Use + Share + Adapt

{ Content the copyright holder, author, or law permits you to use, share and adapt. }

- **Public Domain – Government:** Works that are produced by the U.S. Government. (USC 17 § 105)
- **Public Domain – Expired:** Works that are no longer protected due to an expired copyright term.
- **Public Domain – Self Dedicated:** Works that a copyright holder has dedicated to the public domain.
- **Creative Commons – Zero Waiver**
- **Creative Commons – Attribution License**
- **Creative Commons – Attribution Share Alike License**
- **Creative Commons – Attribution Noncommercial License**
- **Creative Commons – Attribution Noncommercial Share Alike License**
- **GNU – Free Documentation License**

Make Your Own Assessment

{ Content Open.Michigan believes can be used, shared, and adapted because it is ineligible for copyright. }

- **Public Domain – Ineligible:** Works that are ineligible for copyright protection in the U.S. (USC 17 § 102(b)) *laws in your jurisdiction may differ

{ Content Open.Michigan has used under a Fair Use determination. }

- **Fair Use:** Use of works that is determined to be Fair consistent with the U.S. Copyright Act. (USC 17 § 107) *laws in your jurisdiction may differ

Our determination **DOES NOT** mean that all uses of this 3rd-party content are Fair Uses and we **DO NOT** guarantee that your use of the content is Fair.

To use this content you should **do your own independent analysis** to determine whether or not your use will be Fair.
LECTURE 2: SEARCHING, SCREENING THE LITERATURE; DATA EXTRACTION; QUALITY ASSESSMENT

Joel J. Gagnier MSc, PhD
Overview

- Searching for studies
- Screening studies
- Data Extraction
- Evaluating the quality of studies
Locate studies: the search

- Most important part of a SR
- Must collect all possible relevant studies relative to your inclusion/exclusion criteria
- Can be done in duplicate
  - But more important to just be comprehensive
Identifying studies

- Involve a library and information scientist
  - Consult your institution's library
- Take a course on searching
  - Keywords
  - Boolean operators
  - Truncation
  - MeSH Headings
  - Related links etc
- Take tutorials for different databases
Database Searching

- Look at what other people did in their SRs on the same/similar topic
- Must search all of the relevant databases
  - Even if you know the topic
  - May be obscure but relevant databases
  - Medline only is not sufficient
Databases

- MedLine
- EMBASE
- CINAHL: Cumulative Index to Nursing and Allied Health Literature
- Cochrane Library, Controlled trials register
- ToxNet: Databases on toxicology, hazardous chemicals, environmental health, and toxic releases
- UK National Research Register
- Clinical trials.gov
- Google Scholar
- Etc...are many and are discipline specific
  - Consult your library and information scientist
Database searching

- Keep a track of
  - Search terms used for electronic searches
  - Dates searched
- Other people will want to check on this
  - Replicate your work
  - So be transparent
Searching

- Examine the references of articles of relevance
  - Included studies and relevant reviews
- Contact authors
- Snowballing (esp for complex questions or interventions)
- Contact companies, organizations, societies etc
- Hand search important journals
- Search for ongoing studies (prelim data)
  - Clinicaltrials.gov; controlled-trials.com (ISRCTN)
- Citation tracking
Grey literature

- Various definitions
  - Everything that is not peer-reviewed and published
- E.g., dissertations (DAI), conference proceedings (ERIC), government reports, unpublished manuscripts, company research, magazines etc
Electronic Searching

- Take your research question (P.I.C.O.T.)
  - Extract terms
  - Find synonyms
  - Medical Subject Headings (MeSH)
  - Consult an expert

- Combine with terms for the type of articles you are looking for
  - randomized controlled trials
  - observational studies
  - etc
Electronic Search Strategy example

PubMed

- (knee AND injury) AND (anterior cruciate ligament OR ACL OR soft tissue injuries OR sprain OR athletic injuries OR knee injuries) AND (prevention OR preventive) AND (education OR strengthening OR conditioning OR proprioceptive OR proprioception OR varied training OR comprehensive training OR plyometrics OR neuromuscular training) AND ((Humans[Mesh])
Electronic Search Strategies

- Controlled Trials search for PubMed

Electronic Search Strategies

- Observational studies

Selection of Eligible Studies
Select studies

Eligibility checked by two individuals
- Separately and independently
- Get a sample of studies
- Apply inclusion/exclusion criteria
  - First to abstract and title
  - If unknown on any, get full text and review
Inclusion/Exclusion Spreadsheet

One of: 1. Primary Outcome: the occurrence of a new non-contact ACL injury, and outcome rates expressed per unit of at-risk exposure (e.g., per hour of playing time or per number of active events such as practices or competitions) or, per number of subjects; 2. Secondary intermediate outcomes: (measured prior to ACL injuries) include biomechanical parameters or performance measures that are expected to increase the risk of future ACL injury (e.g., muscular strength, skill level, and neuromuscular control or) or degree of injury; Y/N/?

**Study ID: record number, first author last name, journal, year, volume**
- Pilot 1: pasanen, bmj, 2008, 337
- Pilot 2: gilchrist
- Pilot 3: myklebust
- Pilot 4: pfeiffer

**Participants:**
- 1. hupperets
- 2. Lehance
- 3. Renstrom
- 4. hupperets
- 5. Brushoij
- 6. van tiggelen
- 7. Buist
- 8. Abernethy
- 9. silvers
- 10, myer
- 11, Soderman
- 12. Myklebust

**Interventions:** One or more of: educational or instructional programs, isolated strengthening, isolated conditioning, isolated proprioceptive training, or neuromuscular training (e.g., technique, proprioception and strengthening, varied training, comprehensive training); Y/N/?

**Control Group:** Does the study have one or more of: (1) participants in other real or sham interventions; 2) untrained individuals or athletes not participating in any type of training program; or 3) the experimental participants themselves before being exposed to the intervention under study; Y/N/?

**Initial Inclusion reading title and abstract? (Y/N/?)**

<table>
<thead>
<tr>
<th>Study ID</th>
<th>Study Design: randomized or quasi-randomized or observational; Y/N/?</th>
<th>Participants: male or female; 13 yoa or &gt;; Y/N/?</th>
<th>Interventions</th>
<th>Control Group</th>
<th>Initial Inclusion reading title and abstract? (Y/N/?)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot 1</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
<tr>
<td>Pilot 2</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
<tr>
<td>Pilot 3</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
<tr>
<td>Pilot 4</td>
<td>y</td>
<td>?</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
<tr>
<td>1. hupperets</td>
<td>y</td>
<td>?</td>
<td>? Pre-season muscle strength</td>
<td>y</td>
<td>y</td>
</tr>
<tr>
<td>2. Lehance</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
<tr>
<td>3. Renstrom</td>
<td>n</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
<tr>
<td>4. hupperets</td>
<td>n</td>
<td>?</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
<tr>
<td>5. Brushoij</td>
<td>y</td>
<td>?</td>
<td>y</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>6. van tiggelen</td>
<td>n</td>
<td>n</td>
<td>n sleeve</td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td>7. Buist</td>
<td>n</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
<tr>
<td>8. Abernethy</td>
<td>y</td>
<td>n</td>
<td>y</td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td>9. silvers</td>
<td>y</td>
<td>?</td>
<td>y</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>10, myer</td>
<td>y</td>
<td>?</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
<tr>
<td>11, Soderman</td>
<td>n</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>n</td>
</tr>
<tr>
<td>12. Myklebust</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
</tbody>
</table>
Inclusion/Exclusion

Strategy to resolve disagreement

- The two meet to discuss disagreements on inclusion and try to resolve them
  - E.g. sit down and discuss papers individually
- If can’t resolve 3rd party
- Calculate agreement
Measures of Agreement

- **Raw percentage agreement**
  - # inclusion criteria agreed on divided by the total number of criteria

- **Kappa Coefficient**
  - Chance corrected agreement
  - The percentage agreement between assessors when chance agreement has been eliminated
  - But is not accurate for a small (<50%) or large (>80%) raw agreement

- Generally people like to see these
Select Studies

Track everything

- # title and abstracts were read from the searches
- # full texts retrieved and read
- # you chose to exclude and why

Include a flow chart and a table with reasons for excluded studies (Cochrane asks for this)

- Flow chart
  - See PRISMA statement
PRISMA flowchart

Figure 1. Flow of information through the different phases of a systematic review.
doi:10.1371/journal.pmed.1000097.g001

http://www.prisma-statement.org/
Organizing your studies

- Use a reference/database tool of some kind
- Very useful to organize and format reference lists
Assess Study Risk of Bias (ROB) / Methodological Quality

- Independently by two reviewers
- Separately for different trial designs

May include:

- Discrete criteria for each
  - e.g., generation of randomization sequence

- An open criterion
  - other potential threats to validity
  - e.g., baseline differences
Consider the role of the following biases in the relevant studies

- **Selection bias**
  - Systematic differences in the initial composition of groups

- **Performance bias**
  - Systematic differences in the care provided to groups apart from the interventions under investigation

- **Attrition bias**
  - Systematic differences in dropouts and withdrawals that alter initial group composition

- **Detection bias**
  - Systematic differences in the outcome assessment
ROB Assessment

- Scoring
  - 1, 0
  - Y, N, DK
  - Should assess whether reported at all
  - Must go beyond scoring and look at individual aspects of these studies
Make an assessment (for each study; & across studies for each outcome):

- **Magnitude of bias**
  - Try to make an assessment of how this methodological flaw might bias the summary treatment effect for that study and for the pooled effect estimate
  - Explore with statistical techniques
    - Do meta-regression for methodological aspects and influence on summary effect
    - Subgroup/sensitivity analyses with and without low quality studies

- **Likely direction of bias**
  - Look at empirical literature
    - Cochrane Library, Methodological studies database
    - CONSORT database
Cochrane Risk of Bias Tool

- Cochrane Handbook 2009
  - Download with RevMan software
  - Very useful resource
- Moved away from study quality to risk of bias
- Applicable to randomized controlled trials only
‘Quality’ or ‘Risk of bias’?

Quality ≈ “did they do the best they could?”
Bias ≈ “should I believe the result?”

- We never know biases, but there is rationale for considering **risk of bias**
  1. Key consideration in Cochrane reviews is **believability**; risk of bias targets this question squarely
  2. ‘High quality’ research methods can still leave a study at important risk of bias. (e.g. when blinding is impossible, baseline imbalances)
  3. Some markers of quality in medical research are unlikely to have direct implications for risk of bias (e.g. ethical approval)
  4. Overcomes ambiguity between quality of **reporting** and the quality of the underlying **research**
The new tool: principles

- Provides a framework for assessing the whole trial
- Explicitly judgemental — but separates the facts from the judgements
- Transparent and so repeatable
The new tool: Domains to address

- Sequence generation *(randomization)*
- Allocation concealment
- Blinding of participants, personnel and outcomes
- Incomplete outcome data *(attrition and exclusions)*
- Selective outcome reporting
- Other *(including topic-specific, design-specific)*
The new tool: how to assess them

Two components

1. Description of what happened
   - possibly including ‘done’, ‘probably done’, ‘probably not done’ or ‘not done’ for some items

2. Review authors’ judgement
   - whether bias unlikely to be introduced through this item (Yes, No, Unclear)
     - Yes = Low risk of bias
     - No = High risk of bias
     - Unclear = Insufficient information to assess whether an important risk of bias exists; or Insufficient rationale or evidence that an identified problem will introduce bias

‘Blinding’ and ‘Incomplete outcome data’ may need separate assessments for different outcomes
### Risk of bias table

<table>
<thead>
<tr>
<th>Item</th>
<th>Authors' judgment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequate sequence generation?</td>
<td>Unclear</td>
<td>&quot;Patients were randomly allocated&quot;</td>
</tr>
<tr>
<td>Allocation concealment?</td>
<td>Unclear</td>
<td>No information.</td>
</tr>
<tr>
<td>Blinding?</td>
<td>Yes</td>
<td>&quot;double blind design&quot;.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&quot;Millet... resembles lecithin in appearance... When ground, each substance could be distinguished from the other by hue and taste but staff were not informed as to which was which.&quot;</td>
</tr>
<tr>
<td>Incomplete outcome data addressed?</td>
<td>No</td>
<td>Data unavailable for meta-analysis.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Randomised: lecithin = Not stated, placebo = Not stated, Total = 33. Missing: lecithin = 7 (non-cooperation or diarrhoea = 2; moved to nursing home = 4, death = 2), placebo = 5 (non-cooperation or diarrhoea = 3, death = 2), total missing = 36%.</td>
</tr>
<tr>
<td>Free of selective reporting?</td>
<td>No</td>
<td>No quantitative results reported due to lack of effect. It is apparently clear which outcomes were measured.</td>
</tr>
<tr>
<td>Free of other bias?</td>
<td>Yes</td>
<td>No problems apparent</td>
</tr>
</tbody>
</table>
Here ‘Blinding’ and ‘Incomplete outcomes data’ have been assessed for two sets of outcomes

<table>
<thead>
<tr>
<th>Source</th>
<th>Adequate sequence generation</th>
<th>Allocation concealment</th>
<th>Blinding (Patient-reported outcomes)</th>
<th>Blinding (Mortality)</th>
<th>Incomplete outcome data addressed (Short-term outcomes (2-6 wks))</th>
<th>Incomplete outcome data addressed (Longer-term outcomes (&gt;6ks))</th>
<th>Free of selective reporting</th>
<th>Free of other bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barry 1988</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Goodwin 1986</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Sanders 1983</td>
<td>+</td>
<td>-</td>
<td>?</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Source Undetermined
Summary Assessments of ROB

- Empirical evidence of bias:
  - See Cochrane handbook for all categories
  - For “other” risk of biases seek-out empirical data or have strong rational argument

- Likely direction of bias
  - Usually over estimates of effect when high likelihood of bias

- Likely magnitude of bias
  - Varies; look at evidence base
  - Consider it relative to the estimated magnitude of effect
  - Statistical testing
<table>
<thead>
<tr>
<th>Risk of bias</th>
<th>Interpretation</th>
<th>Within a study</th>
<th>Across studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low risk of bias</td>
<td>Plausible bias unlikely to seriously alter the results</td>
<td>Low risk of bias for all key items</td>
<td>Most information is from studies at low risk of bias</td>
</tr>
<tr>
<td>Unclear risk of bias</td>
<td>Plausible bias that raises some doubt about the results</td>
<td>Unclear risk of bias for one or more key items</td>
<td>Most information is from studies at low or unclear risk of bias</td>
</tr>
<tr>
<td>High risk of bias</td>
<td>Plausible bias that seriously weakens confidence in the results</td>
<td>High risk of bias for one or more key items</td>
<td>The proportion of information from studies at high risk of bias is sufficient to affect the interpretation of results</td>
</tr>
</tbody>
</table>
## Assessing Risk of Bias for Observational Studies

<table>
<thead>
<tr>
<th>ROB Item</th>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Is the outcome absent at the start of the study?</td>
<td>Y/N/DK</td>
<td></td>
</tr>
<tr>
<td>2. Was clustering at the group level accounted for in analyses?</td>
<td>Y/N/DK</td>
<td></td>
</tr>
<tr>
<td>3. a. Were the outcome assessors (for the primary outcome) blind to the intervention? Describe how the outcome was measured (be sure there is no detection bias) b. Was the outcome measurement performed in the same manner with similar intensity in the groups being compared?</td>
<td>a.Y/N/DK</td>
<td>a.</td>
</tr>
<tr>
<td></td>
<td>b.Y/N/DK</td>
<td>b.</td>
</tr>
<tr>
<td>4. Was a similarly trained individual administering the intervention across groups? Describe who this was and their training if available.</td>
<td>Y/N/DK</td>
<td></td>
</tr>
<tr>
<td>5. Was the outcome measurement performed in the same manner with similar intensity in the groups being compared?</td>
<td>Y/N/DK</td>
<td></td>
</tr>
<tr>
<td>6. Were the groups similar at baseline? Describe any differences (values and significance tests)</td>
<td>Y/N/DK</td>
<td></td>
</tr>
<tr>
<td>7. Did the authors perform analyses adjusting for known confounders?</td>
<td>Y/N/DK</td>
<td></td>
</tr>
<tr>
<td>Describe the variables and analyses.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Were all the withdrawals described? Describe the numbers and reasons for withdrawals in each group.</td>
<td>Y/N/DK</td>
<td></td>
</tr>
<tr>
<td>9. Other possible sources of bias: Describe each</td>
<td>Y/N/DK</td>
<td></td>
</tr>
<tr>
<td>10. Other possible sources of bias: Describe each</td>
<td>Y/N/DK</td>
<td></td>
</tr>
</tbody>
</table>
## Assessing Risk of Bias for RCTs

<table>
<thead>
<tr>
<th>ROB Item</th>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Was the randomization method appropriate? Also, describe the unit of</td>
<td>Y/N/DK</td>
<td></td>
</tr>
<tr>
<td>randomization.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Was the allocation sequence concealed from those assigning patients to</td>
<td>Y/N/DK</td>
<td></td>
</tr>
<tr>
<td>groups?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Were the participants blind to the intervention?</td>
<td>Y/N/DK</td>
<td></td>
</tr>
<tr>
<td>4. a. Were the outcome assessors (for the primary outcome) blind to the</td>
<td>Y/N/DK</td>
<td>a.</td>
</tr>
<tr>
<td>intervention?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Describe how the outcome was measured (be sure there is no detection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bias)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. b. Was the outcome measurement performed in the same manner with</td>
<td>Y/N/DK</td>
<td>b.</td>
</tr>
<tr>
<td>similar intensity in the groups being compared? (describe who measured</td>
<td></td>
<td></td>
</tr>
<tr>
<td>outcomes and how… was it valid?)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Were similarly trained individuals administering the intervention</td>
<td>Y/N/DK</td>
<td></td>
</tr>
<tr>
<td>across groups?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Describe who this was and their training if available.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Were all the withdrawals described? Describe the numbers and reasons</td>
<td>Y/N/DK</td>
<td></td>
</tr>
<tr>
<td>for withdrawals in each group.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Were all originally randomized participants analyzed in the groups</td>
<td>Y/N/DK</td>
<td></td>
</tr>
<tr>
<td>they were assigned to (i.e. An intention to treat analysis)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Was clustering at the group level accounted for in analyses?</td>
<td>Y/N/DK</td>
<td></td>
</tr>
<tr>
<td>9. Were the groups similar at baseline? Describe any differences (values</td>
<td>Y/N/DK</td>
<td></td>
</tr>
<tr>
<td>and significance tests)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Other possible sources of bias avoided: Describe each</td>
<td>Y/N/DK</td>
<td></td>
</tr>
<tr>
<td>11. Other possible sources of bias avoided: Describe each</td>
<td>Y/N/DK</td>
<td></td>
</tr>
</tbody>
</table>
Data Extraction

Design and pilot extraction / abstraction form

- Be sure to pilot and revise this
- Spreadsheet to extract information and data from each trial
  - study design
  - sample size
  - patient characteristics
  - outcome measures
  - statistical analysis
  - results (data)
  - author conclusions
  - methodological drawbacks
Data Extraction

- Consider dual extraction
  - Train them (good tips in Littell)
  - Independent, two individuals
  - Meet to discuss any problems

- Coding may make things easier
  - E.g., for study design, types of outcomes, age grouping etc

- Note missing information/data (dk)
  - Will have to contact them
  - Under reporting is a big problem in the literature
Analyze and present results

Report and tabulate individual study results

- **Summary of findings table** (detailed trial designs, methods, results, important methodological notes)
  - Improves readability of the review
- Allows examination of possible differences between the studies that may
  - Preclude a meta-analysis
  - Direct explorations of heterogeneity
### Example Summary Table

**TABLE 1**

*Estimation of Injury Incidence per 1000 Exposures*

<table>
<thead>
<tr>
<th>Study</th>
<th>Sport</th>
<th>Age, y</th>
<th>Group</th>
<th>Exposure: Game and Practice</th>
<th>ACL Knee Injuries, incidence/1000 exposures</th>
<th>Noncontact ACL, incidence/1000 exposures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hewett et al</td>
<td>Basketball, soccer, volleyball</td>
<td>14-18</td>
<td>Trained (n = 366)</td>
<td>17,222</td>
<td>0.12*</td>
<td>0.00*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Untrained (n = 463)</td>
<td>23,138</td>
<td>0.22*</td>
<td>0.22*</td>
</tr>
<tr>
<td>Heidt et al</td>
<td>Soccer</td>
<td>14-18</td>
<td>Trained (n = 42)</td>
<td>3948</td>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Untrained (n = 258)</td>
<td>24,252</td>
<td>0.33</td>
<td></td>
</tr>
<tr>
<td>Soderman et al</td>
<td>Soccer</td>
<td>20.4 ± 4.6</td>
<td>Trained (n = 62)</td>
<td>4123</td>
<td>0.73</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Untrained (n = 78)</td>
<td>4631</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>Myklebust et al</td>
<td>Team handball</td>
<td>16-35</td>
<td>Trained (n = 263)</td>
<td>38,085</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Untrained (n = 645)</td>
<td>55,318</td>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Trained (n = 850)</td>
<td>93,403</td>
<td>0.18</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Untrained (n = 942)</td>
<td>104,468</td>
<td>0.28</td>
<td></td>
</tr>
<tr>
<td>Mandelbaum et al</td>
<td>Soccer</td>
<td>14-18</td>
<td>Trained (n = 1885)</td>
<td>67,860</td>
<td>0.09*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Untrained (n = 3818)</td>
<td>137,448</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petersen et al</td>
<td>Team handball</td>
<td>Adult</td>
<td>Trained (n = 134)</td>
<td>--</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Untrained (n = 142)</td>
<td>--</td>
<td>0.42</td>
<td></td>
</tr>
</tbody>
</table>

*Significant decrease in injuries through training intervention.*

*Injury exposures estimated from Hewett et al 17 soccer exposures times 2 seasons.*

*Injury exposures estimated as 2 hours = 1 practice or game exposure.*

*Screening year 2000-2001, completed intervention versus dropped out.*

*Screening year 2000-2001, intervention, all athletes.*

*Screening year 1998-1999, no intervention.*

Work on your protocols!!
Protocol Work Sheet 2: Inclusion/Exclusion, Search, Review Methods

Criteria for selecting studies for this review

- Types of studies
- Types of participants
- Types of interventions
- Types of outcome measures

Methods for identification of studies

- Databases,
- Search strategies,
- Screening,
- Personnel, etc

Methods of the review

- Risk of bias assessment
- Data Extraction Methods
Thank-you!!!