S. E., Pearce, S. H. S., Simpson, H. L.	The health effects of quarantine during the COVID-19 pandemic Patients with inflammatory bowel disease on immunosuppressive drugs: perspectives' on COVID-19 and health care service during the pandemic ENDOCRINOLOGY IN THE TIME OF COVID-19: Management of adrenal insufficiency	10.1007/s00384-020-03635-6 10.3233/wor-203306 10.1080/00365521.2021.1901308
Green, Heidi, Fernandez, Ritin, MacPhail, Catherine	The social determinants of health and health outcomes among adults during the COVIDâ€ 19 pandemic: A systematic review	10.1111/phn.12959
Hristova, C., Ordonez, P., Stripling, A., Nuccio, A., Perez, S.	Caregiver Burden as Impacted by COVID-19: Translation of a Rapid Review to Clinical Recommendations	https://dx.doi.org/10.1016/j.jagp.2021.01.055

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BrÃ¼ssow, H.	COVID-19 and children: medical impact and collateral damage	10.1016/j.ijid.2021.01.067
Devi, Dayal	COVID-19: Considerations for Children and Adolescents with Diabetes	
de Hoop, T.,Adegbite, O.,Anderson, L.,Chidiac, S.,Dirisu, O.,Grzeslo, J.,Hakspiel, J.,Holla, C.,Janoch, E.,Jafa, K.,Jayaram, S.,Majara, G.,Mulyampiti, T.,Namisango, E.,Noble, E.,Onyishi, B.,Panetta, D.,Siwach, G.,Sulaiman, M.,Walcott, R.,Desai, S.	Women's groups and COVID-19: An evidence review on savings groups in Africa	
Ojo, O.,Wang, X. H.,Ojo, O. O.,Orjih, E.,Pavithran, N.,Adegboye, A. R. A.,Feng, Q. Q.,McCrone, P.	The Effects of COVID-19 Lockdown on Glycaemic Control and Lipid Profile in Patients with Type 2 Diabetes: A Systematic Review and Meta-Analysis	
Silverii, G. A.,Delli Poggi, C.,Dicembrini, I.,Monami, M.,Mannucci, E.	Glucose control in diabetes during home confinement for the first pandemic wave of COVID-19: a meta-analysis of observational studies	
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Bashir, M. F., Ma, B., Shahzad, L.	A brief review of socio-economic and environmental impact of Covid-19	10.3389/fpsyg.2022.878002
Gualano, M. R., Santoro, P. E., Borrelli, I., Rossi, M. F., Amantea, C., Daniele, A., Moscato, U.	TElewoRk-RelAted Stress (TERRA) as an emerging problem during the Covid-19 Pandemic: a Systematic Review	https://dx.doi.org/10.1016/j.shaw.2021.12.1706
Parent-Lamarche, A., Boulet, M., Jesus, T. S., Bhattacharjya, S., Papadimitriou, C., Bogdanova, Y., Bentley, J., Arango-Lasprilla, J. C., Kamalakannan, S., The Refugee Empowerment Task Force International Networking Group Of The American Congress Of Rehabilitation, Medicine	Employee well-being in the COVID-19 pandemic: The moderating role of teleworking during the first lockdown in the province of Quebec, Canada Lockdown-Related Disparities Experienced by People with Disabilities during the First Wave of the COVID-19 Pandemic: Scoping Review with Thematic Analysis	10.1007/s13181-021-00839-2 10.3233/wor-205311
Dhada, Symran,Stewart, Derek,Cheema, Ejaz,Hadi, Muhammed Abdul,Paudyal, Vibhu	Cancer Services During the COVID-19 Pandemic: Systematic Review of Patientsâ€™ and Caregiversâ€™ Experiences</p>	

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Appendices

Appendix 1: Detailed search strategy

The search was conducted in the following databases:

- PubMed
- iCITE
- Embase
- CINAHL
- Web of Science

Sample Search: PubMed

Line	Query
1	((("COVID 19"[MeSH Terms] OR "COVID 19"[All Fields] OR "SARS CoV 2"[All Fields] OR "SARS CoV 2"[MeSH Terms] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR ("SARS CoV 2"[MeSH Terms] OR "SARS CoV 2"[All Fields] OR "ncov"[All Fields]) OR "2019 ncov"[All Fields] OR "coronavirus infections"[MeSH Terms] OR "coronavirus"[MeSH Terms] OR ("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields] OR "coronaviruses"[All Fields]) OR ("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields] OR "coronaviruses"[All Fields]) OR "betacoronavirus"[MeSH Terms] OR ("betacoronavirus"[MeSH Terms] OR "betacoronavirus"[All Fields] OR "betacoronaviruses"[All Fields]) OR ("betacoronavirus"[MeSH Terms] OR "betacoronavirus"[All Fields] OR "betacoronaviruses"[All Fields]) OR "wuhan coronavirus"[All Fields] OR "2019nCoV"[All Fields] OR "betacoronavirus*"[All Fields] OR "corona virus*"[All Fields] OR "coronavirus*"[All Fields] OR "coronovirus*"[All Fields] OR "CoV"[All Fields] OR "CoV2"[All Fields] OR ("SARS CoV 2"[MeSH Terms] OR "SARS CoV 2"[All Fields] OR "covid"[All Fields] OR "COVID 19"[MeSH Terms] OR "COVID 19"[All Fields]) OR ("COVID 19"[MeSH Terms] OR "COVID 19"[All Fields] OR "covid19"[All Fields]) OR ("COVID 19"[All Fields] OR "COVID 19"[MeSH Terms] OR "covid 19 vaccines"[All Fields] OR "covid 19 vaccines"[MeSH Terms] OR "covid 19 serotherapy"[All Fields] OR "covid 19 serotherapy"[Supplementary Concept] OR "covid 19 nucleic acid testing"[All Fields] OR "covid 19 nucleic acid testing"[MeSH Terms] OR "covid 19 serological testing"[All Fields] OR "covid 19 serological testing"[MeSH Terms] OR "covid 19 testing"[All Fields] OR "covid 19 testing"[MeSH Terms] OR "SARS CoV 2"[All Fields] OR "SARS CoV 2"[MeSH Terms] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR "ncov"[All Fields] OR "2019 ncov"[All Fields] OR (("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields] OR "CoV"[All Fields]) AND 2019/11/01:3000/12/31[Date - Publication])) OR ("SARS CoV 2"[MeSH Terms] OR "SARS CoV 2"[All Fields] OR "hcov 19"[All Fields]) OR ("SARS CoV 2"[MeSH Terms] OR "SARS CoV 2"[All Fields] OR "ncov"[All Fields]) OR "SARS CoV 2"[All Fields] OR ("SARS CoV 2"[MeSH Terms] OR "SARS CoV 2"[All Fields] OR "sars2"[All Fields]) OR "SARSCoV"[All Fields] OR ("sars virus"[MeSH Terms] OR ("sars"[All Fields] AND "virus"[All Fields]) OR "sars virus"[All Fields] OR ("sars"[All Fields] AND "CoV"[All Fields]) OR "sars cov"[All Fields]) OR "SARS-CoV2"[All Fields]) AND "English"[Language] AND 2020/01/01:2023/01/01[Date - Publication] AND ("cohorting"[Title/Abstract] OR "community containment"[Title/Abstract] OR "social bubble"[Title/Abstract] OR "shelter-in-place"[Title/Abstract] OR "stay-at-home"[Title/Abstract] OR "Work-from-home"[Title/Abstract] OR "working from home"[Title/Abstract] OR "curfew"[Title/Abstract] OR "capacity restriction"[Title/Abstract] OR "capacity restrictions"[Title/Abstract] OR "capacity limit"[Title/Abstract] OR "capacity limits"[Title/Abstract] OR "reduce contact*"[Title/Abstract] OR "reducing contact*"[Title/Abstract] OR "reduced contact*"[Title/Abstract] OR "limit contact*"[Title/Abstract] OR "limit contact*"[Title/Abstract] OR "limiting contact*"[Title/Abstract] OR "limited contact*"[Title/Abstract] OR (("business*"[Title/Abstract] OR "retail"[Title/Abstract] OR "school"[Title/Abstract]) AND ("closure*"[Title/Abstract] OR "lockdown"[Title/Abstract] OR "lock-down"[Title/Abstract]))) AND ("search*"[Title/Abstract] OR "meta-analysis"[Publication Type] OR "meta-analysis"[Title/Abstract] OR "meta analysis as topic"[MeSH Terms] OR "review"[Publication Type] OR "diagnosis"[MeSH Subheading] OR "associated"[Title/Abstract])) OR (("COVID 19"[MeSH Terms] OR "COVID 19"[All Fields] OR "SARS CoV 2"[All Fields] OR "SARS CoV 2"[MeSH Terms] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR ("SARS CoV 2"[MeSH Terms] OR "SARS CoV 2"[All Fields] OR "ncov"[All Fields]) OR "2019 ncov"[All Fields] OR

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	down"[Title/Abstract]))) AND ("cohort studies"[MeSH Terms:noexp] OR "longitudinal studies"[MeSH Terms:noexp] OR "follow up studies"[MeSH Terms:noexp] OR "prospective studies"[MeSH Terms:noexp] OR "retrospective studies"[MeSH Terms:noexp] OR "cohort"[Title/Abstract] OR "longitudinal"[Title/Abstract] OR "prospective"[Title/Abstract] OR "retrospective"[Title/Abstract])) OR (("COVID 19"[MeSH Terms] OR "COVID 19"[All Fields] OR "SARS CoV 2"[All Fields] OR "SARS CoV 2"[MeSH Terms] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR ("SARS CoV 2"[MeSH Terms] OR "SARS CoV 2"[All Fields] OR "ncov"[All Fields]) OR "2019 ncov"[All Fields] OR "coronavirus infections"[MeSH Terms] OR "coronavirus"[MeSH Terms] OR ("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields] OR "coronaviruses"[All Fields]) OR ("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields] OR "coronaviruses"[All Fields]) OR "betacoronavirus"[MeSH Terms] OR ("betacoronavirus"[MeSH Terms] OR "betacoronavirus"[All Fields] OR "betacoronaviruses"[All Fields]) OR ("betacoronavirus"[MeSH Terms] OR "betacoronavirus"[All Fields] OR "betacoronaviruses"[All Fields]) OR "wuhan coronavirus"[All Fields] OR "2019nCoV"[All Fields] OR "betacoronavirus*"[All Fields] OR "corona virus*"[All Fields] OR "coronavirus*"[All Fields] OR "coronovirus*"[All Fields] OR "CoV"[All Fields] OR "CoV2"[All Fields] OR ("SARS CoV 2"[MeSH Terms] OR "SARS CoV 2"[All Fields] OR "covid"[All Fields] OR "COVID 19"[MeSH Terms] OR "COVID 19"[All Fields]) OR ("COVID 19"[MeSH Terms] OR "COVID 19"[All Fields] OR "covid19"[All Fields]) OR ("COVID 19"[All Fields] OR "COVID 19"[MeSH Terms] OR "covid 19 vaccines"[All Fields] OR "covid 19 vaccines"[MeSH Terms] OR "covid 19 serotherapy"[All Fields] OR "covid 19 serotherapy"[Supplementary Concept] OR "covid 19 nucleic acid testing"[All Fields] OR "covid 19 nucleic acid testing"[MeSH Terms] OR "covid 19 serological testing"[All Fields] OR "covid 19 serological testing"[MeSH Terms] OR "covid 19 testing"[All Fields] OR "covid 19 testing"[MeSH Terms] OR "SARS CoV 2"[All Fields] OR "SARS CoV 2"[MeSH Terms] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR "ncov"[All Fields] OR "2019 ncov"[All Fields] OR (("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields] OR "CoV"[All Fields]) AND 2019/11/01:3000/12/31[Date - Publication])) OR ("SARS CoV 2"[MeSH Terms] OR "SARS CoV 2"[All Fields] OR "hcov 19"[All Fields]) OR ("SARS CoV 2"[MeSH Terms] OR "SARS CoV 2"[All Fields] OR "ncov"[All Fields]) OR "SARS CoV 2"[All Fields] OR ("SARS CoV 2"[MeSH Terms] OR "SARS CoV 2"[All Fields] OR "sars2"[All Fields]) OR "SARSCoV"[All Fields] OR ("sars virus"[MeSH Terms] OR ("sars"[All Fields] AND "virus"[All Fields]) OR "sars virus"[All Fields] OR ("sars"[All Fields] AND "CoV"[All Fields]) OR "sars cov"[All Fields]) OR "SARS-CoV2"[All Fields]) AND "English"[Language] AND 2020/01/01:2023/01/01[Date - Publication] AND ("cohorting"[Title/Abstract] OR "community containment"[Title/Abstract] OR "social bubble"[Title/Abstract] OR "shelter-in-place"[Title/Abstract] OR "stay-at-home"[Title/Abstract] OR "Work-from-home"[Title/Abstract] OR "working from home"[Title/Abstract] OR "curfew"[Title/Abstract] OR "capacity restriction"[Title/Abstract] OR "capacity restrictions"[Title/Abstract] OR "capacity limit"[Title/Abstract] OR "capacity limits"[Title/Abstract] OR "reduce contact*"[Title/Abstract] OR "reducing contact*"[Title/Abstract] OR "reduced contact*"[Title/Abstract] OR "limit contact*"[Title/Abstract] OR "limit contact*"[Title/Abstract] OR "limiting contact*"[Title/Abstract] OR "limited contact*"[Title/Abstract] OR (("business*"[Title/Abstract] OR "retail"[Title/Abstract] OR "school"[Title/Abstract]) AND ("closure*"[Title/Abstract] OR "lockdown"[Title/Abstract] OR "lock-down"[Title/Abstract]))) AND ("case control studies"[MeSH Terms:noexp] OR "retrospective studies"[MeSH Terms:noexp] OR "control groups"[MeSH Terms:noexp] OR ("case"[Title/Abstract] AND "control"[Title/Abstract]) OR ("cases"[Title/Abstract] AND "controls"[Title/Abstract]) OR ("cases"[Title/Abstract] AND "Controlled"[Title/Abstract]) OR ("case"[Title/Abstract] AND "comparison*"[Title/Abstract]) OR ("cases"[Title/Abstract] AND "comparison*"[Title/Abstract]) OR "control group"[Title/Abstract] OR "control groups"[Title/Abstract]))) NOT ("animals"[MeSH Terms] NOT ("animals"[MeSH Terms] AND "humans"[MeSH Terms]))

Appendix 2: Studies excluded at the last stages of reviewing

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Appendix 3: Data extraction form

1. Date released (DD Month YYYY)

...

2. Setting and time covered

(City/region, Country; OR "Global")

...

3. Study Characteristics: Design

(Your assessment which may/may not align with authors; for quasi-experimental studies include details if able about approach such as interrupted- time-series or difference in differences, etc.)

...

4. Study Characteristics: Intervention/Exposure

(How is this defined in the study)

...

5. Study characteritics: sample

...

6. Study characteristics: Key Outcomes

(Only include those relevant to our research question, be succinct but specific)

...

7. Study characterstics: Variants of Concern assessed

(Authors may state explicitly in analysis for example comparing alpha vs. delta waves, but may need to look in the introductino or discussion for context about the variants of concern circulating at the time period of data collection; for data collected early in the pandemic please use your judgement as to when it is safe to state No VoCs circulating)

...

8. Summary of key findings in relation to the research question

Appendix 4: Plain Language Summary: Do measures that aim to reduce contacts help to control the spread of COVID-19?

What are measures to reduce contacts?

Measures to reduce contacts are policies or rules that are put in place to decrease the number of people that a person could spread COVID-19 to. In this review, these include curfews, cancelling public events, closing public transit, restricting large gatherings, closing schools, workplaces or businesses and stay-at-home orders.

What questions did this review answer?

- Do measures to reduce contacts decrease the number of COVID-19 cases?
- Do measures to reduce contacts decrease the number of people who are hospitalized or die from COVID-19?
- Do measures to reduce contacts decrease the number of other infections that are mainly spread through our airways?

What did we do?

We searched for studies in scientific databases that sought to answer these questions. We included studies from around the world that were published from January 1, 2020 to March 3, 2023.

Key results

We found 56 studies. Most studies described how these measures changed the number of cases of COVID-19 (46 studies). The other studies described how these measures changed the number of hospitalizations and deaths due to COVID-19 (17 studies), or the number of cases caused by other respiratory viruses (4 studies).

While studies could come from anywhere in the world, most studies were from Europe (11 studies) or North America (13 studies).

Decreasing the number of COVID-19 cases

- Gathering restrictions appeared to decrease the spread of COVID-19 (23 studies). These restrictions were more effective with stricter limits (e.g., a limit of groups of 10 instead of groups of 100).
- Closing schools decreased the number of COVID-19 cases in the first wave of the pandemic, but the impact from later time periods on the number of COVID-19 cases was inconsistent (29 studies).
- Stay-at-home orders were consistently found to decrease the number of COVID-19 cases (27 studies).
- Closing public transit (5 studies) and curfews (5 studies) led to a small decrease in the number of COVID-19 cases (5 studies).
- There were mixed findings for cancelling public events (7 studies) and closing businesses (24 studies).

Reducing COVID-19 hospitalizations and deaths

- All studies collected most, if not all, of this data prior to widespread availability of vaccines.
- Curfews (1 study), cancelling public events (1 study), and closing public transit (1 study) decreased the number of deaths due to COVID-19.
- Gathering restrictions had mixed results on deaths due to COVID-19 (7 studies).
- Closing schools (11 studies) and stay-at-home orders (12 studies) did not decrease the number of deaths due to COVID-19.
- Closing businesses may not have any effect on COVID-19 deaths (12 studies). The findings were mixed because of the different types of workplaces studied.
- There is limited evidence reporting on hospitalization due to COVID-19 (3 studies).

Decreasing the number of other respiratory infections

- School closures during the first wave of the pandemic reduced the spread of Influenza A (i.e., the more common form of the flu) (1 study) and respiratory syncytial virus (1 study), but not bronchiolitis (1 study).
- Cancelling public events, closing public transit, gathering restrictions, and workplace closures did not appear to decrease the number of cases of epidemic influenza (1 study).

How confident are we in the results of the studies?

Our confidence in these findings is limited. Because the studies were conducted in real-world settings, where a number of measures were put in place at the same time, the types of studies that would be needed to understand the impact of each measure individually are not possible to conduct. Despite this, these studies represent the best available information to use for decision-making on public health measures that reduce contacts.

Conclusions

The most effective measures aimed at reducing the spread of COVID-19 appear to be gathering restrictions, stay-at-home orders, and school closures. Although some studies suggest measures result in reductions in COVID-19 hospitalizations and deaths, the findings are mixed.