CPD CONTINUING PROFESSIONAL DEVELOPMENT

Searching and critiquing the research literature

Abstract

This article explores how to search and critique the research literature. This involves explaining how to generate a robust literature review question, search databases in the most effective manner and produce a robust analysis of the literature. The article also outlines how a novice literature reviewer might develop the skills required to undertake a critical analysis of the available evidence. In this manner, the reader is able to present a coherent debate on the state of the literature and how this might be used to construct a comprehensive rationale for why further research or analysis of clinical practice may be needed in relation to a particular topic of interest.

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Online

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Aims and intended learning outcomes

The aim of this article is to examine how to search and critique the research literature. After reading this article and completing the Time out activities you should be able to:
▶ Define the term literature review.
▶ Describe the steps that need to be taken to generate a clear question to guide the literature search.
▶ Formulate a series of keywords to guide the literature search.
▶ Analyse what constitutes an appropriate database in terms of locating potential articles for review.
▶ Summarise how best to narrow the literature search to make it manageable for the specific purpose.
▶ Identify the main steps that need to be taken to present a coherent explanation of why a review of the literature is needed.

Introduction

This article examines how to undertake a literature review, which is an essential skill if considering engaging in a change in practice, research-based essay or dissertation, or evidence-based practice. To engage in any one of these activities, it is important to distinguish between rigorous research and research that is not based on robust approaches to gathering data.

Defining and planning a literature review

A literature review is a report that examines the worth or credibility and value of information that can be extracted from the available

research evidence (Aveyard 2010). For this reason, a literature review should summarise, critically analyse, evaluate and clarify ideas that have been presented by other authors. In this way, you can provide a reasoned argument to outline why the literature review is needed to help you explain why your question related to practice, policy or the robustness of the available research is important (Hart 1998, Cronin *et al* 2008, Aveyard 2010). For example, a literature review should:

- Provide an opportunity for you to share with your reader the results of other studies closely related to the question you are trying to answer (Fraenkel and Wallen 2009, Aveyard 2010).
- Relate your question to the larger body of knowledge by filling in gaps and perhaps extending others' work (Marshall and Rossman 2011).
- Provide a framework to establish the importance of your question and set it in the context of other work (Denney and Tewksbury 2013).

Being clear about why you want to undertake your review is important. If you do not have a clear idea of why you want to review the research literature, you will not develop a clear research question. More importantly, without a robust, researchable, unambiguous research question, your literature search and ultimately your research, policy or practice development will not be sufficiently focused (Alvesson and Sandberg 2013). Arguably, there are seven steps to examining and critiquing the literature, as shown in Table 1.

Step 1: generating a researchable question

To write a robust evaluative literature review, it is essential to start with a sound research question (Jones and Smyth 2004, Aveyard 2010, The Writing Centre, George Manson University 2012). The art of writing a research question is to have a clear idea of what it is you want to achieve. However, this is not always easy and questions can lack focus and may be too broad, or they can be so narrow that you are unable to generate any literature to review.

One way to help you think about how to generate a sound research question is to use a tool such as PICO (Centre for Reviews and Dissemination 2007), particularly if you are generating quantitative questions. PICO is defined as P = Patient/Population/Participants/Problem; I = Intervention, C = Comparison or Comparator and O = Outcome. An example of a question formulated using the PICO tool might be: 'In patients receiving end of life care, is there a two-point reduction in pain intensity recorded on a visual analogue scale in patients who are administered oramorph sustained release via a skin patch compared with the same analgesic administered via a continuous syringe driver?' Using the PICO tool:

- P – patients receiving end of life care.
- I – analgesic administration of oramorph via a skin patch.
- C – analgesic administration of oramorph via a continuous syringe driver.
- O – two-point reduction in pain intensity recorded using a visual analogue scale.

TABLE 1

Seven-step approach to searching and critiquing the research literature

Step	Rationale
1. Generate a researchable question.	To provide the review with a clear focus.
2. Select a database.	To access a wide range of data sources quickly and effectively.
3. Clarify the terms to be used to access the literature.	To ensure only the most appropriate sources of evidence are accessed.
4. Select the literature.	To generate a series of evidence sources for review.
5. Search the literature.	To examine what others have to say that relates to your specific question and to identify what sources you want to review in more detail.
6. Analyse, synthesise and critique the articles.	To review the data sources in detail and make sense of what others have written.
7. Present the findings.	To present the work of others in your own words. To generate a clear argument for why you want to change practice, develop a new policy or undertake a research study.

Although PICO is a useful tool when formulating questions, it does not work quite so well when the question requires a more exploratory qualitative focus (Aslam and Emmanuel 2010). In this case, use of the PICo tool may be more useful, in which P = Participants; I = area of Interest and Co = Context (Joanna Briggs Institute 2011).

An example of a question formulated using the PICo tool might be: 'Do patients experiencing end of life care feel their pain is managed effectively?'. Using the PICo tool:
‣ P = patients receiving end of life care.
‣ I = efficacy of pain management practices.
‣ Co = the patient's thoughts and feelings regarding the way his or her pain is managed.
Complete time out activity ❶

Step 2: selecting a database
When you have generated your search question, you will need to use a database or several databases to access articles to review. The articles you access need to be based on sound sources of evidence. Therefore, what can be termed research or academic databases will help you to access peer-reviewed journals, which will be the main source of evidence you will use to generate your review, efficiently. *Academic database* An academic database is a computer programme that has been instructed to collate information in an organised manner after you have entered your search criteria. Hence, academic databases enable you to access peer-reviewed journal articles, conference proceedings, newspaper articles, government and legal reports, patents and books in a timely manner. In effect, a database can be compared to a sophisticated electronic filing system (Webopedia 2014). However, there are many databases to choose from and you will need to decide which are the most appropriate to help you to access the type of information you think you require. Table 2 lists some of the databases most relevant to nursing and health care. However, if you are going to generate the most comprehensive search possible, you will usually need to access more than one database.

Step 3: clarifying the terms to be used to access the literature
When you have generated your question and chosen a database or series of databases that will help you to access the most appropriate type of evidence-based information about your topic, you need to think about what terms you will enter into the database or databases to enable you to undertake a well-organised

literature search (Jones and Smyth 2004). When generating your search terms, the initial step would be to think of those terms that relate to or describe the intervention, outcome or, in the case of qualitative questions, the phenomenon you want to investigate. For example, the next part of the discussion will be based on the following question: 'When nursing patients in their own home, what pressure ulcer management techniques have nurses found to be most effective?' Using the PICo tool:
‣ P = patients with pressure ulcers.
‣ I = pressure ulcer management techniques.
‣ Co = nursing people in their own home.
The first thing you need to do is generate a list of terms related to your topic – in this case, pressure ulcers and their management. However, pressure ulcers can be represented by different terms, for example bed sores, decubitus ulcers, and pressure sores; given that different authors may use different words to mean the same thing. For this reason, you need to think more

TIME OUT

❶ Using the PICO and PICo tools, devise a research question of your own that you feel would be interesting to answer.

TABLE 2

Examples of databases relevant to nursing and health care

Database	Type of information
AgeLine	Ageing, economics, public health and policy.
ASSIA (Applied Social Sciences Index and Abstracts)	Health, social services, psychology, sociology, economics, politics, race relations and education.
British Nursing Index (BNI)	UK nursing and midwifery.
CINAHL (Cumulative Index to Nursing and Allied Health Literature)	Nursing and allied health.
The Cochrane Library	Systematic reviews and meta-analyses of high-quality medical research.
DARE (Database of Abstracts of Reviews of Effects)	Systematic reviews.
DOAJ (Directory of Open Access Journals)	Open access scientific and scholarly journals.
EMB Evidence Based Medicine Reviews	Best evidence regarding medical decision making.
Embase	Biomedical database.
Health Technology Assessment Database	Health technology assessments worldwide.
Medline	Medicine, dentistry and nursing-related topics.
PsycINFO	Behavioural sciences and mental health.
PubMed	Health, medicine, nursing, audiology and biology.

laterally when generating your search terms so that you can access as much information as possible. Consequently, you will need to add terms to your list so that you can compile a list of alternatives for the search you want to undertake.
Complete time out activity ❷

Continuing with the pressure ulcer example outlined above and if you were in a position to generate a comprehensive body of literature, the next set of terms you would need to consider are those related to the management of the pressure ulcer itself. The term that automatically comes to mind in this case is wound dressing, but as with the term pressure ulcer, this too can be substituted for other equally applicable terms that authors may have used in their work to refer to some form of pressure ulcer management technique.

As you will have realised, there are a variety of terms that you might need to use to capture those which other authors have used to represent the same or a similar concept to the one you want to examine. If you are going to be in a position to access the full range of available articles and undertake a thorough literature review, you will need to think of as many alternative terms, as you can. To help you generate these terms you can consult the thesaurus facility located in most, if not all, of the databases (Jones and Smyth 2004, Hek and Moule 2006).
Complete time out activity ❸

When you access the databases you can also use Boolean operators such as AND, OR, or NOT (Jones and Smyth 2004, Ely and Scott 2007). In this context, the terms AND or NOT narrow a search, while the term OR expands it. Furthermore, brackets can also be used to group words together, for example (Nurse Nursing) will bring up texts that contain both words. Finally, 'wild cards' can be used to help you expand your search further. Wild cards are usually represented by an asterix such as *Pressure Ulcer to broaden out searches or to programme the database to search for alternative spellings of words, for example behavi*r, where using the asterix symbol will ask the database to pick up both behaviour and behavior. Alternatively, you could use truncations represented by the $ sign so that you can ask the database to pick up and include different derivatives of the same word stem, for example Nur$ will select nurse, nurses, nursing, nursed.

Although Boolean operators are not search terms in their own right, you need to decide before you access a database whether they are worth using alongside your own search terms to either expand or focus your search further. Alternatively, you might want to check whether such tools are accessible and/or available in the database you are accessing.
Complete time out activity ❹

Step 4: selecting the literature
Inclusion and exclusion criteria are in essence a list of factors designed to limit the number of articles you review so that only the most appropriate are included (Aveyard 2010). Hence, these limiting factors should enable you to decide if an article is appropriate to include in your analysis. For this reason, inclusion and exclusion criteria need to be unambiguous, but sufficiently wide-ranging to ensure any article located as part of the database search would only be included or excluded on the basis of the inclusion and exclusion criteria set. More importantly, the inclusion and exclusion criteria need to be sufficiently explicit to ensure that if someone else were to undertake the review using the same set of articles, they too would select more or less the same subset of articles for inclusion in the final review to those chosen by you (Randolph 2009). An example of inclusion criteria for a study looking at hospital-acquired pressure ulcers is shown in Box 1. An example of exclusion criteria for a

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TIME OUT

❷ Think about the search question you generated in Time out 1 and identify the key terms that best fit with your topic. Now generate as many alternative terms for your topic as you can.

❸ Use the process outlined in Time out 2 for generating key terms, but this time use the thesaurus facility located in one of the databases listed in Table 2 to help you generate a more comprehensive list of search terms.

❹ Refine the search you have already completed in Time out 2 and 3 by using the Boolean operators AND, OR, or NOT as well as truncations and wild cards to see how this affects your search results, in particular the number of articles you locate.

❺ Search through the titles of the articles you have located in Time out 4. Identify inclusion and exclusion criteria for these articles.

BOX 1

Example of inclusion criteria for a study examining hospital-acquired pressure ulcers

▸ All studies involving adults aged 18 or over who have developed a pressure ulcer after admission to hospital.
▸ Pressure ulcers that occur as a result of a period of enforced immobility because of surgery, orthopaedic or cardiac surgery, or complex pathology, intensive care unit admissions or severe stroke – these are just used as examples, the exact criteria would depend on the size of the study, its purpose and the resources available to undertake the work.
▸ Studies that include only the following methodologies: randomised controlled trial, control trial or cohort study.
▸ Studies written in English.
▸ Studies that have been undertaken in the past five years (this is an example and it may be necessary to go back further because seminal texts that have had a significant effect on a particular topic might be older than this).

study looking at hospital-acquired pressure ulcers is shown in Box 2.

The inclusion and exclusion criteria in Boxes 1 and 2 are provided only as one example of what your search criteria might contain. They are not a definitive list to be used exclusively for all literature searches. Hence, when generating your own inclusion and exclusion criteria, they need to be relevant to your specific search question, location and study context or purpose. More importantly, they should include articles that date as far back as you need to go to access the most relevant literature, given that if you limit your search too much you run the risk of excluding the main sources of evidence that would otherwise be important to include.

Complete time out activity ❺

Irrespective of how inclusive your search strategy might be, you will not always be able to locate all the articles that could help you answer your question. As a note of caution, however, if you are undertaking a literature search for the first time, you might be surprised at how little evidence is available or how contradictory the literature might be. Therefore, you need to remember that everything that nurses do is not always based on sound research evidence, suggesting that there are potential gaps in the literature that provide ideal research or practice or policy development opportunities.

Furthermore, when you start to implement your search strategy, you might find that not all articles are identifiable using the databases. Consequently, you may decide to hand-search

journals to seek out any additional articles or you may undertake a reference search by looking at the reference lists of the articles that you have already accessed to identify any missed articles.

When researching topics where little has been written, a reference search might be the only way to increase the number of articles available for review. Likewise, there might also be seminal articles that have been written about the topic in question – these are studies that have either been ground-breaking in that they have been the first articles published about the topic or they may have made a substantial, unique, original and/or new contribution to the topic. Consequently, it is vital such articles are included in your review given that to omit them would be a significant limitation because your review would not be complete. Hence, if you date limit your search, you will need to justify why you have included articles outside this parameter, particularly since seminal or other major texts may have been written long before the date limit you have selected.

Step 5: searching the literature
Examining articles from a global perspective

Although inclusion and exclusion criteria will help you decide which article to review, these articles will not necessarily be the final list of articles you will use to construct your analysis. Therefore, you will need to take a much more detailed look at the articles to see if they address exactly what you are looking for. Consequently, once you have generated your list of potential articles, you will need to filter them further and decide which ones are relevant and those that are not deemed fit for purpose. Therefore, you will need to develop an additional strategy for deciding which articles you want to keep and those you want to discard because you may still have a significant number of articles for review. Nevertheless, many articles may still not directly address the topic in question, hence you will need to condense them further to generate the most relevant and complete articles possible.

If you only have a small number of articles, you will need to read all of the abstracts to see if there is anything of relevance to your topic located in the main body of the text. However, if you have a much larger number of articles, which should be the case if you have completed your search in a comprehensive manner, then you will need to adopt what could be termed first and second-level filtering processes. The preliminary filtering process uses a

rudimentary set of characteristics to help you reduce the number of articles as outlined below:

▸ Title.

▸ Abstract.

▸ Full text.

▸ Type of article, for example research as opposed to reviews, opinion or theoretical articles.

These criteria are then applied to the articles you have accessed as outlined in Box 3.

In the fourth element of this rudimentary filtering process, you might decide that an article is theoretical or more opinion based and discard it from your list to review because it is not based on sound research evidence. Nevertheless, although it is not fit for purpose in terms of answering the literature review question, you might decide to keep it in a pending folder, because it might be used to provide contextual and/or background information helping you to provide a sound rationale for why you should examine the topic in greater detail.

Deciding which articles to keep and which to discard The next step would be to examine the literature again, this time asking more detailed questions to help you decide whether the article is truly worthy of inclusion in your review or if it is not really giving you the information you need. Although you will already have completed this activity on a limited basis in steps four and five, you will still need to read the full article in much more detail by asking yourself the questions shown in Table 3.

Complete time out activity ❻

The questions in the first column of Table 3 are simple descriptors encouraging you to examine the article in a more systematic way than you may have done so far. The questions in the second column ask you for more detail in

terms of critique by requiring that you justify your actions. In particular, the questions in the second column encourage you to examine the quality and robustness of the articles you have selected. They also encourage you to develop your overall understanding of the content and relevance of the article. Undertaking a critical analysis of the research literature involves a process of repetitive reading. Although this might seem laborious, it is a vital part of the review process.

In particular, such processes enable you to be clear about the points you want to address in your review and why. From this, you will then be better able to construct a complete, complex, but cogent analysis of the literature to explain what others have discovered about the topic and to provide the reader with a sound rationale for why your study is important (Aveyard 2010). Consequently, by repeatedly reading your chosen articles, you will be better able to combine others' ideas and organise them into overarching themes to give your work a coherent structure, logical flow and develop a fuller picture regarding the state of the literature as a whole.

Stage 6: analysing, synthesising and critiquing articles

As part of your reading, you will need to identify the main themes explored in the articles selected for inclusion in your review (Cronin *et al* 2008). Consequently, it might be useful to use a data extraction tool to identify the articles you have found and where they were sourced from. This not only helps you to organise your ideas regarding the articles selected, but it also helps you to generate your reference list.

A data extraction sheet will provide a framework to focus and structure your examination of the articles sourced in an organised and consistent manner (Cochrane Consumers and Communication Review Group 2013). Therefore, by examining the articles you have located using the same framework and in the same level of detail, there is less likelihood that you will miss important pieces of information. When using data extraction sheets the main details they encourage you to consider relate to the study, including the participants, location, type of study method or methods used and the main themes or statistical data presented in each of the articles. By summarising the information in this structured way, you are better able to identify patterns of ideas in the literature and see how the research relates not only to your

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BOX 3

Preliminary literature filtering process

▸ Title

Look at the title to decide whether it addresses the subject matter you are interested in.

▸ Abstract

Read the abstract in full to compare its content with the topic and your inclusion and exclusion criteria to see if the article addresses these.

▸ Full text

Read the full text to compare the content with the topic, purpose of the study, and your inclusion and exclusion criteria to see if the article meets all your requirements.

▸ Type of article

In this final stage, you will need to decide if the article is what you want. For example, if you want to use only empirical research data in your review.

chosen topic or your question, but how the articles relate to each other in terms of content and findings. There are many examples of such tools located on the internet (Box 4).

However, if you are a novice you might want to start with something more simple, as shown in Table 4, because this tool is designed to make you look across the studies you have located rather than looking at each one in isolation, thus encouraging description of the studies you have located rather than synthesis and critique of the findings across all articles. Remember, when reviewing the literature it is the synthesis of the articles that you need to achieve.
Complete time out activity **7**

Given that you have already read your selected articles in full at least twice, you should now be familiar with their general content. However, when analysing and synthesising the literature, you are not simply reading the articles to see if they are suitable to include in your review or understand the content; instead, you are now looking specifically for patterns of ideas manifest across all or a series of articles. In essence, you are searching through each article to identify a set of possible themes that you could use as the framework for your review. Therefore, when you read the articles this time, you will be searching for words or phrases that recur across the articles and that might

TABLE 3

Further assessment of the literature

Descriptive questions	Analytical questions
What is the question I want to address?	Does this article address my question in full or in part, and is it based on empirical research?
What is the quality of the source?	Is the journal and, therefore, the article credible? How do I know and on what am I basing my decision?
Who has written the article?	Is the author a subject expert or novice, and does this matter? How do I know if the author is credible?
In what type of setting has the study taken place?	Is it possible to transfer the findings from this study to my own setting? Is the setting equivalent to my own setting and does this matter? If so, why? If not, why not and can I articulate this?
What was the sample and how was it generated?	Who are the participants? Are they the same or similar to those I want to include? Does this matter and if so, why? If not, why not and does this matter? Am I able to articulate my rationale for including this study in my review?
What study method was used?	Was the method appropriate and fit for purpose? Was it robust? How do I know? What am I basing my decision on? Has it helped me clarify what methods I want to use as part of my own study?
What were the findings?	Are the findings relevant to what took place in the study and are they relevant to my own needs? Do I understand what the researchers have deduced from the findings? Is it clear how the findings have been generated? Is there a clear trail outlining how, where, when and why the data have been managed?
How were the data analysed?	Were the correct statistical tests used as and where appropriate? How do I know and what am I basing my decision on? Were any themes generated from the qualitative data? How was this done? Is it clear that the ideas expressed came from the data? Was the process of analysing such data robust? How do I know this?
How have the researchers reported or discussed their findings?	Are the findings and modes of analysis transparent, or are they so brief I do not understand what took place? Can I trust the findings and how do I know this?
What are the conclusions?	How realistic and how appropriately derived are the study conclusions? Are they based on the data or do they appear tangential to the study? How applicable are they to my own setting or proposed study?
Is this article worth including and if so, in what context?	Will it form one of the themes of the literature review or will it only be worth using as background information?

eventually serve as labels for a collection of similar ideas or thoughts, which would then become the headings for your review.

When writing a literature review, it is not simply about critiquing each article; instead, you need to examine what the authors of the various articles have said collectively, not individually, about the topic. Hence, critical analysis and critical thinking is about trying to examine what is presented in the literature to draw conclusions about what has been written from a variety of different viewpoints. From this analysis, you can generate your own interpretation, in your own words, about what you have read by representing the main points arising from the debate or arguments that others have presented. In this way, you examine the ideas that support or refute a particular point as part of a debate rather than presenting a simple description (Woods 2012).

Consequently, you need to highlight areas of agreement between authors so that you can draw meaningful evidence-based conclusions from what you have read and understood. However, you also need to explore the possible reasons for any disagreement or contention between authors by offering a rationale for why such disagreements might exist (Aveyard 2010). For example, there may be one or a small number of authors who express ideas opposed to those offered by the majority of researchers. If this is the case, you need to establish if there is a reason for this. If there is, you will need to explain why this might be, for example it might be that more recent work has taken a slightly different perspective, which has uncovered new evidence that legitimately contradicts previous ideas. However, it might also be that the contradictory research was based on flawed, misinterpreted or misrepresented evidence. You will need to identify why the outlying ideas have manifest and determine whether they are credible.

Step 7: presenting the findings

When starting to put your ideas together in terms of presenting the main findings as part of writing up your literature review, it is essential to generate a logical structure based on your main themes. Hence, you need to set the scene by informing the reader what you are going to examine, why and how. The structure of a literature review can take one of at least three approaches:
▶ Chronological.
▶ Methodological.
▶ Thematic.
When using the chronological approach, you would arrange your material into different eras so that the review would take the form of an historical overview by exploring how things have changed over time (Cronin *et al* 2008). In contrast, a methodologically focused review would be framed around the research methods that have been used to examine the topic and what conclusions could be drawn from previous studies based on the

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BOX 4

Examples of data extraction sheets

▶ Clinical Appraisal Skills Programme (CASP) appraisal tool for a randomised controlled trial
tinyurl.com/ljzqobb
▶ CASP appraisal tool for a systematic review
tinyurl.com/o5lnlbj
▶ CASP appraisal tool for qualitative research
tinyurl.com/kyvu3lo
▶ CASP appraisal tool for a case control study
tinyurl.com/ktfw33s
▶ CASP appraisal tool for a cohort study
tinyurl.com/p9w2ac2
▶ National Institute for Health and Care Excellence data extraction forms for qualitative studies
tinyurl.com/mq79pva
▶ The Cochrane Collaboration data extraction template for Cochrane reviews
tinyurl.com/mmzmulr

(Last accessed: April 30 2014)

TABLE 4

Example of a simple data extraction sheet

Full reference for article, including publication date	Population targeted and number of participants	Intervention or area of interest	Study method used by author/ authors	Summary of the findings	Conclusions	Themes	Similarities and differences between other studies

methods used. The thematic approach is the one most of you will be familiar with, and the approach you will most often be expected to use as part of a literature review.

Although the thematic approach uses the themes you identified in the articles, it also draws on elements of the chronological and methodological approaches, as most good literature reviews provide the reader with an historical overview of the literature and how it has developed as part of the background followed by examination of the major themes derived from your reading. However, a thematic analysis also examines how the research methods used by other researchers have shaped the ideas you have developed for undertaking your own policy development or practice change, thesis, dissertation, essay or research study. Hence, this final element will act as a clear and logical link to the methods section if your review is being formulated to enable you to generate a thesis, dissertation or research study. Likewise, this element of the literature review can also be used to highlight

gaps in the research evidence or provide a rationale for the type of research investigation you might wish to undertake as part of a research proposal.
Complete time out activity **8**

Conclusion

Conducting a literature review is essential to explore what others have to say about a particular topic. If a literature review is not approached and conducted in a comprehensive manner, a complete picture regarding the state of the research evidence will not be obtained. Therefore, a thorough understanding of the topic being investigated will not be achieved from the outset, resulting in a weak foundation from which to begin any investigation or analysis of a topic and failure to identify gaps in the literature. False avenues of investigation can be pursued or inaccurate conclusions can be drawn such that outmoded practices may be championed **NS**
Complete time out activity **9**

TIME OUT

8 Return to the data extraction sheet you were asked to complete in Time out 7 and identify similar and different links or ideas across all three articles.

9 Now that you have completed the article, you might like to write a practice profile. Guidelines to help you are on page 62.

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