Learn & Create Workshops

Comprehensive Literature Reviews

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Learning Objectives

After this presentation, you will be able to

• Decide the types of reviews that would be appropriate for your research topic
• Describe the main stages of the review process
• Select an appropriate framework to specify your research question
Literature versus Scoping/Mapping Reviews

- Literature Reviews: Aim to summarize the critical points of current knowledge of a particular topic.
- Scoping/Mapping Reviews: Aim to address an exploratory research question by mapping key concepts, types of evidence, and gaps in research related to a defined area or field.
Systematic Reviews

• A research method that aims to answer question(s) by analyzing studies meeting a specified criteria.
  ➢ An explicit, reproducible methodology that aims to minimize publication bias
  ➢ Contains clearly defined eligibility criteria
  ➢ A systematic search to identify all related studies
  ➢ An assessment of the validity of the findings

• Meta-analysis: A statistical method to summarize the results of independent studies
  ➢ Better estimate effects
  ➢ Investigate consistency and explore discrepancies
Review Spectrum

Describe methods

Appraisal of studies

Literature

Scoping / Mapping

Systematic Meta-Analysis
Which review?

- A review of the last 10 years of literature on machine learning models for detection and diagnosis of cancer.

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

- To assess the effectiveness of machine learning models for detection and diagnosis of cancer.
Which review?

- A review of remediation methods for PCBs in school buildings
- A review of adverse human health effects of exposure to environmentally relevant PCB mixtures
- To assess the effectiveness of the PCB cleanup and disposal methods for environmentally relevant PCB mixtures
Which review?

- To assess the effectiveness of library instruction on students scores on a standardized test
- As more universities strive to support open access efforts, what does this mean for students?
- A review on the efficacy and safety of chloroquine for the treatment of COVID-19
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 half a year or longer depending on topic
Review Process

Specify research question → Develop protocol → Search for studies

Select studies/screening → Assess quality

Extract data

Synthesize → Report
Specify Research Questions

- Research Question Frameworks

<table>
<thead>
<tr>
<th>Framework</th>
<th>Population</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>PICO</td>
<td>Population</td>
<td>Intervention</td>
<td>Comparison</td>
<td>Outcome</td>
</tr>
<tr>
<td>PECO/PEO</td>
<td>Population</td>
<td>Exposure</td>
<td>Comparator</td>
<td>Outcome</td>
</tr>
<tr>
<td>SPICE</td>
<td>Setting</td>
<td>Perspective</td>
<td>Intervention or interest</td>
<td>Comparison</td>
</tr>
<tr>
<td>WWH</td>
<td>Who</td>
<td>What</td>
<td>How</td>
<td></td>
</tr>
<tr>
<td>PICO</td>
<td>Question</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>-------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population</td>
<td>What are the characteristics of the population including animal species?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>What therapy or intervention do you want to investigate exposing the population to?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison</td>
<td>What is alternative therapy or intervention do you want to compare the primary intervention?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outcome</td>
<td>What are the possible outcomes?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
What are the main elements using PICO?

- **Research Question**: 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</th>
<th>Adults without pre-existing cardiovascular disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>Moderate alcohol consumption</td>
</tr>
<tr>
<td>Comparison</td>
<td>Those after a period of no alcohol use</td>
</tr>
<tr>
<td>Outcome</td>
<td>Reduced risk of coronary heart disease</td>
</tr>
</tbody>
</table>
PECO/PEO (risk or protective factors)

<table>
<thead>
<tr>
<th>Category</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>What are the characteristics of the population including animal species?</td>
</tr>
<tr>
<td>Exposure</td>
<td>What pre-existing conditions does the population have or what has the population been exposed to?</td>
</tr>
<tr>
<td>Comparator</td>
<td>What are the characteristics of the population who do not have pre-existing conditions or exposure?</td>
</tr>
<tr>
<td>Outcome</td>
<td>What are the possible outcomes?</td>
</tr>
</tbody>
</table>
What are the main elements using PECO?

- Research Question: Evaluate the adverse children health effects of exposure to environmentally relevant PCB mixtures

<table>
<thead>
<tr>
<th>Population</th>
<th>Exposure</th>
<th>Comparator</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children</td>
<td>Exposure to PCBs</td>
<td>Children exposed to lower levels (or no exposure/exposure below detection limits) of PCBs</td>
<td>Any examination of survival, body weight, or development, or of the structure or function of dermatologic etc.</td>
</tr>
</tbody>
</table>
What are the main elements using PEO?

- Research Question: In infants, is there an association between exposure to soy milk and the subsequent development of peanut allergy?
### SPICE (social sciences)

<table>
<thead>
<tr>
<th>Category</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting</td>
<td>Where? In what context?</td>
</tr>
<tr>
<td>Population</td>
<td>for whom?</td>
</tr>
<tr>
<td>Population</td>
<td>What intervention do you want to do with the population?</td>
</tr>
<tr>
<td>Intervention</td>
<td>What is alternative intervention do you want to compare the primary intervention?</td>
</tr>
<tr>
<td>Comparison</td>
<td>How well? What are possible outcomes?</td>
</tr>
</tbody>
</table>
What are the main elements using SPICE?

- Research Question: 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>Population or perspective</td>
<td>Family members of patients</td>
</tr>
<tr>
<td>Intervention</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>

Who
What are the characteristics of the population?

What
What was done? (intervention, exposure, policy, phenomenon, etc.)

How
How does the what affect the who?
What are the main elements using WWH?

- **Research Question:** The effects of alcohol consumption on biological markers associated with risk of coronary heart disease in adults without known cardiovascular disease.

<table>
<thead>
<tr>
<th>Who</th>
<th>Adults without known cardiovascular disease</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What</strong></td>
<td>Protective association of alcohol on coronary heart disease</td>
</tr>
<tr>
<td><strong>How</strong></td>
<td>Examine biological markers</td>
</tr>
</tbody>
</table>
Activity – Q1 & Q2

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

• 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.
Review Process

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

• Reduce the probability of reviewer bias

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

• Be evaluated by your advisor or others for feedback

• 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
Search Literature Databases

• Translate a focused research question into its relevant 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 search results

• Boolean (AND, OR, NOT) and proximity operators

• Subject headings: i.e., MeSH

• Synonyms, acronyms or abbreviations

• Filters: i.e., RCT (randomized controlled trials) filter
Activity - Q3

• Research Question: How effective is artificial intelligence in predicting organ transplantation outcomes?

<table>
<thead>
<tr>
<th>Main concepts</th>
<th>Concept 1</th>
<th>Concept 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Artificial intelligence</td>
<td>Organ Transplantation</td>
</tr>
<tr>
<td></td>
<td>Machine Learning</td>
<td></td>
</tr>
<tr>
<td>Synonyms, Acronyms, Abbreviations</td>
<td>Prediction Model Simulation Model</td>
<td>Organ Transplant Failure</td>
</tr>
<tr>
<td></td>
<td>Intelligent Computing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intelligent System</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intelligent Agent</td>
<td></td>
</tr>
<tr>
<td>Subject Headings: MeSH Terms</td>
<td>&quot;Artificial Intelligence&quot;[Mesh]</td>
<td>&quot;Organ Transplantation&quot; [Mesh]</td>
</tr>
<tr>
<td></td>
<td>&quot;Machine Learning&quot;[Mesh]</td>
<td>Transplantation [Mesh]</td>
</tr>
</tbody>
</table>
Systematic Reviews Process

1. Specify research question
2. Develop protocol
3. Search for studies
   - Select studies/screening
4. Extract data
5. Assess quality
6. Synthesize
7. Report
Select Studies / 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 an article 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

- Research Question: 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
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,  

<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>PubMed</td>
<td>&quot;hamstring&quot; OR hamstring* OR semitendinosus* OR (Text Word) OR (Text Phrase) OR..., AND &quot;tendon injuries&quot; OR &quot;tension injuries&quot; OR &quot;rupture&quot; OR &quot;athletic injuries&quot; OR &quot;muscle, skeletal injuries&quot; OR &quot;surgery&quot; OR &quot;therapy&quot; OR &quot;rehabilitation&quot; OR &quot;surgical procedures&quot; OR &quot;physical therapy modalities&quot; OR &quot;management&quot; OR &quot;treatment outcome&quot; OR &quot;Recovery of function&quot; OR &quot;patient satisfaction&quot; OR &quot;Sports&quot; OR &quot;Exercise&quot; OR &quot;athletes&quot; OR &quot;Sport&quot; OR &quot;athlet&quot; OR (Text Word) OR (Text Phrase) OR...</td>
<td>1982</td>
</tr>
<tr>
<td>CINAHL</td>
<td>(MH &quot;hamstring muscle&quot;) OR &quot;biceps femoris&quot; OR..., AND (MH &quot;tendon injuries&quot;) OR MH &quot;athletic injuries&quot; OR &quot;riah*&quot; OR &quot;rupture*&quot; OR..., AND &quot;m/w OR &quot;th&quot; OR &quot;rh&quot; OR &quot;su&quot; OR MH &quot;surgery&quot;, OR MH &quot;physical therapy&quot; OR nonoperative OR non operative 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 &quot;outcome*&quot; OR...</td>
<td>947</td>
</tr>
<tr>
<td>SportDiscus</td>
<td>(DE &quot;HAMBRENGMuskel&quot;) OR DE &quot;BICEPS Femoris&quot; OR &quot;Semitendinosus*&quot; OR..., AND OR DE &quot;HAMSTRING muscle&quot; OR DE &quot;BICEPS femoris&quot; OR &quot;TX semitendinos*&quot; OR..., AND OR &quot;HAMSTRING muscle&quot; OR DE &quot;BICEPS femoris&quot; OR &quot;TX semitendon*&quot; OR..., AND OR DE &quot;Surgery&quot; OR &quot;exploded&quot; OR DE &quot;physical therapy&quot; OR &quot;exploded&quot; OR &quot;tx conservative OR... AND DE &quot;treatment effectiveness OR DE &quot;exercise&quot; OR &quot;exploded&quot; OR &quot;tx outcome*&quot; OR...</td>
<td>1538</td>
</tr>
<tr>
<td>Embase</td>
<td>&quot;biceps femoris muscle&quot; OR &quot;hamstring&quot; OR &quot;semitendinosus muscle&quot; OR &quot;surgery&quot; OR &quot;avulsion injury&quot; OR &quot;sport injury&quot; OR &quot;avulsion OR... AND &quot;tendon rupture OR &quot;surgery&quot; OR &quot;therapy&quot; OR &quot;rehabilitation&quot; OR &quot;surgery&quot; OR &quot;physiotherapy&quot; OR &quot;surgical OR... AND &quot;self report&quot; OR &quot;treatment outcome&quot; OR &quot;functional assessment&quot; OR &quot;not [medline]/lim...</td>
<td>583</td>
</tr>
<tr>
<td>Cochrane</td>
<td>(ti,ab, kw) &quot;tibial tuberosity&quot; OR (ti,ab, kw) hamstring OR... AND (MeSH Tendon Injuries OR exploded) OR MeSH &quot;skeletal muscle&quot; OR &quot;surgical procedures&quot;, OR &quot;operative&quot; OR &quot;surgical OR... AND &quot;effectiveness&quot; OR...</td>
<td>119</td>
</tr>
</tbody>
</table>
Methods

• PRISMA flow diagram

• PRISMA Guidelines for Reporting

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

Resources


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