COVID-19 Living Evidence Synthesis 14.2:
Effectiveness of masks for reducing transmission of COVID-19 in non-health care community-based settings

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Please note: This living evidence synthesis (LES) 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.

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Question

What is the best-available evidence about the effectiveness of masks in reducing transmission of COVID-19 in non-health care community-based settings?

Sub-questions:

1. What is the best-available evidence about which types of masks are the most effective at reducing transmission of COVID-19 in non-health care community-based settings?
2. What is the best-available evidence about the effectiveness of mask mandates in reducing transmission of COVID-19 in non-health care community-based settings?
3. In studies about the effectiveness of masks in reducing transmission of COVID-19, was there evidence about the effectiveness of masks in reducing transmission of other respiratory infections?
4. What knowledge gaps and/or methodological gaps exist in the scientific literature related to masks for COVID-19?

Executive summary

Background

- This living evidence synthesis (LES) focused on the impact of masking is one of a suite of eight LESs aiming to describe the effectiveness of, and adherence to, public health and social measures (PHSMs) for reducing transmission of COVID-19 and other respiratory infections in non-health care community-based settings. The suite also aims to identify knowledge gaps in the scientific literature and potential negative outcomes associated with these PHSMs.
- Recommendations and mandates to use masks, respirators, and other facial coverings have been common PHSMs during the pandemic. Through a lens of the hierarchy of evidence, the initial version of this report focused on studies of higher quality (randomized controlled trials [RCTs] of mask use). This version adds summaries of studies lower in the hierarchy, including observational studies about the effectiveness of masks (including different types of masks) and mask mandates in reducing transmission of COVID-19 in community settings.
- Face coverings of variable filtration efficiency are implemented in these studies. In this review "medical masks" refer to multilayer polypropylene masks as used in medical and surgical health care settings, cloth masks are face coverings of variable manufacture that cover the mouth and nose, and respirator masks refer to polypropylene masks manufactured for higher filtration efficiency which are usually intended to be fit tested to the wearer.

Key points

- **Majority of studies favoured masks.** Observational studies were the most common design contributing evidence to this question (n=34/37; 92%). Overall, there were more studies favouring masks (n=23/24; 96%) and mask mandates (n=9/10; 90%) to reduce transmission than those that found no effect (n=2/34; 6%); no studies found that masks or mask mandates increased transmission. However, effect size, sample size, outcome measures, and intervention characteristics varied greatly across studies.
- **Randomized controlled trials (RCTs) were rare.** RCTs about the effectiveness of masks in reducing transmission of COVID-19 in the community are limited in number with only three in community-based settings currently published. All three RCTs were assessed to have high risk of bias, and all took place before the more highly transmissible Omicron variant became prevalent.
- **Critical risk of bias in almost all observational studies.** Risk of bias was assessed to be critical in almost all observational studies (n=31/34; 91%). Of these 31 studies, 19 had an unpredictable direction of bias and 11 favoured mask use.
- **Non-adjustment for confounding factors was common.** Many studies were assessed to have a critical risk of bias either due the authors' inability to definitively relate outcomes to masks or mask mandates alone (n=12/37; 32%) or due to a failure to adjust for other COVID-19 protective interventions either before or during the study period (n=6/37; 16%). This illustrates the difficulty in studying the effectiveness of masks and mask mandates, which are rarely the sole measure taken to prevent or control COVID-19.
- **Masking most often measured using questionnaires.** Almost all observational studies of the effectiveness of masks in general or types of masks relied on self-reported mask-wearing behaviour collected via questionnaire (n=22/24; 92%). These studies are therefore subject to recall and social desirability bias. Studies of mask mandates (n=10) relied on publicly available

information about what requirements were in effect, and did not measure adherence. Only two studies involved active observation of mask use.

- **Adherence was rarely measured.** In addition to mask type and quality, adherence is likely to influence the protective effects of masking and is therefore an important factor to consider in this literature. Assessing and reporting of adherence was rare and varied across included studies.
- **Laboratory-confirmed COVID-19 was a required outcome measure for inclusion in this review.** COVID-19 infection was confirmed using nasal or saliva testing (RT-PCR n=11/37; 30% or PCR n=7/37; 19%), seropositivity testing (n=10/37; 27%), or non-specific "molecular" testing (n=2/37; 5%). Five studies (14%) were not specific about the testing method for laboratory-confirmed cases, and three studies (8%) relied on databases of laboratory-confirmed cases for their analysis. 18 studies using self-reported COVID-19 status were excluded from this review.
- **Little evidence comparing types of masks.** Two studies (one RCT, one observational) found that surgical masks were more effective than cloth masks, one RCT found that surgical masks plus face shields were non-inferior to surgical masks alone, and one observational study found that the type of mask was not significantly associated with infection risk.
- **Schools were most common setting for mask mandate studies.** The majority (n=6/10; 60%) of observational studies examining mask mandates have been conducted in school settings.
- **Overall, the existing body of literature examining effectiveness of masks and mask mandates is of low quality.** In general, the strength of the findings to support an evidence-based conclusion is low. The studies included in this review may serve as a valuable source for hypothesis generation.

Patient-identified key messages

Patients and families, particularly those with compromised health, worry about how the limited level of evidence supporting the use of masks to reduce transmission of COVID-19 will impact adherence in community settings.

Overview of evidence and knowledge gaps

- As with many PHSMs for reducing transmission of COVID-19, there is a paucity of high-quality evidence about effectiveness.
- Modelling and mechanical studies were the most common study design excluded from this LES. Study designs that measure real-world human response to complex natural, political, and social phenomena are needed to explain human behaviour related to masking in community settings as a PHSM, and how that impacts effectiveness of this intervention.
- Standardized strategies for recording and reporting adherence to masking are needed.

Findings

- 37 studies (3 RCTs and 34 observational studies) are included in this LES.
- 1 RCT reports on the effectiveness of masks in general in reducing transmission, 1 RCT reports on different types of masks, and 1 RCT reports on both.
- 24 observational studies report on the effectiveness of masks in reducing transmission, of which 22 used a comparison group and 2 were single-arm studies.
- 2 observational studies report on different types of masks, both of which used a comparison group.
- 10 observational studies report on mask mandates, of which 9 used a comparator and 1 was a single-arm study.
- 1 RCT and no observational studies report on masks to reduce other respiratory infections as a secondary outcome.
- All RCTs were assessed to have high risk of bias.
- Among observational studies, all except three (one at moderate risk, two at serious risk) were assessed to have critical risk of bias.
- A PRISMA 2020 flow diagram of the screening process is shown in Figure 1.

Box 1: Our approach

We retrieved candidate studies by searching: 1) PubMed; 2) the iCite pre-print server; 3) Embase; 4) CINAHL; and 5) ERIC. 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 were identified up to ten days before the version release date. 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: Any device that covers the nose and mouth and that may reduce the risk of spreading or becoming infected with an infectious pathogen. May include non-medical masks, medical masks, and/or respirators.

Primary outcome: Reduction in transmission of COVID-19; **Secondary outcomes**: Reduction in COVID-19 associated 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 a modified version of ROBINS-I. Judgements for the domains within these tools were decided by consensus of the synthesis team and underwent revision with subsequent iterations of the LES as needed. Once a study was seemed 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.

Box 2: Summary of findings about the primary outcome: Masks for reducing transmission of COVID-19

26 studies (2 RCTs, 24 observational) were included that report on masks for reducing transmission of COVID-19. The characteristics, findings and assessment of risk of bias for each study are presented in Table 1.

The body of RCT related to the effectiveness of masks in reducing transmission of COVID-19 is sparse and inconclusive. While a community-based implementation cluster RCT **(Abaluck et al., 2022)** found a 9.5% reduction in symptomatic seroprevalence and an estimated 11.6% reduction in proportion of individuals with COVID-19-like symptoms in those who used masks versus those who did not, the other RCT **(Bundgaard et al., 2021)** found no statistically significant difference (1.8% versus 2.1% incidence, compared with a 46% reduction to 23% increase in infection) in reduction of SARS-CoV-2 infection transmission between the intervention group (medical masking recommendation) and control group. Both RCTs were assessed to have a high risk of bias.

The only observational study with a moderate (rather than critical) risk of bias was **Andrejko et al. (2022b)**, a case-control study that controlled for all important confounding factors and matched cases with controls. They found that mask usage was protective when both parties reported mask usage, when exposures took place outside the household, when exposures involved no physical contact, and when exposures were indoors.

The remaining 23 studies in this section (21 with a comparison group, 2 without), all at critical risk of bias, have wide variation in study design, intervention characteristics, and outcome measures. Two are preprints that have not been subject to peer review.

Studies of masks for reducing transmission of COVID-19

Randomized controlled trials

*Both studies in this section have a **high** risk of bias*

In a cluster RCT involving adults living in rural villages dispersed throughout Bangladesh, **Abaluck et al. (2022)** examined the community-level impact of a range of mask promotion strategies including free masks, information on the importance of masking, role modeling by community leaders and reminders for 8 weeks, versus no intervention, on SARS-CoV-2 seroprevalence. Mask-wearing was assessed at community locations through direct observation at least weekly. Blood samples were collected at 10-12 week follow ups for symptomatic individuals. Findings estimate 11.6% reduction in COVID-19 symptoms and 9.5% reduction in symptomatic seroprevalence between intervention and control arms after adjusting for baseline covariates. Of note, proper mask wearing increased from 13.3% in control villages to 42.3% in intervention villages.

This study was found to have a **high** risk of bias (favouring intervention).

In another RCT involving adults in Denmark, **Bundgaard et al. (2021)** evaluated the impact on SARS-CoV-2 infection of receiving recommendations to wear a mask while outside of the home and providing 50 disposable masks. At the time of this study mask wearing was uncommon and not a recommended PHSM in Denmark. Participants were randomized to intervention (n=3,030) and control (n=2,994) groups at two time periods (April 12, 2020 and April 24, 2020) and were followed for 4 weeks after randomization. SARS-CoV-2 infection was determined by a positive result with either a self-administered oropharyngeal/nasal swab test, a positive SARS-COV-2 antibody test or a hospital-based diagnosis. Infections occurred in 42 participants (1.8%) in the mask group and 53 (2.1%) in the control group. Following an intention-to-treat analysis the between group difference favored the mask group but did not reach statistical significance –0.3 (95%CI: -1.2–0.4); p=0.38 (OR, 0.82 [95%CI: 0.54–1.23]; p=0.33). At follow-up, less than half (46%) of participants in the intervention group reported wearing masks as recommended and 7% reported nonadherence. Further, in three unplanned, post hoc analyses accounting for only those participants reporting wearing masks "exactly as instructed", excluding participants who did not provide antibody tests at baseline, and different constellations of patient characteristics, investigators did not find a subgroup where masks were effective at conventional levels of statistical significance.

This study was found to have a **high** risk of bias (unpredictable direction).

Observational studies with a comparison group

Moderate *risk of bias*

Andrejko et al. (2022b) conducted a case-control study of 1,006 California residents to identify predictors of SARS-CoV-2 infection following high-risk exposures. Participants (n=1,448) with positive COVID-19 test results reported to the California Department of Public Health were matched with 1,443 COVID-19-negative controls. Cases and controls were contacted at random within 48 hours of their test results and administered a standardized phone-based questionnaire about their exposures over the 14 days preceding their tests, including whether they or their contacts had worn masks. Findings indicated that 52% of cases (n=751/1,448) and 18% of controls (n=255/1,443) reported high-risk exposures; among these participants, 14% of cases (n=101) and 34% of controls (n=87) reported mask usage during these exposures. Mask usage was protective when both parties reported mask usage (aOR=0.50; 95%CI: 0.26–0.96), when exposures took place outside the household (aOR=0.39; 95%CI: 0.22–0.70), when exposures involved no physical contact (aOR=0.37; 95%CI: 0.20–0.69), and when exposures were indoors (aOR=0.51; 95%CI: 0.28–0.93). Mask usage was not protective when exposures happened within the household, involved physical contact, or occurred outdoors. Notably, the benefits of mask-wearing were found to be highest in unvaccinated and partially vaccinated participants.

This study was assessed to have a **moderate** risk of bias (unpredictable direction). The authors adjusted for all important confounding factors, demographics, calendar time, and matched cases with controls. However, they did not account for mask mandates in effect at the time of the study.

Critical *risk of bias*

In North Carolina, **Gigot et al. (2022)** conducted a prospective cohort study of industrial livestock operation (ILO) workers, their families, and their neighbours from February 2021 to July 2022. The objective was to ascertain SARS-CoV-2 IgG antibody prevalence among participants via self-

collected saliva samples, and to gather data on participant demographics, preventive behaviours including masking, and health history via a phone-based questionnaire. ILO workers and their families were compared to their neighbours and to non-ILO participants living in metropolitan areas of North Carolina. Among all 279 participants, not wearing a mask in public during the previous two weeks was associated with higher IgG prevalence (78.6%) compared to wearing a mask (49.3%; PR=1.59; 95%CI: 1.19-2.13). However, no comparison in mask-wearing was made between any of the groups, making it impossible to ascertain if masks were preventive in ILO vs. non-ILO settings.

As a **preprint**, this study has not undergone peer review.

This study was assessed to have a **critical** risk of bias (unpredictable direction).

In a case-control involving residents in California (n=1,828), **Andrejko et al. (2022a)** examined the effectiveness of masks and respirators (NN95/KN95) against COVID-19 transmission over a 10-month span in 2021. Mask use and type of mask used were compared via self-report between identified test-positive cases and test-negative controls. Acquisition of COVID-19 was measured with a positive molecular test result for SARS-CoV-2. Odds ratio calculations were used to calculate COVID-19 risk. Self-reported use of any mask in indoor settings was associated with a significantly lower risk of contracting the virus (aOR= 0.51; 95%CI: 0.29–0.93). Self-reported data on face mask use identified those who always wore a mask had significantly lower odds of a positive COVID-19 test compared to those who never masked (aOR= 0.44; 95%CI: 0.24–0.82). Reductions in positive tests were also noted among those who masked most (aOR= 0.55; 95%CI: 0.29–1.05) or sometimes (aOR = 0.71; 95%CI: 0.35–1.46) compared to those who never masked. The author noted potential limitations of the study, primarily that other prevention measures may have been used with masks, which could also reduce COVID-19 transmission.

This study was assessed to have a **critical** risk of bias (favours mask use).

In a secondary analysis of case control data, involving students and staff from Georgia, USA, **Hast et al. (2022)** sought to evaluate transmission of COVID-19 between positive staff and students and contacts at school. Data was collected between December 2020 and January 2021. Mandatory mask use was in place in schools and on the school bus, among other public health measures. COVID-19 transmission was measured using RT-PCR tests. Transmission of COVID-19 and characteristics were assessed using descriptive statistics and logistic regressions. 628 students and staff completed the survey and COVID-19 testing. Among study findings, elementary aged students had a positivity rate of 44% (n=4/9) among unmasked students who played sports compared to 8% among other students (n=28/344; OR=9.0, 95%CI: 2.3-35.5; p<0.005). Among middle/high school students, COVID-19 positive rate was 18% (n=15/85) among students who played sports compared to 6% in other students (n=7/121; OR=3.5, 95%CI: 1.4-9.0). Positive rate increased to 20% (n=15/74) among sports-playing students who reported unmasked sport playing time compared to 6% among masked sports-playing students (OR=4.3, 95%CI: 1.7-11.3; p<0.001).

This study was assessed to have a **critical** risk of bias (favours mask use).

In a retrospective study of 21 basketball players and 48 staff at a professional basketball sporting event in November 2020 in Germany, **Pauser et al. (2021)** studied mask use for the length of the sporting event in three different zones. Community masks, surgical masks, and particle filtering masks (FFP2, FFP3, and KN95) masks were used. COVID-19 cases post-sporting event were

measured using PCR testing. Participants were contacted about PCR testing after the event, testing was performed in approximately 90% of the participants. Using statistical methods, it was shown that self-reported wearing of masks (medical face mask - community masks and/or surgical masks) or particle filter masks (FFP2, FFP3 or KN95) was associated with a reduced risk of SARS-CoV-2 transmission from 83% to 46%.

This study was assessed to have a **critical** risk of bias (unpredictable direction).

In a case-control study involving residents of Iowa, USA, **Riley et al. (2022)** examined the effects of masks on secondary attack rates of COVID-19 between October 2020 and February 2021. COVID-19 rates were assessed using laboratory-confirmed tests. Using logic regressions, the authors found a secondary attack rate of 12.5% when it was self-reported that both parties were masked (n= 47/376; 95%CI: 9.6-16.3%). Most contacts were exposed when it was self-reported that at least one person was not wearing a mask, resulting in an overall infection rate in this group of 25.6% (n=151/590; 95%CI: 22.3-29.4%); this rate varied if the COVID-19 positive person was masked (29.1%; 95%CI: 19.3-43.9%) or if the contact was the masked person (10%; 95%CI: 4-25.3%). When all parties were not masked, the rates were 26.4% (95%CI: 22.9-30.7). Among contacts who were school-aged children (n=426; aged 5-18 years), 53 tested positive when at least one person was not masked (5.2%; 95%CI: 20.1-32.0%) and increased to 12% when both people were masked (95%CI: 8.4-17.2%).

This study was assessed to have a **critical** risk of bias (favours mask use).

In a survey of residents of Islamabad, Pakistan, **Baig et al. (2021)** examined the association between SARS-CoV-2 seropositivity and preventive behaviours such as mask-wearing. In a survey of 6,333 individuals who provided blood samples in June 2020, a Chi-Square test indicated that self-reported regular mask use was correlated with lower seroprevalence ($\chi 2 = 8.6$; $p<0.05$) than occasionally or never wearing a mask.

As a **preprint**, this study has not undergone peer review.

This study was assessed to have a **critical** risk of bias (unpredictable direction).

In a cohort study of staff and students in 70 Massachusetts K-12 schools, **Nelson et al. (2021)** examined SARS-CoV-2 secondary attack rate and factor associated with transmission risk. Index cases and their close contacts were questioned about whether both parties were masked or unmasked during their encounter. The secondary attack rate was significantly higher if both reported being unmasked vs. both masked (RR=6.98; 95%CI: 3.09-15.77; $p<0.001$). Although there were three incidences of exposures in which one party was masked and the other unmasked, these data were excluded from the analysis. This study is a preprint and has not been subject to peer review.

This study was assessed to have a **critical** risk of bias (unpredictable direction).

In a case control study involving students at St. Louis University (265 positive cases and 378 close contacts), in St. Louis USA, **Rebmann et al., (2021)** examined how a modified quarantine procedure at the university affected COVID-19 transmission between cases and close contacts during the spring 2021 semester (January-May 2021). COVID-19 transmission to close contacts was monitored through saliva-based PCR tests 5-7 days after exposure. Using t-tests and logistic

regression analyses methods, the authors identified 116/378 (30.7%) of close contacts tested positive for COVID-19. Rates of positive results were significantly higher among self-reported unmasked contact with the initial positive cases (unmasked: n=114/352; 32.4 vs masked: n=2/26; 7.7%; aOR: 5.4, 95%CI: 1.5–36.5; p = 0.008).

This study was assessed to have a **critical** risk of bias (favours mask use).

In an epidemiological surveillance study conducted in Hiroshima Prefecture, Japan, **Sugimura et al. (2021)** evaluated mask-wearing among 820 close contacts of patients with COVID-19. In comparison to self-reported non-mask wearers who had a positive rate of 16.4% for COVID-19, individuals who reported wearing masks possessed a positive rate of 7.1%. A significant relationship between mask use and COVID-19 infections were observed in those who were men, involved in cluster cases, were in contact with the patient at the welfare facility, and worked with the patient.

This study was assessed to have a **critical** risk of bias (unpredictable direction).

In a cross-sectional longitudinal study involving 1,119 primary students, secondary students, staff and household members in Berlin, Germany in November 2020, **Theuring et al. (2021)** examined SARS-CoV-2 transmission and IgG antibodies and associations with individual and institutional prevention measures. SARS-CoV-2 infections and seroreactivity were measured using oral-nasopharyngeal swabs and blood samples, a questionnaire about individual prevention measures was administered, and school-related implementation of government infection was documented. Almost 9 in 10 index participants stated they often or always wore a mask at school, and their infection prevalence was 1.4%. Of those who wore masks never to sometimes, 14.3% tested positive (OR= 11.38; 95%CI: 2.28−59.64). 8 of 16 non-affected classes required masking in the classroom, while only 1 of 8 affected classes required masking.

This study was assessed to have a **critical** risk of bias (unpredictable direction).

In a prospective case-ascertained transmission study involving 15 index cases and 50 household contacts in Los Angeles County households, **Liu et al. (2021)** examined the effect of index case masking vs. not masking on secondary attack rates of household contacts from December 2020 to February 2021. Secondary attack rates were measured using self-collected nasal midturbinate swab specimens in which SARS-CoV-2 positivity was determined using the Swab Seq protocol. Demographics, medical history, household characteristics and control measures were captured via a Qualtrics survey completed by household contacts. Using $\chi 2$ test of proportions, it was found that transmission was significantly lower in households in which the index patient reported being masked compared with those who were unmasked.

This study was assessed to have a **critical** risk of bias (unpredictable direction).

In a cross-sectional survey consisting of 684 individuals aged 15 and older living in congregate households within Dire Dawa city administration, Ethiopia, **Shaweno et al. (2021)** examined self-reported mask-wearing practices while away from home. Blood samples were collected by the Ethiopian Public Health Institute (EPHI) to estimate SAR-CoV-2 antibody seroprevalence. In conducting multivariate logistic regression analyses, SARS-CoV-2 seroprevalence was found to be significantly associated with face mask usage outside of the home. In comparison to individuals who

reported mask-wearing, the odds of SARS-CoV-2 antibody seroprevalence was found to be higher for those who did not use masks when away from home.

This study was assessed to have a **critical** risk of bias (favours mask use).

In a case-control study involving residents of Brazil, **Goncalves et al. (2020)** studied mask use and COVID-19 transmission between April-June 2020. Mandates were in place during the study period, however the authors note there was limited compliance with public health measures, including masking, as a result of influential sources in the country who discredited the pandemic control measures. Self-reported mask use and COVID-19 positive test rates were compared between case patients (n=229) and a subset of controls (n=464/1,396) as mask data was not consistently collected during data collection. From this analysis, mask use was associated with a decrease in COVID-19 cases (OR= 0.12; 95%CI: 0.04-0.30). When data from participants who stayed home at all times were removed from the sample, the trend in decreased COVID-19 cases as a result of mask use was maintained (OR=0.13; 95%CI: 0.04-0.36). When those who never and sometimes masked were grouped and compared with those who always masked, COVID-19 cases remained low (OR: 0.36; 95%CI: 0.17-0.74).

This study was assessed to have a **critical** risk of bias (favours mask use).

Lio et al. (2021) administered a cross-sectional survey to 24 hospitalized COVID-19 patients and 1,113 controls in Macao between March-April 2020. The objective was to evaluate risk and protective factors for COVID-19 infection, including self-reported mask-wearing behaviour. 25% of infected participants reported wearing a mask whenever outdoors vs. 63.5% of controls ($p < 0.001$), and those who wore masks whenever outdoors had a risk reduction of 80.9% (OR: 0.191; 95%CI: 0.075–0.486; $p< 0.005$) compared with those who did not. However, the sample size of COVID-19 infected participants (n=24) was very small.

This study was assessed to have a **critical** risk of bias (unpredictable direction).

In a retrospective cohort study consisting of close contacts of patients with COVID-19 in Thrissur, Kerala, **Areekal et al. (2021)** assessed secondary cases of infection. Contact tracing and telephone interviews for data collection were completed by a dedicated team at the Government Medical College, where the COVID infected patients were admitted. From the 267 admitted patients with COVID-19, 1,286 close contacts were identified, with 311 contacts subsequently testing positive. Results from binary logistic regression analyses suggested that self-reported mask use was associated with a statistically significant reduction of odds of COVID-19 infection (aOR=0.570; 95%CI: 0.461-0.704 p=0.001).

This study was assessed to have a **critical** risk of bias (unpredictable direction).

In a survey study involving 454 community dwelling adults in Vermont, **van den Broek-Altenburg et al. (2021)** measured the prevalence and incidence of COVID-19 and identified masking behaviours outside of work over 2 months. Prevalence of SARS-CoV-2 in the community was measured using PCR testing on nasopharyngeal swabs, while incidence rate was tested using two different serologic assays performed on patient-matched blood samples. Using multivariate analysis, it was found that there was no significant difference between those who tested positive and those who did not, on self-reported mask wearing outside of work. However, statistical analyses were not

performed on the PCR test results because only one positive test was found, thus analyses were based only on patient-matched blood samples.

This study was assessed to have a **critical** risk of bias (unpredictable direction).

In a case-control, test-negative study involving 357 children and adolescents aged <18 years in Mississippi, **Hobbs et al. (2020)** examined the association between positive SARS-CoV-2 infection with parent or guardian reported exposures and mask use over 1 month, with the exposure history of RT-PCR positive participants compared to RT-PCR negative participants. Demographics and other information about exposures were collected using structured telephone interviews with parents or guardians. Children and adolescents who received a positive RT-PCR test were less likely to have a parent/guardian report consistent mask use. However, the sample included children and adolescents who received testing with health care facilities associated with one large academic medical center in Mississippi and might not be representative of children and adolescents in other geographic areas.

This study was assessed to have a **critical** risk of bias (favours mask use).

In a retrospective case-control study involving 211 cases who tested positive for SARS-CoV-2 and 839 controls with negative results in Thailand, **Doung-Ngern et al. (2020)** examined self-report of types of masks used and mask-wearing compliance during interaction with a person with COVID-19 ("index patient"). Cloth face masks were recommended for the public on March 3rd and data used for identifying sample population were gathered during March 1st to 31st, 2020. Comparisons were made across the usage of no masks, nonmedical masks only, medical masks only, and both types of masks. Mask-wearing compliance was rated as "not", "sometimes", or "always" wearing a mask. SARS-CoV-2 cases were confirmed using RT-PCR results. The Thailand Surveillance and Rapid Response Teams provided data for identification of study sample and telephone interviews were used to collect mask-wearing practices. The variable on mask usage of the index patient was not included in the final analyses because it comprised of 27% missing values. Assuming that all other missing values were occurring at random, authors applied the chain equation method to generate imputed datasets. Using multivariable analyses on the imputed datasets, wearing a mask during the entire contact time with a person with COVID-19 was negatively associated with risk for SARS-CoV-2 infection (aOR 0.23; 95% CI 0.09-0.60). Type of masks was not significantly associated with COVID-19 risk (p=0.54). In comparison to those who did not wear a mask, individuals who always wore a mask while in contact with a person with COVID-19 also reported being more likely to have shorter contact duration and practice frequent hand washing.

This study was assessed to have a **critical** risk of bias (favours mask use).

In a survey study involving 382 military service members at a base in Guam, **Payne et al. (2020)** studied the self-reported use of facemasks compared to no facemask use on the risk of SARS-CoV-2 infection. SARS-CoV-2 infection was measured using serum specimens tested for antibody reactivity and RT-PCR nasopharyngeal tests. Participants voluntarily completed a questionnaire which captured demographics, exposure, and preventative measure information at the time of specimen collection. Data from the questionnaire was compared to SARS-CoV-2 infection data and ORs were calculated, which found that lower odds of infection were independently associated with use of face coverings (OR:0.3; 95%CI: 0.2-0.5; p-value: <0.005). Of note, authors used RT-PCR and ELISA tests to determine current or past SARS-CoV-2 infection in the study population.

This study was assessed to have a **critical** risk of bias (favours mask use).

In a retrospective cohort study involving 124 households in Beijing, China, **Wang et al. (2020)** used a questionnaire to examine the self-reported practices (mask wearing, social distancing, living arrangements) of family members 4 days before and 24 hours after another family in the home developed an illness with laboratory confirmed COVID-19. Interview subjects (n=124) ranged in age from 18 years to >60 years and included the primary case and other members of the household. When comparing self-reported mask wearing behaviour of families with and without secondary transmission, 19.5% of households with secondary transmission reported wearing masks all of the time versus 45.8% of households without secondary transmission (OR=0.03; 95%CI: 0.11-0.82). However, households reported other protective behaviours including eating separately and self-isolation after illness onset.

This study was assessed to have a **critical** risk of bias (favours mask use).

Cheng et al. (2020) conducted a study to evaluate the impact of mask usage within the community in managing the COVID-19 pandemic within Hong Kong Special Administrative Region (HKSAR). Between April 6 to 8, 2020, 67 employees from the Infection Control Unit and the Department of Microbiology within Queen Mary Hospital documented whether the first 50 people that they encountered on their way to work were wearing a mask. All SARS-CoV-2 were confirmed according to a screening protocol and daily cases were reported each day by the Center for Health Protection of the Department of Health and Hosptial Authority. During the three consecutive days of assessment, masking behaviour was noted in 10,050 individuals, where 337 (3.4%) people were not using a mask. Within the first 100 days of the pandemic, there were 961 confirmed COVID-19 cases in HKSAR. In examining the 961 cases in clusters involving self-reported masked (e.g., people at work) and unmasked (e.g., dining in restaurants, exercising at the gym) activities, there was significantly greater unmasked COVID-19 cluster settings than the equal number of masked and unmasked clusters predicted by the null hypothesis (p=0.036).

This study was assessed to have a **critical** risk of bias (favours mask use).

Observational studies with no comparison group

*Both studies in this section have a **critical** risk of bias*

In a prospective study following a cohort of schools in two North Carolina school districts, **Moorthy et al. (2022)** evaluated the impact of masking surveillance programs on masking adherence and rates of within-school and county-level transmission of COVID-19. The masking surveillance programs were implemented in 23 elementary schools, 9 middle schools, and 9 high schools with about 22,400 total students. Over a six-week period in District 1 (~2,400 students) and a five-week period in District 2 (~20,000 students), staff and students were shown an educational video about proper cloth and medical mask use, and then a surveillance program was implemented in which safety team leaders or administrators performed regular walkthroughs to monitor adherence and remind non-compliant individuals to wear their masks properly. COVID-19 rates were measured both at the county level (using three publicly accessible databases) and at the school level (using data from a concurrent study). Within the study period, both school districts reported 127 overall primary SARS-CoV-2 infections documented by diagnostic testing, and 14 cases of

secondary (i.e., within school) transmission, 13 of which occurred in the much larger District 2. County-level rates of infections were low during the study period. The study's lack of a comparison group does not allow for inference of the effect of the masking surveillance program, but secondary transmission did remain low throughout the study period.

This study was assessed to have a **critical** risk of bias (unpredictable direction).

Gillespie et al. (2021) followed a cohort of two independent American K-12 schools during the fall semester of 2020 (approximately between August and December) to study the in-school transmission of COVID-19. A total of 3,699 students and staff from the schools were subjected to a suite of preventive measures, including universal mask mandates except while eating and drinking, as well as regular COVID-19 testing. Contact tracing and cluster analysis of each case were used to identify common linkages, source of COVID-19 introduction, and the potential route of transmission. As a result, it was found that 72% of in-school transmission cases in School A (actual number not reported) were associated with non-adherence to mask mandates. This data analysis was not reported for School B.

This study was assessed to have a **critical** risk of bias (unpredictable direction).

Box 3. Summary of findings about primary outcome: Types of masks for reducing transmission of COVID-19

4 studies (2 RCTs, 2 observational) were included that compare the effectiveness of different types of masks in reducing transmission of COVID-19. The characteristics, findings and assessment of risk of bias for each study is presented in Table 2.

2 RCTs compared different types of masks in community settings. In one **(Abaluck et al., 2022)**, surgical masks outperformed cloth masks when compared with the control group without masks. In the other **(Varela et al., 2022)**, use of a closed face shield with surgical face mask was non-inferior to using surgical mask alone to prevent SARS-CoV-2 infection but adherence was lower in the intervention group. Both studies were at high risk of bias.

One observational study **(Andrejko et al., 2022a)** found that N95/KN95 masks and surgical masks were effective while cloth masks were not, but the other **(Doung-Ngern et al., 2020)** found that type of mask was not significantly associated with infection risk. Both studies were at critical risk of bias.

Studies of types of masks for reducing transmission of COVID-19

Randomized controlled trials

*Both studies in this section have a **high** risk of bias*

Varela et al. (2022) conducted a non-inferiority RCT in Bogota, Colombia to determine the effectiveness of closed face shields with surgical masks compared with using only surgical masks to prevent SARS-CoV-2 transmission. Following randomization to one of two groups, packages containing masks, recorded educational materials about COVID-19 prevention measures, guidance to ensure adherence and appropriate handling of the assigned personal protective equipment (PPE) were mailed to participants. Follow up was conducted twice a week by phone and the primary outcome was the composite of positive RT-PCR or seroconversion during follow-up. A non-inferiority limit of –5% was established based on previous literature examining other respiratory devices. In the intention-to-treat analysis, the absolute risk difference was –1.40 % (95%CI: -4.14%-1.33%; p=0.31). Of note, adherence played an important role in study findings with high adherence to the assigned intervention noted by only 27.4% of the face shield plus surgical mask group compared with 88.6% of the surgical mask comparison group.

This study was found to have a **high** risk of bias due to deviations (adherence).

In a cluster RCT examining the impact of mask wearing on symptomatic SARS-CoV-2 in Bangladesh, **Abaluck et al. (2022)**, cross-randomized villages in the intervention group to receive either a cloth mask or a surgical mask. The control group did not receive any intervention. Mask wearing was assessed through direct observation at least weekly. Blood samples were collected at 10-12 week follow ups for symptomatic individuals. Findings indicate surgical masks lead to a relative reduction in symptomatic seroprevalence of 11.1% (adjusted prevalence ratio =0.89 (95%CI: 0.78–1.00; control prevalence =0.81%; treatment prevalence = 0.72%) and outperform cloth masks

compared with control (adjusted prevalence ratio = 0.94 (95%CI: 0.78–1.10; control=0.67%; treatment=0.61%). The authors note that the statistical significance of the impact of cloth masks varied depending on whether they impute missing values for nonconsenting adults. Further, precision of the results may be impacted by the number of villages assigned to cloth masks (100) versus surgical masks (200). However, there was no significant difference in the rate of mask-wearing between surgical mask villages and cloth mask villages.

This study was found to have a **high** risk of bias (favouring intervention).

Observational studies with a comparison group

*Both studies in this section have a **critical** risk of bias*

In a case-control involving n=1,828 residents in California, **Andrejko et al. (2022a)** examined the effectiveness of masks and respirators (NN95/KN95) against COVID-19 transmission over a 10-month span in 2021. Self-reported mask use and type of mask used were compared between cases and controls. Transmission of COVID-19 was measured with a positive molecular test result for SARS-CoV-2 . Odds ratio calculations were used to calculate COVID-19 transmission and identified use of any mask in indoor settings was associated with a significantly lower risk of contracting the virus (aOR = 0.51; 95%CI: 0.29–0.93). Analysis of mask type identified wearing a N95/KN95 respirator (aOR = 0.17; 95%CI: 0.05–0.64) or surgical mask (aOR = 0.34; 95%CI: 0.13–0.90) were associated with lower positive test rates compared to no mask wearing. Cloth masks also had a lower positive rate when compared to non-masking, however it was not significant (aOR= 0.44; 95%CI: 0.17-1.17). The authors note potential limitations of the study, primarily that other prevention measures may have been used with masks, which could also reduce COVID-19 transmission.

This study was assessed to have a **critical** risk of bias (favours mask use).

In a retrospective case-control study involving 211 cases who tested positive for SARS-CoV-2 and 839 controls with negative results in Thailand, **Doung-Ngern et al. (2020)** examined self-report of types of masks used and mask-wearing compliance during interaction with a person with COVID-19 ("index patient"). Cloth face masks were recommended for the public on March 3rd and data used for identifying sample population were gathered during March 1st to 31st, 2020. Comparisons were made across the usage of no masks, nonmedical masks only, medical masks only, and both types of masks. Mask-wearing compliance was rated as "not", "sometimes", or "always" wearing a mask. SARS-CoV-2 cases were confirmed using RT-PCR results. The Thailand Surveillance and Rapid Response Teams provided data for identification of study sample and telephone interviews were used to collect mask-wearing practices. The variable on mask usage of the index patient was not included in the final analyses because it comprised of 27% missing values. Assuming that all other missing values were occurring at random, authors applied the chain equation method to generate imputed datasets. Using multivariable analyses on the imputed datasets, wearing a mask during the entire contact time with a person with COVID-19 was negatively associated with risk for SARS-CoV-2 infection (aOR 0.23; 95% CI 0.09-0.60). Type of masks was not significantly associated with COVID-19 risk (p=0.54). In comparison to those who did not wear a mask, individuals who always wore a mask while in contact with a person with COVID-19 also reported being more likely to have shorter contact duration and practice frequent hand washing.

This study was assessed to have a **critical** risk of bias (favours mask use).

Box 4. Summary of findings about primary outcome and secondary outcome 1: Mask mandates for reducing transmission of COVID-19 and COVID-19 related deaths

10 studies (all observational) are included that report on the effectiveness of mask mandates in reducing transmission of COVID-19, of which 1 also reported on reduction in deaths. The characteristics, findings and assessment of risk of bias for each study are presented in Table 3.

High-quality evidence relating to mask mandates for reducing transmission of COVID-19 in community settings is lacking, with few studies utilizing comparator groups or controlling for many possible confounders, given that mask mandates generally have been implemented as part of a suite of public health actions and in the context of altered community behaviours, and different levels of community level immune protection from infection and/or vaccination. Studies were limited in accounting for major confounders such as population mobility, distribution of infection risk factors in the population, concurrent public health restrictions, and level of population immunity.

The majority (n=6/10; 60%) of observational studies examining mask mandates have been conducted in school settings.

All studies were determined to be at critical risk of bias.

Studies of mask mandates for reducing transmission of COVID-19 and COVID-19 related deaths

Observational studies with a comparison group

Serious *risk of bias*

Islam et al. (2022) conducted a case-control study involving 38 counties across 4 USA states with populations from 40,000 to 105,000 to examine the effectiveness of mask mandates. 19 test counties were followed for 30 days after implementing their mask mandates. The 19 control counties, without mask mandates, were followed for the same period as their matched test county. Daily COVID-19 transmission data per county was collected using USAfacts.org. Difference-in-difference analysis revealed similar COVID-19 case rates between groups 10 days before the mask mandates were implemented. After 30 days, a difference-in-difference analysis indicated the average treatment effect reduced COVID-19 cases by 4.22 cases per day, or 16.9% (p=0.01). Compliance with mask mandates was not recorded in test counties and it is unknown if other factors such as lockdowns or social distancing were implemented during the study period.

This study was assessed to have a **serious** risk of bias (favouring mask).

In a comparative interrupted time series, **Li et al. (2021)** studied the impact of a mask mandate requiring face masks in public settings on COVID-19 cases and mortality. Data collection was carried out from March 25 to May 6, 2020 in New York (NY; intervention state) and Massachusetts (MA; comparison state). Facemask policy was implemented in NY on April 17, 2020. Data on daily COVID-19 cases for both states were accessed via the COVID Tracking Project and data on daily

COVID-19 deaths were extracted from the *New York Times*, based on reports from state and local health agencies. Comparison between the two states reveal significant differences in both the level of change (2,686, 95%CI: 412-4961) and the trend change (223, 95%CI: 80-366) in the daily number of confirmed cases from pre-intervention to post-intervention. Compliance with mask mandate was not recorded and the effect of inter-state migration between 2 states that share a border was not included in the analysis.

This study was assessed to have a **serious** risk of bias (favouring mask mandate).

***Critical** risk of bias*

In a cohort study of K-12 school districts in Wisconsin, **DeJonge et al. (2022)** examined the association of COVID-19 prevention policies (including masking obligations) within schools and COVID-19 cases among educators. Information about school COVID-19 prevention policies were collected via telephone surveys and information about COVID-19 cases were gathered from the Wisconsin Electronic Disease Surveillance System (WEDSS). The final study sample included 51,997 educators from 307 school districts, whereby 2,828 (5.5%) educators were infected with COVID-19 during September 2 to November 24, 2021. Seventy-three school districts reported having a robust masking policy that required masking in both educators and students. Authors conducted analyses using several data sets: (1) a completed data set with no missing data for any of the prevention policies, (2) an imputed data set that filled in missing policy data from available district-level information, and (3) other data sets that assumed missing policy data were "absent" or "robust". Using the completed data set (no missing policy information) to compare school districts with and without a robust masking policy, those who worked in districts with such masking requirements had an overall 19% reduced COVID-19 hazard during the study period (HR=0.81; 95% CI = 0.67, 0.98). Similar results were observed within other data sets involving imputed data for missing policy information.

This study was assessed to have a **critical** risk of bias (unpredictable direction).

Moek et al. (2022) conducted a retrospective cross-sectional study of in-flight transmission of COVID-19. Ninety-five close flight contacts of cases identified in Berlin, Germany were contacted by public health officials to confirm SARS-CoV-2 testing results. The time period of the study, from January to August 2020, occurred both before (Jan-Jun) and after (Jun-Aug) the implementation of mandatory in-flight masking. Four instances of probable in-flight transmission occurred, whereby two were before the implementation of mandatory masking, and two after. This would suggest that the mask mandate did not affect in-flight transmission. However, the researchers were unable to report data about actual mask usage in these cases, and assumed that passengers generally did not wear masks before the mask mandate was enforced.

This study was assessed to have a **critical** risk of bias (unpredictable direction).

In a prospective observational study comprised of children and staff within schools and pre-schools settings in Mecklenburg-Western Pomerania, Germany, **Sombetzki et al. (2021)** examined mask mandates from August 2020 to May 2021. While masking requirements changes throughout the study period for staff and school-aged students, children who attended pre-school were never required to wear a mask during this timeframe. COVID-19 positive cases were measured using RT-PCR testing. All study data was provided by the State Office for Health and Social Affairs

Mecklenburg-Western Pomerania. Using multivariate regression model analyses, mask mandates for children and adults within school and pre-school settings were reported to significantly decrease the likelihood of secondary SARS-CoV-2 infections.

This study was assessed to have a **critical** risk of bias (unpredictable direction).

In a retrospective observational study involving 59,561 students and 11,854 staff at 783 schools in North Carolina, **Boutzoukas et al. (2022)** examined rates of primary (community-acquired) and secondary (school-acquired) transmissions of COVID-19. All sample schools implemented universal masking policies during the study period from August to November 2021. All staff and students, grades K-12, were required to wear a mask regardless of their vaccination status. The community-acquired to school-acquired infection ratio was calculated by diving the number of primary infections by that of secondary infections, whereby the latter figure was estimated by dividing the total number of within-school infections by the number of exposures requiring quarantine. The ratio of community-acquired to school-acquired infections was about 12.4 (808:64), and the estimated secondary attack rate was 2.6%, suggesting that the in-school mask mandate was associated with a low rate of secondary infection.

This study was assessed to have a **critical** risk of bias (favours masks).

In a study involving students and staff as 1,020 K-12 schools in Arizona, **Jehn et al. (2021)** examined the association between school mask policies and school-associated COVID-19 outbreaks during in-person learning July-August 2021. Masks were required in schools at different stages throughout the year (early and late requirements) and some schools did not have mask requirements. School masking policies were drawn from publicly available mitigation plans, and outbreak data were obtained from Arizona's Medical Electronic Disease Surveillance Intelligence System. Schools enacting late (i.e., reactive) masking policies were excluded from the analysis due to potential confounding from existing outbreaks. Using crude analysis, the odds of a school-associated outbreak in schools with no mask requirement was 3.7 times higher than those in schools with an early (i.e., proactive) mask requirement.

This study was assessed to have a **critical** risk of bias (favours masks).

In a descriptive study of schools in Florida, Doyle et al. (2021) examined mask mandates outlined in the reopening plans of each school district during August to December 2020. Data on positive COVID-19 cases were supplied by the county health department. Overall, higher student incidences of COVID-19 were reported in school districts without mask mandates than those with mask mandates.

This study was assessed to have a **critical** risk of bias (unpredictable direction).

In a study involving approximately 26,000 meat processing workers in Nebraska, **Herstein et al. (2021)** examined the effectiveness of masking and physical barriers over a 4-month period (April - July 2020). Facility masking policies were brought into effect with cloth and surgical masks used. SARS-CoV-2 incidence rates were measured with testing. Using confirmed case data, incidence of SARS-CoV-2 infection before and after the date the last intervention was initiated (e.g., physical barriers were installed if universal mask policy began first) was reported. Ten days after the last intervention was initiated, 8 facilities (62%) showed a statistically significant decrease in incidence

and 3 showed a non-significant decrease, while 1 facility showed a statistically significant increase in incidence and 1 showed a non-significant increase in incidence.

This study was assessed to have a **critical** risk of bias (unpredictable).

Observational studies without a comparison group

In a longitudinal cohort study involving 2,487 children in 55 different schools, in the Canton of Zurich, Switzerland, **Ulyte et al. (2021)** examined the effects of masking on seropositivity over three, one-month periods. Masks were mandated for adults, secondary school children and primary school children at varied time points. Clusters of seropositive children were measured with blood samples that underwent serological testing. Sociodemographic and health information was collected from parents using an online questionnaire. Using Bayesian logistic regression to estimate the proportion of seropositive children, and a difference-in-differences model, it was found that there was evidence to support the preventative effects of masking on seropositivity rates.

This study was assessed to have a **critical** risk of bias (unpredictable direction).

Box 5. Summary of findings about secondary outcome 2: Masks to reduce transmission of <u>other respiratory infections</u>

1 RCT was included reporting on effectiveness of masks in reducing transmission of other respiratory infections as an outcome. The characteristics, findings and assessment of risk of bias for this study is presented in Table 4.

Studies of masks to reduce transmission of other respiratory infections (secondary outcome)

Randomized controlled trial

Bundgaard et al. (2021) conducted an RCT involving adults in Denmark comparing mask recommendations with no mask recommendation. Findings suggest no significant difference between the mask group (0.5% positive) for 1 or more of 11 respiratory viruses other than SARS-CoV-2 compared with the control group (0.6% positive). Between-group difference was determined as -0.1% (95%CI: -0.6–0.4); p=0.87, OR, 0.84 (95%CI: 0.35–2.04); p=0.71.

This study was assessed to have a **high** risk of bias.

Box 6. Knowledge gaps and/or methodological gaps in the scientific literature related to masks for COVID-19

- Strategies that promote masking behaviour (e.g., educational, policy, distribution of supplies, modeling) are not well-described in the literature.
- Standardized strategies for recording and reporting adherence to masking are needed.

Table 1: Summary of studies reporting on effectiveness of masks in reducing transmission of COVID-19 (presented from most to least recent release date)

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Moorthy, G. S., Mann, T. K., Boutzoukas, A. E., Blakemore, A., Brookhart, M. A., Edwards, L., Jackman, J. G., Panayotti, G. M. M., Warren, T., Pendleton, J., Garcés, A. W., Corneli, A., Weber, D. J., Kalu, I. C., Benjamin, D. K., & Zimmerman, K. O. (2022). Masking Adherence in K-12 Schools and SARS-CoV-2 Secondary Transmission. Pediatrics, 149(12 Suppl 2), e2021054268l. https://doi.org/10.1542/peds.2021-054268I	1-Feb-2023	North Carolina, USA Apr 5 - May 21, 2021	**Design**: Prospective cohort study **Intervention**: In-school masking adherence interventions **Sample**: 6 elementary schools with ~2,400 total students in District 1 and 17 elementary schools, 9 middle schools, and 9 high school with ~20,000 total students in District 2 **Key outcomes**: Primary: Proportion of observed students and staff with appropriate mask use; Secondary: Secondary transmission rates within schools **VOCs assessed**: None	• Primary: Within the study period, both school districts reported 127 overall primary SARS-CoV-2 infections documented by diagnostic testing, and 14 cases of secondary (i.e., within school) transmission, 13 of which occurred in the much larger District 2. County-level rates of infections were low during the study period. The study's lack of comparison group does not allow for inference of the effect of the masking surveillance programs, but secondary transmission did remain low throughout the study period. • Secondary: There was high masking adherence (>80%) in both school districts at all school levels (elementary, middle, and high school).	**Critical**; unpredictable direction of bias

Gigot, C., Pisanic, N., Kruczynski, K., Gregory Rivera, M., Spicer, K., Kurowski, K. M., Randad, P., Koehler, K., Clarke, W. A., Holmes, P., Hall, D. J., Jr, Hall, D. J., & Heaney, C. D. (2023). SARS-CoV-2 Antibody Prevalence among Industrial Livestock Operation Workers and Nearby Community Residents, North Carolina, 2021 to 2022. mSphere, e0052222. Advance online publication. https://doi.org/10.1128/msphere.00522-22	19-Jan-2023	North Carolina, USA Feb 2021 - Jul 2022	**Design**: Prospective cohort study **Intervention**: Wearing a mask vs. not wearing a mask **Sample**: 279 individuals from 240 households (80 industrial livestock operation (ILO) workers and their family members, 80 neighbours of ILO (ILON), 80 participants living in metropolitan areas of North Carolina (Metro) **Key outcomes**: SARS-CoV-2 IgG prevalence **VOCs assessed**: None	Participants who reported not wearing a mask in public during the previous two weeks had significantly higher infection-induced IgG prevalence (78.6%) compared to those who reported wearing a mask (49.3%) (PR=1.59; 95%CI: 1.19–2.13)	**Critical**; unpredictable direction of bias
Andrejko, K. L., Pry, J. M., Myers, J. F., Fukui, N., DeGuzman, J. L., Openshaw, J., Watt, J. P., Lewnard, J. A., Jain, S., & California COVID-19 Case-Control Study Team (2022). Effectiveness of Face Mask or Respirator Use in Indoor Public Settings for Prevention of SARS-CoV-2 Infection - California, February-December 2021. MMWR. Morbidity and mortality weekly report, 71(6), 212–216. https://doi.org/10.15585/mmwr.mm7106e1	11-Feb-2022	California, USA Feb 18 – Dec 1, 2021	**Design**: Test-negative design case-control study **Intervention**: Mask use and type of mask **Sample**: n=1,828 California residents (cases: n=652; controls: n=1176) **Key outcomes**: COVID-19 positive test result **VOCs assessed**: None	Self-reported data on face mask use identified those who always wore a mask had significantly lower odds of a positive COVID-19 test compared to those who never masked (aOR = 0.44; 95%CI: 0.24–0.82). Reductions in positive tests were also noted among those who masked most (aOR = 0.55; 95%CI: 0.29–1.05) or some times (aOR = 0.71; 95%CI: 0.35–1.46) compared to those who never masked. For comparison of mask types, see Table 2	**Critical**; favours mask use

Hast, M., Swanson, M., Scott, C., Oraka, E., Espinosa, C., Burnett, E., Kukielka, E. A., Rice, M. E., Mehari, L., McCloud, J., Miller, D., Franklin, R., Tate, J. E., Kirking, H. L., & Morris, E. (2022). Prevalence of risk behaviors and correlates of SARS-CoV-2 positivity among in-school contacts of confirmed cases in a Georgia school district in the pre-vaccine era, December 2020-January 2021. BMC public health, 22(1), 101. https://doi.org/10.1186/s12889-021-12347-7	14-Jan-2022	Georgia, USA Dec 1, 2020 – Jan 26, 2021	**Design**: Secondary analysis of case control study data **Intervention**: All COVID-19 risk behaviours, including masks **Sample**: n=796 students and education staff participated in first survey, 628 completed survey and COVID-19 testing and were eligible for bivariate comparisons **Key outcomes**: COVID-19 transmission between positive cases in student and their close contacts **VOCs assessed**: None	Among study findings, elementary aged students had a positivity rate of 44% (n=4/9) among unmasked students who played sports compared to 8% among other students (n=28/344; OR=9.0, 95%CI: 2.3-35.5; p<0.005). Among middle/high school students, COVID-19 positive rate was 18% (n=15/85) among students who played sports compared to 6% in other students (n=7/121; OR=3.5, 95%CI: 1.4-9.0). Positive rate increased to 20% (n=15/74) among sports-playing students who reported unmasked sport playing time compared to 6% among masked sports-playing students (OR=4.3, 95%CI: 1.7-11.3; p<0.001).	**Critical**; favours mask use
Abaluck, J., Kwong, L. H., Styczynski, A., Haque, A., Kabir, M. A., Bates-Jefferys, E., Crawford, E., Benjamin-Chung, J., Raihan, S., Rahman, S., Benhachmi, S., Bintee, N. Z., Winch, P. J., Hossain, M., Reza, H. M., Jaber, A. A., Momen, S. G., Rahman, A., Banti, F. L., Huq, T. S., … Mobarak, A. M. (2022). Impact of community masking on COVID-19: A cluster-randomized trial in Bangladesh. Science (New York, N.Y.), 375(6577), eabi9069. https://doi.org/10.1126/science.abi9069	14 January 2022	Bangladesh Nov 2020 – Apr 2021	**Design**: Cluster-randomized controlled trial **Intervention**: Free masks (cloth or surgical); information on the importance of masking; role modeling by community leaders; and in-person reminders; vs. no interventions in the control group **Sample**: 342,183 adults (at baseline) from 572 villages: 178,322 in intervention group vs. 163,861 in control group; 336,010 provided symptom data; 10,790 consented to blood collection **Key outcomes**: Primary: symptomatic seroprevalence of SARS-CoV-2; Secondary: prevalence of proper mask-wearing, physical distancing, and symptoms consistent with COVID-19 **VOCs assessed**: None	• Reduction in transmission: 9.5% reduction in symptomatic seroprevalence (IG prevalence = 0.68%, control prevalence = 0.76%); estimated 11.6% reduction in proportion of individuals with COVID-19-like symptoms (IG=7.63%, Control=8.6%) • Other outcomes: Proper mask-wearing was 42.3% in IG vs. 13.3% in CG (adjusted % point difference = 0.29 (95%CI: 0.26–0.31); physical distancing was 29.2% in IG vs. 24.1% in CG (0.05 [0.05, 0.06]); no change in social distancing • For comparison of mask types (surgical vs. cloth), see Table 2	**High**; favours mask use

Andrejko, K. L., Pry, J., Myers, J. F., Openshaw, J., Watt, J., Birkett, N., DeGuzman, J. L., Barbaduomo, C. M., Dong, Z. N., Fang, A. T., Frost, P. M., Ho, T., Javadi, M. H., Li, S. S., Tran, V. H., Wan, C., Jain, S., Lewnard, J. A., & California COVID-19 Case-Control Study Team (2022). Predictors of Severe Acute Respiratory Syndrome Coronavirus 2 Infection Following High-Risk Exposure. Clinical infectious diseases : an official publication of the Infectious Diseases Society of America, 75(1), e276–e288. https://doi.org/10.1093/cid/ciab1040	21-Dec-2021	California, USA Feb 24 - Nov 12, 2021	**Design**: Case-control study (test-negative design) **Intervention**: Mask usage during high-risk exposures **Sample**: 1,006 California residents reporting high-risk exposures ≤14 days before testing: 751 of 1,448 COVID-19 cases vs. 255 of 1,443 COVID-19 negative controls **Key outcomes**: Predictors of SARS-CoV-2 infection among participants reporting high-risk exposures **VOCs assessed**: None	52% of cases (n=751 of 1,448) and 18% of controls (n=255 of 1,443) reported high-risk exposures; among these participants, 14% of cases (n=101) and 34% of controls (n=87) reported mask usage during these exposures. Mask usage was protective when both parties reported mask usage (aOR = 0.50; 95%CI: 0.26–0.96), when exposures took place outside the household (aOR = 0.39; 95%CI: 0.22–0.70), when exposures occurred without physical contact (aOR = 0.37; 95%CI: 0.20–0.69), and when exposures were indoors (aOR = 0.51; 95%CI: 0.28–0.93). Mask usage was not protective when exposures occurred within the household, involved physical contact, or occurred outdoors. Notably, the benefits of mask-wearing were found to be highest in unvaccinated and partially vaccinated participants.	**Moderate**; unpredictable direction of bias
Pauser, J., Schwarz, C., Morgan, J., Jantsch, J., & Brem, M. (2021). SARS-CoV-2 transmission during an indoor professional sporting event. Scientific reports, 11(1), 20723. https://doi.org/10.1038/s41598-021-99997-0	20-Oct-2021	Germany Date range not reported	**Design**: Retrospective study **Intervention**: Mask use **Sample**: 21 players and 48 staff/assistants **Key outcomes**: COVID-19 cases post-sporting event **VOCs assessed**: None	Self-reported wearing of masks (medical face mask - community masks and/or surgical masks) or particle filter masks (FFP2, FFP3 or KN95) was associated with a reduced risk of SARS-CoV-2 transmission from 83% to 46%.	**Critical**; unpredictable direction of bias

Riley, J., Huntley, J. M., Miller, J. A., Slaichert, A. L. B., & Brown, G. D. (2022). Mask Effectiveness for Preventing Secondary Cases of COVID-19, Johnson County, Iowa, USA. Emerging infectious diseases, 28(1), 69–75. https://doi.org/10.3201/eid2801.211591	12-Oct-2021	Iowa, USA Oct 23, 2020 - Feb 29, 2021	**Design**: Case-control **Intervention**: Mask use **Sample**: n=1,400 community residents (431 cases and 969 contacts) **Key outcomes**: Secondary COVID-19 attack rates **VOCs assessed**: None	Using logic regressions, the authors found a secondary attack rate of 12.5% when both parties were masked (n= 47/376; 95%CI: 9.6-16.3%). Most contacts were exposed when at least one person was not wearing a mask, resulting in an overall infection rate in this group of 25.6% (n=151/590; 95%CI: 22.3-29.4%); this rate varied if the COVID-19 positive person was masked (29.1%; 95%CI: 19.3-43.9%) or if the contact was the masked person (10%; 95%CI: 4-25.3%). When all parties were not masked, the rates were 26.4% (95%CI: 22.9-30.7). Among contacts who were school-aged children (n=426; aged 5-18 years), 53 tested positive when at least one person was not masked (5.2%; 95%CI: 20.1-32.0%) and increased to 12% when both people were masked (95%CI: 8.4-17.2%).	**Critical**; favours mask use
Baig, M. A., Ansari, J. A., Ikram, A., Khan, M. A., Salman, M., Hussain, Z., Baig, M. Z. I., Chaudhry, A., Malik, M. W., Akram, K. S., Saeed, A., Ranjha, M. A., Sultan, F., & Sabir, S. (2021). Prevalence of SARS-CoV-2: An age-stratified, population-based, sero-epidemiological survey in Islamabad, Pakistan. medRxiv 2021.09.27.21264003; doi: https://doi.org/10.1101/2021.09.27.21264003	29-Sep-2021	Islamabad, Pakistan June 2020	**Design**: Survey **Intervention**: Wearing a mask regularly vs. occasionally vs. never **Sample**: 6,333 individuals **Key outcomes**: SARS-CoV-2 seropositivity **VOCs assessed**: None	A Chi-Square test indicated that regular mask use was correlated with lower seroprevalence ($\chi 2 = 8.6$; $p<0.05$) than occasionally or never wearing a mask.	**Critical**; unpredictable direction of bias

Nelson, S. B., Dugdale, C. M., Bilinski, A., Cosar, D., Pollock, N. R., & Ciaranello, A. (2021). Prevalence and risk factors for in-school transmission of SARS-CoV-2 in Massachusetts K-12 public schools, 2020-2021. medRxiv 2021.09.22.21263900; doi: https://doi.org/10.1101/2021.09.22.21263900.	26-Sep-2021	Massachusetts, USA 2020-2021 (months not specified)	**Design**: Prospective cohort study **Intervention**: Both parties unmasked vs. both masked **Sample**: 70 schools with ~33,000 enrolled students **Key outcomes**: SARS-CoV-2 secondary attack rate and factors associated with transmission risk **VOCs assessed**: None	The secondary attack rate was significantly higher if both were unmasked vs. both masked (RR 6.98, 95%CI: 3.09-15.77; p<0.001). Although, there were three incidences of exposures in which one party was masked and the other unmasked, these data were excluded from the analysis.	**Critical**; unpredictable direction of bias
Rebmann, T., Loux, T. M., Arnold, L. D., Charney, R., Horton, D., & Gomel, A. (2021). SARS-CoV-2 Transmission to Masked and Unmasked Close Contacts of University Students with COVID-19 - St. Louis, Missouri, January-May 2021. MMWR. Morbidity and mortality weekly report, 70(36), 1245–1248. https://doi.org/10.15585/mmwr.mm7036a3	10-Sep-2021	St. Louis, Missouri, USA Jan - May 2021	**Design**: Case-control **Intervention**: Mask-wearing in context of mask mandate **Sample**: 9,335 students tested for COVID-19 (n=265 positive cases and 378 close contacts identified) **Key outcomes**: COVID-19 transmission between positive cases in student and their close contacts **VOCs assessed**: None	Rates of positive results were significantly higher among unmasked contact with the initial positive cases (unmasked: n=114/352; 32.4 vs masked: n=2/26; 7.7%; aOR: 5.4, 95%CI: 1.5–36.5; p = 0.008).	**Critical**; favours mask use

Sugimura, M., Chimed-Ochir, O., Yumiya, Y., Ohge, H., Shime, N., Sakaguchi, T., Tanaka, J., Takafuta, T., Mimori, M., Kuwabara, M., Asahara, T., Kishita, E., & Kubo, T. (2021). The Association between Wearing a Mask and COVID-19. International journal of environmental research and public health, 18(17), 9131. https://doi.org/10.3390/ijerph18179131	30-Aug-2021	Hiroshima Prefecture, Japan Mar 6 – May 31, 2020	**Design**: Epidemiological surveillance **Intervention**: Mask use vs. no mask use **Sample**: 820 people out of 1,434 interviewees in the analysis who provided answers regarding mask use and had a PCR test **Key outcomes**: COVID-19 infection **VOCs assessed**: None	In comparison to non-mask wearers who had a positive rate of 16.4% for COVID-19, individuals who reported wearing masks possessed a positive rate of 7.1%. A significant relationship between mask use and COVID-19 infections were observed in those who were men, involved in cluster cases, were in contact with the patient at the welfare facility, and worked with the patient.	**Critical**; unpredictable direction of bias
Theuring, S., Thielecke, M., van Loon, W., Hommes, F., Hülso, C., von der Haar, A., Körner, J., Schmidt, M., Böhringer, F., Mall, M. A., Rosen, A., von Kalle, C., Kirchberger, V., Kurth, T., Seybold, J., Mockenhaupt, F. P., & BECOSS Study Group (2021). SARS-CoV-2 infection and transmission in school settings during the second COVID-19 wave: a cross-sectional study, Berlin, Germany, November 2020. Euro surveillance : bulletin Europeen sur les maladies transmissibles = European communicable disease bulletin, 26(34), 2100184. https://doi.org/10.2807/1560-7917.ES.2021.26.34.2100184	26-Aug-2021	Berlin, Germany 2-16 Nov, 2020	**Design**: Cross-sectional longitudinal **Intervention**: Individual and institutional prevention measures **Sample**: 1,119 participants total including 117 primary students, 175 secondary, 142 staff, 625 household members **Key outcomes**: SARS-CoV-2 infections and seroreactivity **VOCs assessed**: None	Almost 9 in 10 index participants stated they often or always wore a mask at school, and their infection prevalence was 1.4%. Of those who wore masks never to sometimes, 14.3% tested positive (OR = 11.38; 95%CI: 2.28−59.64). 8 of 16 non-affected classes required masking in the classroom, while only 1 of 8 affected classes required masking.	**Critical**; unpredictable direction of bias

Liu, P. Y., Gragnani, C. M., Timmerman, J., Newhouse, C. N., Soto, G., Lopez, L., Spronz, R., Mhaskar, A., Yeganeh, N., Fernandes, P., & Kuo, A. A. (2021). Pediatric Household Transmission of Severe Acute Respiratory Coronavirus-2 Infection-Los Angeles County, December 2020 to February 2021. The Pediatric infectious disease journal, 40(10), e379–e381. https://doi-org.ezproxy.library.dal.ca/10.1097/INF.0000000000003251	12-Aug-2021	Los Angeles County, California, USA Dec 2020 - Feb 2021	**Design**: Prospective case-ascertained transmission study **Intervention**: Masked vs. unmasked index cases **Sample**: 15 index cases and 50 household contacts **Key outcomes**: Secondary attack rates from pediatric primary index case to household contacts **VOCs assessed**: None	Using $\chi 2$ test of proportions, it was found that transmission was significantly lower in households in which the index patient was masked compared with those who were unmasked.	**Critical**; unpredictable direction of bias
Shaweno, T., Abdulhamid, I., Bezabih, L., Teshome, D., Derese, B., Tafesse, H., & Shaweno, D. (2021). Seroprevalence of SARS-CoV-2 antibody among individuals aged above 15 years and residing in congregate settings in Dire Dawa city administration, Ethiopia. Tropical medicine and health, 49(1), 55. https://doi.org/10.1186/s41182-021-00347-7	10-Jul-2021	Dire Dawa City Administration, Ethiopia Jun 15 - Jul 30, 2020	**Design**: Cross-sectional survey (SARS-CoV-2 serosurvey) **Intervention**: Practice of preventive measures (including mask wearing practice). Compared use of face covering while leaving home (yes/no) **Sample**: Data were analyzed for a total of 684 (91.2%) study participants living in congregate settings **Key outcomes**: SARS-CoV-2 seroprevalence **VOCs assessed**: None	In conducting multivariate logistic regression analyses, SARS-CoV-2 seroprevalence was found to be significantly associated with face mask usage outside of the home. In comparison to individuals who reported mask-wearing, the odds of SARS-CoV-2 antibody seroprevalence was found to be higher for those who did not use masks when away from home.	**Critical**; favours mask use

Gonçalves, M. R., Dos Reis, R. C. P., Tólio, R. P., Pellanda, L. C., Schmidt, M. I., Katz, N., Mengue, S. S., Hallal, P. C., Horta, B. L., Silveira, M. F., Umpierre, R. N., Bastos-Molina, C. G., Souza da Silva, R., & Duncan, B. B. (2021). Social Distancing, Mask Use, and Transmission of Severe Acute Respiratory Syndrome Coronavirus 2, Brazil, April-June 2020. Emerging infectious diseases, 27(8), 2135–2143. https://doi.org/10.3201/eid2708.204757	4-Jun-2021	Porto Alegre, Rio Grande do Sul, Brazil Apr – Jun 2020	**Design**: Case-control **Intervention**: Mask use **Sample**: n=1,667 community residents (cases: n=291; controls: n=1,396); Mask use and COVID-19 positive test rates were compared between n=229 case patients and a subset of controls (n=464/1,396) as mask data was not consistently collected during data collection **Key outcomes**: COVID-19 cases **VOCs assessed**: None	Mask use was associated with a decrease in COVID-19 cases (OR: 0.12; 95%CI: 0.04-0.30). When data from participants who stayed home at all times were removed from the sample, the trend in decreased COVID-19 cases as a result of mask use was maintained (OR:0.13; 95%CI: 0.04-0.36). When those who never and sometimes masked were grouped and compared with those who always masked, COVID-19 cases remained low (OR: 0.36; 95%CI: 0.17-0.74).	**Critical**; favours mask use
Lio, C. F., Cheong, H. H., Lei, C. I., Lo, I. L., Yao, L., Lam, C., & Leong, I. H. (2021). Effectiveness of personal protective health behaviour against COVID-19. BMC public health, 21(1), 827. https://doi.org/10.1186/s12889-021-10680-5	29-Apr-2021	Macao Mar 17 - Apr 15, 2020	**Design**: Cross-sectional survey **Intervention**: Personal protective behaviours including masking vs. none **Sample**: 24 COVID-19 patients vs. 1,113 controls **Key outcomes**: Risk and protective factors for COVID-19 at the individual level **VOCs assessed**: None	25% of infected participants wore a mask whenever outdoors vs. 63.5% of controls ($P < 0.001$), and those who wore masks whenever outdoors had a risk reduction of 80.9% (crude OR, 0.191 [95%CI: 0.075–0.486], $P < 0.005$) compared with those who did not.	**Critical**; unpredictable direction of bias

Gillespie, D. L., Meyers, L. A., Lachmann, M., Redd, S. C., & Zenilman, J. M. (2021). The Experience of 2 Independent Schools With In-Person Learning During the COVID-19 Pandemic. The Journal of school health, 91(5), 347–355. https://doi.org/10.1111/josh.13008	25-Mar-2021	United States Fall semester 2020 (~Aug – Dec 2020)	**Design**: Prospective cohort study **Intervention**: Both schools enforced a suite of prevention measures including mask mandates **Sample**: 3,699 students and staff (2,299 at School A and 1,400 at School B) **Key outcomes**: In-school transmission of COVID-19 **VOCs assessed**: None	Contact tracing and cluster analysis of each case were used to identify common linkages, source of COVID-19 introduction, and the potential route of transmission. As a result, it was found that 72% of in-school transmission cases in School A (actual number not reported) were associated with non-adherence to mask mandates. This data analysis was not reported for School B.	**Critical**; unpredictable direction of bias
Areekal, B., Vijayan, S. M., Suseela, M. S., Andrews, M., Ravi, R. K., Sukumaran, S. T., et al. (2021). Risk Factors, Epidemiological and Clinical Outcome of Close Contacts of COVID-19 Cases in a Tertiary Hospital in Southern India. JCDR, 15(3), LC34-LC37. 10.7860/JCDR/2021/48059.14664	Mar-2021	Thrissur, Kerala, India June 2020 - July 2020	**Design**: Retrospective cohort study **Intervention**: Various risk factors (including mask use: nil; cloth mask; surgical; N95) **Sample**: 1,286 close contacts of COVID- 19 patients admitted to Government Medical College **Key outcomes**: COVID-19 transmission from close contacts **VOCs assessed**: None	Results from binary logistic regression analyses suggested that self-reported mask use was associated with a statistically significant reduction of odds of COVID-19 infection (adjusted odds ratio of 0.570; p=0.001).	**Critical**; unpredictable direction of bias
van den Broek-Altenburg, E. M., Atherly, A. J., Diehl, S. A., Gleason, K. M., Hart, V. C., MacLean, C. D., Barkhuff, D. A., Levine, M. A., & Carney, J. K. (2021). Jobs, Housing, and Mask Wearing: Cross-Sectional Study of Risk Factors for COVID-19. JMIR public health and surveillance, 7(1), e24320. https://doi-org.ezproxy.library.dal.ca/10.2196/24320	11-Jan-2021	Vermont, USA Apr 30 - Jun 28, 2020	**Design**: Survey **Intervention**: Wearing a mask outside of work vs. not wearing a mask outside of work **Sample**: 1,694 survey respondents, 26.8% (n=454) of participants provided samples **Key outcomes**: Prevalence of SARS-CoV-2 in community-dwelling adults **VOCs assessed**: None	Using multivariate analysis, it was found that there was no significant difference between those who tested positive and those who did not, on mask wearing outside of work. However, statistical analyses were not performed on the PCR test results because only one positive test was found, thus analyses were based only on patient-matched blood samples.	**Critical**; unpredictable direction of bias

Hobbs, C. V., Martin, L. M., Kim, S. S., Kirmse, B. M., Haynie, L., McGraw, S., Byers, P., Taylor, K. G., Patel, M. M., Flannery, B., & CDC COVID-19 Response Team (2020). Factors Associated with Positive SARS-CoV-2 Test Results in Outpatient Health Facilities and Emergency Departments Among Children and Adolescents Aged <18 Years - Mississippi, September-November 2020. MMWR. Morbidity and mortality weekly report, 69(50), 1925–1929. https://doi.org/10.15585/mmwr.mm6950e3	18-Dec-2020	Mississippi, USA Sep 1 – Nov 5, 2020	**Design**: Case-control **Intervention**: Mask use **Sample**: 397 children and adolescents, including 154 case-patients (positive SARS-CoV-2 test results) and 243 control participants (negative SARS-CoV-2 test results) **Key outcomes**: Compare exposures of RT-PCR positive vs. negative participants **VOCs assessed**: None	Children and adolescents who received a positive RT-PCR test were less likely to to have a parent/guardian report consistent mask use. However, the sample included children and adolescents who received testing with health care facilities associated with one large academic medical center in Mississippi and might not be representative of children and adolescents in other geographic areas	**Critical**; favours mask use

Bundgaard, H., Bundgaard, J. S., Raaschou-Pedersen, D. E. T., von Buchwald, C., Todsen, T., Norsk, J. B., Pries-Heje, M. M., Vissing, C. R., Nielsen, P. B., Winsløw, U. C., Fogh, K., Hasselbalch, R., Kristensen, J. H., Ringgaard, A., Porsborg Andersen, M., Goecke, N. B., Trebbien, R., Skovgaard, K., Benfield, T., Ullum, H., … Iversen, K. (2021). Effectiveness of Adding a Mask Recommendation to Other Public Health Measures to Prevent SARS-CoV-2 Infection in Danish Mask Wearers : A Randomized Controlled Trial. Annals of internal medicine, 174(3), 335–343. https://doi.org/10.7326/M20-6817	18 November 2020	Denmark Apr – Jun 2020	**Design:** Randomized controlled trial **Intervention:** Instruction to wear a mask when outside the home; 50 surgical masks were provided to intervention group participants; written instructions and instructional videos guided proper use of masks; help line was available to participants **Sample:** 3,030 participants in intervention group vs. 2,994 in control group; 4,862 completed the study **Key outcomes:** Primary: SARS-CoV-2 infection; Secondary: infection with other respiratory viruses **VOCs assessed:** None	• Primary outcome: Infection with SARS-CoV2 occurred in 42 participants recommended masks (1.8%) and 53 control participants (2.1%). The between-group difference was 0.3 percentage point (95%CI: 1.2–0.4; P= 0.38) (odds ratio, 0.82 [CI, 0.54 to 1.23]; P= 0.33). Multiple imputation accounting for loss to follow-up yielded similar results. Although the difference observed was not statistically significant, the 95%CIs are compatible with a 46% reduction to a 23% increase in infection. • Secondary outcome: see Table 4	**High**; unpredictable direction of bias

Doung-Ngern, P., Suphanchaimat, R., Panjangampatthana, A., Janekrongtham, C., Ruampoom, D., Daochaeng, N., Eungkanit, N., Pisitpayat, N., Srisong, N., Yasopa, O., Plernprom, P., Promduangsi, P., Kumphon, P., Suangtho, P., Watakulsin, P., Chaiya, S., Kripattanapong, S., Chantian, T., Bloss, E., Namwat, C., … Limmathurotsakul, D. (2020). Case-Control Study of Use of Personal Protective Measures and Risk for SARS-CoV 2 Infection, Thailand. Emerging infectious diseases, 26(11), 2607–2616. https://doi.org/10.3201/eid2611.203003	15-Sep-2020	Thailand Apr 30 – May 27, 2020	**Design:** Retrospective case-control study **Intervention:** Personal protective measures including types of mask (none - referent; nonmedical masks only; nonmedical and medical; medical mask only) and compliance with mask-wearing (not wearing a mask - referent; wearing a mask; wearing a mask sometimes; always wearing a mask) **Sample:** COVID-19 case group = 211 persons who tested positive for SAR-CoV-2 by 2020 Apr 21; Control group = 839 persons who were negative for COVID-19 as of 2020 Apr 21 **Key outcomes:** SARS-CoV-2 infection: Cases were defined as asymptomatic contacts of COVID-19 patients who later tested positive for SARS-CoV-2; controls were asymptomatic contacts who never tested positive **VOCs assessed:** None	Using multivariable analyses, wearing a mask during the entire contact time with a person with COVID-19 was associated with decreased risk for SARS-CoV-2 infection. However, authors did report that they were unable to assess whether the person with COVID-19 wore a mask due missing data and not all controls within the study received a RT-PCR test. For results relating to mask types, see Table 2	**Critical**; favours mask use

Payne, D. C., Smith-Jeffcoat, S. E., Nowak, G., Chukwuma, U., Geibe, J. R., Hawkins, R. J., Johnson, J. A., Thornburg, N. J., Schiffer, J., Weiner, Z., Bankamp, B., Bowen, M. D., MacNeil, A., Patel, M. R., Deussing, E., CDC COVID-19 Surge Laboratory Group, & Gillingham, B. L. (2020). SARS-CoV-2 Infections and Serologic Responses from a Sample of U.S. Navy Service Members - USS Theodore Roosevelt, April 2020. MMWR. Morbidity and mortality weekly report, 69(23), 714–721. https://doi-org.ezproxy.library.dal.ca/10.15585/mmwr.mm6923e4	12-Jun-2020	Guam (U.S Military) Apr 20- 24, 2020	**Design:** Survey **Intervention:** Face covering use vs. not **Sample:** 382 service members (a convenience sample comprising 27% of 1,417 service members staying at the base on Guam or on the ship) **Key outcomes:** SARS-CoV-2 infection, use of preventative measures to lower risk of infection **VOCs assessed:** None	Data from the questionnaire was compared to SARS-CoV-2 infection data and odds ratios were calculated, which found that lower odds of infection were independently associated with use of face coverings.	**Critical**; favours mask use
Wang, Y., Tian, H., Zhang, L., Zhang, M., Guo, D., Wu, W., Zhang, X., Kan, G. L., Jia, L., Huo, D., Liu, B., Wang, X., Sun, Y., Wang, Q., Yang, P., & MacIntyre, C. R. (2020). Reduction of secondary transmission of SARS-CoV-2 in households by face mask use, disinfection and social distancing: a cohort study in Beijing, China. BMJ global health, 5(5), e002794. https://doi.org/10.1136/bmjgh-2020-002794	28-May-2020	Beijing, China Feb 28 - Mar 8, 2020	**Design:** Questionnaire **Intervention:** Mask use (never vs. sometimes vs. all the time) **Sample:** 124 individual family members (83 in households without transmission, 41 in households with transmission) **Key outcomes:** SARS-CoV-2 secondary attack rate and factors associated with transmission risk **VOCs assessed:** None	When comparing self-report mask wearing behaviour of families with and without secondary transmission, 19.5% of households with secondary transmission reported wearing masks all of the time versus 45.8% of households without secondary transmission (OR, 0.03; CI: 0.11–0.82).	**Critical**; favours mask use

Cheng, V. C., Wong, S. C., Chuang, V. W., So, S. Y., Chen, J. H., Sridhar, S., To, K. K., Chan, J. F., Hung, I. F., Ho, P. L., & Yuen, K. Y. (2020). The role of community-wide wearing of face mask for control of coronavirus disease 2019 (COVID-19) epidemic due to SARS-CoV-2. The Journal of infection, 81(1), 107–114. https://doi.org/10.1016/j.jinf.2020.04.024	23-Apr-2020	Hong Kong Special Administrative Region (HKSAR) Apr 6-8, 2020	**Design:** Observational **Intervention:** Community-wide mask usage (mask-on vs mask off activities) **Sample:** 10,050 persons were observed **Key outcomes:** People infected with COVID-19 **VOCs assessed:** None	During the three consecutive days of assessment, masking behaviour was noted in 10,050 individuals, where 337 (3.4%) people were not using a mask. Within the first 100 days of the pandemic, there were 961 confirmed COVID-19 cases in HKSAR. In examining the 961 cases in clusters involving masked (e.g., people at work) and unmasked (e.g., dining in restaurants, exercising at the gym) activities, there was significantly greater unmasked COVID-19 cluster settings than the equal number of masked and unmasked clusters predicted by the null hypothesis (p=0.036).	**Critical**; favours mask use

Table 2: Summary of studies reporting on effectiveness of different types of masks in reducing transmission of COVID-19

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Varela, A. R., Gurruchaga, A. P., Restrepo, S. R., Martin, J. D., Landazabal, Y. D. C., Tamayo-Cabeza, G., Contreras-Arrieta, S., Caballero-Díaz, Y., Florez, L. J. H., González, J. M., Santos-Barbosa, J. C., Pinzón, J. D., Yepes-Nuñez, J. J., Laajaj, R., Buitrago Gutierrez, G., Florez, M. V., Fuentes Castillo, J., Quinche Vargas, G., Casas, A., Medina, A., … CoVIDA Working Group (2022). Effectiveness and adherence to closed face shields in the prevention of COVID-19 transmission: a non-inferiority randomized controlled trial in a middle-income setting (COVPROSHIELD). Trials, 23(1), 698. https://doi.org/10.1186/s13063-022-06606-0	20 August 2022	Bogota, Colombia Jan 12 – Mar 13, 2021	**Design:** Open-label, non-inferiority randomized controlled trial **Intervention:** Closed face shields and surgical masks vs. surgical masks alone **Sample:** 316 participants: 160 intervention group (IG: closed face shields and surgical masks) / 156 active control group (ACG: surgical masks only) **Key outcomes:** Primary: difference in cumulative incidence of COVID-19 between the two groups; Secondary: difference in PPE use and adherence between the two groups **VOCs assessed:** None	• Primary outcome was identified in 1 participant in the IG vs. 3 in the ACG; in intention-to-treat analysis, absolute risk difference was −1.40% (95%CI: − 4.14%–1.33%); in per-protocol analysis, aRD was − 1.40% (95%CI: − 4.20%–1.40%); this indicates non-inferiority of the closed face shield with surgical face mask • Secondary outcomes: # of days of assigned PPE use and face mask use were higher in ACG; higher adherence was reported in the ACG vs. the IG (88.6% reported high or medium-high adherence in the ACG vs. only 27.4% in the IG)	**High**; unpredictable direction of bias
Andrejko, K. L., Pry, J. M., Myers, J. F., Fukui, N., DeGuzman, J. L., Openshaw, J., Watt, J. P., Lewnard, J. A., Jain, S., & California COVID-19 Case-Control Study Team (2022). Effectiveness of Face Mask or Respirator Use in Indoor Public Settings for Prevention of SARS-CoV-2 Infection - California, February-December 2021. MMWR. Morbidity and mortality weekly report, 71(6), 212–216. https://doi.org/10.15585/mmwr.mm7106e1	11-Feb-2022	California, USA Feb 18 – Dec 1, 2021	**Design**: Test-negative design case-control study **Intervention**: Mask use and type of mask **Sample**: n=1,828 California residents (cases: n=652; controls: n=1,176) **Key outcomes**: COVID-19 positive test result **VOCs assessed**: None	Analysis of mask type identified wearing a N95/KN95 respirator (aOR = 0.17; 95%CI: 0.05–0.64) or surgical mask (aOR = 0.34; 95%CI: 0.13–0.90) were associated with lower positive test rates compared to no mask wearing. Cloth masks also had a lower positive rate when compared to non-masking, however it was not significant (aOR:0.44; 95%CI: 0.17-1.17). For results related to all mask types, see Table 1	**Critical**; favours mask use

Abaluck, J., Kwong, L. H., Styczynski, A., Haque, A., Kabir, M. A., Bates-Jefferys, E., Crawford, E., Benjamin-Chung, J., Raihan, S., Rahman, S., Benhachmi, S., Bintee, N. Z., Winch, P. J., Hossain, M., Reza, H. M., Jaber, A. A., Momen, S. G., Rahman, A., Banti, F. L., Huq, T. S., … Mobarak, A. M. (2022). Impact of community masking on COVID-19: A cluster-randomized trial in Bangladesh. Science (New York, N.Y.), 375(6577), eabi9069. https://doi.org/10.1126/science.abi9069	14 January 2022	Bangladesh Nov 2020 – Apr 2021	**Design**: Cluster-randomized controlled trial **Intervention**: Intervention group cross-randomized to receive free surgical masks or free cloth masks **Sample**: 342,183 adults (at baseline) from 572 villages: 178,322 in intervention group (100 villages assigned to cloth mask group and 200 villages assigned to surgical mask group) vs. 163,861 in control group; 336,010 provided symptom data; 10,790 consented to blood collection **Key outcomes**: Symptomatic seroprevalence of SARS-CoV-2 in participants wearing surgical masks vs. cloth masks **VOCs assessed**: None	Surgical masks found to be more effective than cloth; surgical masks led to relative reduction in symptomatic seroprevalence of 11.1% (adjusted prevalence ratio = 0.89 [0.78, 1.00]); confidence limits for cloth masks include include both an effect size similar to surgical masks and no effect (adjusted prevalence ratio = 0.94 [0.78, 1.10]) For results related to all mask types, see Table 1	**High**; favours mask use

Doung-Ngern, P., Suphanchaimat, R., Panjangampatthana, A., Janekrongtham, C., Ruampoom, D., Daochaeng, N., Eungkanit, N., Pisitpayat, N., Srisong, N., Yasopa, O., Plernprom, P., Promduangsi, P., Kumphon, P., Suangtho, P., Watakulsin, P., Chaiya, S., Kripattanapong, S., Chantian, T., Bloss, E., Namwat, C., … Limmathurotsakul, D. (2020). Case-Control Study of Use of Personal Protective Measures and Risk for SARS-CoV 2 Infection, Thailand. Emerging infectious diseases, 26(11), 2607–2616. https://doi.org/10.3201/eid2611.203003	15-Sep-2020	Thailand Apr 30 – May 27, 2020	**Design:** Retrospective case-control study **Intervention:** Personal protective measures including types of mask (none - referent; nonmedical masks only; nonmedical and medical; medical mask only) and compliance with mask-wearing (not wearing a mask - referent; wearing a mask; wearing a mask sometimes; always wearing a mask) **Sample:** COVID-19 case group = 211 persons who tested positive for SAR-CoV-2 by 2020 Apr 21; Control group = 839 person who were negtaive for COVID-19 as of 2020 Apr 21 **Key outcomes:** SARS-CoV-2 infection: Cases were defined as asymptomatic contacts of COVID-19 patients who later tested positive for SARS-CoV-2; controls were asymptomatic contacts who never tested positive **VOCs assessed:** None	Type of masks was not significantly associated with infection risk. For results related to all mask types, see Table 1	**Critical**; favours mask use

Table 3: Summary of studies reporting on effectiveness of mask mandates in reducing transmission of COVID-19

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
DeJonge, P. M., Pray, I. W., Gangnon, R., McCoy, K., Tomasallo, C., & Meiman, J. (2022). School District Prevention Policies and Risk of COVID-19 Among In-Person K-12 Educators, Wisconsin, 2021. American journal of public health, 112(12), 1791–1799. https://doi.org/10.2105/AJPH.2022.307095	16-Nov-2022	Wisconsin, USA Sep 2 – Nov 24, 2021	**Design**: Cohort study **Intervention**: Various COVID-19 preventive policies (including masking policies): Compared districts with and without robust masking policies **Sample**: 51,997 educators from 307 districts; Linked to COVID-19 cases—2,838 educators from 300 districts; N=298 districts for masking policy (73 had a robust masking policy; 202 absent a robust masking policy) **Key outcomes**: COVID-19 cases **VOCs assessed**: None	2,828 (5.5%) educators were infected with COVID-19 during September 2 to November 24, 2021. Seventy-three school districts reported having a robust masking policy that required masking in both educators and students. In comparison to school districts without a robust masking policy, those who worked in districts with such requirements had a 19% reduced COVID-19 hazard during the study period (HR=0.81; 95%CI: 0.71–0.92), which remain statistically significant when stratified by grade levels (i.e., elementary, middle, high school).	**Critical**; unpredictable direction of bias
Moek, F., Rohde, A., Schöll, M., Seidel, J., Baum, J. H. J., & der Heiden, M. A. (2022). Attack Rate for Wild-Type SARS-CoV-2 during Air Travel: Results from 46 Flights Traced by German Health Authorities, January-March and June-August 2020. The Canadian journal of infectious diseases & medical microbiology = Journal canadien des maladies infectieuses et de la microbiologie medicale, 2022, 8364666. https://doi.org/10.1155/2022/8364666	22-Oct-2022	Berlin, Germany Jan 23 - Aug 10, 2020	**Design:** Retrospective cross-sectional study **Intervention:** Mandatory masking vs. no mandatory masking **Sample:** 95 persons from 46 flights **Key outcomes:** Prevalence of acute wild-type SARS-CoV2 infection among close in-flight contact persons **VOCs assessed:** None	4 instances of probable in-flight transmission occurred - 2 before the implementation of mandatory masking, and 2 after. This would suggest that the mask mandate did not affect in-flight transmission. However, the researchers were unable to report data about actual mask usage in these cases, and assumed that passengers generally did not wear masks before the mask mandate was enforced.	**Critical**; unpredictable direction of bias

Islam, H., Islam, A., Brook, A., & Rudrappa, M. (2022). Evaluating the effectiveness of countywide mask mandates at reducing SARS-CoV-2 infection in the United States. Journal of osteopathic medicine, 122(4), 211–215. https://doi.org/10.1515/jom-2021-0214	27 January 2022	Missouri, Iowa, Tennessee, and Florida, USA Jul – Oct 2020	**Design:** Comparison controlled prospective study **Intervention:** Mask mandates at the county level **Sample:** 1,355,000 in test counties (masks mandated) vs. 1,371,000 in control counties (masks not mandated) **Key outcomes:** COVID-19 infection rate **VOCs assessed:** Delta	After each county was followed for 30 days after mask mandates came into effect, the test counties had an average of 19.63 new COVID-19 infections per day, and the control counties had an average of 23.34 new COVID-19 infections per day. T-test analysis revealed a p value of 0.009. Difference-in-difference analysis revealed that test counties had a similar average COVID-19 case rate 10 days before the mask mandate was passed compared to the controls (16.05 average cases and 14.01 average cases). After 30 days of the mask mandate, the test counties had a lower average of COVID-19 cases than the controls. The average treatment effect reduced COVID-19 cases by 4.22 cases per day, or 16.9% when utilizing the difference-in-difference analysis.	**Serious**; favours mask use
Sombetzki, M., Lücker, P., Ehmke, M., Bock, S., Littmann, M., Reisinger, E. C., Hoffmann, W., & Kästner, A. (2021). Impact of Changes in Infection Control Measures on the Dynamics of COVID-19 Infections in Schools and Pre-schools. Frontiers in public health, 9, 780039. https://doi-org.ezproxy.library.dal.ca/10.3389/fpubh.2021.780039	20-Dec-2021	Mecklenburg-Western Pomerania, Germany Calendar week (CW) 32 in 2020 to CW 19 in 2021	**Design**: Prospective observational study **Intervention**: Infection control measures (including face mask obligation: yes vs no) **Sample**: Of the included n = 913 infections, n = 475 occurred in schools and n = 438 in pre- schools **Key outcomes**: SARS-CoV-2 positivity **VOCs assessed**: None	Using multivariate regression model analyses, mask mandates for children and adults within school and pre-school settings were reported to significantly decrease the likelihood of secondary SARS-CoV-2 infections.	**Critical**; unpredictable direction of bias

Boutzoukas, A. E., Zimmerman, K. O., Benjamin, D. K., Jr, & ABC Science Collaborative (2021). School Safety, Masking, and the Delta Variant. Pediatrics, e2021054396. Advance online publication. https://doi.org/10.1542/peds.2021-054396	7-Dec-2021	North Carolina, USA Jun 14 - Aug 13, 2021	**Design**: Retrospective observational study **Intervention**: Universal mask mandate for students and staff **Sample**: 59,561 students and 11,854 staff at 783 schools across 20 districts **Key outcomes**: COVID-19 spread within schools vs. the community in the context of the Delta variant **VOCs assessed**: Delta	The ratio of community-acquired to school-acquired infections was about 12.4 (808:64), and the estimated secondary attack rate was 2.6%, suggesting that the in-school mask mandate was associated with a low rate of secondary infection.	**Critical**; favours mask use
Ulyte, A., Radtke, T., Abela, I. A., Haile, S. R., Ammann, P., Berger, C., Trkola, A., Fehr, J., Puhan, M. A., & Kriemler, S. (2021). Evolution of SARS-CoV-2 seroprevalence and clusters in school children from June 2020 to April 2021: prospective cohort study Ciao Corona. Swiss medical weekly, 151, w30092. https://doi-org.ezproxy.library.dal.ca/10.4414/smw.2021.w30092	25-Oct-2021	Canton of Zurich, Switzerland Jun 16 – Jul 9, 2020 Oct 26 - Nov 19, 2020 Mar 15 - Apr 16, 2021	**Design**: Prospective cohort **Intervention**: Mask mandate in schools **Sample**: 2,487 children from 275 classes in 55 schools **Key outcomes**: Clusters of seropositive children **VOCs assessed**: None	Using Bayesian logistic regression to estimate the proportion of seropositive children, and a difference-in-differences model, it was found that there was evidence to support the preventative effects of masking on seropositivity rates.	**Critical**; unpredictable direction of bias

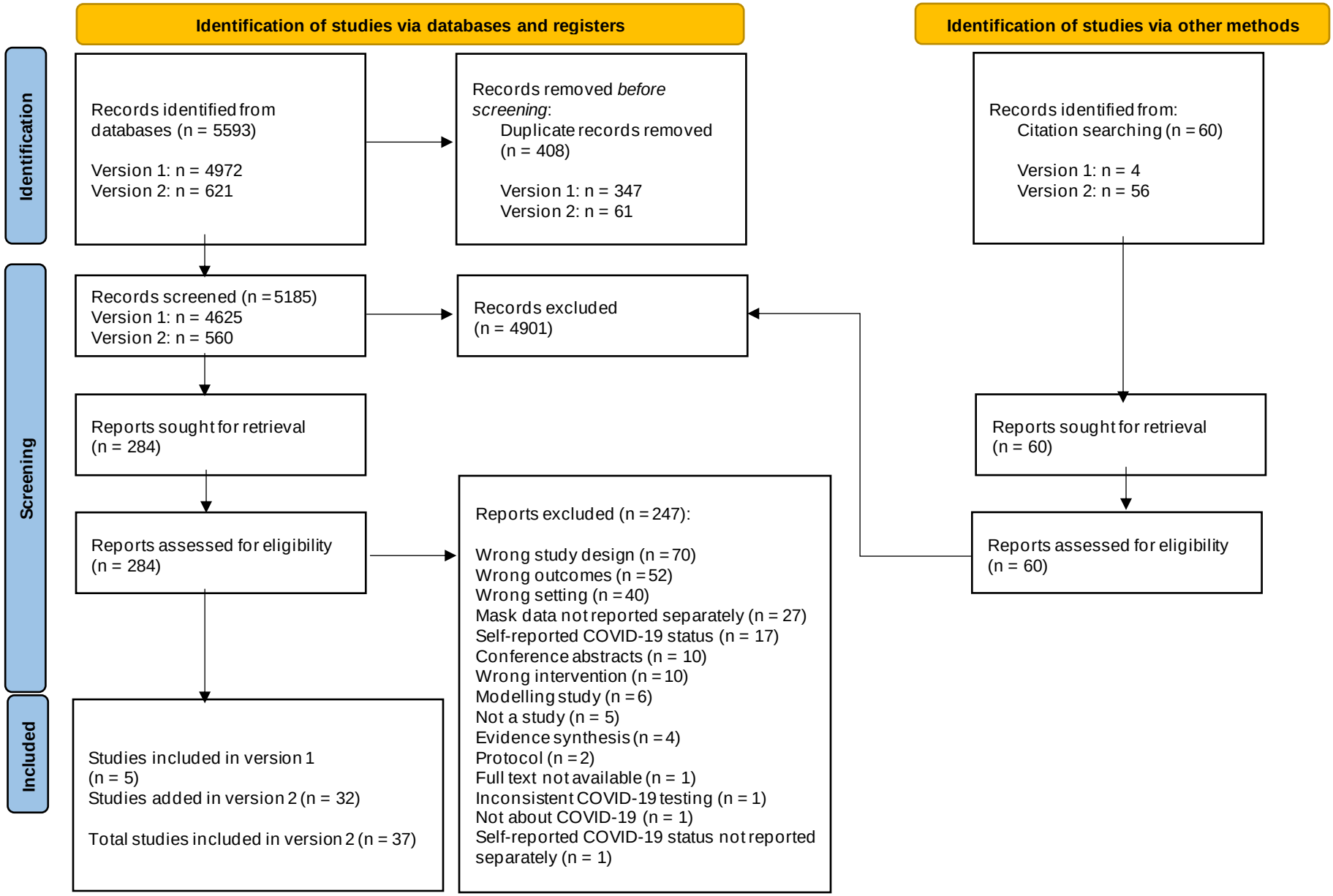
Jehn, M., McCullough, J. M., Dale, A. P., Gue, M., Eller, B., Cullen, T., & Scott, S. E. (2021). Association Between K-12 School Mask Policies and School-Associated COVID-19 Outbreaks - Maricopa and Pima Counties, Arizona, July-August 2021. MMWR. Morbidity and mortality weekly report, 70(39), 1372–1373. https://doi.org/10.15585/mmwr.mm7039e1	1-Oct-2021	Arizona, USA July - August 2021	**Design**: Epidemiological analysis **Intervention**: Masking policies **Sample**: 1,020 of 1,041 (98.0%) K–12 public non-charter schools in Maricopa and Pima counties **Key outcomes**: Association between school mask policies and school-associated COVID-19 outbreaks in K–12 public non-charter schools open for in-person learning **VOCs assessed**: None	Using crude analysis of school-associated outbreak data gathered from Arizona's Medical Electronic Disease Surveillance Intelligence System, the odds of a school-associated outbreak in schools with no mask requirement was 3.7 times higher than those in schools with an early mask requirement.	**Critical**; favours mask use
Doyle, T., Kendrick, K., Troelstrup, T., Gumke, M., Edwards, J., Chapman, S., Propper, R., Rivkees, S. A., & Blackmore, C. (2021). COVID-19 in Primary and Secondary School Settings During the First Semester of School Reopening - Florida, August-December 2020. MMWR. Morbidity and mortality weekly report, 70(12), 437–441. https://doi.org/10.15585/mmwr.mm7012e2	26-Mar-2021	Florida, USA Aug 10 - Dec 21, 2020	**Design**: Epidemiological analysis **Intervention**: Districts with vs districts without mandatory mask use policies **Sample**: 63,654 cases of COVID-19 among persons aged 5–17 years reported to FDOH (34,959 school-related COVID-19 cases, including 25,094 (72%) among students and 9,630 (28%) among staff) **Key outcomes**: COVID-19 cases **VOCs assessed**: None	Overall, higher student incidences of COVID-19 were reported in school districts without mask mandates than those with mask mandates.	**Critical**; unpredictable direction of bias

Herstein, J. J., Degarege, A., Stover, D., Austin, C., Schwedhelm, M. M., Lawler, J. V., Lowe, J. J., Ramos, A. K., & Donahue, M. (2021). Characteristics of SARS-CoV-2 Transmission among Meat Processing Workers in Nebraska, USA, and Effectiveness of Risk Mitigation Measures. Emerging infectious diseases, 27(4), 1032–1038. https://doi.org/10.3201/eid2704.204800	16-Feb-2021	Nebraska, USA Apr 1 - Jul 31, 2020	**Design**: Epidemiological analysis **Intervention**: Masking policies **Sample**: ≈26,000 meat processing workers **Key outcomes**: SARS-CoV-2 rates **VOCs assessed**: None	Using confirmed case data, incidence of SARS-CoV-2 infection before and after the date the last intervention was initiated (e.g., physical barriers were installed if universal mask policy began first) was reported. Ten days after the last intervention was initiated, 8 facilities (62%) showed a statistically significant decrease in incidence and 3 showed a non-significant decrease, while 1 facility showed a statistically significant increase in incidence and 1 showed a non-significant increase in incidence.	**Critical**; unpredictable direction of bias
Li, L., Liu, B., Liu, S. H., Ji, J., & Li, Y. (2021). Evaluating the Impact of New York's Executive Order on Face Mask Use on COVID-19 Cases and Mortality: a Comparative Interrupted Times Series Study. Journal of general internal medicine, 36(4), 985–989. https://doi.org/10.1007/s11606-020-06476-9	26 January 2021	States of New York (NY) and Massachusetts (MA), USA Mar 25 – May 6, 2020	**Design**: Comparative interrupted time series **Intervention**: Statewide mask mandate in NY, then 3 weeks later in MA **Sample**: Not specified **Key outcomes**: Daily numbers of confirmed cases and deaths from March 25, 2020, to May 6, 2020 **VOCs assessed:** None	The average daily number of confirmed cases in NY decreased from 8549 to 5085 after the Executive Order took effect, with a trend change of 341 (95%CI: 187–496) cases per day. The average daily number of deaths decreased from 521 to 384 during the same two time periods, with a trend change of 52 (95%CI: 44–60) deaths per day. Compared to MA, the decreasing trend in NY was significantly greater for both daily numbers of confirmed cases ($P = 0.003$) and deaths ($P < 0.001$).	**Serious**; favours mask use

Table 4: Summary of studies reporting on effectiveness of masks in reducing other respiratory infections

Reference	Date released	Setting and time covered	Study characteristics	Summary of key findings in relation to the outcome	Risk of Bias
Bundgaard, H., Bundgaard, J. S., Raaschou-Pedersen, D. E. T., von Buchwald, C., Todsen, T., Norsk, J. B., Pries-Heje, M. M., Vissing, C. R., Nielsen, P. B., Winsløw, U. C., Fogh, K., Hasselbalch, R., Kristensen, J. H., Ringgaard, A., Porsborg Andersen, M., Goecke, N. B., Trebbien, R., Skovgaard, K., Benfield, T., Ullum, H., … Iversen, K. (2021). Effectiveness of Adding a Mask Recommendation to Other Public Health Measures to Prevent SARS-CoV-2 Infection in Danish Mask Wearers : A Randomized Controlled Trial. Annals of internal medicine, 174(3), 335–343. https://doi.org/10.7326/M20-6817	18 November 2020	Denmark Apr – Jun 2020	**Design:** Randomized controlled trial **Intervention:** Instruction to wear a mask when outside the home; 50 surgical masks were provided to intervention group participants; written instructions and instructional videos guided proper use of masks; help line was available to participants **Sample:** 3030 participants in intervention group vs. 2994 in control group; 4862 completed the study **Key outcomes:** Primary: SARS-CoV-2 infection; Secondary: infection with other respiratory viruses **Other respiratory infections assessed:** Para-influenza-virus type 1, Para-influenza-virus type 2, Human coronavirus 229E, Human coronavirus OC43, Human coronavirus NL63, Human coronavirus HKU1, Respiratory Syncytial-Virus A, Respiratory Syncytial-Virus B, Influenza A virus or Influenza B virus	In the mask group, 9 participants (0.5%) were positive for 1 or more of the 11 respiratory viruses other than SARS-CoV-2, compared with 11 participants (0.6%) in the control group (between-group difference, 0.1 percentage point [CI: 0.6–0.4 percentage point]; p= 0.87) (OR, 0.84 [CI: 0.35–2.04]; p= 0.71).	High; unpredictable direction of bias

Figure 1: PRISMA 2020 Flow Diagram



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Appendices

Appendix 1: PubMed search strategy

#1 ("COVID 19"[MeSH] OR "COVID 19"[All Fields] OR "sars cov 2"[All Fields] OR "sars cov 2"[MeSH] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR ncov[All Fields] OR "2019 ncov"[All Fields] OR "coronavirus infections"[MeSH] OR coronavirus[MeSH] OR coronavirus[All Fields] OR coronaviruses[All Fields] OR betacoronavirus[MeSH] OR betacoronavirus[All Fields] OR betacoronaviruses[All Fields] OR "wuhan coronavirus"[All Fields] OR 2019nCoV[All Fields] OR Betacoronavirus*[All Fields] OR "Corona Virus*"[All Fields] OR Coronavirus*[All Fields] OR Coronovirus*[All Fields] OR CoV[All Fields] OR CoV2[All Fields] OR COVID[All Fields] OR COVID19[All Fields] OR COVID-19[All Fields] OR HCoV-19[All Fields] OR nCoV[All Fields] OR "SARS CoV 2"[All Fields] OR SARS2[All Fields] OR SARSCoV[All Fields] OR SARS-CoV[All Fields] OR SARS-CoV2[All Fields]) AND English[la])

#2 (Masks[Mesh:NoExp] OR "Respiratory Protective Devices"[Mesh] OR mask[TIAB] OR masks[TIAB] OR masking[TIAB] OR face-mask[TIAB] OR facemask[TIAB] OR face-masks[TIAB] OR facemasks[TIAB] OR "face covering"[TIAB] OR "facial covering"[TIAB] OR "mouth covering"[TIAB] OR "face piece"[TIAB] OR "face protect*"[TIAB] OR "face protection"[TIAB] OR "face shield"[TIAB] OR respirator[TIAB] OR respirators[TIAB] OR "respiratory protection"[TIAB] OR "respiratory equipment"[TIAB] OR "respiratory device"[TIAB] OR "respiratory devices"[TIAB] OR n95[TIAB] OR "n 95"[TIAB] OR kn95[TIAB] OR kf94[TIAB] OR ffp[TIAB] OR ffp1[TIAB] OR ffp2[TIAB] OR ffp3[TIAB] OR n97[TIAB] OR n99[TIAB] OR p2[TIAB] OR airborne[TIAB] OR droplet[TIAB] OR droplets[TIAB]) AND (protection[TIAB] OR precaution[TIAB] OR prevention and control[MeSH Subheading] OR prevention[TIAB]) AND (transmi*[TIAB] OR spread*[TIAB]) NOT (mechanical[TIAB])

#1 and #2

#4 search*[Title/Abstract] OR meta-analysis[Publication Type] OR meta analysis[Title/Abstract] OR meta analysis[MeSH Terms] OR review[Publication Type] OR diagnosis[MeSH Subheading] OR associated[Title/Abstract]

#5(clinical[TIAB] AND trial[TIAB]) OR clinical trials as topic[MeSH] OR clinical trial[Publication Type] OR random*[TIAB] OR random allocation[MeSH] OR therapeutic use[MeSH Subheading]

#6 comparative study[pt] OR Controlled Clinical Trial[pt] OR quasiexperiment[TIAB] OR "quasi experiment"[TIAB] OR quasiexperimental[TIAB] OR "quasi experimental"[TIAB] OR quasi-randomized[TIAB] OR "natural experiment"[TIAB] OR "natural control"[TIAB] OR "Matched control"[TIAB] OR (unobserved[TI] AND heterogeneity[TI]) OR "interrupted time series"[TIAB] OR "difference studies"[TIAB] OR "two stage residual inclusion"[TIAB] OR "regression discontinuity"[TIAB] OR non-randomized[TIAB] OR pretest-posttest[TIAB]

#7 cohort studies[mesh:noexp] OR longitudinal studies[mesh:noexp] OR follow-up studies[mesh:noexp] OR prospective studies[mesh:noexp] OR retrospective studies[mesh:noexp] OR cohort[TIAB] OR longitudinal[TIAB] OR prospective[TIAB] OR retrospective[TIAB]

#8 Case-Control Studies[Mesh:noexp] OR retrospective studies[mesh:noexp] OR Control Groups[Mesh:noexp] OR (case[TIAB] AND control[TIAB]) OR (cases[TIAB] AND controls[TIAB]) OR (cases[TIAB] AND controlled[TIAB]) OR (case[TIAB] AND comparison*[TIAB]) OR (cases[TIAB] AND comparison*[TIAB]) OR "control group"[TIAB] OR "control groups"[TIAB]

#9 #3 and #4 (will retrieve Reviews)

#10 #3 and #5 (will retrieve RCTs)

#11 #3 and #6 (will retrieve Quasi-experimental studies)

#12 #3 and #7 (will retrieve Cohort studies)

#13 #3 and #8

#14 #9 or #10 or #11 or #12 or #13

#15 #14 NOT (Animals[Mesh] NOT (Animals[Mesh] AND Humans[Mesh]))

Appendix 2: Studies excluded at full text screening, with reasons for exclusion

Wrong study design (n = 70)

Title	Authors	Year	Journal	Vol	Iss	Pages
A multi-institutional assessment of COVID-19-related risk in radiation oncology.	N, Viscariello; S, Evans; S, Parker; D, Schofield; B, Miller; S, Gardner; L, Fong de Los Santos; C, Hallemeier; L, Jordan; E, Kim; E, Ford	2020	Radiother Oncol	153		296-302
A novel approach to preventing SARS-CoV-2 transmission in classrooms: AnOpenFOAM based CFD Study	Pal, Anish; Biswas, Riddhideep; Pal, Ritam; Sarkar, Sourav; Mukhopadhyay, Achintya	2022				-
Absence of Apparent Transmission of SARS-CoV-2 from Two Stylists After Exposure at a Hair Salon with a Universal Face Covering Policy - Springfield, Missouri, May 2020.	Hendrix MJ; Walde C; Findley K; Trotman R	2020	MMWR Morb Mortal Wkly Rep	69	28	930-932
Absence of in-flight transmission of SARS-CoV-2 likely due to use of face masks on board.	Nir-Paz R; Grotto I; Strolov I; Salmon A; Mandelboim M; Mendelson E; Regev-Yochay G	2020	J Travel Med	27	8	-
Airborne SARS-CoV-2 and the Use of Masks for Protection against Its Spread in Wuhan, China	Jia Hu; Chengfeng Lei; Zhen Chen; Weihua Liu; Xujuan Hu; Rongjuan Pei; Zhengyuan Su; Fei Deng; Yu Huang; Xiulian Sun; Junji Cao; Wuxiang Guan	2020				-
Analysing different exposures identifies that wearing masks and establishing COVID-19 areas reduce secondary-attack risk in aged-care facilities.	B, ReynÃ©; C, Selinger; MT, Sofonea; S, Miot; A, Pisoni; E, Tuaillon; J, Bousquet; H, Blain; S, Alizon	2022	Int J Epidemiol	50	6	1788-1794
Association of Country-wide Coronavirus Mortality with Demographics, Testing, Lockdowns, and Public Wearing of Masks.	Leffler CT; Ing E; Lykins JD; Hogan MC; McKeown CA; Grzybowski A	2020	Am J Trop Med Hyg	103	6	2400-2411
Association of Jail Decarceration and Anticontagion Policies With	Reinhart, Eric; Chen, Daniel L.	2021	JAMA Network Open	4	9	e2123405-e2123405

COVID-19 Case Growth Rates in US Counties.						
Association of social distancing and face mask use with risk of COVID-19.	Kwon S; Joshi AD; Lo CH; Drew DA; Nguyen LH; Guo CG; Ma W; Mehta RS; Shebl FM; Warner ET; Astley CM; Merino J; Murray B; Wolf J; Ourselin S; Steves CJ; Spector TD; Hart JE; Song M; VoPham T; Chan AT	2021	Nat Commun	12	1	3737-
Behavioral changes before lockdown, and decreased retail and recreation mobility during lockdown, contributed most to the successful control of the COVID-19 epidemic in 35 Western countries	Deforche, Koen; Vercauteren, Jurgen; Muller, Viktor; Vandamme, Anne Mieke	2020				-
College reopening and community spread of COVID-19 in the United States.	Chang, C.-N.; Chien, H.-Y.; Malagon-Palacios, L.	2022	Public Health (Elsevier)	204		70-75
Community Use Of Face Masks And COVID-19: Evidence From A Natural Experiment Of State Mandates In The US.	Wei-Lyu; Wehby, George L.	2020	Health Affairs	39	8	1419-1425
COVID-19 pandemic: Impact of lockdown, contact and non-contact transmissions on infection dynamics	Roy, Shovonlal	2020				-
Decline in COVID-19 Hospitalization Growth Rates Associated with Statewide Mask Mandates - 10 States, March-October 2020.	Joo H; Miller GF; Sunshine G; Gakh M; Pike J; Havers FP; Kim L; Weber R; Dugmeoglu S; Watson C; Coronado F	2021	MMWR Morb Mortal Wkly Rep	70	6	212-216
Delta and Omicron: protective measures and SARS-CoV-2 infections in day care centres in Germany in the 4th and 5th wave of the pandemic 2021/2022.	Neuberger F; Grgic M; Buchholz U; Maly-Motta HL; Fackler S; Lehfeld AS; Haas W; Kalicki B; Kuger S	2022	BMC Public Health	22	1	2106-
District-Level Universal Masking Policies and COVID-19 Incidence During the First 8 Weeks of School in Texas.	Hughes, Amy E.; Medford, Richard J.; Perl, Trish M.; Basit, Mujeeb A.; Kapinos, Kandice A.	2022	American Journal of Public Health	112	6	871-875
Duration of Behavioral Policy Interventions and Incidence of COVID-19 by Social	Kao SZ; Sharpe JD; Lane RI; Njai R; McCord RF; Ajiboye AS; Ladva CN; Vo L; Ekwueme DU	2022	Public Health Rep			333549221125202-

Vulnerability of US Counties, April-December 2020.						
Effectiveness of Face Masks in Blocking the Transmission of SARS-CoV-2: a Preliminary Evaluation of Masks Used by SARS-CoV-2-Infected Individuals	Mello, Vinicius M; Eller, Cristiane M; Salvio, Andreza L; Nascimento, Felipe F; Figueiredo, Camila M; Silva, Emanuelle S R F; Sousa, Paulo S F; Costa, Pamela F; Paiva, Anne A P; Mares Guias, Maria A M M; Lemos, Elba R S; Horta, Marco A P	2021				-
Effectiveness of non-pharmaceutical interventions to contain COVID-19: a case study of the 2020 spring pandemic wave in New York City.	Yang W; Shaff J; Shaman J	2021	J R Soc Interface	18	175	20200822-
Effects of universal masking on Massachusetts healthcare workers' COVID-19 incidence.	Lan FY; Christophi CA; Buley J; Iliaki E; Bruno-Murtha LA; Sayah AJ; Kales SN	2020	Occup Med (Lond)	70	8	606-609
Enhanced contact investigations for nine early travel-related cases of SARS-CoV-2 in the United States.	Burke RM; Balter S; Barnes E; Barry V; Bartlett K; Beer KD; Benowitz I; Biggs HM; Bruce H; Bryant-Genevier J; Cates J; Chatham-Stephens K; Chea N; Chiou H; Christiansen D; Chu VT; Clark S; Cody SH; Cohen M; Conners EE; Dasari V; Dawson P; DeSalvo T; Donahue M; Dratch A; Duca L; Duchin J; Dyal JW; Feldstein LR; Fenstersheib M; Fischer M; Fisher R; Foo C; Freeman-Ponder B; Fry AM; Gant J; Gautom R; Ghinai I; Gounder P; Grigg CT; Gunzenhauser J; Hall AJ; Han GS; Haupt T; Holshue M; Hunter J; Ibrahim MB; Jacobs MW; Jarashow MC; Joshi K; Kamali T; Kawakami V; Kim M; Kirking HL; Kita-Yarbro A; Klos R; Kobayashi M; Kocharian A; Lang M; Layden J; Leidman E; Lindquist S; Lindstrom S; Link-Gelles R; Marlow M; Mattison CP; McClung N; McPherson TD; Mello L; Midgley CM; Novosad S; Patel MT; Pettrone K; Pillai SK; Pray IW; Reese HE; Rhodes H; Robinson S; Rolfes M; Routh J; Rubin R; Rudman SL; Russell D; Scott S; Shetty V; Smith-Jeffcoat SE; Soda EA; Spitters C; Stierman B; Sunenshine R; Terashita D; Traub E; Vahey GM; Verani JR; Wallace M; Westercamp M; Wortham J; Xie A; Yousaf A; Zahn M	2020	PLoS One	15	9	e0238342
Estimation of mask effectiveness perception for small domains usingmultiple data sources	Sen, Aditi; Lahiri, Partha	2021				-
Evaluating effectiveness of public health intervention strategies for mitigating COVID-19 pandemic.	Xie S; Wang W; Wang Q; Wang Y; Zeng D	2022	Stat Med	41	19	3820-3836

Experience of comprehensive interventions in reducing occupational exposure to COVID-19.	Liu H; Wang Y; He HY; Liu LB; Zhang Q; Chen JL	2021	J Infect Public Health	14	2	201-205
Face masks, old age, and obesity explain countryâ€™s COVID-19 death rates	Miyazawa, D.	2021	medRxiv			2020.06.22.20137745
Face masks, public policies and slowing the spread of COVID-19: Evidence from Canada.	Karaivanov A; Lu SE; Shigeoka H; Chen C; Pamplona S	2021	J Health Econ	78		102475-
Factors preventing SARS-CoV-2 transmission during unintentional exposure in a GP practice: a cohort study of patient contacts// Germany, 2020	Sonia Boender, T; Bender, Jennifer K; Kruger, Angelika; Michaelis, Kai; Buchholz, Udo	2021				
High efficacy of face masks explained by characteristic regimes of airborne SARS-CoV-2 virus abundance	Cheng, Yafang; Ma, Nan; Witt, Christian; Rapp, Steffen; Wild, Philipp; Andreae, Meinrat O; Poschl, Ulrich; Su, Hang	2021				-
Impact assessment of non-pharmaceutical interventions against coronavirus disease 2019 and influenza in Hong Kong: an observational study.	Cowling BJ; Ali ST; Ng TWY; Tsang TK; Li JCM; Fong MW; Liao Q; Kwan MY; Lee SL; Chiu SS; Wu JT; Wu P; Leung GM	2020	Lancet Public Health	5	5	e279-e288
Impact on COVID-19 morbidity and mortality according to the regulations on the use of face mask.	Saavedra-Delgado ME; VillaseÃ±or-Todd A; Caicedo-Aguddo SP; LÃ¡zaro-Presenda DA; Ng-SolÃs B	2021	Gac Med Mex	157	3	277-283
Impacts of worldwide individual non-pharmaceutical interventions on COVID-19 transmission across waves and space	Ge, Yong; Zhang, Wen Bin; Liu, Haiyan; Ruktanonchai, Corrine W; Hu, Maogui; Wu, Xilin; Song, Yongze; Ruktanonchai, Nick W; Yan, Wei; Cleary, Eimear; Feng, Luzhao; Li, Zhongjie; Yang, Weizhong; Liu, Mengxiao; Tatem, Andrew J; Wang, Jin Feng; Lai, Shengjie	2021				-
Infection and transmission risks in schools and contribution to the COVID-19 pandemic in Germany â€“ a retrospective observational study using nation-wide and regional health and education agency notification data	Heinsohn, Torben; Lange, Berit; Vanella, Patrizio; Rodiah, Isti; Glockner, Stephan; Joachim, Alexander; Becker, Dennis; Brandle, Tobias; Dhein, Stefan; Ehehalt, Stefan; Fries, Mira; Galante Gottschalk, Annette; Jehnichen, Stefanie; Kolkmann, Sarah; Kossow, Annelene; Hellmich, Martin; Dotsch, Jorg; Krause, Gerard	2022				-

Infectious SARS-CoV-2 in Exhaled Aerosols and Efficacy of Masks During Early Mild Infection	Adenaiye, Oluwasanmi O; Lai, Jianyu; Jacob Bueno De Mesquita, P; Hong, Filbert; Youssefi, Somayeh; German, Jennifer; Tai, S H Sheldon; Albert, Barbara; Schanz, Maria; Weston, Stuart; Hang, Jun; Fung, Christian; Chung, Hye Kyung; Coleman, Kristen K; Sapoval, Nicolae; Treangen, Todd; Berry, Irina Maljkovic; Mullins, Kristin; Frieman, Matthew; Ma, Tianzhou; Milton, Donald K; for the University of Maryland StopCOVID Research Group	2021				-
International observational survey of the effectiveness of personal protective equipment during endoscopic procedures performed in patients with COVID-19	Niikura, Ryota; Fujishiro, Mitsuhiro; Nakai, Yousuke; Matsuda, Koji; Kawahara, Takuya; Yamada, Atsuo; Tsuji, Yosuke; Hayakawa, Yoku; Koike, Kazuhiko	2020				
Interrupted time series analysis of the implementation of social distancing policy, its lifting and the mandate of wearing face masks in Iran to mitigate against COVID-19	Saki, Mandana; Behzadifar, Masoud; Behzadifar, Meysam; Ghanbari, Mahboubeh Khaton; Bakhtiari, Ahad; Azari, Samad; Gorji, Hasan Abolghasem; Wu, Jianhong; Bragazzi, Nicola Luigi	2020				-
Late surges in COVID-19 cases and varying transmission potential partially due to public health policy changes in 5 Western states, March 10, 2020-January 10, 2021	Hua, Xinyi; Kehoe, Aubrey R D; Tome, Joana; Motaghi, Mina; Ofori, Sylvia K; Lai, Po Ying; Ali, Sheikh Taslim; Chowell, Gerardo; Spaulding, Anne C; Fung, Isaac Chun Hai	2021				-
Lessons Learned From Cases of COVID-19 Infection in South Korea.	Kang YJ	2020	Disaster Med Public Health Prep	14	6	818-825
Mask Interventions in K12 Schools Can Also Reduce Community Transmission in Fall 2021	Mele, Jessica; Rosenstrom, Erik; Ivy, Julie; Mayorga, Maria; Patel, Mehul D; Swann, Julie	2021				-
Mask mandate and use efficacy for COVID-19 containment in US States	Guerra, Damian D; Guerra, Daniel J	2021				-
Mask mandates can limit COVID spread: Quantitative assessment of month-over-month effectiveness of governmental policies in reducing the number of new COVID-19 cases in 37 US	Maloney, Michael J; Rhodes, Nathaniel J; Yarnold, Paul R	2020				-

States and the District of Columbia						
Mask Wearing and Control of SARS-CoV-2 Transmission in the United States	Rader, Benjamin; White, Laura F; Burns, Michael R; Chen, Jack; Brilliant, Joe; Cohen, Jon; Shaman, Jeffrey; Brilliant, Larry; Hawkins, Jared B; Scarpino, Samuel V; Astley, Christina M; Brownstein, John S	2020				-
Mask-wearing and control of SARS-CoV-2 transmission in the USA: a cross-sectional study.	Rader B; White LF; Burns MR; Chen J; Brilliant J; Cohen J; Shaman J; Brilliant L; Kraemer MUG; Hawkins JB; Scarpino SV; Astley CM; Brownstein JS	2021	Lancet Digit Health	3	3	e148-e157
Projecting COVID-19 Mortality as States Relax Nonpharmacologic Interventions.	Linas, Benjamin P.; Xiao, Jade; Dalgic, Ozden O.; Mueller, Peter P.; Adee, Madeline; Aaron, Alec; Ayer, Turgay; Chhatwal, Jagpreet	2022	JAMA Health Forum	3	4	e220760-e220760
Relation of masking policy to COVID-19 positivity rate in Texas school districts.	Shah, Maya; Shah, Mudita; Hollingsworth, John W.	2022	Baylor University Medical Center Proceedings	35	4	466-467
Risk of SARS-CoV-2 transmission to medical staff and patients from an exposure to a COVID-19-positive ophthalmologist.	Saban O; Levy J; Chowers I	2020	Graefes Arch Clin Exp Ophthalmol	258	10	2271-2274
SARS-CoV-2 Incidence in K-12 School Districts with Mask-Required Versus Mask-Optional Policies - Arkansas, August-October 2021.	Donovan CV; Rose C; Lewis KN; Vang K; Stanley N; Motley M; Brown CC; Gray FJ Jr; Thompson JW; Amick BC 3rd; Williams ML; Thomas E; Neatherlin J; Zohoori N; Porter A; Cima M	2022	MMWR Morb Mortal Wkly Rep	71	10	384-389
SARS-CoV-2 Infection among Health Care Workers despite the Use of Surgical Masks and Physical Distancing-the Role of Airborne Transmission	L., Goldberg; Y., Levinsky; N., Marcus; V., Hoffer; M., Gafner; S., Hadas; S., Kraus; M., Mor; O., Scheuerman	2021	Open Forum Infectious Diseases	8	3	ofab036
SARS-CoV-2 Transmission Potential and Policy Changes in South Carolina, February 2020 â€“ January 2021	Davies, Margaret R; Hua, Xinyi; Jacobs, Terrence D; Wiggill, Gabi I; Lai, Po Ying; Du, Zhanwei; Deb Roy, Swati; Robb, Sara Wagner; Chowell, Gerardo; Fung, Isaac Chun Hai	2022				-
SARS-CoV-2 transmission potential and rural-urban disease burden disparities across Alabama, Louisiana, and Mississippi, March 2020 â€” May 2021	Ofori, Sylvia K; Ogwara, Chigozie A; Kwon, Seoyon; Hua, Xinyi; Martin, Kamryn M; Mallhi, Arshpreet Kaur; Twum, Felix; Chowell, Gerardo; Fung, Isaac C H	2021				-

The association of opening K-12 schools with the spread of COVID-19 in the United States: County-level panel data analysis.	Chernozhukov V; Kasahara H; Schrimpf P	2021	Proc Natl Acad Sci U S A	118	42	-
The Effectiveness Of Government Masking Mandates On COVID-19 County-Level Case Incidence Across The United States, 2020.	Huang, Jing; Fisher, Brian L.; Tam, Vicky; Zi Wang; Lihai Song; Jiasheng Shi; La Rochelle, Caroline; Xi Wang; Morris, Jeffrey S.; Coffin, Susan E.; Rubin, David M.	2022	Health Affairs	41	3	445-453
The impact of face-mask mandates on all-cause mortality in Switzerland: a quasi-experimental study.	De Giorgi G; Geldsetzer P; Michalik F; Speziali MM	2022	Eur J Public Health	32	5	818-824
The Role of Masks in Mitigating Viral Spread on Networks	Tian, Yurun; Sridhar, Anirudh; Wu, Chai Wah; Levin, Simon A; Carley, Kathleen M; Poor, H Vincent; Yagan, Osman	2022				-
Transmission of SARS-CoV-2 during air travel: a descriptive and modelling study.	Zhang J; Qin F; Qin X; Li J; Tian S; Lou J; Kang X; Lian H; Niu S; Zhang W; Chen Y	2021	Ann Med	53	1	1569-1575
Transmission of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) From Asymptomatic and Presymptomatic Individuals in Healthcare Settings Despite Medical Masks and Eye Protection.	Klompas, Michael; Baker, Meghan A; Griesbach, Diane; Tucker, Robert; Gallagher, Glen R; Lang, Andrew S; Fink, Timelia; Cumming, Melissa; Smole, Sandra; Madoff, Lawrence C; Rhee, Chanu	2021	Clinical Infectious Diseases	73	9	1693-1695
Transmission of Severe Acute Respiratory Syndrome Coronavirus 2 Infection Among Children in Summer Schools Applying Stringent Control Measures in Barcelona, Spain.	Jordan, Iolanda; Sevilla, Mariona Fernandez de; Fumado, Victoria; Bassat, Quique; Bonet-Carne, Elisenda; Fortuny, Claudia; Garcia-Miquel, Aleix; Jou, Cristina; Adroher, Cristina; Casas, MarÃa MelÃ©; Girona-Alarcon, MÃ²nica; Garcia, MarÃa HernÃ¡ndez; Tomas, Gemma Pons; Ajanovic, Sara; Arias, Sara; Balanza, NÃºria; Baro, BÃ¡rbara; Millat-Martinez, Pere; Varo, Rosauro; Alonso, Sergio	2022	Clinical Infectious Diseases	74	1	66-73
Transmission risk of SARS-CoV-2 to healthcare workers - observational results of a primary care hospital contact tracing.	Canova V; Lederer SchlÃ¤pfer H; Piso RJ; Droll A; Fenner L; Hoffmann T; Hoffmann M	2020	Swiss Med Wkly	150		w20257
Universal masking to control healthcare-associated transmission of severe acute respiratory	ER, Thompson; FS, Williams; PA, Giacin; S, Drummond; E, Brown; M, Nalick; Q, Wang; JR, McDonald; AL, Carlson	2022	Infect Control Hosp Epidemiol	43	3	344-350

coronavirus virus 2 (SARS-CoV-2).						
Unmasking the mask studies: why the effectiveness of surgical masks inpreventing respiratory infections has been underestimated	Kollepara, Pratyush K; Siegenfeld, Alexander F; Taleb, Nassim Nicholas; Bar Yam, Yaneer	2021				-
Use of personal protective equipment against coronavirus disease 2019 by healthcare professionals in Wuhan, China: cross sectional study.	Liu M; Cheng SZ; Xu KW; Yang Y; Zhu QT; Zhang H; Yang DY; Cheng SY; Xiao H; Wang JW; Yao HR; Cong YT; Zhou YQ; Peng S; Kuang M; Hou FF; Cheng KK; Xiao HP	2020	BMJ	369		m2195
Wearing masks and establishing COVID-19 areas reduces secondary attack risk in nursing homes	Reyne, Bastien; Selinger, Christian; Sofonea, Mircea T; Miot, Stephanie; Pisoni, Amandine; Tuaillon, Edouard; Bousquet, Jean; Blain, Hubert; Alizon, Samuel	2020				
What are the measures taken to prevent COVID-19 infection among healthcare workers? A retrospective study in a cluster of primary care clinics in Singapore.	Moey PKS; Ang ATW; Ee AGL; Ng DCC; Ng MCW; Teo SSH; Tay EG; Tan NC	2021	BMJ Open	11	6	e049190
What are the sources of exposure in healthcare personnel with coronavirus disease 2019 infection?	Zabarsky, Trina F.; Bhullar, Davinder; Silva, Sandra Y.; Mana, Thriveen S.C.; Ertle, Michael T.; Navas, Maria E.; Donskey, Curtis J.	2021	American Journal of Infection Control	49	3	392-395
Association Between Implementation of a Universal Face Mask Policy for Healthcare Workers in a Health Care System and SARS-CoV-2 Positivity Testing Rate in Healthcare Workers.	Wang, Dee Dee; O'Neill, William W.; Zervos, Marcus J.; McKinnon, John E.; Allard, David; Alangaden, George J.; Schultz, Lonni R.; Poisson, Laila M.; Chu, Betty S.; Kalkanis, Steven N.; Suleyman, Geehan	2021	Journal of Occupational & Environmental Medicine	63	6	476-481
Detection of Environmental Spread of SARS-CoV-2 and Associated Patient Characteristics.	CT, Semelka; DA, Ornelles; NS, O'Connell; EC, Parsons; MW, Blevins; LE, Ivey; WE, Bischoff	2021	Open Forum Infect Dis	8	6	ofab107
Human behaviour, NPI and mobility reduction effects on COVID-19 transmission in different countries of the world	Mohammadi, Zahra; Cojocaru, Monica Gabriela; Thommes, Edward Wolfgang	2022				-
The Use of Digital Tools to Mitigate the COVID-19	Zeng K; Bernardo SN; Havins WE	2020	JMIR Public Health Surveill	6	4	e24598-

Pandemic: Comparative Retrospective Study of Six Countries.						
Infection and transmission risks of COVID-19 in schools and their contribution to population infections in Germany: A retrospective observational study using nationwide and regional health and education agency notification data	Heinsohn T.; Lange B.; Vanella P.; Rodiah I.; Glockner S.; Joachim A.; Becker D.; Brandle T.; Dhein S.; Ehehalt S.; Fries M.; Galante-Gottschalk A.; Jehnichen S.; Kolkmann S.; Kossow A.; Hellmich M.; Dotsch J.; Krause G.	2022	PLoS Medicine	19	12	e1003913-
Effectiveness of non-pharmaceutical interventions on COVID-19 transmission in 190 countries from 23 January to 13 April 2020.	Bo Y; Guo C; Lin C; Zeng Y; Li HB; Zhang Y; Hossain MS; Chan JWM; Yeung DW; Kwok KO; Wong SYS; Lau AKH; Lao XQ	2021	Int J Infect Dis	102		247-253
Clusters of SARS-CoV-2 Infection Among Elementary School Educators and Students in One School District - Georgia, December 2020-January 2021.	Gold JAW; Gettings JR; Kimball A; Franklin R; Rivera G; Morris E; Scott C; Marcet PL; Hast M; Swanson M; McCloud J; Mehari L; Thomas ES; Kirking HL; Tate JE; Memark J; Drenzek C; Vallabhaneni S	2021	MMWR Morb Mortal Wkly Rep	70	8	289-292

Wrong outcomes (n = 52)

Title	Authors	Year	Journal	Vol	Iss	Pages
A dynamic response to exposures of health care workers to newly diagnosed COVID-19 patients or hospital personnel, in order to minimize cross-transmission and the need for suspension from work during the outbreak	C., Schwartz; Y., Oster; C., Slama; S., Benenson	2020	Open Forum Infectious Diseases	7	9	ofaa384
Adherence to facemask use in public places during the autumnâ€“winter 2020 COVID-19 lockdown in Greece: observational data.	Fountoulakis, Konstantinos N.; Breda, Joao; Arletou, Marianna P.; Charalampakis, Anastasios I.; Karypidou, Maria G.; Kotorli, Konstantina S.; Koutsoudi, Christina G.; Ladia, Eleftheria S.; Mitkani, Calypso A.; Mpouri, Vasiliki N.; Samara, Anastasia C.; Stravoravdi, Aikaterini S.; Tsiamis, Ioannis G.; Tzortzi, Aphrodite; Vamvaka, Maria A.; Zacharopoulou, Charikleia N.; Prezerakos, Panagiotis E.; Koupidis, Sotirios A.; K. Fountoulakis, Nikolaos; Tsapakis, Eva Maria	2022	Annals of General Psychiatry	21	1	07-Jan

Application of refined management in prevention and control of the coronavirus disease 2019 epidemic in non-isolated areas of a general hospital.	Xu C; Jin J; Song J; Yang Y; Yao M; Zhang Y; Zhao R; Chen Z	2020	Int J Nurs Sci	7	2	143-147
Association Between COVID-19 Exposure and Self-reported Compliance With Public Health Guidelines Among Essential Employees at an Institution of Higher Education in the US.	Nelson, Tracy L.; Fosdick, Bailey K.; Biela, Laurie M.; Schoenberg, Hayden; Mast, Sarah; McGinnis, Emma; Young, Michael C.; Lynn, Lori; Fahrner, Scott; Nolt, Laura; Dihle, Tina; Quicke, Kendra; Gallichotte, Emily N.; Fitzmeyer, Emily; Ebel, Greg D.; Pabilonia, Kristy; Ehrhart, Nicole; VandeWoude, Sue	2021	JAMA Network Open	4	7	e2116543-e2116543
Communication with Face Masks during the COVID-19 Pandemic for Adults with Hearing Loss	Poon, Brenda T.; Jenstad, Lorienne M.	2022	Cognitive Research: Principles and Implications	7		-
Communication With Older Adults in Times of a Pandemic: Practical Suggestions for the Health Care Professionals	A., Pinsonnault-Skvarenina; A.B.M.D., Lacerda; M., Hotton; J.-P., Gagne	2021	Public Health Reviews	42		1604046
Community practice of using face masks for the prevention of COVID-19 in Saudi Arabia.	Al Naam YA; Elsafi SH; Alkharraz ZS; Alfahad OA; Al-Jubran KM; Al Zahrani EM	2021	PLoS One	16	2	e0247313-
COVID-19 containment measures adopted by Italian Paediatric Oncology and Haematology Association (AIEOP) centres to prevent the virus spread among healthcare providers.	Amicucci, Matteo; Canesi, Marta; Rostagno, Elena; Bergadano, Anna; Badino, Clara; Botta, Debora; Fenicia, Diana; Longo, Antonella; Macchi, Simone; Ricciardi, Celeste; Partel, Moreno Crotti	2020	European Journal of Oncology Nursing	47		N.PAG-N.PAG
Decreasing High-risk Exposures for Healthcare Workers Through Universal Masking and Universal Severe Acute Respiratory Syndrome Coronavirus 2 Testing on Entry to a Tertiary Care Facility.	Walker, Jeremey; Fleece, Molly E; Griffin, Russell L; Leal, Sixto M; Alsip, Jorge A; Stigler, William S; Nafziger, Sarah D; Marrazzo, Jeanne M; Lee, Rachael A	2021	Clinical Infectious Diseases	73	9	e3113-e3115
Early Data on Predictors of COVID-19 Treatment Frequency at Community Health Centers.	Goldstein, Evan V.; Seiber, Eric E.	2021	Journal of Primary Care & Community Health	12		06-Jan

Epidemiological characteristics of COVID-19 in medical staff members of neurosurgery departments in Hubei province: A multicentre descriptive study	Wang, Qiangping; Huang, Xing; Bai, Yansen; Wang, Xuan; Wang, Haijun; Hu, Xuebin; Wang, Feng; Wang, Xianke; Chen, Jincao; Chen, Qianxue; Jiang, Xiaobing; Zhao, Hongyang	2020	medRxiv			2020.04.20.20064899
Evaluation of masks' internal and external surfaces used by health care workers and patients in coronavirus-2 (SARS-CoV-2) wards.	A, Dargahi; F, Jeddi; H, Ghobadi; M, Vosoughi; C, Karami; M, Sarailoo; A, Hadisi; SA, Mokhtari; SB, Haghighi; H, Sadeghi; M, Alighadri	2021	Environ Res	196		110948
Face Mask-Associated Ocular Irritation and Dryness.	Moshirfar M; West WB Jr; Marx DP	2020	Ophthalmol Ther	9	3	397-400
Face Masks Impair Facial Emotion Recognition and Induce Specific Emotion Confusions	Rinck, Mike; Primbs, Maximilian A.; Verpaalen, Iris A. M.; Bijlstra, Gijsbert	2022	Cognitive Research: Principles and Implications	7		-
Hair, nail and skin changes during COVID 19 era	Al-Harbawi A.L.; Alsalman H.N.; Al Chalabi Q.S.; Saeed M.S.	2021	Journal of Pakistan Association of Dermatologists	31	3	441-446
Healthcare personnel exposure to COVID - 19: an observational study on quarantined positive workers.	Rubbi I; Pasquinelli G; Brighenti A; Fanelli M; Gualandi P; Nanni E; D'Antoni V; Fabbri C	2020	Acta Biomed	91	12-S	e2020012
Hospitalizations Associated with COVID-19 Among Children and Adolescents - COVID-NET, 14 States, March 1, 2020-August 14, 2021.	MJ, Delahoy; D, Ujamaa; M, Whitaker; A, O'Halloran; O, Anglin; E, Burns; C, Cummings; R, Holstein; AK, Kambhampati; J, Milucky; K, Patel; H, Pham; CA, Taylor; SJ, Chai; A, Reingold; NB, Alden; B, Kawasaki; J, Meek; K, Yousey-Hindes; EJ, Anderson; KP, Openo; K, Teno; A, Weigel; S, Kim; L, Leegwater; E, Bye; K, Como-Sabetti; S, Ropp; D, Rudin; A, Muse; N, Spina; NM, Bennett; K, Popham; LM, Billing; E, Shiltz; M, Sutton; A, Thomas; W, Schaffner; HK, Talbot; MT, Crossland; K, McCaffrey; AJ, Hall; AM, Fry; M, McMorrow; C, Reed; S, Garg; FP, Havers	2021	MMWR Morb Mortal Wkly Rep	70	36	1255-1260
Impact of imposed social isolation and use of face masks on asthma course and mental health in pediatric and adult patients with recurrent wheeze and asthma	Herbruggen H.; Abdo M.; Fuchs O.; Roesler B.; Welchering N.; Kohistani-Greif N.; Kurz J.; Landgraf-Rauf K.; Laubhahn K.; Maison N.; Schaub B.; Ege M.; von Mutius E.; Illi S.; Omony J.; Hose A.; Zeitlmann E.; Berbig M.; Marzi C.; Schauberger C.; Ricklefs I.; Diekmann G.; Liboschik L.; Voigt G.; Sultansei L.; Weckmann M.; Kopp M.V.; Nissen G.; Konig I.R.; Thiele D.; Bahmer T.; Kirsten A.-M.; Pedersen F.; Watz	2021	Allergy, Asthma and Clinical Immunology	17	1	93-

	H.; Waschki B.; Rabe K.F.; Herzmann C.; Hundack L.; Opitz A.; Gaede K.I.; Bovermann X.; Steinmetz A.; Veith V.; Brinkmann F.; Dittrich A.-M.; Happle C.; Grychtol R.; Malik A.; Schwerk N.; Dopfer C.; Price M.; Hansen G.; Jirmo A.C.; Habener A.; DeLuca D.S.; Nikolaizik W.; Zemlin M.; Foth S.; Leson A.; Werlein A.; Maier N.; Skevaki C.; Renz H.; Schildberg T.; Rietschel E.; van Koningsbruggen-Rietschel S.					
Impacts of face coverings on communication: an indirect impact of COVID-19.	Saunders, Gabrielle H.; Jackson, Iain R.; Visram, Anisa S.	2021	International Journal of Audiology	60	7	495-506
Infection control of COVID-19 in pediatric tertiary care hospitals: challenges and implications for future pandemics.	J, Remppis; J, Hilberath; T, GanzenmÃ¼ller; C, Slavetinsky; MK, Vasconcelos; M, GnÃ¤dig; J, Liese; S, GÃ¶pel; P, Lang; O, Heinzel; H, Renk	2022	BMC Pediatr	22	1	229
Listening in 2020: A Survey of Adults' Experiences With Pandemic-Related Disruptions.	Helfer, Karen S.; Mamo, Sara K.; Clauss, Michael; Tellerico, Silvana	2021	American Journal of Audiology	30		941-955
Masked education? The benefits and burdens of wearing face masks in schools during the current Corona pandemic.	Spitzer M	2020	Trends Neurosci Educ	20		100138-
Medical mask versus cotton mask for preventing respiratory droplet transmission in micro environments.	Ho KF; Lin LY; Weng SP; Chuang KJ	2020	Sci Total Environ	735		139510-
Outbreak of SARS-CoV-2 B.1.617.2 (Delta Variant) in a Youth Camp Associated With Community Spread, Nebraska, June-July 2021	Bai J.; Phinney S.; Angell K.; Grimm B.; Tegomoh B.; Figliomeni J.; Abdalhamid B.; Khan A.S.; Donahue M.; Brett-Major D.M.; McDougall L.	2023	Public Health Reports	138	1	157-163
Perceptions towards mask use in school children during the SARS-CoV-2 pandemic: descriptive results from the longitudinal Ciao Corona cohort study.	Ammann P; Ulyte A; Haile SR; Puhan MA; Kriemler S; Radtke T	2022	Swiss Med Wkly	152		w30165-
Prevention Measures of COVID-19 in Prisons in Indonesia.	Wahidin, Mugi; Pane, Masdalina; Angkasawati, Tri Juni	2022	Asia-Pacific Journal of Public Health	34	5	573-575
Relationship Between COVID-19 Infection and Risk Perception, Knowledge, Attitude, and Four	Xu H; Gan Y; Zheng D; Wu B; Zhu X; Xu C; Liu C; Tao Z; Hu Y; Chen M; Li M; Lu Z; Chen J	2020	J Med Internet Res	22	11	e21372

Nonpharmaceutical Interventions During the Late Period of the COVID-19 Epidemic in China: Online Cross-Sectional Survey of 8158 Adults.						
Restrictive measures during COVID-19 pandemic: the impact of face masks and social distancing on communication, physical and mental health of normal hearing subjects.	Malzanni, Giulia Elvira; Canova, Chiara; Battista, Rosa Alessia; Malerba, Paolo; Lerda, Caterina; Angelone, Sara Monica; Bussi, Mario; Piccioni, Lucia Oriella	2021	Hearing, Balance & Communication	19	3	144-150
SARS-CoV-2 outbreak in medical employees in a large urologic department: Spread, containment and outcome.	Brandt, Maximilian Peter; JÃ¤ger, Wolfgang; Epple, Stefan; Haferkamp, Axel; SchrÃ¶der, Annette	2021	American Journal of Infection Control	49	6	674-677
Selfâ€ perceived and selfâ€ reported breath odour and the wearing of face masks during the COVIDâ€ 19 pandemic.	Faria, Sandro Felipe Santos; Costa, Fernando Oliveira; Pereira, Alexandre Godinho; Cota, LuÃs OtÃ¡vio Miranda		Oral Diseases	28		2406-2416
Strategies for the Prevention of the Intra-Hospital Transmission of COVID-19: A Retrospective Cohort Study.	Chang MC; Hur J; Park D	2020	Healthcare (Basel)	8	3	
Surgical mask and N95 in healthcare workers of Covid-19 departments: clinical and social aspects.	M, Gelardi; V, Fiore; R, Giancaspro; E, La Gatta; F, Fortunato; O, Resta; GE, Carpagnano; C, Santomasi; M, Dimitri; MP, Foschino Barbaro; D, Lacedonia; G, Scioscia; L, Antonio; M, Cassano	2020	Acta Biomed	91	4	e2020171
Targeted reduction of airborne viral transmission risk in residential aged care	Brass, Amanda; Shoubridge, Andrew P; Larby, Nicolas; Elms, Levi; Sims, Sarah K; Flynn, Erin; Miller, Caroline; Crotty, Maria; Papanicolas, Lito E; Wesselingh, Steve L; Morawska, Lidia; Bell, Scott C; Taylor, Steven L; Rogers, Geraint B	2022				
The high level of adherence to personal protective equipment in health care workers efficiently protects them from COVID-19 infection.	Zangoue, Malihe; Safari, Hamidreza; Royce, Simon G.; Zangooie, Alireza; Rezapour, Hadis; Zangouei, Amirsadra; Fereidouni, Mohammad	2021	Work	69	4	1191-1196
Transmission of severe acute respiratory coronavirus virus 2 (SARS-CoV-2) among health careworkers (HCWs) during three waves of the coronavirus disease	Schulz-Stubner, S.; Pielert, E.	2022	Infection Control and Hospital Epidemiology	43	11	1742-1744

2019 (COVID-19) pandemic in Germany: Results of an anonymous survey						
Why the mask? The effectiveness of face masks in preventing the spread of respiratory infections such as COVID-19 - a home testing protocol.	Swain ID	2020	J Med Eng Technol	44	6	334-337
COVID-19 among dentists in the United States: A 6-month longitudinal report of accumulative prevalence and incidence.	Araujo, Marcelo W.B.; Estrich, Cameron G.; Mikkelsen, Matthew; Morrissey, Rachel; Harrison, Brittany; Geisinger, Maria L.; Ioannidou, Effie; Vujicic, Marko	2021	Journal of the American Dental Association (JADA)	152	6	425-433
COVID-19 Preventive Measures in Northern California Jails: Perceived Deficiencies, Barriers, and Unintended Harms.	Liu YE; LeBoa C; Rodriguez M; Sherif B; Trinidad C; Del Rosario M; Allen S; Clifford C; Redding J; Chen WT; Rosas LG; Morales C; Chyorny A; Andrews JR	2022	Front Public Health	10		854343-
Sources of SARS-CoV-2 transmission in Jordan: Self-reported approach	Kofahi H.M.; Khabour O.F.; Swedan S.F.; Nimer R.M.	2022	Informatics in Medicine Unlocked	32		101075-
Association of Child Masking With COVID-19â€“Related Closures in US Childcare Programs.	Murray, Thomas S.; Malik, Amyn A.; Shafiq, Mehr; Lee, Aiden; Harris, Clea; Klotz, Madeline; Humphries, John Eric; Patel, Kavin M.; Wilkinson, David; Yildirim, Inci; Elharake, Jad A.; Diaz, Rachel; Reyes, Chin; Omer, Saad B.; Gilliam, Walter S.	2022	JAMA Network Open	5	1	e2141227-e2141227
COVID-19 infection among healthcare workers: a cross-sectional study in southwest Iran	Sabetian, Golnar; Moghadami, Mohsen; Haghighi, Leila Hashemizadeh Fard; Fallahi, Mohammad Javad; Shahriarirad, Reza; Asmarian, Naeimehossadat; Moeini, Yalda Sadat	2020				
Effect Of Nonpharmaceutical Interventions On COVID-19 Cases And Deaths In Brazil.	Russell, Louise B.; Santos da Silva, Lara Livia; Fracalossi de Moraes, Rodrigo; Gidwani, Risha; Luz, Paula M.; Toscano, Cristiana M.	2022	Health Affairs	41	7	1005-1012
Analysis of the Effects of a Texas State-Wide Mask Mandate (Executive Order GA-29) on Case Load, Hospitalizations, and Mortality.	April MD; Naylor JF; Long B	2022	South Med J	115	3	175-180
Differences in rapid increases in county-level COVID-19 incidence by implementation of statewide closures and mask mandates - United States, June 1-September 30, 2020.	Dasgupta S; Kassem AM; Sunshine G; Liu T; Rose C; Kang GJ; Silver R; Maddox BLP; Watson C; Howard-Williams M; Gakh M; McCord R; Weber R; Fletcher K; Musial T; Tynan MA; Hulkower R; Moreland A; Pepin D; Landsman L; Brown A; Gilchrist S; Clodfelter C; Williams M; Cramer R; Limeres A; Popoola A; Dugmeoglu S; Shelburne J; Jeong G; Rao CY	2021	Ann Epidemiol	57		46-53

Association of Mask Mandates and COVID-19 Case Rates, Hospitalizations, and Deaths in Kansas.	Ginther, Donna K.; Zambrana, Carlos	2021	JAMA Network Open	4	6	e2114514-e2114514
Association of State-Issued Mask Mandates and Allowing On-Premises Restaurant Dining with County-Level COVID-19 Case and Death Growth Rates - United States, March 1-December 31, 2020.	Guy GP Jr; Lee FC; Sunshine G; McCord R; Howard-Williams M; Kompaniyets L; Dunphy C; Gakh M; Weber R; Sauber-Schatz E; Omura JD; Massetti GM	2021	MMWR Morb Mortal Wkly Rep	70	10	350-354
Declines in SARS-CoV-2 Transmission, Hospitalizations, and Mortality After Implementation of Mitigation Measures- Delaware, March-June 2020.	Kanu FA; Smith EE; Offutt-Powell T; Hong R; Dinh TH; Pevzner E	2020	MMWR Morb Mortal Wkly Rep	69	45	1691-1694
Widespread use of face masks in public may slow the spread of SARS CoV-2: an ecological study	Kenyon, Chris	2020				-
The role of mask mandates, stay at home orders and school closure in curbing the COVID-19 pandemic prior to vaccination.	Krishnamachari, Bhuma; Morris, Alexander; Zastrow, Diane; Dsida, Andrew; Harper, Brian; Santella, Anthony J.	2021	American Journal of Infection Control	49	8	1036-1042
Association between School Mask Mandates and SARS-CoV-2 Student Infections: Evidence from a Natural Experiment of Neighboring K-12 Districts in North Dakota	Sood, Neeraj; Heick, Shannon; Stevenson, Josh; Hoeg, Tracy	2022				-
Evaluating the Association of Face Covering Mandates on COVID-19 Severity by State.	Strand, Mark A.; Shyllon, Omobosinuola; Hohman, Adam; Jansen, Rick J.; Sidhu, Savita; McDonough, Stephen	2022	Journal of Primary Care & Community Health	13		08-Jan
Trends in County-Level COVID-19 Incidence in Counties With and Without a Mask Mandate - Kansas, June 1-August 23, 2020.	Van Dyke ME; Rogers TM; Pevzner E; Satterwhite CL; Shah HB; Beckman WJ; Ahmed F; Hunt DC; Rule J	2020	MMWR Morb Mortal Wkly Rep	69	47	1777-1781

Wrong setting (n = 40)

Title	Authors	Year	Journal	Vol	Iss	Pages
A Case-Control Study of Factors Associated with SARS-CoV-2 Infection Among Healthcare Workers in Colombia.	Rodriguez Lopez, Merida; Parra, Beatriz; Vergara, Enrique; Rey, Laura; Salcedo, Mercedes; Arturo, Gabriela; Alarcon, Liliana; Holguin, Jorge; Osorio, Lyda	2021				
A retrospective observational insight into COVID-19 exposures resulting from personal protective equipment (PPE) breaches.	UN, Gaikwad; O, Bose; A, Padhi; A, Jindal; K, Nagpure; A, Bhargava; P, Das	2022	PLoS One	17	5	e0268582
Assessing coronavirus disease 2019 (COVID-19) transmission to healthcare personnel: The global ACT-HCP case-control study.	RJ, Lentz; H, Colt; H, Chen; R, Cordovilla; S, Popevic; S, Tahura; P, Candoli; S, Tomassetti; GJ, Meachery; BP, Cohen; BD, Harris; TR, Talbot; F, Maldonado	2021	Infect Control Hosp Epidemiol	42	4	381-387
Association between 2019-nCoV transmission and N95 respirator use	Wang, Xinghuan; Pan, Zhenyu; Cheng, Zhenshun	2020				
Association Between Universal Masking in a Health Care System and SARS-CoV-2 Positivity Among Health Care Workers.	Wang X; Ferro EG; Zhou G; Hashimoto D; Bhatt DL	2020	JAMA	324	7	703-704
Comparing Dynamics and Determinants of Severe Acute Respiratory Syndrome Coronavirus 2 Transmissions Among Healthcare Workers of Adult and Pediatric Settings in Central Paris.	Contejean, Adrien; Leporrier, JÃ©rÃ©mie; CanouÃ¯, Etienne; Alby-Laurent, Fanny; Lafont, Emmanuel; Beaudeau, Lauren; Parize, Perrine; Lecieux, Fabienne; Greffet, AgnÃ¨s; ChÃ©ron, GÃ©rard; Gauzit, RÃ©my; Fourgeaud, Jacques; L'Honneur, Anne-Sophie; TrÃ©luyer, Jean-Marc; Charlier, Caroline; Casetta, Anne; Frange, Pierre; Leruez-Ville, Marianne; Rozenberg, Flore; Lortholary, Olivier	2021	Clinical Infectious Diseases	72	2	257-264
Contact Screening for Healthcare Workers Exposed to Patients with COVID-19.	Coppeta L; Somma G; Ippoliti L; Ferrari C; D'Alessandro I; Pietroiusti A; Trabucco Aurilio M	2020	Int J Environ Res Public Health	17	23	
Coronavirus Disease 2019 (COVID-19) Seropositivity and Asymptomatic Rates in Healthcare Workers Are Associated with Job Function and Masking.	Sims, Matthew D; Maine, Gabriel N; Childers, Karen Lins; Podolsky, Robert H; Voss, Daniel R; Berkiw-Scenna, Natalie; Oh, Joyce; Heinrich, Kevin E; Keil, Hans; Kennedy, Richard H; Homayouni, Ramin	2021	Clinical Infectious Diseases	73		S154-S162
COVID-19 infection is related to differences in the use of personal protective equipment by	Mastan, S.; Malik, R. A.; Charalambous, C. P.; Abdulla, Mustafa; Alonge, John; Chelva, Ruth; Collins, Thomas; Dupley, Leanne; Din, Azhar; Ferns, John; Hodhody,	2021	European Journal of Orthopaedic	31	5	989-993

orthopaedic specialist trainees caring for hip fracture patients during the second surge of COVID-19 in the North West of England.	Ghazal; Hughes, Isabel; Jamalfar, Aral; Jump, Chris; Koo, Kenneth; Qureshi, Alham; Qureshi, Mobeen; Patel, Dhawal; Patel, Neelam; Pearce, Adrian		Surgery & Traumatology			
COVID-19 outbreaks in hospital workers during the first COVID-19 wave.	Piapan L; De Michieli P; Ronchese F; Rui F; Peresson M; Segat L; D'Agaro P; Negro C; Bovenzi M; Larese Filon F	2022	Occup Med (Lond)	72	2	110-117
Determinants of SARS-CoV-2 infection in Italian healthcare workers: a multicenter study.	Boffetta P; Violante F; Durando P; De Palma G; Pira E; Vimercati L; Cristaudo A; Icardi G; Sala E; Coggiola M; Tafuri S; Gattini V; Apostoli P; Spatari G	2021	Sci Rep	11	1	5788
Effect of a strict hygiene bundle for the prevention of nosocomial transmission of SARS-CoV-2 in the hospital: a practical approach from the field.	A, Ambrosch; F, Rockmann; F, Klawonn; B, Lampl	2020	J Infect Public Health	13	12	1862-1867
Effectiveness of prevention of SARS-CoV-2 transmission among unvaccinated Italian healthcare workers	Collatuzzo, Giulia; Mansour, Ihab; Ciocan, Catalina; Ditano, Giorgia; Godono, Alessandro; Rossello, Paola; Coggiola, Maurizio; Pira, Enrico; Boffetta, Paolo; Working Group On Sars-Cov-Prevention	2022	Med. Lav.	113	6	e2022050
Effectivity of a Program for the Control and Prevention of COVID-19 Healthcare-Associated Infections in a Spanish Academic Hospital.	Gras-ValentÃ, Paula; Mora-Muriel, Juan G.; Chico-SÃ¡nchez, Pablo; Algado-SellÃ©s, Natividad; Soler-Molina, Victor M.; HernÃ¡ndez-Maldonado, MarÃa; Lameiras-Azevedo, Ana S.; JimÃ©nez SepÃºlveda, Natali J.; GÃ³mez Sotero, Isel L.; Villanueva-Ruiz, CÃ©sar O.; Barrenengoa-SaÃ±udo, Julio; Fuster-PÃ©rez, Marina; CÃ¡novas-JÃ¡vega, Sandra; Cerezo-Milan, Patricia; Monerris-Palmer, Miranda; Llorens-Soriano, Pere; Merino-Lucas, Esperanza; RodrÃguez-Diaz, Juan C.; Gil-Carbonell, Joan; SÃ¡nchez-MartÃnez, Rosario	2021	Journal of Patient Safety	17	4	323-330
Evaluation of healthcare personnel exposures to patients with severe acute respiratory coronavirus virus 2 (SARS-CoV-2) associated with personal protective equipment.	VP, Shah; LE, Breeher; CM, Hainy; MD, Swift	2022	Infect Control Hosp Epidemiol	43	6	770-774
Evaluation of risk factors for developing COVID-19 in healthcare professionals working at two university hospitals in Turkey	Sertcelik, A.; Cakir, B.; Metan, G.	2022	Work (Reading, Mass.)			
Examining Common Characteristics Among Healthcare Personnel Positive for COVID-19 and the	Adawee, Mohamed O.; Brum, Renee E.; Ellsworth, Lauretta J.	2021	Journal of Occupational &	63	3	226-229

Effectiveness of Healthcare Personnel Mask Use in Preventing COVID-19 in a Large Health System in Central Michigan.			Environmental Medicine			
Factors Associated with Positive SARS-CoV-2 Test Results in Outpatient Health Facilities and Emergency Departments Among Children and Adolescents Aged <18 Years - Mississippi, September-November 2020.	Hobbs CV; Martin LM; Kim SS; Kirmse BM; Haynie L; McGraw S; Byers P; Taylor KG; Patel MM; Flannery B	2020	MMWR Morb Mortal Wkly Rep	69	50	1925-1929
Guidance for the Prevention of the COVID-19 Epidemic in Long-Term Care Facilities: A Short-Term Prospective Study.	Rolland Y; Lacoste MH; de Mauleon A; Ghisolfi A; De Souto Barreto P; Blain H; Villars H	2020	J Nutr Health Aging	24	8	812-816
Healthcare workers & SARS-CoV-2 infection in India: A case-control investigation in the time of COVID-19.	Chatterjee P; Anand T; Singh KJ; Rasaily R; Singh R; Das S; Singh H; Praharaj I; Gangakhedkar RR; Bhargava B; Panda S	2020	Indian J Med Res	151	5	459-467
High SARS-CoV-2 antibody prevalence among healthcare workers exposed to COVID-19 patients.	Chen Y; Tong X; Wang J; Huang W; Yin S; Huang R; Yang H; Huang A; Liu Y; Yuan L; Yan X; Shen H; Wu C	2020	J Infect	81	3	420-426
Incidence and Prevalence of Coronavirus Disease 2019 Within a Healthcare Worker Cohort During the First Year of the Severe Acute Respiratory Syndrome Coronavirus 2 Pandemic.	Doernberg SB; Holubar M; Jain V; Weng Y; Lu D; Bollyky JB; Sample H; Huang B; Craik CS; Desai M; Rutherford GW; Maldonado Y	2022	Clin Infect Dis	75	9	1573-1584
Medical Masks Versus N95 Respirators for Preventing COVID-19 Among Health Care Workers : A Randomized Trial	Loeb, M.; Bartholomew, A.; Hashmi, M.; Tarhuni, W.; Hassany, M.; Youngster, I.; Somayaji, R.; Larios, O.; Kim, J.; Missaghi, B.; Vayalumkal, J. V.; Mertz, D.; Chagla, Z.; Cividino, M.; Ali, K.; Mansour, S.; Castellucci, L. A.; Frenette, C.; Parkes, L.; Downing, M.; Muller, M.; Glavin, V.; Newton, J.; Hookoom, R.; Leis, J. A.; Kinross, J.; Smith, S.; Borhan, S.; Singh, P.; Pullenayegum, E.; Conly, J.	2022	Annals of internal medicine			
Occupational risk factors for severe acute respiratory coronavirus virus 2 (SARS-CoV-2) infection among healthcare personnel: A 6-month	Howard-Anderson JR; Adams C; Dube WC; Smith TC; Sherman AC; Edupuganti N; Mendez M; Chea N; Magill SS; Espinoza DO; Zhu Y; Phadke VK; Edupuganti S;	2022	Infect Control Hosp Epidemiol	43	11	1664-1671

prospective analysis of the COVID-19 Prevention in Emory Healthcare Personnel (COPE) Study.	Steinberg JP; Lopman BA; Jacob JT; Fridkin SK; Collins MH					
Predictors of contracting COVIDâ€□ 19 in nursing homes: Implications for clinical practice.	Aghili, Mohammad Sadegh; Darvishpoor Kakhki, Ali; Gachkar, Latif; Davidson, Patricia M.	2022	Journal of Advanced Nursing (John Wiley & Sons, Inc.)	78	9	2799-2806
Prevalence and clinical correlates of covid-19 outbreak among health care workers in a tertiary level hospital in Delhi	A., Khurana; G.P., Kaushal; R., Gupta; V., Verma; K., Sharma; P.M., Kohli	2021	American Journal of Infectious Diseases	17	2	107-119
Professional practice for COVID-19 risk reduction among health care workers: A cross-sectional study with matched case-control comparison.	S, Wilson; A, Mouet; C, Jeanne-Leroyer; F, Borgey; E, Odinet-Raulin; X, Humbert; S, Le Hello; P, Thibon	2022	PLoS One	17	3	e0264232
Risk factors, epidemiological and clinical outcome of close contacts of covid-19 cases in a tertiary hospital in southern india	B., Areekal; S.M., Vijayan; M.S., Suseela; M.A., Andrews; R.K., Ravi; S.T., Sukumaran; R., Jose; F.T.T., Edappanatt	2021	Journal of Clinical and Diagnostic Research	15	3	LC34-LC37
Risk of SARS-CoV-2 transmission from universally masked healthcare workers to patients or residents: A prospective cohort study.	Williams, Victoria R.; Maze dit Mieusement, Lorraine; Tomiczek, Nicholas; Chan, Adrienne K.; Salt, Natasha; Leis, Jerome A.	2021	American Journal of Infection Control	49	11	1429-1431
Role of Personal Protective Measures in Prevention of COVID-19 Spread Among Physicians in Bangladesh: a Multicenter Cross-Sectional Comparative Study	M.M., Khalil; M.M., Alam; M.K., Arefin; M.R., Chowdhury; M.R., Huq; J.A., Chowdhury; A.M., Khan	2020	SN Comprehensive Clinical Medicine	2	10	1733-1739
SARS-CoV-2 Exposures of Healthcare Workers from Primary Care, Long-Term Care Facilities and Hospitals: A Nationwide Matched Case-Control Study	Belan, Martin; Charmet, Tiffany; Schaeffer, Laura; Tubiana, Sarah; Duval, Xavier; Lucet, Jean Christophe; Fontanet, Arnaud; Birgand, Gabriel; Kerneis, Solen	2022				
SARS-CoV-2 Positivity and Mask Utilization Among Health Care Workers.	Li, Aldon; Slezak, Jeff; Maldonado, Ana Miranda; Concepcion, June; Maier, Catherine Voloso; Rieg, Gunter	2021	JAMA Network Open	4	6	e2114325-e2114325
SARS-CoV-2 seroprevalence among health care workers in a New York City hospital: A cross-sectional	Venugopal U; Jilani N; Rabah S; Shariff MA; Jawed M; Mendez Batres A; Abubacker M; Menon S; Pillai A; Shabarek N; Kasubhai M; Dimitrov V; Menon V	2021	Int J Infect Dis	102		63-69

analysis during the COVID-19 pandemic.						
Seroprevalence of SARS-CoV-2 Among Frontline Health Care Personnel in a Multistate Hospital Network - 13 Academic Medical Centers, April-June 2020.	WH, Self; MW, Tenforde; WB, Stubblefield; LR, Feldstein; JS, Steingrub; NI, Shapiro; AA, Ginde; ME, Prekker; SM, Brown; ID, Peltan; MN, Gong; MS, Aboodi; A, Khan; MC, Exline; DC, Files; KW, Gibbs; CJ, Lindsell; TW, Rice; ID, Jones; N, Halasa; HK, Talbot; CG, Grijalva; JD, Casey; DN, Hager; N, Qadir; DJ, Henning; MM, Coughlin; J, Schiffer; V, Semenova; H, Li; NJ, Thornburg; MM, Patel	2020	MMWR Morb Mortal Wkly Rep	69	35	1221-1226
Sources of healthcare workers' COVIDâ€'19 infections and related safety guidelines.	LAH, Oksanen; E, Sanmark; SA, Oksanen; VJ, Anttila; JJ, Paterno; M, Lappalainen; L, Lehtonen; A, Geneid	2021	Int J Occup Med Environ Health	34	2	239-249
Specific risk factors for SARS-CoV-2 transmission among health care workers in a university hospital.	Ã‡elebi, GÃ¼ven; PiÅŸkin, Nihal; Ã‡elik BekleviÃ§, Arzum; Altunay, YurdagÃ¼l; SalcÄ± KeleÅŸ, AyÅŸegÃ¼l; TÃ¼z, Mehmet Ali; AltÄ±nsoy, BÃ¼lent; HacÄ±seyitoÄŸlu, Demet	2020	American Journal of Infection Control	48	10	1225-1230
Surgical Masks for Protection of Health Care Personnel Against Covid-19: Results from an Observational Study.	Z, Pan; H, Zhang; J, Yang; S, Tang; Z, Cheng; K, Wu; B, Liu	2021	Clin Invest Med	44	2	E48-54
Survey of COVID-19 Disease Among Orthopaedic Surgeons in Wuhan, People's Republic of China.	Guo X; Wang J; Hu D; Wu L; Gu L; Wang Y; Zhao J; Zeng L; Zhang J; Wu Y	2020	J Bone Joint Surg Am	102	10	847-854
The first wave of COVID-19 in hospital staff members of a tertiary care hospital in the greater Paris area: A surveillance and risk factors study.	Davido B; Gautier S; Riom I; Landowski S; Lawrence C; Thiebaut A; Bessis S; Perronne V; Mascitti H; Noussair L; Rancon MD; Touraine B; Rouveix E; Herrmann JL; Annane D; de Truchis P; Delarocque-Astagneau E	2021	Int J Infect Dis	105		172-179
The Role of Possible Factors Affecting the Risk of Getting Infected by COVID-19 in Emergency Medical Technicians: A Case-Control Study	Sadeghi, Mostafa; Saberian, Peyman; Hasani Sharamin, Parisa; Dadashi, Fatemeh; Babaniamansour, Sepideh; Aliniagerdroudbari, Ehsan	2020				
Viral whole-genome sequencing to assess impact of universal masking on SARS-CoV-2 transmission among pediatric healthcare workers.	LK, Kociolek; AB, Patel; JF, Hultquist; EA, Ozer; LM, Simons; M, McHugh; WJ, Muller; R, Lorenzo-Redondo	2022	Infect Control Hosp Epidemiol	43	10	1408-1412
What influences the infection of COVID-19 in healthcare workers?	Lai X; Zhou Q; Zhang X; Tan L	2020	J Infect Dev Ctries	14	11	1231-1237

Mask data not presented separately (n = 27)

Title	Authors	Year	Journal	Vol	Iss	Pages
Assessment of a Multifaceted Approach, Including Frequent PCR Testing, to Mitigation of COVID-19 Transmission at a Residential Historically Black University.	Hockstein, Neil G.; Moultrie, LaKresha; Fisher, Michelle; Mason, R. Christopher; Scott, Derrick C.; Coker, Joan F.; Tuxward, Autumn; Terheyden, Juliana; Canter, Nolan; Coons, Michael; DeLauder, Saundra; Allen, Tony	2021	JAMA Network Open	4	12	e2137189-e2137189
Association between personal protective equipment and SARS-CoV-2 infection risk in emergency department healthcare workers.	Schmitz D; Vos M; Stolmeijer R; Lameijer H; SchÃ¶nberger T; Gaakeer MI; de Groot B; Eikendal T; Wansink L; Ter Avest E	2021	Eur J Emerg Med	28	3	202-209
Contact tracing, use of surgical masks, hand hygiene and social distancing represent a bundle of effective measures to control SARS-CoV-2 spreading among healthcare workers in a paediatric hospital.	D, LA Masa; O, Vianello; M, Piccinini; M, Mariani; G, Brisca; C, Saffioti; A, Mesini; E, DI Marco; E, Castagnola	2021	J Prev Med Hyg	62	3	E592-E597
Containment of a Large SARS-CoV-2 Outbreak Among Healthcare Workers in a Pediatric Intensive Care Unit.	RL, Knoll; J, Klopp; G, Bonewitz; B, GrÃ¶ndahl; K, Hilbert; W, Kohnen; K, Weise; B, Plachter; W, Hitzler; F, Kowalzik; S, Runkel; F, Zepp; J, Winter; ML, Cacicedo; S, Gehring	2020	Pediatr Infect Dis J	39	11	e336-e339
Control of COVID-19 transmission on an urban university campus during a second wave of the pandemic	Hamer, Davidson H; White, Laura; Jenkins, Helen E; Gill, Christopher J; Landsberg, Hannah N; Klapperich, Catherine; Bulekova, Katia; Platt, Judy; Decarie, Linette; Gilmore, Wayne; Pilkington, Megan; Mcdowell, Trevor L; Faria, Mark A; Densmore, Douglas; Landaverde, Lena; Li, Wenrui; Rose, Tom; Burgay, Stephen P; Miller, Candice; Doucette Stamm, Lynn; Lockard, Kelly; Elmore, Kenneth; Schroeder, Tracy; Zaia, Ann M; Kolaczyk, Eric D; Waters, Gloria; Brown, Robert A	2021				-
COVID-19 infection among healthcare workers in a national healthcare system: The Qatar experience.	Alajmi J; Jeremijenko AM; Abraham JC; Alishaq M; Concepcion EG; Butt AA; Abou-Samra AB	2020	Int J Infect Dis	100		386-389
COVID-19 surveillance in the Flemish school system: development of systematic data collection within the Public Health School System and	Merckx, Joanna; Creveceour, Jonas; Proesmans, Kristiaan; Hammami, Naima; Denys, Hilde; Hens, Niel	2022				-

descriptive analysis of cases reported between October 2020 and June 2021						
COVIDâ€□ 19 Transmission during Transportation of 1st to 12th Grade Students: Experience of an Independent School in Virginia.	Ramirez, Dana W.E.; Klinkhammer, Martin D.; Rowland, Leah C.	2021	Journal of School Health	91	9	678-682
Details of COVID-19 Disease Mitigation Strategies in 17 K-12 Schools in Wood County, Wisconsin	Falk, Amy; Benda, Alison; Falk, Peter; Steffen, Sarah; De Coster, Mikaela; Gandhi, Monica; Hoeg, Tracy Beth	2021				-
In-person schooling and COVID-19 transmission in Canadaâ€™s three largest cities	Assche, Simona Bignami Van; Boujija, Yacine; Fisman, David; Sandberg, John	2021				-
Minimal SARS-CoV-2 Transmission After Implementation of a Comprehensive Mitigation Strategy at a School - New Jersey, August 20-November 27, 2020.	Volpp KG; Kraut BH; Ghosh S; Neatherlin J	2021	MMWR Morb Mortal Wkly Rep	70	11	377-381
Outbreak of COVID-19 and interventions in a large jail â€" Cook County, IL, United States, 2020.	Zawitz, Chad; Welbel, Sharon; Ghinai, Isaac; Mennella, Connie; Levin, Rebecca; Samala, Usha; Smith, Michelle Bryant; Gubser, Jane; Jones, Bridgette; Varela, Kate; Kirbiyik, Uzay; Rafinski, Josh; Fitzgerald, Anne; Orris, Peter; Bahls, Alex; Black, Stephanie R.; Binder, Alison M.; Armstrong, Paige A.	2021	American Journal of Infection Control	49	9	1129-1135
Personal protective equipment protecting healthcare workers in the Chinese epicentre of COVID-19.	Zhao Y; Liang W; Luo Y; Chen Y; Liang P; Zhong R; Chen A; He J	2020	Clin Microbiol Infect	26	12	1716-1718
Pilot Investigation of SARS-CoV-2 Secondary Transmission in Kindergarten Through Grade 12 Schools Implementing Mitigation Strategies - St. Louis County and City of Springfield, Missouri, December 2020.	Dawson P; Worrell MC; Malone S; Tinker SC; Fritz S; Maricque B; Junaidi S; Purnell G; Lai AM; Neidich JA; Lee JS; Orscheln RC; Charney R; Rebmann T; Mooney J; Yoon N; Petit M; Schmidt S; Grabeel J; Neill LA; Barrios LC; Vallabhaneni S; Williams RW; Goddard C; Newland JG; Neatherlin JC; Salzer JS	2021	MMWR Morb Mortal Wkly Rep	70	12	449-455
Rapid Control of Hospital-Based Severe Acute Respiratory Syndrome Coronavirus 2 Omicron Clusters Through Daily Testing and Universal Use of N95 Respirators.	Baker, Meghan A; Rhee, Chanu; Tucker, Robert; Badwaik, Amy; Coughlin, Cassie; Holtzman, Meghan A; Hsieh, Candace; Maguire, Angela; Blaeser, Elizabeth Mermel; Seetharaman, Saranya; Solem, Ofelia; Vaidya, Vineeta; Klompas, Michael	2022	Clinical Infectious Diseases	75	1	e296-e299
Risk factors and frequency of COVID-19 among healthcare workers at a	Dev N; Meena RC; Gupta DK; Gupta N; Sankar J	2021	Trans R Soc Trop Med Hyg	115	5	551-556

tertiary care centre in India: a case-control study.						
Risk factors associated with an outbreak of COVID-19 in a meat processing plant in southern Germany, April to June 2020.	Finci I; Siebenbaum R; Richtzenhain J; Edwards A; Rau C; Ehrhardt J; Koiou L; Joggerst B; Brockmann SO	2022	Euro Surveill	27	13	-
Risk Factors Associated with COVID-19 Infected Healthcare Workers in Muscat Governorate, Oman.	Al Abri, Zahir Ghassan Hilal; Al Zeedi, Manar Al Sanaa Ali; Al Lawati, Anwar Ahmed	2021	Journal of Primary Care & Community Health	08-Jan		
Risk Mitigation Strategies to Prevent Transmission of COVID-19 in the Military Classroom Setting: A Case of a Symptomatic SARS-CoV2 Positive Student without Apparent Spread to Classmates.	Petrik E; Mease L	2021	Med J (Ft Sam Houst Tex)	PB 8-21-01/02/03		104-107
Risks to healthcare workers following tracheal intubation of patients with COVID-19: a prospective international multicentre cohort study.	El-Boghdadly K; Wong DJN; Owen R; Neuman MD; Pocock S; Carlisle JB; Johnstone C; Andruszkiewicz P; Baker PA; Biccard BM; Bryson GL; Chan MTV; Cheng MH; Chin KJ; Coburn M; Jonsson Fagerlund M; Myatra SN; Myles PS; O'Sullivan E; Pasin L; Shamim F; van Klei WA; Ahmad I	2020	Anaesthesia	75	11	1437-1447
Role of non-aerosols activities in the transmission of SARS-Cov-2 infection among health care workers	Paris, Christophe; Tadie, Emilie; Heslan, Christopher; Gary Bobo, Pierre; Oumary, Sitty; Sitruk, Anais; Wild, Pascal; Tattevin, Pierre; Thibault, Vincent; Garlantezec, Ronan	2021				
Screening Students and Staff for Asymptomatic Coronavirus Disease 2019 in ChicagoÂ Schools.	Edward PR; Reyna ME; Daly MK; Hultquist JF; Muller WJ; Ozer EA; Lorenzo-Redondo R; Seed PC; Simons LM; Sheehan K; Staples J; Kociolek L	2021	J Pediatr	239		74-80.e1
The Outcome and Implications of Public Precautionary Measures in Taiwan-Declining Respiratory Disease Cases in the COVID-19 Pandemic.	Hsieh CC; Lin CH; Wang WYC; Pauleen DJ; Chen JV	2020	Int J Environ Res Public Health	17	13	-
The Spread of SARS-CoV-2 Infection Among the Medical Oncology Staff of ASST Spedali Civili of Brescia: Efficacy of Preventive Measures	A., Dalla Volta; F., Valcamonico; R., Pedersini; C., Fornaro; V., Tovazzi; S., Monteverdi; A., Baggi; F., Consoli; V.D., Ferrari; S., Grisanti; E., Conti; V., Amoroso; P., Bossi; A., Berruti	2020	Frontiers in Oncology	10		1574
Timely intervention and control of a novel coronavirus (COVID-19)	EN, Karmarkar; I, Blanco; PN, Amornkul; A, DuBois; X, Deng; PK, Moonan; BL, Rubenstein; DA, Miller; I, Kennedy; J, Yu; JP, Dauterman; M,	2021	Infect Control Hosp Epidemiol	42	10	1173-1180

outbreak at a large skilled nursing facility-San Francisco, California, 2020.	Ongpin; W, Hathaway; L, Hoo; S, Trammell; EF, Dosunmu; G, Yu; Z, Khwaja; W, Lu; NZ, Talai; S, Jain; JK, Louie; SS, Philip; S, Federman; G, Masinde; DA, Wadford; N, Bobba; J, Stoltey; A, Smith; E, Epson; CY, Chiu; AS, Bennett; AM, Vasquez; T, Williams					
Trends in COVID-19 Incidence After Implementation of Mitigation Measures - Arizona, January 22-August 7, 2020.	Gallaway MS; Rigler J; Robinson S; Herrick K; Livar E; Komatsu KK; Brady S; Cunico J; Christ CM	2020	MMWR Morb Mortal Wkly Rep	69	40	1460-1463
SARS-CoV-2 transmission in an indoor mass-gathering live music event. A randomized clinical trial.	Llibre, Josep M; Revollo, Boris; Blanco, Ignacio; Soler, Pablo; Toro, Jessica; Izquierdo Useros, Nuria; Puig, Jordi; Puig, Xavier; Navarro, Valenti; Casan, Cristina; Ruiz, Lidia; Perez Zsolt, Daniel; Videla, Sebastia; Clotet, Bonaventura	2021				-

Self-reported COVID-19 status (n = 17)

Title	Authors	Year	Journal	Vol	Iss	Pages
American Frontline Healthcare Personnel's Access to and Use of Personal Protective Equipment Early in the COVID-19 Pandemic.	Rich-Edwards, Janet W.; Ding, Ming; Rocheleau, Carissa M.; Boiano, James M.; Kang, Jae H.; Becene, Iris; Nguyen, Long H.; Chan, Andrew T.; Hart, Jaime E.; Chavarro, Jorge E.; Lawson, Christina C.	2021	Journal of Occupational & Environmental Medicine	63	11	913-920
Association between self-reported masking behavior and SARS-CoV-2 infection wanes from Pre-Delta to Omicron-predominant periods - North Carolina COVID-19 Community Research Partnership (NC-CCRP).	Tjaden AH; Gibbs M; Runyon M; Weintraub WS; Taylor YJ; Edelstein SL	2022	Am J Infect Control			-
COVID-19 mitigation measures in primary schools and association with infection and school staff wellbeing: An observational survey linked	Marchant E; Griffiths L; Crick T; Fry R; Hollinghurst J; James M; Cowley L; Abbasizanjani H; Torabi F; Thompson DA; Kennedy J; Akbari A; Gravenor MB; Lyons RA; Brophy S	2022	PLoS One	17	2	e0264023

with routine data in Wales, UK.						
Effects of wearing FFP2 masks on SARS-CoV-2 infection rates in classrooms	Jarnig, Gerald; Kerbl, Reinhold; Poppel, Mireille N M Van	2022				-
Mask Use and Ventilation Improvements to Reduce COVID-19 Incidence in Elementary Schools - Georgia, November 16-December 11, 2020.	Gettings J; Czarnik M; Morris E; Haller E; Thompson-Paul AM; Rasberry C; Lanzieri TM; Smith-Grant J; Aholou TM; Thomas E; Drenzek C; MacKellar D	2021	MMWR Morb Mortal Wkly Rep	70	21	779-784
Reported COVID-19 Incidence in Wisconsin High School Athletes in Fall 2020.	Sasser P; McGuine TA; Haraldsdottir K; Biese KM; Goodavish L; Stevens B; Watson AM	2022	J Athl Train	57	1	59-64
Risk of COVID-19 infection and work place exposure of front-line mass media professionals	Tahura, Sarabon; Banu, Bilkis; Akter, Nasrin; Hossain, Sarder Mahmud; Mahumud, Rashidul Alam; Ahmed, Md Rishad	2021				-
Risk of SARS-CoV-2 Acquisition in Health Care Workers According to Cumulative Patient Exposure and Preferred Mask Type.	DÃ¶rr, Tamara; Haller, Sabine; MÃ¼ller, Maja F.; Friedl, AndrÃ©e; Vuichard, Danielle; Kahlert, Christian R.; Kohler, Philipp	2022	JAMA Network Open	5	8	e2226816-e2226816
SARSâ€□ CoVâ€□ 2 Infections and Incidence at a North Carolina Preâ€□ Kindergartenâ€□ 12 School During Inâ€□ Person Education: August 2020 to January 2021.	Thakkar, Pavan V.; Zimmerman, Kanecia O.; Benjamin, Daniel K.; Kalu, Ibukunoluwa C.	2022	Journal of School Health	92	5	461-468
Household Transmission of SARS-CoV-2 from Children and Adolescents.	Chu VT; Yousaf AR; Chang K; Schwartz NG; McDaniel CJ; Lee SH; Szablewski CM; Brown M; Drenzek CL; Dirlikov E; Rose DA; Villanueva J; Fry AM; Hall AJ; Kirking HL; Tate JE; Lanzieri TM; Stewart RJ	2021	N Engl J Med	385	10	954-956
Protective measures are associated with the	Sharif N; Alzahrani KJ; Ahmed SN; Opu RR; Ahmed N; Talukder A; Nunia R;	2021	PLoS One	16	11	e0260287-

reduction of transmission of COVID-19 in Bangladesh: A nationwide cross-sectional study.	Chowdhury MS; Nodi IJ; Saha T; Zhang M; Dey SK					
Use of respirator vs. surgical masks in healthcare personnel and its impact on SARS-COV-2 acquisition-a prospective multicentre cohort study	S., Haller; S., Gusewell; T., Egger; G., Scanferla; R., Thoma; O., Leal-Neto; D., Flury; A., Brucher; E., Lemmenmeier; C., Moller; P., Rieder; M., Rutti; R., Stocker; D., Vuichard-Gysin; B., Wiggli; U., Besold; S., Kuster; A., McGeer; L., Risch; M., Schlegel; A., Friedl; P., Vernazza; C., Kahlert; P., Kohler	2021	Antimicrobial Resistance and Infection Control	10	SUPPL 1	
Estimation of the risk of COVID-19 transmission through aerosol-generating procedures.	S, Manzar; F, Kazmi; H, Bin Shahzad; FA, Qureshi; M, Shahbaz; S, Rashid	2022	Dent Med Probl	59	3	351-356
Association between COVID-19 and consistent mask wearing during contact with others outside the household-A nested case-control analysis, November 2020-October 2021	Tjaden A.H.; Edelstein S.L.; Ahmed N.; Calamari L.; Dantuluri K.L.; Gibbs M.; Hinkelman A.; Mongraw-Chaffin M.; Sanders J.W.; Saydah S.; Plumb I.D.	2023	Influenza and other Respiratory Viruses			
COVID-19â€“Positive Testing in Minnesota High School Fall and Winter Sports: A Guide for Sports Risk.	Roberts, William O.; Stuart, Michael J.; Lee, Jason A.; Miner, Michael H.	2022	Clinical Journal of Sport Medicine	32	3	283-289
Household COVID-19 risk and in-person schooling.	Lessler J; Grabowski MK; Grantz KH; Badillo-Goicoechea E; Metcalf CJE; Lupton-Smith C; Azman AS; Stuart EA	2021	Science	372	6546	1092-1097
Investigation of SARS-CoV-2 Transmission Associated With a Large Indoor Convention - New York City, November-December 2021.	Sami S; Horter L; Valencia D; Thomas I; Pomeroy M; Walker B; Smith-Jeffcoat SE; Tate JE; Kirking HL; Kyaw NTT; Burns R; Blaney K; Dorabawila V; Hoen R; Zirnhelt Z; Schardin C; Uehara A; Retchless AC; Brown VR; Gebru Y; Powell C; Bart SM; Vostok J; Lund H; Kaess J; Gumke M; Propper R; Thomas D; Ojo M; Green A; Wieck M; Wilson E; Hollingshead RJ;	2022	MMWR Morb Mortal Wkly Rep	71	7	243-248

	Nunez SV; Saady DM; Porse CC; Gardner K; Drociuk D; Scott J; Perez T; Collins J; Shaffner J; Pray I; Rust LT; Brady S; Kerins JL; Teran RA; Hughes V; Sepcic V; Low EW; Kemble SK; Berkley A; Cleavinger K; Safi H; Webb LM; Hutton S; Dewart C; Dickerson K; Hawkins E; Zafar J; Krueger A; Bushman D; Ethridge B; Hansen K; Tant J; Reed C; Boutwell C; Hanson J; Gillespie M; Donahue M; Lane P; Serrano R; Hernandez L; Dethloff MA; Lynfield R; Como-Sabetti K; Lutterloh E; Ackelsberg J; Ricaldi JN					

Conference abstract (n = 10)

Title	Authors	Year	Journal	Vol	Iss	Pages
Association between universal face shield in a quaternary care center and reduction of SARS-CoV2 infections among healthcare personnel and hospitalized patients	V., Hemmige; B., Winterer; T., Lasco; B., Lembcke	2020	Open Forum Infectious Diseases	7	SUPPL 1	S851
Clinical and epidemiological features of healthcare workers detected with coronavirus disease	M., Campbell; R., Datta; A., Wyllie; A., Casanovas-Massana; R., Handoko; L., Sewanan; A.I., Ko; R.A., Martinello	2020	Open Forum Infectious Diseases	7	SUPPL 1	S313
Effectiveness of personal protective equipment in preventing transmission of COVID-19 in healthcare workers	A., Li; G., Rieg; A.M., Maldonado; J., Concepcion	2020	Open Forum Infectious Diseases	7	SUPPL 1	S314
Outcomes and factors associated with a SARS-CoV-2 positive test in asymptomatic and symptomatic healthcare workers of a Mexican hospital converted to treat COVID-19 patients	S., Rajme-Lopez; P.E., Leal-Moran; F., Gonzalez-Lara; A.T., Vargas-Fernandez; E., Ochoa-Hein; F., Alberto-Hernandez; L.N., Valverde-Ramos; D.E., Bustos-Roman; A.P., De Leon-Garduno; A., Galindo-Fraga; J., Sifuentes-Osornio	2020	Open Forum Infectious Diseases	7	SUPPL 1	S297
Predictors of Seropositivity to SARS-CoV-2 among Workforce Members at a Large Urban Medical Center	E.A., Flores; D., Kupferwasser; P., Merino; D.P., Tran; H., Liu; Y., Huang; M., Bolaris; M.H., Nguyen; M., Gonzalez; W.D., Silva; L., Astorga-Cook; A., Abueg; H., Mason; L.G., Miller	2021	Open Forum Infectious Diseases	8	SUPPL 1	S295-S296

FACE MASK AND HYPERCAPNIA IN PATIENTS WITH COPD IN COVID-19 PANDEMIC...IS IT REAL!	Patil S.	2021	Chest	160	4 Supplement	A1404-
Investigation of a Cluster of COVID-19 among Factory X Workers, Buikwe District, Uganda, 2020	Byaruhanga A.	2022	Journal of Public Health in Africa	13	Supplement 1	34-35
How to COVID-19 pandemic infection control and prevention In Cho Ray hospital, Vietnam	T.M., Phung Manh; T., Nguyen Tri	2021	Antimicrobial Resistance and Infection Control	10	SUPPL 1	
Risk Categorization and Outcomes among Healthcare Workers Exposed to COVID-19: A Cohort Study from A Thai Tertiary-care Center	Khawcharoenporn T.; Chancharoenrat W.; Sajak S.; Phetsaen S.; Hanchai P.; Thongphubeth K.; Pienthong T.	2022	Open Forum Infectious Diseases	9	Supplement 2	S745
Recent sars-cov-2 seroconversion in a national prospective cohort of us adults	Nash D.; Rane M.S.; Chang M.; Kulkarni S.G.; You W.X.; Zimba R.; Berry A.; Mirzayi C.; Kochhar S.; Maroko A.; Robertson M.M.; Westmoreland D.A.; Parcesepe A.; Grov C.	2021	Topics in Antiviral Medicine	29	1	246-

Wrong intervention (n = 10)

Title	Authors	Year	Journal	Vol	Iss	Pages
Effectiveness of Physical Distancing: Staying 6 Feet Over to Put Respiratory Viruses 6 Feet Under.	Freeman CM; Rank MA; Bolster LaSalle CM; Grys TE; Lewis JC	2021	Mayo Clin Proc	96	1	148-151
Epidemiology of COVID-19 among indigenous people living in the Amazon region of Brazil.	dos Santos Santana, Rodrigo; Santos da Silva, Robson; AlmirÃ³n, Maria; Navegantes de AraÃºjo, Wildo; Ramalho Massa, Walter; Lins Frutuoso, Rodrigo; Said, Rodrigo; Guerra Gallo, Luciana; Milhomem Bastos, MÃ¡bia; Coutinho de Souza, Amanda; Barbosa Monica, Rayane; Mota Costa, Gabriely; Vanni, Tazio	2022	Weekly Epidemiological Record	97	14	141-149
Epidemiology of SARS-CoV-2 Infection Evaluated by Immunochromatographic Rapid Testing for the Determination of IgM and IgG Against SARS-CoV-2 in a Cohort of Mask Wearing Workers in the Metal-Mechanical Sector in an Area With a High Incidence of COVID-19.	Esposito S; Neglia C; Affanni P; Colucci ME; Argentiero A; Veronesi L; Messina G; Deolmi M; Principi N	2021	Front Public Health	9		628098

Pre-vaccination RT-PCR negative contacts in workplace settings show high, SARS COV-2 neutralizing antibody levels.	Karunathilake RP; Hewage S; Vidanapathirana G; Kumara A; Ranasinghe P; Noordeen F; Gawarammana I; Ratnatunga CN	2022	BMC Public Health	22	1	1961-
Risk of COVID-19 among front-line health-care workers and the general community: a prospective cohort study.	Nguyen LH; Drew DA; Graham MS; Joshi AD; Guo CG; Ma W; Mehta RS; Warner ET; Sikavi DR; Lo CH; Kwon S; Song M; Mucci LA; Stampfer MJ; Willett WC; Eliassen AH; Hart JE; Chavarro JE; Rich-Edwards JW; Davies R; Capdevila J; Lee KA; Lochlainn MN; Varsavsky T; Sudre CH; Cardoso MJ; Wolf J; Spector TD; Ourselin S; Steves CJ; Chan AT	2020	Lancet Public Health	5	9	e475-e483
Secondary Transmission of COVID-19 in K-12 Schools: Findings From 2 States.	Boutzoukas, Angelique E.; Zimmerman, Kanecia O.; Benjamin Jr, Daniel K.; DeMuri, Gregory P.; Kalu, Ibukunoluwa C.; Smith, Michael J.; McGann, Kathleen A.; Koval, Shawn; Brookhart, M. Alan; Butteris, Sabrina M.	2022	Pediatrics	149		S1-S8
Viral dynamics of Omicron and Delta SARS-CoV-2 variants with implications for timing of release from isolation: a longitudinal cohort study	Bouton, Tara C; Atarere, Joseph; Turcinovic, Jacquelyn; Seitz, Scott; Sher Jan, Cole; Gilbert, Madison; White, Laura; Zhou, Zhenwei; Hossain, Mohammad M; Overbeck, Victoria; Doucette Stamm, Lynn; Platt, Judy; Landsberg, Hannah E; Hamer, Davidson H; Klapperich, Catherine; Jacobson, Karen R; Connor, John H	2022				-
Factors affecting high-risk exposure amongst health care workers (Hcw): Audit of covid-19 risk assessment committee from tertiary care centre in North East India	V.K., Jagtap; T., Ete; L., Thangkhiew; E., Marbaniang; A., Marak; D., Slong; D., Tongper; N.M., Lyngdoh; A., Sarma; N., Topno	2021	Journal of the Indian Medical Association	65	1	56-59
Personnel protection strategy for healthcare workers in Wuhan during the COVID-19 epidemic	F.F., Hou; F., Zhou; X., Xu; D., Wang; G., Xu; T., Jiang; S., Nie; X., Wu; C., Ren; G., Wang; J.Y.-N., Lau; X., Wang; K., Zhang	2020	Precision Clinical Medicine	3	3	169-174
Transmission of COVID-19 to Health Care Personnel During Exposures to a Hospitalized Patient - Solano County, California, February 2020.	Heinzerling A; Stuckey MJ; Scheuer T; Xu K; Perkins KM; Resseger H; Magill S; Verani JR; Jain S; Acosta M; Epson E	2020	MMWR Morb Mortal Wkly Rep	69	15	472-476
SARS-CoV-2 Infection Among Community Health Workers in India Before and After Use of Face Shields.	ME, Bhaskar; S, Arun	2020	JAMA	324	13	1348-1349

Modelling study (n = 6)

Title	Authors	Year	Journal	Vol	Iss	Pages
Associations of Stay-at-Home Order and Face-Masking Recommendation with Trends in Daily New Cases and Deaths of Laboratory-Confirmed COVID-19 in the United States.	Xu J; Hussain S; Lu G; Zheng K; Wei S; Bao W; Zhang L	2020	Explor Res Hypothesis Med			10-Jan
COVID-19 Policy Differences across US States: Shutdowns, Reopening, and Mask Mandates.	Zhang X; Warner ME	2020	Int J Environ Res Public Health	17	24	
Identifying airborne transmission as the dominant route for the spread of COVID-19.	Zhang R; Li Y; Zhang AL; Wang Y; Molina MJ	2020	Proc Natl Acad Sci U S A	117	26	14857-14863
Mask wearing in community settings reduces SARS-CoV-2 transmission.	Leech G; Rogers-Smith C; Monrad JT; Sandbrink JB; Snodin B; Zinkov R; Rader B; Brownstein JS; Gal Y; Bhatt S; Sharma M; Mindermann S; Brauner JM; Aitchison L	2022	Proc Natl Acad Sci U S A	119	23	e2119266119
SARS-CoV-2 Seroprevalence among Healthcare, First Response, and Public Safety Personnel, Detroit Metropolitan Area, Michigan, USA, May-June 2020.	Akinbami LJ; Vuong N; Petersen LR; Sami S; Patel A; Lukacs SL; Mackey L; Grohskopf LA; Shehu A; Atas J	2020	Emerg Infect Dis	26	12	2863-2871
The Association of COVID-19 Incidence with Sport and Face Mask Use in United States High School Athletes.	Watson AM; Haraldsdottir K; Biese K; Goodavish L; Stevens B; McGuine T	2021	J Athl Train			

Not a study (n = 5)

Title	Authors	Year	Journal	Vol	Iss	Pages
A comparison of epidemic prevention of COVID-19 between China and the US	Bian Q.	2020	Traditional Medicine and Modern Medicine	3	1	26-Nov
Mitigating airborne transmission of SARS-CoV-2.	Addleman S; Leung V; Asadi L; Sharkawy A; McDonald J	2021	CMAJ	193	26	E1010-E1011
Pediatric COVID-19 Cases in Counties With and Without School Mask Requirements - United States, July 1-September 4, 2021.	Budzyn SE; Panaggio MJ; Parks SE; Papazian M; Magid J; Eng M; Barrios LC	2021	MMWR Morb Mortal Wkly Rep	70	39	1377-1378
Staff and Patient Protection in Radiation Oncology Departments During Coronavirus Disease 2019 (COVID-19) Pandemic	M., Portaluri; S., Bambace; F., Tramacere; A., Errico; S., Carbone; T., Portaluri	2020	Advances in Radiation Oncology	5	4	628-630

Wearing face masks regardless of symptoms is crucial for preventing the spread of COVID-19 in hospitals.	JK, Lee; HW, Jeong	2021	Infect Control Hosp Epidemiol	42	1	115-116

Evidence synthesis (n = 4)

Title	Authors	Year	Journal	Vol	Iss	Pages
Community Use of Face Masks against the Spread of COVID-19.	Bubbico L; Mastrangelo G; Larese-Filon F; Basso P; Rigoli R; Maurelli M; Ferlito S; Capelli M; Gisabella C; Javanbakht M; Bellizzi S; Cegolon L	2021	Int J Environ Res Public Health	18	6	-
Comprehensive review of mask utility and challenges during the COVID-19 pandemic.	Tirupathi R; Bharathidasan K; Palabindala V; Salim SA; Al-Tawfiq JA	2020	Infez Med	28	suppl 1	57-63
SARS-CoV-2 Transmission and Prevention in the Era of the Delta Variant.	Meyerowitz EA; Richterman A	2022	Infect Dis Clin North Am	36	2	267-293
A novel perspective approach to explore pros and cons of face mask in prevention the spread of SARS-CoV-2 and other pathogens	Ahmad M.D.F.; Wahab S.; Ali Ahmad F.; Intakhab Alam M.; Ather H.; Siddiqua A.; Amir Ashraf S.; Abu Shaphe M.; Idreesh Khan M.; Ali Beg R.	2021	Saudi Pharmaceutical Journal	29	2	121-133

Protocol (n = 2)

Title	Authors	Year	Journal	Vol	Iss	Pages
Transmission of SARS-CoV-2 during indoor clubbing events: A clustered randomized, controlled, multicentre trial protocol	Goupil de Bouille, J.; Luong Nguyen, L. B.; Crepey, P.; Garlantezec, R.; Dore, V.; Dumas, A.; Ben Mechlia, M.; Tattevin, P.; Gaudart, J.; Spire, B.; Lert, F.; Yazdanpanah, Y.; Delaugerre, C.; Noret, M.; Zeggagh, J.	2022	Frontiers in public health	10		981213-
Face masks for the prevention of COVID-19-rationale and design of the randomised controlled trial DANMASK-19	Bundgaard H.; Bundgaard J.S.; Raaschou-Pedersen D.E.T.; Mariager A.F.; Schytte N.; von Buchwald C.; Todsen T.; Skovgaard K.; Trebbien R.; Andersen M.P.; Benfield T.; Ullum H.; Torp-Pedersen C.; Iversen K.	2020	Danish Medical Journal	67	9	10-Jan

Full text not available (n = 1)

Title	Authors	Year	Journal	Vol	Iss	Pages

Risk factors for novel corona virus (COVID-19) re-infections among health care workers at tertiary care center: A case control study	Y., Pusdekar; V., Pusdekar; S., Bhagat; L., Balpande; A., Saoji	2022	NeuroQuantology	20	8	8231-8242

Inconsistent COVID-19 testing (n = 1)

Title	Authors	Year	Journal	Vol	Iss	Pages
School Masking Policies and Secondary SARS-CoV-2 Transmission.	Boutzoukas, Angelique E.; Zimmerman, Kanecia O.; Inkelas, Moira; Brookhart, M. Alan; Benjamin Sr., Daniel K.; Butteris, Sabrina; Koval, Shawn; DeMuri, Gregory P.; Manuel, Vladimir G.; Smith, Michael J.; McGann, Kathleen A.; Kalu, Ibukunoluwa C.; Weber, David J.; Falk, Amy; Shane, Andi L.; Schuster, Jennifer E.; Goldman, Jennifer L.; Hickerson, Jesse; Benjamin, Vroselyn; Edwards, Laura	2022	Pediatrics	149	6	42-49

Not about COVID-19 (n = 1)

Title	Authors	Year	Journal	Vol	Iss	Pages
Human coronavirus data from four clinical trials of masks and respirators.	MacIntyre CR; Chughtai AA; Seale H; Dwyer DE; Quanyi W	2020	Int J Infect Dis	96		631-633

Self-reported COVID-19 status not reported separately (n = 1)

Title	Authors	Year	Journal	Vol	Iss	Pages
Protective behavior and SARS-CoV-2 infection risk in the populationÂ -Â Results from the Gutenberg COVID-19 study.	BaumkÃ¶tter R; Yilmaz S; Zahn D; Fenzl K; Prochaska JH; Rossmann H; Schmidtmann I; Schuster AK; Beutel ME; Lackner KJ; MÃ¼nzel T; Wild PS	2022	BMC Public Health	22	1	1993-

Appendix 3: Data extraction form

Metadata:

- PMID
- Open access URL
- Reference (APA format)
- Date of publication
- Preprint or published
- Variant(s) of concern of focus
- Other public health measures studied
- Relevance to other LESs within the suite

Study data:

- Study design
- Location (city/region, country; or "global")
- Setting (e.g., schools, restaurants, community)
- Date range of data collection
- Population
- Sample size (include size of each group)
- Intervention and comparison (if applicable)
- Was there a comparator? (Y/N)
- Length of intervention (i.e., when/how long were masks worn?)
- Was the intervention intended to prevent or control transmission?
- Was mask use mandated?
- Mandated population(s) (if applicable)
- Description and duration of mandate (if applicable)
- How was mask mandate or use promoted or communicated?
- Type(s) of mask(s) studied
- Outcomes of interest
- Outcome measure(s)
- Follow-up / how results were gathered
- Results – reduction in transmission
- Results – reduction in deaths
- Results – other outcomes
- Reduction in hospitalizations measured? (Y/N)
- Caveats or other notes

Appendix 4: Approach to critical appraisal

ROB-2 was used to assessed RCTs. A modified version of ROBINS-I was used to assess observational studies. Once a study met one criterion that made it "critical" risk of bias, it was dropped from further risk of bias assessment.

Modified ROBINS-I instrument

Critical Appraisal Process for Assessment of Public Health Measures for COVID-19 in Cohort Studies

1. **Bias due to confounding**

Did the study adjust for other COVID protective interventions (including vaccination, prior community infection history, concurrent public health measures, mobility)? (Mobility especially relevant to mask mandate studies - i.e., was everyone staying in their homes?)**
(critical = multiple co-interventions with no controlling or adjustment; serious = one co-intervention not controlled for; moderate = all known important interventions controlled for)

Did the study adjust for calendar time (implications for circulating variant, season), demographics, and other relevant factors?**
(critical = no adjustment; serious = at least one known important domain not measured or controlled for; moderate = all known important confounding domains measured)

Were participants free of confirmed COVID infection at the start of the study?**
(critical = unclear or high likelihood pts had COVID at start of study; serious = COVID status of intervention group known but unclear for control group OR COVID status of both groups known by self-report only; low = negative COVID status of both groups known at study start (lab confirmed))

2. **Bias in selection of participants**

Was it a single-arm cohort study?
(serious = yes; low = no)

Were both study groups recruited from the same population during the same time period?
(critical = same or diff country/province/state measured at a diff time prior to pandemic)
(serious = same or diff country/province/state measured at a diff time during pandemic *or* diff country/province/state with dissimilar cultural/political landscapes measured at same time)
(moderate = same country/province/state measured at same time)

Were the COVID protective interventions implemented prior to period of data collection? (prevalent users)
(critical = not addressed and highly likelihood of prevalent users; moderate = prevalent users likely but appropriately controlled for; low = start of data collection at same time as implementation with no prevalent users)

Were the study groups balanced with respect to participant adherence (based on internal and external factors unrelated to COVID)?
(For example, people who are less likely to adhere to PHSMs anyway may be more likely to be exposed to COVID and require quarantine & isolation but then are less likely to adhere. Similar for e.g. people who work are essential workers wi thout paid time off.)

(critical = not addressed and highly likelihood of difference in adherence; moderate = difference in adherence likely but appropriately controlled for; low = adherence confirmed to be same in both groups at start of study)

3. **Bias in classification of interventions**

Were the authors able to definitively relate outcomes to only masking?
(critical = masking was reported separately but in reality it would be **impossible** to separate it from other interventions; serious = masking was reported separately but in reality it would be **difficult** to separate it from other interventions; moderate = other interventions were implemented but there was an attempt to tie transmission directly to mask usage (e.g., identifying specific mask-related exposure events); low = masking was implemented in a controlled environment

Was the method for confirming the intervention clearly defined and applied consistently across study samples (e.g., districts within a country)?
(critical = not addressed; serious = intervention status not well defined or applied inconsistently; moderate = well defined but some aspects of assignment of intervention status determined retrospectively; low = well defined and solely based on information collected at time of intervention)

In periods of co-occurring interventions, do the authors clearly classify each individual intervention?
(critical = not addressed and co-interventions present; serious = co-intervention classification not well defined or applied inconsistently; moderate = co-intervention classification well defined but some aspects of assignment of status determined retrospectively; low = all co-interventions well defined and solely based on information collected at time of intervention)

Does classification into intervention/control group depend on self-report in a way that might introduce bias?
(For example, where negative consequences of providing truthful responses may lead to negative consequences e.g. self-reporting COVID symptoms would trigger 14 day quarantine and loss of income)
(critical = not addressed and reliant on self-report; moderate = reliant on self-report but appropriately controlled for/analyzed separately; low = not reliant on self-report)

For household transmission studies, was it clear that exposure to the index case was the most likely the only exposure to COVID for household or close contacts?
(critical = not addressed; serious = high risk occupational and social exposures likely and not accounted for; moderate = all participants isolated to same house or hospital from time of index case identification; low = all participants isolated to same house or hospital prior to index case identification)

4. Bias due to deviations from intended intervention?

Did the authors assess adherence to the protective behaviours/interventions after intervention implementation?**
(critical = not addressed; serious = reliant on self-report of adherence without verification or adjustment; moderate = adherence verified in at least a subset of each study group or appropriately adjusted for; low = adherence verified in all study participants)

5. **Risk of bias due to missing data**

Was outcome data at the end of the study period available for all or nearly all participants?

(critical = critical differences in missing data between groups; moderate: missing data did not differ between groups or was accounted for by appropriate statistical methods; low = no missing data)

Were participants excluded due to missing data?
(critical = participants excluded based on data missing unevenly across groups; moderate = participants excluded due to missing data, but rationale was appropriate and applied the same across all groups; low = no exclusions due to missing data)

6. **Risk of bias in measurement of outcomes**

Was the outcome of COVID confirmed by laboratory testing?**
(critical = not reported; serious = only sample or subset of population had PCR; moderate = most participants had PCR; low = all participants had PCR)

If the outcomes were derived from databases, were the databases constructed specifically for the collection of COVID data?**
(critical = no or unclear; serious = database for non-COVID purpose without individual level data; moderate = database for non-COVID purpose with individual level data (e.g. health records, employee records); low = national/state/province level surveillance database or specifically for COVID)

Were appropriate tools/methods with validated/justified cut-points used to determine outcomes of interest (other than COVID infection/transmission which is covered under laboratory testing)? **
(critical = not reported; serious = outcomes solely dependent on self-report without a validated measure; moderate = objective measure applied but validation uncertain; low = objective validated measure used consistently across all groups)

If the intervention was self-reported, did the authors attempt to control for social desirability?**
(critical = not reported and outcome likely to be influenced by social desirability; moderate = attempt made to control for social desirability; low = outcome not influenced by social desirability)

Was the frequency of testing for the outcome different between the study groups?
(critical = routinely done more frequently in one group more than the other; moderate = some differences but rationale appropriate; low = no difference in frequency of testing between groups)

If outcome was observed, was there more than one assessor and if so, was interrater agreement reported?
(critical = not reported; serious = reported with low agreement; moderate = reported with moderate agreement; low = reported with excellent agreement)

**relevant to single arm cohort studies