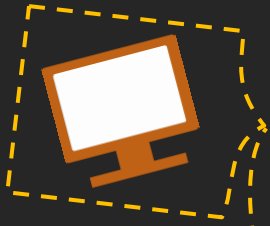# Systematic Reviews 101

Marina Zhang

Engineering & Informatics Librarian

qianjin-zhang@uiowa.edu 319-335-5301

Lichtenberger Engineering Library, 2001 SC

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
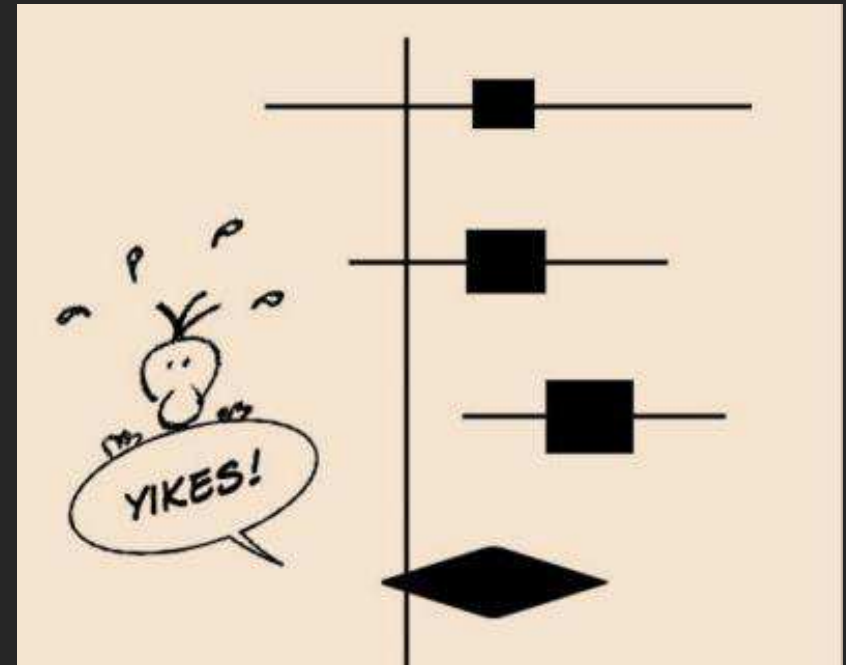 - A systematic presentation and synthesis of the findings
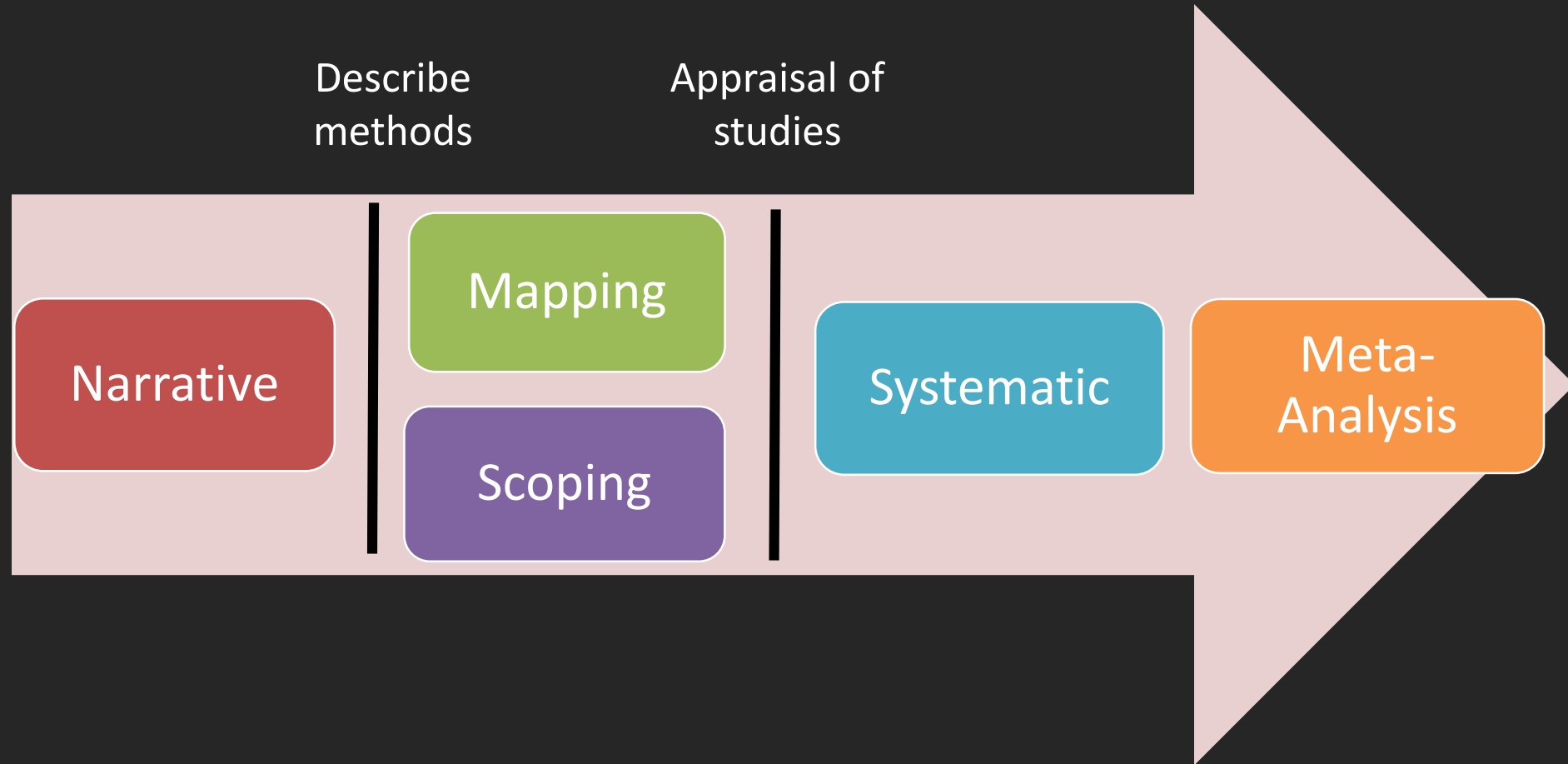
Cochrane

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

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

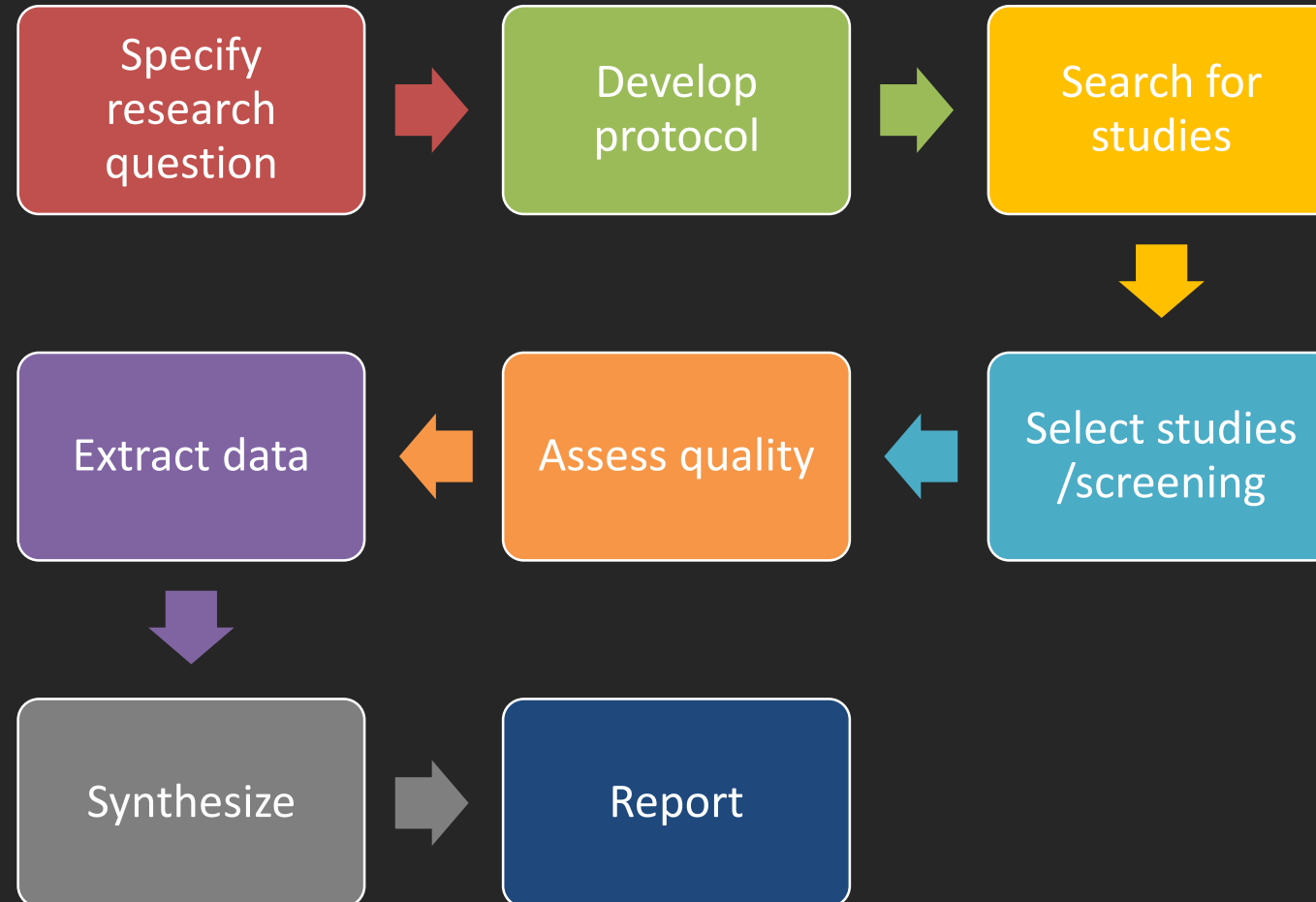# Which review? Example C

- 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

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?

Population or Problem	What are the characteristics of the population? What is the problem or condition you are interested in?
Intervention	What do you want to do with population or problem?
Comparison	What is the comparison or alternative to the intervention?
Outcome	What are the possible outcomes?

PEO (risk or protective factors)

- Example: In infants, is there an association between exposure to soy milk and the subsequent development of peanut allergy?

Population or Problem	What are the characteristics of the population? What is the problem or condition you are interested in?
Exposure	What do you want to do with population or problem?
Outcome	What are the possible outcomes?

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?

Setting	Surgical waiting room
Perspective	Family members of patients
Intervention/Interest	Providing in-person progress report
Comparison	Providing pagers or a phone call
Evaluation	Anxiety

WWH (interdisciplinary)

- 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
- 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

Example of Criteria

- The effectiveness of interventions using computer, mobile or wearable technologies aimed at reducing sedentary behavior (SB)
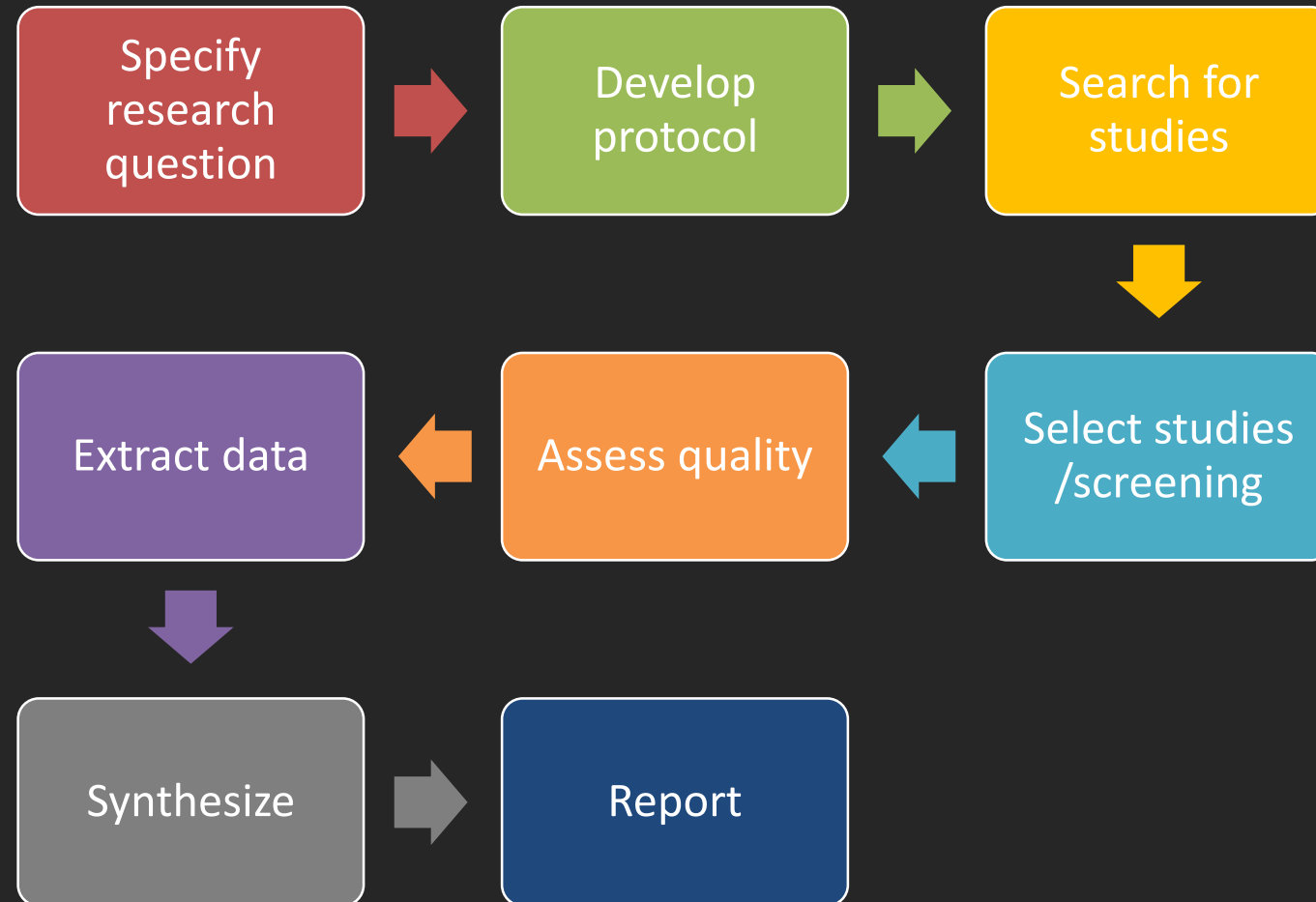
Inclusion criteria:
- Adults aged 18 years and over
- Published RCTs of any duration with a main aim of reducing SB and with computer, mobile or wearable technology as any part of the intervention
- RCTs with a comparison or control arm that consisted of no intervention control, usual care, or alternative 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

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
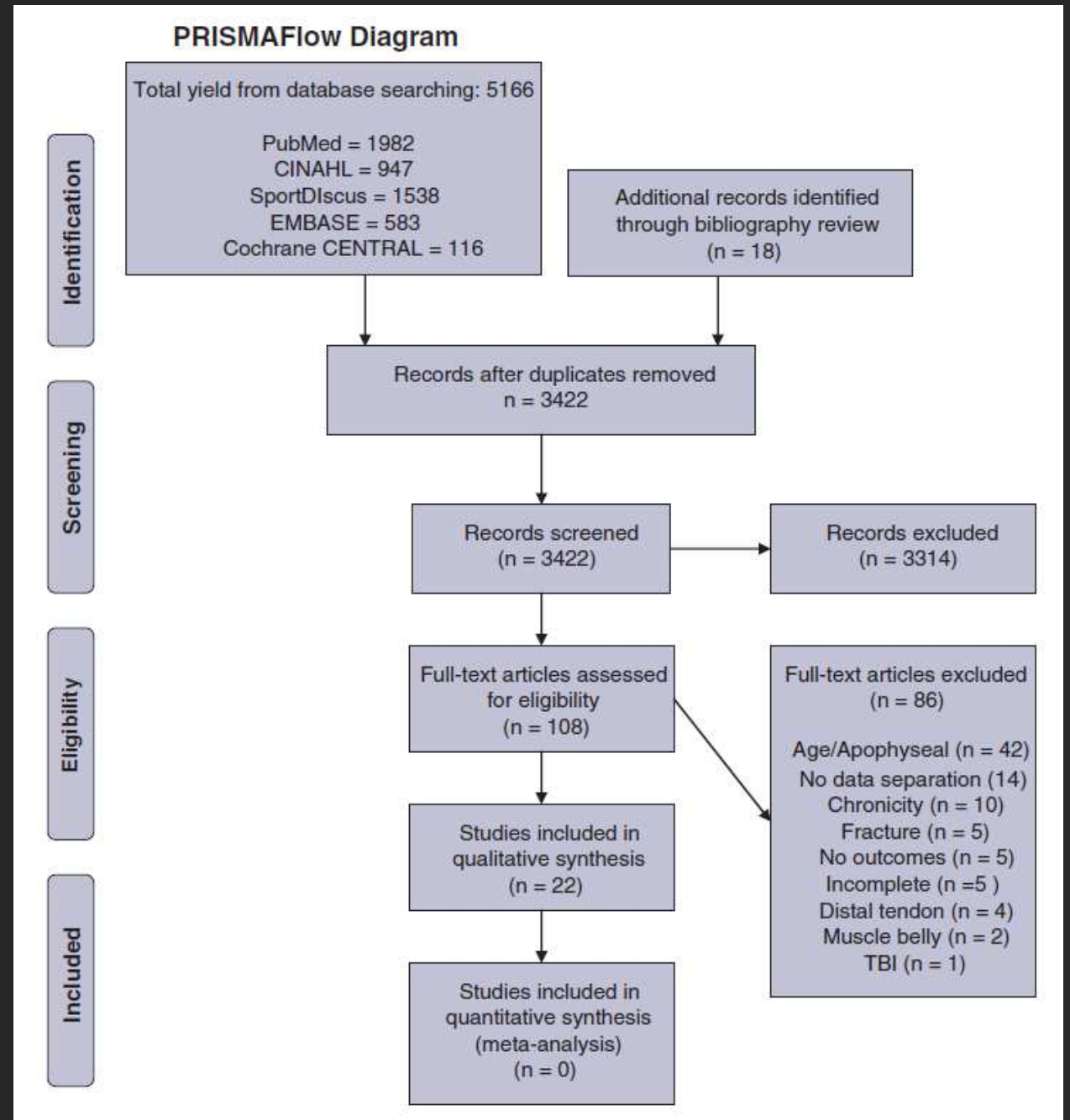- Can demonstrate rigor in applying the review process.

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,

be found in the figure.

Database	Abbreviated search strategy (full results available on request or in appendix)	Result #'s (October 2015)
PubMed	("Ischium"[Mesh] OR hamstring*[Text Word] OR semitend*[Text Word] OR...) **AND** ("Tendon Injuries"[Mesh] OR "Rupture"[Mesh] OR "Athletic Injuries"[Mesh] OR "Muscle, Skeletal/injuries"[Mesh] OR avulsion*[Text Word] OR...) **AND** ("surgery" [Subheading] OR "therapy" [Subheading] OR "rehabilitation" [Subheading] OR "Surgical Procedures, Operative"[Mesh] OR "Physical Therapy Modalities"[Mesh] OR management[Text Word] OR...) **AND** ("Treatment Outcome"[Mesh] OR "Recovery of Function"[Mesh]OR "Patient Satisfaction"[Mesh] OR "Sports"[Mesh] OR "Exercise"[Mesh] OR "Athletes" [Mesh] OR sport*[Text Word] OR athlet* [Text Word] OR ....)	1982
CINAHL	(MH "Hamstring Muscles" OR "biceps femoris" OR ....) **AND** (MH "Tendon Injuries+" OR MH "Athletic Injuries+" OR injur* OR rupture*OR ...) **AND** (MW "TH" OR "RH" OR "SU" OR MH "Surgery, Operative +" OR MH "Physical Therapy+" OR nonoperative OR non operative OR nonsurgical OR...) **AND** (MH "Treatment Outcome+" OR MH "Recovery" OR MH "Functional Status" OR quality of life" OR outcome* OR...)	947
SportDiscus	(DE "HAMSTRING muscle" OR DE "BICEPS femoris" OR TX semitendion* OR...) **AND** (DE "HAMSTRING muscle" OR DE "BICEPS femoris" OR TX semitendion* OR...) **AND** (DE "SURGERY"[exploded] OR DE "Physical Therapy" [exploded] OR TX conservative OR...) **AND** (DE "TREATMENT effectiveness" OR DE"Exercise" [exploded] OR TX outcome* OR....)	1538
Embase	('biceps femoris muscle'/exp OR 'hamstring'/exp OR 'semitendinous muscle'/exp OR hamstring*:ab,ti OR...) **AND** ('tendon rupture'/exp OR 'avulsion injury'/exp OR 'sport injury'/exp OR avulsion*:ab,ti OR...) **AND** ('surgery':lnk OR 'therapy':lnk OR 'rehabilitation':lnk OR 'surgery'/exp OR 'physiotherapy'/exp OR surgical:ab,ti OR....) **AND** ('self report'/exp OR 'treatment outcome'/exp OR 'functional assessment'/exp OR....) **NOT** [medline]/lim	583
Cochrane (CENTRAL)	(ti,ab,kw "ischial tuberosity" OR ti,ab,kw hamstring OR ...) **AND** (MeSH Tendon injuries [exploded] OR MeSH Skeletal Muscle/IN [exploded] OR ti,ab,kw avulsion* OR...) **AND**(MeSH Surgical Procedures, Operative [exploded] OR MeSH Physical Therapy Modalities [exploded] OR ti,ab,kw surgical OR...) **AND** MeSH Treatment Outcome [exploded] OR ti,ab,kw recover* OR outcome* OR....)	119

Methods

- PRISMA flow diagram

- PRISMA Guidelines for Reporting

http://prisma-statement.org/

PRISMAFlow Diagram

Total yield from database searching: 5166

PubMed = 1982
CINAHL = 947
SportDIscus = 1538
EMBASE = 583
Cochrane CENTRAL = 116

Additional records identified through bibliography review (n = 18)

Records after duplicates removed n = 3422

Records screened (n = 3422)

Records excluded (n = 3314)

Full-text articles assessed for eligibility (n = 108)

Full-text articles excluded (n = 86)

Age/Apophyseal (n = 42)
No data separation (14)
Chronicity (n = 10)
Fracture (n = 5)
No outcomes (n = 5)
Incomplete (n =5)
Distal tendon (n = 4)
Muscle belly (n = 2)
TBI (n = 1)

Studies included in qualitative synthesis (n = 22)

Studies included in quantitative synthesis (meta-analysis) (n = 0)

Identification | Screening | Eligibility | Included

Guidelines & Standards

- PRISMA Guidelines for Reporting http://prisma-statement.org/

- Cochrane Handbook for Systematic Reviews of Interventions
http://handbook.cochrane.org/

- Joanna Briggs Reviewers' Manual
http://joannabriggs.org/assets/docs/sumari/ReviewersManual-2014.pdf

- Finding What Works in Healthcare: Standards for Systematic Reviews
http://www.nationalacademies.org/hmd/Reports/2011/Finding-What-Works-in-Health-Care-Standards-for-Systematic-Reviews/Standards.aspx

Resources

- Kitchenham, B. A., Budgen, D. & Brereton, P. (2015). *Evidence-Based Software Engineering and Systematic Reviews*. Boca Raton, FL: CRC Press, Taylor & Francis Group

- Foster, M. J. (2017). Systematic Literature Reviews: Role of librarians to support engineering education [PowerPoint Slides]. Retrieved from http://tamu.libguides.com/systematicreviews/eld

- Jewell, S. T. & Foster, M. J. (2018). Matching review type to research question: which review is right for you? [PowerPoint Slides]. MLA Webinar.

- Deberg, J. (2017). Systematic Reviews: Nuts and Bolts [PowerPoint Slides].

- Folb, B., Ketchum, A. M., Klem, M.L. etc. (2017). Systematic Review Workshop: The Nuts and Bolts for Librarians. Retrieved from https://www.hsls.pitt.edu/systematicreview/

- 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/

- Marina Zhang

  qianjin-zhang@uiowa.edu   319-335-5301

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