



## CRITICAL APPRAISAL SKILLS

### Making sense of evidence about clinical effectiveness

This is the cribsheet for Herbert RD, Gabriel M. Effects of stretching before and after exercising on muscle soreness and risk of injury: systematic review. BMJ 2002;325:468-472

#### 10 questions to help you make sense of a review

These questions consider the following:

*Are the results of the review valid? (SECTION A)*

*What are the results? (SECTION B)*

*Will the results help locally? (SECTION C)*

A number of italicised prompts are given after each question. These are designed to remind you why the question is important. There will not be time in the small groups to answer them all in detail!

These materials were developed by the Critical Appraisal Skills Programme (CASP) and we thank them for permission to use the materials.

# A/ Are the results of the review valid?

## Screening Questions

<p><b>1. Did the review address a clearly focused question?</b></p> <p><i>HINT: An issue can be 'focused' in terms of</i></p> <ul style="list-style-type: none"> <li>• the population studied</li> <li>• the intervention given</li> <li>• the outcome considered</li> </ul> <p><b>Notes: The review addresses a very broad question, therefore should be regarded as an exploratory review. Given this, a great deal of heterogeneity between included studies is to be expected therefore there should be a clear plan to investigate this. This does not appear to have been done. Also, it is implausible to draw firm conclusions from such a review.</b></p> <p><b>Fuller analysis and results are available in the Cochrane Review.</b></p>	<table border="0"> <tr> <td style="text-align: center;"><b>Yes</b></td> <td style="text-align: center;"><b>Can't tell</b></td> <td style="text-align: center;"><b>No</b></td> </tr> <tr> <td style="text-align: center;">✓</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table> <p>Population – any adults (or ? young, fit, healthy adults)</p> <p>Intervention – stretching before exercise (but is this mainly about lab-based stretches before lab-induced muscle pain rather than real life stretching before playing football etc)</p> <p>Outcome – muscle soreness, incidence of injury, athletic performance (but do they really include athletic performance)</p>	<b>Yes</b>	<b>Can't tell</b>	<b>No</b>	✓	<input type="checkbox"/>	<input type="checkbox"/>
<b>Yes</b>	<b>Can't tell</b>	<b>No</b>					
✓	<input type="checkbox"/>	<input type="checkbox"/>					
<p><b>2. Did the authors look for the appropriate sort of papers?</b></p> <p><i>HINT: The 'best sort of studies' would</i></p> <ul style="list-style-type: none"> <li>- address the review's question</li> <li>- have an appropriate study design (usually RCTs for papers evaluating interventions)</li> </ul>	<table border="0"> <tr> <td style="text-align: center;"><b>Yes</b></td> <td style="text-align: center;"><b>Can't tell</b></td> <td style="text-align: center;"><b>No</b></td> </tr> <tr> <td style="text-align: center;">✓</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table> <p>Do look for RCTs, do look for stretching as intervention,</p>	<b>Yes</b>	<b>Can't tell</b>	<b>No</b>	✓	<input type="checkbox"/>	<input type="checkbox"/>
<b>Yes</b>	<b>Can't tell</b>	<b>No</b>					
✓	<input type="checkbox"/>	<input type="checkbox"/>					

## Is it worth continuing?

### Detailed questions

<p><b>3. Do you think the important, relevant studies were included?</b></p> <p><i>HINT Look for</i></p> <ul style="list-style-type: none"> <li>- which bibliographic databases were used</li> <li>- follow up from reference lists</li> <li>- personal contact with experts</li> <li>- search for unpublished as well as published studies</li> <li>- search for non-English language studies</li> </ul>	<table border="0"> <tr> <td style="text-align: center;"><b>Yes</b></td> <td style="text-align: center;"><b>Can't tell</b></td> <td style="text-align: center;"><b>No</b></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;">✓</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table> <p>Good list of databases, but no expert contacts. They include the outcome in the search strategy which is quite unusual. They don't include non-English language studies which could be a big problem. They include cross-over studies but don't explain how they handled the results of these, particularly with reference to the washout period. They don't describe the process of data extraction at all.</p>	<b>Yes</b>	<b>Can't tell</b>	<b>No</b>	<input type="checkbox"/>	✓	<input type="checkbox"/>
<b>Yes</b>	<b>Can't tell</b>	<b>No</b>					
<input type="checkbox"/>	✓	<input type="checkbox"/>					
<p><b>4. Did the review's authors do enough to assess the quality of the included studies?</b></p> <p><i>HINT The authors need to consider the rigour of the studies they have identified. Lack of rigour may affect the studies' results ("All that glitters is not gold" Merchant of Venice – Act II Scene?)</i></p>	<table border="0"> <tr> <td style="text-align: center;"><b>Yes</b></td> <td style="text-align: center;"><b>Can't tell</b></td> <td style="text-align: center;"><b>No</b></td> </tr> <tr> <td style="text-align: center;">✓</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table> <p>Good table with the quality criteria they assessed. They state in the methods that they exclude studies with quality less than 3 but they include them in the list of studies in Table 1 and 2. They don't assess quality of cross-over trials separately explicitly, particularly with the washout period problem and assessment of period effects.</p>	<b>Yes</b>	<b>Can't tell</b>	<b>No</b>	✓	<input type="checkbox"/>	<input type="checkbox"/>
<b>Yes</b>	<b>Can't tell</b>	<b>No</b>					
✓	<input type="checkbox"/>	<input type="checkbox"/>					

	Yes	Can't tell	No
<p><b>5. If the results of the review have been combined, was it reasonable to do so?</b></p> <p><i>HINT: Consider whether</i></p> <ul style="list-style-type: none"> <li>- the results were similar from study to study</li> <li>- the results of all the included studies are clearly displayed</li> <li>- the results of the different studies are similar</li> <li>- the reasons for any variations in results are discussed</li> </ul>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<p>The Forest plot is not good as there are no numbers contributing to the plot. Unsure as to why only 77 subjects' data was pooled as there were 89 subjects in these trials. They aggregated data from Likert scales with 6 or categories and VAS with 100 categories. Also they combine results for stretching before exercise and stretching after exercise and this may not be appropriate.</p> <p>With the survival curves having so different number of outcomes in one trial compared to another (possibly because of the different outcomes they collected in each), it is debateable whether they should have combined to give a pooled Hazard Ratio. Also, the pooled ratio seems to be much closer to the hazard ratio with the lower event rates, which doesn't make sense.</p>		

## B/ What are the results?

<p><b>6. What are the overall result of the reviews?</b></p> <p><i>HINT: Consider</i></p> <ul style="list-style-type: none"> <li>- if you are clear about the review's 'bottom line' results:</li> <li>- what these are (numerically if appropriate)</li> <li>- how were the results expressed (NNT, odds ratio etc.)</li> </ul>	<p>For muscle soreness 0.9mm (on a scale that varies between 0-100 mm ie not a lot).</p> <p>For incidence of injury hazard ratio 0.95 so not a lot of difference between the two groups on each of the trials</p> <p>For athletic performance – they don't report the result!</p>
<p><b>7. How precise are the results?</b></p> <p><i>HINT: Look at the confidence intervals, if given</i></p>	<p>For muscle soreness 0.9mm (95% confidence intervals -2.6mm to + 4.4mm) ie each side of zero so no significant difference</p> <p>For incidence of injury 0.95 (95% confidence intervals 0.78 to 1.16) ie either side of 1 so no significant difference.</p> <p>(NB the muscle soreness outcome is an absolute risk difference so 0 is the no significant difference point whereas incidence of injury is a ratio so 1 is the no significant difference point</p>

## C/Will the results help locally?

<p><b>8. Can the results be applied to the local population?</b></p> <p><i>HINT: Consider whether</i></p> <ul style="list-style-type: none"> <li>- the patients covered by the review could be sufficiently different to your population to cause concern</li> <li>- your local setting is likely to differ much from that of the review</li> </ul>	<p><b>Yes</b></p> <p><input checked="" type="checkbox"/></p>	<p><b>Can't tell</b></p> <p><input type="checkbox"/></p>	<p><b>No</b></p> <p><input type="checkbox"/></p>
<p><b>9. Were all important outcomes considered?</b></p>	<p><b>Yes</b></p> <p><input type="checkbox"/></p>	<p><b>Can't tell</b></p> <p><input type="checkbox"/></p>	<p><b>No</b></p> <p><input checked="" type="checkbox"/></p> <p>There is no information here on whether stretching before exercise such as playing football will reduce muscle soreness because: The studies they list with muscle soreness as an outcome are all laboratory studies where very precise movements are made in order to induce specific muscle soreness in specific muscles. This is not the same as running about on a football field with the relatively random use of various muscle groups over a prolonged period of time, without attention on any muscle groups whilst the game is happening. With regards to injury, they don't list muscle injury in one trial and the other is very non-specific. Also these are you and fit men so these results may well not be generalisable to older not particularly fit members of the population who have been told by their GP to exercise more. They don't even tell us about the athletic performance results</p>
<p><b>10. Are the benefits worth the harms and costs?</b></p> <p><i>Even if this is not addressed by the review, what do you think?</i></p>	<p><b>Yes</b></p> <p><input type="checkbox"/></p>		<p><b>No</b></p> <p><input checked="" type="checkbox"/></p> <p>Insufficient information here to say either way. However, the cost of stretching is so minimal – time only and tiny risk of muscle damage - that any benefit of reduced injury or soreness would probably outweigh harms.</p>