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Searching for studies: a guide to information retrieval for Campbell systematic reviews

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1 About this guide

This guide is derived from the information in chapter 6 of The Cochrane Handbook (1, 2). Carol Lefebvre, Eric Manheimer and Julie Glanville kindly gave permission to the original Campbell Collaboration (Campbell) Information Retrieval Guide authors to use the chapter and chapter updates as the basis for this guide. In 2015 the Campbell Information Retrieval Methods Group (IRMG) revised this guide to reflect current Campbell Collaboration areas of practice and recommendations in the Methodological Expectations of Campbell Collaboration Intervention Reviews (MEC2IR), capture evolving practice and strategies for searching, and update links and descriptions of individual bibliographic and other resources.

This guide presents key considerations on the information retrieval process and provides examples of strategies and resources for review authors and Trial Search coordinators (TSC) to reference in the planning and conduct of Campbell Systematic Reviews. The guide provides an overview of information retrieval principles (Ch.2); covers sources of literature including specific subject databases and bibliographic indexes (Ch. 3); describes steps for planning and executing searches (Ch.4 and 5); reviews tools for managing retrievals (Ch. 6); introduces the role of text mining (Ch. 7); and outlines key elements of the search process and search strategies for documentation (Ch.8). The Guide Appendices include subject specific databases and other sources of literature (Appendix I), grey literature sources (Appendix II), a search strategy template (Appendix III), a checklist for information retrieval activity (Appendix IV), and the literature search-specific items from the MEC2IR document (Appendix V) and list of abbreviations used in the guide (Appendix VI).

This guide provides high-level, overview information on information retrieval principles and is not a substitute for the Help sections of individual databases. Individuals who wish to search particular sources should familiarize themselves with the resource before beginning a search.

KEY POINTS

- Outline the information retrieval strategy and methods in the review protocol.
- Identify the key sources of information and develop search strategies in collaboration with the Campbell Collaboration Coordinating Group (CG) Trials Search Co-ordinator (TSC) and/or a librarian.
- Use a wide variety of search terms for each concept, combining natural language “keywords” and database-specific subject headings.
- Consider search filters and limits to focus retrieval.

- Use alternate strategies (e.g., internet searches, manual searches, branching, etc.) to supplement the database searches.
- Manage retrieved references using bibliographic software.
- Consider text mining tools and functions to filter search results.
- Document all searches to ensure reproducibility; copy strategies directly from the databases, record the date of the search, the database supplier, and retrieval numbers.

2 Information retrieval overview

2.1 GENERAL ISSUES

Campbell Coordinating Groups (CGs) are responsible for providing review authors with help locating references to studies that are possibly relevant to their review. The majority of CGs employ a dedicated Trials Search Co-ordinator (TSC) to provide this service (see Section 2.1.2). Thus, the information in this guide is designed to **assist** authors wishing to undertake supplementary searches for studies and to provide background information so that they can better understand the search process. In all cases review authors should contact the TSC of their CG before starting to search in order to find out the level of support they provide.

This guide will also be useful to TSCs who are new to their post, as well those who are more experienced, who may wish to consult this guide as a reference source.

The document outlines some general issues in searching for studies; describes the main sources of potential studies; and discusses how to plan the search process, design and carry out search strategies, manage references found during the search process and correctly document and report the search process.

This document is meant to provide general guidance to reviewers and to establish minimum standards for key information retrieval tasks. Although the guide speaks specifically to individuals planning to conduct a Campbell review, the policies, procedures and guidelines are applicable to anyone interested in implementing information retrieval methods that maximise coverage and minimise bias during the information retrieval process. For a more comprehensive discussion of information retrieval for systematic reviews see White's chapter entitled *Scientific Communication and Literature Retrieval* (3) and other reports that have described searching challenges for systematic reviews of various topics (4-8).

This guide's fundamental premise is that information retrieval is an essential component of the systematic review process, analogous to the data collection phase of a primary research study, and requires the expertise of TSC, an information specialist (IS) or a librarian. A thorough and unbiased compilation of all potentially relevant studies is one of the key characteristics of a systematic review and if the literature located is unrepresentative of the population of completed studies, the remainder of the review process will be compromised (9).

2.1.1 The nature of the social, behavioural, and educational sciences literature

Given the diverse nature of the research questions addressed in the social, behavioural, and educational sciences that encompass the Campbell Collaboration's core areas of focus (crime and justice, education, international development, and social welfare), potentially relevant studies are likely to be widely distributed and unreliably categorised. While retrieval of information from the literature is a critical concern for any systematic reviewer, retrieval of information about complex social, behavioural, and educational interventions is likely to be especially challenging.

2.1.2 Minimizing bias

Systematic reviews of interventions require a thorough, objective and reproducible search of a range of sources to identify as many relevant studies as possible (within resource limits). This is one factor in distinguishing systematic reviews from traditional narrative reviews and helps to minimize bias and therefore assist in achieving reliable estimates of effects.

A search of one database alone is typically not considered adequate. A systematic review showed that in the medical sciences, only 30% - 80% of all known published randomized trials were identifiable using MEDLINE (depending on the area or specific question) (10). Even if relevant records are in MEDLINE, it can be difficult to retrieve them (11, 12). For the social sciences, this is even more pronounced. Firstly, there is no apparent main source of randomized trials and secondly, it seems that studies in the social sciences more often lack a structured abstract and methodology terms compared to those of the medical sciences (13).

Going beyond the main subject database (such as ERIC) is important not only for ensuring that as many relevant studies as possible are identified but also to minimize selection bias for those that are found. Relying exclusively on one database search may retrieve a set of studies unrepresentative of all studies that would have been identified through a comprehensive search of several sources.

Time and budget restraints require the review author to balance the thoroughness of the search with efficiency in use of time and funds and the best way of achieving this balance is to be aware of, and try to minimize, the biases such as publication bias and language bias that can result from restricting searches in different ways.

2.2 THE TRIALS SEARCH CO-ORDINATOR (TSC)

The Trials Search Co-ordinator (TSC) for each CG is responsible for providing assistance to authors with searching for studies for inclusion in their reviews. The range of assistance varies according to the resources available to individual CCGs but may include designing search strategies for the main bibliographic databases, running these searches in databases available to the CG, saving search results and sending them to authors, advising authors on how to run searches in other databases (including web search engines) and how to download results into their reference management software (see Section 6). Contact your TSC before you start searching to find out the level of assistance offered. If a CG is currently without a TSC, authors should seek the guidance of an

academic librarian or information specialist. In the latter two instances, ideally these individuals should have experience conducting searches for systematic reviews.

2.3 STUDIES VERSUS REPORTS OF STUDIES

Systematic reviews typically identify studies as the unit of analysis. Individual studies may be reported in multiple publications or be associated with other studies (e.g., post hoc analyses or surveillance studies). Related publications may report unique information or be a source of potentially unwanted duplicate data. Every possible effort should be made to flag associated or related publications for inspection by the review authors.

2.4 TYPES OF STUDIES

This guide focuses on searching for studies on the effectiveness of interventions. Some reviews may cover other types of studies and hence need a different approach to searching, but the sources listed in this document may nevertheless be equally relevant for these reviews. For reviews concerning cost effectiveness specifically, authors may seek guidance on searching from chapter 7 in *Evidence-Based Decisions and Economics* (13) or methodologic reports (13-18).

2.5 COPYRIGHT

It is Campbell policy that all review authors and others involved in the Collaboration should adhere to copyright legislation. With respect to searching for studies, this refers in particular to adhering to the terms and conditions of use when searching databases and downloading records and adhering to copyright legislation when obtaining copies of articles. Review authors should seek guidance on this from their TSC or local academic librarian, as copyright legislation varies across jurisdictions.

2.6 SUMMARY POINTS

- Campbell review authors should seek advice from the TSC, or from an academic librarian or information specialist with experience conducting searches for systematic reviews.
- A search of one database alone is not considered adequate. Relying solely on database searches, even if several databases are searched, is considered inadequate.
- To minimize bias during the information retrieval phase, search multiple databases and incorporate alternate strategies (e.g., handsearches, citation tracking, grey literature sources) to complement the literature search.
- Campbell policy requires that all review authors and others involved in the Collaboration adhere to database licensing terms and conditions of use and copyright legislation.

3 Sources to search

3.1 SUBJECT DATABASES

3.1.1 General introduction

Social science-related subject databases are generally the best way to identify an initial set of relevant reports of studies within a specific field. The majority of field specific databases, such as ERIC and PsycINFO®, include abstracts, and may include links to the full-text of the scholarly literature within a given field or the full text of materials. Access to full text literature will vary based on a user's institutional affiliations. These databases usually index journal and non-journal sources, as well as non-English material. A key advantage of these databases is that they can be searched for keywords in the title or abstract and/or by using controlled vocabulary assigned to each record (see Section 5.4).

Decisions related to which subject-specific databases are to be searched, in addition to the main field-related database, will be influenced by the topic of the review, access to specific databases, and budget considerations. Most of the subject-specific databases are available only on a subscription or “pay-as-you-go” basis. Databases also may be available at no cost to the individual through national provisions, site-wide licences at institutions such as universities or hospitals, through professional organizations as part of their membership packages, or free of charge on the internet. Access to databases is therefore likely to be limited to those databases that are available to the TSC and those that are available at the institutions of the review authors.

A selection of the main subject-specific databases that are more likely to be available through institutional subscriptions (and therefore available at no cost to the individual) or are available free of charge on the internet are listed in Appendix I, together with web addresses for further information. Access details vary according to institution. Review authors should seek advice from their local librarian for access at their institution. In addition to field-specific databases, there are also a variety of multi-disciplinary databases (Appendix I) which can be worthwhile to search.

3.1.2 Selected databases in the social, behavioural, education and health sciences

A comprehensive list of the databases in the social, behavioural, education and health sciences is in Appendix I, however some of the more frequently used subject databases include:

Applied Social Sciences Index and Abstracts (ASSIA)

ASSIA provides access to literature in the health, social services, psychology, sociology, economics, politics, race relations and education. ASSIA is only available by subscription.

The Cochrane Central Register of Controlled Trials (CENTRAL)

CENTRAL serves as a comprehensive source of reports of controlled trials in medicine. CENTRAL is published as part of *The Cochrane Library* and is updated quarterly. CENTRAL contains citations to reports of trials and other studies potentially eligible for inclusion in Cochrane reviews from MEDLINE, EMBASE and other sources such as other databases and handsearching.

CENTRAL also includes citations to reports of controlled trials that are not indexed in MEDLINE, EMBASE or other bibliographic databases; citations published in many languages; and citations that are available only in conference proceedings or other sources that are difficult to access (19). It also includes records from trials registers and registers of trials results.

CENTRAL is available through *The Cochrane Library*. Many health and academic institutions and organizations provide access to their members, and in many countries there is free access for the whole population (for example through funded national licences or arrangements for low-income countries). Information about access to *The Cochrane Library* for specific countries can be found under Access to Cochrane at the top of *The Cochrane Library* home page:

Education Resources Information Center (ERIC)

ERIC provides free access to millions of bibliographic records of journal articles and other education-related materials, such as journal articles, books, research syntheses, conference papers, technical reports, policy papers and other education-related materials. ERIC has special collections from the What Works Clearinghouse and the Regional Educational Laboratories, and also provides full-text access to grey literature, ranging from informational materials to researched and reviewed documents, including research syntheses, conference papers, and policy reports.

International Bibliography of the Social Sciences (IBSS)

IBSS is funded by the Economic and Social Research Council and has been produced by The London School of Economics and Political Science (LSE) since 1989. The IBSS database has a main focus on the social science subjects of anthropology, economics, politics and sociology. IBSS covers current social science journals from every region of the world, plus journals which are indexed on an irregular basis. In addition to printed journals IBSS also indexes electronic journals. Journal coverage includes articles, reviews, research notes, responses and short essays.

MEDLINE

MEDLINE indexes health sciences journal titles from numerous languages from the 1950s onwards. To see the list of currently indexed MEDLINE titles, from the Limit function, select the subset titled "Journals Currently indexed in MEDLINE" and click the Search button. PubMed provides access to a free version of MEDLINE and MEDLINE is available on subscription from numerous database vendors, such as Ovid. The US National Library of Medicine (NLM) has developed the NLM Gateway, which allows users to search MEDLINE or PubMed together with other NLM resources.

PsycINFO®

PsycINFO® is a database of psychological literature from the 1800s to the present, containing bibliographic citations, abstracts and cited references across a wide variety of scholarly publications in the behavioral and social sciences.

Sociological abstracts

Sociological Abstracts indexes the international literature in sociology and related disciplines in the social and behavioural sciences. The database provides abstracts of journal articles and citations to book reviews, and also provides abstracts of books, book chapters, dissertations, and conference papers.

3.2 GENERAL DATABASES

3.2.1 National and regional databases

Many countries and regions produce databases that concentrate on the literature produced in those regions, and which often include journals and other literature not indexed elsewhere. Access to many of these databases is available free of charge on the internet. Others are only available by subscription or on a pay-as-you-go basis. Indexing complexity and consistency varies, as does the sophistication of the search interface, but they can be an important source of additional studies from journal articles not indexed in other international databases. Some examples are listed in Appendix I.

3.2.2 Citation indexes

As well as searching the references cited in existing systematic reviews and meta analyses, reference lists of identified studies may also be searched for additional studies (20). This approach can complement the searches in the subject databases as it provides an alternative way of accessing potentially relevant studies. A recent study found that 7% of the included studies in a social science systematic review were located through citation searching alone (21). Many of the bibliographic databases allow for citation searches (known as cited reference searches), as does Google Scholar. See also 3.2.3.

Web of Science

Web of Science is a database that lists published articles from over 10,000 major journals across scientific disciplines and links them to the articles in which they have been cited (a feature known as cited reference searching). This large database can be used to identify studies for a review by identifying a known relevant source article, and checking each of the articles citing the source article, to see if they are also relevant to the review. Records also include the listed references from the original record, which in turn are another possible source of relevant trial reports. Citation or reference searching is a way of searching forward in time from the publication of an important relevant article to identify additional relevant articles published since then. It is an important adjunct to database searching and handsearching (20), and may prove very effective. Web of Science can also be searched for articles indexed by author, title, topic, etc. Web of Science subscriptions may include access to the Science Citation Index Expanded, Arts and Humanities Citation Index, and Social Sciences Citation Index databases as well as other resources.

Arts & Humanities Citation Index

This resource indexes leading international arts and humanities journals and relevant items from major science and social science journals.

Science Citation Index Expanded (SCIE)

SCIE indexes major journals across multiple scientific disciplines including the agricultural, biological, and environmental sciences, engineering, technology, applied science, medical and life sciences, and physical and chemical sciences.

Social Sciences Citation Index (SSCI)

SSCI indexes journals spanning multiple disciplines related to the social sciences, as well as covering individually selected, relevant items from the world's leading scientific and technical journals.

Scopus

Scopus is an abstract and citations database which covers thousands of journals and conference proceedings, and results from scientific web pages and patent records.

3.2.3 Full-text journals available electronically

The full-text of an increasing number of journals is available electronically on a subscription basis or free of charge on the internet. In addition to providing a convenient method for retrieving the full article of already identified records, full-text journals can also be searched electronically, depending on the search interface, similarly to the way database records can be searched in a subject database. It is important to specify if the full text of a journal has been searched electronically. Some electronic journals omit sections of the print version, for example letters, and some include extra articles in electronic format only. Most academic institutions subscribe to a wide range of electronic journals and these are therefore available free of charge to members of those institutions. Review authors should seek advice about electronic journal access from the library service at their local institution. Some professional organizations provide access to a range of journals as part of their membership package. In some countries similar arrangements exist through national licences. There are also a number of international initiatives to provide free or low-cost online access to full-text journals (and databases) over the internet, including the Health InterNetwork Access to Research Initiative (HINARI), the International Network for the Availability of Scientific Publications (INASP) and Electronic Information for Libraries (eIFL). For further information on these initiatives see Section 3.1.1. Examples of some full-text journal sources that are available free of charge without subscription are given in Appendix I.

It is recommended that a local electronic or print copy be maintained for any possibly relevant article found electronically in subscription journals, as the subscription to that journal may not be in perpetuity. The journal may cease publication or change publishers and access to previously available articles may cease. The same applies to journals available free of charge on the internet, as the availability of specific journals might change.

3.2.4 Dissertations and theses databases

Dissertations and theses are often indexed in subject databases such as ERIC or PsycINFO®, however there are also databases devoted to indexing this type of material and it is advisable to search these specific dissertation sources. See Appendix I for a selected list of the larger databases.

3.3 OTHER SOURCES OF STUDY INFORMATION

3.3.1 Grey literature sources

While there are several definitions of grey literature, broadly, it is a body of information that may not be published in conventional sources such as books or journal articles. Grey literature sources include government and regulatory agencies, professional organizations, NGOs, industry, academic institutions, etc. Examples of grey literature include conference proceedings, theses, white papers, and technical reports.

Conference abstracts and other grey literature have been shown to be sources of approximately 10% of the studies referenced in Cochrane reviews (22). In a Cochrane methodology review, all five studies reviewed showed that published trials showed an overall greater treatment effect than grey literature trials (23). In a Campbell review on multisystemic therapy, the single largest and most rigorous experiment was not published in a peer-reviewed journal or a book (24). Thus, failure to identify trials reported in conference proceedings and other grey literature might bias the results of a systematic review.

Some databases contain both published and unpublished literature, and this is true for many of the databases listed earlier in this guide. However there are also a variety of resources available on the Internet that provide access to the grey literature. For a comprehensive list of sources, see Appendix II of this guide; see also Rothstein (9).

3.3.1.1 Conference proceedings and meeting abstracts

More than one-half of studies reported in conference abstracts never reach full publication, and those that are eventually published in full have been shown to be systematically different from those that are never published in full (25). It is, therefore, important to try to identify possibly relevant studies reported in conference abstracts through specialist database sources or on the internet. Some databases such as Sociological Abstracts index conference and meeting abstracts. Conference and meeting abstract sources are listed in Appendix I.

3.3.2 Existing review and publication reference lists

Some of the most convenient and obvious sources of references to potentially relevant studies are existing reviews. Reviews may also provide useful information about the search strategies used in their development. Copies of previously published reviews relevant to the topic of interest should be obtained and checked for references to the included (and excluded) studies.

Reviews may be found in The Campbell Library as well as The Cochrane Library, which in addition to the Database of Systematic Reviews includes The Database of Abstracts of Reviews of Effects

(DARE) produced by the Centre for Reviews and Dissemination (CRD) at the University of York. Both databases provide information on published reviews. Several investigators have also published search methods for identifying systematic reviews in various areas (26-33). See Appendix I for other sources of existing systematic reviews.

Subject databases can also be used to identify review articles and guidelines. In PsycINFO®, review articles may be indexed under the Methodology terms 'Systematic Review' and 'Meta-Analysis' or under the Subject Heading "Literature Review". In MEDLINE, reviews should be indexed under the Publication Type term 'Meta-analysis' or 'Review'.

Along with searching the references cited in existing systematic reviews and meta-analyses, reference lists of identified studies may also be searched for additional studies (20, 34). Citation searching may produce a different set of hits compared to those produced from a keyword/controlled vocabulary search (see also 3.1.5). However, since investigators may selectively cite studies with positive (or negative) results, reference lists is a supplementary information retrieval strategy only, and should be used with caution as an adjunct to other search methods.

3.3.3 Web searching

Using general internet search engines such as Google to identify potential studies may be a good secondary resource as these may be used to retrieve current (both published and unpublished) studies.

Tip: When using web search engines, search strategies should be entered into the Advanced search screen as this allows the searcher to easily use Boolean logic and limiting commands through the use of menus. Strategies should be precise to reduce retrieving a large number of records. Keywords such as "study" or "studies" or "control group" may be used to limit the results to empirical research.

Search engines that have large, up-to-date databases include the following:

Google (www.google.com)

Bing (www.bing.com)

Yahoo! Search (search.yahoo.com)

Both Google and Yahoo have additional country- and language-specific versions, e.g., www.google.ca and ca.yahoo.com/ for Canadian sites.

Note that **Google Scholar** may also be used; however this database is a compilation of records pulled from the subject databases (and other sources). Hence searching Google Scholar may produce a number of hits that have already been identified by the database searches, assuming comprehensive searches have been performed in these databases in the initial phase of retrieval (35).

Searching professional associations, research funders' and government web sites is also fruitful. See Appendix II for a list of web sites that provide access to this material.

Generally web searches are completed towards the end of the search phase of a review to ensure picking up the most current information. When used, it is recommended that review authors file a print copy or save locally an electronic copy of document found on the internet, rather than simply 'book-marking' the site, in case the record of the trial is removed or altered at a later stage. It is important to keep a record of the search strategy used within each search engine, the exact URL for the web document found and the date the web site was accessed for citation purposes.

3.3.4 Unpublished studies

Some completed studies are never published. Finding out about unpublished studies, and including them in a systematic review when eligible and appropriate, is important for minimizing bias. There is no easy and reliable way to obtain information about studies that have been completed but never published.

Colleagues can be an important source of information about unpublished studies, and informal channels of communication can sometimes be the only means of identifying unpublished data. Formal letters of request for information can also be used to identify completed but unpublished studies. One way of doing this is to send a comprehensive list of relevant articles along with the inclusion criteria for the review to the first author of reports of included studies, asking if they know of any additional studies (published or unpublished) that might be relevant. It may also be desirable to send the same letter to experts or others with an interest in the area, either individually or through mailing lists.

It should be kept in mind that asking researchers for information about completed but never published studies has not always been found to be fruitful (36, 37) though some researchers have reported that this is an important method for retrieving studies for systematic reviews (20, 38).

Some organizations set up web sites for systematic review projects listing the studies identified to date and inviting submission of information on studies not already listed. It has also been suggested that legislation such as the Freedom of Information Acts in countries such as the UK and the US might be used to gain access to information about unpublished trials (39, 40).

3.3.5 Ongoing studies

It is also important to identify ongoing studies, so that when a review is later updated these can be assessed for possible inclusion. Awareness of the existence of a possibly relevant ongoing study might also affect decisions with respect to when to update a specific review. Unfortunately, no single, comprehensive, centralized register of ongoing trials exists (41). Efforts have, in the medical sciences, been made by a number of organizations to begin to provide central access to ongoing trials and in some cases trial results on completion, either on a national or international basis. Databases include Clinicaltrials.gov and the EU Clinical Trials Register (<https://www.clinicaltrialsregister.eu>).

Campbell authors whose reviews concern or border on health related topics or outcomes, may find relevant studies in Social Care Online (<http://www.scie-socialcareonline.org.uk>) or the World Health Organization (WHO) International Clinical Trials Registry Platform Search Portal from numerous international trial registers (www.who.int/trialsearch).

To avoid unplanned duplication and enable comparison of reported review methods from other systematic reviews, authors may search PROSPERO (<http://www.crd.york.ac.uk/PROSPERO>), an international database of prospectively registered systematic reviews in health and social care.

3.3.6 Institutional repositories

Institutional repositories are online resources that research institutions such as universities provide for collecting and disseminating intellectual output. Publication types may include journal articles, theses and dissertations, and may be a mixture of published and grey literature.

The Directory of Open Access Repositories (OpenDOAR) and the Register of Open Access Repositories (ROAR) are comprehensive directories of academic open access repositories, providing both repository lists, as well as the possibility to search for repositories or search repository contents. For a list of Canadian Institutional Repositories see CARL's listing (<http://www.carl-abrc.ca/ir.html>)

3.4 HANDSEARCHING

Handsearching involves a manual page-by-page examination of the entire contents of a journal issue or conference proceedings to identify all eligible reports of trials. In journals, they may appear in articles, abstracts, news columns, editorials, letters or other text. Handsearching journals and conference proceedings can be a useful adjunct to searching electronic databases for at least two reasons: 1) not all studies are included in electronic bibliographic databases, and 2) even when they are included, they may not contain relevant search terms in the titles or abstracts or be indexed with terms that allow them to be easily identified as studies (10). A Cochrane Methodology Review found that a combination of handsearching and electronic searching is necessary for full identification of relevant reports published in journals, even for those that are indexed in MEDLINE. However, the difference in the retrieval rate between handsearching and electronic searches is reduced when using a complex electronic search such as the highly sensitive search strategies prepared by Cochrane (42).

As handsearching is a labour intensive process, reviewers may wish to consider only manually scanning the Table of Contents of the most current issues of those journals in which a large number of included studies have been found. This will ensure picking up studies that have not yet been indexed by the databases.

3.5 SUMMARY POINTS

As there is no preferred single source of reports of trials that can be searched for Campbell reviews, a broad selection of databases needs to be searched in order to ensure a comprehensive search strategy.

- Consult the TSC or information specialist to select national, regional and subject-specific databases that index literature related to the topic of the review.
- Consider alternate sources of information including conference abstracts, technical reports, theses and dissertations, and grey literature sources to complement the database search retrieval.
- Search trial registries to identify ongoing studies for possible inclusion in the review.
- Review reference lists of existing reviews and relevant studies for additional studies. Handsearch the table of contents of key journals to identify newly published/non-indexed publications.

4 Planning the search

4.1 TRIALS SEARCH CO-ORDINATORS (TSCS) AND ACADEMIC LIBRARIANS

Prior to beginning the search phase of the information retrieval process, it is worthwhile to invest time in the planning of the sources to be consulted and the preparation of search strategies for each.

The CCGs offer support to authors in study identification from the early planning stage to the final write-up of the review for publication in the *Campbell Library*. This support might include designing search strategies or advising on their design, running searches, in particular in databases not available to the review author at their institution, and providing access to translators. The range of services offered varies across CCGs according to the resources available. Review authors are, therefore, encouraged to contact the TSC of their CG at the earliest stage for advice and support.

If authors are conducting their own searches, they should seek advice from their TSC with respect to which database(s) to search and the exact strategies to be run. It should also be kept in mind that the search process needs to be documented in enough detail throughout to ensure that it can be reported correctly in the review, to the extent that all the searches of all the databases are reproducible. The full search strategies for each database should be included in the review in an Appendix. It is, therefore, important that review authors save all search strategies and take notes regarding decisions taken at the time to enable the completion of that section at the appropriate time. See Appendix III for a Database Worksheet template that may be used in this regard. For further guidance on this, authors should contact their TSC, and see Section 8.

If the CG is currently without a TSC it is recommended that review authors seek guidance from an academic librarian or information specialist with experience in supporting systematic reviewers.

4.2 THE CAMPBELL COLLABORATION REVIEW PROCESS

Prior to submitting a Campbell review, reviewers must submit a protocol, or plan of their review to their CCG. Referees will review this protocol to ensure that all the necessary steps are to be completed correctly. This review procedure includes a review of the information retrieval stage. An information retrieval checklist (see Appendix IV) is used both at this stage and at the review stage.

It is recommended that reviewers consult this checklist during the planning phase to ensure their plan matches the criteria that will be used to judge the review's completeness.

4.3 SEARCH UPDATES

When a Campbell review is updated, the search process (i.e., deciding which databases and other sources to search and for which years) will have to be reviewed. Those databases that were previously searched and are considered relevant for the update will need to be searched again.

The previous search strategies will need to be updated to reflect issues such as changes in indexing such as the addition or removal of controlled vocabulary terms; changes in search syntax; comments or criticisms of the previous search strategies. If any of the databases originally searched are not to be searched for the update this should be explained and justified. New databases or other sources may have been produced or become available to the review author or TSC and these should also be considered.

Tip: Search strategies within a database may be saved for future use but the strategies may have to be tweaked due to new-found keywords or changes in the database provider's search software.

4.4 SUMMARY POINTS

- Allocate sufficient time to plan search strategies and tailor strategies for selected databases.
- Consult the IRMG search checklist and document the number of records retrieved and search date for each database searched.
- When updating searches, original strategies may have to be refined due to: changes in the providers' software, changes in controlled vocabulary, or concerns from other researchers related to the original strategies used.

5 Search strategies

5.1 AN INTRODUCTION

This section highlights some of the issues to consider when designing search strategies for databases within the social sciences, but it does not completely address the many complexities in this area. There are two important reasons for this:

1. **Range of databases:** Given the multidisciplinary nature of most social science research questions and the large selection of social science-related databases, searches must be implemented in multiple databases. Terminology (both keywords and controlled vocabulary) will vary across these databases as different disciplines often use different words to mean the same thing.
2. **Database providers:** The same database is supplied by different organizations, called database providers. Examples of database providers are, EBSCO, Gale, Institute for Scientific Information, Ovid and ProQuest. For example, ERIC is supplied by EBSCO, ProQuest, and Ovid, as well as its producer, Institute of Education Sciences. Each database provider designs their own search software and packages the data within the database differently (e.g. some fields may be included, others may not). This means that commands, operators, limiting options, and availability of fields will differ, resulting in the need to understand each provider's software thoroughly.

Given the above, customized search strategies must be constructed for each database as terminology will vary across disciplines, and the way one searches will differ across databases. It is for these reasons that the construction and implementation of searches requires the skills of a TSC or academic librarian as one risks missing retrieving key studies if searches are poorly constructed or improperly implemented.

The review inclusion criteria will inform how the search is designed. The inclusion criteria may specify the eligible study designs, participants, interventions and, outcomes. Other aspects to consider in planning a search include:

- Geographic considerations;
- Publication language;
- Publication dates (keeping in mind that retrieval tools have different beginning dates and may not index very old material);
- Relevance of data from unpublished sources.

5.2 SENSITIVITY VERSUS PRECISION

Searches for systematic reviews aim to be as extensive as possible in order to ensure that as many as possible of the necessary and relevant studies are included in the review. It is, however, necessary to strike a balance between striving for comprehensiveness and maintaining relevance when developing a search strategy. Increasing the comprehensiveness (or sensitivity) of a search will reduce its precision and will retrieve more non-relevant articles.

Sensitivity is defined as the number of relevant reports identified divided by the total number of relevant reports in existence. Precision is defined as the number of relevant reports identified divided by the total number of reports identified.

Conducting searches is an iterative process in which the terms that are initially used may be modified based on what has already been retrieved. There are diminishing returns for search efforts; after a certain stage, each additional unit of time invested in searching returns fewer references that are relevant to the review. Consequently there comes a point where the rewards of further searching may not be worth the effort required to identify the additional references. The decision as to how much to invest in the search process depends on the question a review addresses and the resources that are available. It should be noted, however, that article abstracts identified through a literature search can be ‘scan-read’ very quickly to ascertain potential relevance. The process can be facilitated by answering a few specific questions that relate to the inclusion criteria when scanning the abstracts, such as “Does this document report an empirical study?” or “Are children age 3-18 in the sample?”. If the answer to any question is No, then the reference is excluded. But any study that makes it through all of the questions answered either Yes or Can’t Tell, is retrieved. At an estimated reading rate of two abstracts per minute, the results of a database search can be ‘scan-read’ at the rate of 120 per hour (or approximately 1000 over an 8-hour period), so the high yield and low precision associated with systematic review searching is not as daunting as it might at first appear in comparison with the total time to be invested in the review. Nonetheless, librarians or search experts working on a review should consult with investigators to target the search appropriately within the parameters of the inclusive searching that is conducted for systematic reviews.

5.3 SEARCH STRATEGY STRUCTURE AND COMPONENTS

The structure of a search strategy should be based on the main concepts being examined in a review. For a Campbell review, the review title and stated objectives should provide these concepts. The eligibility criteria for studies to be included will further assist in the selection of appropriate subject headings and keywords for the search strategy. It is usually unnecessary and even undesirable, to search on every aspect of the review’s research question. Although a question may address particular settings or outcomes, these concepts may not be well described in the title or abstract of an article and are often not well indexed with controlled vocabulary terms. They generally, therefore, do not lend themselves well to searching.

Generally speaking, a search strategy to identify intervention studies will typically have three sets of terms: 1) the **condition of interest**, i.e., the population; 2) the **intervention(s)** evaluated; and 3) the **outcomes** (optional). Limiting commands may be used to further narrow the results by study design (or document type), dates, language, etc.

Tip: The greater the number of Limiting commands used, the greater the risk of biasing the results of a review.

Once decisions have been made regarding which databases will be searched, the following key decisions will need to be made:

- What are the key concepts to be searched?
- How are these key concepts represented in each relevant (or related) field and across different cultures?
- What are the related terms for these key concepts?
- How are these key concepts represented in the controlled vocabulary within each database?

5.4 KEYWORDS AND CONTROLLED VOCABULARY

Search statements in subject databases may be constructed using keywords (often referred to as natural language), i.e., those terms used by the author in the title or abstract. However the majority of subject databases may be searched using standardized subject terms assigned by indexers. Standardized subject terms (as part of a controlled vocabulary found in a thesaurus) are useful because they provide a way of retrieving articles that may use different terms to describe the same concept and because they can provide information beyond that which is simply contained in the words of the title and abstract.

When searching for studies for a systematic review, however, the extent to which subject terms are applied to references should be viewed

Tip: Each database has developed its own controlled vocabulary, which is listed in a database's thesaurus. When planning a search, it is useful to scan the online version of the thesaurus to get a sense of the terminology used, and to view broader, narrower and related subject terms.

with caution. Authors may not describe their methods or objectives well and indexers are not always experts in the subject areas or methodological aspects of the articles that they are indexing. In addition, the available indexing terms might not correspond to the terms the searcher wishes to use. Thus, it is recommended that both keywords (natural language) terms and controlled vocabulary be used in a search strategy.

One way to **begin** to identify controlled vocabulary terms for a particular database is to retrieve articles from that database that meet the inclusion criteria for the review, and to note common keywords and the subject terms the indexers have applied to the articles, which can then be used for a full search. However, while this approach is very effective, additional controlled vocabulary terms **must be identified** using the thesaurus provided within each of the databases searched.

To help illustrate this process, the following example (see Box 5.1) draws on a Campbell review (Nye 2006 {#24}) on parental involvement. The purpose of this review was to assess the effects of parental involvement on the academic performance of elementary school age children. Box 5.1 presents an example of the terminology used when preparing the ERIC search. Note that a mixture of controlled vocabulary and keywords (natural language) terms are listed, with the use of a truncation symbol (the asterisk) to pick up variants of some terms (parent, parental, for example). The database provider in the ensuing examples uses the term ‘Descriptor’ to describe controlled vocabulary terms.

Box 5.1: ERIC example on parent involvement

Selecting Keywords and Descriptors for ERIC

Descriptors: Parent Involvement See: Parent participation

Related descriptors: Family involvement, Parent-school relationship, Parent-student relationship, Parent role, Parents as teachers

Relevant keywords: parent* involvement, parent* effectiveness, parent* support, family support, family participation

Descriptors: Academic Performance See: Academic achievement

Related descriptors: Science achievement, Reading achievement, Literacy Achievement, Writing achievement, Achievement gains

Descriptors: Elementary school children See: Elementary school students

Related descriptors: Elementary education, Primary education, Kindergarten

A similar strategy would be used for every database consulted, but would need to be customised according to the controlled vocabulary used within each of them. Box 5.2 presents an example of the terminology used for the PsycINFO® search that was used in the abovementioned review. Note that in this database (and in others), certain important concepts may also be represented in fields other than those for controlled vocabulary index terms, and natural language titles or abstracts. In this example, Classification Code and Age Group are fields within PsycINFO® that contain relevant concepts.

Box 5.2: PsycINFO example on parent involvement

Selecting Free Text Terms and Descriptors for PsycINFO

Descriptors: Parent involvement See: Parent-school relationship

Related descriptors: Parenting style; Parental role; Parents; Involvement; Participation

Relevant keywords: parent* involvement; parent* practices; parent* behaviours

Descriptors: Academic performance See: Academic achievement

Classification Code: Academic-Learning-and-Achievement

Descriptors: Elementary school children See: Elementary school students

Age Group: Childhood (birth-12-yrs); School-Age (6-12-yrs)

A constant dialogue between members of the review author(s) and the TSC is essential as search strategies and terms are adjusted on the basis of decisions that are made following the review of potential studies. By not identifying the correct terms within each field, one risks missing relevant studies.

Similarly, a common error by novice searchers is the use of redundant terminology within a given field, and this may yield many unwanted hits (low precision). For example, using 'education' as a keyword within an education database such as ERIC, or 'psychology' as a keyword within PsycINFO, is likely to produce many unnecessary records.

Review authors should assume that earlier articles are even harder to identify than recent articles. For example, abstracts are not included in MEDLINE for most articles published before 1976 and, therefore, keyword searches will only apply to titles. In addition, few indexing terms relating to study design were available before the 1990s, so keyword searches are necessary to retrieve older records. In order to identify as many relevant records as possible searches should comprise a combination of subject terms selected from the controlled vocabulary or thesaurus with a wide range of keywords.

5.5 FORMULATING SEARCH STATEMENTS

Some of the key decisions to be taken when formulating the search statements are related to the following questions:

- Which terms should be searched as controlled vocabulary or as keywords (natural language)?
- What keywords should be truncated?
- What Boolean operators should be used and how should they be logically arranged?
- What limiting features are available to target primary studies only (for example, use of Document Type codes)?
- What time period should be searched?
- Will the search be limited by language?

5.5.1 Boolean operators (AND, OR and NOT)

A search strategy should build up the controlled vocabulary terms, keywords, synonyms and related terms for each concept one at a time, joining together each of the terms within each concept with the Boolean 'OR' operator (see demonstration search strategies in Section 5.7). This means articles will be retrieved that contain at least one of these search terms. Sets of terms should be developed for the population or condition, intervention(s) and outcome (optional). These three sets of terms can then be joined together with the 'AND' operator. This final step of joining the three sets with the 'AND' operator limits the retrieved set to articles of the appropriate study design that address both the population or condition of interest and the intervention(s) to be evaluated. A note of caution about this approach is warranted however: if an article does not contain at least one term from each of the three sets, it will not be identified. For example, if an index term has not

been added to the record for the intervention and the intervention is not mentioned in the title and abstract, the article would be missed. A possible remedy is to omit one of the three sets of terms and decide which records to check on the basis of the number retrieved and the time available to check them. The 'NOT' operator should be avoided where possible to avoid the danger of inadvertently removing from the search set records that are relevant. For example, when searching for records indexed as female, 'NOT male' would remove any record that was about both males and females.

5.5.2 Phrase searching and proximity operators (NEAR and WITHIN)

Most databases offer the ability to search for two or more words, in the ordered specified, commonly by enclosing keywords within quotes. An example of phrase searching would be: "parent* involvement".

Many database providers allow the searcher to use proximity operators (e.g., NEAR, WITHIN) that specifies the relationship of two or more concepts within a field. This results in higher sensitivity than simple phrase searching but greater precision than use of the 'AND' operator. It is, therefore, desirable to use this operator where available and relevant.

For example, the 'NEAR' operator in *EBSCO* databases will find the search terms within "x" words of each other regardless of their order. So "parent* N3 involvement" will find these two keywords within three words of each other regardless of the order in which they appear. Similarly, the 'WITHIN' operator finds the words if they are within "x" words of one another, but in the order in which they have been entered. So "parent* N3 involvement" will find these two keywords within three words of each other, but in the order specified.

The availability and commands of proximity operators will vary depending on the provider of the database. It is therefore important to consult the Help or Search Tips section within each database.

5.5.3 Synonyms, related terms, variant spellings, and truncation

When designing a search strategy, in order to be as comprehensive as possible, it may be necessary to include a wide range of keywords for each of the concepts selected. For example, a search for *elearn** using the asterisk as a truncation character to retrieve 'elearn', 'elearners' or 'elearning' only yielded 37 records as shown in Box 5.3. An experienced searcher would not be satisfied with this result, knowing that there are bound to be more items within ERIC pertaining to this topic. In this example, the searcher also had to use a proximity operator, 'near1', to pick up the hyphenated term 'e-learning'. Yet this still did not retrieve all the relevant records. Upon closer examination of the results and a scan of the subject fields, the Identifier 'electronic learning' was found (consultation of the ERIC thesaurus did not reveal this subject term because Identifiers are new terms, not yet listed in the thesaurus). The final set of retrieved records numbered 536.

Locating the correct term

Set #1: elearn* (37 records)

Set #2: e near1 learn* (459 records)

Display of a record from Set #2

AU: Holstrom,-Lisa

TI: Eliminating Barriers for All E-Learners.

SO: Educational Technology. v43 n6 p61-62 Nov-Dec 2003

DE: *Access-to-Education; *Distance-Education

DE: Feedback-; Higher-Education; Literacy-; Low-Income-Groups; Skill-Development

IDM: *Barriers-to-Participation; *Electronic-Learning

IDR: Educational-Media-Use; University-of-Cincinnati-OH

Set #3: (electronic learning) in DE,ID (104 records)

Final search statement:

Set #4: ((electronic learning) in DE, ID) or (e near1 learn*) or (elearn*) (536 records)

5.5.4 Language and date restrictions

Research related to identifying trials has recently focused on the effect of excluding versus including from meta-analyses trials reported in languages other than English. This question is particularly important because the identification and translation of, or at least data extraction from, trials reported in languages other than English can add to the cost and time to complete a review. Whenever possible, review authors should attempt to identify and assess for eligibility all possibly relevant reports of trials irrespective of language of publication. Ideally no language restrictions should be included in the search strategy to minimize bias.

The application of a Date restriction will depend on the research question being addressed. For example, if it is known that relevant studies could only have been reported during a specific time period, for example if the intervention was only available after a certain time point (e.g. web-based learning in schools would not be addressed prior to the mid-1990s).

5.5.5 Search filters versus limiting commands

Search filters are predefined strategies that are designed to retrieve specific types of records, such as those of a particular methodological design. Used extensively in the medical and health sciences, they may also be used when searching in the social sciences, but with some caution. For example the RCT filter developed by Cochrane for MEDLINE has been well tested and may be used as it is in MEDLINE (see Box 5.4). A search filters web site has been developed by the UK InterTASC Information Specialists Subgroup (ISSG), which is the group of information professionals supporting research groups within England and Scotland providing technology assessments to the National Institute for Health and Clinical Excellence (NICE) (43). The purpose of the web site is to list methodological search filters and ultimately to provide critical appraisals of the various filters. The site includes, amongst others, filters for identifying systematic reviews, randomized and non-

randomized studies and qualitative research in a range of databases and across a range of service providers (www.york.ac.uk/inst/crd/intertasc).

Box 5.4: Cochrane highly sensitive RCT search filter

Cochrane Highly Sensitive Search Strategy for identifying randomized trials in MEDLINE: sensitivity-maximizing version (2008 revision); Ovid format

- 5.5.6 randomized controlled trial.pt.
- 5.5.6 controlled clinical trial.pt.
- 5.5.6 randomized.ab.
- 5.5.6 placebo.ab.
- 5.5.6 drug therapy.fs.
- 5.5.6 randomly.ab.
- 5.5.6 trial.ab.
- 5.5.6 groups.ab.
- 5.5.6 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8
- 5.5.6 exp animals/ not humans.sh.
- 5.5.6 9 not 10

However, there are two main problems with using search filters in the social sciences. Firstly, databases in the social sciences tend not to be as thoroughly indexed as those in medicine and may use methodological indexing inconsistently, if at all. Similarly if a search filter that uses keywords is used, potentially relevant studies may be missed, as reference to methodology is often not found in social sciences abstracts. This calls for a **broader** approach to searching for methodological contents. Searching for specific study types along with general terms might be a more useful way of limiting searches. For example experimenting with the use of keywords such as *study*, *studies*, *evaluation*, *control group**, *random** etc., on their own or combined with terms from existing study filters may prove to be effective. Note that some databases allow limiting to Methodological Design (e.g. Empirical study) or more broadly, Document Type (e.g. Research – Reports). This is commonly performed by using the Limit command.

5.5.6 Additional strategies

Many databases offer useful features such as “*Related Searches*” or “*Find Similar Results*”, or a list of subject headings extracted from the retrieved set will be displayed in a sidebar, along with the number of hits retrieved for each heading. The latter feature is especially useful as it may introduce new subject headings that were not previously considered while also providing an indication of the number of records within the database that contains a particular subject heading.

5.5.7 Search strategies for Internet search engines

Given an Internet search engine (Google, Google Scholar, Bing, etc.) that uses software to scan a database of keywords extracted from web pages, many of these search strategies may also be applied. For example, Phrase searching, Boolean Operators and Limiting features are typically all offered. Using the search engine’s Advanced search screen can provide an easy way of accessing these features.

Tip: Google’s Advanced search screen may be accessed by clicking on *Settings* in the bottom right corner.

Box 5.4 provides an example of Google’s Advanced search screen.

Advanced Search

Find pages with...		To do this in the search box.
all these words:	<input type="text"/>	Type the important words: <code>tri-colour rat terrier</code>
this exact word or phrase:	<input type="text"/>	Put exact words in quotes: <code>"rat terrier"</code>
any of these words:	<input type="text"/>	Type OR between all the words you want: <code>miniature OR standard</code>
none of these words:	<input type="text"/>	Put a minus sign just before words that you don't want: <code>-rodent, -"Jack Russell"</code>
numbers ranging from:	<input type="text"/> to <input type="text"/>	Put two full stops between the numbers and add a unit of measurement: <code>10..35 kg, £300..£500, 2010..2011</code>

Then narrow your results by...		
language:	<input type="text" value="any language"/>	Find pages in the language that you select.
region:	<input type="text" value="any region"/>	Find pages published in a particular region.
last update:	<input type="text" value="anytime"/>	Find pages updated within the time that you specify.
site or domain:	<input type="text"/>	Search one site (like <code>wikipedia.org</code>) or limit your results to a domain like <code>.edu, .org</code> or <code>.gov</code>
terms appearing:	<input type="text" value="anywhere in the page"/>	Search for terms in the whole page, page title or web address, or links to the page you're looking for.
SafeSearch:	<input type="text" value="Show most relevant results"/>	Tell SafeSearch whether to filter sexually explicit content.
reading level:	<input type="text" value="no reading level displayed"/>	Find pages at one reading level or just view the level info.
file type:	<input type="text" value="any format"/>	Find pages in the format that you prefer.
usage rights:	<input type="text" value="not filtered by licence"/>	Find pages that you are free to use yourself.

Boolean logic can be used by entering keywords into the following search windows:

- “All of these words” (AND),
- “Exact word or phrase” (Phrase searching),
- “Any of these words” (OR), and
- “None of these words” (NOT).

If keywords are entered into multiple search windows, the system will **AND** each search statement.

The screenshot shows the Google Advanced Search interface with the following text entered in the search windows:

- all these words:** elementary
- this exact word or phrase:** parental involvement
- any of these words:** performance achievement
- none of these words:** (empty)
- numbers ranging from:** (empty) to (empty)

For example, the search strategy entered into Google's Advanced search screen illustrated in Box 5.5, may be translated as: *elementary AND (performance OR achievement) AND "parental involvement"*

Similarly, search results may be narrowed by using specific **limits** such as: Language, Date, File type, or Domain.

Tip: Using the File type restriction is an effective way to limit your results to reports in Word or PDF documents.

5.6 DEMONSTRATION

Box 5.5 provides an example of some ERIC statements used in the review on parent participation. Note that a combination of descriptors (or controlled vocabulary) and keywords were used.

Box 5.5: Searching within ERIC

Using Boolean Operators and Limiting Commands

#1 (Parent participation OR Family involvement OR Parent-school relationship OR Parent-student relationship OR Parent role OR Parents as teachers) in DE

#2 Parent* NEAR2 involvement OR Parent* NEAR2 effectiveness OR Parent* NEAR2 support OR Famil* NEAR2 support or Family NEAR2 participation

#3 #1 OR #2

#4 (Academic achievement OR Science achievement OR Reading achievement OR Literacy Achievement OR Achievement gains) in DE

#5 (Elementary school students OR elementary education OR primary education OR kindergarten) in DE

#6 #3 AND #4 AND #5

Limiting commands: Research reports (DTC=143)

In the majority of cases, search strategies will require the use of Boolean operators such as 'AND' and 'OR'; proximity operators such as 'phrase', 'NEAR', 'WITHIN'; truncation characters using a wild card character such as the asterisk (*) to search on a stem word; and limiting commands to restrict retrieval by date, language, publication type or document type. Consult the 'Help' features within each database to ensure the correct syntax. For example, truncation characters may differ across databases, proximity operators may not be recognised or may be entered differently, and so on.

5.7 SUMMARY POINTS

- Aim for high sensitivity and be prepared to accept low precision.
- Tailor search syntax and controlled vocabulary for individual databases.
- For most Campbell reviews, the search strategy will be comprised of two main concepts: population or condition and intervention. Use of a third concept for outcomes will vary depending on the nature of the question.
- Avoid too many *different* search concepts in the search strategy. Use a variety of synonyms and related terms (both keywords and controlled vocabulary terms) combined with 'OR' within each concept.
- Combine different concepts with the 'AND' operator. Minimize use of the 'NOT' operator. Consider proximity operators to narrow search retrieval.

6 Reference management

6.1 BIBLIOGRAPHIC SOFTWARE

Specially designed bibliographic or reference management software such as EndNote, Reference Manager, Zotero, and RefWorks is useful and relatively easy to use to manage the references from searches, as well as the full-text of studies. Search results may be imported directly into a central database, managed (elimination of duplicates, addition of notes), and outputted in a variety of citation styles.

6.1.1 Features

Reference Manager is generally considered to be very efficient for identifying duplicate references but it does not support the wider range of character sets allowing references to be entered correctly in languages other than English, whereas EndNote does. Please note that automatic deletion of duplicate references in any reference management software is not recommended. The duplicate search feature is useful for finding possible duplicates, but the list needs to be checked manually in order to minimise the risk of deleting unique references. Bibliographic software also facilitates storage of information about the methods and process of a search. For example, separate unused fields can be used to store information such as 1) the name of database or other source details from which a trial report was identified, 2) when and from where an article was ordered and the date of article receipt and 3) whether the study associated with an article was included in or excluded from a review and if excluded the reasons for exclusion.

The choice of which software to use is likely to be influenced by what is available and thus supported at the review author's institution, although more recently freeware reference management software such as Zotero has become available. Wikipedia offers a good comparison of the main products, including price and version information (http://en.wikipedia.org/wiki/Comparison_of_reference_management_software).

6.2 POPULATING THE DATABASE

Reference management software allows for the manual entry of references and automated importing of search results from many databases.

In addition to the full record citation, the following fields should be considered for importing from the database search results where they are available.

Tip: Use Google Scholar's *Settings* to enable exportation of search results directly into your Reference Manager.

Abstract: abstracts can be used to eliminate clearly irrelevant reports, obviating the need to obtain the full text of those reports or to return to the bibliographic database at a later time.

Accession number/Unique identifier: it is advisable to set aside an unused field for storing the Unique Identifier/Accession Number of records downloaded, such as the ERIC number (EJ or ED). This allows subsequent linkage to the full database record and also facilitates information management such as duplicate detection and removal.

Affiliation/address: may include the institutional affiliation and / or e-mail address of the author(s).

Article identifier/Digital object identifier (DOI): should be used to cite and link to the full record.

Index terms/thesaurus terms/keywords: list of subject terms used to describe the study.

Language: language of publication of the original article.

Document Type or Methodology: describes the type of document (research report, literature review) or methodological design (empirical study, qualitative study).

Comments, corrections, errata, retractions and updates: it is important to ensure that any fields that relate to subsequently published comments, corrections, errata, retractions and updates are selected for inclusion in the download, so that any impact of these subsequent publications can be taken into account.

6.3 SUMMARY POINTS

- Use reference management software to store, manage, and export references, and save copies of the full-text articles.
- Ensure that all the necessary fields are downloaded.

7 Text mining

It is currently challenging to identify eligible studies for inclusion in systematic reviews in a timely and reliable way. A significant proportion of a review's budget is often spent developing and implementing search strategies and then sifting through thousands of study records – most of which are irrelevant. New developments in information technologies – and in particular in text mining – aim to transform the way that studies are identified, reducing the time and resource spent screening the results of database searches.

Text mining can offer efficiencies by automating some of the manual work whereby reviewers check each citation retrieved manually. The technology is able to do this by building a model, based on previous eligibility decisions, which is able to predict whether a given citation is likely to be relevant or irrelevant in a given review. The technology thus cannot automate the whole process, as it needs a representative sample of included and excluded citations, and requires iteration and interaction with human reviewers to operate most effectively.

A recent systematic review of text mining methods for identifying studies examined 44 evaluations of the ability of text mining to reduce workload in systematic reviews (44). Though it was difficult to compare results across studies due to differences in methodology, technology and evaluation contexts, the overall picture was positive, showing that, potentially, the use of text mining can reduce workload in reviews. The review made three main recommendations for reviewers: 1) that the use of text mining to rank citations for screening (with the most relevant at the top) should be considered safe, and ready for use; 2) that the use of text mining as a 'second screener' may also be used cautiously (in situations where every citation might be screened by two reviewers, text mining should be considered as an alternative to the 2nd reviewer); and 3) that the use of text mining to eliminate studies automatically, without any reviewer check, should be considered promising, but not yet fully proven (while excellent results are possible (45), more complex concepts – e.g. those used in the social sciences – may result in poorer performance (see Miwa et al. (46) for a comparison of two contexts).

While text mining may be ready for use in 'live' reviews – under certain circumstances – there are few situations where it is actually being used. This is partly because the technology is still being developed, and so software solutions are scarce, but it may also be because reviewers have not been able to engage with the technology properly, and so develop methods for its most effective utilisation (47). Reviewers and computer scientists should work together to explore how the potential of these new technologies might be realised to make the review process more efficient, potentially moving beyond study identification and automating other phases of the review as well (48, 49).

7.1 RESOURCES

There are only a few tools currently available that provide text mining functionality for screening citations in systematic reviews: Abstrackr, from Brown University, USA (<http://abstrackr.cebm.brown.edu/account/login>), EPPI-Reviewer from UCL in London, UK (<http://eppi.ioe.ac.uk/cms/Default.aspx?tabid=2914>), and Rayaan from the Qatar Computing Research Institute, Qatar (<http://rayyan.qcri.org/>). There are many open source offerings providing generic text mining functionality (including the widely used open source software, R: <http://cran.r-project.org/web/packages/tm/vignettes/tm.pdf>), but these require more technical knowhow to use than the aforementioned bespoke tools.

7.2 SUMMARY POINTS

- Text mining has the potential to reduce screening workload in systematic reviews and to make the screening process more efficient.
- It should be safe to use for ranking the order in which citations are screened to facilitate the early identification of relevant studies.
- It can also be used cautiously to replace a 'second screener' when all citations are being double-screened.
- Automatic elimination of irrelevant studies should be considered promising, but not yet fully proven in all domains.
- Reviewers and computer scientists should work together to further develop methods and tools in this area.

8 Reporting and documenting the search

The search process needs to be documented in enough detail throughout the process to ensure that it can be reported correctly in the review, to the extent that all the searches of all the databases are reproducible. It should be borne in mind at the outset that the full search strategies for each database will need to be included in the review. The search strategies will need to be copied and pasted exactly as run and included in full, together with the search set numbers and the number of records retrieved. The number of records retrieved will need to be recorded in the Results section of the review, under the heading 'Results'. The search strategies should not be re-typed as this can introduce errors. See Appendix III for a template that may be used for this purpose.

It is recommended that review authors should seek guidance from the TSC in the group with which they are working at the earliest opportunity with respect to documenting the process. A well-documented search will facilitate writing up this section of the review. As mentioned elsewhere in this document, it is particularly important to save locally or file print copies of any information found on the internet as this information may no longer be accessible at the time the review is written up.

8.1 REPORTING THE SEARCH PROCESS

8.1.1 Reporting the search process in the protocol

The inclusion of the search strategy in the protocol for a Campbell review is mandatory. The actual searches should first be undertaken when the protocol is accepted.

8.1.2 Reporting the search process in the review

Reporting the search process in the review:

- List all databases searched;
- Note the dates of the last search for each database AND the period searched;
- Note any language or publication status restrictions;
- List grey literature sources;
- List individuals or organizations contacted;
- List any journals and conference proceedings specifically handsearched for the review;
- List any other sources searched (e.g., reference lists, the internet).

8.2 DOCUMENTING THE SEARCH

The full search strategies for each database should be included. The search strategies should be copied and pasted exactly as run and included in full together with the line numbers for each search set. They should not be re-typed as this can introduce errors. For further detailed guidance on this contact the TSC.

8.3 SUMMARY POINTS

- Seek guidance on documenting the search process from a TSC before starting searching.
- Copy and paste the full strategy for searches of all sources into the review.
- Use the IRMG template to help document this process.
- Save locally or file print copies of any information found on the internet.

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Appendix I: Literature sources

FREE OR LOW-COST DATABASES AND FULL-TEXT JOURNALS

Database	URL (March 2015)	Additional Information
The Evidence Network, Centre for Evidence & Policy at King's College London	http://www.kcl.ac.uk/innovation/research/researchportal/openaccess.aspx	provides access to a wide range of information resources in social and public policy and acts as a gateway to the social science literature
The Health InterNetwork Access to Research Initiative (HINARI)	www.who.int/hinari/en/	provides access to a wide range of databases including The Cochrane Library and nearly 4000 major journals in biomedical and related social sciences in local, not-for-profit institutions in low-income countries
The International Network for the Availability of Scientific Publications (INASP)	www.inasp.info/file/68/about-inasp.html	provides access to a wide range of databases including The Cochrane Library and journals
Electronic Information for Libraries (eIFL)	www.eifl.net/cps/sections/about	supports affordable licensing of journals in 50 low-income and transition countries
PubMed Central (PMC)	http://www.ncbi.nlm.nih.gov/pmc/	free full-text archive of biomedical and life sciences journal literature at the U.S. National Institutes of Health's National Library of Medicine (NIH/NLM)

MAJOR SUBJECT SPECIFIC DATABASES

Biology and Pharmacology

BIOSIS: Comprehensive source for life sciences research provides access to Biological Abstracts and BIOSIS Previews

www.thomsonreuters.com/content/PDF/scientific/BIOSIS_Factsheet.pdf

Derwent Drug File:

scientific.thomson.com/support/products/drugfile/

International Pharmaceutical Abstracts:

<http://health.ebsco.com/products/international-pharmaceutical-abstracts>

TOXLINE:

Subset of MEDLINE for toxicology citations

<http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?TOXLINE>

Communication and Language

Communication Abstracts: Provides abstracts to journal articles, books, book chapters and reports in the field of communication studies. It is international in scope and includes general communication, mass communication, organizational communication, radio, television, broadcasting, journalism, public relations, public opinion, advertising, small group communication, interpersonal and intrapersonal communication

Linguistics and Language Behavior Abstracts (LLBA):

Covers disciplines concerned with the nature and use of language.

Community Health and Social Welfare

AgeLine:

Provides abstracts to the literature of social gerontology as well as aging-related research from psychology, sociology, social work, economics, public policy, and the health sciences.

<http://www.ebscohost.com/ACADEMIC/ageline>

Child Abuse, Child Welfare & Adoption Database:

Bibliographic resource on the maltreatment, safety, permanency and well-being of children. Citations and abstracts are to books, journal articles, final reports from federally-funded grants, conference papers, unpublished papers, reports on completed or continuing research, as well as descriptions of service programs and prevention and treatment strategies. Materials cited are primarily in English-language, originating from U.S. research and service programs.

www.nisc.com/factsheets/qcan.asp

ChildData:

Provides access to policy, legislation, practice and research on the care, education, health and welfare of children.

<http://www.ncb.org.uk/childdata>

Child Welfare Information Gateway:

Access to information and resources relating to child welfare, including child abuse prevention, out-of-home care, and adoption. Items selected include peer-reviewed articles, books, evaluation reports, grantee final reports and program reports.

<https://www.childwelfare.gov/>

CommunityWISE:

Indexes published and unpublished material on community and social issues including health, education, welfare, and the physical environment.

www.oxmill.com/communitywise/

HUD USER Database:

Housing and community development issues. It contains full-abstract citations to research reports, articles, books, monographs, and data sources in housing policy, building technology, economic development, urban planning, and a host of other relevant fields.

www.huduser.org/search/search_biblio_adv.asp

Social Care Online:

Social care information; free on the internet.

www.scie-socialcareonline.org.uk/

Social Science Research Network (SSRN):

eLibrary is composed of references from a number of specialized research networks in each of the social sciences, containing abstracts for accepted journal articles from scholarly journals and working paper abstracts from academic schools, institutions, and departments and independent research centers.

<http://www.ssrn.com/en/>

Social Services Abstracts:

Social work, human services and related fields

<http://www.proquest.com/products-services/ssa-set-c.html>

Crime and Justice**Bibliography of Nordic Criminology:**

Bibliographical data on criminological research literature published in the Nordic countries and relevant literature by authors from the Nordic countries published in other countries. The data material includes scientific literature, scholarly literature, grey material, special literature, reports published by public authorities, monographs, periodical articles and other articles of relevance. The database is no longer being updated.

<http://www.nsfk.org/BIBLIOGRAPHY>

CrimDoc (Criminology Library Grey Literature):

From the Centre of Criminology Library at the University of Toronto comprises grey literature from the field of criminology, as well as other, related areas of specialization and is composed of institute, association, and government publications, as well as unpublished documents.

<http://link.library.utoronto.ca/criminology/crimdoc/index.cfm>

NCJRS Abstracts Database:

Hosted by the National Criminal Justice Reference Service (NCJRS). The collection, with holdings from the early 1970s to the present, contains publications, reports, articles, and audiovisual products from the United States and around the world. These resources include statistics, research findings, program descriptions, congressional hearing transcripts, and training materials.

www.ncjrs.gov/library.html

Social Science Research Network (SSRN):

eLibrary is composed of references from a number of specialized research networks in each of the social sciences, containing abstracts for accepted journal articles from scholarly journals and working paper abstracts from academic schools, institutions, and departments and independent research centers.

<http://www.ssrn.com/en/>

Education

Education Abstracts:

Full-text coverage of an international range of English-language periodicals, monographs and yearbooks

Education Full Text:

Wilson. Indexes education-related periodicals

ERIC:

Provides free access to millions of bibliographic records of journal articles and other education-related materials, such as journal articles, books, research syntheses, conference papers, technical reports, policy papers and other education-related materials. ERIC has special collections from the What Works Clearinghouse and the Regional Educational Laboratories, and also provides full-text access to grey literature, ranging from informational materials to researched and reviewed documents, including research syntheses, conference papers, and policy reports.

www.eric.ed.gov/

Health, Medicine, and Nursing

Allied and Complementary Medicine (AMED):

Contains records from journals dealing with alternative or complementary medicine and related medical professions;

<http://www.bl.uk/reshelp/findhelpsubject/scitectenv/medicinehealth/amedpublisherslist/amedpubs.html>

BiblioMap:

EPPI-Centre database of health promotion research (free on the internet).

eppi.ioe.ac.uk/webdatabases/Intro.aspx?ID=7

British Nursing Index (BNI):

UK index of nursing and midwifery scholarly literature

www.bnipius.co.uk/

CIRRIE Database of International Rehabilitation Research:

Contains citations of international research on rehabilitation;

cirrie.buffalo.edu/search/index.php

Cochrane Central Register of Controlled Trials (CENTRAL):

The Cochrane Central Register of Controlled Trials (CENTRAL) serves as the most comprehensive source of reports of controlled trials. CENTRAL is published as part of *The Cochrane Library* and is updated quarterly.

Many of the records in CENTRAL have been identified through systematic searches of MEDLINE and EMBASE. Information about access to *The Cochrane Library* for specific countries can be found under 'Access to Cochrane' at the top of *The Cochrane Library* home page.

www.thecochranelibrary.com

Cumulative Index to Nursing and Allied Health (CINAHL):

Comprehensive resource for literature on nursing and allied health.

<http://health.ebsco.com/products/the-cinahl-database/allied-health-nursing>

Database of Promoting Health Effectiveness Reviews (DoPHER):

Indexes systematic and non-systematic reviews of health promotion and public health effectiveness. Free on the internet.

<http://eppi.ioe.ac.uk/webdatabases4/Intro.aspx?ID=9>

EMBASE:

Comprehensive international biomedical literature database. Journal coverage overlaps with that of MEDLINE; however, EMBASE includes many international publications and may be especially useful for drug information.

<http://www.elsevier.com/online-tools/embase>

EMCare:

Indexes allied health, nursing, and biomedical literature; about half of the 3,000 titles in EMCare overlap with those in EMBASE

Global Health:

Specializes in public health research and practice;

<http://www.cabi.org/publishing-products/online-information-resources/global-health>

Health Management Information Consortium (HMIC):

Records from the Library & Information Services department of the Department of Health (DH) in England and the King's Fund Information & Library Service.; source of grey literature on topics such as health and community care management and organizational development, inequalities in health, user involvement, and race and health.

http://www.lshtm.ac.uk/library/resources/databases/info_hmic.html

MEDLINE:

Comprehensive health sciences database produced by the U.S. National Library of Medicine. Free access is available via PubMed.

<http://www.ncbi.nlm.nih.gov/pubmed>

OTseeker:

Systematic reviews and appraised randomized trials in occupational therapy. Free on the internet.

www.otseeker.com/

Ovid HealthSTAR:

Comprised of data from the National Library of Medicine's (NLM) MEDLINE and former HealthSTAR databases. It contains citations to the published literature on health services, technology, administration, and research from multiple sources from 1975 to the present.

www.ovid.com/site/products/ovidguide/hstrdb.htm

PSycInfo®:

Psychiatry and psychology literature. Available via subscription from the APA.

PsycEXTRA:

Grey literature companion to the scholarly PsycINFO database. Documents include newsletters, magazines, newspapers, technical and annual reports, government reports, consumer brochures, and more. PsycEXTRA is different from PsycINFO in its coverage, and also in its format, because it includes abstracts and citations plus full text for a major portion of the records. There is no coverage overlap with PsycINFO.

www.apa.org/psyceextra/

Physiotherapy Evidence Database (PEDro):

Systematic reviews and appraised randomized trials in physiotherapy (free on the internet).

www.pedro.fhs.usyd.edu.au/

POPLINE:

Reproductive health (free on the internet).

<http://www.popline.org/>

Rehabdata (naric):

Indexes disability and rehabilitation research. <http://www.naric.com/?q=en/REHABDATA>

International Development

AccessUN:

Index to United Nations documents. Available through subscription

AGRICOLA:

Agriculture and allied disciplines.

<http://agricola.nal.usda.gov/>

EconLit:

Global economics and finance. Available through ProQuest.

Human Population and Natural Resource Management:

Human population and demography, natural resource management. Available through ProQuest

International Political Science Abstracts:

Political science and related disciplines. Available through EBSCO

Lexis-Nexis Academic:

News, business, legal information. Available through Lexis-Nexis subscription

PolicyFile:

Resource for U.S. public policy research, containing information from over 300 public policy think tanks, non-governmental organizations, research institutes, university centers, advocacy groups, and other entities. Most records link directly to the full-text report, paper, document or other source.

<http://www.policyfile.com/marketing/about.jsp>

POPLINE:

Reproductive and population health (free on the internet).

<http://www.popline.org/>

Public Affairs Information Service:

Public and social policy information. Available through ProQuest

Sustainable organization library (SOL):

Governance, sustainability, environmental management. Available via subscription at

<http://www.gseresearch.com/>

TRIS Online:

Contains records of published transportation research including technical reports, books, conference proceedings and journal articles. The time span covers literature from the 1960s to the present, with some coverage of prior years. Highway Research Board publications are covered back to 1923. Coverage includes the planning, finance, design and construction, materials, environmental issues, safety and human factors and operations for the modes of highways, transit, railroads, maritime and aviation.

<http://ntlsearch.bts.gov/tris/index.do>

UNESCO DOC:

Access to UNESCO documents. <http://www.unesco.org/new/en/unesco/resources/online-materials/publications/unesdoc-database/>

Web of Science:

Large database of science and social science information. Available via subscription at webofknowledge.com

World Bank e-Library:

Social and economic development. <http://elibrary.worldbank.org/>

World Bank OpenKnowledge Repository:

Access to World Bank publications. <https://openknowledge.worldbank.org/>

Worldwide Political Science Abstracts:

International political science and related fields. Available through ProQuest

Social Science, Psychology and Psychiatry**Applied Social Sciences Index and Abstracts (ASSIA):**

Health, social services, psychology, sociology, economics, politics, race relations and education.
www.csa.com/factsheets/assia-set-c.php

International Bibliography of the Social Sciences (IBSS):

Anthropology, economics, politics and sociology. www.lse.ac.uk/collections/IBSS/about/keyFacts.htm

PsycINFO®:

Database of psychological literature in the behavioral and social sciences.
www.apa.org/psycinfo/

Social Care Online:

Produced by the Social Care Institute for Excellence (SCIE) is a database of social care information, including research briefings, reports, government documents, journal articles, and websites.

<http://www.scie-socialcareonline.org.uk/>

Social Policy and Practice:

Evidence-based social science research;
www.ovid.com/site/catalog/DataBase/1859.pdf

Social Science Research Network (SSRN):

eLibrary is composed of references from a number of specialized research networks in each of the social sciences, containing abstracts for accepted journal articles from scholarly journals and working paper abstracts from academic schools, institutions, and departments and independent research centers.

<http://www.ssrn.com/en/>

MULTIDISCIPLINARY DATABASES

Academic Search Complete: Coverage spans virtually every area of academic study

<http://www.ebscohost.com/academic/academic-search-complete>

CAIRN: Collection of French language periodicals in the social sciences and humanities, teaching institutions and learned societies; most comprehensive collection of publications in the French language in the humanities and social sciences available online.

http://www.cairn.info/Accueil_Revues.php

CORDIS Library: Research and Technological Development (RTD) publications contains references to publications resulting from RTD programmes financed wholly or partly by the European Communities. In addition, the database contains references to other scientific and technical publications by the Commission not necessarily related to specific RTD programmes.

http://cordis.europa.eu/projects/home_en.html

Expanded Academic ASAP (GALE): Provides full text for indexed titles, which cover a range of subjects including social sciences, humanities, education, science and technology.

<http://www.gale.cengage.com/PeriodicalSolutions/academicAsap.htm?grid=ExpandedAcademicASAPRedirect>

National Technical Information Service (NTIS) provides access to the results of US and non-US government-sponsored research and can provide the full text of the technical report for most of the results retrieved.

www.ntis.gov/

Open Grey provides access to bibliographic references of grey literature produced in Europe. Subjects include science, technology, biomedical science, economics, social science and humanities.

<http://www.opengrey.eu/>

ProQuest Research Library: Includes titles on a wide range of academic subjects.

<http://search.proquest.com/index>

ScienceDirect: indexes journals, books chapters in multiple scientific disciplines including health sciences, social sciences, life sciences, physical science, and engineering.

<http://www.sciencedirect.com/>

Scopus: Journals and conference proceedings, and results from scientific web pages and patent records.

<http://www.scopus.com/>

Web of Science: Large database of science and social science information. Includes access to Science and Social Sciences Citation Indexes and other resources. Available via subscription at webofknowledge.com.

REGIONAL BIBLIOGRAPHIC DATABASES

Australia

Australian Education Index

www.acer.edu.au/library/aei/index.html

Britain

British Education Index

www.leeds.ac.uk/bei/index.html

Canada

CBCA Education

www.twu.ca/Library/cbcaeduc.htm

Canadian Research Index

http://www.proquest.com/products-services/canadian_research.html

Denmark

STATSBIBLIOTEKET

<http://www.statsbiblioteket.dk/>

Europe

PASCAL

<http://www.inist.fr/?PASCAL-73&lang=en>

Finland

LINDA

<http://linda.linneanet.fi>

India

IndMed (health sciences)

<http://indmed.nic.in/>

Latin America and the Caribbean

LILACS (health sciences)

<http://lilacs.bvsalud.org/en/>

Nordic Countries

Bibliography of Nordic Criminology (not updated since 2008)

<http://www.nsfk.org/BIBLIOGRAPHY>

Norway

Nasjonalt bibliotek for barnevern og familievern

www.nbbf.no/BUF/rss/Portal.php

DISSERTATIONS AND THESES DATABASES

DissOnline: Indexes German dissertations.

www.dissonline.de/

Index to Theses in Great Britain and Ireland: Theses dating back to the year 1716.

www.theses.com/

Networked Digital Library of Theses and Dissertations: Open access theses and dissertations.

<http://www.ndltd.org/>

ProQuest Dissertations and Theses: Extensive resource for North American theses and dissertations published since 1861.

www.proquest.co.uk/en-UK/catalogs/databases/detail/pqdt.shtml

Theses Canada: Provides access to the National Library of Canada's records of PhD and Masters' theses from Canadian universities.

www.collectionscanada.gc.ca/thesescanada/

FREE FULL TEXT JOURNAL SOURCES

BioMed Central

www.biomedcentral.com/browse/journals/

Public Library of Science (PLoS)

www.plos.org/journals/

PubMedCentral (PMC)

www.pubmedcentral.nih.gov/

Directory of Open Access Journals (DOAJ)

www.doaj.org

Education Research Global Observatory

<http://ergo.asu.edu/ejdirectory.html>

HighWire Press

highwire.stanford.edu/lists/freeart.dtl

CONFERENCE AND MEETING ABSTRACTS SOURCES

American Society of Criminology (ASC)

www.asc41.com/Annual_Meeting/priorabs.html

Conference Proceedings Citation Index

<http://thomsonreuters.com/en/products-services/scholarly-scientific-research/scholarly-search-and-discovery/conference-proceedings-citation-index.html>

EditLib (Educational Technology and E-Learning)

www.editlib.org/

Scopus: Journals and conference proceedings, and results from scientific web pages and patent records.

<http://www.scopus.com/>

SOURCES OF REVIEWS

Agency for Healthcare Research and Quality (AHRQ) Effective Health Care Program (EHC) funds effectiveness and comparative effectiveness research for clinicians, consumers, and policymakers to support health services research, improve the quality of health care, and promote evidence-based decisionmaking.

<http://www.effectivehealthcare.ahrq.gov/index.cfm>

Centre for Reviews and Dissemination (CRD) at the University of York includes *The Campbell Library*, *The Cochrane Library*, the *Database of Systematic Reviews*, and *The Database of Abstracts of Reviews of Effects (DARE)* and *PROSPERO*, an international registry of systematic review protocols.

<http://www.york.ac.uk/crd/>

The Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre) is part of the Social Science Research Unit at the Institute of Education, University of London.

<http://eppi.ioe.ac.uk/cms/>

The Joanna Briggs Institute (JBI) is the international not-for-profit, research and development arm of the School of Translational Science based within the Faculty of Health Sciences at the University of Adelaide, South Australia. JBI collaborates internationally to promote and support the synthesis, transfer and utilization of evidence to assist in the improvement of healthcare outcomes globally.

<http://www.joannabriggs.org>

The Social Care Institute for Excellence (SCIE) was established to improve social care services for adults and children in the United Kingdom. www.scie.org.uk/publications/index.asp

Appendix II: Grey literature

GREY LITERATURE SITES (Updated March 2015): Originally Prepared by Terri Thompson and William Durland, Canadian Council on Learning

Canadian Sites	
Aboriginal Canada Portal	http://www.aboriginalcanada.gc.ca/acp/site.nsf/en-frames/index.html
Association of Universities and Colleges of Canada	http://www.aucc.ca/
Atlantic Institute for Market Studies	http://www.aims.ca/
British Columbia Teachers' Federation	http://bctf.ca/
Caledon Institute on Social Policy	http://www.caledoninst.org/
Canada Millenium Scholarship Foundation	http://www.millenniumscholarships.ca/en/index.asp
Canada West Foundation	http://www.cwf.ca/
Canada's Digital Collections	http://epe.lac-bac.gc.ca/100/205/301/ic/cdc/E/Alphabet.asp
Canada's SchoolNet	http://www.schoolnet.ca/home/e/
Canadian Adolscents at Risk Research Network	http://educ.queensu.ca/~caarrn/index.htm
Canadian Association of Research Libraries (CARL) Canada's Institutional repository	http://carl-abrc-oai.lib.sfu.ca/
Canadian Centre for Policy Alternatives	http://www.policyalternatives.ca/
Canadian Chambers of Commerce	http://www.chamber.ca/article.asp?id=3
Canadian Council on Social Development	http://www.ccsd.ca/
Canadian Education association	http://www.cea-ace.ca/home.cfm
Canadian Education Statistics Council	http://www.cesc.ca/mainE.html
Canadian Evaluation Society (Grey literature data base)	http://www.evaluationcanada.ca/site.cgi?s=6&ss=8&_lang=en
Canadian Foundation for the Americas	http://www.focal.ca/
Canadian Institute for Research on Regional Development	http://www.umoncton.ca/icrpap/fs_mandate_en.html
Canadian Policy Research Networks	http://www.cprn.com/
Canadian Research Institute for Social Policy	http://www.unb.ca/crisp/index.php
Canadian Teachers' Federation	http://www.ctf-fce.ca/
Carleton School of Public Policy and Administration	http://www.carleton.ca/spa/Publication/index.html
CD Howe Institute	http://www.cdhowe.org/
Centre for Research and Information on Canada	http://www.cric.ca/
Centre for Research on Community Services	http://www.socialsciences.uottawa.ca/crcs/eng/publ.asp
Centre for the Analysis of Public Policy	http://www.capp.ulaval.ca/ (French only)
Childcare Resource and Research Unit (CRRU)	http://www.childcarecanada.org/

Community University Institute for Social Research	http://www.usask.ca/cuisr/publications/publications.html
Conference Board of Canada	http://www.conferenceboard.ca/
Council of Ministers of Education, Canada	http://www.cmec.ca/
Depository Services Program	http://dsp-psd.pwgsc.gc.ca/Epubs/epub_subject01-e.html#Education
Educational Policy Institute	www.educationalpolicy.org
Edvantia	http://www.edvantia.org/
Encyclopedia of Language and Literacy Development	http://literacyencyclopedia.ca/index.php?fa=categories.show
Evidence Based Library and Information Practice	http://ejournals.library.ualberta.ca/index.php/EBLIP/index
Fraser Institute	http://www.fraserinstitute.ca/
Frontier Centre for Public Policy	http://www.fcpp.org/main/index.php
Health Canada	http://www.hc-sc.gc.ca/index_e.html
Human Resources and Social Development Canada	http://www.hrsdc.gc.ca/en/cs/sp/sdc/pkrf/page00.shtml
Institute for advanced Policy Research	http://www.iapr.ca/
Institute for Research on Public Policy	http://www.irpp.org/indexe.htm
Links to all Education Ministries in Canada	http://www.edu.gov.on.ca/eng/relsites/oth_prov.html
The Learning Disabilities Association of Canada	http://www.ldac-taac.ca/index-e.asp
LORNET (portals and services for knowledge management and learning on the Semantic web)	http://www.lornet.org/
McGill Institute for the Study of Canada	http://www.misc-icem.mcgill.ca/
Metropolis International	http://www.international.metropolis.net/index_e.html
Montreal Economic Institute	http://www.iedm.org/main/search_en.php?select=1&theme_id=2
National Adult Literacy Database	http://www.nald.ca/index.htm
National Research Council Canada	http://www.nrc-cnrc.gc.ca/main_e.html
Ontario Institute for Studies in Education of The University of Ontario	http://www.oise.utoronto.ca/research/index.html
Open Access Bibliography	http://www.digital-scholarship.com/oab/oab.htm
Public Policy Forum	http://www.ppforum.com/en/
Policy.ca	http://www.policy.ca/
Society for the Advancement of Excellence in Education	http://www.saeec.ca/
Statistics Canada	http://cansim2.statcan.ca/cgi-win/cnsmcgi.exe?Lang=E&ResultTemplate=Srch2&CORCmd=GetTList&CORId=1821
The McCreary Centre Society	http://www.mcs.bc.ca/index.html
US Sites	
Academy Health	http://www.academyhealth.org/index.cfm

(ASCD) Association for Supervision and Curriculum Development	www.ascd.org
ACE (American Council on Education)	http://www.acenet.edu//AM/Template.cfm?Section=Home
AGRICOLA	http://agricola.nal.usda.gov/
Alliance for International Higher Education Policy Studies	http://www.nyu.edu/iesp/aiheps/
American Association of Colleges for Teacher Education: Education Policy Clearinghouse	http://www.edpolicy.org/
American Educational Research Association	http://www.aera.net/publications/?id=308
American Institutes for Research	http://www.air.org/
American Society of Civil Engineers	http://cedb.asce.org/?_ga=1.73684882.1490712920.1431027533
Brown Center on Education Policy at the Brookings Institution	http://www.brookings.edu/gs/brown/links.htm
Bureau of Labor statistics	http://www.bls.gov/
Campbell Collaboration	http://www.campbellcollaboration.org/index.asp
Center for Adult English Language Acquisition	http://www.cal.org/caelanetwork/
Center for Higher Education Policy Analysis (University of Southern California).	http://www.usc.edu/dept/chepa/
Center for Migration Studies	http://www.cmsny.org/
Center for Multilingual, Multicultural Research	http://www.usc.edu/dept/education/CMMR/
Center for Public Education	http://www.centerforpubliceducation.org
Center for Research on Learning and training	http://www.crlt.umich.edu/
Center for Studies in Higher Education (University of California, Berkeley).	http://cshe.berkeley.edu/
Center for the Study of Higher Education	http://www.ed.psu.edu/cshe/
CEP (Center on Education Policy)	http://www.cep-dc.org/
Child Welfare Information Gateway	http://www.childwelfare.gov/index.cfm
Clearinghouse on educational Policy and Management (CEPM)	http://www.eric.uoregon.edu/
Consortium for policy Research in Education	http://www.cpre.org/index_js.htm
Cornell Higher Education Research Institute	http://www.ilr.cornell.edu/cheri/
Council for Exceptional Children	http://www.cec.sped.org//AM/Template.cfm?Section=Home
CREDE Center for Research on Education, Diversity and Excellence	http://crede.berkeley.edu/
Department of Education	http://www.ed.gov/index.jhtml
Distance Education Clearinghouse	http://www.uwex.edu/disted/index.cfm
Economic Policy Institute	http://www.epinet.org/
educator's reference desk	http://www.eduref.org/
educause	http://www.educause.edu/
Ericae.net (Clearinghouse on Assessment and Evaluation)	http://ericae.net/nav-au.htm

Evidence-Based Program Database	http://www.alted-mh.org/ebpd/
GPO ACCESS Catalog of U.S. Government Publications	http://catalog.gpo.gov/F
Grey Literature Report (New York Academy of Medicine)	http://www.greylit.org/
Higher Education Research Institute	http://www.gseis.ucla.edu/heri/index.php
Hoover Institution	http://www.hoover.org/research/education
Institute for Research on Higher Education	http://www.irhe.upenn.edu/
Institute of Education Sciences	http://www.ed.gov/about/offices/list/ies/index.html
Institute of Medicine	http://www.iom.edu/Reports.aspx
Idonline.org (learning disabilities and ADHD)	http://www.idonline.org/
Knowledge Loom (Educators site)	http://knowledgeloom.org/index.jsp
Librarians' Internet Index	http://lii.org/
Manhattan Institute For Policy Research	http://www.manhattan-institute.org/
MERLOT Multimedia educational resource for learning and online teaching	http://www.merlot.org/merlot/index.htm
National Bureau of Economic Research	http://www.nber.org
National Center for Education Statistics	http://nces.ed.gov/
National Center for Policy Analysis	http://www.ncpa.org/iss/edu/
National Center for Public Policy and Higher Education	http://www.highereducation.org/
NCELE National Clearinghouse for English Language Acquisition and Language Instruction Educational Programs	http://www.ncela.gwu.edu/
National Education Association (NEA)	http://www.nea.org/index.html
National Education Association (NEA) Higher Education Research Center	http://www2.nea.org/he/research.html
National Information Center for Higher Education Policymaking and Analysis	http://www.higheredinfo.org/
National Institute for Early Education Research	http://nieer.org/
National Institute for Literacy	http://www.nifl.gov/
New York University's Institute for Education and Social Policy	http://www.nyu.edu/iesp/
OAister	http://www.oclc.org/oaister.en.html?urlm=168646
OpenDOAR	http://www.opendoar.org/
RAND Institute on Education and Training	http://www.rand.org/centers/education
SciTech Connect	http://www.osti.gov/scitech/
SPARC (Scholarly Publishing and Academic Resources Coalition)	http://www.arl.org/sparc/
Social Science Research Network	http://www.ssrn.com/
Stanford Institute for Higher Education Research	http://siher.stanford.edu/
TCRecord	http://www.tcrecord.org/ContentCollection.asp?cid=8

The Cato Institute	http://www.cato.org/
The Merrill Advanced Studies Center (Scholarship on disabilities and the policies shaping university research)	http://merrill.ku.edu/
The Researching Librarian	http://www.researchinglibrarian.com/stats.htm
USA.gov	http://www.usa.gov/
U.S. Centers for Disease Control and Prevention (CDC)	www.cdc.gov
U.S. Department of Education	http://www.ed.gov/index.jhtml?src=a
U.S. Government Documents Ready Reference Collection	http://www.columbia.edu/cu/lweb/indiv/usgd/rref/education.html
U.S. National Institutes of Health	http://www.nih.gov/
What Works Clearinghouse	http://www.whatworks.ed.gov/
WWW Virtual Library	http://vlib.org/
British/European Sites	
British Education Index	http://www.leeds.ac.uk/bei
British Education Internet Resource Catalogue	http://brs.leeds.ac.uk/~beiwwww/beir.html
BUBL Link (Catalogue of Internet Resources)	http://bubl.ac.uk/index.html
Center for Higher Education Policy Studies (Universiteit Twente, The Netherlands).	http://www.utwente.nl/cheps/
Centre for the Economics of Education	http://cee.lse.ac.uk/
CEPR The Centre for Economic Policy Research	http://www.cepr.org/default_static.htm
Cogprints (Cognitive Sciences Electronic Print Archives)	http://cogprints.org/
Department for Children, Schools and Families	http://www.dfes.gov.uk/
ECONBase	http://www.elsevier.nl/homepage/sae/econbase/menu.sht
education-line	http://www.leeds.ac.uk/educol/
EPPI Centre	http://eppi.ioe.ac.uk/cms/
ESRC (Economic and Social Research Council)	http://www.esrcsocietytoday.ac.uk/ESRCInfoCentre/index.aspx
Eurydice-information network on education in Europe	http://www.eurydice.org/portal/page?_pageid=257,1&_dad=portal&_schema=PORTAL
Evidence Network	http://evidencenetwork.org/cgi-win/enet.exe/pubs?QMW
HERO the official gateway to universities, colleges and research organisations in the UK	http://www.hero.ac.uk/uk/home/index.cfm
Higher Education Funding Council for England	http://www.hefce.ac.uk/
Higher Education Policy Institute (United Kingdom).	http://www.hepi.ac.uk/
Higher Education Research Institute	http://www.gseis.ucla.edu/heri/heri.html
Index of Conference Proceedings	http://catalogue.bl.uk/F/?func=file&file_name=login-bl-list
Institute for Public Policy Research	http://www.ippr.org.uk/
Intute	http://www.intute.ac.uk/
JISC Joint Information Systems Committee	http://www.jisc.ac.uk/

National Education Research Forum	http://www.nerf-uk.org/
National Institute for Health and Care Excellence (NICE)	https://www.nice.org.uk/
National Foundation for Educational Research	http://www.nfer.ac.uk/index.cfm
Policy Hub - British Civil Service	http://www.nationalschool.gov.uk/policyhub/evidence_hotlinks/index.asp
SIGLE (System for Information on Grey Literature)	http://opensigle.inist.fr/
Social Care Online (Affiliated with Social Care Institute for Excellence)	http://www.scie-socialcareonline.org.uk/search.asp
Social Care Institute for Excellence	http://www.scie.org.uk/
The Economic and Social Research Institute (Ireland)	http://www.esri.ie/
UKOLN: research organization that aims to inform practice and influence policy in the areas of: digital libraries, information systems, bibliographic management, and web technologies	http://www.ukoln.ac.uk/
Other international sites	
Australian Council for Educational Research	http://www.acer.edu.au/
CEDEFOP European Centre for the Development of Vocational Training	http://www.cedefop.europa.eu/
Commonwealth of Learning	http://www.col.org/colweb/site
Daedalus	http://www.lib.gla.ac.uk/daedalus/
Directory of Open Access Journals	http://www.doaj.org/doaj?func=expand
EDNA Australia's free online network for educators	http://www.edna.edu.au/edna/go/cache/offonce/pid/1;jsessionid=C0C5AF586A0B595AFAD6FB92B8BEC153
Educa.ch (the Swiss education Server)	http://www.educa.ch/dyn/14.asp
ESTIA - Information about education and labour market in European countries	http://www.estia.educ.goteborg.se/
EUROPA education and training The European Commission	http://ec.europa.eu/index_en.htm
EURYDICE - Information Network on Education in Europe	http://www.eurydice.org/portal/page/portal/Eurydice
Grey Literature Network Service	http://www.greynet.org/
GreySource	http://www.greynet.org/greysourceindex.html
Higher Education Resource Hub	http://www.higher-ed.org/
HRK (German Universities site)	http://www.hrk.de/eng/home/index_eng.php
IAU International Assoc of Universities	http://www.unesco.org/iau/onlinedatabases/index.html
International Higher Education Clearinghouse!	http://www.bc.edu/bc_org/avp/soe/cihe/ihec/
International Institute for Educational Planning	http://www.unesco.org/iiep/
MEXT Ministry of education (Japan)	http://www.mext.go.jp/english/index.htm
Networked Digital Library of Theses and Dissertations (NDLTD)	http://www.ndltd.org/

OECD - Organisation for Economic Co-operation and Development	http://oecd.org
Policypointers	http://www.policypointers.org/page_8.html
UNESCO	http://www.unesco.org/
United Nations Statistics Division	http://unstats.un.org/unsd/cdb/cdb_help/cdb_quick_start.asp
United Nations Official Documents	http://documents.un.org/welcome.asp?language=E
World Bank Documents and Reports	http://www.worldbank.org/reference/
RePEc (Research Papers in Economics)	http://www.repec.org/
PADI Preserving Access to Digital information	http://www.nla.gov.au/padi/topics/372.html
Institutional repositories	
The Directory of Open Access Repositories - OpenDOAR	http://www.openoar.org/
Free journals	
Directory of Open Access Journals	http://www.doaj.org/

Appendix III: Search strategy form

Database Worksheet

Title:

Research question

Overview of search strategy

Concepts	Related terms
<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>

Database searches

Database name	Internal code for search	Date of search	Name of searcher
<hr/>	<hr/>	<hr/>	<hr/>

Notes about the database

Database supplier (e.g. Proquest)	<hr/>
Dates of db file used (e.g. 1996-2008/06)	<hr/>
Db update frequency (e.g. Quarterly)	<hr/>

Languages indexed	
Other information about db coverage: (e.g. Incl. some full-text)	

Notes about the search

Purpose of the search	
Comments on the strategy	

Results

Number of records retrieved	
Final set of records (after duplicate check)	

Original search strategy (cut and paste from the search history)

Additional Notes

Appendix IV: IRMG checklist

Information Retrieval Methods Group Systematic Review Checklist

Title:

Instructions: This checklist is designed to aid you in organizing the evaluation of the information retrieval activities for a review and to make explicit the criteria to be use during the evaluation. Each section of the checklist requires the evaluation of a specific activity. For each question in the checklist, you will make the following assessments:

Was the checklist question or criterion addressed in the **protocol (PR)**?

- 0: Not applicable
- 1: Not at all
- 2: Incomplete (see comments)
- 3: Satisfactory

Was the question answered or criteria addressed appropriately in the **review (RW)**?

- 0: Not applicable
- 1: Not at all
- 2: Incomplete (see comments)
- 3: Satisfactory

Search Tools and Strategies	PR	RW
1. Database Selection and Strategies		
A. Were the appropriate subject databases searched?		
B. Were the full (original) search strategies listed for each of the main databases?		
If so, did the search strategies include keywords or descriptors appropriate for the topic and the database?		
C. Were databases for related fields consulted?		
If so, were the full (complete) search strategy listed for each database?		

Did the search strategy include keywords appropriate for the topic and the database?

D. Were the time periods for each source indicated?

E. Did the authors consult the list of databases in the IRMG Guide?

F. Did the authors search for dissertations separately?

G. Did the electronic searches appear sufficiently comprehensive for the topic?

2. Were any print-based subject indices used?

If not, did the authors state why they were not used?

If so, did the authors include the subject headings that were used?

If so, did the search strategy include subject headings appropriate for the topic and the field?

3. Web Search Tools

Did the authors use the main search engines (e.g. Google, Bing, etc.) to locate web-based material?

If so, were the search strategies included?

4. Locating Other Material including Grey Literature

A. Did the authors search for conference proceedings separately?

B. Did the authors search for government documents separately?

C. Did the author's document their grey literature (e.g. unpublished research reports) searches?

If not, did the authors provide their rationale for not doing so?

5. Hand searches

A. Did the authors conduct a hand search of journals relevant to the topic?

If not, did the authors provide their rationale for not doing so?

B. Did the authors consult the reference lists of reviews and/or previous trials?

6. Non U.S. Literature

A. Were Canadian studies included?

If so, were the search strategies included for each of the retrieval tools used?

If not, did the author provide their rationale for not doing so?

B. Were British and/or Australian studies included?

If so, were the search strategies included for each of the retrieval tools used?

If not, did the author provide their rationale for not doing so?

C. Were non-English studies included?

If so, were the search strategies included for each of the retrieval tools used?

If not, did the author provide their rationale for not doing so?

7. Personal Contacts

Did the authors contact experts in the field?

If so, were the contact strategies documented?

Was a list of names and contact information included in the documentation?

8. Currency

Will (or have) the searches be(en) updated to ensure retrieving the most current information?

9. Other

Was the information retrieval stage of this review sufficiently informed by the use of a TSC or an information specialist?

Was the information retrieval stage described in sufficient detail for replication?

Was documentation provided for steps taken to assess the need for an update at the end of three years?

Was bibliographic reference manager software used to store the citations?

If so, what package was used? Name:

Was the search strategy/approach peer reviewed by a librarian/search expert?

General Comments

What is your overall assessment of this protocol (PR) or review (RW)?

- a. Accept without revision
- b. Accept with revisions. Authors will revise the protocol or review in consultation with the Coordinator.
- c. Substantial revisions required. Authors should revise the protocol or review and resubmit it to the Coordinator who will send it to external readers.

Reader:

<i>Name</i>	<i>Middle Initial</i>	<i>Last Name</i>
-------------	-----------------------	------------------

Date:

Appendix V. MEC2IR literature search conduct standards

<https://campbellcollaboration.org/library/campbell-methods-conduct-standards.html>

Item No.	Status	Item Name	Standard	Rationale and elaboration
24	Mandatory	Planning the search	Refer to the white paper by Hammerstrom, Wade, and Jorgensen (2010) to ensure that all relevant databases have been properly searched.	Searches for studies should be as extensive as possible to reduce the risk of publication bias and to identify as much relevant evidence as possible. There is no minimum set of databases to search, but reviewers should consider consulting with a research retrieval specialist to avoid unnecessary duplication of effort.
25	Highly desirable	Searching specialist bibliographic databases	Search appropriate national, regional, and subject specific bibliographic databases.	Searches for studies should be as extensive as possible to reduce the risk of publication bias and to identify as much relevant evidence as possible. Databases relevant to the review topic should be covered (e.g., ERIC for educational interventions, PsycINFO for psychological interventions), and regional databases (e.g. LILACS) should be considered.
26	Mandatory	Searching for different types of evidence	If the review has specific eligibility criteria around study design to address adverse effects, economic issues, or qualitative research questions, undertake searches to address them.	Sometimes different searches will be conducted for different types of evidence, such as for non-randomized studies for addressing adverse effects, or for economic evaluation studies.
27	Mandatory (if applicable)	Searching trials registers	When relevant, search trials registers and repositories of results, where relevant to the topic through ClinicalTrials.gov, metaREGISTER, the WHO International Clinical Trials Registry Platform (ICTRP) portal, and other sources as appropriate.	When relevant, searches for studies should be as extensive as possible to reduce the risk of publication bias and to identify as much relevant evidence as possible. Although ClinicalTrials.gov is included as one of the registers within the WHO ICTRP portal, it is recommended that both ClinicalTrials.gov and the ICTRP portal are searched separately due to additional features in ClinicalTrials.gov.
28	Mandatory	Searching for grey literature	Search relevant grey literature sources such as reports/dissertations/theses	Searches for studies should be as extensive as possible to reduce the risk of publication

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			databases and databases of conference abstracts.	bias and to identify as much relevant evidence as possible.
29	Mandatory	Searching within other reviews	Search within previous reviews on the same topic.	Searches for studies should be as extensive as possible to reduce the risk of publication bias and to identify as much relevant evidence as possible.
30	Mandatory	Searching reference lists	Check reference lists in included studies and any relevant systematic reviews identified.	Searches for studies should be as extensive as possible to reduce the risk of publication bias and to identify as much relevant evidence as possible.
31	Highly desirable	Searching by contacting relevant individuals and organizations	Contact relevant individuals and organizations for information about unpublished or ongoing studies.	Searches for studies should be as extensive as possible to reduce the risk of publication bias and to identify as much relevant evidence as possible. It is important to identify ongoing studies, so that when a review is later updated these can be assessed for possible inclusion.
32	Mandatory	Structuring search strategies for bibliographic databases	Inform the structure of search strategies in bibliographic databases around the main concepts of the review, using appropriate elements from PICO and study design. In structuring the search, maximize sensitivity whilst striving for reasonable precision. Ensure correct use of the AND and OR operators.	Inappropriate or inadequate search strategies may fail to identify records that are included in bibliographic databases. Expertise may need to be sought, in particular from an Information Retrieval Specialist. The structure of a search strategy should be based on the main concepts being examined in a review. In electronic bibliographic databases, a search strategy to identify studies for a Campbell Review will typically have three sets of terms: 1) terms to search for the population of interest; 2) terms to search for the intervention(s) evaluated; and 3) terms to search for the types of study designs to be included. There are exceptions, however. For instance, for reviews of complex interventions, it may be necessary to search only for the population or the intervention. Within each concept, terms are joined together with the Boolean 'OR' operator, and the concepts are combined with the Boolean 'AND' operator. The 'NOT' operator should be avoided where possible to avoid the danger of inadvertently removing from the search set records that are relevant.
33	Mandatory	Developing search strategies for bibliographic databases	Identify appropriate controlled vocabulary (e.g. MeSH, Emtree, including 'exploded' terms) and free-text terms (considering, for example, spelling variants, synonyms, acronyms, truncation, and proximity	Inappropriate or inadequate search strategies may fail to identify records that are included in bibliographic databases. Search strategies need to be customized for each database. It is important that

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			operators), and tailor the search strategy to each specific database.	MeSH terms are 'exploded' wherever appropriate, in order not to miss relevant articles. The same principle applies to Emtree when searching Embase and also to a number of other databases. The controlled vocabulary search terms are different for each electronic database, and thus search strategies must be tailored to each database. To be as comprehensive as possible, it is necessary to include a wide range of free-text terms for each of the concepts selected. This might include the use of truncation and wildcards. Developing a search strategy is an iterative process in which the terms that are used are modified, based on what has already been retrieved.
34	Highly desirable	Using search filters	Use specially designed and tested search filters where appropriate (such as the Cochrane Highly Sensitive Search Strategies for identifying randomized trials in Medline), but do not use filters in pre-filtered databases (e.g. do not use a randomized trial filter in CENTRAL or a systematic review filter in DARE).	Search filters should be used with caution. They should be assessed not only for the reliability of their development and reported performance but also for their current accuracy, relevance, and effectiveness given the frequent interface and indexing changes affecting databases.
35	Mandatory	Restricting database searches	Justify the use of any restrictions in the search strategy on publication date, publication format, or language.	Date restrictions in the search should only be used when there are date restrictions in the eligibility criteria for studies. They should be applied only if it is known that relevant studies could only have been reported during a specific time period, for example if the intervention was only available after a certain time point. Searches for updates to reviews might naturally be restricted by date of entry into the database (rather than date of publication) to avoid duplication of effort. Publication format restrictions (e.g. exclusion of letters) should generally not be used in Campbell reviews, since any information about an eligible study may be of value.
36	Mandatory	Documenting the search process	Document the search process in enough detail to ensure that it can be reported correctly in the review/update. Include the month and year the search began and ended for future replicability.	The search process (including the sources searched, when, by whom, and using what terms) needs to be documented in enough detail throughout the process to ensure that it can be reported correctly in the review, to the extent that all the searches of all the databases are reproducible.

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37	Highly desirable	Rerunning searches	Rerun or update searches for all relevant databases within 12 months before publication of the review or review update, and screen the results for potentially eligible studies.	The published review should be as up to date as possible. The search should be rerun close to publication, if the initial search date is more than 12 months (preferably 6 months) from the intended publication date, and the results screened for potentially eligible studies. Ideally the studies should be fully incorporated. If not, then the potentially eligible studies will need to be reported, at a minimum as a reference under 'Studies awaiting classification' or 'Ongoing studies'.
38	Highly desirable	Incorporating findings from rerun searches	Incorporate fully any studies identified in the rerun or update of the search within 12 months before publication of the review or review update.	The published review should be as up to date as possible. After the rerun of the search, the decision whether to incorporate any new studies fully into the review will need to be balanced against the delay in publication.

Appendix VI. Abbreviations

List of abbreviations used

CG	Campbell Coordinating Group
EBSCO	EBSCO Academic Search Premier
ASP	EdResearch Online (see
EdRo	http://cunningham.acer.edu.au/dbtw-wpd/sample/edresearch.htm)
EducAB	Education Abstracts
ETA	Educational Technology Abstracts
PDD	ProQuest Digital Dissertations and Theses
Proceedings	Selected conference proceedings
UMI	Dissertations Abstracts (on Dialog)
Web	Web searches using Google and All the Web search engines
TSC	Trial search co-ordinator
