

The Literature Review: A Foundation for High-Quality Medical Education Research

Lauren A. Maggio, PhD, MS (LIS)

Justin L. Sewell, MD, MPH

Anthony R. Artino Jr, PhD

Despite a surge in published scholarship in medical education¹ and rapid growth in journals that publish educational research, manuscript acceptance rates continue to fall.² Failure to conduct a thorough, accurate, and up-to-date literature review identifying an important problem and placing the study in context is consistently identified as one of the top reasons for rejection.^{3,4} The purpose of this editorial is to provide a road map and practical recommendations for planning a literature review. By understanding the goals of a literature review and following a few basic processes, authors can enhance both the quality of their educational research and the likelihood of publication in the *Journal of Graduate Medical Education (JGME)* and in other journals.

The Literature Review Defined

In medical education, no organization has articulated a formal definition of a literature review for a research paper; thus, a literature review can take a number of forms. Depending on the type of article, target journal, and specific topic, these forms will vary in methodology, rigor, and depth. Several organizations have published guidelines for conducting an intensive literature search intended for formal systematic reviews, both broadly (eg, PRISMA)⁵ and within medical education,⁶ and there are excellent commentaries to guide authors of systematic reviews.^{7,8}

Such work is outside the scope of this article, which focuses on literature reviews to inform reports of original medical education research. We define such a literature review as *a synthetic review and summary of what is known and unknown regarding the topic of a scholarly body of work, including the current work's place within the existing knowledge*. While this type of literature review may not require the intensive search processes mandated by systematic reviews, it merits a thoughtful and rigorous approach.

Purpose and Importance of the Literature Review

An understanding of the current literature is critical for all phases of a research study. Lingard⁹ recently invoked the “journal-as-conversation” metaphor as a way of understanding how one’s research fits into the larger medical education conversation. As she described it: “Imagine yourself joining a conversation at a social event. After you hang about eavesdropping to get the drift of what’s being said (the conversational equivalent of the literature review), you join the conversation with a contribution that signals your shared interest in the topic, your knowledge of what’s already been said, and your intention.”⁹

The literature review helps any researcher “join the conversation” by providing context, informing methodology, identifying innovation, minimizing duplicative research, and ensuring that professional standards are met. Understanding the current literature also promotes scholarship, as proposed by Boyer,¹⁰ by contributing to 5 of the 6 standards by which scholarly work should be evaluated.¹¹ Specifically, the review helps the researcher (1) articulate clear goals, (2) show evidence of adequate preparation, (3) select appropriate methods, (4) communicate relevant results, and (5) engage in reflective critique.

Failure to conduct a high-quality literature review is associated with several problems identified in the medical education literature, including studies that are repetitive, not grounded in theory, methodologically weak, and fail to expand knowledge beyond a single setting.¹² Indeed, medical education scholars complain that many studies repeat work already published and contribute little new knowledge—a likely cause of which is failure to conduct a proper literature review.^{3,4}

Likewise, studies that lack theoretical grounding or a conceptual framework make study design and interpretation difficult.¹³ When theory is used in medical education studies, it is often invoked at a superficial level. As Norman¹⁴ noted, when theory is used appropriately, it helps articulate variables that

DOI: <http://dx.doi.org/10.4300/JGME-D-16-00175.1>

Key Points

- A literature review forms the basis for high-quality medical education research and helps maximize relevance, originality, generalizability, and impact.
- A literature review provides context, informs methodology, maximizes innovation, avoids duplicative research, and ensures that professional standards are met.
- Literature reviews take time, are iterative, and should continue throughout the research process.
- Researchers should maximize the use of human resources (librarians, colleagues), search tools (databases/search engines), and existing literature (related articles).
- Keeping organized is critical.

might be linked together and why, and it allows the researcher to make hypotheses and define a study's context and scope. Ultimately, a proper literature review is a first critical step toward identifying relevant conceptual frameworks.

Another problem is that many medical education studies are methodologically weak.¹² Good research requires trained investigators who can articulate relevant research questions, operationally define variables of interest, and choose the best method for specific research questions. Conducting a proper literature review helps both novice and experienced researchers select rigorous research methodologies.

Finally, many studies in medical education are "one-offs," that is, single studies undertaken because the opportunity presented itself locally. Such studies frequently are not oriented toward progressive knowledge building and generalization to other settings. A firm grasp of the literature can encourage a programmatic approach to research.

Approaching the Literature Review

Considering these issues, journals have a responsibility to demand from authors a thoughtful synthesis of their study's position within the field, and it is the authors' responsibility to provide such a synthesis, based on a literature review. The aforementioned purposes of the literature review mandate that the review occurs throughout all phases of a study, from conception and design, to implementation and analysis, to manuscript preparation and submission.

Planning the literature review requires understanding of journal requirements, which vary greatly by journal (TABLE 1). Authors are advised to take note of common problems with reporting results of the literature review. TABLE 2 lists the most common problems that we have encountered as authors, reviewers, and editors.

Locating and Organizing the Literature

Three resources may facilitate identifying relevant literature: human resources, search tools, and related literature. As the process requires time, it is important to begin searching for literature early in the process (ie, the study design phase). Identifying and understanding relevant studies will increase the likelihood of designing a relevant, adaptable, generalizable, and novel study that is based on educational or learning theory and can maximize impact.

Human Resources

A medical librarian can help translate research interests into an effective search strategy, familiarize researchers with available information resources, provide information on organizing information, and introduce strategies for keeping current with emerging research. Often, librarians are also aware of research across their institutions and may be able to connect researchers with similar interests. Reaching out to colleagues for suggestions may help researchers quickly locate resources that would not otherwise be on their radar.

During this process, researchers will likely identify other researchers writing on aspects of their topic. Researchers should consider searching for the publications of these relevant researchers (see TABLE 3 for search strategies). Additionally, institutional websites may include curriculum vitae of such relevant faculty with access to their entire publication record, including difficult to locate publications, such as book chapters, dissertations, and technical reports.

Search Tools and Related Literature

Researchers will locate the majority of needed information using databases and search engines. Excellent resources are available to guide researchers in the mechanics of literature searches.^{15,16}

Because medical education research draws on a variety of disciplines, researchers should include search tools with coverage beyond medicine (eg, psychology, nursing, education, and anthropology) and that cover several publication types, such as reports, standards, conference abstracts, and book chapters (see the BOX for several information resources). Many search tools include options for viewing citations of selected articles. Examining cited references provides additional articles for review and a sense of the influence of the selected article on its field.

Once relevant articles are located, it is useful to mine those articles for additional citations. One strategy is to examine references of key articles, especially review articles, for relevant citations.

TABLE 1

Sample of Journals' Author Instructions for Literature Reviews Conducted as Part of Original Research Article^a

Journal	Description ^b
<i>Journal of Graduate Medical Education</i>	"A brief summary of the importance and relevance to <i>JGME</i> readers, concise literature review highlighting the evidence gap(s) the study will attempt to answer, and clear hypothesis or question."
<i>Medical Education</i>	"The introduction should include a strong conceptual framework that indicates how publication of the paper can be expected to fill a gap in knowledge that is important for the field to fill. The context of the work and your choice of methods must be made clear."
<i>Academic Medicine</i>	"The following are general research parameters: The study addresses a serious challenge facing the academic medicine community. The study critically reviews the scholarly literature."
<i>Advances in Health Sciences Education</i>	"From the perspective of external validity, it is critical that authors place their study in a theoretical and empirical context. <i>AHSE</i> has no page limit, in order that each paper can be accompanied by a critical review of related research, and the discussion can highlight how the study findings add to knowledge."
<i>Journal of Continuing Education in the Health Professions^c</i>	"Submissions should be scholarly, demonstrate that they build upon and extend the existing empirical and/or theoretical literature, identify an educational (as opposed to clinical) problem or issue addressed by the study, and offer a successful argument establishing the importance to the field of addressing that problem or issue (ie, explain why <i>JCEHP's</i> readers will want to read the article)."
<i>BMC Medical Education</i>	"The background section should be written in a way that is accessible to researchers without specialist knowledge in that area and must clearly state—and if helpful, illustrate—the background to the research and its aims. Reports of clinical research should, where appropriate, include a summary of the search of the literature to indicate why this study was necessary and what it aimed to contribute to the field."
<i>Perspectives on Medical Education^c</i>	"The introduction introduces the problem, discusses relevant research and literature, and includes arguments as to how the research could contribute to the scholarship of medical education. The introduction should include a coherent conceptual orientation for the work, and enough background to give readers the sense of a thoughtful identification of a core topic, an analysis of what is and is not known about it, and proposals to fill a clearly identified gap in the literature."
<i>Medical Teacher</i>	Not specifically addressed
<i>Teaching and Learning in Medicine</i>	Not specifically addressed

^a When a journal does not provide specific instructions for a literature review in its author guidelines or does not provide adequate space, it is still imperative for researchers to conduct a literature review, for the reasons described in this editorial.

^b Information obtained from each journal's website and instructions for authors.

^c Information obtained from the journal editor via personal correspondence.

Getting Organized

As the aforementioned resources will likely provide a tremendous amount of information, organization is crucial. Researchers should determine which details are most important to their study (eg, participants, setting, methods, and outcomes) and generate a strategy for keeping those details organized and accessible. Increasingly, researchers utilize digital tools, such as Evernote, to capture such information, which enables accessibility across digital workspaces and search capabilities. Use of citation managers can also be helpful as they store citations and, in some cases, can generate bibliographies (TABLE 4).

Knowing When to Say When

Researchers often ask how to know when they have located enough citations. Unfortunately, there is no

magic or ideal number of citations to collect. One strategy for checking coverage of the literature is to inspect references of relevant articles. As researchers review references they will start noticing a repetition of the same articles with few new articles appearing. This can indicate that the researcher has covered the literature base on a particular topic.

Putting It All Together

In preparing to write a research paper, it is important to consider which citations to include and how they will inform the introduction and discussion sections. The "Instructions to Authors" for the targeted journal will often provide guidance on structuring the literature review (or introduction) and the number of total citations permitted for each article category. Reviewing articles of similar type published in the

TABLE 2
Common Problem Areas for Reporting Literature Reviews in the Context of Scholarly Articles

Problem	Potential Negative Impact(s)	Potential Solution(s)
Citations are too old (ie, more than 10 years)	<ul style="list-style-type: none"> ▪ Study results are not discussed in the context of current literature, theory, and evidence thus limiting generalizability and impact ▪ May propagate outdated ideas, potentially falsely inflating study outcomes 	<ul style="list-style-type: none"> ▪ Cite old references only for classic, paradigm-shifting studies, or in the rare case that relevant contemporary studies are unavailable ▪ State the reference age and indicate the reason for citing ▪ Cite contemporary work and discuss how older and newer studies together inform current research
Too few or too many citations are provided ⁹ (ie, Goldilocks principle)	<p><i>Too few studies cited:</i></p> <ul style="list-style-type: none"> ▪ Inadequate context to understand the study ▪ Authors of relevant work are not provided with opportunities for their work to be cited and disseminated <p><i>Too many studies cited:</i></p> <ul style="list-style-type: none"> ▪ Lends the study a false sense of authoritativeness ▪ Readers will not know which prior studies are most relevant 	<ul style="list-style-type: none"> ▪ Map out information that readers need to understand in your paper, and select the highest-yield references ▪ Include the following types of references: those that illustrate core, background, theoretical, and methodological concepts (ie, groundbreaking, paradigm-shifting papers); recent relevant studies; and society position/policy statements ▪ Read articles of a similar type for the journal to which you are submitting to get a sense for the usual number of references
The most extreme or hyperbolic studies are the only studies cited	<ul style="list-style-type: none"> ▪ Synthesis of available literature is biased toward extreme examples, which can cause inaccurate understanding of results and impact 	<ul style="list-style-type: none"> ▪ Cite studies across the spectrum of findings when available and discuss them in relation to one another and the current study ▪ If only extreme examples are available, articulate and discuss implications in the discussion section
Studies conflicting with the authors' findings are intentionally not cited	<ul style="list-style-type: none"> ▪ Causes extreme bias and is unethical ▪ Contributes to harm if erroneously interpreted results are applied in future studies/practice ▪ Eliminates productive discussion that arises from comparing studies with divergent results 	<ul style="list-style-type: none"> ▪ Identify and discuss the studies with results that conflict with your study ▪ Compare and contrast those studies with yours in the discussion section
Ideas are inappropriately attributed	<ul style="list-style-type: none"> ▪ Attributes an idea, concept, or claim falsely, giving the illusion of authenticity or credibility ▪ Is a disservice to the authors to whom ideas are inappropriately attributed 	<ul style="list-style-type: none"> ▪ Confirm that an idea, claim, or concept is clearly articulated in the reference ▪ Contact the author of the cited study to ask whether you accurately understand their study's claims ▪ If you cannot find a reference for an idea or concept, discuss it without a citation, and state that the literature is lacking
Secondary literature (eg, reviews, commentaries, editorials, other studies citing primary literature) are overcited	<ul style="list-style-type: none"> ▪ Author conclusions of secondary literature are taken at face value; these may be incorrect or even biased, potentially propagating ideas or concepts lacking evidence ▪ Failure to consider nuances and details of primary literature reduces the sophistication of interpreting results and conclusions drawn 	<ul style="list-style-type: none"> ▪ Cite secondary literature only when it explains a general concept ▪ Supplement secondary literature cited with primary literature ▪ Identify the primary source for an idea or concept and cite that source

TABLE 2
Common Problem Areas for Reporting Literature Reviews in the Context of Scholarly Articles (continued)

Problem	Potential Negative Impact(s)	Potential Solution(s)
Authors' own work is overcited	<ul style="list-style-type: none"> Provides a biased view of the current literature and context for study Reduces the external generalizability of the work May falsely inflate the impact of authors' prior work 	<ul style="list-style-type: none"> Cite your own work as long as the work is clearly relevant Limit citations of your own work to references relevant to rationale, methodology, and interpretation of results Avoid citing your own work if it relates only to general context or background Clearly indicate when citing your own work Discuss studies that conflict with your prior work
A laundry list of studies is provided without adequate synthesis	<ul style="list-style-type: none"> Readers will not understand the context or rationale for your study May lend false authoritativeness to your paper 	<ul style="list-style-type: none"> Prior to writing, outline the results of your literature search along with key points to be discussed in the introduction and discussion sections Ask colleagues to review your outline and manuscript
Discussion of literature review is overly long	<ul style="list-style-type: none"> Readers may become overwhelmed In the introduction section, the context and rationale for the study will be lost In the discussion section, the impact and meaning of results will be lost 	<ul style="list-style-type: none"> Review journal guidelines Read articles of a similar topic within the journal to which you are submitting to get a sense for typical style and length Outline the literature you want to discuss, including the main points for cited articles, and hold to that outline Critically read your discussion of the literature and revise or delete any repetitive or superfluous sections Include only studies specifically that inform the study context and rationale or that support and/or conflict with study results
Literature review lacks structure or organization	<ul style="list-style-type: none"> The reader will not understand the points you are trying to make Findings will be weakened, which reduces the likelihood of publication and the impact if published 	<ul style="list-style-type: none"> Carefully outline the literature that you want to discuss, including main points for cited articles, and stick to that outline Ask colleagues within and outside your authorship group to critique your literature review for clarity and impact

^a There is no right number of references—this depends on the topic, the complexity with which that topic is addressed, the authors' style, and usual practices for the journal to which you are submitting your work.

targeted journal can also provide guidance regarding structure and average lengths of the introduction and discussion sections.

When selecting references for the introduction consider those that illustrate core background theoretical and methodological concepts, as well as recent relevant studies. The introduction should be brief and present references not as a *laundry* list or narrative of available literature, but rather as a synthesized summary to provide context for the current study and to identify the gap in the literature that the study intends to fill. For the discussion, citations should be thoughtfully selected to compare and contrast the present study's findings with the current literature and to indicate how the present study moves the field forward.

To facilitate writing a literature review, journals are increasingly providing helpful features to guide authors. For example, the resources available through *JGME* include several articles on writing.¹⁷ The

Box Information Resources

- PubMed
- Web of Science^a
- Education Resource Information Center (ERIC)
- Cumulative Index of Nursing & Allied Health (CINAHL)^a
- Scopus^a
- PsycINFO^a
- Google Scholar

^a These are subscription resources. Researchers should check with their librarian to determine their access rights.

TABLE 3
Strategies for Finding Related Researcher Publications in Databases and Search Engines

Strategy	Examples
Search for author name; usually an author's last name will suffice, but consider adding first and/or middle initial or complete first name	Durning Steven Durning Steven J Durning SJ Durning Durning SJ
Combine author name with research concept	Hauer AND trust
Combine author name with his or her institution	O'Sullivan AND UCSF
Consult the database/search engine's help pages to determine its command for author searching	PubMed: lrby [Author] Web of Science: AU = lrby Google: author: lrby

TABLE 4
Citation Managers

Citation Manager	More Information
Zotero	https://www.zotero.org/
Endnote ^a	http://www.endnote.com/
Refworks ^a	https://www.refworks.com/
Mendeley	https://www.mendeley.com/
Papers ^a	http://www.papersapp.com/

^a Denotes a fee-based resource. Researchers should check with their librarian to determine if their institution has a subscription.

journal *Perspectives on Medical Education* recently launched “The Writer’s Craft,” which is intended to help medical educators improve their writing. Additionally, many institutions have writing centers that provide web-based materials on writing a literature review, and some even have writing coaches.

Conclusion

The literature review is a vital part of medical education research and should occur throughout the research process to help researchers design a strong study and effectively communicate study results and importance. To achieve these goals, researchers are advised to plan and execute the literature review carefully. The guidance in this editorial provides considerations and recommendations that may improve the quality of literature reviews.

References

1. Lee K, Whelan JS, Tannery NH, Kanter SL, Peters AS. 50 years of publication in the field of medical education. *Med Teach*. 2013;35(7):591–598.
2. Norman G. Taking stock. *Adv Health Sci Educ Theory Pract*. 2014;19(4):465–467.

3. Artino AR Jr, West DC, Gusic ME. Foreword: the more things change, the more they stay the same. *Acad Med*. 2015;90(suppl 11):Si–Siii.
4. Bordage G. Reasons reviewers reject and accept manuscripts: the strengths and weaknesses in medical education reports. *Acad Med*. 2001;76(9):889–896.
5. Moher D, Liberati A, Tetzlaff J, Altman DG; PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med*. 2009;6(7):e1000097.
6. Harden R, Grant J, Buckley G, Hart I. BEME Guide No. 1: best evidence medical education. *Med Teach*. 1999;21(6):553–562.
7. Cook DA, West CP. Conducting systematic reviews in medical education: a stepwise approach. *Med Educ*. 2012;46(10):943–952.
8. Hammick M, Dornan T, Steinert Y. Conducting a best evidence systematic review. Part 1: from idea to data coding. BEME Guide No. 13. *Med Teach*. 2010;32(1):3–15.
9. Lingard L. Joining a conversation: the problem/gap/hook heuristic. *Perspect Med Educ*. 2015;4(5):252–253.
10. Boyer EL. *Scholarship Reconsidered: Priorities of the Professoriate*. San Francisco, CA: Jossey-Bass; 2016.
11. Hofmeyer A, Newton M, Scott C. Valuing the scholarship of integration and the scholarship of application in the academy for health sciences scholars: recommended methods. *Health Res Policy Syst*. 2007;5:5.
12. Albert M, Hodges B, Regehr G. Research in medical education: balancing service and science. *Adv Health Sci Educ Theory Pract*. 2007;12(1):103–115.
13. Bordage G. Conceptual frameworks to illuminate and magnify. *Med Educ*. 2009;43(4):312–319.
14. Norman G. Editorial—how bad is medical education research anyway? *Adv Health Sci Educ Theory Pract*. 2007;12(1):1–5.
15. Haig A, Dozier M. BEME Guide No. 3: systematic searching for evidence in medical education—part 2: constructing searches. *Med Teach*. 2003;25(5):463–484.
16. Maggio LA, Tannery NH, Kanter SL. AM last page: how to perform an effective database search. *Acad Med*. 2011;86(8):1057.
17. *Journal of Graduate Medical Education*. Resources for authors. 2015. http://www.jgme.org/page/resources_for_authors. Accessed February 2, 2016.



Lauren A. Maggio, PhD, MS (LIS), is Associate Professor, Department of Medicine, Uniformed Services University of the Health Sciences; **Justin L. Sewell, MD, MPH**, is Assistant Professor, Department of Medicine, University of California, San Francisco; and **Anthony R. Artino Jr, PhD**, is Professor and Deputy Director for Graduate Programs in Health Professions

Education, Department of Medicine, Uniformed Services University of the Health Sciences.

The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the Uniformed Services University of the Health Sciences, the

Department of the Navy, the Department of Defense, or the US government.

Corresponding author: Lauren A. Maggio, PhD, MS (LIS), Uniformed Services University of the Health Sciences, 4301 Jones Bridge Road, Bethesda, MD 20814-4799, 301.295.3395, lauren.maggio@usuhs.edu