Effects of Non-Pharmaceutical Interventions (NPIs) Aimed at Limiting the Spread of SARS-CoV-2

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Objectives

During the pandemic, national policy makers frequently required evidence briefs within very short time-frames. Consulting entities such as national public health institutes or academia were challenged with finding a balance between methodological robustness, limited resources, and the aim to provide a timely and meaningful answer to decision makers. The aim of this **overview of reviews** was to produce an up-to-date evidence map of systematic reviews (SRs) on the effects – both, intended and unintended – of NPIs that were applied to limit the spread of SARS-CoV-2. The evidence map should enable production of rapid evidence summaries to support decision makers, contribute to a retrospective assessment of the appropriateness of NPIs and identify evidence gaps.
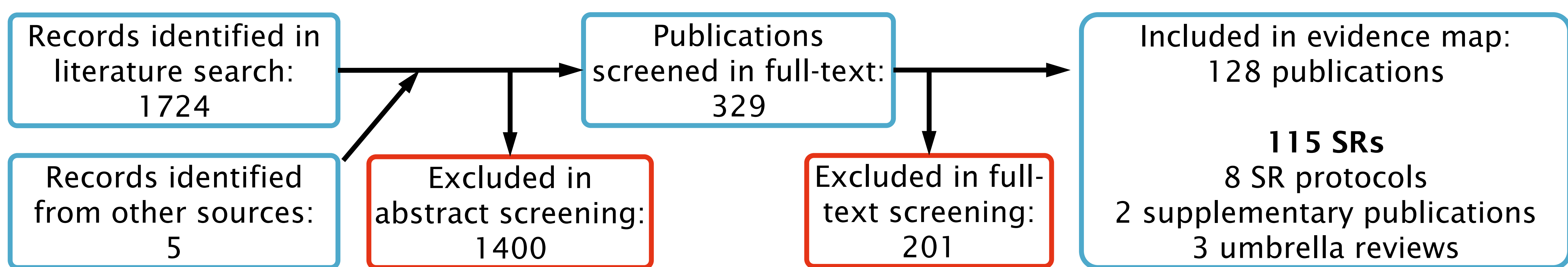
Methods

We performed systematic literature searches in the COVID L.OVE repository using the PICO search function (uses classification by COVID-19 L.OVE curators) and the advanced search function (text search with Boolean operators) in the repository. We **included systematic reviews** (SRs) that examined the effects of NPIs based on empirical primary studies. Title and abstract screening was performed independently by two reviewers, full-text screening and data extraction were performed by one reviewer and checked by another. We used AMSTAR 2 for quality assessment of selected SRs.

Results

Evidence map: The literature searches were performed on 10 March 2022 and yielded 1724 hits. Of the 329 publications that we screened in full-text, we included 128 in the evidence map. Of these, 115 were systematic reviews, the remaining were SR protocols, supplementary publications or umbrella reviews. We categorized the included SRs according to the studied NPIs and effects (intended and unintended). Of the **47 SRs that studied intended effects** of NPIs, 26 studied mask wearing or mask mandates, 11 studied travel restrictions (internal or cross-border restrictions), 9 studied lockdown-type interventions (including curfews and stay-at-home orders), and 6 studied test, trace, isolate interventions. The remaining **68 SRs studied unintended effects** of different NPIs.

Rapid evidence summaries: For the production of rapid evidence summaries, we selected from the evidence map peer-reviewed SRs that provided any kind of summary synthesis on the effects of specific NPIs based on empirical primary studies. Using the AMSTAR 2 instrument, we deemed the majority of the 29 selected SRs to be of **critically low quality**, with only 1 SR reaching low quality and 1 SR reaching medium quality. The methodologies of the SRs were very heterogeneous, and in most cases the overlap of the included primary studies was conspicuously low. The **lack of study overlap** could only partially be explained by the respective dates of the literature searches or the inclusion criteria, and almost none of the selected SRs provided a list of the excluded studies with exclusion reasons.

All 3 selected SRs examining lockdown-type interventions reported a reduction of SARS-CoV-2 transmission and mortality associated with the studied interventions. However, the definitions of the studied interventions were unclear and not comparable. Of the 4 selected SRs studying travel restrictions, 2 concluded that the studied interventions effectively reduced SARS-CoV-2 transmission or mortality, whereas 2 SRs concluded that there was insufficient evidence on the effectiveness of the studied interventions. All 7 selected SRs studying mask wearing or mandates and all 2 SRs studying contact tracing interventions reported a reduction of SARS-CoV-2 transmission associated with the studied interventions. The majority of the SRs that studied unintended effects did not report results on specific NPIs but a bundle of NPIs, leaving only 13 SRs for the rapid evidence summary. These studied the association of lockdown-type interventions with a variety of different outcomes, including mental health outcomes, blood sugar control in diabetic patients, hospitalizations due to myocardial infarctions or bone fractures and perinatal outcomes. All of the 29 selected SRs emphasized the **low certainty of the available evidence** and the high risk of bias of most primary studies.

Records identified in literature search: 1724 → Publications screened in full-text: 329 → Included in evidence map: 128 publications

115 SRs
8 SR protocols
2 supplementary publications
3 umbrella reviews

Records identified from other sources: 5

Excluded in abstract screening: 1400

Excluded in full-text screening: 201

	SRs on intended effects of				SRs on unintended effects of different NPIs
	Lockdowns	Travel restrictions	Masks	TTI interventions	
SRs identified for evidence map	9	11	26	6	68
SRs selected for rapid evidence summaries	3	4	7	2	13

Conclusions and lessons learned

Pre-emptively creating and curating an evidence map can enable a more rapid and adaptive response to emerging urgent requests for evidence briefs by policy makers. A large number of SRs studying the effects of NPIs has been published, but most of them failed to meet the AMSTAR 2 quality requirements. A crucial shortcoming of the assessed SRs is the lack of lists of excluded studies with exclusion reasons, which makes it difficult to summarize the different SRs and compare between them.

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