The PRISMA 2020 statement: an updated guideline for reporting systematic reviews

Matthew J Page, senior research fellow[1,*], Joanne E McKenzie, associate professor[1,†], Patrick M Bossuyt, professor[2], Isabelle Boutron, professor[3], Tammy C Hoffmann, professor[4], Cynthia D Mulrow, professor[5], Larissa Shamseer, doctoral student[6], Jennifer M Tetzlaff, research product specialist[7], Elie A Akl, professor[8], Sue E Brennan, senior research fellow[1], Roger Chou, professor[9], Julie Glanville, associate director[10], Jeremy M Grimshaw, professor[11], Asbjørn Hróbjartsson, professor[12], Manoj M Lalu, associate scientist and assistant professor[13], Tianjing Li, associate professor[14], Elizabeth W Loder, professor[15], Evan Mayo-Wilson, associate professor[16], Steve McDonald, senior research fellow[1], Luke A McGuinness, research associate[17], Lesley A Stewart, professor and director[18], James Thomas, professor[19], Andrea C Tricco, scientist and associate professor[20], Vivian A Welch, associate professor[21], Penny Whiting, associate professor[17], David Moher, director and professor[22,†]

1. School of Public Health and Preventive Medicine, Monash University, Melbourne, Australia
2. Department of Clinical Epidemiology, Biostatistics and Bioinformatics, Amsterdam University Medical Centres, University of Amsterdam, Amsterdam, Netherlands
3. Université de Paris, Centre of Epidemiology and Statistics (CRESS), Inserm, F 75004 Paris, France
4. Institute for Evidence-Based Healthcare, Faculty of Health Sciences and Medicine, Bond University, Gold Coast, Australia
5. University of Texas Health Science Center at San Antonio, San Antonio, Texas, United States; Annals of Internal Medicine
6. School of Epidemiology and Public Health, Faculty of Medicine, University of Ottawa, Ottawa, Canada
7. Evidence Partners, Ottawa, Canada
8. Clinical Research Institute, American University of Beirut, Beirut, Lebanon; Department of Health Research Methods, Evidence, and Impact, McMaster University, Hamilton, Ontario, Canada
9. Department of Medical Informatics and Clinical Epidemiology, Oregon Health & Science University, Portland, Oregon, United States
10. York Health Economics Consortium (YHEC Ltd), University of York, York, UK
11. Clinical Epidemiology Program, Ottawa Hospital Research Institute, Ottawa, Canada; School of Epidemiology and Public Health, University of Ottawa, Ottawa, Canada; Department of Medicine, University of Ottawa, Ottawa, Canada

12. Centre for Evidence-Based Medicine Odense, Odense University Hospital, Odense, Denmark; Department of Clinical Research, University of Southern Denmark, Odense, Denmark; Open Patient data Explorative Network, Odense University Hospital, Odense, Denmark
13. Department of Anesthesiology and Pain Medicine, The Ottawa Hospital, Ottawa, Canada; Clinical Epidemiology Program, Blueprint Translational Research Group, Ottawa Hospital Research Institute, Ottawa, Canada; Regenerative Medicine Program, Ottawa Hospital Research Institute, Ottawa, Canada
14. Department of Ophthalmology, School of Medicine, University of Colorado Denver, Denver, Colorado, United States; Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, United States
15. Division of Headache, Department of Neurology, Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts, United States; Head of Research, The BMJ, London, UK
16. Department of Epidemiology and Biostatistics, Indiana University School of Public Health-Bloomington, Bloomington, Indiana, United States
17. Population Health Sciences, Bristol Medical School, University of Bristol, Bristol, UK
18. Centre for Reviews and Dissemination, University of York, York, UK
19. EPPI-Centre, UCL Social Research Institute, University College London, London, UK
20. Li Ka Shing Knowledge Institute of St. Michael's Hospital, Unity Health Toronto, Toronto, Canada; Epidemiology Division of the Dalla Lana School of Public Health and the Institute of Health Management, Policy, and Evaluation, University of Toronto, Toronto, Canada; Queen's Collaboration for Health Care Quality Joanna Briggs Institute Centre of Excellence, Queen's University, Kingston, Canada
21. Methods Centre, Bruyère Research Institute, Ottawa, Ontario, Canada; School of Epidemiology and Public Health, Faculty of Medicine, University of Ottawa, Ottawa, Canada
22. Centre for Journalology, Clinical Epidemiology Program, Ottawa Hospital Research Institute, Ottawa, Canada; School of Epidemiology and Public Health, Faculty of Medicine, University of Ottawa, Ottawa, Canada

***Correspondence to:** Dr. Matthew Page, School of Public Health and Preventive Medicine, Monash University, 553 St Kilda Road, Melbourne, Victoria, 3004, Australia. Telephone: +61 9903 0248. Email address: matthew.page@monash.edu

†JEM and DM are joint senior authors.

Dedication: We dedicate this paper to the late Douglas G Altman and Alessandro Liberati, whose contributions were fundamental to the development and implementation of the original PRISMA statement.

Abstract

Background: The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) Statement, published in 2009, was designed to help systematic reviewers transparently report why the review was done, what the authors did and what they found. Over the last decade, there have been many advances in systematic review methodology and terminology, which have necessitated an update to the guideline.

Objectives: To develop the PRISMA 2020 statement for reporting systematic reviews.

Methods: We reviewed 60 documents with reporting guidance for systematic reviews to generate suggested modifications to the PRISMA 2009 statement. We sought feedback on the suggested modifications through an online survey of 110 systematic review methodologists and journal editors. The results of the review and survey were discussed at a 21-member in-person meeting. Following the meeting, drafts of the PRISMA 2020 checklist, abstract checklist, explanation and elaboration and flow diagram were generated and refined iteratively based on feedback from co-authors and a convenience sample of 15 systematic reviewers.

Results: In this statement paper, we present the PRISMA 2020 27-item checklist, an expanded checklist that details reporting recommendations for each item, the PRISMA 2020 abstract checklist, and the revised flow diagrams for original and updated reviews. The checklist includes new reporting guidance that reflects advances in methods to identify, select, appraise and synthesise studies. The structure and presentation of the items have been modified to facilitate implementation. The PRISMA 2020 statement replaces the 2009 statement.

Conclusions: The PRISMA 2020 statement is intended to facilitate transparent, complete and accurate reporting of systematic reviews. Improved reporting should benefit users of reviews, including guideline developers, policy makers, health care providers, patients and other stakeholders. In order to achieve this, we encourage authors, editors and peer-reviewers to adopt the guideline.

INTRODUCTION

Systematic reviews serve many critical roles. They can provide syntheses of the state of knowledge in a field, from which future research priorities can be identified; they can address questions that otherwise could not be answered by individual studies; they can identify problems in primary research that should be rectified in future studies; and they can generate or evaluate theories about how or why phenomena occur. Systematic reviews therefore generate various types of knowledge for different users of reviews (e.g. patients, health care providers, researchers, and policy makers) (1, 2). To ensure a systematic review is valuable to users, authors should prepare a transparent, complete and accurate account of why the review was done, what they did (e.g. how studies were identified and selected) and what they found (e.g. characteristics of contributing studies and results of meta-analyses). Up-to-date reporting guidance facilitates authors achieving this (3).

The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) statement published in 2009 (hereafter referred to as PRISMA 2009) (4-7) is a reporting guideline designed to address poor reporting of systematic reviews (8). The PRISMA 2009 statement comprised a checklist of 27 items recommended for reporting in systematic reviews and an 'explanation and elaboration' paper (9-12) providing additional reporting guidance for each item, along with exemplars of reporting. The recommendations have been widely endorsed and adopted, as evidenced by its co-publication in multiple journals, citation in over 60,000 reports (Scopus, August 2020), endorsement from almost 200 journals and systematic review organisations, and adoption in various disciplines. Evidence from observational studies suggests that use of the PRISMA 2009 statement is associated with more complete reporting of systematic reviews (13-16), although more could be done to improve adherence to the guideline (17).

Many innovations in the conduct of systematic reviews have occurred since publication of the PRISMA 2009 statement. For example, technological advances have enabled the use of natural language processing and machine learning to identify relevant evidence (18-20); methods have been proposed to synthesise and present findings when meta-analysis is not possible or appropriate (21-23); and new methods have been developed to assess the risk of bias in results of included studies (24, 25). Evidence on sources of bias in systematic reviews has accrued, culminating in the development of new tools to appraise the conduct of systematic reviews (26, 27). Terminology used to describe particular review processes has also evolved, as in the shift from assessing "quality" to assessing "certainty" in the body of evidence (28). In addition, the publishing landscape has transformed, with multiple avenues now available for registering and disseminating systematic review protocols (29, 30), disseminating reports

of systematic reviews, and sharing data and materials, such as preprint servers and publicly accessible repositories. To capture these advances in the reporting of systematic reviews necessitated an update to the PRISMA 2009 statement.

DEVELOPMENT OF PRISMA 2020

Several steps were taken to develop PRISMA 2020 (a complete description of the methods used is available elsewhere (31)). We identified PRISMA 2009 items that were often reported incompletely by examining the results of studies investigating the transparency of reporting of published reviews (13, 17, 32, 33). We identified possible modifications to the PRISMA 2009 statement by reviewing 60 documents providing reporting guidance for systematic reviews (34). We gathered feedback on suggested modifications by conducting an online survey of 110 systematic review methodologists and journal editors (of 220 invited). We discussed proposed content and wording of the PRISMA 2020 statement, as informed by the review and survey results, at a 21-member, two-day in-person meeting in September 2018 in Edinburgh, Scotland. Throughout 2019 and 2020, we circulated an initial draft and five revisions of the checklist and explanation and elaboration paper to co-authors for feedback. In April 2020, we invited 22 systematic reviewers who had expressed interest in providing feedback on the PRISMA 2020 checklist to share their views (via an online survey) on the layout and terminology used in a preliminary version of the checklist. Feedback was received from 15 individuals and considered by the first author, and any revisions deemed necessary were incorporated before the final version was approved and endorsed by all co-authors.

THE PRISMA 2020 STATEMENT

Scope of the guideline

The PRISMA 2020 statement has been designed primarily for systematic reviews of studies that evaluate the effects of health interventions, irrespective of the design of the included studies. However, the checklist items are applicable to reports of systematic reviews evaluating other non-health-related interventions (e.g. social or educational interventions), and many items are applicable to systematic reviews with objectives other than evaluating interventions (e.g. evaluating aetiology, prevalence or prognosis). PRISMA 2020 is intended for use in systematic reviews that include synthesis (e.g. pairwise meta-analysis, or other statistical synthesis methods), or do not include synthesis (e.g. because only one eligible study is identified). The PRISMA 2020 items are relevant for mixed-methods systematic reviews (which include quantitative and qualitative studies), but reporting guidelines addressing the presentation and synthesis of qualitative data should also be consulted (35, 36). PRISMA 2020 can be used for original systematic reviews, updated systematic reviews, or continually

updated ("living") systematic reviews. Where there is relevant content from other reporting guidelines, we reference these guidelines within the items in the explanation and elaboration paper (37) (e.g. PRISMA-Search (38) in items 7 and 8, Synthesis without meta-analysis (SWiM) reporting guideline (23) in item 13d). Box 1 includes a glossary of terms used throughout the PRISMA 2020 statement.

PRISMA 2020 is not intended to guide systematic review conduct, for which comprehensive resources are available (39-42). However, familiarity with PRISMA 2020 is useful when planning and conducting systematic reviews to ensure that all recommended information is captured. Also, PRISMA 2020 should not be used to assess the conduct or methodological quality of systematic reviews; tools exist for this purpose (26, 27). Finally, extensions to the PRISMA 2009 statement have been developed to guide reporting of network meta-analyses (43), meta-analyses of individual participant data (44), systematic reviews of harms (45), systematic reviews of diagnostic test accuracy studies (46) and scoping reviews (47); for these types of reviews we recommend authors report their review in accordance with the recommendations in PRISMA 2020 along with the guidance specific to the extension.

How to use PRISMA 2020

The PRISMA 2020 statement (including the checklists, explanation and elaboration and flow diagram) replaces the PRISMA 2009 statement, which should no longer be used. Box 2 summarises noteworthy changes from the PRISMA 2009 statement. The PRISMA 2020 checklist includes seven sections with 27 items, some of which include sub-items (Table 1). A checklist for journal and conference abstracts for systematic reviews is included in PRISMA 2020. This abstract checklist is an update of the 2013 'PRISMA for Abstracts' statement (48), reflecting new and modified content in PRISMA 2020 (Table 2). A template PRISMA flow diagram is provided, which can be modified depending on whether the systematic review is original or updated (Figure 1). The PRISMA statement website (http://www.prisma-statement.org/) includes fillable templates of the checklists in Word to download and complete, and an editable template for each flow diagram. We are also creating a web application that allows users to complete the checklist via a user-friendly interface.

We have also prepared an updated explanation and elaboration paper, in which we explain why reporting of each item is recommended and present bullet points that detail the reporting recommendations (which we refer to as 'elements') (37). The bullet point structure is new to PRISMA 2020 and has been adopted to facilitate implementation of the guidance (49, 50). An expanded checklist, which comprises an abridged version of the 'elements' presented in the explanation and

elaboration paper, with references and some examples removed, is presented in Table 3. Consulting the explanation and elaboration paper is recommended if further clarity or information is required.

Ideally, each checklist item should be addressed within the main report of the review. Where this is not possible (e.g. journal policies require that full search strategies be included as supplementary material), we encourage uploading of additional content to an open-access repository that provides free and permanent access to the material (e.g. Open Science Framework, Dryad, figshare). A reference or link to the additional information should be included in the main report.

DISCUSSION

Use of PRISMA 2020 has the potential to benefit many stakeholders. Complete reporting allows readers to assess the appropriateness of the methods, and therefore the trustworthiness of the findings. Presenting and summarising characteristics of studies contributing to a synthesis allows health care providers and policy makers to evaluate the applicability of the findings to their setting. Describing the certainty in the body of evidence for an outcome and the implications of findings should help policy makers, managers and other decision makers formulate appropriate recommendations for practice or policy. Complete reporting of all PRISMA 2020 items also facilitates replication and review updates, as well as inclusion of systematic reviews in overviews (of systematic reviews) and guidelines, so teams can leverage work that is already done and decrease research waste (32, 51, 52).

We updated the PRISMA 2009 statement by adapting the EQUATOR Network's guidance for developing health research reporting guidelines (53). We evaluated the reporting completeness of published systematic reviews (13, 17, 32, 33), reviewed the items included in other reporting guidance for systematic reviews (34), surveyed systematic review methodologists and journal editors for their views on how to revise the original PRISMA statement (31), discussed the findings at an in-person meeting, and prepared this document through an iterative process. Our recommendations are informed by the reviews and survey conducted prior to the in-person meeting, theoretical considerations about which items facilitate replication and help users assess the risk of bias and applicability of systematic reviews, and co-authors' experience with authoring and using systematic reviews.

Various strategies to increase the use of reporting guidelines and improve reporting have been proposed. They include educators introducing reporting guidelines into graduate curricula to promote good reporting habits of early career scientists (54); journal editors and regulators endorsing use of

reporting guidelines (14); peer reviewers evaluating adherence to reporting guidelines (50, 55); journals requiring authors to indicate where in their manuscript they have adhered to each reporting item (56); and authors using online writing tools that prompt complete reporting at the writing stage (49). Of 31 interventions proposed to increase adherence to reporting guidelines, the effects of only 11 have been evaluated, mostly in observational studies at high risk of bias due to confounding (57). It is therefore unclear which strategies should be used. Future research might explore barriers and facilitators to the use of PRISMA 2020 by authors, editors and peer reviewers, designing interventions that address the identified barriers, and evaluating those interventions using randomized trials. To inform possible revisions to the guideline, it would also be valuable to conduct think-aloud studies (58) to understand how systematic reviewers interpret the items, and reliability studies to identify items where there is varied interpretation of the items.

We encourage readers to submit evidence that informs any of the recommendations in PRISMA 2020 (via the PRISMA statement website: http://www.prisma-statement.org/). To enhance accessibility of PRISMA 2020, several translations of the guideline are underway (see available translations at the PRISMA statement website). We encourage journal editors to raise awareness of PRISMA 2020 by updating their "Instructions to Authors", endorsing its use and advising editors and peer reviewers to evaluate submitted systematic reviews against the PRISMA 2020 items. We recommend existing PRISMA extensions (43-47, 59-61) be updated to reflect PRISMA 2020, and advise developers of new PRISMA extensions to use PRISMA 2020 as the foundation document.

Conclusion

We anticipate that the PRISMA 2020 statement will benefit authors, editors, and peer reviewers of systematic reviews, and different users of reviews, including guideline developers, policy makers health care providers, patients and other stakeholders. Ultimately, we hope that uptake of the guideline will lead to more transparent, complete and accurate reporting of systematic reviews, thus facilitating evidence-based decision-making.

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Competing interests

All authors have completed the ICMJE uniform disclosure form at http://www.icmje.org/conflicts-of-interest/ and declare: EL is head of research for the *BMJ*, MJP is an editorial board member for *PLOS Medicine*, ACT is an associate editor and MJP, TL, EMW, and DM are editorial board members for the *Journal of Clinical Epidemiology,* and DM and LAS were editors in chief, LS, JMT and ACT are associate editors, and JG is an editorial board member for *Systematic Reviews*; none of these authors were involved in the peer review process or decision to publish. TCH has received personal fees from Elsevier outside the submitted work. EMW has received personal fees from the *American Journal for Public Health*, for which he is the editor for systematic reviews. VW is editor in chief of the Campbell Collaboration which produces systematic reviews and co-convenor of the Campbell and Cochrane equity methods group. DM is chair of the EQUATOR Network, IB is adjunct director of the French EQUATOR Centre and TCH is co-director of the Australasian EQUATOR Centre, which advocate for the use of reporting guidelines to improve the quality of reporting in research articles. JMT received salary from Evidence Partners Inc., creators of DistillerSR software for systematic reviews; Evidence Partners Inc. was not involved in the design or outcomes of the statement and the views expressed solely represent those of the author.

Author contributions

All authors declare to meet the ICMJE conditions for authorship. MJP, JEM, PMB, IB, TCH, CDM, LS and DM conceived this paper and designed the literature review and survey conducted to inform the guideline content. MJP conducted the literature review, administered the survey and analysed the data for both. MJP prepared all materials for the development meeting. MJP and JEM presented proposals at the development meeting. All authors except for TCH, JMT, EAA, SEB and LAM attended the development meeting. MJP and JEM took and consolidated notes from the development meeting. MJP and JEM led the drafting and editing of the article. JEM, PMB, IB, TCH, LS, JMT, EAA, SEB, RC, JG, AH, TL, EMW, SM, LAM, LAS, JT, ACT, PW and DM drafted particular sections of the article. All authors were involved in revising the article critically for important intellectual content. All authors approved the final version of the article. MJP is the guarantor of this work.

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Box 1. Glossary

Systematic review: A review that uses explicit, systematic methods to collate and synthesize findings of studies that address a clearly formulated question (39).

Statistical synthesis: The combination of quantitative results of two or more studies. This encompasses meta-analysis of effect estimates (described below) and other methods, such as combining P values, calculating the range and distribution of observed effects, and vote counting based on the direction of effect (see McKenzie and Brennan (21) for a description of each method).

Meta-analysis of effect estimates: A statistical technique used to synthesize results when study effect estimates and their variances are available, yielding a quantitative summary of results (21).

Outcome: An event or measurement collected for participants in a study (e.g. quality of life, mortality).

Result: The combination of a point estimate (such as a mean difference, risk ratio or proportion) and a measure of its precision (such as a confidence/credible interval) for a particular outcome.

Report: A document (paper or electronic) supplying information about a particular study. It could be a journal article, preprint, conference abstract, study register entry, clinical study report, dissertation, unpublished manuscript, government report or any other document providing relevant information.

Record: The title or abstract (or both) of a report indexed in a database or website (e.g. a title or abstract for an article indexed in MEDLINE). Records that refer to the same report (e.g., the same journal article) are "duplicates"; however, records that refer to reports that are merely similar (e.g. a similar abstract submitted to two different conferences) should be considered unique.

Study: An investigation, such as a clinical trial, that includes a defined group of participants and one or more interventions and outcomes. A "study" might have multiple reports. For example, reports could include the protocol, statistical analysis plan, baseline characteristics, results for the primary outcome, results for harms, results for secondary outcomes, and results for additional mediator and moderator analyses.

Box 2. Noteworthy changes to the PRISMA 2009 statement

Inclusion of the abstract reporting checklist within PRISMA 2020 (see item #2 and Table 2).

Movement of the 'Protocol and registration' item from the start of the Methods section of the checklist to a new Other section, with addition of a sub-item recommending authors describe amendments to information provided at registration or in the protocol (see item #24a-24c).

Modification of the 'Search' item to recommend authors present full search strategies for *all* databases, registers and websites searched, not just at least one database (see item #7).

Modification of the 'Study selection' item in the Methods section to emphasise the reporting of how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process (see item #8).

Addition of a sub-item to the 'Data items' item recommending authors report how outcomes were defined, which results were sought, and methods for selecting a subset of results from included studies (see item #10a).

Splitting of the 'Synthesis of results' item in the Methods section into six sub-items recommending authors describe: the processes used to decide which studies were eligible for each synthesis; any methods required to prepare the data for synthesis; any methods used to tabulate or visually display results of individual studies and syntheses; any methods used to synthesize results; any methods used to explore possible causes of heterogeneity among study results; and any sensitivity analyses used to assess robustness of the synthesized results (see item #13a-13f).

Addition of a sub-item to the 'Study selection' item in the Results section recommending authors list citations of studies that met many but not all inclusion criteria ('near-misses') and explain why they were excluded (see item #16b).

Splitting of the 'Synthesis of results' item in the Results section into four sub-items recommending authors: summarise the characteristics and risk of bias among studies contributing to the synthesis; present results of all syntheses conducted; present results of any investigations of possible causes of heterogeneity among study results; and present results of any sensitivity analyses (see item #20a-20d).

Addition of new items recommending authors report methods for and results of an assessment of certainty (or confidence) in the body of evidence for an outcome (see items #15 and #22).

Addition of a new item recommending authors declare any competing interests (see item #26).

Addition of a new item recommending authors indicate whether data, analytic code and other materials used in the review are publicly available and if so, where they can be found (see item #27).

Table 1. PRISMA 2020 item checklist

Section and Topic	Item #	Checklist item
TITLE		
Title	1	Identify the report as a systematic review.
ABSTRACT		
Abstract	2	See the PRISMA 2020 for Abstracts checklist (Table 2).
INTRODUCTION		
Rationale	3	Describe the rationale for the review in the context of existing knowledge.
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.
METHODS		
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis.
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.
	13e	Describe any methods used to explore possible causes of heterogeneity among study results.
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.

Section and Topic	Item #	Checklist item
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.
RESULTS		
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram (see Figure 1).
	16b	Cite studies that met many but not all inclusion criteria ('near-misses') and explain why they were excluded.
Study characteristics	17	Cite each included study and present its characteristics.
Risk of bias in studies	18	Present assessments of risk of bias for each included study.
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.
	20c	Present results of all investigations of possible causes of heterogeneity among study results.
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.
DISCUSSION		
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.
	23b	Discuss any limitations of the evidence included in the review.
	23c	Discuss any limitations of the review processes used.
	23d	Discuss implications of the results for practice, policy, and future research.
OTHER INFORMATION		
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.
	24c	Describe and explain any amendments to information provided at registration or in the protocol.
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.
Competing interests	26	Declare any competing interests of review authors.
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.

Table 2. PRISMA 2020 for Abstracts checklist*

Section and Topic	Item #	Checklist item
TITLE		
Title	1	Identify the report as a systematic review.
BACKGROUND		
Objectives	2	Provide an explicit statement of the main objective(s) or question(s) the review addresses.
METHODS		
Eligibility criteria	3	Specify the inclusion and exclusion criteria for the review.
Information sources	4	Specify the information sources (e.g. databases, registers) used to identify studies and the date when each was last searched.
Risk of bias	5	Specify the methods used to assess risk of bias in the included studies.
Synthesis of results	6	Specify the methods used to present and synthesize results.
RESULTS		
Included studies	7	Give the total number of included studies and participants and summarise relevant characteristics of studies.
Synthesis of results	8	Present results for main outcomes, preferably indicating the number of included studies and participants for each. If meta-analysis was done, report the summary estimate and confidence/credible interval. If comparing groups, indicate the direction of the effect (i.e. which group is favoured).
DISCUSSION		
Limitations of evidence	9	Provide a brief summary of the limitations of the evidence included in the review (e.g. study risk of bias, inconsistency and imprecision).
Interpretation	10	Provide a general interpretation of the results and important implications.
OTHER		
Funding	11	Specify the primary source of funding for the review.
Registration	12	Provide the register name and registration number.

*This abstract checklist retains the same items as those included in the PRISMA for Abstracts statement published in 2013 (48), but has been revised to make the wording consistent with the PRISMA 2020 statement and includes a new item recommending authors specify the methods used to present and synthesize results (item #6).

Table 3. PRISMA 2020 expanded checklist

Note: This expanded checklist details elements recommended for reporting for each PRISMA 2020 item. Non-italicized elements are considered 'essential' and should be reported in all systematic reviews (except for those preceded by "If…", which should only be reported where applicable). Elements written in italics are 'additional', and while not essential, provide supplementary information that may enhance the completeness and usability of systematic review reports. Note that elements presented here are an abridged version of those presented in the explanation and elaboration paper (37), with references and some examples removed. Consulting the explanation and elaboration paper is recommended if further clarity or information is required.

Section	#	Topic	Elements recommended for reporting
TITLE	1	TITLE	• Identify the report as a systematic review in the title. • Report an informative title that provides key information about the main objective or question the review addresses (e.g. the population(s) and intervention(s) the review addresses). • *Consider providing additional information in the title, such as the method of analysis used, the designs of included studies, or an indication that the review is an update of an existing review, or a continually updated ("living") systematic review.*
ABSTRACT	2	ABSTRACT	• Report an abstract addressing each item in the PRISMA 2020 for Abstracts checklist (Table 2).
INTRODUCTION	3	RATIONALE	• Describe the current state of knowledge and its uncertainties. • Articulate why it is important to do the review. • If other systematic reviews addressing the same (or a largely similar) question are available, explain why the current review was considered necessary. If the review is an update or replication of a particular systematic review, indicate this and cite the previous review. • If the review examines the effects of interventions, also briefly describe how the intervention(s) examined might work. • *If there is complexity in the intervention or context of its delivery (or both) (e.g. multi-component interventions, equity considerations), consider presenting a logic model to visually display the hypothesised relationship between intervention components and outcomes.*
INTRODUCTION	4	OBJECTIVES	• Provide an explicit statement of all objective(s) or question(s) the review addresses, expressed in terms of a relevant question formulation framework. • If the purpose is to evaluate the effects of interventions, use the Population, Intervention, Comparator, Outcome (PICO) framework or one of its variants, to state the comparisons that will be made.

Section	#	Topic	Elements recommended for reporting
METHODS	5	ELIGIBILITY CRITERIA	• Specify all study characteristics used to decide whether a study was eligible for inclusion in the review, that is, components described in the PICO framework or one of its variants, and other characteristics, such as eligible study design(s) and setting(s), and minimum duration of follow-up. • Specify eligibility criteria with regard to report characteristics, such as year of dissemination, language, and report status (e.g. whether reports, such as unpublished manuscripts and conference abstracts, were eligible for inclusion). • Clearly indicate if studies were ineligible because the outcomes of interest were not measured, or ineligible because the results for the outcome of interest were not reported. • Specify any groups used in the synthesis (e.g. intervention, outcome and population groups) and link these to the comparisons specified in the objectives (item #4). • *Consider providing rationales for any notable restrictions to study eligibility.*
METHODS	6	INFORMATION SOURCES	• Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. • Specify the date when each source was last searched or consulted. • If bibliographic databases were searched, specify for each database its name (e.g. MEDLINE, CINAHL), the interface or platform through which the database was searched (e.g. Ovid, EBSCOhost), and the dates of coverage (where this information is provided). • If study registers, regulatory databases and other online repositories were searched, specify the name of each source and any date restrictions that were applied. • If websites, search engines or other online sources were browsed or searched, specify the name of each source. • If organisations or manufacturers were contacted to identify studies, specify the name of each source. • If individuals were contacted to identify studies, specify the types of individuals contacted (e.g. authors of studies included in the review or researchers with expertise in the area). • If references lists were examined, specify the types of references examined (e.g. references of studies included in the systematic review, or references of systematic reviews on the same or similar topic). • If cited or citing reference searches (also called backward and forward citation searching) were conducted, specify the bibliographic details of the reports to which citation searching was applied, the citation index or platform used (e.g. Web of Science), and the date the citation searching was done. • If journals or conference proceedings were consulted, specify of the names of each source, the dates covered and how they were searched (e.g. handsearching or browsing online).

Section	#	Topic	Elements recommended for reporting
METHODS	7	SEARCH STRATEGY	• Provide the full line by line search strategy as run in each database with a sophisticated interface (such as Ovid), or the sequence of terms that were used to search simpler interfaces, such as search engines or websites. Make all search strategies publicly accessible. • Describe any limits applied to the search strategy (e.g. date or language) and justify these by linking back to the review's eligibility criteria. • If published approaches, including search filters designed to retrieve specific types of records or search strategies from other systematic reviews, were used, cite them. If published approaches were adapted, for example if search filters are amended, note the changes made. • If natural language processing or text frequency analysis tools were used to identify keywords, synonyms or subject indexing terms to use in the search strategy, specify the tool(s) used. • If the search strategy was validated, for example by evaluating whether it could identify a set of clearly eligible studies, report the validation process used and specify which studies were included in the validation set. • If the search strategy was peer reviewed, report the peer review process used and specify any tool used such as the Peer Review of Electronic Search Strategies (PRESS) checklist. • If languages other than English were used to carry out searches, specify the languages used. • If the search strategy structure adopted was not based on a PICO-style approach, describe the final conceptual structure and any explorations that were undertaken to achieve it.
METHODS	8	SELECTION PROCESS	*Recommendations for reporting regardless of the selection processes used:* • Report how many reviewers screened each record (title/abstract) and each report retrieved, whether multiple reviewers worked independently at each stage of screening or not, and any processes used to resolve disagreements between screeners. • Report any processes used to obtain or confirm relevant information from study investigators. • If articles required translation into another language to determine their eligibility, report how these articles were translated. *Recommendations for reporting in systematic reviews using automation tools in the selection process:* • Report how automation tools were integrated within the overall study selection process. • If an externally derived machine learning classifier was applied (e.g. Cochrane RCT Classifier), either to eliminate records or to replace a single screener, include a reference or URL to the version used. If the

Section	#	Topic	Elements recommended for reporting
			classifier was used to eliminate records *before screening*, report the number eliminated in the PRISMA flow diagram as 'Records marked as ineligible by automation tools'. • If an internally derived machine learning classifier was used to assist with the screening process, identify the software/classifier and version, describe how it was used (e.g. to remove records or replace a single screener) and trained (if relevant), and what internal or external validation was done to understand the risk of missed studies or incorrect classifications. • If machine learning algorithms were used to prioritise screening (whereby unscreened records are continually re-ordered based on screening decisions), state the software used and provide details of any screening rules applied. *Recommendations for reporting in systematic reviews using crowdsourcing or previous 'known' assessments in the selection process:* • If crowdsourcing was used to screen records, provide details of the platform used and specify how it was integrated within the overall study selection process. • If datasets of already-screened records were used to eliminate records retrieved by the search from further consideration, briefly describe the derivation of these datasets.
METHODS	9	DATA COLLECTION PROCESS	• Report how many reviewers collected data from each report, whether multiple reviewers worked independently or not, and any processes used to resolve disagreements between data collectors. • Report any processes used to obtain or confirm relevant data from study investigators. • If any automation tools were used to collect data, report how the tool was used, how the tool was trained, and what internal or external validation was done to understand the risk of incorrect extractions. • If articles required translation into another language to enable data collection, report how these articles were translated. • If any software was used to extract data from figures, specify the software used. • If any decision rules were used to select data from multiple reports corresponding to a study, and any steps were taken to resolve inconsistencies across reports, report the rules and steps used.
METHODS	10a	DATA ITEMS (outcomes)	• List and define the outcome domains and time frame of measurement for which data were sought. • Specify whether all results that were compatible with each outcome domain in each study were sought, and if not, what process was used to select results within eligible domains.

Section	#	Topic	Elements recommended for reporting
			• If any changes were made to the inclusion or definition of the outcome domains, or to the importance given to them in the review, specify the changes, along with a rationale. • If any changes were made to the processes used to select results within eligible outcome domains, specify the changes, along with a rationale. • *Consider specifying which outcome domains were considered the most important for interpreting the review's conclusions and provide rationale for the labelling.*
METHODS	10b	DATA ITEMS (other variables)	• List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). • Describe any assumptions made about any missing or unclear information from the studies. • If a tool was used to inform which data items to collect, cite the tool used.
METHODS	11	STUDY RISK OF BIAS ASSESSMENT	• Specify the tool(s) (and version) used to assess risk of bias in the included studies. • Specify the methodological domains/components/items of the risk of bias tool(s) used. • Report whether an overall risk of bias judgement that summarised across domains/components/items was made, and if so, what rules were used to reach an overall judgement. • If any adaptations to an existing tool to assess risk of bias in studies were made, specify the adaptations. • If a new risk of bias tool was developed for use in the review, describe the content of the tool and make it publicly accessible. • Report how many reviewers assessed risk of bias in each study, whether multiple reviewers worked independently, and any processes used to resolve disagreements between assessors. • Report any processes used to obtain or confirm relevant information from study investigators. • If an automation tool was used to assess risk of bias, report how the automation tool was used, how the tool was trained, and details on the tool's performance and internal validation.
METHODS	12	EFFECT MEASURES	• Specify for each outcome (or type of outcome [e.g. binary, continuous]), the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results. • If synthesized results were re-expressed to a different effect measure, report the method used to re-express results (e.g. meta-analysing risk ratios and computing an absolute risk reduction based on an assumed comparator risk). • *Consider providing justification for the choice of effect measure.*
METHODS	13a	SYNTHESIS METHODS	• Describe the processes used to decide which studies were eligible for each synthesis.

Section	#	Topic	Elements recommended for reporting
		(eligibility for synthesis)	
METHODS	13b	SYNTHESIS METHODS (preparing for synthesis)	• Report any methods required to prepare the data collected from studies for presentation or synthesis, such as handling of missing summary statistics, or data conversions.
METHODS	13c	SYNTHESIS METHODS (tabulation and graphical methods)	• Report chosen tabular structure(s) used to display results of individual studies and syntheses, along with details of the data presented. • Report chosen graphical methods used to visually display results of individual studies and syntheses. • *If studies are ordered or grouped within tables or graphs, consider reporting the basis for the chosen ordering/grouping.* • *If non-standard graphs were used, consider reporting the rationale for selecting the chosen graph.*

METHODS	13d	SYNTHESIS METHODS (statistical synthesis methods)	• If statistical synthesis methods were used, reference the software, packages and version numbers used to implement synthesis methods.
			• If it was not possible to conduct a meta-analysis, describe and justify the synthesis methods or summary approach used.
			• If meta-analysis was done, specify:
			  ○ the meta-analysis model (fixed-effect, fixed-effects or random-effects) and provide rationale for the selected model.
			  ○ the method used (e.g. Mantel-Haenszel, inverse-variance).
			  ○ any methods used to identify or quantify statistical heterogeneity (e.g. visual inspection of results, a formal statistical test for heterogeneity, heterogeneity variance (τ^2), inconsistency (e.g. I^2), and prediction intervals).
			• If a random-effects meta-analysis model was used:
			  ○ specify the between-study (heterogeneity) variance estimator used (e.g. DerSimonian and Laird, restricted maximum likelihood (REML)).
			  ○ specify the method used to calculate the confidence interval for the summary effect (e.g. Wald-type confidence interval, Hartung-Knapp-Sidik-Jonkman).
			  ○ *consider specifying other details about the methods used, such as the method for calculating confidence limits for the heterogeneity variance.*

Section	#	Topic	Elements recommended for reporting
			• If a Bayesian approach to meta-analysis was used, describe the prior distributions about quantities of interest (e.g. intervention effect being analysed, amount of heterogeneity in results across studies). • If multiple effect estimates from a study were included in a meta-analysis, describe the method(s) used to model or account for the statistical dependency (e.g. multivariate meta-analysis, multilevel models or robust variance estimation). • If a planned synthesis was not considered possible or appropriate, report this and the reason for that decision.

METHODS	13e	SYNTHESIS METHODS (methods to explore heterogeneity)	• If methods were used to explore possible causes of statistical heterogeneity, specify the method used (e.g. subgroup analysis, meta-regression).
			• If subgroup analysis or meta-regression was performed, specify for each:
			  ○ which factors were explored, levels of those factors, and which direction of effect modification was expected and why (where possible).
			  ○ whether analyses were conducted using study-level variables (i.e. where each study is included in one subgroup only), within-study contrasts (i.e. where data on subsets of participants within a study are available, allowing the study to be included in more than one subgroup), or some combination of the above.
			  ○ how subgroup effects were compared (e.g. statistical test for interaction for subgroup analyses).
			• If other methods were used to explore heterogeneity because data were not amenable to meta-analysis of effect estimates (e.g. structuring tables to examine variation in results across studies based on subpopulation), describe the methods used, along with the factors and levels.
			• If any analyses used to explore heterogeneity were not pre-specified, identify them as such.

METHODS	13f	SYNTHESIS METHODS (sensitivity analyses)	• If sensitivity analyses were performed, provide details of each analysis (e.g. removal of studies at high risk of bias, use of an alternative meta-analysis model). • If any sensitivity analyses were not pre-specified, identify them as such.
METHODS	13	REPORTING BIAS ASSESSMENT	• Specify the methods (tool, graphical, statistical or other) used to assess the risk of bias due to missing results in a synthesis (arising from reporting biases). • If risk of bias due to missing results was assessed using an existing tool, specify the methodological components/domains/items of the tool, and the process used to reach a judgement of overall risk of bias.

Section	#	Topic	Elements recommended for reporting
			• If any adaptations to an existing tool to assess risk of bias due to missing results were made, specify the adaptations. • If a new tool to assess risk of bias due to missing results was developed for use in the review, describe the content of the tool and make it publicly accessible. • Report how many reviewers assessed risk of bias due to missing results in a synthesis, whether multiple reviewers worked independently, and any processes used to resolve disagreements between assessors. • Report any processes used to obtain or confirm relevant information from study investigators. • If an automation tool was used to assess risk of bias due to missing results, report how the automation tool was used, how the tool was trained, and details on the tool's performance and internal validation.
METHODS	15	CERTAINTY ASSESSMENT	• Specify the tool or system (and version) used to assess certainty (or confidence) in the body of evidence. • Report the factors considered (e.g. precision of the effect estimate, consistency of findings across studies) and the criteria used to assess each factor when assessing certainty in the body of evidence. • Describe the decision rules used to arrive at an overall judgement of the level of certainty, together with the intended interpretation (or definition) of each level of certainty. • If applicable, report any review-specific considerations for assessing certainty, such as thresholds used to assess imprecision and the rationale for these thresholds. • If any adaptations to an existing tool or system to assess certainty were made, specify the adaptations. • Report how many reviewers assessed certainty in the body of evidence for an outcome, whether multiple reviewers worked independently, and any processes used to resolve disagreements between assessors. • Report any processes used to obtain or confirm relevant information from investigators. • If an automation tool was used to support the assessment of certainty, report how the automation tool was used, how the tool was trained, and details on the tool's performance and internal validation. • Describe methods for reporting the results of assessments of certainty, such as the use of Summary of Findings tables. • If standard phrases that incorporate the certainty of evidence were used (e.g. "hip protectors *probably* reduce the risk of hip fracture slightly"), report the intended interpretation of each phrase and the reference for the source guidance.
RESULTS	16a	STUDY SELECTION (flow of studies)	• Report, ideally using a flow diagram, the number of: records identified; records excluded before screening; records screened; records excluded after screening titles or titles and abstracts; reports retrieved for detailed evaluation; potentially eligible reports that were not retrievable; retrieved reports

Section	#	Topic	Elements recommended for reporting
			that did not meet inclusion criteria and the primary reasons for exclusion; and the number of studies and reports included in the review. If applicable, also report the number of ongoing studies and associated reports identified. • If the review is an update of a previous review, report results of the search and selection process for the current review and specify the number of studies included in the previous review. • If applicable, indicate in the PRISMA flow diagram how many records were excluded by a human and how many by automation tools.
RESULTS	16b	STUDY SELECTION (excluded studies)	• Cite studies that met many but not all inclusion criteria ('near-misses') and explain why they were excluded.
RESULTS	17	STUDY CHARACTERISTICS	• Cite each included study. • Present the key characteristics of each study in a table or figure (considering a format that will facilitate comparison of characteristics across the studies). • *If the review examines the effects of interventions, consider presenting an additional table that summarises the intervention details for each study.*
RESULTS	18	RISK OF BIAS IN STUDIES	• Present tables or figures indicating for each study the risk of bias in each domain/component/item assessed (e.g. blinding of outcome assessors, missing outcome data) and overall study-level risk of bias. • Present justification for each risk of bias judgement, for example in the form of relevant quotations from reports of included studies. • *If assessments of risk of bias were done for specific outcomes or results in each study, consider displaying risk of bias judgements on a forest plot, next to the study results.*
RESULTS	19	RESULTS OF INDIVIDUAL STUDIES	• For all outcomes, irrespective of whether statistical synthesis was undertaken, present for each study summary statistics for each group (where appropriate). For dichotomous outcomes, report the number of participants with and without the events for each group; or the number with the event and the total for each group (e.g. 12/45). For continuous outcomes, report the mean, standard deviation and sample size of each group. • For all outcomes, irrespective of whether statistical synthesis was undertaken, present for each study an effect estimate and its precision (e.g. standard error or 95% confidence/credible interval). For example, for time-to-event outcomes, present a hazard ratio and its confidence interval. • If study-level data is presented visually or reported in the text (or both), also present a tabular display of the results.

Section	#	Topic	Elements recommended for reporting
			• If results were obtained from multiple data sources (e.g. journal article, study register entry, clinical study report, correspondence with authors), report the source of the data. • If applicable, indicate which results were not reported directly and had to be computed or estimated from other information.
RESULTS	20a	RESULTS OF SYNTHESES (characteristics of contributing studies)	• Provide a brief summary of the characteristics and risk of bias among studies contributing to each synthesis (meta-analysis or other). The summary should focus only on study characteristics that help in interpreting the results (especially those that suggest the evidence addresses only a restricted part of the review question, or indirectly addresses the question). • Indicate which studies were included in each synthesis (e.g. by listing each study in a forest plot or table or citing studies in the text).

RESULTS	20b	RESULTS OF SYNTHESES (results of statistical syntheses)	• Report results of all statistical syntheses described in the protocol and all syntheses conducted that were not pre-specified.
			• If meta-analysis was conducted, report for each:
			  ○ the summary estimate and its precision (e.g. standard error or 95% confidence/credible interval)
			  ○ measures of statistical heterogeneity (e.g. τ^2, I^2, prediction interval)
			• If other statistical synthesis methods were used (e.g. summarising effect estimates, combining P values), report the synthesized result and a measure of precision (or equivalent information, for example, the number of studies and total sample size).
			• If the statistical synthesis method does not yield an estimate of effect (e.g. as is the case when P values are combined), report the relevant statistics (e.g. P value from the statistical test), along with an interpretation of the result that is consistent with the question addressed by the synthesis method.
			• If comparing groups, describe the direction of effect (e.g. fewer events in the intervention group, or higher pain in the comparator group).
			• If synthesising mean differences, specify for each synthesis, where applicable, the unit of measurement (e.g. kilograms or pounds for weight), the upper and lower limits of the measurement scale (e.g. anchors range from 0 to 10), direction of benefit (e.g. higher scores denote higher severity of pain), and the minimal clinically important difference, if known.

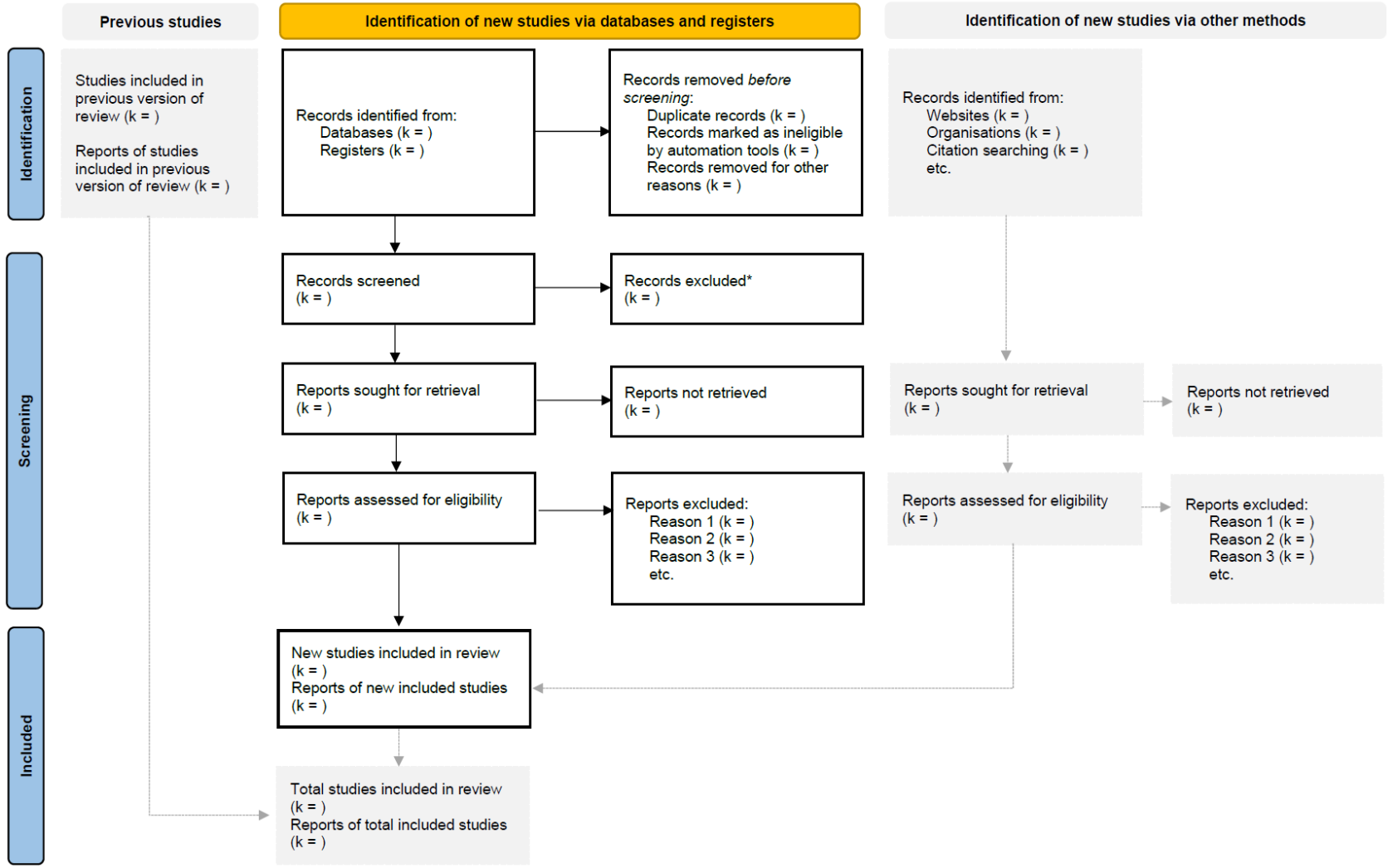
RESULTS	20c	RESULTS OF SYNTHESES (results of	• If investigations of possible causes of heterogeneity were conducted: ○ present results regardless of the statistical significance, magnitude, or direction of effect modification.

Section	#	Topic	Elements recommended for reporting
		investigations of heterogeneity)	○ identify the studies contributing to each subgroup. ○ report results with due consideration to the observational nature of the analysis and risk of confounding due to other factors. • If subgroup analysis was conducted: ○ report for each analysis the exact P value for a test for interaction, as well as, within each subgroup, the summary estimates, their precision (e.g. standard error or 95% confidence/credible interval) and measures of heterogeneity. ○ *consider presenting the estimate for the difference between subgroups and its precision.* • If meta-regression was conducted: ○ report for each analysis the exact P value for the regression coefficient and its precision. ○ *consider presenting a meta-regression scatterplot with the study effect estimates plotted against the potential effect modifier.* • If informal methods (i.e. those that do not involve a formal statistical test) were used to investigate heterogeneity, describe the results observed.
RESULTS	20d	RESULTS OF SYNTHESES (results of sensitivity analyses)	• If any sensitivity analyses were conducted: ○ report the results for each sensitivity analysis. ○ comment on how robust the main analysis was given the results of all corresponding sensitivity analyses. ○ *consider presenting results in tables that indicate: (i) the summary effect estimate, a measure of precision (and potentially other relevant statistics, for example, I^2 statistic) and contributing studies for the original meta-analysis; (ii) the same information for the sensitivity analysis; and (iii) details of the original and sensitivity analysis assumptions.* ○ *consider presenting results of sensitivity analyses visually using forest plots.*
RESULTS	21	REPORTING BIASES	• Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed. • If a tool was used to assess risk of bias due to missing results in a synthesis, present responses to questions in the tool, judgements about risk of bias and any information used to support such judgements. • If a funnel plot was generated to evaluate small-study effects (one cause of which is reporting biases), present the plot and specify the effect estimate and measure of precision used in the plot. If a contour-

Section	#	Topic	Elements recommended for reporting
			enhanced funnel plot was generated, specify the 'milestones' of statistical significance that the plotted contour lines represent (P = 0.01, 0.05, 0.1, etc.) • If a test for funnel plot asymmetry was used, report the exact P value observed for the test, and potentially other relevant statistics, for example the standardised normal deviate, from which the P value is derived. • If any sensitivity analyses seeking to explore the potential impact of missing results on the synthesis were conducted, present results of each analysis (see item #20d), compare them with results of the primary analysis, and report results with due consideration of the limitations of the statistical method. • *If studies were assessed for selective non-reporting of results by comparing outcomes and analyses pre-specified in study registers, protocols, and statistical analysis plans with results that were available in study reports, consider presenting a matrix (with rows as studies and columns as syntheses) to present the availability of study results.* • *If an assessment of selective non-reporting of results reveals that some studies are missing from the synthesis, consider displaying the studies with missing results underneath a forest plot or including a table with the available study results.*
RESULTS	22	CERTAINTY OF EVIDENCE	• Report the overall level of certainty (or confidence) in the body of evidence for each important outcome. • Provide an explanation of reasons for downgrading (or upgrading) the evidence (e.g. in footnotes to an evidence summary table). • Communicate certainty in the evidence wherever results are reported (i.e. abstract, evidence summary tables, results, conclusions), using a format appropriate for the section of the review. • *Consider including evidence summary tables, such as GRADE Summary of Findings tables.*
DISCUSSION	23a	DISCUSSION (interpretation)	• Provide a general interpretation of the results in the context of other evidence.
DISCUSSION	23b	DISCUSSION (limitations of evidence)	• Discuss any limitations of the evidence included in the review.
DISCUSSION	23c	DISCUSSION (limitations of review processes)	• Discuss any limitations of the review processes used, and comment on the potential impact of each limitation.

Section	#	Topic	Elements recommended for reporting
DISCUSSION	23d	DISCUSSION (implications)	• Discuss implications of the results for practice and policy. • Make explicit recommendations for future research.
OTHER INFORMATION	24a	REGISTRATION AND PROTOCOL (registration)	• Provide registration information for the review, including register name and registration number, or state that the review was not registered.
OTHER INFORMATION	24b	REGISTRATION AND PROTOCOL (protocol)	• Indicate where the review protocol can be accessed (e.g. by providing a citation, DOI or link), or state that a protocol was not prepared.
OTHER INFORMATION	24c	REGISTRATION AND PROTOCOL (amendments)	• Report details of any amendments to information provided at registration or in the protocol, noting: (a) the amendment itself; (b) the reason for the amendment; and (c) the stage of the review process at which the amendment was implemented.
OTHER INFORMATION	25	SUPPORT	• Describe sources of financial or non-financial support for the review, specifying relevant grant ID numbers for each funder. If no specific financial or non-financial support was received, this should be stated. • Describe the role of the funders or sponsors (or both) in the review. If funders or sponsors had no role in the review, this should be declared.
OTHER INFORMATION	26	COMPETING INTERESTS	• Disclose any of the authors' relationships or activities that readers could consider pertinent or to have influenced the review. • If any authors had competing interests, report how they were managed for particular review processes.
OTHER INFORMATION	27	AVAILABILITY OF DATA, CODE AND OTHER MATERIALS	• Report which of the following are publicly available: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review. • If any of the above materials are publicly available, report where they can be found (e.g. provide a link to files deposited in a public repository). • If data, analytic code, or other materials will be made available upon request, provide the contact details of the author responsible for sharing the materials and describe the circumstances under which such materials will be shared.

Figure 1. PRISMA 2020 flow diagram template for systematic reviews



*If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.
The new design is adapted from flow diagrams proposed by Boers (62), Mayo-Wilson et al. (63) and Stovold et al. (64). The boxes in grey should only be completed if applicable; otherwise they should be removed from the flow diagram. Note that a "report" could be a journal article, preprint, conference abstract, study register entry, clinical study report, dissertation, unpublished manuscript, government report or any other document providing relevant information.