HOW TO EXTRACT THE RELEVANT STUDIES

by Simon Moss

Introduction

Suppose you want to conduct a systematic review to explore whether mindfulness meditation—a variant of meditation—diminishes the incidence of colds. The first phase of a systematic literature review is to clarify the research question or objectives. The PICOS acronym can help you decide whether you have clarified these objectives sufficiently. In particular, you should have specified five attributes:

|  |  |
| --- | --- |
| Attributes to clarify the research objective | Examples |
| P: What is the **problem** you want to address, the **patients** you want to help, or the **population** you want to include | * Problem: Colds
* Patients: Humans with colds
* Participants: Humans with no other diagnosed medical conditions
 |
| I: For experiments or quasi-experiments, what are the **interventions** you want to assess. For correlational studies, what are **independent variables** or causes you want to examine | * Interventions: Mindfulness meditation
* Independent variables: Degree to which individuals engage in mindfulness meditation
 |
| C: For experiments or quasi-experiments, what are the **comparison** or **control** groups. For correlational studies, this attribute might not be relevant | * Comparison group: Other forms of meditation that do not foster mindfulness and no meditation.
 |
| O: What are the **outcome** measures or dependent variables | * Frequency of colds
* Duration of colds
* Number of absent days that can be ascribed to colds
 |
| S. Which study designs will you include? | * Will you include randomized control trials only?
* Or will you include quasi-experiments or correlational designs as well
 |

For this document, we will assume you have completed this phase. This document instead helps you develop the method you will use to extract the relevant studies.

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# Determine the inclusion criteria and exclusion criteria of studies

You first need to specify which studies you will include in your systematic literature review, sometimes called the study eligibility criteria. That is, you need to ascertain the inclusion criteria—criteria that stipulate which studies to include—and exclusion criteria—criteria that stipulate which studies to exclude.

Typically, the inclusion criteria are derived from the intervention or independent variable, the comparison or control groups, the outcomes, and sometimes the study design. In the following table, the first column classifies these criteria, although you would not include these classifications in a paper. The second column presents the inclusion criteria.

|  |  |
| --- | --- |
|  Technique | Examples to practice |
| Interventions, independent variables, and comparisons | * Study compares individuals who practice mindfulness meditation with individuals who do not practice mindfulness
 |
| Outcomes | * In all individuals, frequency of colds, duration of colds, or number of absent days that can be ascribed to colds were measured
 |
| Study design | * Participants were randomly allocated to complete either mindfulness meditation or a comparison group
 |

In contrast, the exclusion criteria are often derived from the patients or population and sometimes the study design. Furthermore, papers published before a particular date or in other languages may be excluded as well. In the following table, the first column classifies these criteria. The second column presents these exclusion criteria.

|  |  |
| --- | --- |
|  Technique | Examples to practice |
| **Problem or participants** |   |
| Demographic, health, or other characteristics of participants  | * Participants who were younger than 8 and, therefore, may not understand the instructions
* Participants who were diagnosed with some medical condition
 |
| Location or setting, such as only English-speaking nations or at hospitals  |  |
| **Study characteristics** |  |
| Study design | * Studies in which participants were measured at one time only
 |
| Publication status | * Papers that report only interim results instead of the final results
 |
| **Other characteristics** |  |
| Date—such as only including studies published after a previous systematic review | * Studies before 1995, when the definition of mindfulness diverged from existing conceptualizations
 |
| Language | * Studies that were not published in English. However, if possible, you should include studies from all languages and use Google translate or proper translation. Otherwise, your studies might not be representative.
 |

To some extent, writing these inclusion criteria and exclusion criteria is an iterative procedure. As you refine these criteria, you might realize, for example, that one inclusion criteria could be more readily expressed as an exclusion criterion and vice versa. To illustrate, initially, you might include the exclusion criteria “correlational studies”. But, you might then decide this phrase is ambiguous and instead develop the inclusion criteria “studies that compare two or more groups” instead.

## Determine the sources of these studies

Next, you need to characterize how you will locate the studies. Besides scholarly databases of studies, you should utilize other sources. For example, you could scan the reference list of the initial set of studies you uncover. In the following table, the first column outlines the source of studies you should explore. The second column offers some details on how to explore these sources as well as some examples.

|  |  |
| --- | --- |
| Source of studies | Recommendations or examples |
| Relevant scholarly databases, such as Scopus | * Proceed to the catalogue of databases in your library. For example, see <http://libguides.cdu.edu.au/az.php>
* Utilize relevant keywords, such as “psychology”, to identify suitable databases
* Or skim all these databases to identify suitable alternatives
* You should utilize at least two databases but preferably more than four databases
 |
| Scan the reference list of the studies you uncover | * You might extract an initial set of studies from scholarly databases
* Then, you might scan the reference lists of all these studies to identify titles that purportedly relate to your topic—such as mindfulness meditation and colds.
 |
| Contact relevant authors  | * You might extract an initial set of studies from scholarly databases or reference lists
* You could then develop a database of authors and email addresses from these articles
* Finally, you could email these authors. You could write a message like “We are conducting a systematic review into whether mindfulness meditation prevents colds. If possible, could you email us any empirical papers you have published on this topic but not in refereed journals. We sincerely thank you for your time and apologize for the inconvenience”.
 |
| Explore the grey literature | * See the document on “How to review the grey literature” that appears on this Learnline page
 |
| Scan websites in which researchers can register studies  | * If your research revolves around clinical interventions, you could visit ClinicalTrials.gov or other websites in which researchers can register their studies
* These registers might uncover studies that were registered but never published. You could then contact the authors to determine the results.
 |

You should probably contact a trained information specialist—usually a librarian—to help you in this endeavour.

## For scholarly databases, determine the search strategy

For each scholarly database, you should specify the search terms and the limits that were imposed—sometimes called the search strategy. The search terms are largely derived from the inclusion criteria. The limits are largely derived from the exclusion criteria. The search terms should include every relevant synonym. The following table presents an example

|  |  |
| --- | --- |
|  | Recommendations or examples |
| Search terms  | * (Mindfulness meditation OR mindfulness intervention or mindfulness practice) AND (Colds)
 |
| Limits or filters | * Published after December 1993
* English
 |

Sometimes, you might apply the same search terms or filters to all the databases. Hence, you would not need to describe this search strategy more than once.

**Procedure to select studies**

After completing the previous phases, you will have collected a range of studies, papers, and books—anywhere between 10 and 10 000—that might explore your research question. However, not all these studies will fulfil your inclusion and exclusion criteria. For example, you might have inadvertently uncovered a study in which the participants were younger than 8.

You now need to clarify how you will ascertain whether these studies fulfill the inclusion criteria and exclusion criteria. These procedures should specify

* which terms or details you were seeking while scanning the titles and abstracts
* which terms or details you were seeking while scanning the full text, if applicable
* the role of other individuals to assess the validity of this procedure.
* how discrepancies between researchers were resolved, as the following table illustrates.

|  |
| --- |
| Recommendations or examples |
| Two researchers scanned all the titles and abstracts of the articles that we initially uncovered. Both researchers had studied undergraduate psychology  |
| While reading the titles and abstracts, the researchers explored whether the study compared two or more groups—and excluded studies in which the participants had been diagnosed with a medical condition or younger than 8 |
| Studies that one or both researchers uncovered were then read in full by one researcher |
| This researcher then examined all the remaining inclusion criteria and exclusion criteria in more detail  |
| To assess the validity of this procedure, another researcher read a subset of 50 of these papers |
| Any discrepancies were discussed—and the definition of each criterion was adjusted or clarified, if necessary, to prevent further discrepancies |
| If uncertain whether a study achieved the eligibility criteria, the researchers contacted the study authors to clarify this information |

## Identifying retractions and errata

Occasionally, authors will retract one of their studies or correct one of their papers, called an errata. If possible, you should decide how you will uncover these retractions and errata. For example, you might write

* for each study we identified, we entered the title and *retraction OR errata* in Google to ascertain whether or not the study had been retracted or corrected
* we excluded retracted studies from the systematic review
* we included the latest, corrected versions of studies in the systematic review

## Register the protocol and search other protocols

The final step, before conducting the review, is to register this protocol. A protocol delineates the procedures you plan to conduct such as

* the research objective
* the inclusion criteria and exclusion criteria
* the scholarly databases you will use as well as the procedures you will apply to uncover other studies
* the search strategies you will apply
* the procedures you will utilize to exclude studies that do not fulfill the criteria.

 In addition, these protocols often include other information, such as how you will extract the data, assess biases, and synthesize the data. To locate a typical protocol as well as to assess whether anyone else has completed, or is now completing, a systematic review that overlaps with your plan

* proceed to [www.crd.york.ac.uk/PROSPERO/](http://www.crd.york.ac.uk/PROSPERO/)
* in the box under “Search PROSPERO” enter keywords on a relevant topic, such as “meditation colds” or “meditation exercise”
* then click the mouse on any results that appear.

After you construct this document, you should register the protocol. That is, in the same website, click the option “Register your review now”. Registration offers two benefits

* First, registration diminishes the likelihood that someone else will complete the same systematic review
* Second, registration shows that you did not change the criteria or procedures to bias the results.

To illustrate, the researcher might be motivated to demonstrate that meditation prevents colds. Furthermore, the researcher might discover that studies on adults tend to support this conclusion but studies on children do not support this conclusion. Therefore, to bias the results, the researcher might decide to exclude studies on children. To demonstrate that you did not bias your results, you need to show how you developed your plan before conducting the review.

**Before you submit the paper**

Finally, during the month before you submit your paper, you should repeat this procedure if possible. That is, locate studies that might have been published after your original search but before you submit.

# Systematic Review Accelerator

To assist this phase of systematic reviews—and indeed most phases of a systematic review—the Institute for Evidence-Based Healthcare at Bond University have developed a suite of tools called SRA or Systematic Review Accelerator. You can access SRA from [this link](https://sr-accelerator.com/#/) after you create an account. SRA comprises several distinct tools. The following table outlines some of these tools.

|  |  |
| --- | --- |
| Tool | Benefit |
| Polyglot | * To search publications, you often need to construct a search strategy, such as (Mindfulness meditation OR mindfulness intervention or mindfulness practice) AND (Colds) AFTER 2019
* Yet, the format of these search strategies varies across databases
* This tool applies the strategies you developed in one database to other databases—so you do not have to reformat each search strategy
 |
| De-duplicator | * This tool helps you remove duplicate references
 |
| Search refiner | * This tool help you identify, and then remove, words from a search strategy that have not been useful
 |
| Screenatron  | * This tool helps you decide whether a title or abstract aligns with the eligibility criteria
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