HOW TO DEVELOP A RESEARCH QUESTION IN SYSTEMATIC REVIEWS

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# **Introduction**

Many researchers conduct systematic reviews. To conduct systematic reviewers, researchers first construct a question they want to answer, such as whether mindfulness meditation diminishes the frequency of colds. Next, researchers need to decide which studies to collect, which data to extract from the studies, and how to synthesize these data to answer the question. This document clarifies how to construct a research question to answer.

# Types of Questions

To help you construct a research question or a research objective, perhaps skim the following table. The first column of this table demonstrates the variety of research questions that reviews can answer. The second column present several examples of each variety.

|  |  |
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| Type | Examples |
| Does some **intervention** diminish some problem, generate some benefit, or amplify complications? | * Does mindfulness meditation help prevent colds? * Do plastics increase the prevalence of bacteria in pools? * Does learning a foreign language improve confidence? * Do humble leaders improve the profitability of workplaces? |
| Does the impact of some intervention **depend on** other characteristics or circumstances? | * Do the benefits mindfulness meditation depend on intelligence? * Does the impact of plastics on bacteria vary across the seasons? * Does the effect of learning a foreign language depend vary across cultures? * Are humble leaders more effective during unstable times? |
| Which characteristics or circumstance **cause** or **predict** some problem? | * Which personality traits determine the incidence of colds? * What economic variables affect the prevalence of plastics? * Which educational experiences influence student confidence? * In which circumstances do leaders exhibit more humility? |
| What are the likely **consequences** of some problem? | * To what extent do colds affect the safety of planes? * What is the effect of bacteria in water bottles on health? * Does the confidence of students affect their learning? * How does profit affect the innovation of organizations? |
| What is the **incidence or prevalence** of some problem? | * How many pilots are infected with colds while flying? * What is the volume of plastics in city rivers? * What proportion of students overestimate their capabilities * What percentage of leaders acknowledge their shortcomings? |
| To what extent does some technique **diagnose or measure** some problem? | * To what extent does the XA blood test to predict colds? * What is the accuracy of the YB tool to detect bacteria in water? * Which techniques most accurately measure student confidence? * Which measures of financial performance are most important? |

Decide whether your systematic review should investigate the benefits of some intervention, the circumstances that influence the magnitude of these benefits, the causes of some problem, the consequences of some problem, the frequency of some problem, or the validity of measures or diagnoses. That is, if possible, generate a provisional research question to explore.

## Features of question: PICOS

After you generate a provisional research question to explore, your next goal is to clarify this question. To achieve this goal, many researchers apply the PICOS acronym or similar acronyms. This acronym is defined in the following table. The precise meaning of PICOS, however, varies across disciplines, designs, and researchers. The acronym is merely a reminder of some, or most, of the key features of studies you should consider.

|  |
| --- |
| Attributes to clarify the research objective |
| P: Clarify the **problem** you want to address, the **patients** you want to help, or the **population** you want to include |
| I: For experiments or quasi-experiments, specify the **interventions** you want to assess. For correlational studies, specify the **independent variables** or causes you want to examine |
| C: For experiments or quasi-experiments, specify the **comparison** or **control** groups. For correlational studies, this attribute might not be relevant |
| O: What are the **outcome** measures or dependent variables |
| S. Which **study** designs will you include or in which **settings** do you want to examine the issue? |

The next table demonstrates how researchers can apply this acronym. To illustrate, consider the second column. In this column, the researcher starts with the question “Does mindfulness meditation help prevent colds”. The researcher then considers the participants, interventions, control groups, outcomes, and settings or study design more carefully. After this exercise, the researchers are likely to modify the research question slightly, perhaps ending with “In winter, is mindfulness meditation more likely to diminish the duration, severity, and frequency of human colds than other meditation techniques”.

|  |  |  |  |
| --- | --- | --- | --- |
| Acronym | Does mindfulness meditation help prevent colds? | Does the impact of plastics on bacteria vary across the seasons? | Which educational experiences influence student confidence? |
| P | Humans with colds | Bacteria in pools | Students |
| I | Mindfulness meditation | Seasons | Educational experiences |
| C | Other variants of meditation | NA | NA |
| O | Duration, severity, and frequency of colds | Effect of plastics on the bacteria profile in pools | Confidence |
| S | Winter | Correlational design; swimming pools | University |
| Final research question | In winter, is mindfulness meditation more likely to diminish the duration, severity, and frequency of human colds than will other meditation techniques? | Does the impact of plastics on the bacteria profile in swimming pools vary across the seasons? | Which educational experiences influence student confidence in university? |

## Questions to help you decide whether to explore this research question

After you have clarified your research question, you need to decide whether this question is likely to generate a meaningful answer. To achieve this goal, you need to determine whether the question achieves various criteria. The first column in the following table specifies these criteria. The second column offers some insights on how to assess these criteria.

|  |  |
| --- | --- |
| Criteria to decide whether a  research question is worthwhile | Procedures to assess these criteria |
| Is the systematic review original? | * Google and then proceed to “Google Scholar” * In Google Scholar, enter “systematic review” ad relevant keywords, such as “mindfulness meditation colds” * Proceed to www.crd.york.ac.uk/PROSPERO/ * In the box under “Search PROSPERO” enter keywords on a relevant topic, such as “meditation colds” * Then click the mouse on any results that appear. * These procedures should uncover other systematic reviews that have been conducted, or are scheduled to be conducted, on this topic * Do not conduct systematic reviews if other researchers have completed similar reviews in the last five or so years * However, if recent advances are likely, more frequent systematic reviews could be warranted. |
| Have enough studies explored this topic? | * Perhaps enter the keywords into the most relevant database—or Google Scholar * If you can uncover at least 4 or 5 relevant studies in one to three hours, the systematic review is likely to include enough studies to be informative |
| Has a reasonable, rather than excessive, number of studies explored this topic | * If you can uncover more than 50 relevant studies in an hour or so, the systematic review might comprise too many studies. Perhaps you should consider a more specific research topic. You might refine your question to a specific setting or intervention, for example. |
| Is the answer to this research question uncertain rather than inevitable | * If the answer to this research question is almost inevitable, your systematic review might not be especially informative or warranted |
| Is the answer to this research question very important to at least a specific community of individuals |  |