

how to write a literature review for a systematic review

how to write a literature review for a systematic review requires a meticulous and structured approach, far beyond that of a traditional narrative review. This comprehensive guide will illuminate the essential steps and best practices for crafting a robust literature review that forms the bedrock of a high-quality systematic review. From defining a clear research question and developing a rigorous protocol to executing systematic searches, critically appraising evidence, and synthesizing findings, each stage demands precision and adherence to established methodological standards. Understanding these intricacies is crucial for producing a review that is transparent, reproducible, and provides unbiased answers to specific research questions. This article will delve into the critical phases, offering actionable insights for researchers aiming to contribute valuable, evidence-based knowledge to their respective fields.

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Understanding the Systematic Review and Its Literature Component

A systematic review is a type of literature review that collects and critically analyzes multiple research studies or papers, using rigorous, predefined methods to minimize bias and provide more reliable findings. Unlike traditional narrative reviews, which can be

selective and subjective, a systematic review adheres to a strict protocol, making its process transparent and reproducible. The literature review component within a systematic review is not a freestanding piece but an integral part of the overall methodology, meticulously detailing the evidence identified and analyzed.

The primary purpose of a systematic review is to answer a specific research question by identifying, appraising, and synthesizing all empirical evidence that meets pre-specified eligibility criteria. This robust approach helps in making informed decisions, identifying gaps in current knowledge, and providing a comprehensive understanding of a particular topic. Consequently, the literature review within this context serves as the structured documentation of the entire evidence synthesis process, from initial search to final synthesis.

Formulating a Clear Research Question and Protocol Development

The foundation of any successful systematic review, and by extension its literature review, is a well-defined and focused research question. A poorly formulated question can lead to an unfocused search, irrelevant results, and an ultimately inconclusive review. The PICO framework (Population, Intervention, Comparator, Outcome) is widely recommended for clinical questions, while other frameworks like PECO (Population, Exposure, Comparator, Outcome) or SPIDER (Sample, Phenomenon of Interest, Design, Evaluation, Research type) may be more suitable for qualitative or mixed-methods reviews.

Once the research question is established, developing a comprehensive protocol is the next critical step. A protocol serves as a detailed roadmap for the systematic review, outlining every step of the process before any studies are identified. This pre-registration of the protocol enhances transparency and minimizes the risk of reporting bias. Protocols should be registered with platforms such as PROSPERO to ensure public access and prevent duplication of efforts.

Key elements to include in your systematic review protocol:

- **Background:** Briefly state what is known about the topic and why the review is needed.
- **Objectives:** Clearly articulate the primary and secondary objectives of the review, directly linked to the research question.
- **Eligibility Criteria:** Define inclusion and exclusion criteria for studies based on participants, interventions, comparators, outcomes, study designs, and timeframes.
- **Search Strategy:** Detail the databases to be searched, keywords, and search syntax.
- **Study Selection:** Describe the screening process (e.g., title/abstract screening, full-text review) and how conflicts will be resolved.
- **Data Extraction:** Specify what data will be extracted from eligible studies and the tool/form to be used.

- **Risk of Bias Assessment:** Outline the tools and methods for assessing the methodological quality or risk of bias in included studies.
- **Data Synthesis:** Explain how the findings will be synthesized (e.g., narrative synthesis, meta-analysis) and how heterogeneity will be addressed.
- **Reporting:** Indicate adherence to reporting guidelines like PRISMA.

Systematic Search Strategy Development

A thorough and reproducible search strategy is paramount to identifying all relevant studies and minimizing publication bias. This involves identifying appropriate databases, selecting relevant keywords, and constructing sophisticated search strings. The goal is to cast a wide net without being overwhelmed by irrelevant results. Collaboration with an experienced librarian or information specialist is highly recommended at this stage to optimize the search.

The search strategy must be explicitly documented within the literature review section of your systematic review. This includes the names of all databases searched (e.g., PubMed, Embase, CINAHL, Web of Science), the full search strings used for each database, any limits applied (e.g., date ranges, language), and the date the searches were conducted. It is also good practice to search grey literature (e.g., conference proceedings, dissertations, government reports) and reference lists of included studies to ensure comprehensiveness.

Key considerations for developing a robust search strategy:

- **Database Selection:** Choose databases relevant to your field and research question.
- **Keywords and Synonyms:** Brainstorm a comprehensive list of keywords, including MeSH terms (Medical Subject Headings), entry terms, and free-text terms. Consider different spellings (e.g., British vs. American English) and acronyms.
- **Boolean Operators:** Use AND, OR, NOT effectively to combine search terms.
- **Truncation and Wildcards:** Employ symbols like `*` or `?` to capture variations of words.
- **Proximity Operators:** Use operators like NEAR or ADJ to specify the closeness of terms.
- **Pilot Search:** Conduct a pilot search to refine your strategy and ensure it captures known relevant studies while minimizing irrelevant ones.

Screening and Selection of Studies

Following the execution of the systematic searches across multiple databases, a large number of potentially relevant studies will be retrieved. These studies must then undergo a

rigorous screening and selection process according to the pre-defined eligibility criteria outlined in your protocol. This phase typically involves two main stages to ensure accuracy and reduce human error.

The first stage involves screening titles and abstracts. All retrieved records are uploaded to a reference management software or a specialized systematic review platform (e.g., Covidence, Rayyan) to remove duplicates. Two independent reviewers then screen the remaining titles and abstracts against the inclusion/exclusion criteria. Each reviewer decides whether to include, exclude, or mark as "maybe" for full-text retrieval. Discrepancies between reviewers are resolved through discussion, and if necessary, by a third reviewer.

The second stage involves full-text review. All studies that passed the title and abstract screening are retrieved in full. Again, two independent reviewers meticulously read the full texts of these articles to determine their eligibility for inclusion in the systematic review. This stage often leads to further exclusions as more detailed information becomes available. Reasons for exclusion at the full-text stage must be meticulously documented and ideally presented in a PRISMA flow diagram, which visually represents the entire study selection process.

Data Extraction and Quality Appraisal

For all studies deemed eligible and included in the systematic review, the next crucial step is data extraction. This involves systematically collecting relevant information from each study using a pre-designed data extraction form. This form should be piloted with a few studies to ensure its comprehensiveness and ease of use. Data extraction should ideally be performed by two independent reviewers to minimize errors and ensure consistency.

Data to be extracted typically includes:

- **Study Characteristics:** Author, year of publication, country, study design, aims/objectives.
- **Participant Characteristics:** Sample size, demographics (age, gender, ethnicity), health conditions.
- **Intervention/Exposure Details:** Type, duration, dosage, delivery method.
- **Comparator Details:** Nature of the control or comparison group.
- **Outcome Measures:** Specific outcomes assessed, measurement tools, units, time points.
- **Key Findings:** Quantitative data (e.g., means, standard deviations, effect sizes) or qualitative themes.

Simultaneously with data extraction, or immediately thereafter, a critical appraisal of the included studies' methodological quality or risk of bias must be conducted. This step is vital for understanding the trustworthiness and reliability of the evidence. Various validated tools are available depending on the study design. For randomized controlled trials, the Cochrane

Risk of Bias tool is commonly used. For observational studies, tools like ROBINS-I or the Newcastle-Ottawa Scale are appropriate. Qualitative studies might use tools like CASP checklists.

Independent assessment by two reviewers is crucial for quality appraisal, with discrepancies resolved through discussion or by a third reviewer. The findings from the quality appraisal will inform the synthesis and interpretation of results, potentially influencing the strength of the recommendations derived from the systematic review.

Synthesizing and Presenting Findings

Once data has been extracted and critically appraised, the next major challenge is to synthesize the findings from diverse studies into a coherent and meaningful whole. The method of synthesis depends heavily on the nature of the included studies and the research question. If studies are sufficiently homogenous in terms of population, intervention, comparator, and outcome, and their data allow, a meta-analysis may be conducted. This statistical technique combines results from multiple studies to produce a single pooled estimate of effect.

However, if studies are too diverse (heterogeneous) for a meta-analysis, a narrative synthesis or qualitative synthesis approach is often employed. A narrative synthesis systematically describes and summarizes the findings of the included studies, identifying patterns, consistencies, and inconsistencies across studies. This involves grouping studies by themes, interventions, or outcomes and discussing their main contributions. Tables and figures are invaluable at this stage for presenting key characteristics and findings of individual studies in an accessible format.

The presentation of findings should be structured logically, often following the order of the outcomes identified in the research question. It is important to transparently report the results of the quality appraisal, highlighting any studies with a high risk of bias and discussing how this might affect the overall conclusions. The systematic review's literature component acts as the narrative space where these complex findings are distilled and explained.

Structuring the Literature Review for a Systematic Review

When writing the literature review for a systematic review, the structure differs significantly from a traditional essay. It's not merely an overview of existing knowledge, but a detailed account of the systematic process and its outcomes. The overall systematic review document itself contains what would traditionally be considered a "literature review" within its methodology and results sections, contextualized by a brief introduction.

The introduction section of the systematic review sets the stage, providing background on the research problem and the rationale for conducting the review. It culminates in stating the precise research question. The methodology section then becomes the heart of the "literature review" in a systematic context, detailing every step taken to identify and synthesize the evidence.

Within the methodology, you will describe:

- **Search Strategy:** The databases, keywords, and search strings used.
- **Study Selection Process:** How studies were screened and reasons for exclusion.
- **Data Extraction:** The process and variables extracted.
- **Quality Appraisal:** The tools used and how bias was assessed.
- **Data Synthesis:** The methods employed to combine or summarize findings.

The results section then presents the findings systematically. This includes the PRISMA flow diagram, characteristics of included studies (often in tables), the risk of bias assessment for each study, and the synthesized results, whether through meta-analysis or narrative synthesis. This clear, step-by-step reporting ensures transparency and reproducibility, which are core tenets of systematic reviews.

Crafting a Cohesive and Impactful Narrative

Despite the rigid structure and methodological precision required, the literature review component of a systematic review still needs to tell a cohesive and impactful story. The goal is not just to present data but to interpret it meaningfully in response to the research question. The discussion section is where this narrative truly comes to life.

In the discussion, you should:

- **Summarize Main Findings:** Briefly reiterate the most important results related to your research question.
- **Interpret Findings:** Explain what your results mean in the context of existing literature. Do they confirm, contradict, or extend previous research?
- **Discuss Strengths and Limitations:** Acknowledge the strengths of your systematic review (e.g., comprehensiveness of search, rigorous methodology) and its limitations (e.g., quality of included studies, potential for publication bias).
- **Consider Clinical or Policy Implications:** Discuss how your findings might impact practice or policy.
- **Suggest Future Research:** Identify gaps in the literature that your review uncovered and propose directions for future studies.

The conclusion should provide a concise summary of the primary findings and their significance. Maintain a professional and objective tone throughout, ensuring that the narrative flows logically from one section to the next, building a clear and convincing argument based on the synthesized evidence. Visual aids such as forest plots for meta-analyses or summary tables for narrative syntheses can significantly enhance the clarity and impact of your narrative.

Ethical Considerations and Reporting Standards

Ethical conduct is paramount in all research, including systematic reviews. This primarily involves ensuring transparency, avoiding plagiarism, and acknowledging all sources appropriately. While systematic reviews typically do not involve direct human or animal subjects, adhering to ethical principles ensures the integrity and trustworthiness of the synthesized evidence.

Adherence to established reporting standards is crucial for enhancing the transparency, completeness, and reproducibility of your systematic review. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement is the widely accepted guideline for reporting systematic reviews. Using the PRISMA checklist helps ensure that all essential components, from the abstract to the discussion, are adequately addressed. Similarly, the PRISMA flow diagram is indispensable for illustrating the flow of studies through the review process.

Other ethical considerations include proper citation of all sources, giving credit to original authors, and transparently reporting any conflicts of interest. The goal is to produce a review that is not only methodologically sound but also ethically responsible, contributing to the collective scientific knowledge in a credible manner.

Refinement and Revision

The process of writing a literature review for a systematic review is iterative, involving multiple rounds of refinement and revision. After completing the initial draft, it is highly beneficial to seek feedback from co-authors, supervisors, and potentially external experts. A fresh pair of eyes can often spot inconsistencies, ambiguities, or areas where clarity can be improved.

During the revision phase, pay close attention to:

- **Clarity and Cohesion:** Ensure the arguments flow logically and the language is clear and concise.
- **Accuracy:** Double-check all reported data, citations, and methodological details against the original sources.
- **Adherence to Protocol:** Verify that the final review aligns with the pre-registered protocol, and clearly explain any deviations.
- **Completeness:** Confirm that all sections required by PRISMA or other relevant reporting guidelines are present and adequately addressed.
- **Grammar and Style:** Proofread carefully for any grammatical errors, typos, or awkward phrasing.

This final stage of refinement is critical for polishing the systematic review into a publication-ready manuscript. A well-written, thoroughly revised, and rigorously presented literature review significantly enhances the impact and credibility of your systematic review, ensuring its contribution to evidence-based practice and future research.

FAQ Section

Q: What is the primary difference between a traditional literature review and one for a systematic review?

A: The primary difference lies in their methodology and scope. A traditional literature review often involves a narrative, subjective summary of existing literature, selectively choosing studies and potentially reflecting researcher bias. In contrast, a literature review for a systematic review is highly structured, follows a predefined protocol, employs systematic search strategies, and critically appraises all eligible evidence to answer a specific research question, minimizing bias and ensuring reproducibility.

Q: Why is a protocol essential for a systematic review's literature component?

A: A protocol is essential because it serves as a detailed, pre-specified plan outlining every step of the systematic review process before any data collection begins. This commitment to a plan enhances transparency, minimizes the risk of selective reporting or outcome switching, and reduces bias. Registering the protocol (e.g., with PROSPERO) further ensures public access and prevents unintentional duplication of efforts.

Q: How do I ensure my systematic search strategy is comprehensive?

A: To ensure comprehensiveness, develop a robust search strategy that includes searching multiple relevant databases (e.g., PubMed, Embase, CINAHL), utilizing a broad range of keywords and their synonyms, employing Boolean operators, truncation, and proximity operators effectively. Additionally, searching grey literature, hand-searching reference lists of included studies, and consulting with an information specialist are crucial steps.

Q: What is the PRISMA flow diagram, and why is it important?

A: The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram is a visual tool that illustrates the flow of studies through the systematic review process. It details the number of records identified, screened, assessed for eligibility, and finally included in the review, along with reasons for exclusion at each stage. It is important because it provides a clear, transparent, and reproducible summary of the study selection process, enhancing the review's credibility and allowing readers to understand how studies were identified and chosen.

Q: What is the role of quality appraisal (risk of bias assessment) in a systematic review?

A: Quality appraisal, or risk of bias assessment, evaluates the methodological rigor and trustworthiness of each included study. It identifies potential flaws in study design or execution that could lead to biased results. The role is critical because it helps in understanding the reliability of the evidence, informing the synthesis of findings, and influencing the strength of the conclusions drawn from the systematic review. Studies with a high risk of bias may lead to less confident recommendations.

Q: Can a systematic review include qualitative studies, and how would its literature review differ?

A: Yes, a systematic review can include qualitative studies; this is often referred to as a "qualitative systematic review" or "meta-synthesis." The literature review component would differ primarily in its data extraction and synthesis methods. Instead of extracting quantitative data for meta-analysis, the focus would be on extracting qualitative themes, concepts, and interpretations. Synthesis methods like thematic synthesis or meta-ethnography would be employed to generate new conceptual understandings from the aggregated qualitative findings, using appropriate quality appraisal tools for qualitative research (e.g., CASP checklists).

Q: How do I handle conflicting findings among studies in a systematic review?

A: Handling conflicting findings is a common challenge. In the synthesis section, you should transparently report and discuss these inconsistencies. Investigate potential sources of heterogeneity, such as differences in study populations, interventions, outcome measures, study designs, or methodological quality (risk of bias). It may be appropriate to perform subgroup analyses or sensitivity analyses if possible, or to explain why a meta-analysis was not feasible due to significant heterogeneity. The discussion should carefully interpret conflicting results and their implications for the overall conclusions.

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