Learn & Create Workshops

Systematic Reviews 101

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Objectives

• Identify the differences and similarities of
  ✓ narrative reviews
  ✓ scoping/mapping reviews
  ✓ systematic reviews

• Describe research question frameworks and search strategies

• Provide resources to aid in planning and preparing a systematic review project

• Increase awareness of library services to support your project
Narrative Reviews

• Aim to summarize the critical points of current knowledge of a particular topic. Also called literature reviews.

• Narrative review can be written as
  ➢ An introduction to a study to:
    ✓ Demonstrate how a study fills a gap in research
    ✓ Compare a study with other research
  ➢ A separate work which:
    ✓ Organizes/describes a topic
    ✓ Describes variables within a particular issue/problem
Systematic Reviews

• A research method that aims to locate and summarize all available evidence for a specific question in order to guide decisions and practices.

• Key characteristics
  - An explicit, reproducible methodology that aims to minimize publication bias
  - Contains clearly stated objectives with clearly defined eligibility criteria
  - A systematic search to identify all related studies
  - An assessment of the validity of the findings
  - A systematic presentation and synthesis of the findings
Scoping/Mapping Reviews

• Aim is to address an exploratory research question aimed at mapping key concepts, types of evidence, and gaps in research related to a defined area or field.

• Characteristics defined by Joanna Briggs Institute Reviewer’s Manual
  ➢ Examine emerging evidence
  ➢ Identify gaps in the evidence, clarify key concepts and report on the types of evidence that address and inform practice in a topic area
  ➢ Provide a broad overview of a topic
Meta-Analysis

- A statistical method to summarize the results of independent studies
- Optional in systematics reviews
- Better estimate effects
- Investigate consistency and explore discrepancies
- Consult with a statistician or biostatistician
Review Spectrum

- **Narrative**
- **Mapping**
- **Scoping**
- **Systematic**
- Meta-Analysis

Describe methods

Appraisal of studies
Which review? Example A

• A review of the last 10 years of literature on machine learning models for detection and diagnosis of cancer.
  
a) Narrative
b) **Scoping/Mapping**
c) Systematic
Which review? Example B

As machine learning models are emerging, what does this mean for detection and diagnosis of cancer?

a) Narrative

b) Scoping/Mapping

c) Systematic
• To assess the effectiveness of machine learning models for detection and diagnosis of cancer.

a) Narrative

b) Scoping/Mapping

c) Systematic
Team & Timeline

• A team of 3 or more with sufficient expertise, time and ability to work together
  ✓ Subject expert(s)
  ✓ Search expert/ librarian
  ✓ Statistician/ biostatistician

• Gaining familiarity with software (citation management, statistical) prior to beginning the project

• The entire project may take up to a year or longer depending on topic
Systematic Reviews Process

1. Specify research question
2. Develop protocol
3. Search for studies
4. Select studies/screening
5. Assess quality
6. Extract data
7. Synthesize
8. Report
Research Question Frameworks - PICO

- Example: Does moderate alcohol consumption have favorable effects on reduced risk of coronary heart disease in adults without known cardiovascular disease?

<table>
<thead>
<tr>
<th>Population or Problem</th>
<th>What are the characteristics of the population? What is the problem or condition you are interested in?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>What do you want to do with population or problem?</td>
</tr>
<tr>
<td>Comparison</td>
<td>What is the comparison or alternative to the intervention?</td>
</tr>
<tr>
<td>Outcome</td>
<td>What are the possible outcomes?</td>
</tr>
</tbody>
</table>
Example: In infants, is there an association between exposure to soy milk and the subsequent development of peanut allergy?
**SPICE (social sciences)**

- Example: In which way (providing in-person progress report versus providing pagers or a phone call) would effectively reduce family members’ anxiety while their relatives are undergoing surgery?

<table>
<thead>
<tr>
<th>Setting</th>
<th>Surgical waiting room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perspective</td>
<td>Family members of patients</td>
</tr>
<tr>
<td>Intervention/Interest</td>
<td>Providing in-person progress report</td>
</tr>
<tr>
<td>Comparison</td>
<td>Providing pagers or a phone call</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Anxiety</td>
</tr>
</tbody>
</table>
Example: The effects of alcohol consumption on biological markers associated with risk of coronary heart disease in adults without known cardiovascular disease.

- **Who**: Adults without known cardiovascular disease
- **What**: Protective association of alcohol on coronary heart disease
- **How**: Examine biological markers
Activity – Q1 & Q2

• Read the background information and then develop your research question using a research question framework of your choice

• High levels of sedentary behavior (SB) are associated with negative health consequences. While technological advancements have contributed to a rise in SB, they are also being harnessed to reduce SB. Digital tools such as mobile phones, internet, text-messaging and wearable sensors can provide a platform to intervene to change health behavior. However, there is a lack of evidence examining their role in reducing SB.
Develop A Protocol

• Reduce the probability of reviewer bias

• Project management
  ✓ allocation of roles
  ✓ mechanisms for resolving disagreements
  ✓ project schedule

• Can be evaluated by other researchers for feedback

• Can form the basis of the introduction and method sections of a report of a review
Search Strategies

• Literature databases – Library Guides http://www.lib.uiowa.edu/eng/
  ✓ Theses and dissertations
  ✓ Technical reports

• Manual search
  ✓ Specific journals and conference proceedings
  ✓ Grey literature if possible

• Snowballing
  ✓ Reference lists from relevant papers
  ✓ Scopus, Web of Science and Google Scholar for citing reference search

• Contact key researchers
Tips for Searching Databases

• Translate a research question into search concepts
  ✓ The question matches the search strategy.
  ✓ Search concepts are clear.
  ✓ Search concepts are not too broad or too narrow.
  ✓ Revise search concepts if retrieve too many or too few records

• Boolean and proximity operators
• Subject headings
• Synonyms, acronyms or abbreviations
• Filters: i.e., RCT filter

Activity Q3: list the main concepts and terms from your question
Screening

- De-duplicating: EndNote [http://guides.lib.uiowa.edu/citations](http://guides.lib.uiowa.edu/citations)
- Sorting
  - Eligibility criteria (example on the next slide)
    - Specific
    - Definitions
    - Determine if a paper will be included or not
    - For exclusions, provide reasons
  - Rayyan – free software to manage the sorting process
- More SR software [http://systematicreviewtools.com](http://systematicreviewtools.com)
Example of Criteria

• The effectiveness of interventions using computer, mobile or wearable technologies aimed at reducing sedentary behavior (SB)

Inclusion criteria:
• Adults aged 18 years and over
• Published RCTs of any duration with a main aim of reducing SB and with computer, mobile or wearable technology as any part of the intervention
• RCTs with a comparison or control arm that consisted of no intervention control, usual care, or alternative treatment conditions
• Pre-post objective, subjective or proxy measure of SB

Exclusion criteria:
• RCTs not published in English
• Comparator intervention using computer, mobile or wearable technology to reduce SB or increase physical activity
• RCTs where the main aim of the intervention was to increase physical activity
• Interventions delivered in a hospital setting
• Clinically diagnosed populations, with the exception of those who are overweight or obese
Systematic Reviews Process

- Specify research question
- Develop protocol
- Search for studies
- Extract data
- Assess quality
- Select studies/screening
- Synthesize
- Report
Report

• A review is reported as
  ✓ Detailed technical report
  ✓ Conference or journal paper
  ✓ Chapter in a thesis or dissertation.

• Can provide traceability from individual primary studies to the results and conclusions of a review

• Can demonstrate rigor in applying the review process.
Methods

- Resources including interface
  - Databases
  - Grey literature
- Date that search conducted
- Describe search overall, which concepts were included
- Describe filters
- Describe additional search strategies

Comprehensive search strategies, including index and keyword methods, were devised for the following databases: PubMed, CINAHL (EBSCO), EMBASE (Elsevier), SPORTDiscus (EBSCO) and Cochrane Central Register of Controlled Trials (Wiley). No database filters were used, in an effort to maximize sensitivity.

Searches were conducted during October 2015, and results for each database can be found in the figure.

<table>
<thead>
<tr>
<th>Database</th>
<th>Abbreviated search strategy (full results available on request or in appendix)</th>
<th>Result #’s (October 2015)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CINAHL</td>
<td>(MH &quot;Hamstring Muscle&quot; OR biceps femoris OR ...) AND (MH &quot;Tendon Injuries&quot; OR MH &quot;Achilles Tendinopathy&quot; OR ...) AND (MH &quot;Thigh&quot; OR MH &quot;Horse&quot; OR MH &quot;Surgery, Operative&quot; OR MH &quot;Physical Therapy&quot; OR nonoperative OR nonoperative OR nonsurgical OR ...) AND (MH &quot;Treatment Outcome&quot; OR MH &quot;Recovery&quot; OR MH &quot;Functional Status&quot; OR quality of life OR outcome OR ...)</td>
<td>947</td>
</tr>
<tr>
<td>SportDiscus</td>
<td>(DE &quot;HAMSTRING muscle&quot; OR DE &quot;BICEPS femoris&quot; OR TX semitendinos* OR ...) AND (DE &quot;HAMSTRING muscle&quot; OR DE &quot;BICEPS femoris&quot; OR TX semitendinos* OR ...) AND (DE &quot;Surgery&quot;[exploded] OR DE &quot;Physical Therapy&quot;[exploded] OR TX conservative OR ...) AND (DE &quot;TREATMENT effectiveness&quot; OR DE &quot;Exercise&quot;[exploded] OR TX outcome* OR ...)</td>
<td>1538</td>
</tr>
<tr>
<td>Embase</td>
<td>(biceps femoris muscle&quot;[exp OR hamstring]/exp OR &quot;semitendinosus muscle&quot;[exp OR hamstring]&quot; OR...) AND (tendon rupture/exp OR &quot;avulsion injury&quot;/exp OR &quot;sport injury&quot;/exp OR avulsion*[ab,ti] OR ...) AND (&quot;surgery&quot;[link OR &quot;therapy&quot; OR &quot;rehabilitation&quot; OR &quot;Surgical Procedures, Operative&quot; OR &quot;physical therapy&quot; OR &quot;physiotherapy&quot; OR surgical[ab,ti] OR ...) AND (&quot;self report&quot;/exp OR &quot;treatment outcome&quot;/exp OR &quot;functional assessment&quot;/exp OR ...) NOT [medline]/film</td>
<td>583</td>
</tr>
<tr>
<td>Cochrane (CENTRAL)</td>
<td>(ti,ab,kw &quot;tibial tuberosity&quot; OR ti,ab,kw hamstring OR ...) AND (MeSH Tendon Injuries [exploded] OR MeSH Skeletal Muscle[In] [exploded] OR ti,ab,kw avulsion OR ...) AND (ti,ab,kw Surgical Procedures, Operative [exploded] OR ti,ab,kw Physical Therapy Modalities [exploded] OR ti,ab,kw surgical OR ...) AND MeSH Treatment Outcome [exploded] OR ti,ab,kw recover* OR outcome* OR ...)</td>
<td>119</td>
</tr>
</tbody>
</table>
Methods

• PRISMA flow diagram

• PRISMA Guidelines for Reporting

http://prisma-statement.org/
Guidelines & Standards

- PRISMA Guidelines for Reporting http://prisma-statement.org/
- Cochrane Handbook for Systematic Reviews of Interventions http://handbook.cochrane.org/
Resources


• Hardin Library guide for Systematic Reviews: http://guides.lib.uiowa.edu/systematicreviews
Contact

- Engineering Library Systematic Reviews Request Form
  http://www.lib.uiowa.edu/eng/systematic-reviews/
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