Doing a Systematic Review: A Student's Guide

simplypsychology.org/systematic-review.html

What is Systematic Review?

A systematic review is a comprehensive, structured analysis of existing research on a specific topic. It uses predefined criteria to identify, evaluate, and synthesize relevant studies, aiming to provide an unbiased summary of the current evidence.

The explicit and systematic approach of a systematic review distinguishes it from traditional reviews and commentaries.

Here are some key ways that systematic reviews differ from narrative reviews:

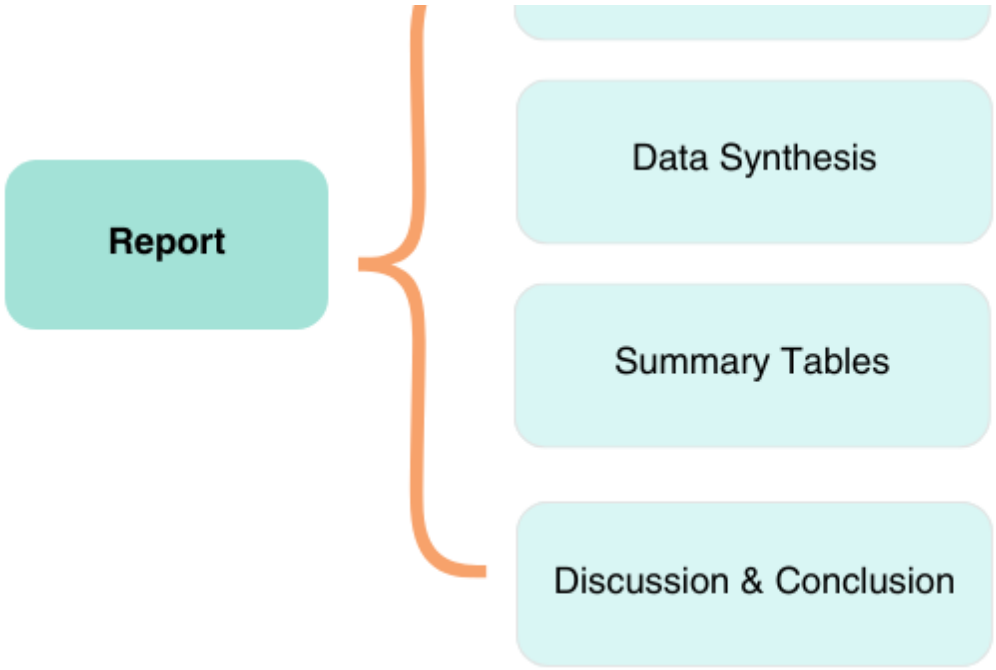
- **Goals:** Narrative reviews provide a summary or overview of a topic, while systematic reviews answer a focused review question.
- **Sources of Literature:** Narrative reviews often use a non-exhaustive and unstated body of literature, which can lead to publication bias. Systematic reviews consider a list of databases, grey literature, and other sources.
- **Selection Criteria:** Narrative reviews usually use subjective or no selection criteria, which can lead to selection bias. Systematic reviews have a clear and explicit selection process.
- **Appraisal of Study Quality:** Narrative reviews vary in their evaluation of study quality. Systematic reviews use standard checklists for a rigorous appraisal of study quality.

Systematic reviews are time-intensive and need a research team with multiple skills and contributions. There are some cases where systematic reviews are unable to meet the necessary objectives of the review question.

In these cases, scoping reviews (which are sometimes called scoping exercises/scoping studies) may be more useful to consider.

Scoping reviews are different from systematic reviews because they may not include a mandatory critical appraisal of the included studies or synthesize the findings from individual studies.


Planning
Searching for existing reviews/protocols
Formulate research question
Develop review protocol
Search strategy
Conducting
Search databases with keywords
Apply inclusion criteria
Quality Assessment
Data Extraction
PRISMA Flowchart



Assessing The Need For A Systematic Review

When assessing the need for a systematic review, one must first check if any existing or ongoing reviews already exist and determine if a new review is justified.

Scoping reviews frequently serve as preliminary steps before conducting full systematic reviews. They help assess the available literature's breadth, identify key concepts, and determine the feasibility of a more comprehensive review.

This initial exploration guides researchers in refining their approach for subsequent in-depth analyses.

This process should begin by searching relevant databases.

Resources to consider searching include:

- NICE: National Institute for Health and Clinical Excellence
- Campbell Library of Systematic Reviews for reviews in education, crime and justice, and social welfare
- EPPI: Evidence for Policy and Practice Information Centre, particularly their database of systematic and non-systematic reviews of public health interventions (DoPHER)
- MEDLINE: Primarily covers the medical domain, making it a primary resource for systematic reviews concerning healthcare interventions

- PsycINFO: For research in psychology, psychiatry, behavioral sciences, and social sciences
- Cochrane Library (specifically CDSR): Focuses on systematic reviews of health care interventions, providing regularly updated and critically appraised reviews

If an existing review addressing the question of interest is found, its quality should be assessed to determine its suitability for guiding policy and practice.

If a high-quality, relevant review is located, but its completion date is some time ago, updating the review might be warranted.

Assessing current relevance is vital, especially in rapidly evolving research fields. Collaboration with the original research team might be beneficial during the update process, as they could provide access to their data.

If the review is deemed to be of adequate quality and remains relevant, undertaking another systematic review may not be necessary.

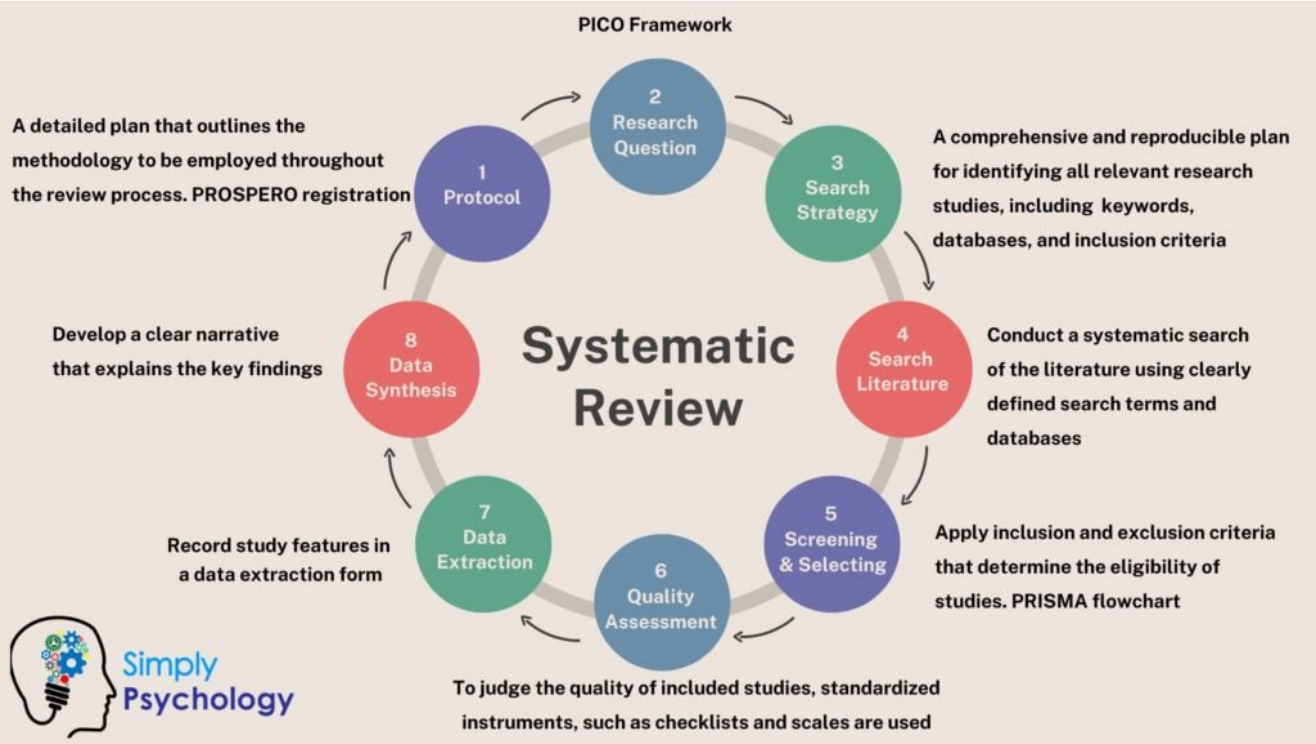
When a new systematic review or an update is deemed necessary, the subsequent step involves establishing a review team and potentially an advisory group, who will then develop the review protocol.

How To Conduct A Systematic Review

PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) is a reporting guideline designed to improve the transparency and completeness of systematic review reporting.

PRISMA was created to tackle the issue of inadequate reporting often found in systematic reviews:

- **Checklist**: PRISMA features a 27-item checklist covering all aspects of a systematic review, from the rationale and objectives to the synthesis of findings and discussion of limitations. Each checklist item is accompanied by detailed reporting recommendations in an Explanation and Elaboration document.
- **Flow Diagram**: PRISMA also includes a flow diagram to visually represent the study selection process, offering a clear, standardized way to illustrate how researchers arrived at the final set of included studies.



Step 1: write a research protocol

A protocol in the context of systematic reviews is a detailed plan that outlines the methodology to be employed throughout the review process.

The protocol serves as a roadmap, guiding researchers through each stage of the review in a transparent and replicable manner.

This document should provide specific details about every stage of the research process, including the methodology for identifying, selecting, and analyzing relevant studies.

For example, the protocol should specify search strategies for relevant studies, including whether the search will encompass unpublished works.

The protocol should be created before beginning the research process to ensure transparency and reproducibility.

This pre-determined plan ensures that decisions made during the review are objective and free from bias, as they are based on pre-established criteria.

> Protocol modifications are sometimes necessary during systematic reviews. While adhering to the protocol is crucial for minimizing bias, there are instances where modifications are justified. For instance, a deeper understanding of the research question that emerges from examining primary research might necessitate changes to the protocol.

Systematic reviews should be registered at inception (at the protocol stage) for these reasons:

- To help avoid unplanned duplication
- To enable the comparison of reported review methods with what was planned in the protocol

This registration prevents duplication (research waste) and makes the process easy when the full systematic review is sent for publication.

PROSPERO is an international database of prospectively registered systematic reviews in health and social care. Non-Cochrane protocols should be registered on PROSPERO.

Research Protocol

Citation

Rasika Jayasekara, Nicholas Procter. The effects of cognitive behaviour therapy for major depression in older adults: a systematic review. PROSPERO 2012 CRD42012003151 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42012003151

Review question

How effective is CBT compared with other interventions, placebo or standard treatment in achieving relapse prevention and improving mental status for older adults with major depression?

Searches

The search strategy aims to find both published and unpublished studies and publications. The search will be limited to English language papers published from 2002 to 2012.

A three-step search strategy will be developed using MeSH terminology and keywords to ensure that all materials relevant to the review are captured.

An initial limited search of MEDLINE and CINAHL will be undertaken followed by an analysis of the text words contained in the title and abstract, and of the index terms used to describe the article. A second search using all identified keywords and index terms will then be undertaken.

Thirdly, the reference list of all identified reports and articles will be searched for additional studies.

The databases to be searched included:

- MEDLINE
- CINAHL
- Cochrane Central Register of Controlled Trials
- Controlled Trials
- EMBASE
- Current Contents
- PsycINFO
- Ageline

The search for unpublished studies will include:

- Digital Dissertations (Proquest)
- Conference Proceedings
- MEDNAR

Experts in the field will be contacted for ongoing and unpublished trials. Experts will be identified through journal publications.

Types of study to be included

All randomised controlled trials (RCTs) assessing the effectiveness of CBT as a treatment for older adults with major depression when compared to standard care, specific medication, other therapies and no intervention will be considered.

In the absence of RCTs, other research designs such as quasi-experimental studies, case-controlled studies and cohort studies will be examined. However, descriptive studies and expert opinion will be excluded.

Condition or domain being studied

Major depression is diagnosed according to DSM IV or ICD 10 criteria.

Where trials fail to employ diagnostic criteria, the severity of depression will be described by the use of standardised rating scales, including the Hamilton Depression Rating Scale, Montgomery and Asberg Rating Scale and the Geriatric Depression Rating Scale.

The trials including participants with an explicit diagnosis of dementia or Parkinson's disease and other mental illnesses will be excluded.

The review will include trials conducted in primary, secondary, community, nursing homes and in-patient settings.

Participants/population

The review will include trials in which patients are described as elderly, geriatric, or older adults, or in which all patients will be aged 55 or over (many North American trials of older adult populations use a cut-off of 55 years).

The review will include trials with subjects of either sex. Where possible, participants will be categorised as community or long term care residents.

Intervention(s), exposure(s)

The review will focus on interventions designed to assess the effects of CBT for older adults with major depression.

The label cognitive behavioural therapy has been applied to a variety of interventions and, accordingly, it is difficult to provide a single, unambiguous definition.

In order to be classified as CBT the intervention must clearly demonstrate the following components:

1. the intervention involves the recipient establishing links between their thoughts, feelings and actions with respect to the target symptom;

2. the intervention involves the correction of the person's misperceptions, irrational beliefs and reasoning biases related to the target symptom.
3. the intervention should involve either or both of the following:
    - – the recipient monitoring his or her own thoughts, feelings and behaviours with respect to the target symptom; and
    - – the promotion of alternative ways of coping with the target symptom.

In addition, all therapies that do not meet these criteria (or that provide insufficient information) but are labelled as 'CBT' or 'Cognitive Therapy' will be included as 'less well defined' CBT.

Comparator(s)/control

other interventions, placebo or standard treatment

Main outcome(s)

Primary outcomes

1. Depression level as assessed by Hamilton Depression Rating Scale, Montgomery or Asberg Rating Scale or the Geriatric Depression Rating Scale.
2. Relapse (as defined in the individual studies)
3. Death (sudden, unexpected death or suicide).
4. Psychological well being (as defined in the individual studies)

Measures of effect

The review will categorise outcomes into those measured in the shorter term (within 12 weeks of the onset of therapy), medium term (within 13 to 26 weeks of the onset of therapy) and longer term (over 26 weeks since the onset of therapy).

Additional outcome(s)

Secondary outcomes

1. Mental state
2. Quality of life
3. Social functioning
4. Hospital readmission

5. Unexpected or unwanted effect (adverse effects), such as anxiety, depression and dependence on the relationship with the therapist

Data extraction (selection and coding)

Data will be extracted from papers included in the review using JBI-MAStARI. In this stage, any relevant studies will be extracted in relation to their population, interventions, study methods and outcomes.

Where data are missing or unclear, authors will be contacted to obtain information.

Risk of bias (quality) assessment

All papers selected for retrieval will be assessed by two independent reviewers for methodological validity prior to inclusion in the review.

Since the review will evaluate the experimental studies only, The Joanna Briggs Institute Meta Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI) will be used to evaluate each study's methodological validity.

If there is a disagreement between the two reviewers, there will be a discussion with the third reviewer to solve the dissimilarity.

Strategy for data synthesis

Where possible quantitative research study results will be pooled in statistical meta-analysis using Review Manager Software from the Cochrane Collaboration.

Odds ratio (for categorical outcome data) or standardised mean differences (for continuous data) and their 95% confidence intervals will be calculated for each study.

Heterogeneity will be assessed using the standard Chi-square. Where statistical pooling is not possible the findings will be presented in narrative form.

Step 2: formulate a research question

Developing a focused research question is crucial for a systematic review, as it underpins every stage of the review process.

The question defines the review's nature and scope, guides the identification of relevant studies, and shapes the data extraction and synthesis processes.

It's essential that the research question is answerable and clearly stated in the review protocol, ensuring that the review's boundaries are well-defined.

A narrow question may limit the number of relevant studies and generalizability, while a broad question can make it challenging to reach specific conclusions.

PICO Framework

> The PICO framework is a model for creating focused clinical research questions. The acronym PICO stands for:

- **P**opulation/Patient/Problem: This element defines the specific group of people the research question pertains to.
- **I**ntervention: This is the treatment, test, or exposure being considered for the population.
- **C**omparison: This is the alternative intervention or control group against which the intervention is being compared.
- **O**utcome: This element specifies the results or effects of the interventions being investigated

Using the PICO format when designing research helps to minimize bias because the questions and methods of the review are formulated before reviewing any literature.

The PICO elements are also helpful in defining the inclusion criteria used to select sources for the systematic review.

The PICO framework is commonly employed in systematic reviews that primarily analyze data from randomized controlled trials.

Not every element of PICO is required for every research question. For instance, it is not always necessary to have a comparison

Types of questions that can be answered using PICO:

Therapy

> “In patients with a recent acute stroke (less than 6 weeks) with reduced mobility (**P**), is any specific physiotherapy approach (**I**) more beneficial than no physiotherapy (**C**) at improving independence in activities of daily living and gait speed (**O**)?

Prevention

> “For women who have experienced domestic violence (**P**), how effective are advocacy programmes (**I**) compared to other treatments (**C**) on improving the quality of life (**O**)?”

Etiology/Harm

> Are women with a history of pelvic inflammatory disease (PID) (**P**) at higher risk for gynecological cancers (**O**) than women with no history of PID (**C**)?

Diagnosis

> Among asymptomatic adults at low risk of colon cancer (**P**), is fecal immunochemical testing (FIT) (**I**) as sensitive and specific for diagnosing colon cancer (**O**) as colonoscopy (**C**)?

Prognosis

> Among adults with pneumonia (**P**), do those with chronic kidney disease (CKD) (**I**) have a higher mortality rate (**O**) than those without CKD (**C**)?

Alternative Frameworks

`The selection of an appropriate framework for a research question hinges significantly on aligning the framework with the type of evidence under review.`

- **PICOCS**: This framework, used in public health research, adds a “**C**ontext” element to the PICO framework. This is useful for examining how the environment or setting in which an intervention is delivered might influence its effectiveness.
- **PICOC**: This framework expands on PICO by incorporating “**C**osts” as an element of the research question. It is particularly relevant to research questions involving economic evaluations of interventions.
- **ECLIPSE**: **E**xpectations, **C**lient group, **L**ocation, **I**mpact, **P**rofessionals involved, **S**ervice, and **E**valuation. It is a mnemonic device designed to aid in searching for health policy and management information.

- **PEO**: This acronym, standing for **P**atient, **E**xposure, and **O**utcome, is a variation of PICO used when the research question focuses on the relationship between exposure to a risk factor and a specific outcome.
- **PIRD**: This acronym stands for **P**opulation, **I**ndex Test, **R**eference Test, and **D**iagnosis of Interest, guiding research questions that focus on evaluating the diagnostic accuracy of a particular test.
- **PFO**: This acronym, representing **P**opulation, **P**rognostic **F**actors, and **O**utcome, is tailored for research questions that aim to investigate the relationship between specific prognostic factors and a particular health outcome.
- **SDMO**: This framework, which stands for **S**tudies, **D**ata, **M**ethods, and **O**utcomes, assists in structuring research questions focused on methodological aspects of research, examining the impact of different research methods or designs on the quality of research findings.

Step 3: Search Strategy

PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) provide appropriate guidance for reporting quantitative literature searches.

> Present the full search strategies for all databases, registers and websites, including any filters and limits used.
>
> PRISMA 2020 Checklist

A search strategy is a comprehensive and reproducible plan for identifying all relevant research studies that address a specific research question.

This systematic approach to searching helps minimize bias and distinguishes systematic reviews from other types of literature reviews.

It’s important to be transparent about the search strategy and document all decisions for auditability. The goal is to identify all potentially relevant studies for consideration.

Here’s a breakdown of a search strategy:

Search String Construction

It is recommended to consult topic experts on the review team and advisory board in order to create as complete a list of search terms as possible for each concept.

To retrieve the most relevant results, a search string is used. This string is made up of:

- **Keywords:** Search terms should be relevant to the subject areas of the research question and should be identified for all components of the research question (e.g., Population, Intervention, Comparator, and Outcomes – PICO). Using relevant keywords helps minimize irrelevant search returns. Sources such as dictionaries, textbooks, and published articles can help identify appropriate keywords.
- **Synonyms:** These are words or phrases with similar meanings to the keywords, as authors may use different terms to describe the same concepts. Including synonyms helps cover variations in terminology and increases the chances of finding all relevant studies. For example, a drug intervention may be referred to by its generic name or by one of its several proprietary names.
- **Truncation symbols**: These broaden the search by capturing variations of a keyword. They function by locating every word that begins with a specific root. For example, if a user was researching interventions for smoking, they might use a truncation symbol to search for “smok*” to retrieve records with the words “smoke,” “smoker,” “smoking,” or “smokes.” This can save time and effort by eliminating the need to input every variation of a word into a database.
- **Boolean operators:** The use of Boolean operators (AND/OR/NEAR/NOT) helps to combine these terms effectively, ensuring that the search strategy is both sensitive and specific. For instance, using “AND” narrows the search to include only results containing both terms, while “OR” expands it to include results containing either term.

Information Sources

The primary goal is to find all published and unpublished studies that meet the predefined criteria of the research question. This includes considering various sources beyond typical databases

Information sources for systematic reviews can include a wide range of resources like scholarly databases, unpublished literature, conference papers, books, and even expert consultations.

> 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.
>
> *PRISMA 2020 Checklist*

An exhaustive, systematic search strategy is developed with the assistance of an expert librarian.

- **Electronic Databases**: Searches should include seven key databases: CINAHL, Medline, APA PsycArticles, Psychology and Behavioral Sciences Collection, APA PsycInfo, SocINDEX with Full Text, and Web of Science: Core Collections.
- **Grey Literature**: In addition to databases, forensic or 'expansive' searches can be conducted. This includes: grey literature database searches (e.g. OpenGrey,WorldCat, Ethos), conference proceedings, unpublished reports, theses , clinical trial databases, searches by names of authors of relevant publications. Independent research bodies may also be good sources of material, e.g. Centre for Research in Ethnic Relations, Joseph Rowntree Foundation, Carers UK.
- **Citation Searching**: Reference lists often lead to highly cited and influential papers in the field, providing valuable context and background information for the review.
- **Handsearching**: Manually searching through specific journals or conference proceedings page-by-page is another way to ensure all relevant studies are captured, particularly those not yet indexed in databases.
- **Contacting Experts**: Reaching out to researchers or experts in the field can provide access to unpublished data or ongoing research not yet publicly available.

It is important to note that this may not be an exhaustive list of all potential databases.

Example:

> *A systematic computerized search was performed for publications that appeared between 1974 and 2018 in English language journals. Four databases were searched including PsychINFO, Embase, OVOID MEDLINE, and AMED. The databases were searched with combinations of search terms relating to attachment ("attachment" OR "working model" OR "safe haven" OR "secure base" OR "felt security") AND romantic couples ("dyad" OR "couple" OR "spous" OR "partner" OR "romantic" OR "wife" OR "husband" OR "close relationship" OR "interpersonal" OR "intimate" OR "mari") AND social support ("support prov" OR "caregiving" OR "support giv" OR "social support" OR "enacted support" OR "support received" OR "receiv* support" OR "prov support" OR "dyadic coping" OR "interpersonal coping" OR "collaborative coping" OR "help-seeking" OR "emotional support" OR "tangible support" OR "instrumental support" OR "perceived support" OR "responsive" OR "buffer" OR "partner support" OR "Support avail*" OR "available support"). The reference lists of the retrieved studies were checked to find other relevant publications, which were not identified in the computerized database searches.*

Source: McLeod, S., Berry, K., Hodgson, C., & Wearden, A. (2020). Attachment and social support in romantic dyads: A systematic review. *Journal of clinical psychology*, *76*(1), 59-101.

Inclusion Criteria

> Specify the inclusion and exclusion criteria for the review. PRISMA 2020 Checklist

Before beginning the literature search, researchers should establish clear eligibility criteria for study inclusion.

Inclusion criteria are used to select studies for a systematic review and should be based on the study's research method and PICO elements.

To maintain transparency and minimize bias, eligibility criteria for study inclusion should be established a priori. Ideally, researchers should aim to include only high-quality randomized controlled trials that adhere to the intention-to-treat principle.

The selection of studies should not be arbitrary, and the rationale behind inclusion and exclusion criteria should be clearly articulated in the research protocol.

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Inclusion criteria should be piloted by applying them to a sample of papers to check if they can be reliably interpreted and appropriately classify studies. The pilot phase can refine and clarify inclusion criteria and ensure that multiple reviewers can apply the criteria consistently.
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When specifying the inclusion and exclusion criteria, consider the following aspects:

- **Intervention Characteristics:** Researchers might decide that, in order to be included in the review, an intervention must have specific characteristics. They might require the intervention to last for a certain length of time, or they might determine that only interventions with a specific theoretical basis are appropriate for their review.
- **Population Characteristics:** A systematic review might focus on the effects of an intervention for a specific population. For instance, researchers might choose to focus on studies that included only nurses or physicians.
- **Outcome Measures:** Researchers might choose to include only studies that used outcome measures that met a specific standard.
- **Age of Participants:** If a systematic review is examining the effects of a treatment or intervention for children, the authors of the review will likely choose to exclude any studies that did not include children in the target age range.
- **Diagnostic Status of Participants:** Researchers conducting a systematic review of treatments for anxiety will likely exclude any studies where the participants were not diagnosed with an anxiety disorder.
- **Study Design:** Researchers might determine that only studies that used a particular research design, such as a randomized controlled trial, will be included in the review.
- **Control Group:** In a systematic review of an intervention, researchers might choose to include only studies that included certain types of control groups, such as a waiting list control or another type of intervention.
- **Publication status**: Decide whether only published studies will be included or if unpublished works, such as dissertations or conference proceedings, will also be considered.

Example:

> Studies that met the following criteria were included: (a) empirical studies of couples (of any gender) who are in a committed romantic relationship, whether married or not; (b) measurement of the association between adult attachment and support in the context of this relationship; (c) the article was a full report published in English; and (d) the articles were reports of empirical studies published in peer-reviewed journals, dissertations, review papers, and conference presentations.

Source: McLeod, S., Berry, K., Hodgson, C., & Wearden, A. (2020). Attachment and social support in romantic dyads: A systematic review. *Journal of clinical psychology*, *76*(1), 59-101.

Iterative Process

The iterative nature of developing a search strategy for systematic reviews stems from the need to refine and adapt the search process based on the information encountered at each stage.

A single attempt rarely yields the perfect final strategy. Instead, it is an evolving process involving a series of test searches, analysis of results, and discussions among the review team.

Here's how the iterative process unfolds:

1. **Initial Strategy Formulation:** Based on the research question, the team develops a preliminary search strategy, including identifying relevant keywords, synonyms, databases, and search limits.
2. **Test Searches and Refinement:** The initial search strategy is then tested on chosen databases. The results are reviewed for relevance, and the search strategy is refined accordingly. This might involve adding or modifying keywords, adjusting Boolean operators, or reconsidering the databases used.
3. **Discussions and Iteration:** The search results and proposed refinements are discussed within the review team. The team collaboratively decides on the best modifications to improve the search's comprehensiveness and relevance.
4. **Repeating the Cycle:** This cycle of test searches, analysis, discussions, and refinements is repeated until the team is satisfied with the strategy's ability to capture all relevant studies while minimizing irrelevant results.

The iterative nature of developing a search strategy is crucial for ensuring that the systematic review is comprehensive and unbiased.

By constantly refining the search strategy based on the results and feedback, researchers can be more confident that they have identified all relevant studies.

This iterative process ensures that the applied search strategy is sensitive enough to capture all relevant studies while maintaining a manageable scope.

Throughout this process, meticulous documentation of the search strategy, including any modifications, is crucial for transparency and future replication of the systematic review.

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Searching is a pragmatic activity: if a search identifies 15,000 items and the review team comprises two people working in their free time, it may be necessary to narrow the scope of the review and the inclusion criteria. This could be done by revising the publication date (for example, articles published in the last ten, rather than 20 years), and/or the population and/or study designs of interest.
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Step 4: Search the Literature

Conduct a systematic search of the literature using clearly defined search terms and databases.

Applying the search strategy involves entering the constructed search strings into the respective databases' search interfaces. These search strings, crafted using Boolean operators, truncation symbols, wildcards, and database-specific syntax, aim to retrieve all potentially relevant studies addressing the research question.

The researcher, during this stage, interacts with the database's features to refine the search and manage the retrieved results.

This might involve employing search filters provided by the database to focus on specific study designs, publication types, or other relevant parameters.

Applying the search strategy is not merely a mechanical process of inputting terms; it demands a thorough understanding of database functionalities and a discerning eye to adjust the search based on the nature of retrieved results.

Step 5: screening and selecting research articles

Once the search strategy is finalized, it is applied to the selected databases, yielding a set of search results.

These search results are then screened against pre-defined inclusion criteria to determine their eligibility for inclusion in the review.

The goal is to identify studies that are both relevant to the research question and of sufficient quality to contribute to a meaningful synthesis.

Studies meeting the inclusion criteria are usually saved into electronic databases, such as Endnote or Mendeley, and include title, authors, date and publication journal along with an abstract (if available).

Study Selection

> 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.
>
> *PRISMA 2020 Checklist*

The selection process in a systematic review involves multiple reviewers to ensure rigor and reliability.

To minimize bias and enhance the reliability of the study selection process, it is recommended that at least two reviewers independently assess the eligibility of each study. This independent assessment helps reduce the impact of individual biases or errors in judgment.

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Two reviewers should independently screen titles and abstracts, removing duplicates
and irrelevant studies based on predefined inclusion and exclusion criteria.
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1. **Initial screening of titles and abstracts:** After applying a strategy to search the literature, the next step involves screening the titles and abstracts of the identified articles against the predefined inclusion and exclusion criteria. During this initial screening, reviewers aim to identify potentially relevant studies while excluding those clearly outside the scope of the review. It is crucial to prioritize over-inclusion at this stage, meaning that reviewers should err on the side of keeping studies even if there is uncertainty about their relevance. This cautious approach helps minimize the risk of inadvertently excluding potentially valuable studies.
2. **Retrieving and assessing full texts:** For studies which a definitive decision cannot be made based on the title and abstract alone, reviewers need to obtain the full text of the articles for a comprehensive assessment against the predefined inclusion and exclusion criteria. This stage involves meticulously reviewing the full text of each potentially relevant study to determine its eligibility definitively.
3. **Resolution of disagreements**: In cases of disagreement between reviewers regarding a study's eligibility, a predefined strategy involving consensus-building discussions or arbitration by a third reviewer should be in place to reach a final decision. This collaborative approach ensures a fair and impartial selection process, further strengthening the review's reliability.

Example:

> *First, the search results from separate databases were combined, and any duplicates were removed. The lead author (S. M.) and a postgraduate researcher (F. N.) applied the described inclusion criteria in a standardized manner. First, both the titles and abstracts of the articles were evaluated for relevance. If, on the basis of the title and/or abstract, the study looked likely to meet inclusion criteria hard copies of the manuscripts were obtained. If there was doubt about the suitability of an article, then the manuscript was included in the next step. The remaining articles were obtained for full-text review, and the method and results sections were read to examine whether the article fitted the inclusion criteria. If there was doubt about the suitability of the manuscripts during this phase, then this article was discussed with another author (C. H.). Finally, the reference lists of the eligible articles were checked for additional relevant articles not identified during the computerized search. For the selected articles (n = 43), the results regarding the relationship between attachment and support were included in this review (see Figure 1, for PRISMA flowchart).*

Source: McLeod, S., Berry, K., Hodgson, C., & Wearden, A. (2020). Attachment and social support in romantic dyads: A systematic review. *Journal of clinical psychology*, *76*(1), 59-101.

PRISMA Flowchart

The PRISMA flowchart is a visual representation of the study selection process within a systematic review.

The flowchart illustrates the step-by-step process of screening, filtering, and selecting studies based on predefined inclusion and exclusion criteria.

The flowchart visually depicts the following stages:

- **Identification:** The initial number of titles and abstracts identified through database searches.
- **Screening:** The screening process, based on titles and abstracts.
- **Eligibility:** Full-text copies of the remaining records are retrieved and assessed for eligibility.
- **Inclusion:** Applying the predefined inclusion criteria resulted in the inclusion of publications that met all the criteria for the review.
- **Exclusion:** The flowchart details the reasons for excluding the remaining records.

This systematic and transparent approach, as visualized in the PRISMA flowchart, ensures a robust and unbiased selection process, enhancing the reliability of the systematic review's findings.

The flowchart serves as a visual record of the decisions made during the study selection process, allowing readers to assess the rigor and comprehensiveness of the review.

> How to fill a PRISMA flow diagram

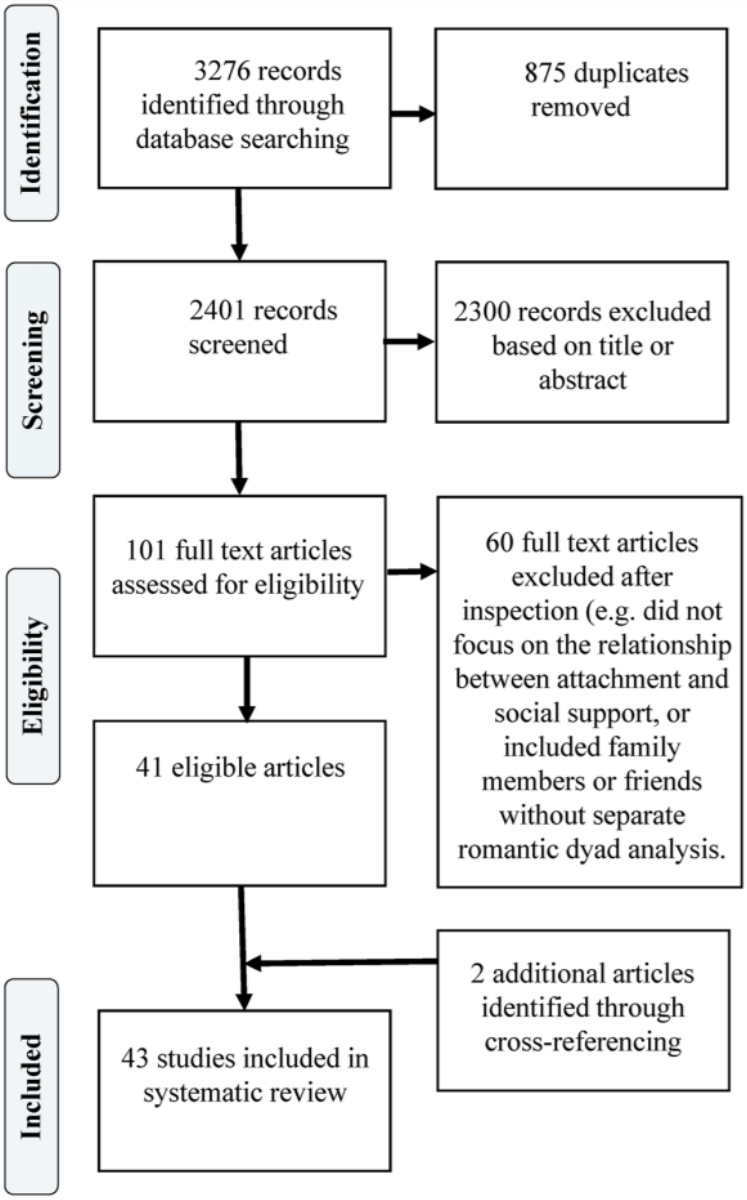

FIGURE 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses chart of the study selection process

Source: McLeod, S., Berry, K., Hodgson, C., & Wearden, A. (2020). Attachment and social support in romantic dyads: A systematic review. *Journal of clinical psychology*, *76*(1), 59-101.

Step 6: Criticallay Appraising the Quality of Included Studies

Quality assessment provides a measure of the strength of the evidence presented in a review.

High-quality studies with rigorous methodologies contribute to a more robust and reliable evidence base, increasing confidence in the review's conclusions.

Conversely, including low-quality studies with methodological weaknesses can undermine the review's findings and potentially lead to inaccurate recommendations.

To judge the quality of studies included in a systematic review, standardized instruments, such as checklists and scales, are commonly used. These tools help to ensure a transparent and reproducible assessment process.

The choice of tool should be justified and aligned with the study design and the level of detail required. Using quality scores alone is discouraged; instead, individual aspects of methodological quality should be considered.

Here are some specific tools mentioned in the sources:

- **For RCTs:**
  - Jadad score
  - Cochrane Risk of Bias tool
- **For non-RCTs:**
  - Cochrane Effective Practice and Organisation of Care (EPOC) Group Risk of Bias Tool
  - Quality Assessment of Diagnostic Accuracy Studies (QUADAS)
  - Newcastle – Ottawa Quality Assessment Scale for case-control and cohort studies
- **For Public Health studies:**
  - EPHPP Assessment Tool
  - Critical Appraisal Skills Programme (CASP) Appraisal Checklist
  - Cochrane Public Health Group (CPHG)

Example:

> *The quality of the study was not an inclusion criterion; however, a study quality check was carried out. Two independent reviewers (S. M. and C. H.) rated studies that met the inclusion criteria to determine the strength of the evidence. The Effective Public Health Practice Project Quality Assessment Tool for Quantitative Studies was adapted to assess the methodological quality of each study (Thomas, Ciliska, Dobbins, & Micucci, 2004). The tool was adjusted to include domains relevant to the method of each study. For example, blinding was removed for nonexperimental studies. Following recommendations by Thomas et al. (2004) each domain was rated as either weak (3 points), moderate (2 points), or strong (1 point). The mean score across questions was used as an indicator of overall quality, and studies were assigned an overall quality rating of strong (1.00–1.50), moderate (1.51–2.50),*

Source: McLeod, S., Berry, K., Hodgson, C., & Wearden, A. (2020). Attachment and social support in romantic dyads: A systematic review. *Journal of clinical psychology*, *76*(1), 59-101.

Evidence Tables

Aspects of the appraisal of studies included in the review should be recorded as evidence tables (NICE 2009): simple text tables where the design and scope of studies are summarised.

The reader of the review can use the evidence tables to check the details, and assess the credibility and generalisability of findings, of particular studies.

Critical appraisal of the quality of included studies may be combined with data extraction tables.

Author(s)	(A) Selection bias	(B) Study design	(C) Confounders	(D) Blinding	(E) Data collection	(F) Withdrawals	Quality rating
Kordahji et al. (2015)	W	M	M	S	M	S	(1.83) M
Kuan mak et al. (2010)	W	W	W	(N/A)	S	(N/A)	(2.50) M
Martin et al. (2010)	W	W	W (NR)	(N/A)	W	(N/A)	(3.0) W
McClure et al. (2014)	M	M	W (NR)	(N/A)	S	S	(1.5) S
Meuwly et al. (2012)	W	W	W (NR)	(N/A)	S	(N/A)	(2.50) M
Millings and Walsh (2009)	M	W	W (NR)	(N/A)	S	(N/A)	(2.25) M
Monin et al. (2012)	W	W	W (NR)	(N/A)	S	(N/A)	(2.50) M
Peloquin et al. (2014)	W	W	S	S	M	(N/A))	(2.0) M
Reizer et al. (2012)	W	W	S	(N/A)	M	(N/A)	(2.25) M
Reizer et al. (2014)	W	W	W (NR)	(N/A)	S	(N/A)	(2.50) M
Rini et al. (2006)	M	M	S	(N/A)	S	W	(1.80) M
Jayamaha, Girme, and Overall (2017).	W	W	W	(N/A)	S	(N/A)	(2.5) W
Simpson et al. (2003)	M	M	S	(N/A)	S	S	(1.4) S
Simpson et al. (1992)	W	W	W (NR)	(N/A)	W	(N/A)	(3.0) W
Simpson et al. (2002)	W	W	S	(N/A)	S	(N/A)	(2.0) M
Simpson et al. (2007)	W	W	M	(N/A)	S	(N/A)	(2.25) M
Stanton and Campbell (2014)	W	W	W (NR)	(N/A)	S	(N/A)	(2.5) M
Verhofstadt et al. (2007)	W	W	S	S	W	(N/A)	(2.2) M
Vilchinsky et al. (2010)	M	W	W	(N/A)	M	(N/A)	(2.5) M
You et al. (2015)	W	W	W (NR)	(N/A)	S	(N/A)	(2.5) M

Note: Each domain was rated as either weak (W) (3 points), moderate (M) (2 points) or strong (S) (1 point). Where the domain was not reported (NR), a rating of weak (W) was given. If the domain was not relevant to the study design this was reported as not applicable (N/A). Scores were averaged to provide a total score, and studies were assigned an overall quality rating of strong (S) (1.00–1.50), moderate (M) (1.51–2.50) or weak (W) (2.51–3.00).

Source: McLeod, S., Berry, K., Hodgson, C., & Wearden, A. (2020). Attachment and social support in romantic dyads: A systematic review. *Journal of clinical psychology*, *76*(1), 59-101.

Step 7: extracting data from studies

To effectively extract data from studies that meet your systematic review's inclusion criteria, you should follow a structured process that ensures accuracy, consistency, and minimizes bias.

1. Develop a data extraction form:

- **Design a standardized form (paper or electronic) to guide the data extraction process**: This form should be tailored to your specific review question and the types of studies included.
- **Pilot test the form**: Test the form on a small sample of included studies (e.g., 3-5). Assess for clarity, completeness, and usability. Refine the form based on feedback and initial experiences.
- **Reliability**: Ensure all team members understand how to use the form consistently.

2. Extract the data:

- **General Information:** This includes basic bibliographic details (journal, title, author, volume, page numbers), study objective as stated by the authors, study design, and funding source.
- **Study Characteristics:** Capture details about the study population (demographics, inclusion/exclusion criteria, recruitment procedures), interventions (description, delivery methods), and comparators (description if applicable).
- **Outcome Data:** Record the results of the intervention and how they were measured, including specific statistics used. Clearly define all outcomes for which data are being extracted.
- **Risk of Bias Assessment:** Document the methods used to assess the quality of the included studies and any potential sources of bias. This might involve using standardized checklists or scales.
- **Additional Information:** Depending on your review, you may need to extract data on other variables like adverse effects, economic evaluations, or specific methodological details.

3. Dual independent review:

- **Ensure that at least two reviewers independently extract data from each study using the standardized form.** Cross-check extracted data for accuracy to minimize bias and helps identify any discrepancies.
- **Have a predefined strategy for resolving disagreements:** This might involve discussion, consensus, or arbitration by a third reviewer.
- **Record the reasons for excluding any studies during the data extraction phase.**:This enhances the transparency and reproducibility of your review.
- **If necessary, contact study authors to obtain missing or clarify unclear information**: This is particularly important for data critical to your review's outcomes.
- **Clearly document your entire data extraction process, including any challenges encountered and decisions made.** This enhances the transparency and rigor of your systematic review.

By following these steps, you can effectively extract data from studies that meet your inclusion criteria, forming a solid foundation for the analysis and synthesis phases of your systematic review.

Step 8: synthesize the extracted data

The key element of a systematic review is the synthesis: that is the process that brings together the findings from the set of included studies in order to draw conclusions based on the body of evidence.

Data synthesis in a systematic review involves collating, combining, and summarizing findings from the included studies.

This process aims to provide a reliable and comprehensive answer to the review question by considering the strength of the evidence, examining the consistency of observed effects, and investigating any inconsistencies.

The data synthesis will be presented in the **results section** of the systematic review.

- Develop a clear text narrative that explains the key findings
- Use a logical heading structure to guide readers through your results synthesis
- Ensure your text narrative addresses the review's research questions
- Use tables to summarise findings (can be same table as data extraction)

Identifying patterns, trends, and differences across studies

Narrative synthesis uses a textual approach to analyze relationships within and between studies to provide an overall assessment of the evidence's robustness. All systematic reviews should incorporate elements of narrative synthesis, such as tables and text.

Reference	Design	Population	Intervention	Outcome Measured	Results—Patient-Reported Outcomes
Davis et al (2015)[9]	Two-group nonrandomized design comparing patients receiving the intervention to those not offered or declining the intervention	1352 Home hospice patients with varying serious illnesses in metropolitan Washington, DC, area in the United States	Proactive outbound phone-based care service to hospice patients from specialists and nurses using a standard call script	Intervention evaluated by intervention acceptance rate, intensity of the intervention, escalations of calls from specialists to nurses, utilization of clinical services, and clinical miles traveled	84% of new home hospice patients accepted TeleCaring. TeleCaring participants had lower utilization of clinical services compared with nonparticipants. Patient satisfaction increased and clinical miles decreased after the implementation of the intervention TeleCaring is a viable method to proactively identify home hospice patient or caregiver needs and adjust clinical services accordingly
Dhiliwal and Salins (2015)[10]	Case report	2 Indian patients with advanced cancer referred for symptom control and supportive care	WhatsApp—smart phone application allowing sharing of text messages, pictures, and video	Symptom management, satisfaction, ability to die at home	Both patients reported improved symptom management and were able to die at home Smartphone applications in palliative homecare are a novel cost-effective approach which improves symptom control, helps in continued care at home, prevents unnecessary hospitalization, and improves patient satisfaction
Hebert et al (2006)[11]	Randomized noninferiority trial with 2 groups comparing conventional palliative home care to a combination of conventional and home telehealth	44 Home palliative care patients from 11 rural communities in Alberta, Canada	Combination of conventional care and home telehealth ''video-visits'' by nurses through the use of videophones at home	Palliative care symptoms: the Edmonton Symptom Assessment Scale (ESAS) and the Palliative Performance Scale (PPS). Quality of Life: the McGill Quality of Life Questionnaire (MQOL). Thematic analysis of interviews and focus groups. Unable to evaluate cost-	There were no significant differences between the groups for palliative care symptoms (ESAS and PPS) and quality of life (MQOL). Clients indicated a higher level of readiness to use the telehealth technology than did the nurses. All patients showed preference to fewe visits but wanted them to be in person Results suggested a similar quality of care could be delivered via videophones and conventional care

Source: Head, B. A., Schapmire, T. J., & Zheng, Y. (2017). Telehealth in palliative care: a systematic review of patient-reported outcomes. *Journal of Hospice & Palliative Nursing*, *19*(2), 130-139.

Remember, the goal of a narrative synthesis is to go beyond simply summarizing individual studies. You're aiming to create a new understanding by integrating and interpreting the available evidence in a systematic and transparent way.

Organize your data:

- Group studies by themes, interventions, or outcomes
- Create summary tables to display key information across studies
- Use visual aids like concept maps to show relationships between studies

Describe the studies:

- Summarize the characteristics of included studies (e.g., designs, sample sizes, settings)
- Highlight similarities and differences across studies
- Discuss the overall quality of the evidence

Develop a preliminary synthesis:

- Start by describing the results of individual studies
- Group similar findings together
- Identify overarching themes or trends

Explore relationships:

- Look for patterns in the data
- Identify factors that might explain differences in results across studies
- Consider how study characteristics relate to outcomes

Address contradictions:

- Consider differences in study populations, interventions, or contexts
- Look at methodological differences that might explain discrepancies
- Consider the implications of inconsistent results
- Don't ignore conflicting findings
- Discuss possible reasons for contradictions

Avoid vote counting:

- Don't simply tally positive versus negative results
- Instead, consider the strength and quality of evidence for each finding

Assess the robustness of the synthesis:

- Reflect on the strength of evidence for each finding
- Consider how gaps or limitations in the primary studies affect your conclusions
- Discuss any potential biases in the synthesis process

Step 9: discussion section and conclusion

Summarize key findings:

- Summarize key findings in relation to your research questions
- Highlight main themes or patterns across studies
- Explain the nuances and complexities in the evidence
- Discuss the overall strength and consistency of the evidence
- This provides a clear takeaway message for readers

Consider study quality and context:

- Assess whether higher quality studies tend to show different results
- Examine if findings differ based on study setting or participant characteristics
- This helps readers weigh the relative importance of conflicting findings

Discuss implications:

- For practice: How might professionals apply these findings?
- For policy: What policy changes might be supported by the evidence?
- Consider both positive and negative implications
- This helps translate your findings into real-world applications

Identify gaps and future research:

- Point out areas where evidence is lacking or inconsistent
- Suggest specific research questions or study designs to address these gaps
- This helps guide future research efforts in the field

State strengths and limitations:

- Discuss the strengths of your review (e.g., comprehensive search, rigorous methodology)
- Acknowledge limitations (e.g., language restrictions, potential for publication bias)

- This balanced approach demonstrates critical thinking and helps readers interpret your findings

Minimizing Bias

To reduce bias in a systematic review, it is crucial to establish a systematic and transparent review process that minimizes bias at every stage. Sources provide insights into strategies and methods to achieve this goal.

1. **Protocol development and publication:** Developing a comprehensive protocol before starting the review is essential. Publishing the protocol in repositories like PROSPERO or Cochrane Library promotes transparency and helps avoid deviations from the planned approach, thereby minimizing the risk of bias.
2. **Transparent reporting:** Adhering to reporting guidelines, such as PRISMA, ensures that all essential aspects of the review are adequately documented, increasing the reader's confidence in the transparency and completeness of systematic review reporting.
3. **Dual independent review:** Employing two or more reviewers independently at multiple stages of the review process (study selection, data extraction, quality assessment) minimizes bias. Any disagreements between reviewers should be resolved through discussion or by consulting a third reviewer. This approach reduces the impact of individual reviewers' subjective interpretations or errors.
4. **Rigorous quality assessment:** Assessing the methodological quality of included studies is crucial for minimizing bias in the review findings. Using standardized critical appraisal tools and checklists helps identify potential biases within individual studies, such as selection bias, performance bias, attrition bias, and detection bias.

5. **Mitigate publication bias**: Systematic reviews should aim to include all relevant studies, regardless of their publication status.
    - **Searching beyond published literature:** Explore sources of “grey literature” such as conference proceedings, unpublished reports, theses, and ongoing clinical trial databases.
    - **Contacting experts in the field**: Researchers can reach out to authors and investigators to inquire about unpublished or ongoing studies
    - **Considering language bias**: Expanding the search to include studies published in languages other than English can help reduce language bias, although this may increase the complexity and cost of the review.

Reading List

- Galante, J., Galante, I., Bekkers, M. J., & Gallacher, J. (2014). Effect of kindness-based meditation on health and well-being: a systematic review and meta-analysis. *Journal of consulting and clinical psychology*, *82*(6), 1101.
- Schneider, M., & Preckel, F. (2017). Variables associated with achievement in higher education: A systematic review of meta-analyses. *Psychological bulletin*, *143*(6), 565.
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- Roberts, B. W., Luo, J., Briley, D. A., Chow, P. I., Su, R., & Hill, P. L. (2017). A systematic review of personality trait change through intervention. *Psychological bulletin*, *143*(2), 117.
- Chu, C., Buchman-Schmitt, J. M., Stanley, I. H., Hom, M. A., Tucker, R. P., Hagan, C. R., … & Joiner Jr, T. E. (2017). The interpersonal theory of suicide: A systematic review and meta-analysis of a decade of cross-national research. *Psychological bulletin*, *143*(12), 1313.
- McLeod, S., Berry, K., Hodgson, C., & Wearden, A. (2020). Attachment and social support in romantic dyads: A systematic review. *Journal of clinical psychology*, *76*(1), 59-101.