COVID-19 Living Evidence Synthesis 16.2a: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

Date of Literature Search: 27 Jan 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 LESs are updated every six weeks and include enhancements from the previous versions (e.g., inclusion of additional study designs and updated risk of bias assessments). The most up-to-date version of this and other LESs in the suite are available on the COVID-END website.

Question
1. 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?

Executive summary

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.

What is new in this version?
• Three studies reporting only on secondary outcomes of reduced transmission of other respiratory viruses have been added in this version. School closures appear to reduce the risk of transmission of Influenza A and RSV but not physician-diagnosed cases of bronchiolitis. Other measures to reduce contacts were not associated with the likelihood of a seasonal influenza epidemic.
LES 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
LES 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

**Key points**
- Gathering restrictions, stay-at-home orders, and school closures (particularly in the first wave of the pandemic) appear to be associated with reduced transmission of COVID-19.
- There was inconsistent evidence for the association between closing public transit, cancelling public events, and workplace and business closures and reduced transmission of COVID-19; while these interventions were found to be effective in some studies, 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.
- Very limited evidence exists on the role of measures to individual measures to reduce contacts and the risk of transmission of other respiratory viruses.

**Overview of evidence and knowledge gaps**
- 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.
- 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.
- 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.

Infographic
Box 1: 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, cross-sectional studies, case reports, case series, and press releases excluded. Other study designs may be considered for future versions in the absence of other forms of evidence. 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 (R₀), 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 RCTs we used ROB-2, and for observational studies, we used ROBINS-I. Judgements for the domains within these tools will be decided by consensus within synthesis team and undergo revision with subsequent iterations of the LES as needed. Additional ROB tools will be added as needed to fit with other study designs. Once a study was deemed to meet one criterion that made it “critical” risk of bias, it was dropped without completing the full ROB assessment. Our detailed approach to critical appraisal is provided in Appendix 4.

Summaries: We summarized the evidence by presenting narrative evidence profiles across studies by outcome measure. Future versions may include statistical pooling of results if deemed appropriate.

We will update this document every six weeks up to the end of March 2023.
Findings

- In this version a total of 55 studies were included, 44 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 34 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.

4 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 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.

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.

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.

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 synthesis and 10 single studies reported the impact of workplace closures on COVID-19 associated deaths. Overall, workplace closures may not be associated with COVID-19 associated deaths, although highly heterogeneous categories of workplaces were examined within studies.

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

Four single studies (three newly identified, one previously reported) 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 measure 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, and 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 for Version 1 and Version 2 combined.
Table 1: Summary of syntheses reporting on effectiveness of measures to reduce contacts for preventing COVID-19 infections

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and search date</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Quality Rating</th>
</tr>
</thead>
</table>
**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 |
<table>
<thead>
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</tr>
</thead>
</table>
**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 |
**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 |
## Reference Table

<table>
<thead>
<tr>
<th>Reference</th>
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<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Quality Rating</th>
</tr>
</thead>
</table>
**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 R, ROB is moderate | Moderate |
**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           |
**LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and search date</th>
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</table>
Intervention: Stay-at-home order  
Sample: 12 studies total; 3 on stay-at-home orders  
Date NR  
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 |
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 |
**Reference**


**Date released**

20 June 2021

**Setting and search date**

Global

20 January - 9 March 2021

**Study characteristics**

**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 preprints).

**Key outcomes**: Overall effectiveness as measured by Rt, epidemic growth and daily incidence

**VOCs assessed**: NR

**Summary of key findings in relation to the outcome**

- 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 gathering bans in studies of higher and intermediate quality.
- 30 studies were rated moderate-high quality; 4 low quality

**Quality Rating**

Moderate
### LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

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<th>Quality Rating</th>
</tr>
</thead>
</table>
**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. | Moderate |
**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

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
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<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previously reported evidence</td>
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</tbody>
</table>
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

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</tr>
</thead>
</table>
**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 |
**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 |
LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

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</tr>
</thead>
</table>
**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) | Critical |
### Table 2B: Summary of studies reporting on the effectiveness of cancellation of public events in preventing COVID-19 infections

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Previously reported evidence</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
**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. | Moderate |
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). | Serious |
**LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings**

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<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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 |
**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 |
## LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

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<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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 |
**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) | Critical |
Table 2C: Summary of studies reporting on effectiveness of closing public transport in preventing COVID-19 infections

<table>
<thead>
<tr>
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<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
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. | Moderate |
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) | Serious |
<table>
<thead>
<tr>
<th>Reference</th>
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<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun, J., Zheng, Y., Liang, W., Yang, Z., Zeng, Z., Li, T… Zhong, N. (2022). <em>Quantifying the Effect of Public Activity Intervention Policies on COVID-19 Pandemic Containment Using Epidemiologic Data From 145 Countries</em>. <em>Value in health</em>, 25(5), 699–708.</td>
<td>08 December 2021</td>
<td>Global 31 December 2019 - 01 July 2020</td>
<td><strong>Design</strong>: Quasi  <strong>Intervention</strong>: Closing public transport  <strong>Sample</strong>: Daily confirmed cases of COVID-19 for 145 countries from Oxford COVID-19 Government Response Tracker  <strong>Key outcomes</strong>: Estimated cumulative infections per million population for each country on July 1, 2020, correlated with policy start date, stringency (e.g., stringency), and duration (correlation coefficient, r); COVID-19 time-varying Rt  <strong>VOCs assessed</strong>: NR</td>
<td>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.</td>
<td>Serious</td>
</tr>
<tr>
<td>Liu, Y., Morgenstern, C., Kelly, J., Lowe, R., CMMID COVID-19 Working Group, &amp; Jit, M. (2021). <em>The impact of non-pharmaceutical interventions on SARS-CoV-2 transmission across 130 countries and territories</em>. <em>BMC medicine</em>, 19(1), 40.</td>
<td>5 February 2021 (in progress)</td>
<td>Global 1 January - 22 June 2020</td>
<td><strong>Design</strong>: Interrupted time series  <strong>Intervention</strong>: Closing public transport  <strong>Sample</strong>: EpiForecasts data paired with OxCGRT data (total # observations NR) for 130 countries (follow up time NR)  <strong>Key outcomes</strong>: Rt  <strong>VOCs assessed</strong>: NR</td>
<td>Closing public transit was associated with reductions in Rt (p&lt;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.</td>
<td>Serious</td>
</tr>
</tbody>
</table>
**Table 2D: Summary of studies reporting on effectiveness of gathering restrictions in preventing COVID-19 infections**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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 |
<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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)). | Critical     |
**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. | Moderate     |
### LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
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<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
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</tr>
</thead>
</table>
**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). | Serious |
**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 |
<table>
<thead>
<tr>
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</tr>
</thead>
</table>
**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) | Critical |
**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 |
<table>
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<tr>
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</tr>
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</table>
**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 |
**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); | Critical |
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<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
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</thead>
</table>
**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 |
| 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. | 2 June 2021 | Canada, USA, Australia, the EU-15 countries, Norway and Switzerland | **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. | Critical |
## LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

<table>
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<tbody>
<tr>
<td>Kharya, P., Koparkar, A.R., Dixit, A.M., Joshi, H.S., &amp; Rath, R.S. (2021). <em>Impact of Nonpharmacological Public Health Interventions on Epidemiological Parameters of COVID-19 Pandemic in India</em>. Cureus, 13(6), e15393.</td>
<td>02 June 2021</td>
<td>India January 2020 – June 2020</td>
<td>Design: Quasi&lt;br&gt;Intervention: Gathering restrictions&lt;br&gt;Sample: COVID-19 case data from government of India data, pre-lockdown (January – March 2020), lockdown (April – May 2020), and post-lockdown (June 2020).&lt;br&gt;Key outcomes: Role of individual interventions on COVID-19 median doubling time and basic Rt (RT; calculated for a rolling 7-day period)&lt;br&gt;VOCs assessed: NR</td>
<td>Prior to lockdown gathering restrictions were not associated with median doubling time (0.2639, p &gt;0.05), or decrease in Rt (-1.35e14, p&gt;0.05).</td>
<td>Critical</td>
</tr>
<tr>
<td>Brauner, J.M., Mindermann, S., Sharma, M., Johnston, D., Salvatier, J., Gavenčiak, T., … Kulveit, J. (2021). <em>Inferring the effectiveness of government interventions against COVID-19</em>. Science, 371(6531), eabd9338.</td>
<td>19 February 2021</td>
<td>Global 22 January 2020 – 30 May 2020</td>
<td>Design: Cohort&lt;br&gt;Intervention: Gathering restrictions&lt;br&gt;Sample: Data on confirmed COVID-19 cases and deaths from the Johns Hopkins CSSE COVID-19 Dataset for 41 countries.&lt;br&gt;Key outcomes: % reduction in Rt&lt;br&gt;VOCs assessed: NR</td>
<td>Gathering restrictions were associated with reductions in Rt:&lt;br&gt;• Limiting gatherings to &lt; 1000 people: -23% (95% CI = -40, 0)&lt;br&gt;• Limiting gatherings to &lt; 100 people: -34% (95% CI = -52, -12)&lt;br&gt;• Limiting gatherings to &lt; 10 people: -42% (95% CI = -60, -17)</td>
<td>Moderate</td>
</tr>
</tbody>
</table>
## LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

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</tr>
</thead>
<tbody>
<tr>
<td>Liu, Y., Morgenstern, C., Kelly, J., Lowe, R., CMMID COVID-19 Working Group, &amp; Jit, M. (2021). The impact of non-pharmaceutical interventions on SARS-CoV-2 transmission across 130 countries and territories. <em>BMC medicine</em>, 19(1), 40.</td>
<td>5 February 2021 (in progress)</td>
<td>Global 1 January – 22 June 2020</td>
<td><strong>Design:</strong> Interrupted time series  <strong>Intervention:</strong> Gathering restrictions  <strong>Sample:</strong> EpiForecasts data paired with OxCGRT data (total # observations NR) for 130 countries (follow up time NR)  <strong>Key outcomes:</strong> Rt  <strong>VOCs assessed:</strong> NR</td>
<td>Data suggest that gathering restrictions were only effective when more stringently applied (p &lt; 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.</td>
<td>Serious</td>
</tr>
<tr>
<td>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. <em>The American journal of the medical sciences</em>, 361(5), 575–584.</td>
<td>8 January 2021</td>
<td>United States  January - 30 April 2020</td>
<td><strong>Design:</strong> Interrupted time series  <strong>Intervention:</strong> Limiting mass gatherings  <strong>Sample:</strong> 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.  <strong>Key outcomes:</strong> Average weekly Rt after a territory's 500th case  <strong>Doubling time from 500 to 1000 cases</strong>  <strong>VOCs assessed:</strong> NR</td>
<td>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).</td>
<td>Critical</td>
</tr>
</tbody>
</table>
### Reference

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<tr>
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<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
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. | Serious |
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. | Critical |
### LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td>4 August 2020</td>
<td>USA (California, Florida, New York, and Texas) 1 March - May 31, 2020</td>
<td><strong>Design:</strong> Cohort  <strong>Intervention:</strong> Gathering restrictions  <strong>Sample:</strong> 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</td>
<td>Mass gathering restriction duration was not associated with a decrease in daily COVID-19 case rates (-2.8, SE: 12.81) (p=0.83).</td>
<td>Critical</td>
</tr>
<tr>
<td>Fellows, I.E., Slayton, R.B., &amp; 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.</td>
<td>6 June 2020</td>
<td>United States 22 January - 25 April 2020</td>
<td><strong>Design:</strong> Interrupted time series  <strong>Intervention:</strong> Gathering restrictions  <strong>Sample:</strong> COVID Tracking Project data (total # observations NR) for 51 states up. Follow-up time NR.  <strong>Key outcomes:</strong> % reduction in Rt (7-day rolling average)  <strong>VOCs assessed:</strong> None</td>
<td>Gathering restrictions were not associated with a decrease in Rt (-5% (95% CI = -12, 4))</td>
<td>Critical</td>
</tr>
</tbody>
</table>
### Reference


### Date released

08 May 2020

### Setting and time covered

Global
20 Mar 2020 - 27 Mar 2020

### Study characteristics

**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

### Summary of key findings in relation to the outcome

Mass gathering restrictions were associated with a reduction in epidemic growth (RRR 0.65, 95% CI = 0.53, 0.79).

### Risk of Bias

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

<table>
<thead>
<tr>
<th>Reference</th>
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<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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. | Serious       |
**LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings**

<table>
<thead>
<tr>
<th>Reference</th>
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<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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 |
### LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

<table>
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<tr>
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<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
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. | Serious |
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. | Moderate |
<table>
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</table>
**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). | Serious |
**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 |
<table>
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</table>
**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      |
**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). | Critical     |
### LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

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</tr>
</thead>
</table>
**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 |
**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 |

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.


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.
**LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings**

<table>
<thead>
<tr>
<th>Reference</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Banholzer, N., van Weenen, E., Lison, A., Cenedese, A., Seeliger, A., Kratzwald, B., … Vach, W. (2021). <em>Estimating the effects of non-pharmaceutical interventions on the number of new infections with COVID-19 during the first epidemic wave</em>. <em>PloS one</em>, 16(6), e0252827.</td>
<td>2 June 2021</td>
<td>Canada, USA, Australia, the EU-15 countries, Norway and Switzerland February - May 2020</td>
<td><strong>Design:</strong> Interrupted time series <strong>Intervention:</strong> School closures <strong>Sample:</strong> 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</td>
<td>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.</td>
<td>Critical</td>
</tr>
<tr>
<td>Brauner, J.M., Mindermann, S., Sharma, M., Johnston, D., Salvatier, J., Gavenčiak, T., … Kulveit, J. (2021). <em>Inferring the effectiveness of government interventions against COVID-19</em>. <em>Science</em>, 371(6531), cabd9338.</td>
<td>19 February 2021</td>
<td>Global 22 January 2020 - 30 May 2020</td>
<td><strong>Design:</strong> Cohort <strong>Intervention:</strong> School and university closures <strong>Sample:</strong> Data on confirmed COVID-19 cases and deaths from the Johns Hopkins CSSE COVID-19 Dataset for 41 countries.</td>
<td>School closures were associated with reductions in Rt (-38%, 95% CI = -54, -16)</td>
<td>Moderate</td>
</tr>
</tbody>
</table>
### LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

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</thead>
</table>
**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 |
**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). | Critical |
## LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

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</tr>
</thead>
</table>
**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:** $R_t$ was derived from case counts.  
**VOCs assessed:** None | Closures of schools and universities were associated with a reduction in $R_t$, -23.7%, 95%CI -40.4, -0.7. | Critical |
**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. | Serious |
### Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

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</table>
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). | Critical |
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. | Moderate |
**LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-healthcare community-based settings**

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</tr>
</thead>
</table>
**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 |
**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

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Lesmes, P., Sornay-Rendu, E., &amp; Delacroix, E. (2022).</td>
<td>5 July 2022</td>
<td>United States</td>
<td>Design: Retrospective cohort</td>
<td>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).</td>
<td>Critical</td>
</tr>
<tr>
<td>Ofori, S.K., Ogwara, C.A., Kwon, S., Hua, X., Martin, K.M., Mallhi, A.K., &amp; Fung, I.C. (2022). SARS-CoV-2 transmission potential and rural-urban disease burden disparities across Alabama, Louisiana, and Mississippi, March 2021 - May 2021. Annals of epidemiology, 71, 1–8.</td>
<td>25 April 2022</td>
<td>Alabama, Louisiana &amp; Mississippi, USA</td>
<td>Key outcomes: Change in COVID-19 case rates (in each state)</td>
<td>Stay-at-home orders were associated with minimum of 20% decline in Rt in all three states: Louisiana (-37.82%, 95% CI = -39.80, -35.76), Alabama (-25.81%, 95% CI = -28.78%, -22.69%), Mississippi (-20.05%, 95% CI = -23.27, -15.96).</td>
<td>Serious</td>
</tr>
<tr>
<td>Intervention: Stay-at-home order</td>
<td></td>
<td></td>
<td>VOCs assessed: NR</td>
<td>VOCs assessed: NR</td>
<td>Critical</td>
</tr>
<tr>
<td>Sample: Cumulative incidence data from The New York Times GitHub data repository</td>
<td></td>
<td></td>
<td>Key outcomes: Change in COVID-19 case rates (in each state)</td>
<td>Key outcomes: Change in COVID-19 case rates (in each state)</td>
<td>Critical</td>
</tr>
<tr>
<td>VOCs assessed: NR</td>
<td></td>
<td></td>
<td>Key outcomes: Change in COVID-19 case rates (in each state)</td>
<td>Key outcomes: Change in COVID-19 case rates (in each state)</td>
<td>Critical</td>
</tr>
</tbody>
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<th>Reference</th>
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</tr>
</thead>
</table>
**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. | Moderate |
**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) | Serious |
# LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

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</tr>
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</table>
**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 |
**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) | Critical |
<table>
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</table>
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 |
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). | Critical |

**Date released:** 10 June 2021  
**Setting and time covered:** United States  
**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  
**Summary of key findings in relation to the outcome:** 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).


**Date released:** 2 June 2021  
**Setting and time covered:** Canada, USA, Australia, the EU-15 countries, Norway and Switzerland  
**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  
**Summary of key findings in relation to the outcome:** 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.


**Date released:** 13 April 2021

**Setting and time covered:** France
- 1 March 2020 - 30 January 2021

**Study characteristics:**
- **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

**Summary of key findings in relation to the outcome:**
- There was no significant correlation between stay-at-home orders and Rt ($r=0.09$) ($p<0.05$).

**Risk of Bias:** Critical

### Reference: Lockdown benefit varies among countries and sub-national units: a reanalysis of the data by Bendavid et al.

**Boesch, L. (2021):** Lockdown benefit varies among countries and sub-national units: a reanalysis of the data by Bendavid et al. *Preprint.*

**Date released:** 09 March 2021

**Setting and time covered:** Global
- 18 February 2020 - 06 April 2020

**Study characteristics:**
- **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

**Summary of key findings in relation to the outcome:**
- Mandatory stay-at-home orders were associated with a decrease in COVID-19 growth rates (-0.216 (units unknown), SE=0.048, $p=0.026$).

**Risk of Bias:** Serious
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<tbody>
<tr>
<td>Dreher, N., Spiera, Z., McAuley, F.M., Kuohn, L., Durbin, J.R., Marayati, N.F., … Choudhri, T.F. (2021). <em>Policy Interventions, Social Distancing, and SARS-CoV-2 Transmission in the United States: A Retrospective State-level Analysis</em>. The American journal of the medical sciences, 361(5), 575–584.</td>
<td>8 January 2021</td>
<td>United States January - 30 April 2020</td>
<td><strong>Design</strong>: Interrupted time series  <strong>Intervention</strong>: Stay-at-home order <strong>Sample</strong>: 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. <strong>Key outcomes</strong>: Average weekly Rt after a territory's 500th case Doubling time from 500 to 1000 cases <strong>VOCs assessed</strong>: NR</td>
<td>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).</td>
<td>Critical</td>
</tr>
<tr>
<td>Olney, A.M., Smith, J., Sen, S., Thomas, F., &amp; Unwin, H.J.T. (2021). <em>Estimating the Effect of Social Distancing Interventions on COVID-19 in the United States</em>. American journal of epidemiology, 190(8), 1504–1509.</td>
<td>7 January 2021</td>
<td>United States 29 February 2020 - 25 April 2020</td>
<td><strong>Design</strong>: Interrupted Time Series <strong>Intervention</strong>: Stay-at-home order <strong>Sample</strong>: 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. <strong>Key outcomes</strong>: Rt was derived from case counts. <strong>VOCs assessed</strong>: None</td>
<td>Stay-at-home orders were associated with a reduction in RT, -54.%, 95%CI -62.7, -44.7.</td>
<td>Critical</td>
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</table>
**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). Only descriptive data are reported, and it is not clear which pairwise comparisons were made or why. | Critical |
**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. | Moderate |
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</thead>
<tbody>
<tr>
<td>Guo, S., An, R., McBride, T.D., Yu, D., Fu, L., &amp; Yang, Y. (2021).</td>
<td>21 September 2020</td>
<td>United States</td>
<td>Design: Quasi-experimental</td>
<td>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).</td>
<td>Critical</td>
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<td>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.</td>
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<td></td>
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<td>Key outcomes: Cumulative cases per 10,000 population, cumulative new cases per 10,000 population,</td>
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<td>VOCs assessed: None</td>
<td></td>
<td></td>
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<tr>
<td>Hwang, N., Chatterjee, S., Di, Y., &amp; Bhattacharyya, S. (2020).</td>
<td>21 September 2020</td>
<td>Saline County, Arkansas, United States</td>
<td>Design: Quasi-experimental studies; difference in differences</td>
<td>Juvenile stay-at-home order (anyone under 18 is not allowed to leave the house unless accompanied by an adult) is associated with a decrease in cases per day of $-4.08 \times 10^{-0.4}$.</td>
<td>Critical</td>
</tr>
<tr>
<td>Estimating the treatment effect of the juvenile stay-at-home order on SARS-CoV-2 infection spread in Saline County, Arkansas, Preprint.</td>
<td></td>
<td>6 April 2020- 7 May 2020</td>
<td>Intervention: Juvenile stay-at-home order</td>
<td></td>
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<tr>
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<td></td>
<td>Sample: Number of cases per day before and after juvenile stay-at-home order in counties that did and did not implement.</td>
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<td>Key outcomes: COVID-19 cases per day</td>
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<td>VOCs assessed: NR</td>
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</tr>
</thead>
</table>
**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). | Critical |
### Reference

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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%) | Critical |
**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) | Critical |
<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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 |
Table 2G: Summary of studies reporting on effectiveness of workplace opening/closure in preventing COVID-19 infections

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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)).  
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)). | Critical |

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## LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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. | Moderate |
**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). | Serious |
### Summary of key findings in relation to the outcome

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>McHugh, M., Tian, Y., Macchling, C.R., Farley, D., &amp; Holl, J.L. (2021). <em>Closure of Anchor Businesses Reduced COVID-19 Transmission During the Early Months of the Pandemic</em>. <em>Journal of occupational and environmental medicine</em>, 63(12), 1019–1023.</td>
<td>12 December 2021</td>
<td>United States 1 March 2020 - 31 May 2020</td>
<td><strong>Design</strong>: Interrupted time series  <strong>Intervention</strong>: Workplace closures  <strong>Sample</strong>: Daily cases from publicly available county-level data 20 days before, 40 days after business closures  <strong>Key outcomes</strong>: Adjusted daily incidence; cases/100,000</td>
<td>IRR (anchor business closures vs. non-closure): 0.93 (P &lt; 0.001); equivalent to an estimated 142 cases per 100,000 over a 40-day period</td>
</tr>
<tr>
<td>Sun, J., Zheng, Y., Liang, W., Yang, Z., Zeng, Z., Li, T… Zhong, N. (2022). <em>Quantifying the Effect of Public Activity Intervention Policies on COVID-19 Pandemic Containment Using Epidemiologic Data From 145 Countries</em>. <em>Value in health</em>, 25(5), 699–708.</td>
<td>08 December 2021</td>
<td>Global 31 December 2019 - 01 July 2020</td>
<td><strong>Design</strong>: Quasi  <strong>Intervention</strong>: Workplace closures  <strong>Sample</strong>: Daily confirmed cases of COVID-19 for 145 countries from <a href="https://ourworldindata.org">https://ourworldindata.org</a> 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  <strong>Key outcomes</strong>: 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</td>
<td>Workplace closures were associated with a decrease in Rt, the average effect over 90-days was -0.29, 95% CI = -0.38, -0.20.</td>
</tr>
</tbody>
</table>
### Reference


**Date released:** 9 November 2021  
**Setting and time covered:** Global  
**Study characteristics:**  
**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  
**Summary of key findings in relation to the outcome:** 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).  
**Risk of Bias:** Critical


**Date released:** 5 October 2021  
**Setting and time covered:** Europe  
**Study characteristics:**  
**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  
**Summary of key findings in relation to the outcome:** 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)).  
**Risk of Bias:** Critical
<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
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 |
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). | Critical |
<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
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</tr>
</thead>
</table>
**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 |
**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. | Critical |
### LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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 |
**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, $p=0.148$). | Serious |
### Reference

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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. | Serious |
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) | Moderate |
LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
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<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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 |
**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). | Critical |
### Reference

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
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). | Critical |
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 | Critical |
**LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings**

<table>
<thead>
<tr>
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<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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 |
Table 3: Summary of syntheses reporting on effectiveness of measures to reduce contacts for preventing COVID-19 hospitalizations and deaths

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Quality Rating</th>
</tr>
</thead>
</table>
**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 |
## LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Quality Rating</th>
</tr>
</thead>
</table>
**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

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kalra, A., &amp; Novosad, P. (2021). Impacts of regional lockdown policies on COVID-19 transmission in India in 2020. Preprint.</td>
<td>10 August 2021</td>
<td>India March - August 2020</td>
<td>Design: Interrupted time series</td>
<td>Curfews were associated with a decrease in death growth rate (-0.59 (SE: 0.12), p&lt;0.001)) 14 days after policy implementation.</td>
<td>Critical</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Intervention: Curfews</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Sample: District level COVID-19 data for six states (total # of observations NR) up to 7 days after implementation.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Key outcomes: COVID-19 growth in death rate 14-days after NPI implementation.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>VOCs assessed: No VoCs circulating</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

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

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
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

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previously reported evidence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**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

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahlers, M.J., Aralis, H.J., Tang, W.L., Sussman, J.B., Fonarow, G.C., &amp; Ziaeian, B. (2021). Non-Pharmaceutical Interventions and COVID-19 Burden in the United States. Preprint.</td>
<td>5 July 2022</td>
<td>United States 19 January 2020 - 7 March 2021</td>
<td>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</td>
<td>Indoor gathering bans were not associated with decreased death rate whether mild (&gt;10 people, AOR: 0.78 (95% CI = 0.56, 1.09) or strict (&lt;10 people, AOR: 1.08 (95% CI = 0.72,2.17).</td>
<td>Critical</td>
</tr>
<tr>
<td>Stokes, J., Turner, A.J., Anselmi, L., Morciano, M., &amp; 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.</td>
<td>3 June 2022</td>
<td>Global January 2020 - 1 June 2020</td>
<td>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</td>
<td>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).</td>
<td>Moderate</td>
</tr>
<tr>
<td>Reference</td>
<td>Date released</td>
<td>Setting and time covered</td>
<td>Study characteristics</td>
<td>Summary of key findings in relation to the outcome</td>
<td>Risk of Bias</td>
</tr>
<tr>
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</tbody>
</table>
**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). | Critical |
**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). | Critical |
### Reference

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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 |
**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). | Critical |
<table>
<thead>
<tr>
<th>Reference</th>
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<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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, -0.158), daily new deaths per 10,000 (0.013, 95% CI: -0.151, 0.177). | Critical |
Table 4E: Summary of studies reporting on effectiveness of school closures for reducing COVID-19 associated hospitalizations and deaths

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
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). | Moderate |
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). | Critical |
<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simetin, I.P., Svajda, M., Ivanko, P., Dimnjakovic, J., Belavic, A., Istvanovic, A., &amp; Poljicanin, T. (2021). COVID-19 incidence, hospitalizations and mortality trends in Croatia and school closures. Public health, 198, 164–170.</td>
<td>3 August 2021</td>
<td>Croatia  25 February 2020-14 March 2021</td>
<td><strong>Design:</strong> Quasi experimental  <strong>Intervention:</strong> School closures  <strong>Sample:</strong> National-level surveillance data  <strong>Key outcomes:</strong> COVID-19 associated hospitalizations; COVID-19 associated deaths % average change  <strong>VOCs assessed:</strong> NR</td>
<td>Average % change in weekly change in COVID-19 associated hospitalizations observed over school holidays across age groups (7-14 years: 42.08, p &lt;0.001; 5-18 years: +51.96, p &lt;0.001; 19-25 years: 24.82, p &lt; 0.001; 26-65 years: 32.67, p &lt; 0.001; 66+ years: 21.76, p &lt;0.001); however these started prior to school closures.</td>
<td>Critical</td>
</tr>
<tr>
<td>Hunter, P.R., Colón-González, F.J., Brainard, J., &amp; 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.</td>
<td>15 July 2021</td>
<td>30 European Countries  Up to 24 April 2020</td>
<td><strong>Design:</strong> Quasi-experimental, interrupted time series  <strong>Intervention:</strong> School closures  <strong>Sample:</strong> European Centre for Disease Prevention and Control (up to 24 April 2020)  <strong>Key outcomes:</strong> 7-day rolling average deaths, adjusted to number of tests reported per 1 million population  <strong>VOCs assessed:</strong> First (no variant)</td>
<td>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)</td>
<td>Critical</td>
</tr>
</tbody>
</table>
### Reference

<table>
<thead>
<tr>
<th>Reference</th>
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<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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 |
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 |
## LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
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<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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). | Critical |
**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). | Critical |
### Table 1: Summary of key findings in relation to the outcome

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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). | Critical |
**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. | Moderate |
Table 4F: Summary of studies reporting on effectiveness of stay-at-home orders for reducing COVID-19 associated hospitalizations and deaths

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Previously reported evidence</strong></td>
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</tr>
</tbody>
</table>
**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). | Critical |
**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) | Moderate |
<table>
<thead>
<tr>
<th>Reference</th>
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<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
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). | Critical       |
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), | Critical     |
### Reference

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<thead>
<tr>
<th>Reference</th>
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<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
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 |
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). | Serious |
<table>
<thead>
<tr>
<th>Reference</th>
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<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>McCafferty, S., &amp; 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.</td>
<td>27 April 2021</td>
<td>United States; Europe; NR - June 17, 2020</td>
<td><strong>Design:</strong> Cross-sectional study&lt;br&gt;<strong>Intervention:</strong> Stay-at-home order&lt;br&gt;<strong>Sample:</strong> 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).&lt;br&gt;<strong>Key outcomes:</strong> Peak mortality rate (highest recorded daily deaths over a 7-day average)&lt;br&gt;<strong>VOCs assessed:</strong> None</td>
<td>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).</td>
<td>Critical</td>
</tr>
<tr>
<td>Lansiaux, E., Caut, J.; Forget, J., &amp; Pébay, P.P. (2021): Assessing the efficiency of COVID-19 NPIs in France: a retrospective study using a novel methodology. Preprint.</td>
<td>13 April 2021</td>
<td>France; 1 March 2020 - 30 January 2021</td>
<td><strong>Design:</strong> Interrupted time series&lt;br&gt;<strong>Intervention:</strong> Stay-at-home order&lt;br&gt;<strong>Sample:</strong> Metropolitan France ministry data (total number of observations NR), at a minimum of 90 days post implementation&lt;br&gt;<strong>Key outcomes:</strong> Daily number of COVID-19 hospitalizations, daily number of COVID-19 ICU admissions&lt;br&gt;<strong>VOCs assessed:</strong> No VoCs circulating</td>
<td>Stay-at-home orders were associated with a moderate positive correlation with COVID-19 hospitalizations (r=0.29) and ICU admissions (r=0.31).</td>
<td>Critical</td>
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</table>
### Reference

<table>
<thead>
<tr>
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<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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). | Critical |
**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 ($\beta = -0.204; 95\% \text{ CI: } -0.294, -0.113$).  
• 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 ($\beta = 0.068; 95\% \text{ CI: } 0.044, 0.091$). 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. | Moderate |
<table>
<thead>
<tr>
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<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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 [-0.093, 0.278]) or death rate (0.037, 95% CI: -0.130, 0.203) | Critical |
Table 4G: Summary of studies reporting on effectiveness of workplace opening/closure for reducing COVID-19 associated hospitalizations and deaths

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date released</th>
<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
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) | Moderate |
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). | Critical |
### Reference

<table>
<thead>
<tr>
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<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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), temples (-0.31, SE: 0.03, p <0.001)). | Critical |
**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. | Critical |
<table>
<thead>
<tr>
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<th>Setting and time covered</th>
<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
</tr>
</thead>
</table>
**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 |
**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 |
## Reference

<table>
<thead>
<tr>
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<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
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</table>
| 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 States; 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). | Critical |
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 |
**LES 16.1b: Effectiveness of measures to reduce contacts for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings**

<table>
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<th>Study characteristics</th>
<th>Summary of key findings in relation to the outcome</th>
<th>Risk of Bias</th>
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</table>
**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). | Critical |
**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). | Critical |
Table 5: Summary of studies reporting on effectiveness of measures to reduce contacts for reducing other respiratory infections

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<td>New evidence reported on February 10, 2023</td>
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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 |
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**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). | Critical |
### Previously reported evidence

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</thead>
</table>
**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). | Critical |
Table 6: Syntheses reporting on secondary outcomes

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<thead>
<tr>
<th>Author</th>
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<tbody>
<tr>
<td>Tan, W.</td>
<td>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</td>
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<td>10.11604/pamj.supp.2020.37.2.25183</td>
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<td>Koszalinski, Rebecca S., Olmos, Brenda</td>
<td>Communication challenges in social isolation, subjective cognitive decline, and mental health status in older adults: A scoping review (2019–2021)</td>
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<td>Burnatowska, Ewelina, Surma, StanisÅ‚aw, Olszanecka-Glinianowicz, Magdalena</td>
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<td>Soysal, Pinar, Smith, Lee, Trott, Mike, Alexopoulos, Panagiotis, Barbagallo, Mario, Tan, Semen Gokee, Koyanagi, Ai, Shenkin, Susan, Veronese, Nicola</td>
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<td>Schneider, J., Pegram, G., Gibson, B., Talamonti, D., Tinoco, A., Craddock, N., Matheson, E., Forshaw, M.</td>
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<td>Sohi, Ivneet, Chrystoja, Bethany R., Rehm, JÁ/vargen, Wells, Samantha, Monteiro, Maristela, Ali, Shehzad, Shield, Kevin D.</td>
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<td>Effects of COVID-19 lockdown on eating disorders and obesity: A systematic review and meta-analysis</td>
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<td>Martinez-Ferran, MarÃ­a de la GuÃ­a-Galipienso, Fernando, Sanchis-Gomar, FabiÃ¡n, Pareja-Galeano, Helios</td>
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<td>Alamri, E. S.</td>
<td>Effects of covid-19 home confinement on eating behavior: A review</td>
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<td>Chackalackal, Dhia Joseph, Al Aghbari, Ahmed Asa Ad, Jang, Su Yeon, Ramirez, Tatiana Rivera, Vincent, Jose, Joshi, Anand, Banjara, Megha Raj, Asaga, Peter, Sanchez, Rocio Cardenas, Carrillo, Maria Angelica, Villa, Juan Manuel, Monsalve, Sonia Diaz, Kroeger, Axel</td>
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<td>Vasiliiu, O.</td>
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<td>Green, Heidi, Fernandez, Ritin, MacPhail, Catherine</td>
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Acknowledgements

To help Canadian decision-makers as they respond to unprecedented challenges related to the COVID-19 pandemic, COVID-END in Canada is preparing evidence syntheses like this one. This living evidence synthesis was commissioned by the Office of the Chief Science Officer, Public Health Agency of Canada. The development and continued updating of this living evidence synthesis has been funded by the Canadian Institutes of Health Research (CIHR) and the Public Health Agency of Canada. The opinions, results, and conclusions are those of the team that prepared the evidence synthesis, and independent of the Government of Canada, CIHR, and the Public Health Agency of Canada. No endorsement by the Government of Canada, Public Health Agency of Canada or CIHR is intended or should be inferred.

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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

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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 characteristics: sample
   ...

6. Study characteristics: Key Outcomes
   (Only include those relevant to our research question, be succinct but specific)
   ...

7. Study characteristics: Variants of Concern assessed
   (Authors may state explicitly in analysis for example comparing alpha vs. delta waves, but may need to look in the introduction 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)
   ...

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8. Summary of key findings in relation to the research question
Appendix 4: Approach to critical appraisal

The risk of bias (ROB) of individual studies was assessed by the team using validated ROB tools. Observational studies and were assessed using the ROBINS-I tool, and syntheses of evidence were assessed using AMSTAR 1. ROB was assessed by one reviewer and verified by a second.