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A guide for accounting researchers to conduct and report systematic literature reviews

A Guide for Accounting Researchers to Conduct and Report Systematic Literature Reviews

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Abstract: Literature reviews can potentially contribute to our knowledge and understanding of a particular topic. However, consistent with anecdotal evidence, we document that literature reviews in auditing are of low quality in implementing best practice guidelines for conducting and reporting systematic reviews. We rely on existing guidelines and best practices in other domains to offer accounting researchers a step-by-step guide for conducting and reporting systematic literature reviews. We hope this guide will help to improve the quality of literature reviews in accounting and the assessment of such reviews by editors and reviewers.

Keywords: Accounting research, Systematic review, literature review, meta-analysis, synthesis

I. INTRODUCTION

In this paper, we offer a roadmap for accounting researchers to conduct and report systematic literature reviews, based on existing guidelines and best practices. A systematic literature review "attempts to collate all the empirical evidence that fits pre-specified eligibility criteria in order to answer a specific research question. It uses explicit, systematic methods that are selected with a view to minimizing bias, thus providing more reliable findings from which conclusions can be drawn and decisions made" (Chandler et al. 2022, 1). Systematic reviews are essential because evidence from all available research studies, rather than the results of the largest or most recent study, should be driving our decision-making (e.g., research programs, policy recommendations). Therefore, systematic reviews are often considered the highest level of evidence for decision-making (e.g., Glasziou, Vandenbroucke, and Chalmers 2004; Gurevitch, Koricheva, Nakagawa, and Stewart 2018; Petticrew and Roberts 2006; Siddaway, Wood, and Hedges 2019). In the field of accounting, they are considered "a necessary and useful tool to the entire academic community" (Larrinaga and Stolowy 2019, 1) and are cited more often than other types of papers (Barrick, Mecham, Summers, and Wood 2019).

The extent to which literature reviews add to our knowledge about a particular topic depends, of course, on the quality of the review itself. Both as an editor and as a reviewer, the first author has noticed that literature reviews in accounting rarely seem to be up to date with current standards and best practices for such reviews. However, the authors of such papers are hardly to blame for this, given the paucity of attention to the methodology and methods of literature reviews in our doctoral training programs as well as the lack of guidance within accounting journals and the accounting community at large on conducting reviews. The *European Accounting Review* (EAR) issued a call for papers for literature reviews in accounting in 2018, for which 103 submissions were received. Since 2019, *Behavioral Research in Accounting* (BRIA) has indicated that they aim "to be the venue of choice for

literature reviews of underlying discipline theories." Likewise, the *Journal of Accounting Literature* (JAL) has been an obvious target for accounting researchers to publish literature reviews. However, neither EAR nor BRIA or JAL have offered any guidance on how to conduct and report a (systematic) literature review. The current paper aspires to be precisely that, a clear guide directed at accounting researchers with best practices to adhere to in conducting and reporting results from a systematic literature review.

This guide makes three important contributions to the accounting literature. First, we offer systematic guidance *to accounting researchers* on how to conduct and report systematic literature reviews. While there are extensive guidelines on systematic literature reviews outside of the field of accounting, accounting researchers are influenced mainly by what gets published in accounting journals and a few neighboring disciplines such as finance and economics (see, e.g., Oler, Oler, and Skousen 2010). Further, our guidance is specifically tailored to accounting researchers. As much as possible, the current guide offers recommendations and examples tailored to the specificities of our own research field. This should make it easier for accounting researchers to implement these recommendations.

Second, the current guide offers a roadmap for accounting researchers to conduct *and report* systematic literature reviews. To the best of our knowledge, two other articles already offer relevant guidance to accounting researchers: Massaro, Dumay, and Guthrie (2016) and Andiola, Bedard, and Hux (2017). Both articles provide helpful guidance for accounting researchers unfamiliar with conducting literature reviews. However, neither of these articles discusses important issues considered standard for reporting systematic literature reviews such as describing the results of the search and selection process. Compared to these two articles, the current paper offers updated and more detailed practical "how to" guidance, offering a step-by-step guide for accounting researchers conducting systematic reviews.

Third, our guide should be helpful to reviewers and editors and thus help to improve accounting journals' reviewing of literature reviews. We offer clear guidelines about what information a systematic review needs to report. Reviewers and editors can use these guidelines to evaluate if a review is systematic and non-biased. They can also use it to determine which information a review should include, ensuring transparency and enabling potential evaluation or replication by other researchers.

Our focus is on *systematic* literature reviews (i.e., a review of evidence with respect to a clearly formulated question, based on a systematic and explicit method to identify, select, and critically appraise relevant primary research). Due to their particular methodology, systematic reviews provide the best means to synthesize all available evidence regarding specific questions in an unbiased way.[1] More traditional, non-systematic reviews (i.e., a review that adopts a more informal or selective approach) are typically at higher risk of bias because decisions about how studies are searched for, selected, and integrated are not pre-specified or transparently described. For example, such a review may suffer from confirmation bias if the authors only search for, select, or cover studies that support a particular argument or theory. As a result, such non-systematic reviews generally provide limited knowledge about the *overall* evidence provided by a collection of studies regarding a specific research topic or question (i.e., the collective body of knowledge).[2]

In the remainder of this paper, we offer a step-by-step guide for conducting and reporting a systematic literature review (summarized in Table 1). For this, we rely extensively on existing

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[1] The rigor and transparency of the process are features the systematic review shares with practitioner focused research syntheses. However, the intent of systematic reviews is to produce and transmit knowledge within the academic community, while that of research syntheses is to communicate research-based knowledge (potentially embedded in systematic reviews) to the practitioner community (for detailed discussions of research syntheses in the context of accounting research, see Hoang, Luo, and Salterio 2022a, 2022b; Salterio, Hoang, and Luo 2021).

[2] Reviews that attempt to summarize the literature in a way that is not explicitly systematic can still be valuable in instances where the goal is not to synthesize the existing literature on a particular topic. For example, when the goal is to track the historical development of a certain concept (e.g., true and fair view, professional skepticism), to identify the most influential studies in a field, or to identify problems (e.g., weaknesses, controversies) with existing research. In such cases, the focus is not on assessing the overall evidence but on providing context and substance to the authors' general argument.

guidelines and best practices (e.g., Chandler et al. 2022; Page et al. 2021a, 2021b; Petticrew and Roberts 2006; Siddaway et al. 2019). Whenever necessary we adapt existing guidelines to make them adoptable and implementable by accounting researchers. Many existing guidelines and best practices for systematic reviews were developed in medical and health sciences research. Therefore, it is sometimes necessary to tailor existing guidelines and best practice advice to the specificities of our own research field. Furthermore, for illustrative purposes, we also offer a simplified example of a systematic literature review by assessing the extent to which literature reviews on financial auditing topics adhere to best practices for conducting and reporting systematic literature reviews. We identified 85 literature reviews on financial auditing published from 2000 to 2022. The number of published systematic reviews in financial auditing increased over time (Figure 1).

Consistent with anecdotal evidence, we document that literature reviews in financial auditing implement few best practices for reporting systematic reviews (e.g., mention the type of review in title and abstract, discuss eligibility criteria, define their search strategy and databases, provide information on study screening, assess study quality, identify all studies included in the review). Hence, we suggest that there is substantial room for improvement in the reporting quality of systematic reviews in our field. This does not necessarily imply that the way these reviews were conducted was low-quality. Reviewers and editors may ask authors to remove methodological information in an attempt to shorten a paper or may suggest "catchier" titles than titles that include "systematic review".[3] This is problematic because low reporting quality reduces the usefulness of literature reviews, as it makes it difficult for consumers of research to judge the quality of the review. Therefore, we hope that our guide will not only help accounting researchers to improve the way they conduct and report literature

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[3] We thank an anonymous reviewer for stressing this point.

reviews but will also make reviewers and editors better aware of what they should expect of such reviews.

II. A ROADMAP FOR SYSTEMATIC LITERATURE REVIEWS

In this section, we discuss the steps for undertaking a systematic literature review. We also illustrate each step through a simplified example of a systematic literature review on the use of literature reviews in the accounting literature.

Step 0: Understanding the Importance of Documentation

Conducting a systematic review is a complex process that involves many judgments. For example, as discussed in more detail in the next sections, authors need to decide on their eligibility criteria, search strategy, intended information sources, data selection and collection process, standards for assessing studies' quality and relevance, and synthesis method. To minimize the potential for bias in the review process (e.g., only including studies that fit a specific narrative), as far as possible, such judgments should be made in ways that do not depend on the findings of the studies included in the review. For example, authors' prior knowledge may influence their definition of the review's question, the choice of criteria for study eligibility, or their decisions about which populations or outcomes to consider. Therefore, authors should explicate their review's scope and methodological approach in advance (i.e., without detailed knowledge of the available studies) and document their explicit plan in a so-called review protocol (Moher et al. 2015).[4] Doing so reduces the impact of authors' potential biases, promotes transparency, and allows for potential peer review before the review is conducted.[5]

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[4] Authors can amend their protocol (e.g., broaden eligibility criteria), but all such changes should be tracked and dated (Shamseer et al. 2015).

[5] Ideally, the review protocol is also made publicly available before the start of the actual review (i.e., registered). This can be done by posting it on a public registry like the *Open Science Framework (OSF) Registries* (see Pieper and Rombey 2022). Appendix A reports the review protocol for our review example. We did not register our protocol because our review mainly serves illustrative purposes.

For readers to be able to judge the quality of a literature review, documentation of relevant information is essential. Detailed documentation should occur both before the review starts and after completion of the review. The most comprehensive guidance for the reporting of systematic reviews is provided by the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA).[6] PRISMA offers reporting guidelines for before the review starts and for completed reviews. We refer to the relevant PRISMA guidelines where appropriate.

Review protocols ideally describe in sufficient detail "the rationale and intended purpose of the review, and the planned methodological and analytical approach" (Shamseer et al. 2015, 2). In other words, a good protocol contains details about everything that can be planned before conducting the review. The *Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols* 2015 (PRISMA-P 2015) provides elaborate reporting guidelines for review protocols (for details, see Moher et al. 2015; Moher, Stewart, and Shekelle 2016; Shamseer et al. 2015). PRISMA-P 2015 offers a checklist for review protocols recommending the inclusion of information about 17 items relating to administrative details (e.g., author contact details), introduction (i.e., motivation and research question), and methods (e.g., search strategy).

Completed reviews should report sufficient details about their methods and results. The PRISMA 2020 statement provides extensive reporting guidelines for systematic reviews (for details, see Page et al. 2021a, 2021b). Whereas PRISMA-P helps authors before conducting their review (i.e., with their review protocol), PRISMA helps authors report their review appropriately after it has been conducted. The PRISMA 2020 statement offers a checklist for systematic reviews recommending including information about 27 items relating to administrative information (e.g., title, abstract), introduction, methods, results (e.g., study

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[6] The first reporting guidance for systematic reviews (the QUOROM Statement) dates from 1999. This guidance was updated and renamed to PRISMA in 2009. The PRISMA 2020 statement includes the most recent guidance. The PRISMA statement is currently the most widely endorsed and adopted set of reporting guidelines across various disciplines, as evidenced by its high citation impact and its adoption by over 200 scientific journals. Existing evidence suggests that the endorsement of PRISMA increases both methodological quality and the quality of reporting (e.g., Leclercq et al. 2019). For more information, see http://www.prisma-statement.org/

characteristics), discussion (e.g., policy implications), and other information (e.g., funding, competing interests).[7] The items of the PRISMA-P checklist largely overlap with those of the PRISMA checklist, so authors can transfer information relatively straightforwardly from their completed PRISMA-P checklist to their actual review to ensure compliance with PRISMA 2020.

For our simplified systematic review example, we include completed PRISMA-P 2015 and PRISMA 2020 checklists in Appendices B and C.[8]

Step 1: Defining the Question

The starting point of any systematic review is defining the question the review attempts to answer. A systematic review should address a clearly defined, important, and answerable research question to contribute substantially to our knowledge about a particular topic. Such questions can be very broad (e.g., what do we know about audit quality?) or narrow (e.g., how did the introduction of SOX affect competition in the U.S. audit market?).

The question addressed in a review impacts its scope, but a review addressing a quite broad question may still be narrow in scope (and vice versa). Apart from the review's question, the scope of a review is determined by boundary conditions such as the type of studies that are reviewed (e.g., behavioral experiments, archival studies), the types of outcomes (e.g., financial reporting quality, market reactions), or the type of populations (e.g., professional auditors, listed firms) considered relevant.

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[7] Additionally, authors are specifically referred to the *PRISMA 2020 abstract checklist* to ensure their abstract contains all relevant information (Page et al. 2021a).

[8] Templates of these checklists are available on the PRISMA statement website (http://www.prisma-statement.org). The PRISMA-P checklist can also be downloaded from the website of the journal *Systematic Reviews* (https://resource-cms.springernature.com/springer-cms/rest/v1/content/7121262/data/v4). The PRISMA 2020 checklist is included as an appendix in Page et al. (2021b) and also available as a web application (https://prisma.shinyapps.io/checklist).

For illustrative purposes, we address the following question: *To what extent do literature reviews on financial auditing topics adhere to best practices for conducting systematic literature reviews?*

Step 2: Specifying Eligibility Criteria

One of the primary features that distinguish a systematic review from other types of review is that the authors will justify a set of pre-specified eligibility criteria for the review in the context of a systematic review. That is, criteria that determine which studies will be included and which will be excluded from the review. Such criteria are also commonly known as inclusion and exclusion criteria (eligible studies meet the inclusion criteria and do not meet the exclusion criteria).

Eligibility criteria are defined in relation to the scope of the review. That is, the definition of the exact question to be addressed and its boundary conditions (e.g., types of studies, populations, outcomes) determine which studies will be included and excluded from the review. Criteria that are usually considered in this context include, but are not limited to, publication status, publication date, language, method or study design, populations or participants, location, and reported outcomes. The authors should justify any restrictions regarding publication status, publication date, language, etc.

In the context of accounting research, it will often be relevant for researchers to consider if there is a certain cutoff date that may define eligibility. For example, important regulatory changes (e.g., SOX, EU audit regulation) may make research from before a certain date less relevant for the review's question. Similarly, important regulatory or cultural differences may be a reason to restrict inclusion to studies within a particular context (e.g., the EU audit markets, managerial accountants in the U.S.).

Using our simplified example, Table 2 illustrates how to define eligibility criteria. Because our current review aims to illustrate the process of conducting a systematic literature review,

we focus specifically on published reviews. However, this should not be interpreted as a general endorsement of using publication status as an eligibility criterion. The use of publication status as a basis of eligibility is typically not recommended (e.g., Chan 2012; McKenzie, Brennan, Ryan, Thomson, Johnston, and Thomas 2022; Siddaway et al. 2019). In general, including unpublished studies reduces bias, so excluding such studies requires a compelling argument (for a more detailed discussion of searching for unpublished and "grey" literature, see Lefebvre et al. 2022; Page, Higgins, and Sterne 2022). Likewise, when resources and time allow it, including non-English studies in reviews is recommended to minimize the risk of language bias (e.g., Lefebvre et al. 2022; Petticrew and Roberts 2006, 235).

While it is common for accounting researchers to restrict their reviews to narrow sets of "leading" or "top" journals, we explicitly recommend against this practice because it potentially excludes many relevant studies, and systematic reviews should aim to be comprehensive (i.e., include all relevant evidence). Therefore, we recommend that authors include as many relevant studies in their reviews as possible, including unpublished ones. While including unpublished studies may raise concerns about quality among some accounting scholars, one can restrict the inclusion of working papers to those that meet certain formal criteria (cf. Harvey, Liu, and Zhu 2016), such as having been presented at a top accounting conference, having been cited by published papers, or being co-authored by at least one author who has published about the topic before.

Step 3: Searching the Literature

After specifying the eligibility criteria, authors need to define their search strategy, search databases, and select the studies to be included in their review. In general, it is advised to be as extensive as possible to reduce the risk of reporting bias and identify as much relevant evidence as possible (e.g., Lefebvre et al. 2022; Siddaway et al. 2019, 751). This includes searching through published resources such as journal articles and books (through bibliographic

databases such as *Web of Science*, *EBSCO*, *EconLit*, *RePEC*, or *SCOPUS*) and unpublished studies. There is no easy and reliable single way to obtain information about studies that have been completed but never published. However, authors can check repositories for preprints such as *SSRN* and *ResearchGate* and conference proceedings of relevant accounting conferences.

The first step in searching the literature is designing a search strategy. That is, determining the databases to be searched and the search terms to be used. When creating search terms, it is important to ensure that search terms are unambiguous (e.g., in our context, the term "review" is too broad because it results in identifying papers that are not literature reviews on financial auditing but papers about topics such as the audit review process or SEC reviews). At the same time, it is important to consider alternative terms and concepts (e.g., not just considering the term "literature review" but also "synthesis," considering "audit" as well as "auditing").[9] Creating the right search terms is about finding the right balance between sensitivity (finding as many potentially relevant papers as possible) and specificity (ensuring that these papers are relevant).[10] It is recommended to prioritize sensitivity in the early stages of the literature search to ensure no important studies are missed (e.g., Lefebvre et al. 2022; Siddaway et al. 2019, 757). Table 3 presents the search terms used for our review example.

To ensure that all relevant research is identified, it may be necessary to rerun searches at different points in time (to identify new research and/or in response to an update of the search terms).[11] Additionally, manual searches are recommended (e.g., by searches through the

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[9] If the database allows it, the most effective way to search for relevant studies is by using Boolean search strings (i.e., combinations of search keywords and search operators that allow you to narrow or broaden your search — such as AND, OR, NOT). See Gusenbauer and Haddaway (2020) for a detailed assessment of the suitability of different databases for conducting systematic reviews.

[10] To ensure the adequacy of the search strategy, it can be useful to have it reviewed by a specialist who is not part of the research team. Errors in search strategies (e.g., spelling errors, incorrect use of Boolean operators) are common (Sampson and McGowan 2006).

[11] It is recommended that after some initial search, the search results are inspected to assess if the search terms indeed yield relevant results and if the eligibility criteria need to be updated, preferably independently by two of the authors (e.g., Lefebvre et al. 2022; Siddaway et al. 2019).

references of key studies) to ensure the identification of all relevant studies and to minimize potential bias (e.g., Lefebvre et al. 2022; Petticrew and Roberts 2006, 101-102; Siddaway et al. 2019). Authors should carefully document their search process and report about it in sufficient detail in their review to allow for reproducibility (e.g., document when each source was last searched).

In the next step, the authors search the databases to identify and collect the studies for their review. Each database is searched individually for all search terms. Afterward, search results obtained from searching through different databases and from using different search terms are merged, and duplicates are removed. In our example, the third and fourth authors of this paper comprehensively searched through the *Social Sciences Citation Index* (SSCI) in *Web of Science* (WoS) and *EBSCO* in April 2022. These electronic searches resulted in the identification of respectively 158 and 528 records. After removing 85 duplicates, 601 potentially relevant records remained for screening.

Step 4: Screening and Selecting Studies

After having identified all potentially relevant studies, authors need to screen all such studies and select the ones to be included in their review.[12] First, authors should screen the titles and abstracts of each article to determine if it is relevant to the research question, using the pre-specified eligibility criteria. Studies that meet the exclusion criteria are removed. All other studies need to be obtained ─downloaded, in most cases─ for full-text screening. Finally, the authors review all such papers for eligibility based on full-text screening and make a final decision about whether to include the study or not. To facilitate the exploration and filtering of searches and keep track of the screening and selection process, it is helpful to use a database or bibliographic software (e.g., Covidence, Rayyan, Zotero).

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[12] There is no requirement for a minimum number of articles to be included in a systematic literature review. In fact, several literature reviews in other fields have been published that did not identify any studies eligible for inclusion, commonly referred to as "empty reviews" (Yaffe, Montgomery, Hopewell, and Shepard 2012).

It is recommended that two separate review authors execute this screening and selection process independently (e.g., Lefebvre et al. 2022; Siddaway et al. 2019, 760).[13] Papers should only be included in the review if both authors agree, and the process for resolving disagreements between authors should be discussed in the review. The review should also report on the number of papers identified and excluded at each stage of screening and selection. Ideally, the results of the search and selection process are then described with a flow diagram (Lefebvre et al. 2022), such as the PRISMA flow diagram (Page et al. 2021b).[14]

In our example, the third and fourth author of this paper independently screened first the titles and abstracts of all 601 identified papers and excluded 499 records based on our eligibility criteria. Then, they retrieved the remaining 103 papers and screened their full-texts to identify all relevant studies (i.e., literature reviews on financial auditing topics).[15] The bibliographic software Zotero was used to this end. Discrepancies were discussed, if necessary, with the first and second author of this paper. We included five additional papers from the PCAOB Research Synthesis Project that fit our eligibility criteria but were not identified by our initial search.[16]

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[13] Systematic reviews are typically undertaken by a research team rather than by individual researchers. Such a research team should encompass both topical and methodological expertise. Having more than one author screen and select studies, collect data, and assess study quality minimizes the likelihood of bias and error and is therefore recommended (e.g., Lasserson, Thomas, and Higgins 2022; Petticrew and Roberts 2006). It is thus quite remarkable that single-authored reviews are common in the field of accounting; Endenich and Trapp (2016) report that half of the reviews published in 15 "leading" accounting journals during the period 1992–2011 were single-authored.

[14] Relevant documentation, as well as an R package and app to generate flow diagrams, are available on the PRISMA website (see also Haddaway et al. 2022).

[15] We excluded the reviews ($n = 13$) that clearly indicated that they did not intend to be comprehensive, stated a different goal (e.g., presenting a conceptual framework), or where it could not be determined with reasonable certainty that they intended to synthesize all available evidence (e.g., Francis 2004; Humphrey 2008; Nelson 2009). Even in such cases, however, formulating aims or clear questions and describing the literature search in detail is good practice (e.g., Baethge, Goldbeck-Wood, and Mertens 2019). None of the conclusions that we present here change if we include these reviews. Although it is recommended that papers clearly identify themselves as a systematic review in their title and abstract (e.g., the PRISMA 2020 statement), the reviews in our sample rarely did so (see Table 5), except for the meta-analyses.To determine if a review paper aimed to be a systematic review, we screened the titles, abstracts, and full-texts of all 93 literature reviews. We include all literature reviews in our sample that either explicitly self-identified as systematic reviews (e.g., by using the words *systematic review* or *meta-analysis*) or implicitly implied to be systematic reviews by explicitly stating to attempt to collate all the empirical evidence (by using formulations such as *synthesize* or *summarize* a specific body of literature, providing a *comprehensive* overview, or *review* the existing literature).

[16] The PCAOB Research Synthesis Project led to the publication of 23 academic papers. Our initial search identified fifteen of these papers, of which two did not meet our inclusion criteria because they focused on topics other than financial auditing (e.g., accounting firm culture). Of the eight additional papers that were not identified

Figure 2 shows a flow diagram that depicts our search and selection process, from the initial number of papers identified to the final number of studies included in our review. Our final sample consists of 85 English language literature reviews on financial auditing published between 2000 and 2022.

Step 5: Data Collection and Quality Assessment

When the studies to be included in the systematic review have been selected, the next step is to extract and summarize the necessary data from these studies using structured data collection forms. Data collection forms can be paper forms, electronic forms (e.g., Google Forms, Microsoft Access), or commercially or custom-built data systems (e.g., Covidence, EPPI-Reviewer, Systematic Review Data Repository (SRDR)) that allow online form building, data entry by several users, data sharing, and efficient data management (Li et al. 2015). For our current review example, we used a customized data collection form to collect the data and we stored our data in a Microsoft Access database.[17]

The following information needs to be collected and summarized for each study included in the review: Publication information (e.g., year, journal), important study design characteristics (e.g., randomized experiment, archival), the number and characteristics of participants (e.g., professional auditors, age, sex), the setting (e.g., U.S. listed firms), outcomes and results (e.g., estimates of effects). Funding sources of the study and potential conflicts of interest of the study authors can also be relevant to include. This information allows the authors to select the appropriate methods for assessment and analysis. It is recommended to describe the design of each study in a table "Characteristics of included studies" (e.g., Li, Higgins, and Deeks 2022; Petticrew and Roberts 2006, 121). Table 4 presents a simplified overview of the studies included in our example review.

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in our initial search, three did not meet our inclusion criteria because they were explicit in not being systematic reviews.

[17] Our data collection form and final dataset are publicly available:
https://osf.io/tcepk/?view_only=7e36efca15c64eed8faadafa7dc79048

Summarizing information for each study included in the review is also important for evaluating each study's evidence. While all studies included in the review will at least be somewhat relevant to the research question, not all studies are equal, and better studies provide results that, in some sense, are more valid or accurate than those from other studies. Hence, it is important to consider the strengths and weaknesses of the existing studies.

Evaluating study quality is a daunting task, but one that should not be avoided. It is important that a review be more than an exercise in "vote counting." Simply counting the number of studies that report a positive statistically significant effect, a negative statistically significant effect, or no statistically significant effect is not just useless; it is even misleading because it does not account for sample size (power) or other issues introducing bias. Such an approach is, therefore, strongly discouraged (see, e.g., Light and Smith 1971).

A first step in assessing study quality is to ensure a study has not been retracted. Data and findings from retracted studies are unreliable, thus the inclusion of retracted studies threatens the integrity of the systematic review. To identify retracted studies, authors can, for example, consult the *Retraction Watch Database* (RWdb, www.retractionwatch.com).

Next, it is important to consider if the certainty of a study's results are potentially threatened by problems related to internal validity (e.g., selection bias), external validity (e.g., small non-random samples), measurement issues (e.g., the use of proxies rather than direct measurement, uncertainty about the validity of used measures), uncertainty and imprecision of effect estimates (e.g., wide confidence intervals, small samples), or potential selective reporting.[18] While such assessments unavoidably entail subjectivity, this should not entirely prevent authors from making such assessments. Without an assessment of some sort of individual study quality, an evaluation of the overall amount of evidence to support any

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[18] At this point, authors should be careful that they avoid the common mistake of confusing "no evidence of an effect" with "evidence of no effect" (Cready et al. 2022).

conclusions about the question under investigation is simply impossible. To increase the reliability of these assessments, we recommend that two authors of the review independently assess each study using a set of pre-specified criteria (the intra-class correlation coefficient or Cohen's kappa can then be computed to capture inter-rater agreement).[19]

Step 6: Reporting the Results

The next step of the systematic review is to integrate the results of all identified studies and to comprehensively report all necessary information. We do not offer a detailed discussion about using the data that make up the product of the systematic review because there are different, specialized customs and methods for doing so. For example, if feasible, one can use meta-analysis (i.e., the statistical combination of results from separate studies) to analyze results from primary studies.[20] Other methods, however, need to be considered if, for example, there are insufficient studies available that have used the same outcome measure or if there are incomplete data in the primary studies. However, even if it is impossible to analyze the data through meta-analysis, the systematic review can still be conducted using the same replicable, rigorous, and transparent methodology (McKenzie and Brennan 2022). We refer the interested reader to core texts in each specialty for more information (for quantitative meta-analysis, see, e.g., Borenstein et al. 2021; Schmid, Stijnen, and White 2020; for qualitative meta-analysis or meta-synthesis, see, e.g., Finfgeld-Connett 2018; Malterud 2019).

As noted earlier (see Figure 1), the total number of systematic reviews has increased over time, with just 21 published reviews between 2000 and 2011 but 64 since then. However, the overall number of systematic literature reviews is low. For example, less than 1 percent of all

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[19] There are currently many checklists and other tools available to assess medical and health sciences research, but few (if any) of such tools to assess economic or social sciences research. However, the Joanna Briggs Institute (JBI) provides checklists for the critical appraisal of most types of studies: https://jbi.global/critical-appraisal-tools

[20] Although sometimes used interchangeably, the term meta-analysis is narrower than the term systematic review. A meta-analysis is a systematic review that uses particular statistical techniques to extract and combine data from different studies into a single estimate or summary result. While meta-analyses are a useful tool, they are not a panacea (for some critical discussion, see, e.g., Ioannidis 2016).

papers published in *Auditing: A Journal of Practice & Theory*, outside of their 2013 supplement issue, were systematic literature reviews.[21] The majority of reviews are also published in relatively lower prestige journals (22/85 [26 percent] were published in journals with A* classification in the Australian Business Deans Council (ABDC) ranking versus 63/85 [74 percent] in journals with lower rankings).[22]

For our example, we analyzed the extent to which literature reviews on financial auditing topics adhered to best practices for reporting systematic literature reviews (Table 5). Generally, we observe low implementation of best practices in systematic literature reviews in financial auditing. Most literature reviews clearly identified a question they aimed to answer (66/85 [78 percent]), but rarely did they mention the type of review (e.g., systematic literature review, meta-analysis) in either title (17/85 [20 percent]) or abstract (19/85 [22 percent]). Reference to methodological or reporting guidelines (e.g., PRISMA) was only made by 15/85 [18 percent] of reviews. Eligibility criteria are generally not extensively discussed, with 35/85 [41 percent] of reviews not reporting if unpublished studies were included or not (and only 19/85 [22 percent] of studies explicitly mentioning the inclusion of unpublished studies) and only 4 studies reporting that only English language studies were included. A little more than half of the reviews reported on the database(s) that were searched for review. Years of coverage of the search were only completely reported in 36/85 [42 percent] of the reviews, and most reviews (44/85 [52 percent]) did not report any information about the search terms that were used (only 14/85 [16 percent] of reviews reported a full Boolean search logic). Most reviews lacked any information on how authors performed screening (67/85 [79 percent]), selected studies (51/85 [60 percent]), or assessed study quality (82/85 [97 percent]). If certainty of evidence was

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[21] In 2013, *Auditing: A Journal of Practice & Theory* published a supplement issue containing 11 papers from the PCAOB Research Synthesis Project.

[22] To the best of our knowledge, the number of literature reviews published in different scientific fields is unknown, but we offer the following numbers for some context: about 14 percent of all articles in entrepreneurship are literature reviews (McDonald, Gan, Fraser, Oke, and Anderson 2015) and about 15 percent (4 percent) of all biomedical research nowadays takes the form of a (systematic) review (Ionnadis 2016).

assessed, authors most often relied on either statistical significance (16/85 [19 percent], including 14/15 [93 percent] meta-analyses) or subjective rules (15/85 [18 percent]). Publication bias is typically considered in meta-analyses (13/15 [87 percent]), but hardly ever in other types of literature reviews (2/70 [3 percent]).[23] Approximately a quarter of the reviews (22/85 [26 percent]) in our sample did not clearly identify all studies included in their review.

Reviews published in more prestigious journals (identified as those with an A* classification in the ABDC ranking) do a somewhat better job of clearly defining the question addressed by their review (20/22 [90 percent]), but do not differ much in any other respect from other published systematic literature reviews.

Step 7: Discussing Implications and Limitations

The final step of a systematic literature review is placing the results in a broader context and discussing the limitations of the review process and the evidence.

Literature reviews have become an integral part of the academic accounting literature. Yet, there is limited guidance in the accounting literature on systematic reviews, and reporting practices in accounting seem to lag behind best practices in other scientific fields. This is unfortunate because best practices, such as the PRISMA reporting guidelines, are widely available and broadly accepted in other scientific domains. Our analysis of systematic literature reviews in the field of auditing confirms that there is considerable room for improvement in the way that literature reviews are conducted and reported in accounting research (e.g., mention the type of review in title and abstract, discuss eligibility criteria more extensively discussed).

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[23] Overall, the meta-analyses in our sample adhered better to established methodological guidelines than the other literature reviews in our sample. At the same time, there seems to be room for improvement in the reporting of meta-analyses in accounting as well. For example, publication bias was often (9/15 [60 percent]) assessed by means of a *failsafe N* method or so-called "file-drawer" analysis (e.g., Rosenthal's [1979] approach); namely, an analysis that tries to calculate how many unpublished, non-significant results would need to be added to a meta-analysis to change its overall result. However, it has long been argued that these methods should be abandoned because of their questionable statistical assumptions, among other things. Therefore, researchers should use more informative analyses, including graphical diagnostics such as the funnel plot, which is the primary (visual) tool for investigation of publication and other biases in meta-analyses. Only one meta-analysis in our sample reported a funnel plot. We refer to Rothstein, Sutton, and Borenstein (2005) for detailed information on methods for assessing publication bias in meta-analysis.

In this paper, we provide a roadmap that guides accounting scholars to conduct and report high-quality systematic literature reviews. Improving the quality of literature reviews in accounting should substantially enhance their potential contribution.

Of course, the accounting literature already contains literature reviews that largely followed best practices, both in conducting and reporting their review. For some good examples, we refer the reader to the studies by Andiola, Downey, and Westermann (2020) and Meredith, Blake, Baxter, and Kerr (2020), for systematic reviews, and to Hay (2013) and Khan and Oczkowski (2021) for meta-analyses.

There are also some limitations to our paper. Our reported results offer only partial insights into the current state of literature reviews in accounting. The purpose of our review was primarily illustrative, so we purposely limited our scope and do not claim to offer a comprehensive picture of how accounting researchers conduct and report their literature reviews. Specifically, we focused on published articles in English in the field of financial auditing. Thus, other systematic reviews in accounting, not included in our current study, might adhere better to methodological standards for systematic literature reviews. Future research could conduct a systematic review using wider inclusion criteria to provide a comprehensive picture of the state of systematic literature reviews in the field of accounting. Additionally, we observed that few studies included the words "systematic literature review" in their title or abstract. We addressed this by implementing a more comprehensive search strategy that also captured more subtle or indirect indications about the systematic nature of the literature review. Nonetheless, it is possible that our search strategy failed to identify all literature reviews on financial auditing topics. Finally, assessing the quality of how reviews are conducted is difficult. We can only observe what is being reported and not how authors actually conducted their review. We may underestimate the quality of how reviews in accounting are conducted due to low reporting quality—of course, low reporting quality undermines the usefulness of a

review. Furthermore, some of that low reporting quality may result from requests from reviewers and editors rather than from how authors conducted their review. One important implication of our findings is thus that reviewers and editors in our field should uphold higher standards of reporting quality for literature review.

III. Conclusion

A literature review should provide guidance to the academic community about what has been done (i.e., synthesizing the existing body of evidence) and what is yet to be done (i.e., avenues or suggestions or an agenda for future research) with regard to a specific topic or question. A high-quality review adopts a transparent, reliable, and comprehensive method to search for, select, and integrate primary research ─ its approach is *systematic*.

In this paper, we offer accounting researchers a step-by-step guide for conducting and reporting systematic literature reviews. We hope this guide will help to improve the quality of literature reviews in accounting and the assessment of such reviews by editors and reviewers. We also encourage accounting journals to develop editorial policies around literature reviews (e.g., requiring the use of PRISMA checklists).

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Figure 1: Published literature reviews on financial auditing per year (2000–2022) (*N =* 85)
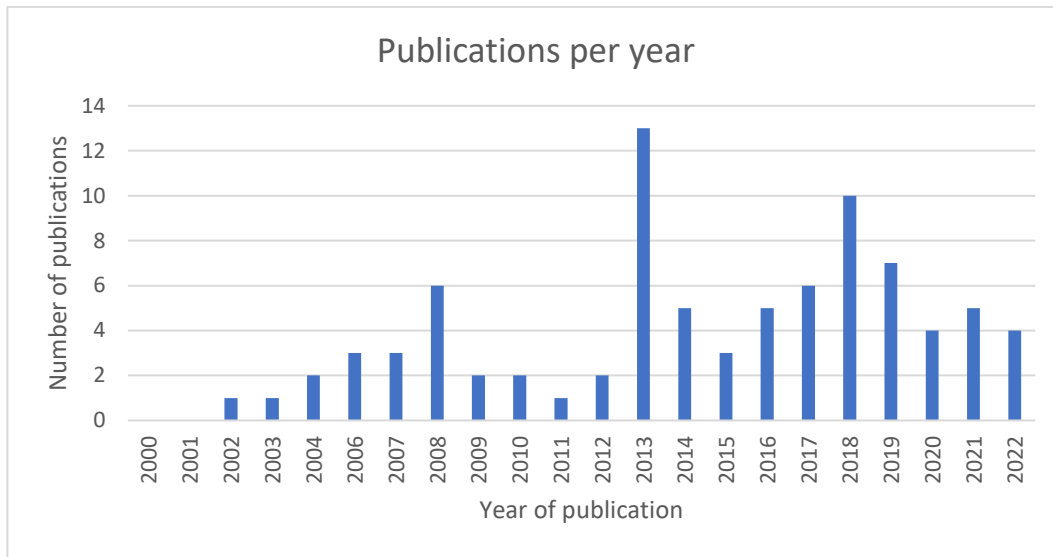
This figure shows the number of published literature reviews on financial auditing topics over the period 2000–2022. These reviews were identified by searching through the *Social Sciences Citation Index* (SSCI) in *Web of Science* (WoS) and *EBSCO* in April 2022.

Figure 2: Flow diagram of identifying, screening, and including financial auditing reviews
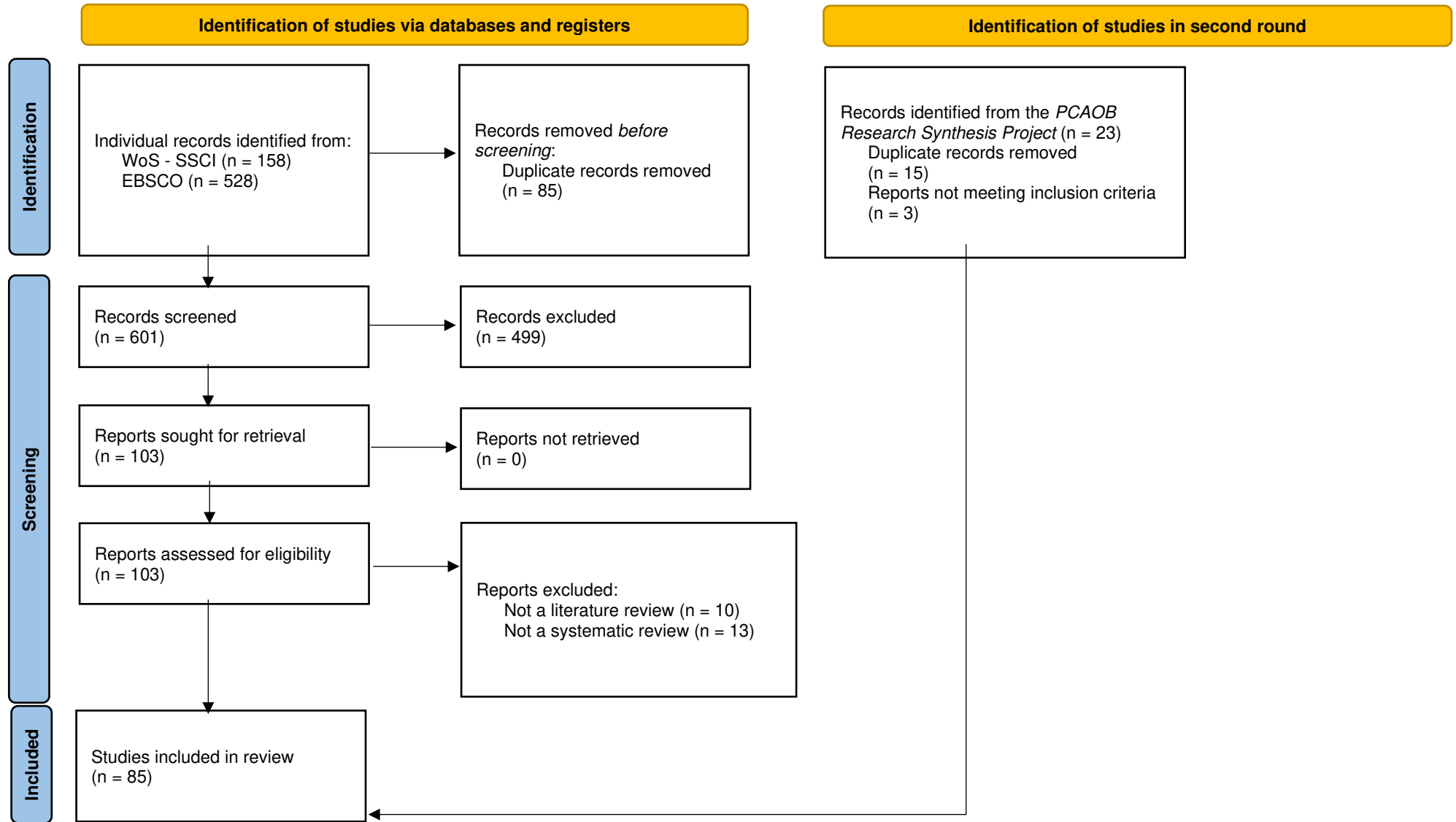
Table 1: A roadmap for systematic literature reviews

Steps for undertaking a systematic review	Useful documentation
Step 1: Defining the Question	PRISMA-P checklist for review protocols: https://prisma-statement.org/Extensions/Protocols
Step 2: Specifying Eligibility Criteria	
Step 3: Searching the Literature	
Step 4: Screening and Selecting Studies	PRISMA flow diagram: https://prisma-statement.org/ PRISMAStatement /FlowDiagram
Step 5: Data Collection and Quality Assessment	Retraction Watch Database listing retractions and corrections: http://retractiondatabase.org/ Checklists for the critical appraisal of most types of studies: https://jbi.global/critical-appraisal-tools
Step 6: Reporting the Results	PRISMA checklist: https://prisma-statement.org/PRISMAStatement/Checklist
Step 7: Discussing Implications and Limitations	

This table summarizes the different steps for conducting and reporting a systematic literature review in adherence with current standards and best practices. The table also identifies some useful documentation that facilitates high-quality reporting of systematic literature reviews.

Table 2: Eligibility criteria for review of literature reviews on financial auditing topics

Category	Inclusion	Exclusion	Justification
Review question	Literature reviews about financial auditing topics	Financial auditing papers that are not reviews Reviews about other topics	Our focus is on systematic literature reviews. For practical purposes, we restrict the scope of our review to literature studies on *financial auditing*
Study design	Systematic reviews	Primary studies Theoretical papers Methodological papers Non-systematic reviews	Our focus is on systematic literature reviews, so we exclude all papers that are not literature reviews We exclude reviews that clearly self-identify as non-systematic We include reviews either explicitly self-identifying as systematic (e.g., meta-analyses) or implicitly implying to be systematic
Publication status	Published studies	Unpublished studies	We only consider published reviews because the goal of our review is primarily illustrative
Publication year	2000-2022	Publications before 2000	Bibliographic databases typically do not have full-text search capabilities for publications before 2000 The first reporting guidelines for systematic reviews (the QUOROM Statement) were published in 1999
Language	English	Languages other than English	We focus on studies in English because the goal of our review is primarily illustrative

This table displays the inclusion and exclusion criteria applied for the current study's review. The table also briefly summarizes the justification of each criterion.

Table 3: Search terms

Panel A: Search strings and limiters	
EBSCO (Business Source Complete)	**Search string:** SU(audit* AND "[Search term]") OR AB(audit* AND "[Search term]") OR TI(audit* AND "[Search term]") **Limiters:** Published Date: 20000101-20221231; Publication Type: Academic Journal; Language: English
WoS (Social Sciences Citation Index)	**Search string:** (TS=(audit* AND "[Search term]") OR AB=(audit* AND "[Search term]") OR TI=(audit* AND "[Search term]") AND (WC= "Operations Research & Management science" OR WC= "Business, Finance" OR WC= "economics" OR WC= "management") AND PY=(2000-2022) **Limiters:** Publication Type: Academic Journal
Panel B: Search terms	
Literature review	
Paper review	
We review	
Synthesis	
Meta analy*	
Meta regress*	
Systematic review	
This study reviews	
This article reviews	
This paper reviews	
This study systematically reviews	
Review and framework	
Literature study	
Literature analysis	
A review of (only included in WoS search as EBSCO ignores stop words such as *a* and *of*)	

This table shows the search strings and limiters used to perform our database searches (Panel A) and the specific search terms used in the search strings (Panel B).

Table 4: Characteristics of included studies

Year	Authors	Title	Journal	ABDC	PCAOB	Meta-analysis
2002	DeZoort, F. T., D. R. Hermanson, D. S. Archambeault, and S. A. Reed	Audit committee effectiveness: A synthesis of the empirical audit committee literature	Journal of Accounting Literature	A	☐	☐
2003	Solomon, I., and K. T. Trotman	Experimental judgment and decision research in auditing: The first 25 years of AOS	Accounting, Organizations & Society	A*	☐	☐
2004	Watkins, A. L., W. Hillison, and S. E. Morecroft	Audit quality: A synthesis of theory and empirical evidence	Journal of Accounting Literature	A	☐	☐
2004	Turley, S., and M. Zaman	The corporate governance effects of audit committees	Journal of Management & Governance	C	☐	☐
2006	Allen, R. D., D. R. Hermanson, T. M. Kozloski, and R. J. Ramsay	Auditor risk assessment: Insights from the academic literature	Accounting Horizons	A	☒	☐
2006	Martin, R. D., J. S. Rich, and T. J. Wilks	Auditing fair value measurements: A synthesis of relevant research	Accounting Horizons	A	☒	☐
2006	Hay, D. C., W. R. Knechel, and N. Wong	Audit fees: A meta-analysis of the effect of supply and demand attributes	Contemporary Accounting Research	A*	☐	☒
2007	Cohen, J., L. M. Gaynor, G. Krishnamoorthy, and A. M. Wright	Auditor communications with the audit committee and the board of directors: Policy recommendations and opportunities for future research	Accounting Horizons	A	☒	☐
2007	Gordon, E. A., E. Henry, T. J. Louwers, and B. J. Reed	Auditing related party transactions: A literature overview and research synthesis	Accounting Horizons	A	☒	☐
2007	Schneider, A., and W. F. Messier	Engagement quality review: Insights from the academic literature	Managerial Auditing Journal	A	☒	☐
2008	Church, B. K., S. M. Davis, and S. A. McCracken	The auditor's reporting model: A literature overview and research synthesis	Accounting Horizons	A	☒	☐
2008	Bedard, J. C., D. R. Deis, M. B. Curtis, and J. G. Jenkins	Risk monitoring and control in audit firms: A research synthesis	Auditing: A Journal of Practice & Theory	A*	☒	☐
2008	Caster, P., R. J., Elder, and Janvrin D. J.	A summary of research and enforcement release evidence on confirmation use and effectiveness	Auditing: A Journal of Practice & Theory	A*	☒	☐
2008	Hogan, C. E., Z. Rezaee, R. A. Riley, U. K. Velury	Financial statement fraud: Insights from the academic literature	Auditing: A Journal of Practice & Theory	A*	☒	☐
2008	Pomeroy, B., and D. Thornton	Meta-analysis and the accounting literature: The case of audit committee independence and financial reporting quality	European Accounting Review	A*	☐	☒
2008	El-Masry, E. E., and K. A. Hansen	Factors affecting auditors' utilization of evidential cues: Taxonomy and future research directions	Managerial Auditing Journal	A	☐	☐
2009	Laurențiu, D., D. C. Liliana, and C. Daniela	A semiologic approach to audit expectations	Annals of the University of Oradea, Economic Science Series	NA	☐	☐
2009	Curtis, M. B., J. G. Jenkins, J. C. Bedard, and D. R. Deis	auditors' training and proficiency in information systems: A research synthesis	Journal of Information Systems	A	☐	☐
2010	Bédard, J., and Y. Gendron	Strengthening the financial reporting system: Can audit committees deliver?	International Journal of Auditing	A	☐	☐

Year	Authors	Title	Journal	Rating		
2010	Lin, J. W., and M. I. Hwang	Audit quality, corporate governance, and earnings management: A meta-analysis	International Journal of Auditing	A	☐	☒
2011	Kanellou, A., and C. Spathis	Auditing in enterprise system environment: A synthesis	Journal of Enterprise Information Management	A	☐	☐
2012	Habib, A	Non-audit service fees and financial reporting quality: A meta-analysis	Abacus-A Journal of Accounting Finance and Business Studies	A	☐	☒
2012	Ittonen, K.	Market reactions to qualified audit reports: Research approaches	Accounting Research Journal	B	☐	☐
2013	Ratzinger-Sakel, N. V. S., S. Audousset-Coulier, J. Kettunen, and C. Lesage	Joint audit: Issues and challenges for researchers and policy-makers	Accounting in Europe	A	☐	☐
2013	Asare, S., B. Fitzgerald, L. Graham, J. Joe, E. Negangard, and C. Wolfe	Auditors' internal control over financial reporting decisions: Analysis, synthesis, and research directions	Auditing: A Journal of Practice & Theory	A*	☒	☐
2013	Bame-Aldred, C., D. Brandon, W. Messier, L. Rittenberg, and C. Stefaniak	A summary of research on external auditor reliance on the internal audit function	Auditing: A Journal of Practice & Theory	A*	☒	☐
2013	Carson, E., N. Fargher, M. Geiger, C. Lennox, K. Raghunandan, and M. Willekens	Audit reporting for going-concern uncertainty: A research synthesis	Auditing: A Journal of Practice & Theory	A*	☒	☐
2013	Chung, J. O. Y., C. P. Cullinan, M. Frank, J. H. Long, J. Mueller-Phillips, D. M. O'Reilly	The auditor's approach to subsequent events: Insights from the academic literature	Auditing: A Journal of Practice & Theory	A*	☒	☐
2013	Elder, R., A. Akresh, S. Glover, J. Higgs, and J. Liljegren	Audit sampling research: A synthesis and implications for future research	Auditing: A Journal of Practice & Theory	A*	☒	☐
2013	Hurtt, R., H. Brown-Liburd, C. Earley, and G. Krishnamoorthy	Research on auditor professional skepticism: Literature synthesis and opportunities for future research	Auditing: A Journal of Practice & Theory	A*	☒	☐
2013	Knechel, W. R., G. Krishnan, M. Pevzner, L. Shefchik, and U. Velury	Audit quality: Insights from the academic literature	Auditing: A Journal of Practice & Theory	A*	☒	☐
2013	Mock, T. J., J. Bédard, P. J. Coram, S. M. Davis, R. Espahbodi, and R. C. Warne	The audit reporting model: Current research synthesis and implications	Auditing: A Journal of Practice & Theory	A*	☒	☐
2013	Trompeter, G., T. Carpenter, N. Desai, K. Jones, and R. Riley	A synthesis of fraud-related research	Auditing: A Journal of Practice & Theory	A*	☒	☐
2013	Hay, D.	Further evidence from meta-analysis of audit fee research	International Journal of Auditing	A	☐	☒
2013	Baatwah, S. R., Z. Salleh, and N. Ahmad	Whether audit committee financial expertise is the only relevant expertise: A review of audit committee expertise and timeliness of financial reporting	Issues in Social & Environmental Accounting	NA	☐	☐
2013	Habib, A.	A meta-analysis of the determinants of modified audit opinion decisions	Managerial Auditing Journal	A	☐	☒
2014	Nolder, C., and T. J. Riley	Effects of differences in national culture on auditors' judgments and decisions: A literature review of cross-cultural auditing studies from a judgment and decision making perspective	Auditing: A Journal of Practice & Theory	A*	☐	☐
2014	Carey, P. J., G. S. Monroe, and G. Shailer	Review of post-CLERP 9 Australian auditor independence research	Australian Accounting Review	B	☐	☐

Year	Authors	Title	Journal	Rank		
2014	Efrim Boritz, J., and L. M. Timoshenko	On the use of checklists in auditing: A commentary	Current Issues in Auditing	B	□	□
2014	DeFond, M., and J. Zhang	A review of archival auditing research	Journal of Accounting & Economics	A*	□	□
2014	Andiola, L. M.	Performance feedback in the audit environment: A review and synthesis of research on the behavioral effects	Journal of Accounting Literature	A	□	□
2015	de Fuentes, C., and E. Sierra	Industry specialization and audit fees: A meta-analytic approach	Academia-Revista Latinoamericana De Administracion	NA	□	⊠
2015	Maksymov, E.	Auditor evaluation of others' credibility: A review of experimental studies on determinants and consequences	Journal of Accounting Literature	A	□	□
2015	Tepalagul, N., and L. Lin	Auditor independence and audit quality: A literature review	Journal of Accounting, Auditing & Finance	A	□	□
2016	Bedard, J., P. Coram, R. Espahbodi, and T. Mock	Does recent academic research support changes to audit reporting standards?	Accounting Horizons	A	□	□
2016	Khlif, H., and I. Achek	IFRS adoption and auditing: A review	Asian Review of Accounting	B	□	□
2016	Carson, E., N. Fargher, and Y. Zhang	Trends in auditor reporting in Australia: A synthesis and opportunities for research	Australian Accounting Review	B	□	□
2016	Löhlein, L.	From peer review to PCAOB inspections: Regulating for audit quality in the U.S.	Journal of Accounting Literature	A	□	□
2016	Chiang, C.	Conceptualising the linkage between professional scepticism and auditor independence	Pacific Accounting Review	B	□	□
2017	Hay, D., and W. Knechel	Meta-regression in auditing research: Evaluating the evidence on the Big N audit firm premium	Auditing: A Journal of Practice & Theory	A*	□	⊠
2017	Christopher, J., P. Leung, and S. Leong	Can employees be used to overcome independent audit limitations?	Australian Accounting Review	B	□	□
2017	Hay, D., J. Stewart, and N. Botica Redmayne	The role of auditing in corporate governance in Australia and New Zealand: A research synthesis	Australian Accounting Review	B	□	⊠
2017	Hay, D. C	Audit fee research on issues related to ethics	Current Issues in Auditing	B	□	□
2017	Abernathy, J., M. Barnes, C. Stefaniak, and A. Weisbarth	An international perspective on audit report lag: A synthesis of the literature and opportunities for future research	International Journal Of Auditing	A	□	□
2017	Hux, C. T.	Use of specialists on audit engagements: A research synthesis and directions for future research.	Journal of Accounting Literature	A	□	□
2018	Lennox, C. S., and X. Wu	A review of the archival literature on audit partners	Accounting Horizons	A	□	□
2018	Haapamäki, E.	Voluntary auditing: A synthesis of the literature	Accounting in Europe	A	□	□
2018	Mactavish, C., S. McCracken, and R. N. Schmidt	External auditors' judgment and decision making: An audit process task analysis	Accounting Perspectives	B	□	□
2018	Kotb, A., H. Halabi, and H. Elbardan	The auditor-to-client revolving door: A structured literature review	International Journal of Auditing	A	□	□
2018	Safitri, M. A., A. S. Kustono, and M. Miqdad	Audit quality and earnings management: Review and synthesis of empirical evidence	International Journal of Management, Accounting & Economics	NA	□	□
2018	Appelbaum, D. A., A. Kogan, and M. A. Vasarhelyi	Analytical procedures in external auditing: A comprehensive literature survey and framework for external audit analytics	Journal of Accounting Literature	A	□	□
2018	Gepp, A., M. K. Linnenluecke, T. J. O'Neill, and T. Smith	Big data techniques in auditing research and practice: Current trends and future opportunities	Journal of Accounting Literature	A	□	□

2018	Ng, H. Y., P. C. Tronnes, and L. Wong	Audit seasonality and pricing of audit services: Theory and evidence from a meta-analysis	Journal of Accounting Literature	A	☐	☒
2018	Bilal, S. Chen, and B. Komal	Audit committee financial expertise and earnings quality: A meta-analysis	Journal of Business Research	A	☐	☒
2018	Eulerich, M., and A. Kalinichenko	The current state and future directions of continuous auditing research: An analysis of the existing literature	Journal of Information Systems	A	☐	☐
2019	Qomariyah, A.	The influences of internal and external factors in auditor choice: A literature study	Asia-Pacific Journal of Accounting & Economics	B	☐	☐
2019	Habib, A., M. B. U. Bhuiyan, H. J. Huang, and M. S. Miah	Determinants of audit report lag: A meta-analysis	International Journal of Auditing	A	☐	☒
2019	Zubairu, U., A. Ochepa, H. Umar, R. Kolo, J. Umar, and A. Usman	Audit retention versus audit rotation - an update of the debate	Journal of Accounting, Finance & Auditing Studies	NA	☐	☐
2019	Haapamäki, E., and J. Sihvonen	Research on international standards on auditing: Literature synthesis and opportunities for future research.	Journal of International Accounting, Auditing & Taxation	A	☐	☐
2019	Alareeni, B.	The associations between audit firm attributes and audit quality-specific indicators A meta-analysis	Managerial Auditing Journal	A	☐	☒
2019	Durand, G.	The determinants of audit report lag: a meta-analysis	Managerial Auditing Journal	A	☐	☒
2019	Ahmad, F.	A systematic review of the role of Big Data Analytics in reducing the influence of cognitive errors on the audit judgement	Revista de Contabilidad - Spanish Accounting Review	B	☐	☐
2020	Andiola, L., D. Downey, and K. Westermann	Examining climate and culture in audit firms: Insights, practice implications, and future research directions	Auditing: A Journal of Practice & Theory	A*	☐	☐
2020	Meredith, K., J. Blake, P. Baxter, and D. Kerr	Drivers of and barriers to decision support technology use by financial report auditors	Decision Support Systems	A*	☐	☐
2020	Bergner, J., B. B. Marquardt, and P. Mohapatra	The auditor reputation cycle: A synthesis of the literature	International Journal of Auditing	A	☐	☐
2020	Nouri, H., and R. J. Parker	Turnover in public accounting firms: A literature review	Managerial Auditing Journal	A	☐	☐
2021	Athira, A., and P. K. Baag	Literature review on methodological aspects of audit independence & materiality perspective	AIMS International Journal of Management	NA	☐	☐
2021	Broye, G., and P. Johannes	Determinants of audit committee effectiveness: Reviewing a decade of empirical research	Comptabilite Controle Audit	B	☐	☐
2021	Elshandidy, T., M. K. Eldaly, and M. Abdel-Kader	Independent oversight of the auditing profession: A review of the literature	International Journal of Auditing	A	☐	☐
2021	Khan, M. J., and E. Oczkowski	The link between trait and state professional skepticism: A review of the literature and a meta-regression analysis	International Journal of Auditing	A	☐	☒
2021	Sun, X. S., and A. Habib	Determinants and consequences of auditor-provided tax services: A systematic review of the international literature	International Journal of Auditing	A	☐	☐
2022	Aghazadeh, S., J. O. Brown, L. Guichard, and K. Hoang	Persuasion in auditing: A review through the lens of the communication-persuasion matrix	European Accounting Review	A*	☐	☐
2022	Alberti, C., J. Bedard, O. Bik, and A. Vanstraelen	Audit firm culture: Recent developments and trends in the literature	European Accounting Review	A*	☐	☐
2022	Khelil, I., H. Khlif, and I. Amara	Political connections, political corruption and auditing: A literature review	Journal of Financial Crime	B	☐	☐

| 2022 | Barr-Pulliam, D., H. L. Brown-Liburd, and I. Munoko | The effects of person-specific, task, and environmental factors on digital transformation and innovation in auditing: A review of the literature | Journal of International Financial Management & Accounting | B | ☐ | ☐ |

This table shows all studies included in the review in chronological order and their characteristics, including the author(s), the title of the article, and the publication outlet. The table also shows the ABDC rating of the publication outlet, whether the article was part of the PCAOB Synthesis Project, and whether the article reports the results of a meta-analysis. ABDC refers to the Australian Business Deans Council (ABDC) 2019 journal ranking. PCAOB refers to the PCAOB Synthesis Project.

Table 5: Reporting characteristics of systematic reviews in financial auditing (2000–2022)

Category	Characteristics	*All* *(n = 85)*	*ABDC A** *(n = 22)*	*ABDC A* *(n = 41)*	*ABDC B* *(n = 15)*
Scope	**Specific research question/objective**	66 (78%)	20 (91%)	32 (78%)	11 (73%)
Administrative information	**Title explicitly mentions type of review**	17 (20%)	3 (14%)	12 (29%)	1 (7%)
	Abstract explicitly mentions type of review	19 (22%)	4 (18%)	12 (29%)	1 (7%)
	Reporting guidelines reported	15 (18%)	5 (23%)	8 (20%)	1 (7%)
Eligibility criteria	**Publication status**				
	Published studies only	31 (36%)	6 (27%)	19 (46%)	4 (27%)
	Unpublished studies included	19 (22%)	4 (18%)	11 (27%)	4 (27%)
	Not reported	35 (41%)	120 (55%)	11 (27%)	7 (47%)
	Language				
	English only	4 (5%)	1 (5%)	1 (2%)	1 (7%)
	Not reported	81 (95%)	21 (95%)	40 (98%)	14 (93%)
	Study design				
	Specific design (e.g. experiments)	15 (18%)	4 (18%)	9 (22%)	1 (7%)
Search methods	**Database(s) identified**	46 (56%)	7 (37%)	29 (71%)	8 (53%)
	Years of coverage reported				
	Both start and end date reported	36 (42%)	8 (36%)	18 (44%)	8 (53%)
	Partially	5 (6%)	1 (5%)	3 (7%)	1 (7%)
	Not reported	44 (52%)	13 (59%)	20 (49%)	6 (40%)
	Search terms				
	Full Boolean search logic	14 (16%)	3 (14%)	5 (12%)	5 (33%)
	Main index terms	7 (8%)	2 (9%)	4 (10%)	1 (7%)
	Free text words	19 (22%)	2 (9%)	15 (37%)	1 (7%)
	No search terms reported	45 (53%)	15 (68%)	17 (41%)	8 (53%)
Screening and data extraction	**Screening method**				
	Screening by at least two authors	12 (14%)	3 (14%)	7 (17%)	2 (13%)
	Screening by one author	6 (7%)	0 (0%)	3 (7%)	3 (20%)
	Not reported	67 (79%)	19 (86%)	31 (76%)	10 (67%)
	Search and selection process				
	Flow diagram	6 (7%)	1 (5%)	4 (10%)	1 (7%)
	Full textual description	11 (13%)	2 (9%)	6 (15%)	3 (20%)

	Partial textual description	14 (16%)	4 (18%)	8 (20%)	2 (13%)
	Table	3 (4%)	0 (0%)	2 (5%)	0 (0%)
	Not reported	51 (60%)	15 (68%)	21 (51%)	9 (60%)
Outcomes	**Assessment of study quality**				
	Assessment by at least two authors	1 (1%)	0 (0%)	1 (2%)	0 (0%)
	Assessment by one author	2 (2%)	0 (0%)	1 (2%)	1 (7%)
	Not reported	82 (97%)	22 (100%)	39 (96%)	14 (93%)
	Assessment of certainty of evidence				
	Statistical significance	16 (19%)	4 (19%)	10 (24%)	0 (0%)
	Subjective rules	15 (18%)	2 (9%)	7 (17%)	6 (40%)
	Journal quality as proxy	4 (5%)	0 (0%)	4 (11%)	0 (0%)
	None reported	50 (59%)	16 (73%)	20 (49%)	9 (60%)
	Publication bias assessed	15 (18%)	3 (14%)	9 (22%)	2 (13%)
	Characteristics included studies				
	Each study cited and described in table	56 (66%)	14 (64%)	32 (78%)	8 (53%)
	Each study identified	7 (8%)	3 (14%)	1 (2%)	2 (13%)
	Not all studies clearly identified	22 (26%)	5 (23%)	8 (20%)	5 (33%)
	Method of synthesis explicitly described	38 (45%)	9 (41%)	21 (51%)	7 (47%)

This table presents the resuls of our analysis of the extent to which literature reviews on financial auditing topics adhere to best practices for reporting systematic literature reviews. The table shows the number of percentage of studies that adhere to various elements that are considered best practices for reporting systematic literature reviews. Results are presented for the overall sample and for different journal categories, based on the ABDC rankings, separately. ABDC A*, ABDC A, and ABDC B refer to the ranking in the ABDC 2019 journal ranking of the journal in which studies were published.

APPENDIX A

Review protocol

April 14, 2022 (updated: August 1, 2022)

Note: The protocol was revised in that articles had to be meet the definition of a systematic literature review to be included in the study.

Administrative information

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KH (the guarantor) devised and designed the research and contributed to writing the review protocol. All authors contributed to deciding the method of the review (information sources, search strategy, eligibility criteria). JM and JV will independently search for, screen, select, and extract the relevant data from identified articles (based on the criteria discussed below). KH and FG will contribute to the writing and methodological planning of the manuscript. All authors will read and approve the final manuscript.

Registration

This protocol is not pre-registered as our study serves as an illustrative example of how to conduct a systematic review. However, we strongly advise to pre-register review protocols for systematic reviews.

Amendments

We updated our eligibility criteria (lines 67-68) on August 1, 2022, to reflect that we exclude non-systematic reviews from our study.

Background to the review

Rationale

Literature reviews in accounting rarely seem to be up to date with current standards and best practices for such reviews. Given the paucity of attention to the methodology and methods of literature reviews in our doctoral training programs as well as the lack of guidance within accounting journals and the accounting community at large on conducting reviews, the current paper aspires to be a clear guide directed at accounting researchers with best practices to adhere to in conducting and reporting results from a systematic literature review. We will offer a step-by-step guide for conducting and reporting a systematic literature review. For this, we will rely extensively on existing guidelines and best practices (e.g., Chandler et al. 2022; Page et al. 2021a, Page et al. 2021b; Petticrew & Roberts 2006; Siddaway et al. 2019). Furthermore, for illustrative purposes, we will also offer a simplified example of a systematic literature review by assessing the extent to which literature reviews on financial auditing topics adhere to best practices for conducting and reporting systematic literature reviews.

Objectives

Our primary objective is to offer a roadmap for accounting researchers to conduct and report systematic literature reviews based on existing guidelines and best practices. To this end, we will conduct a simplified example of a systematic review. The aim of this systematic review is to evaluate to what extent systematic literature reviews on financial auditing topics adhere to best practices for conducting systematic literature reviews.

Methods

Eligibility criteria

Studies eligible for this literature review must correspond to the following criteria:

- *Review question: Our study only includes literature reviews about financial auditing topics. Because our focus is on literature reviews, we restrict the scope of our review for practical purposes.*
- *Study design: We include only systematic literature reviews and exclude primary studies, theoretical papers, methodological papers, and non-systematic reviews. [Updated on August 1, 2022, to reflect that we exclude non-systematic reviews from our study.]*

- *Publication status: We do not include unpublished studies because of the illustrative nature of this review. Furthermore, it is unlikely that unpublished literature reviews would adhere to higher standards than published reviews.*

- *Publication year: 2000-2022. We chose this time frame because* publications before 2000 are typically not digitally available. The first reporting guidelines for meta-analyses (the QUOROM Statement) were published in 1999.

- Language: We focus on studies in English because the goal of our review is primarily illustrative.

Information sources

The literature search will be performed using electronic databases, namely the *Social Sciences Citation Index* (SSCI) in *Web of Science* (WoS) and *Business Source Complete* by *EBSCO.* These searches will be performed by JM and JV.

Search strategy and search terms

The search strategy was developed by all authors and will be executed by JM and JV. We will use the following search strings, limiters, and search terms.

Search strings and limiters	
EBSCO (Business Source Complete)	**Search string:** SU(audit* AND "[Search term]") OR AB(audit* AND "[Search term]") OR TI(audit* AND "[Search term]") **Limiters:** Published Date: 20000101-20221231; Publication Type: Academic Journal; Language: English
WoS (Social Sciences Citation Index)	**Search string:** (TS=(audit* AND "[Search term]") OR AB=(audit* AND "[Search term]") OR TI=(audit* AND "[Search term]") AND (WC= "Operations Research & Management science" OR WC= "Business, Finance" OR WC= "economics" OR WC= "management") AND PY=(2000-2022) **Limiters:** Publication Type: Academic Journal
Search terms	
Literature review; Paper review; We review; Synthesis; Meta analy*; Meta regress*; Systematic review; This study reviews; This article reviews; This paper reviews; This study systematically reviews; Review and framework; Literature study; Literature analysis	

Study records

The records retrieved from the two databases will be imported into Zotero, allowing the removal of duplicates and screening of the titles and abstracts of all records. Then, all records will be checked manually to remove any duplicates that were not removed due to, for example, punctuation differences. The selection process will be conducted by JM and JV, with feedback from KH and FG if necessary. After retrieving the records, JM and JV will independently screen 50 records together to align eligibility

decisions. Afterwards, each author will screen half of the sample. In case of doubt, the other screening author and, if necessary, KH will be consulted. Any disagreements will be resolved through discussion.

After the screening process, JM and JV will read and manually extract the data from each eligible study for the final sample of identified literature reviews. A Microsoft Access form will be used for this. The authors will resolve disagreements by discussion and contact KH and FG if necessary to resolve any uncertainties.

Data items

The items to be extracted into the Microsoft Access form include:

- Publication year

- Authors

- Title

- Publication title (Journal)

- Publication status (Published studies only/Unpublished studies included/Not reported)

- Published in an ABDC listed journal (A*/A/B/C/No)

- The paper aims to be a systematic review (Yes/No)

- Meta-analysis (Yes/No)

- Years of coverage mentioned (Both start and end date reported/Partially/Not reported)

- Review type mentioned (In title/In title or abstract/Not mentioned)

- Protocol mentioned (Yes, which protocol/No)

- Reporting guidelines mentioned

- Explicit statement of objective(s) or question(s) included

- Language inclusion mentioned (English only/All languages/Not reported

- Eligibility based on study design mentioned (Yes/No)

- Databases used mentioned

- Search terms reported (Full Boolean search logic/Main index terms/Free text words/Not reported)

- Screening and data extraction reported (At least two authors/One Author/Not reported)

- Selection process reported (Flow diagram/Full textual description/Partial textual description/Table/Not reported)

- Assessment tool or method (Statistical significance/Subjective rules/Journal quality/Not reported)

- Assessment of evidence (At least two authors/One Author/Not reported)

- Publication bias assessed (Yes/No)
- Characteristics of the included studies reported (Each study described in table/Each study identified/Not all studies clearly identified)
- Explicitly described method of synthesis (Yes/No)

Outcomes and prioritization
Not applicable to our study because of the illustrative nature of our review. We are not interested in specific outcomes reported by the identified reviews, but in their methodological features.

Risk of bias in individual studies
We will not specifically assess the risk of bias in individual studies. Although including unpublished studies typically reduces bias, we will not include unpublished studies because the goal of our review is primarily illustrative. It is also unlikely that unpublished literature reviews would be adhering to higher standards than published ones. We will assess the methodological quality of the identified literature reviews by focusing on various reporting features (as described under *data items*), based on best practices for reporting systematic literature reviews (e.g., the PRISMA statement) and similar to Page et al. (2016).

Data synthesis
All analyses will be descriptive, with data summaries as frequencies per data item. We will compare the methodological quality of reviews published in "higher-ranked" and "lower-ranked" journals.

Meta-bias(es) and confidence in cumulative evidence
Given the purpose of this review and the usage of the data, only a very basic assessment of meta-bias will be performed, investigating the journals in which the reviews were published and their quality.

References

Chandler, J., M. Cumpston, J. Thomas, J. P. T. Higgins, J. J. Deeks, and M. J. Clarke. 2022. Chapter I: Introduction. In *Cochrane Handbook for Systematic Reviews of Interventions* version 6.3 (updated February 2022), edited by J. P. T. Higgins, J. Thomas, J. Chandler, M. Cumpston, T. Li, M. J. Page, and V. A. Welch. Cochrane. Available from www.training.cochrane.org/handbook.

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Page, M. J., J. E. McKenzie, P. M. Bossuyt, I. Boutron, T. C. Hoffmann, C. D. Mulrow, L. Shamseer, J. M. Tetzlaff, E. A. Akl, S. E. Brennan, R. Chou, J. Glanville, J. M. Grimshaw, A. Hróbjartsson, M. M. Lalu, T. Li, E. W. Loder, E. Mayo-Wilson, S. McDonald, L. A. McGuinness, L. A. Stewart, J. Thomas, A. C. Tricco, V. A. Welch, P. Whiting, and D. Moher. 2021a. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Systematic Reviews* 10 (1): 89.

Page, M. J., D. Moher, P. M. Bossuyt, I. Boutron, T. C. Hoffmann, C. D. Mulrow, L. Shamseer, J. M. Tetzlaff, E. A. Akl, S. E. Brennan, R. Chou, J. Glanville, J. M. Grimshaw, A. Hróbjartsson, M. M. Lalu, T. Li, E. W. Loder, E. Mayo-Wilson, S. McDonald, L. A. McGuinness, L. A. Stewart, J. Thomas, A. C. Tricco, V. A. Welch, P. Whiting, and J. E. McKenzie. 2021b. PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews. *BMJ*: n160.

Petticrew, M., and H. Roberts. 2006. *Systematic Reviews in the Social Sciences: A Practical Guide*. Oxford, UK: Blackwell Publishing Ltd.

Siddaway, A. P., A. M. Wood, and L. V. Hedges. 2019. How to Do a Systematic Review: A Best Practice Guide for Conducting and Reporting Narrative Reviews, Meta-Analyses, and Meta-Syntheses. *Annual Review of Psychology* 70 (1): 747-770.

PRISMA-P 2015 Checklist

This checklist has been adapted for use with systematic review protocol submissions to BioMed Central journals from Table 3 in Moher D et al: Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews* 2015 4:1

An Editorial from the Editors-in-Chief of *Systematic Reviews* details why this checklist was adapted - **Moher D, Stewart L & Shekelle P**: Implementing PRISMA-P: recommendations for prospective authors. *Systematic Reviews* 2016 5:15

Section/topic	#	Checklist item	Information reported Yes	Information reported No	Line number(s)
ADMINISTRATIVE INFORMATION					
Title					
Identification	1a	Identify the report as a protocol of a systematic review	☒	☐	1
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	☐	☒	N/A
Registration	2	If registered, provide the name of the registry (e.g., PROSPERO) and registration number in the Abstract	☐	☒	N/A
Authors					
Contact	3a	Provide name, institutional affiliation, and e-mail address of all protocol authors; provide physical mailing address of corresponding author	☒	☐	9-18
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	☒	☐	20-25
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	☒	☐	5-6; 32-34
Support					
Sources	5a	Indicate sources of financial or other support for the review	☒	☐	35-37
Sponsor	5b	Provide name for the review funder and/or sponsor	☒	☐	35-37
Role of sponsor/funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	☒	☐	35-37
INTRODUCTION					

Section/topic	#	Checklist item	Information reported Yes	Information reported No	Line number(s)
Rationale	6	Describe the rationale for the review in the context of what is already known	☒	☐	40-52
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	☒	☐	53-58
METHODS					
Eligibility criteria	8	Specify the study characteristics (e.g., PICO, study design, setting, time frame) and report characteristics (e.g., years considered, language, publication status) to be used as criteria for eligibility for the review	☒	☐	61-76
Information sources	9	Describe all intended information sources (e.g., electronic databases, contact with study authors, trial registers, or other grey literature sources) with planned dates of coverage	☒	☐	78-81
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	☒	☐	83-85
STUDY RECORDS					
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	☒	☐	87-91
Selection process	11b	State the process that will be used for selecting studies (e.g., two independent reviewers) through each phase of the review (i.e., screening, eligibility, and inclusion in meta-analysis)	☒	☐	92-96
Data collection process	11c	Describe planned method of extracting data from reports (e.g., piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	☒	☐	98-101
Data items	12	List and define all variables for which data will be sought (e.g., PICO items, funding sources), any pre-planned data assumptions and simplifications	☒	☐	103-132
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	☒	☐	134-137
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	☒	☐	139-146
DATA					
	15a	Describe criteria under which study data will be quantitatively synthesized	☒	☐	148-151
Synthesis	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data, and methods of combining data from studies, including any planned exploration of consistency (e.g., I^2, Kendall's tau)	☒	☐	148-151

Section/topic	#	Checklist item	Information reported Yes	Information reported No	Line number(s)
	15c	Describe any proposed additional analyses (e.g., sensitivity or subgroup analyses, meta-regression)	☐	☒	N/A
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	☐	☒	N/A
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (e.g., publication bias across studies, selective reporting within studies)	☒	☐	153-156
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (e.g., GRADE)	☒	☐	153-156

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	N/A
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	N/A
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	P1-3
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	P4
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	P6-7
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.	P8
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	P8
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.	P9-10
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.	Appendix A
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.	Appendix A
	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.	Appendix A
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.	N/A
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.	N/A
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	N/A
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	N/A
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	N/A
	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.	N/A

Section and Topic	Item #	Checklist item	Location where item is reported
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	N/A
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	N/A
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	N/A
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	N/A
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.	P8-10, P20
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	P9
Study characteristics	17	Cite each included study and present its characteristics.	P24-27
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	N/A
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.	N/A
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	N/A
	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.	N/A
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	N/A
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	N/A
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	N/A
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	N/A
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	P13-14
	23b	Discuss any limitations of the evidence included in the review.	P15
	23c	Discuss any limitations of the review processes used.	P15
	23d	Discuss implications of the results for practice, policy, and future research.	P15
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.	P4
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	P4

Section and Topic	Item #	Checklist item	Location where item is reported
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	N/A
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Title page
Competing interests	26	Declare any competing interests of review authors.	Title page
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.	P10