Systematic review of empiric studies on lockdowns, workplace closures, and other non-pharmaceutical interventions in non-healthcare workplaces during the initial year of the COVID-19 Pandemic: Benefits and selected unintended consequences

Faruque Ahmed
fahmed@cdc.gov

Centers for Disease Control and Prevention

Livvy Shafer
Oak Ridge Institute for Science and Education

Pallavi Malla
Oak Ridge Institute for Science and Education

Roderick Hopkins
Cherokee Nation Operational Solutions

Sarah Moreland
Oak Ridge Institute for Science and Education

Nicole Zviedrite
Centers for Disease Control and Prevention

Amra Uzicanin
Centers for Disease Control and Prevention

Research Article

Keywords: Anxiety, Community mitigation, COVID-19, Depression, Employment, Lockdown, Non-pharmaceutical, Novel coronavirus, Social distancing, Systematic review, Workplace

Posted Date: April 6th, 2023

DOI: https://doi.org/10.21203/rs.3.rs-2782489/v1

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Additional Declarations: No competing interests reported.

Version of Record: A version of this preprint was published at BMC Public Health on March 22nd, 2024. See the published version at https://doi.org/10.1186/s12889-024-18377-1.
Abstract

Background

We conducted a systematic review aimed to evaluate the effects of nonpharmaceutical interventions within non-healthcare workplaces and community-level workplace closures and lockdowns on COVID-19 outcomes in workers or the general community and on selected mental health and labor market outcomes.

Methods

The inclusion criteria included systematic reviews, randomized controlled trials, and non-randomized studies. The exclusion criteria included qualitative, and modeling studies. Electronic searches were conducted using MEDLINE, Embase, and other databases from January 1, 2020, through May 11, 2021. Risk of bias was assessed using the Risk of Bias in Non-Randomized Studies of Interventions (ROBINS-I) tool. A qualitative synthesis was performed.

Results

A total of 60 studies met the inclusion criteria. There were 40 studies on COVID-19 outcomes, 15 on anxiety and depression symptoms, and five on unemployment and labor force participation. There was a paucity of studies on physical distancing, physical barriers, and symptom and temperature screening within workplaces. Workplace closures significantly reduced COVID-19 incidence or growth rate (five of seven studies) and reproduction number (three of four studies) in the general community. Lockdown significantly reduced COVID-19 incidence and case growth rate (22 of 23 studies), reproduction number (10 of 11 studies), and COVID-19 mortality and death growth rate (seven of seven studies) in the general community. Lockdown significantly increased depression symptoms (10 of 15 studies), but the effect on anxiety symptoms was inconsistent. Lockdown increased unemployment (five studies) and decreased labor force participation (three studies). The risk of bias for most of the studies on COVID-19 or labor market outcomes was moderate or serious. The risk of bias for the studies on anxiety or depression symptoms was serious or critical.

Conclusions

Empiric studies that assessed the effect of workplace closures and lockdowns suggest that these measures helped reduce the impact of COVID-19, albeit with notable secondary (unwanted) effects. There is a pronounced paucity of studies on the effect of interventions, including symptom and temperature screening as well as less disruptive nonpharmaceutical interventions such as physical distancing
measures within still-open workplaces. Addressing the gaps in the evidence base would be important for informing future pandemic preparedness.

Systematic review registration number:

PROSPERO registration # CRD42020182660.

Background

Coronavirus disease (COVID-19) is an infectious disease caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) that emerged in December 2019. COVID-19 has caused a global pandemic that resulted in long-term health problems as well as millions of deaths around the world [1]. Several community-level containment and closure policies were implemented by government authorities to reduce the transmission of SARS-CoV-2 and avert overwhelming of healthcare systems. These policies included cancellation of public events, restrictions on gathering sizes, restrictions on internal movement and international travel, closure of public transport systems, school closures, closures of non-essential businesses, and lockdowns [2]. Lockdowns represent government mandates to stay home except for essential work or necessities and often include several but not necessarily all of the following in a geographic area: closure of non-essential businesses, restaurants and entertainment facilities; closure of schools and universities; prohibition of indoor and outdoor gatherings; restrictions on non-essential travel [3, 4]. Lockdowns are also called stay-at-home or shelter-in-place orders [5]. Governments provided fiscal support to varying extents to reduce financial hardship due to the COVID-19 pandemic and the interventions to reduce SARS-CoV-2 transmission [1, 6, 7].

About two-thirds of the global population over 15 years of age participate in the labor force [8]. SARS-CoV-2 transmission can occur in workplaces through respiratory droplets and aerosols generated by pre-symptomatic, asymptomatic, or symptomatic persons and through fomites [9, 10]. In 2020, employers were encouraged to implement several measures to prevent and reduce the transmission of SARS-CoV-2 within the workplace, including use of face masks or coverings, physical distancing, symptom and temperature screening, flexible leave policies to facilitate self-isolation of sick workers, environmental cleaning and disinfection, and engineering controls to improve air quality (Appendix Table S1) [11–13]. These measures could be used by essential businesses that were not subject to government-mandated closures and by all businesses when lockdowns were not in effect. Essential sectors included healthcare, law enforcement, agriculture and food production, critical retail (grocery stores, hardware stores, mechanics), critical trades (construction workers, electricians, plumbers), transportation, and energy [14, 15].

A Cochrane systematic review on interventions in non-healthcare workplaces examined the effect of interventions introduced by researchers [16]. The review identified one study that met their inclusion criteria, which was a cluster-randomized non-inferiority trial that assigned staff working in schools to standard isolation after contact with a SARS-CoV-2-infected person or to daily COVID-19 testing and
staying at work if the test was negative. Because randomizing employers or geographic regions to workplace-related non-pharmaceutical interventions (NPIs) may not be feasible or ethical during an outbreak, observational studies may provide the best available evidence. We conducted a systematic review to assess the benefits and unintended consequences of NPIs in non-healthcare workplaces that included observational studies. The objectives of our review were to evaluate the effects of NPIs within non-healthcare workplaces and community-level workplace closures and lockdowns, compared to no intervention, on the following: 1) COVID-19 outcomes in workers or the general community, and 2) selected mental health (anxiety, depression) and labor market (unemployment, labor force participation) outcomes.

Methods

The systematic review protocol, including amendments to the protocol, was registered on PROSPERO (ID # CRD42020182660) [17]. It is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement (Appendix Table S2) [18].

Literature search strategy and study selection

Electronic searches of the published and grey literature were conducted using MEDLINE, Embase, PsycINFO, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Scopus, Cochrane Library, NIOSHTIC-2, and EconLit to identify studies published in English from January 1, 2020, through May 11, 2021. The search strategy is provided in Appendix Table S3. Additional studies were identified through authors’ knowledge and examination of references of included studies and previous systematic reviews.

Inclusion And Exclusion Criteria

The inclusion criteria included systematic reviews, randomized controlled trials, and non-randomized studies (cohort, case-control, before-after, controlled before-after, interrupted time series). Cohort studies include both inception cohorts and retrospective cohorts. Controlled before-after studies commonly present a ‘difference in differences’ analysis, where before-after differences in the outcome are compared between the intervention and comparator groups. Before-after and controlled before-after studies can include measurements on the same individual before and after the intervention, or on different individuals at each time point. Interrupted time series studies are those with at least three measurement times before the intervention and at least three measurement times after the intervention. More details about the study designs are available elsewhere [19].

The population of interest was persons working in non-healthcare settings, with no restrictions regarding age, sex, or race/ethnicity. We included the following NPIs within non-healthcare workplaces: 1) Physical distancing (e.g., increased use of telework, email, and teleconferences; increasing physical space between employees; modifying schedules for on-site work; staggered work hours; limiting customers in indoor spaces, including capacity restrictions and outdoor dining; increasing physical space between employees...
and customers, including delivering services remotely, drive-through service, curbside pick-up, or delivery); 2) Physical barriers; 3) Symptom and/or temperature screening before entering facility. We also included community-level initial business closures (e.g., restaurant, entertainment), closures of all non-essential workplaces, and lockdowns. Persons may telework, if feasible, during workplace closures and lockdowns.

We assessed both benefits and unintended consequences of an intervention. The benefits examined were the effects on COVID-19 outcomes (COVID-19 incidence, case growth rate, reproductive number, epidemic doubling time, COVID-19 mortality, death growth rate) in workers or in the general community. The unintended consequences assessed were anxiety and depression symptoms, unemployment, and labor force participation. The case or death growth rate is the percent change in daily cases or deaths, respectively [20]. The reproduction number is the average number of secondary cases each current case would produce, and the epidemic doubling time is the number of days required for the daily incidence to double. Anxiety is characterized by excessive fear and worry and related behavioral disturbances [21], and depression is characterized by persistent sadness and a lack of interest or pleasure in previously rewarding or enjoyable activities [22]. The labor force participation rate is the number of people who are either employed or actively looking for work as a percentage of the civilian noninstitutional population aged 16 years and older [23]. The unemployment rate is the number of employed people as a percentage of the number of people who are employed or actively looking for work. People who are not actively looking for work are excluded from the denominator for computing the unemployment rate.

The exclusion criteria included the following: 1) Studies on severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS), influenza, influenza-like illness, or other diseases; 2) Editorials, commentaries, narrative reviews, as well as case series, cross-sectional, qualitative, and modeling studies; 3) Studies in healthcare, long-term care, nursing home, school, or university settings; 4) Studies on children, family members of healthcare workers or patients, or studies in animals; 5) Studies on hand hygiene, respiratory hygiene (including face mask or covering), generic physical distancing with no specific mention of workplace physical distancing, environmental cleaning and disinfection, isolation, quarantine, postponing work-related travel, or building engineering controls (e.g., ventilation, avoiding air recirculation, particle filtration, ultraviolet germicidal irradiation); 6) Studies that lacked a "no intervention" comparator; 7) Studies on mobility, workplace social contact rates, air pollution, access to health care (e.g., visits to physicians, cancer screening), mental health outcomes other than anxiety or depression, or labor market outcomes other than unemployment and labor force participation; 8) Publications in languages other than English.

Data Extraction And Risk Of Bias Assessment

Data extraction and risk of bias assessment
Two reviewers independently performed title and abstract screening, data extraction, and risk of bias assessments using Covidence software [24]. The variables for which data were extracted included the following: study design, country, setting, population, intervention, comparator, outcomes, study dates, and
sponsorship source. Any disagreements were resolved through discussion or by a third reviewer. All risk of bias assessments were reviewed by a senior author. Study investigators were not contacted.

The quality of the selected studies was assessed using the Risk of Bias in Non-Randomized Studies of Interventions (ROBINS-I) tool, which assesses the risk of bias of non-randomized studies compared to a well-performed randomized trial [19, 25]. There are seven bias domains: confounding, selection of participants into the study, classification of interventions, deviations from intended interventions, missing data, measurement of outcome, and selection of the reported result. The risk of bias judgment for each domain is classified as follows: low (study is comparable to a well-performed randomized trial), moderate (study appears to provide sound evidence for a non-randomized study but cannot be considered comparable to a well-performed randomized trial), serious (study has one or more important problems), and critical (study is too problematic to provide any useful evidence on the effect of the intervention). It is rare for a non-randomized study to be judged as low risk of confounding because of the potential for residual or unmeasured confounding. Before-after studies are usually judged to have at least serious risk of bias because it is not possible to determine whether pre-post changes are due to the intervention rather than other factors. A particular level of risk of bias for a specific domain will mean that the overall risk of bias across domains for a study is at least this severe for the outcome being assessed.

The effect of interest was assignment to intervention as opposed to adherence to intervention. Confounders for COVID-19 outcomes include social contact at baseline and population at risk [26]. Proxies for social contact include mobility, socioeconomic variables (income, education), population density, and occupation. Relevant population characteristics include age structure and population size. Confounders for mental health outcomes include age, sex, marital status, and socioeconomic status (education, income) [27]. Confounders for labor market outcomes include education, age, and sex [28].

**Data Synthesis**

A study could include more than one intervention or more than one outcome. Because of differing effect measures used across the included studies, we conducted a qualitative synthesis displaying the associations between interventions and outcomes in harvest plots [19, 29]. The associations are categorized into three groups: statistically significant decrease; not statistically significant decrease or increase (includes studies that did not perform statistical tests); and statistically significant increase. Each association is represented by a bar where the height of the bar represents the overall risk of bias. The harvest plots facilitate assessment of findings by risk of bias.

**Results**

Search of the databases yielded 15,529 studies. After screening of the titles and abstracts, the full text of 853 studies were assessed for eligibility (Fig. 1). Among these studies, 806 that did not meet the inclusion criteria were excluded. Forty-seven studies were identified through database searching and 13 were identified via other sources (examination of references of previous systematic reviews and authors’
knowledge), yielding a total of 60 studies that met the inclusion criteria. Forty studies reported on COVID-19 outcomes (Appendix Table S4) [30–70], 15 assessed the effect on mental health outcomes (Appendix Table S5) [71–85], and five assessed the effect on labor market outcomes (Appendix Table S6) [7, 86–89]. The studies were based on data from the first year of the pandemic, mostly covering the period March to July 2020. The domain-specific and overall risk of bias for each study are shown in Appendix Tables S7-S9. Studies that were excluded from the review are listed in Appendix Table S10.

Of the 40 studies on COVID-19 outcomes, 16 were based on data from the USA, and 13 studies analyzed data from multiple countries, ranging from 2 to 202 countries (Appendix Table S4). Other studies included data from countries in Europe (Spain, Italy, Germany), Asia (India, China), Africa (South Africa), and Australia. Two studies on physical distancing (teleworking) and physical barriers reported the effect on the occurrence of COVID-19 illness in workers. One study reported that working from home or teleworking significantly decreased the occurrence of COVID-19 (Fig. 2), and one study in meat processing plants showed that physical barriers in combination with masking significantly decreased COVID-19 incidence (Fig. 3). Studies on workplace closures and lockdowns reported the effect on COVID-19 outcomes in the general community, which included both working and non-working persons of any age. One study showed that initial business closures (i.e., restaurant or entertainment business closures) significantly decreased COVID-19 case growth rate (Fig. 4). Workplace closures significantly reduced COVID-19 incidence or growth rate (five of seven studies) and reproduction number (three of four studies) (Fig. 5). Studies showed that lockdown significantly decreased COVID-19 incidence or growth rate (22 of 23 studies), reproduction number (10 of 11 studies), and COVID-19 mortality or death growth rate (seven of seven studies) (Fig. 6). The risk of bias for most studies ranged from moderate to serious (Figs. 2–6).

Among the 15 studies on anxiety and depression symptoms, 10 were conducted in European countries (Spain, Italy, Germany, Ireland, United Kingdom) and two were conducted in the USA (Appendix Table S5). All studies reported on the effect of lockdown. The studies assessed levels of anxiety and depression symptoms using self-reported questionnaires and reported the findings using mean scores and/or proportions. Fourteen studies reported the effect of lockdown on anxiety and/or depression symptoms in the general adult population and one study reported the effect on depression symptoms in workers. For the effect of lockdown on anxiety symptoms in the general population, three studies reported a significant increase, four studies reported a significant decrease, and five studies showed no significant change (Fig. 7). For the effect of lockdown on depression symptoms in the general population, nine studies showed a significant increase, one study showed a significant decrease, and four studies showed no significant change (Fig. 7). One study showed a significant increase in depression symptoms in workers. The risk of bias ranged from serious to critical (Fig. 7).

Among the five studies on unemployment and labor force participation, three were from the USA, one from Mexico, and one from Australia (Appendix Table S6). The studies showed that lockdown increased unemployment (five studies) and decreased labor force participation (three studies), with the risk of bias ranging from moderate to serious (Fig. 8).
Discussion

We found few empiric studies on the effect of NPIs within non-healthcare workplaces. Most of the studies showed that workplace closures and lockdowns reduced COVID-19 incidence and case growth rate, reproduction number, and COVID-19 mortality and death growth rate in the general community during the initial year of COVID-19 pandemic. Lockdown increased unemployment and decreased labor force participation. Studies showed that lockdown increased depression symptoms in the general adult population, but the effect on anxiety symptoms was inconsistent. The risk of bias for most of the studies on COVID-19 and labor market outcomes was moderate or serious, and for the studies on anxiety and depression symptoms was serious or critical.

Non-pharmaceutical measures in workplaces can reduce SARS-CoV-2 transmission by reducing the likelihood of transmission per contact and by reducing contacts between infectious and healthy persons [90]. A study published in 2023 found that employed adults who had telework experience before illness were less likely to work onsite while ill during COVID-19 and other acute respiratory illnesses than persons without telework experience, suggesting that telework may reduce workplace virus transmission [91]. Systematic reviews that assessed the effect of physical distancing and screening in other settings or on other respiratory viruses provide indirect evidence for the effect of these measures on COVID-19 outcomes in non-healthcare workplaces. A systematic review assessed the effectiveness of physical distancing measures in non-healthcare workplaces on influenza attack rates [92]. One review included studies of physical distancing on COVID-19 outcomes in settings other than workplaces (e.g., ≥ 3 vs. ≥ 6 feet distancing policies in schools; frequency of close contact with a primary case in a household) [93]. A Cochrane rapid review assessed the effect of symptom/exposure-based or test-based screening of international travelers for SARS-CoV-2 at borders before or after travel [94]. Systematic reviews of modeling studies on the effect of NPIs within non-healthcare workplaces on COVID-19 outcomes are needed because modeling studies fill in gaps of information when decisions must be made and there is limited information [95, 96].

Recent systematic reviews of empiric studies have assessed the effect of workplace closures and lockdowns [5, 93, 97]. Two of these reviews included cross-sectional studies [93, 97]. We excluded cross-sectional studies because it is difficult to assess cause-and-effect relationships from such studies [98]. The previous reviews reported that workplace closures and lockdowns reduced COVID-19 incidence, case growth rate, reproduction number, COVID-19 mortality, and death growth rate in the general community [5, 93, 97]. Lockdowns have been shown to reduce population mobility, with increased time at home, reductions in visits to shops and workplaces, and decline in use of public transport [4].

Our review found that lockdown increased depression symptoms in the general community but the effect on anxiety symptoms was inconsistent. A previous rapid review of studies published from January 2020 to June 2020 reported small effects of lockdown on anxiety and depression symptoms [99]. Among the 11 empiric studies on anxiety and depression symptoms included in the review, four were conducted in college or university students and thus not directly relevant to our systematic review. Another review
estimated that the global prevalence of anxiety and depression symptoms increased during the COVID-19 pandemic compared to the pre-pandemic period [100]. The authors attributed the increase in anxiety and depression symptoms to the combined effects of the spread of SARS-CoV-2 and the interventions, including lockdown, school and workplace closures, decreased public transport, and reduction of social interactions. Several risk factors for anxiety and depression during lockdown have been reported. Risk factors for anxiety include loneliness and history of mental health issues, while higher level of resilience and spiritual well-being are associated with lower anxiety [77, 78]. Risk factors for depression include loneliness, detachment, negative affect, history of mental health issues, concerns about changes at work and running out of money, and unemployment [71, 77, 84]. On the other hand, protective factors associated with depression include more resilient coping style, higher level of resilience, spiritual well-being, and moderate-to-vigorous physical activity [75, 77, 78, 84].

Our systematic review showed lockdown increased unemployment and decreased labor force participation. Lockdown can directly lead to layoffs because of business closures, cancelation of events, and reduced economic activities. However, in the absence of lockdown, employment can be affected by individuals’ refraining from activities outside their household to reduce their risk of infection, which can lead to decreased consumer spending and business revenues [7, 88]. We did not identify any previous systematic reviews of the effect of lockdown on employment and labor force participation.

Findings of our systematic review should be considered in context of at least six limitations. First, some studies on the effects of workplace closures and lockdowns on COVID-19 outcomes used quasi-experimental designs (controlled before after, interrupted time series) that can allow for causal inferences without randomized trials [101, 102], but it is unclear if the assumptions required to ensure valid causal inference were met. The findings therefore need to be interpreted as showing an association. Second, the included studies often did not describe in detail the interventions that were assessed, which may make it difficult to compare findings across studies. Third, many NPIs were implemented together or within a short time, and so the independent effects of interventions may be difficult to determine [103], particularly for studies that did not have a concurrent control group. Fourth, the number of COVID-19 cases could have been underestimated to a greater degree during the early phase of the pandemic because of limited availability of COVID-19 tests. However, the underestimation would likely bias the effect of an intervention toward the null [104]. Fifth, several studies on the effect of lockdown on anxiety and depression symptoms collected baseline data after the start of lockdown, and so the magnitude of the effect may be under-estimated. In addition, anxiety and depression were assessed using screening questionnaires that identified probable cases, and the findings may not be extrapolated to diagnosed cases of anxiety and depression [100]. Finally, the included studies were limited to those published in English, and thus the findings may not be generalizable to studies published in other languages.

However, this systematic review also has several strengths. We assessed both desired effects (i.e., public health benefits) and secondary (unintended / unwanted) effects of NPIs during the initial year of COVID-19 pandemic. Additionally, we used several electronic databases to search for studies and examined the references of previous systematic reviews, which increased the comprehensiveness of the literature.
search. Next, our review was based on empiric studies that provide direct evidence of effectiveness in real-world settings.

The COVID-19 pandemic had unequal effects on the population, with people who could work remotely faring better in terms of health and socioeconomic wellbeing than persons who were required to work in-person, such as those in goods production or essential industries [1]. Minority and low-income vulnerable persons are over-represented in high-risk essential industries [1, 45, 105]. COVID-19 death rates in the U.S. have been estimated to be substantially higher in Hispanics and non-Hispanic Blacks compared to non-Hispanic Whites [106, 107]. Compared to people working in non-essential sectors, those working in essential sectors (particularly in agriculture, emergency, manufacturing, facilities, and transportation or logistics) were found to have higher COVID-19 deaths [108, 109]. It is important to deploy effective science based NPIs to reduce health inequities and decrease overall disease transmission, especially in industries where work cannot be performed remotely.

Conclusions

Our systematic review showed that several empiric studies assessed the effect of workplace closures and lockdowns, but there is a paucity of studies on the effects of other interventions undertaken in many workplace settings, including temperature/symptom screening, use of different barrier protections including some which were not previously proposed as an NPI or tested (e.g., glass or curtain partitions), and physical distancing measures within the workplace. With the availability of COVID-19 vaccines and effective therapeutics that reduce hospitalizations and deaths [1], as well as the desire to avoid detrimental effects on daily life and the economy, the use of workplace closures and lockdowns abated after the initial year of the pandemic in most countries. However, because SARS-CoV-2 remains endemic and because it evolved into variants which can evade immunity acquired through prior infection or vaccination and transmit more efficiently [110], use of less disruptive NPIs including better ventilation, face masks, and some variations of physical distancing within the workplace may still have relevance. Addressing the gaps in the evidence base on the effects of NPIs pertaining to workplaces is therefore important for informing ongoing prevention strategies as well as future pandemic preparedness.

Abbreviations

CINAHL: Cumulative Index to Nursing and Allied Health Literature; NPI: Nonpharmaceutical intervention; PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analysis; ROBINS-I: Risk of Bias in Non-Randomized Studies of Interventions; Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2); SD: Standard deviation; SE: Standard error

Declarations

Ethics approval and consent to participate
Consent for publication

Not applicable.

Availability of data and materials

All data generated or analysed during this study are included in this published study and its Additional file.

Competing interests

The authors declare that they have no competing interests.

Funding.

None.

Author's contributions

FA participated in all steps of the research and was a major contributor in writing the manuscript. LS and PM participated in screening records, full-text reviews, data extraction, and risk of bias assessment. RH participated in screening records, full-text reviews, data extraction, risk of bias assessment, and drafting the manuscript. SM and NZ participated in screening records and full-text reviews. AU participated in conceptualizing the systematic review, resolving questions about the review, and revising the manuscript. All authors read and approved the final manuscript.

Acknowledgements

The authors thank Joanna Taliano, librarian at the Stephen B. Thacker CDC Library, for her expert contribution and assistance in developing the search strategy and conducting electronic database searches. We appreciate Jeffrey Hodis’ contributions in screening articles and conducting full-text reviews.

Disclaimer. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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**Figures**
Figure 1

Study selection flow diagram for a systematic review of the effects of lockdowns, workplace closures, and other non-pharmaceutical interventions in non-healthcare workplaces during the COVID-19 pandemic, January 1, 2020–May 11, 2021

Studies excluded from the review (n = 806) are listed in Appendix Table S10.
Effect of working from home or teleworking on COVID-19 illness (1 study)

Figure 2

Studies on the effect of physical distancing on COVID-19 illness in workers, January 1, 2020–May 11, 2021

Each study is represented by a bar. The height of the bar indicates the risk of bias assessed using the Risk of Bias in Non-Randomized Studies of Interventions (ROBINS-I) tool. The number at the top of the bar represents the reference to the article.
Figure 3

Studies on the effect of physical barriers on COVID-19 incidence in workers, January 1, 2020–May 11, 2021

Each study is represented by a bar. The height of the bar indicates the risk of bias assessed using the Risk of Bias in Non-Randomized Studies of Interventions (ROBINS-I) tool. The number at the top of the bar represents the reference to the article. The article reported the combined effect of physical barriers and masking.
Figure 4

Studies on the effect of initial business closures (i.e., restaurant or entertainment business closures) on COVID-19 outcomes in the general community, January 1, 2020–May 11, 2021

Each study is represented by a bar. The height of the bar indicates the risk of bias assessed using the Risk of Bias in Non-Randomized Studies of Interventions (ROBINS-I) tool. The numbers at the top of the bars represent the risk of bias categories.
bars represent the references to the articles.

Figure 5

Studies on the effect of workplace closures on COVID-19 outcomes in the general community, January 1, 2020–May 11, 2021

Each study is represented by a bar. Black bar represents study with statistically significant finding, bar with horizontal stripes represents study showing non-significant decrease, and bar with vertical stripes indicates study showing non-significant increase. The height of the bar indicates the risk of bias assessed using the Risk of Bias in Non-Randomized Studies of Interventions (ROBINS-I) tool. The numbers at the top of the bars represent the references to the articles.
Figure 6

Studies on the effect of lockdown on COVID-19 outcomes in the general community, January 1, 2020–May 11, 2021

Each study is represented by a bar. Black bar represents study with statistically significant finding, bar with horizontal stripes represents study showing non-significant decrease, and bar with vertical stripes indicates study showing non-significant increase. The height of the bar indicates the risk of bias assessed using the Risk of Bias in Non-Randomized Studies of Interventions (ROBINS-I) tool. The numbers at the top of the bars represent the references to the articles.
Studies on the effect of lockdown on anxiety and depression symptoms, January 1, 2020–May 11, 2021

Each study is represented by a bar. Black bar represents study with statistically significant finding, bar with horizontal stripes represents study showing non-significant decrease, and bar with vertical stripes indicates study showing non-significant increase. The height of the bar indicates the risk of bias.
assessed using the Risk of Bias in Non-Randomized Studies of Interventions (ROBINS-I) tool. The numbers at the top of the bars represent the references to the articles.

(a) Effect of lockdown on unemployment (5 studies)

(b) Effect of lockdown on labor force participation (3 studies)

Figure 8

Studies on the effect of lockdown on unemployment and labor force participation, January 1, 2020–May 11, 2021
Each study is represented by a bar. The height of the bar indicates the risk of bias assessed using the Risk of Bias in Non-Randomized Studies of Interventions (ROBINS-I) tool. The numbers at the top of the bars represent the references to the articles.

**Supplementary Files**

This is a list of supplementary files associated with this preprint. Click to download.

- WorkplaceNPIAppendixv5BMCPH.docx