

Reporting Standards for Literature Searches and Report Inclusion Criteria:
Making Research Syntheses More Transparent and Easy to Replicate

Kayla Atkinson

Alison C. Koenka

Carmen Sanchez

Hannah Moshontz

Harris Cooper

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Abstract

A complete description of the literature search, including the criteria used for inclusion of reports after they have been located, used in a research synthesis or meta-analysis is critical if subsequent researchers are to accurately evaluate and reproduce a synthesis' methods and results. Based on previous guidelines and new suggestions, we present a set of focused and detailed standards for reporting the methods used in a literature search. The guidelines cover five search strategies: reference database searches; journal and bibliography searches; searches of the reference lists of reports; citation searches, and direct contact searches. First, we bring together all the unique recommendations made in existing guidelines for research synthesis. Second, we identify gaps in reporting standards for search strategies. Third, we address these gaps by providing new reporting recommendations. Our hope is to facilitate successful evaluation and replication of research synthesis results.

Fundamental to the process of science is the critical evaluation of research methods and results and the ability of others to conduct faithful replications. Concerns about both have risen dramatically in recent years. These concerns have grown more severe because of widely publicized cases of research findings that failed to be reproduced (e.g., Harris, et al., 2013; Steele, Bass & Crook, 1999;). In response, the National Science Foundation (Olds, 2014) has taken up the issue, as has the Association for Psychological Science (Pasher & Wagenmakers, 2012).

Research synthesis is a valuable tool that helps establish whether and under what conditions a research finding has been replicated (Giner-Sorolla, 2012; Ioannidis, 2012). In particular, meta-analysis allows for the estimation of cumulative quantitative outcomes and the systematic search for influences on outcomes (perhaps suggesting why some studies found an effect and others did not). Additionally, meta-analysis allows for the estimation of potential sources of bias in results, in particular publication bias and other forms of data censoring. Finally, the results of research synthesis often replace primary research as the arbiter of current knowledge when individual findings pass behind the research front (Price, 1965).

Just like primary research, research syntheses -- whether meta-analyses or otherwise -- should be open to critical scrutiny and replication. Therefore, research synthesists should be held to the same standards for complete reporting as primary researchers (Cooper, 2010). Research synthesists should provide detailed descriptions of the strategies used to define problems, gather the literature, make judgments about the relevant of reports, extract information from reports, integrate results, and draw inferences.

A complete description of the literature search is especially critical if subsequent researchers are to accurately reproduce a synthesis' methods and results. In this paper, we present reporting guidelines for the literature search in research syntheses, which we define broadly as the process by which relevant research is located and selected for inclusion. Our guidelines integrate recommendations made by others as well as add some new ones. To begin, we will examine a major impediment to transparent reporting of research (whether it is primary research or research synthesis) and suggest that this barrier may be disappearing.

Impediment to Complete Reporting

In the past, a major impediment to complete reporting was that printed journal space was limited. This led to a premium being placed on concise, but often incomplete, method reporting. But, the omission of important methodological details makes it difficult to evaluate the quality of research and to reproduce what was done in the target study. However, with the growing use of the Internet in scientific communication, journal space limitations are disappearing, so this problem is now easily overcome. Finely detailed descriptions of research can now be reported through the use of online supplemental files linked to reports. This can be done regardless of whether the report itself was published in print or online. These detailed descriptions can be used to evaluate the research methods and to produce more precise replications. If the results of replications differ, a complete description of methods may point to a possible cause.

Standards for Research Reporting

Standards for thorough reporting of research methods in medical science have existed for many years (e.g., CONSORT, 2010; Des Jarlais, Lyles, Crepaz & the Trend Group, 2004).¹ Standards are relatively new in the social sciences. APA's Journal Article Reporting Standards

¹ A resource for reporting standards in health research can be found at: www.equator-network.org.

(JARS; American Psychological Association, 2008) appeared for the first time in the 6th edition of the *APA Publication Manual* (2010).

Several efforts have been undertaken to establish reporting guidelines for meta-analysis.

These include:

- the Quality of Reporting of Meta-analysis Statement (QUOROM; Moher et al., 1999) and its revision, Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA; Moher, Tetzlaff, Altman, and the PRISMA Group, 2009);
- the Meta-analysis of Observational Studies in Epidemiology (MOOSE; Stroup et al., 2000),
- the Methodologic Guidelines for Systematic Reviews of Randomized Control Trials in Health Care from the Potsdam Consultation on Meta-Analysis (Cook, Sackett, and Spitzer, 1995);
- the Methodological Expectations of Cochrane Intervention Reviews (MECIR; Chandler, Churchill, Higgins, Lasserman, & Tovey, 2013)² and,
- the Meta-Analysis Reporting Standards (MARS; APA, 2008).

Guidelines for reporting research syntheses have acknowledged the importance of reporting about the literature search. This is not surprising since variations in search strategy could hugely impact conclusions, as this is akin to sampling from different populations in primary research. For meta-analyses, documentation of how the included reports were located is essential to replicating statistical results, given that this method involves combining the results of retrieved, relevant studies.

² Although the MECIR guidelines are distinct from those generated by PRISMA, we wish to note that the MECIR guidelines encourage users to report search information recommended by PRISMA.

Taken together, existing reporting standards for syntheses do an excellent job of outlining the reporter's tasks. However, the literature search stage of the synthesis process appears to be the least detailed step in reporting standards. PRISMA provides the general recommendation to present the full electronic search strategy and to describe all information sources along with the date of the last search (Moher et al. 1999). MECIR makes recommendations similar to those outlined by PRISMA. The former set of standards also requires information on the searchers to be reported, but does not provide detail on the nature of this information. The MOOSE guidelines are a bit more specific, suggesting identifying the search strategy, software, registers and databases searched (with dates and keywords) and MOOSE and MARS suggest discussion of the qualifications of searchers (Stroup et al., 2000). It also mentions contacting authors and hand searching. The MARS gives detailed advice for reporting the reference databases searched but provides no suggestions regarding other search procedures (APA, 2008). MOOSE, MARS, and PRISMA all mention publication status, dates for report appearance, communications to individual researchers, treatment of studies in different languages. They also mention the need to describe eligibility criteria but only MOOSE suggests that a justification for exclusions be included. Interestingly, none of the guidelines acknowledge that searches are often conducted sequentially, with an initial screening for relevance followed by a deeper examination of documents. The parameters for a search of citation are also not mentioned.

Despite the less detailed focus on the literature search in existing guidelines, research investigating synthesists' reporting adequacy suggest that a greater focus on it is essential. For example, a recent study examining syntheses of medical research revealed that less than half of the reports provided information on full Boolean operators used in their reference database search(s) and 12% provided no information on the search terms at all (Moher, Tetzlaff, Tricco,

Sampson, & Altman, 2007). A study by Delaney et al. (2005) corroborated these findings, concluding that the literature search was one of the areas most lacking in adequate reporting.

In sum then, the details of a literature search strategy are crucial for (a) assessment of the exhaustiveness of syntheses and (b) replication. Especially in light of evidence that many synthesisists report their search strategy with inadequate detail to accomplish these two goals (Delaney et al., 2005; Moher et al., 2007), additional guidance is needed to create a standard for consistent, comprehensive and transparent reporting of them. We present a set of focused and detailed standards for reporting the methods used in a literature search and accompanying decisions about the relevance of documents to the search topic. Our hope is to facilitate successful evaluation and replication of research synthesis results. Given the excellent existing guidelines for how to conduct a literature search (e.g., handler et al., 2013; Cooper, 2010), guidelines for the former task are only presented as context and justification for the reporting recommendations.

Method for Retrieving Existing Recommendations and Identifying Gaps

We undertook our task to generate a set of focused and detailed literature search reporting standards in four steps. First, we retrieved existing sets of research synthesis guidelines. Second, their recommendations for reporting the search strategy were integrated into a single document and we identified their common gaps. Third, we pilot tested the resulting reporting recommendations, and clarified them based on this experience. Each of these steps is described next.

To obtain existing sets of research synthesis reporting standards, we began with APA's (2008) MARS guidelines and searched for other guidelines cited within this article. We then went through this same process for all other guidelines we retrieved. We also examined four

resources for conducting research syntheses (Fink, 2005; Galvan, 2006; Hart, 1998; Pan, 2008) to identify any additional guidelines cited in them that were not found through our first search procedure.

Second, the first and second author, both of whom are trained and experienced in conducting comprehensive literature searches, independently read the guidelines and retrieved all literature search reporting contributions. They also independently identified missing information in the search reporting guidelines that would be needed for (a) synthesis replication or (b) evaluation of its quality. Next, the first and second author combined their efforts and resolved any disagreements through discussion. When a consensus could not be reached, the last author was consulted. Finally, the list of literature search recommendations was then presented to the two remaining authors and their feedback was integrated.

Third, this final set of literature search reporting guidelines was pilot tested. We did so by applying them to a broad literature search that was used to carry out four research syntheses that all examined the strategies employed in assigning grades (W.T. Grant Foundation, 2013).

Reporting Standards for Literature Searches

Table 1 presents the suggested reporting standards for literature searches associated with research syntheses. The guidelines cover five search strategies: reference database searches; journal and bibliography searches; searches of the reference lists of reports (which we call “backward” searches and are also called ancestry searches or “treeing through the references”); forward, or citation, searches, and direct contact searches, of which three varieties are listed. Other search techniques may exist and if used should be described.

Although the recommendations are presented in a fashion that suggests an efficient order of execution, this is not the reality of the research process. Conducting a comprehensive

literature search is iterative (Chandler et al., 2013) and thus requires flexibility. What we stress is not a strict order of operation, but rather transparency in reporting the steps taken to complete a thorough search. For example, searching reference databases is listed before backward and forward searches. In many circumstances, researchers may discover references in a backward or forward search that lead them to expand the keywords used in database searches. These iterative variations in literature searches are both expected and legitimate, as are different orders depending on the specific topic under study. The criteria for good reporting are that (a) it provides the details that facilitate the evaluation of the comprehensiveness of the search and (b) it can be faithfully replicated.³

Most of the entries in Table 1 are self-explanatory. Others need further explanation and/or justification for their inclusion.

General Search Reporting Guidelines

There is general consensus among guidelines on most of the elements that should be reported for reference database searches, and PRISMA provides a flowchart to help with this process. But, a greater level of detail is needed if replication of the search is the foremost concern.

Quantitative information about the results of a reference database search should be reported at several different levels of search precision. First, the number of documents returned by the computer search, based on the search terms used and the date of the search, should be reported. Second, the number of documents passing the initial screen should be reported. It is important to note that results of these broad relevance decisions may be different depending on what document elements were used to make the initial relevance decision. Thus, the document

³ Information about false starts, expansion and contraction of search terms, etc. can be good to report. These often illuminate the definition of inclusion criteria and help future researchers clarify their own searches.

elements used to make initial relevance decisions should be reported. For example, searchers who make initial decisions based on titles alone may decide to look at fewer full texts than those using titles and abstracts (Cooper & Ribble, 1989).

After all reports have been screened for final inclusion, searchers should have the information needed to report the number of documents that qualified for the synthesis.⁴⁵ They can also identify the number of reports that met all criteria but did not provide sufficient data for inclusion. While this level of detail may seem excessive, the details will serve as important checkpoints for those hoping to replicate, validate and update findings.

Dates searched. It is also important that synthesists report when all searches were conducted. It is reasonable to expect that an exact date of electronic searches be given because they will be provided on the output used for relevance decisions. These dates provide readers and future researchers with a concrete replication strategy and might explain differences in observed replicated data. If the dates encompassed by a search are not the same, this might explain why results of two research syntheses are different.

Searcher Characteristics

Synthesists should report information about the number of searchers, their level of education and/or training, past experience conducting searches, and whether the initial screeners were different from final screeners. If they do differ from one another, the above characteristics should be described for both groups of searchers. Although this information is less important for replication, it is necessary to report because searcher characteristics have implications for the

⁴ Some reports may lack empirical data but provide pertinent background information. Reporting of these documents is not essential to replication, however.

⁵ It is also recommended to update all literature searches closer to publication (Chandler et al., 2013). If synthesists find new qualifying studies through this process, these ideally should be included in the review. If doing so is not possible, MECIR recommends they “be reported...as a reference under ‘Studies Awaiting Classification’ or ‘Ongoing Studies’” (p. 7).

trustworthiness of synthesis findings. For example, the use of multiple searchers is argued to reduce the risk of making mistakes and the possibility that inclusion decisions are biased (Chandler et al., 2013).

Initial Screening for Relevance

Screening reports for relevance during the search stage of research synthesis often is conducted in two steps. First, a reading of selected document elements (e.g., abstract and title) leads to a broad determination of relevance. Next, an examination of full documents applies a more detailed list of relevance criteria. Often, these two decisions are made by different people, using different information about the documents, and applying different rules. For example, to make the initial decision about relevance, the output of a reference database search might be read by the principal investigator alone or by a team of searchers. If any one searcher thinks a document is relevant, it moves to the next stage. The detailed examination of the full text is then carried out, perhaps by different people with different qualifications, and probably more training.

Regardless, inclusion based on “relevance” should remain relatively broad at the initial stage in the search. Further narrowing is done as the documents are read in depth for the presence of inclusion criteria.

Final Inclusion Criteria

Definitions. In order for others to replicate a literature search, it is important to provide a detailed list and explanation of the criteria used to decide whether a study was included. Operational definitions of variables and research questions should be clearly stated. Table 1 lists four substantive classes of inclusion criteria, relating to the definitions of the variables of interest, the participants of interest, the research settings and dates covered. Fink (2005) provides

a more detailed list of common screening variables used in literature searches to set parameters and limit searches based on specific criteria.

Inclusion Dates. Synthesists should report any criteria related to when data presented in the primary reports was collected. For example, if an older review on a similar topic was published in 1990, synthesists may choose to include studies that were conducted since this date. Reporting this information is needed for assessing the temporal generalizability of findings and to conduct moderator analyses involving temporal trends (and to replicate these analyses). Often, the dates of data collection are not included in reports. In these cases, the synthesists should document the dates encompassed by the included reports.

Types of reports. There is ample evidence that published and unpublished reports are likely to have different results (e.g., Lipsey & Wilson, 1993). It is because of this that research syntheses often include tests for publication bias (Duval, 2005) and moderator analyses of publication status (if unpublished research is included). Given that publication status is often related to results, it is important to be transparent about report publication status and the role it played in the literature search. For example, research synthesists' decisions of whether or not to include unpublished manuscripts will have implications for subsequent replication, in addition to the conclusions that can be drawn from the findings. And, because peer review is the major distinction between published and unpublished work (and perhaps an important marker of research differences), if peer review was used as an inclusion criteria, it should be reported as well.

Foreign languages. Ideally secondary research would be globally exhaustive, but how well this can be accomplished is often restricted by language barriers. Sometimes, synthesists

will have reports translated, but this can be expensive. Synthesists should make clear what, if any, language restriction (e.g., only reports in English) occurred in carrying out the search.

Adequacy of reporting. Although not strictly an inclusion criterion related to the relevance of the document, searchers often discover that they must consider a study unusable because the report does not contain the information they need. This often leads to direct contact with the document's authors in the hope of obtaining fuller information. If the contact is not fruitful, the article is excluded.

Excluded Reports

The MOOSE guidelines recommend that when reporting on details of a search strategy, authors should include a "list of citations located and those excluded, including justification" (p. 2010). It is unreasonable to expect researchers to produce a detailed list of *all* reports excluded, given the large number of abstracts and reports examined during many comprehensive literature searches. For example, many documents identified by a reference database search have little to no real relevance to one's research topic. Instead, as the MECIR guidelines recommend, searchers should include a table of studies for which most or all inclusion criteria were met, but after careful review, were ultimately excluded. For example, work falling into this category may meet all but one criterion for inclusion. It may even be the case that a study meets all of the inclusion criteria but the document presents incomplete data or data in a way that makes it unusable. The table of exclusions should include title, authors, and report date, as well as a justification. It is wise to think preemptively about those excluded reports that may lead to questions by readers. Including a table of exclusions will allow for many of these questions to be immediately addressed, and will result in a better understanding of the parameters used in the synthesis.

Reference Database Searches

It is imperative for synthesists to provide precise details on how the reference database searches were carried out. As is recommended by most existing guidelines, it is necessary to document the databases searched and all search terms. In addition to these details, synthesists should note where in reports the search keywords appeared (e.g., the report title, abstract, full text, keywords, etc.), whether the search was automatically “exploded” to include citations with similar controlled vocabulary in the database, and all Boolean connectors (i.e., “AND”, “OR”, “NOT”). Not only can the number of documents vary widely depending on decisions made about these additional details, but they also have important implications for synthesis quality judgments. For example, searches that include the Boolean connector “NOT” introduce the risk of inadvertently removing qualifying documents from a search, making it less comprehensive (Chandler et al., 2013).

Journal and Bibliography Searches

Searchers may find that particular journals contribute heavily to the list of relevant reports. They will then search the tables of contents and/or abstracts of articles published in these journals over specific periods of time. For example, a searcher might find that one to three journals account for a majority of the relevant reports. The searchers also may uncover bibliographies on their topic or related topics (for specific periods) and these may be examined. If this is done, the names of the journals searched and/or bibliographies should be reported. In addition, the method of search should be reported. For example, as mentioned in MOOSE,

specific issues of journals may be selected for *hand searching*. Alternatively, specific journals can be searched by restricting database searches to one or more journals.

Backward and Forward Searches

Existing sets of reporting standards have devoted little attention to the inclusion and potential impact that both backward and forward searches might have on search results. MARS alludes to “reference and citation databases searched” (p. 848) but little information on how and what to report about these searches is specified. Cooper (2010) refers to the backward search as an *ancestry approach*, defining this as “using the reference lists at the end of research reports to locate other reports that might be relevant to a search” (p. 64) and the forward search, or citation analysis, as a descendency approach.

While the importance of a backward search is universally acknowledged in the previous guidelines, variations in techniques are not discussed. For example, some backward searchers choose to concentrate solely on reference lists of reports. In this case, initial decisions are made solely based on the title and date published. Other searchers use the context provided in introductions to guide their decision to examine references more closely. Some on-line journals allow linkage from a reference section to the report abstract and even the full report, providing even greater detail to help make relevance decisions. All these strategies are valid, but it is important to report the details so that replication is possible.

The most common way of conducting a forward search is to use the citation index tool in an online scientific citation indexing service, such as Web of Science. The services will accumulate a list of articles that have cited a particular document. Searchers can set date

parameters and other criteria to further limit this search. From here, researchers may choose to look at titles, titles and abstracts, or the full report in order to narrow the list.

For both types of reference-based searches, it can be valuable to describe the criteria that were used to decide whether to examine full reports. For example, for backward searches, this criterion might be that ancestors of reports were looked for only from the reference lists of reports that were relevant and appeared relatively recently. For forward searches, the searchers need to explain why articles were chosen for citation analysis. Often, the articles used for referenced-base searches will be earlier research syntheses. Or, they may be works that a reading of the relevant literature suggests are seminal in the field. In other words, they may be works that have a high probability of being cited by descendants.

Sometimes, when literatures are small and “tightly” bound by a common heritage, the literature search process may actually begin with forward and backward searches conducted on one or a few focal articles. For example, a synthesis of research on a particular measuring instrument might proceed in this way.

While it is ideal to include the number of additional qualifying reports found through reference-based methods, these numbers are likely to differ significantly in replication. Invariably, there will be overlap in references found using different search strategies, and thus the number of unique reports retrieved from each search strategy is expected to reflect the order in which the searches were conducted. Thus, providing the number of unique references that arise from reference-based searches is not crucial for accurate replication.

Direct Contact Searches

Searchers contact potential authors of reports to acquire very recent and unpublished reports (Cooper, 2010). Typically, these queries go to researchers who are active in the specific area of study.

Mass mailings. Searchers may choose to send mass mailings to either formal or informal distribution lists. If used, the defining characteristics of the list need to be noted (for example, a special interest group affiliated with a professional organization).

Individual researchers. Searchers may also directly contact researchers who they believe to be active in the field. For example, searchers may contact researchers who have published multiple papers on the focal topic during a specified period of time, say, having authored papers within a recent period of time. Or, they may contact researchers whose work is highly cited by other researchers. These extra steps in the literature process are ways to avoid (or estimate) publication bias.⁶

Serendipity. Another method of obtaining relevant literature is through serendipity: the passing of hands from one colleague to another. If *several* qualifying reports are uncovered only through serendipitous sources, such as the colleague next door, searchers may need to reconsider their search parameters and think about why these reports had not been previously found. It is especially important to report the number of *unique* reports retrieved through serendipitous methods. Assuming someone were to follow the search procedures perfectly, they still may be unable to replicate these findings. Detailed reporting will explain these potential discrepancies.

Conclusion

⁶ As mentioned above, the level of reporting in research articles often leaves room for confusion. Although not strictly a form of search, one method of dealing with these questions is to contact authors directly.

It is expected that even after the most comprehensive literature search, there will be qualifying reports that never surface. No one expects a search to be completely exhaustive. The key to adequate reporting is whether the *report* is exhaustive enough so that a subsequent research synthesis would reach the same substantive conclusions were they to use the reported methods to establish their evidence base. If there is disagreement, full reports about searches facilitate the discussion of why results differ.

These guidelines are both the culmination of past suggestions and the addition of novel recommendations. The creation of literature search reporting standards is not a novel idea. But, search reporting recommendations have received less attention than other aspects of writing a research synthesis report (in meta-analysis, for example, coding frames, analytic strategies, results). By focusing attention on the literature search, we hope to highlight the crucial role that it plays in creating quality research syntheses and the importance of detailed reports of searches. We also hope to provide a resource for authors of research syntheses and meta-analysis to facilitate their success in adequate literature search reporting.

Transparent reporting will facilitate both the evaluation of inferences drawn by synthesists and the replication of their findings. In addition, these guidelines may encourage researchers to execute more thorough searches, leading to more trustworthy results.

References

- American Psychological Association. (2010). *Publication Manual of the American Psychological Association* (6th ed.). Washington, DC: American Psychological Association.
- American Psychological Association (2008). Reporting standards for research in psychology: Why do we need them? What might they be? *American Psychologist*, 63(9), 839–851.
- Chander, J., Churchill, R., Higgins, J., Lasserson, T., & Tovey, D. (2013). *Methodological standards for the conduct of new Cochrane Intervention Reviews* (Version 2.3). Retrieved from Cochrane website: <http://www.editorial-unit.cochrane.org/mecir>.
- CONSORT. (2010). CONSORT: Transparent reporting of trials. Retrieved from <http://www.consort-statement.org/home/>
- Cook, D. J., Sackett, D. L., & Spitzer, W. O. (1995). Methodologic guidelines for systematic reviews of randomized control trials in health care from the Potsdam consultation on meta-analysis. *Journal of clinical epidemiology*, 48(1), 167-171.
- Cooper, H. (2010). *Research synthesis and meta-analysis: A step-by-step approach*. (5th ed.). Thousand Oaks, CA: SAGE Publications, Inc.
- Cooper, H., & Ribble, R. G. (1989). Influences on the outcome of literature searches for integrative research reviews. *Science Communication*, 10(3), 179-201.
- Delaney, A., Bagshaw, S. M., Ferland, A., Manns, B., Laupland, K. B., & Doig, C. J. (2005). A systematic evaluation of the quality of meta-analyses in the critical care literature. *Critical Care*, 9(5), 575-582.
- Des Jarlais, D. C., Lyles, C., Crepaz, N., & Trend Group. (2004). Improving the reporting

- quality of nonrandomized evaluations of behavioral and public health interventions: the TREND statement. *Journal Information*, 94(3).
- Duval, S. (2005). The trim-and-fill method. In H.R. Rothstein, A.J. Sutton & M. Borenstein (Eds.) *Publication bias in meta-analysis: Prevention, assessment and adjustments*. Chichester, UK: John Wiley & Sons, Ltd. Pgs. 127-144.
- Fink, A. (2005). *Conducting research literature reviews: From the internet to paper* (2nd ed.). Thousand Oaks, CA. SAGE Publications, Inc.
- Galvan, J. L. (2006). *Writing literature reviews*. Los Angeles, CA: Pyrczak.
- Giner-Sorolla, R. (2012). Science or art? How aesthetic standards grease the way through the publication bottleneck but undermine science. *Psychological Science*, 7, 562.
- Harris C. R, Coburn N., Rohrer D., Pashler H. (2013). Two failures to replicate high-performance-goal priming effects. *PLoS ONE* 8(8).
- Hart, C. (1998). *Doing a literature review: Releasing the social science research imagination*. Thousand Oaks, CA: SAGE Publications, Inc.
- Ioannidis, J. P. A. (2012). Why science is not necessarily self-correcting. *Perspectives on Psychological Science*, 7, 645.
- Lipsey, M. W. & Wilson, D. B. (1993). The efficacy of psychological, educational, and behavioral treatment: Confirmation from meta-analysis. *American Psychologist*, 48, 1181-1209.
- Medin, D. L. (2012). Rigor without rigor mortis: The APS board discusses research integrity. *Association for Psychological Science*, 25(2). Retrieved from <http://www.psychologicalscience.org/index.php/publications/observer/2012/february-12/scientific-rigor.html>

- Moher, D., Cook, D. J., Eastwood, S., Olkin, I., Rennie, D., & Stroup, D. F. (1999). Improving the quality of reports of meta-analyses of randomised controlled trials: the QUOROM statement. *The Lancet*, 354(9193), 1896-1900.
- Moher D., Liberati A., Tetzlaff J., Altman D. G, The PRISMA Group (2009). Preferred reporting items for systematic reviews and meta-Analyses: The PRISMA Statement. *PLoS Med* 6(7): e1000097. doi:10.1371/journal.pmed.1000097
- Moher, D., Tetzlaff, J., Tricco, A. C., Sampson, M., & Altman, D. G. (2007). Epidemiology and reporting characteristics of systematic reviews. *PLoS medicine*, 4(3), 78.
- Olds, J. (2014, February 23). Replication problem workshop at NSF [Web log post]. Retrieved March, 2014, from <http://krasnow.blogspot.com/2014/02/replication-problem-workshop-at-nsf.html>
- Pan, M. L. (2008). *Preparing literature reviews: Qualitative and quantitative approaches* (3rd ed.). Los Angeles, CA: Pyrczak Publishing.
- Pasher, H. & Wagenmakers, E-J, (2012). Editor's introduction to the special section on replicability in psychological science: A crisis of confidence? *Perspectives on Psychological Science*, 7, 528-530.
- Price, D. (1965). Networks of scientific papers. *Science*, 149, 510-515.
- Publication Manual of the American Psychological Association* (6th ed.) (2010). Washington, D.C.: VandenBos, G. R.
- Steele, K. M., Bass, K. E, & Crook, M. D. (1999). The mystery of the Mozart effect: Failure to replicate. *Psychological Science*, 10(4), 366-369.
- Stroup, D. F., Berlin, J. A., Morton, S. C., Olkin, I., Williamson, G. D., Rennie, D., ... &

Thacker, S. B. (2000). Meta-analysis of observational studies in epidemiology: A proposal for reporting. *The Journal of the American Medical Association*, 283(15), 2008-2012.

W.T. Grant Foundation. (2013). *Portfolio of Grants Related to Education*. New York City: Author.

Table 1
Reporting Standards for Literature Searches in Research Syntheses

Searcher Characteristics	<ul style="list-style-type: none"> • Number of searchers • Level of education and/or training • Past experience conducting searches • Were initial screeners different from second screeners? <ul style="list-style-type: none"> ○ If yes, how?
Initial Screening for Relevance	<ul style="list-style-type: none"> • Elements of reports used in initial screening decision <ul style="list-style-type: none"> ○ e.g., title, abstract, full report • Criteria for passing from first to second screen
Final Inclusion Criteria	<ul style="list-style-type: none"> • Definitions <ul style="list-style-type: none"> ○ researched variables ○ participants ○ researched settings ○ dates <ul style="list-style-type: none"> ▪ for conduct of research ▪ for report appearance • Types of reports, e.g., <ul style="list-style-type: none"> ▪ publication status ▪ peer review status • Treatment of studies reported in foreign languages • Adequate reporting <ul style="list-style-type: none"> ○ Information needed to include the report
Excluded Articles	<ul style="list-style-type: none"> • Listing of studies that met most inclusion criteria but were ultimately excluded <ul style="list-style-type: none"> ○ At least one criteria that each study failed to meet <ul style="list-style-type: none"> ▪ e.g., data presented in unusable way
General Search Reporting Guidelines	<ul style="list-style-type: none"> • Total number of documents in the search results • Number of reports retained after initial screening • Number of reports meeting relevance criteria <ul style="list-style-type: none"> ○ Number of reports excluded due to insufficient information

Table 1 (continued)

Reporting Standards for Literature Searches in Research Syntheses

Reference Database & Registry Searches	<ul style="list-style-type: none"> • Search software version • Full names of databases searched <ul style="list-style-type: none"> ○ justification of database choice • Search terms used <ul style="list-style-type: none"> ○ Boolean connectors ○ whether automatic explosion of terms occurred • Parts of text searched (e.g., title, abstract, etc.) • Date database search(es) were conducted
Journal-Bibliography and Registry Search	<ul style="list-style-type: none"> • Journals or bibliographies scanned for relevant reports <ul style="list-style-type: none"> ○ names ○ years/volumes scanned ○ document elements used for decision <ul style="list-style-type: none"> ▪ e.g., tables of contents, titles, abstracts
Backward (Reference List) Search	<ul style="list-style-type: none"> • Whether reference lists were examined • Criteria for reference lists chosen • Element used for relevance decision (e.g., references, mention in Introduction, abstract, full report)
Forward (Citation) Search	<ul style="list-style-type: none"> • Reports for which citation searches were conducted <ul style="list-style-type: none"> ○ justification for why these reports were chosen
Direct Contact Searches	<ul style="list-style-type: none"> • Mass communications to formal or informal distribution lists <ul style="list-style-type: none"> ○ group names or defining characteristics ○ dates of contact • Communications to individual researchers <ul style="list-style-type: none"> ○ criteria for decisions to contact ○ number of researchers contacted ○ response rate • Communications with colleagues (leading to reports found no other way)
Other Search Strategies	<ul style="list-style-type: none"> • Describe search strategies in addition to those above and the results of these searches