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Systematic syntheses. Hierarchy of evidence

Objectives

- Review
- Systematic review
- Meta-analysis

Review

- summary of the literature on a topic
  - made by some authors
- Ex. the effect of stretching

Review > Food Technol Biotechnol. 2021 Mar;59(1):82-91. doi: 10.17113/ftb.59.01.21.6707.

Mozzarella Cheese Stretching: A Minireview

Mônica Correia Gonçalves [1], Haíssa Roberta Cardarelli [2]

Affiliations + expand

PMID: 34084083 PMCID: PMC8157083 DOI: 10.17113/ftb.59.01.21.6707

Free PMC article

Abstract

Mozzarella cheese stretching is a thermomechanical treatment influenced by factors such as pH, acidity, stretching time and temperature. The aim of this minireview is to provide information about the stretching step and the effect of the main factors on the functional properties of mozzarella. The presented studies show that stretching under higher temperatures promotes more interactions in the protein matrix, and changes occur in the calcium balance throughout the storage period that influence water mobility, proteolysis and lead to changes in mozzarella properties. Therefore, the information presented in this minireview may facilitate the production of mozzarella cheese with specific functional properties.

Keywords: calcium content; functional properties; pasta filata cheese; stretching temperature.

- Not this!
- ☺

Review > Appl Physiol Nutr Metab. 2016 Jan;41(1):1-11. doi: 10.1139/apnm-2015-0235. Epub 2015 Dec 8.

Acute effects of muscle stretching on physical performance, range of motion, and injury incidence in healthy active individuals: a systematic review

David G Behm [1], Anthony J Blazevich [2], Anthony D Kay [3], Malachy McHugh [4]

Affiliations + expand

PMID: 26642915 DOI: 10.1139/apnm-2015-0235

Free article

Abstract

Recently, there has been a shift from static stretching (SS) or proprioceptive neuromuscular facilitation (PNF) stretching within a warm-up to a greater emphasis on dynamic stretching (DS). The objective of this review was to compare the effects of SS, DS, and PNF on performance, range of motion (ROM), and injury prevention. The data indicated that SS- (-3.7%), DS- (+1.3%), and PNF- (-4.4%) induced performance changes were small to moderate with testing performed immediately after stretching, possibly because of reduced muscle activation after SS and PNF. A dose-response relationship illustrated greater performance deficits with ≥60 s (-4.6%) than with <60 s (-1.1%) SS per muscle group. Conversely, SS demonstrated a moderate (2.2%) performance benefit at longer muscle lengths. Testing was performed on average 3-5 min after stretching, and most studies did not include poststretching dynamic activities; when these activities were included, no clear performance effect was observed. DS produced small-to-moderate performance improvements when completed within minutes of physical activity. SS and PNF stretching had no clear effect on all-cause or overuse injuries; no data are available for DS. All forms of training induced ROM improvements, typically lasting <30 min. Changes may result from acute reductions in muscle and tendon stiffness or from neural adaptations causing an improved stretch tolerance. Considering the small-to-moderate changes immediately after stretching and the study limitations, stretching within a warm-up that includes additional poststretching dynamic activity is recommended for reducing muscle injuries and increasing joint ROM with inconsequential effects on subsequent athletic performance.

Keywords: ballistic stretch; dynamic stretch; facilitation neuromusculaire proprioceptive; flexibility; flexibilité; proprioceptive neuromuscular facilitation; static stretch; warm-up; échauffement; étirement balistique; étirement dynamique; étirement statique.

Yes!

Review

Possible errors:

- Subjectivism – reflects the author's approach
- Author chooses relevant literature
  - Omissions

Advantages

- It is useful
- Updating a topic
- Establishes new research directions

Sistematic review

- purpose:
  - to answer a question
- Ex.
  - Does ibuprofen reduce pain in people with periapical tooth abscess?
  - Can physical activity prevent periodontitis?

How?

- Analyze the literature systematically (all, organized)
- Analysis – narrative:
  - discuss each study
- attempt to draw conclusions

Systematically analyzes the specialized literature

organized search:

- PICOS search method
- P-problem,
- I-intervention,
- C-comparison,
- O-outcome,
- S-type of study

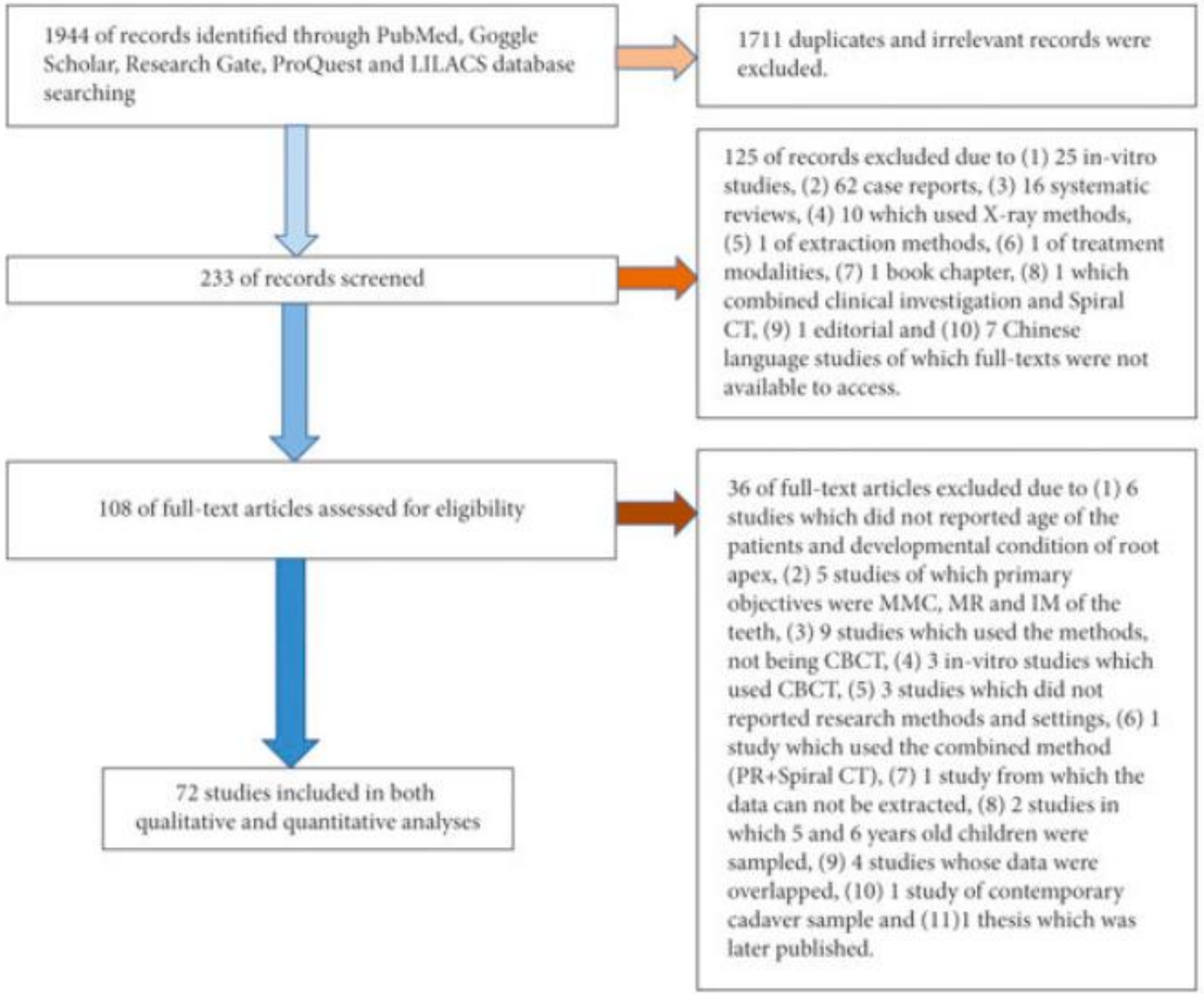
in minimum 3 databases:

- PubMed,
- Embase,
- Cochrane, etc.

different specialists select the articles

there are validity criteria for the articles

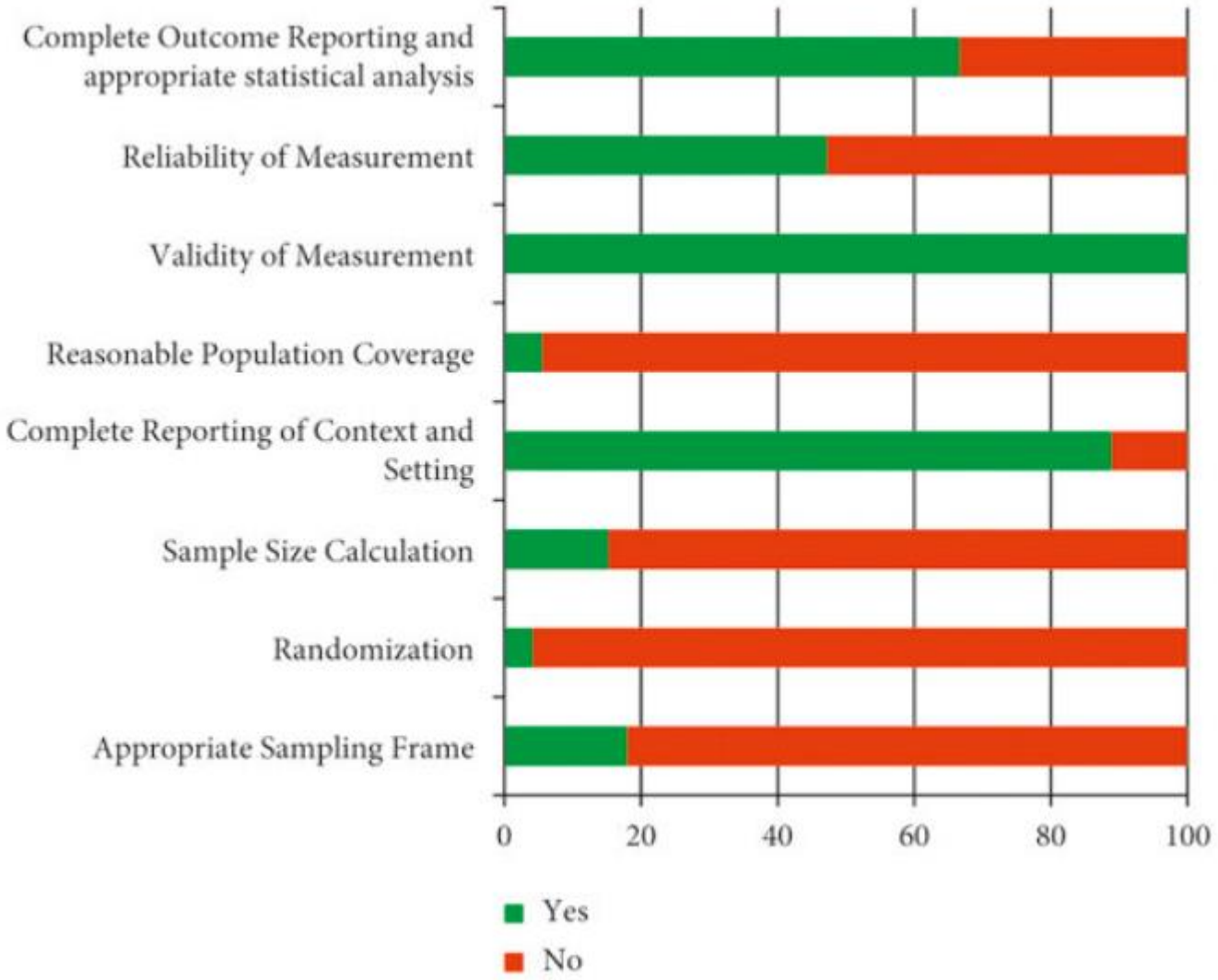
only studies that meet the criteria are analyzed



Flow-chart

Flow diagram of identifying, screening, and processing the studies.

Aung NM, Myint KK. Three-Rooted Permanent Mandibular First Molars: A Meta-Analysis of Prevalence. Int J Dent. 2022 Mar 28;2022:9411076.



of research methodology of the included studies.

Valid articles

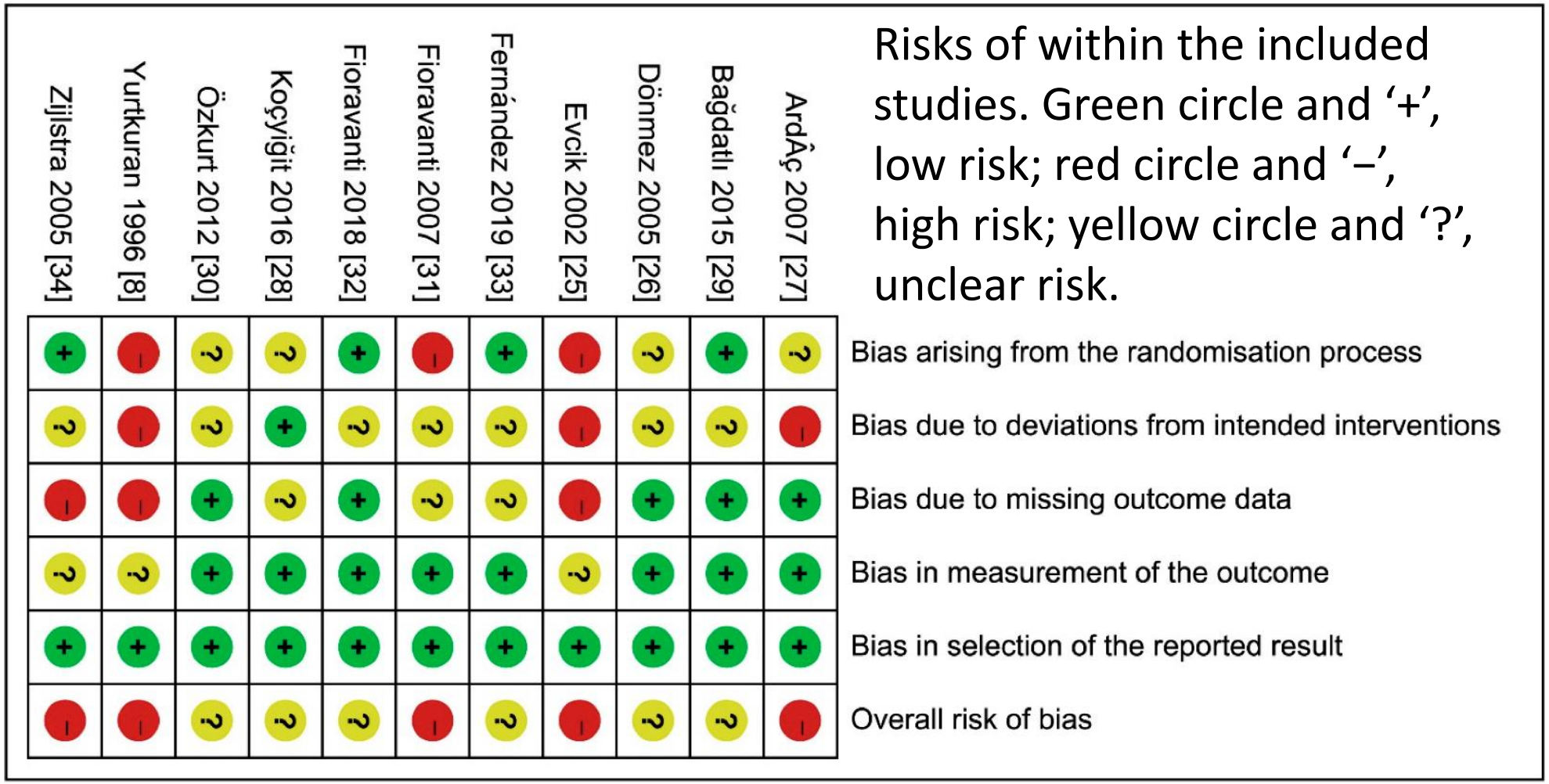
there are validity criteria for the articles

only studies that meet the criteria are analyzed

Aung NM, Myint KK. Three-Rooted Permanent Mandibular First Molars: A Meta-Analysis of Prevalence. Int J Dent. 2022 Mar 28;2022:9411076.

Valid articles there are validity criteria for the articles

only studies that meet the criteria are analyzed



Risks of within the included studies. Green circle and '+', low risk; red circle and '–', high risk; yellow circle and '?', unclear risk.

Cao C-F, Ma K-L, Li Q-L, Luan F-J, Wang Q-B, Zhang M-H, Viswanath O, Myrcik D, Varrassi G, Wang H-Q. Balneotherapy for Fibromyalgia Syndrome: A Systematic Review and Meta-Analysis. *Journal of Clinical Medicine*. 2021; 10(7):1493.

Meta-analisys

- similar studies
  - on the same topic
- add the cases from all these studies
- redo the statistical analysis on all the data
- synthesis estimate

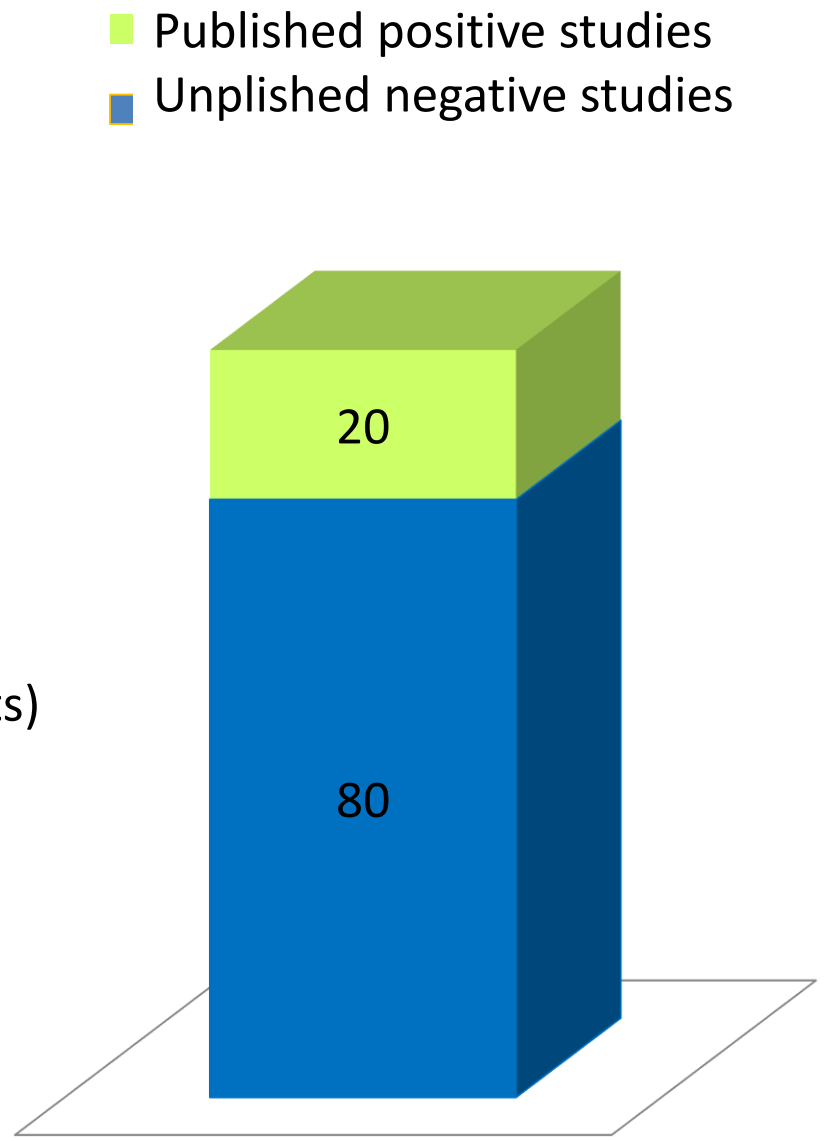
Meta-analisys

- Search for the studies
  - rigurous,
  - exhaustiv (all)
- Only valid studies
- Result
  - following a special statistical analysis

Meta-analisys

Exhaustive search:

- Not all studies are published
  - negative ones are usually not published
  - Because of
    - the sponsor of the research (does not want negative results)
    - researchers who neglect negative results
- less accessible articles
- language barriers



Meta-analisys

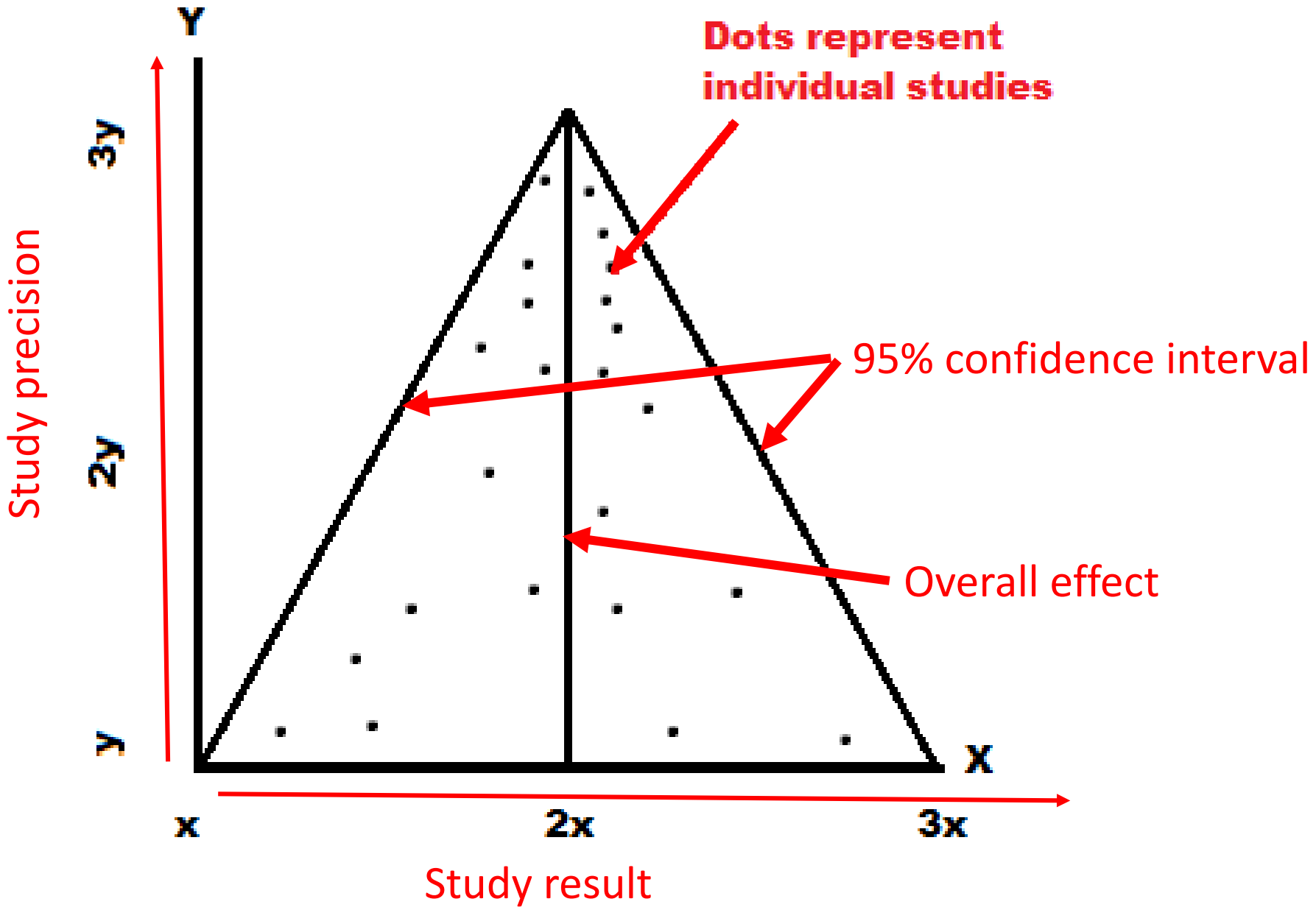
- How do we discover them?
  - trials are registered on the trials portal (there is a record of all trials, even if they are not published, they are registered)
  - Studying the references of the articles found

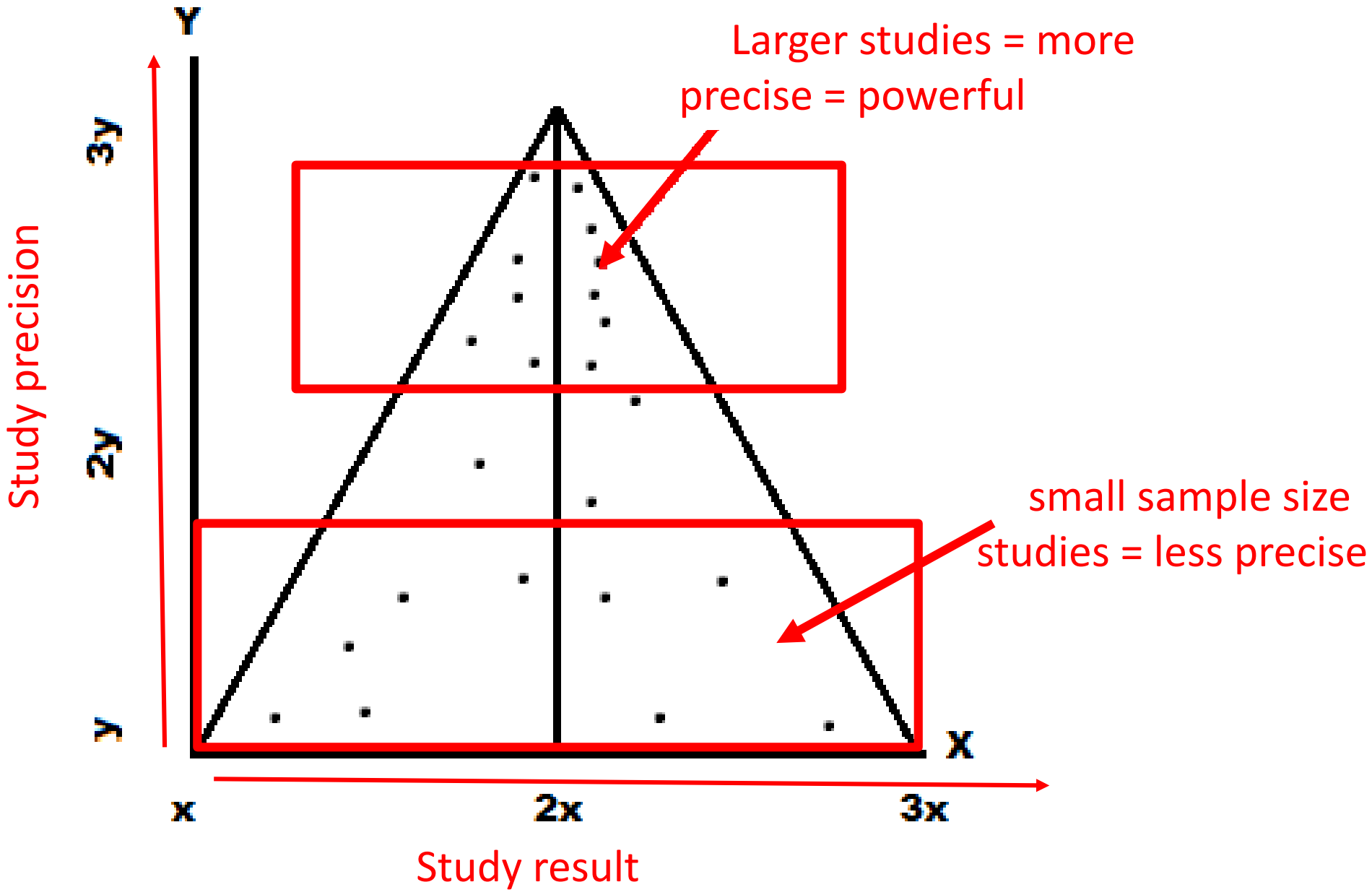
Meta-analisys

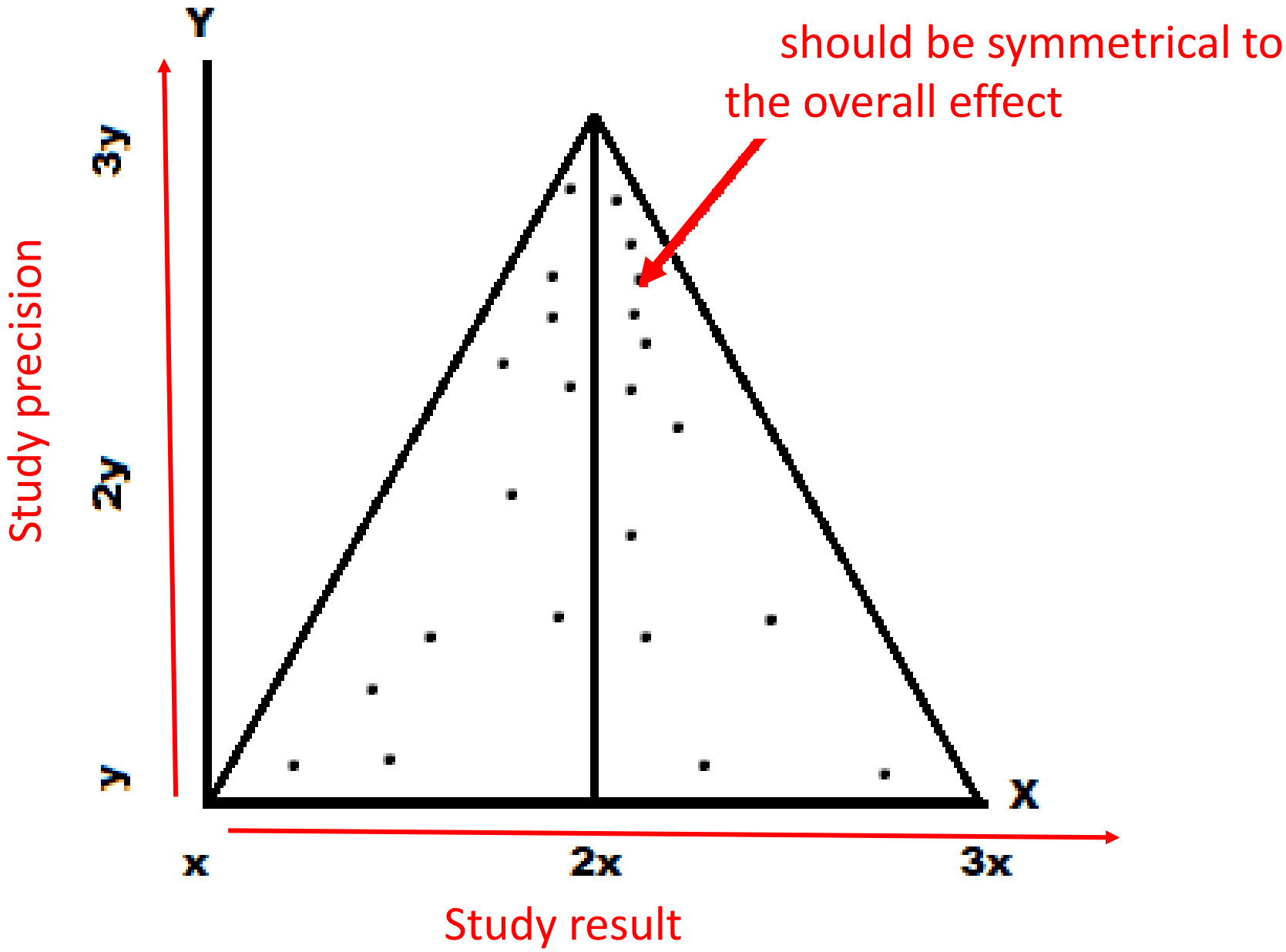
- Validation of studies
- Positive studies – easier to validate
- Negative studies – due to sample size – to analyze
  - Evaluate inclusion/exclusion criteria:
    - Track possible confounding factors
  - Evaluate the applied methods

Publishing bias

- the non-inclusion in the meta-analysis of some studies
  - lead to possible errors
- evaluate the publishing bias with
  - **Egger test**
  - **Funnel plots**
    - asymmetry = systematic publication error
    - The studies with many subjects
      - at the top = close to the effect size values
    - The studies with few subjects
      - on the sides


Y
3y
2y
y
Study precision
Dots represent
individual studies
95% confidence interval
Overall effect
X
x
2x
3x
Study result


Y
3y
2y
y
Study precision
Larger studies = more precise = powerful
small sample size studies = less precise
X
x
2x
3x
Study result


should be symmetrical to
the overall effect
Y
3y
2y
y
Study precision
X
x
2x
3x
Study result

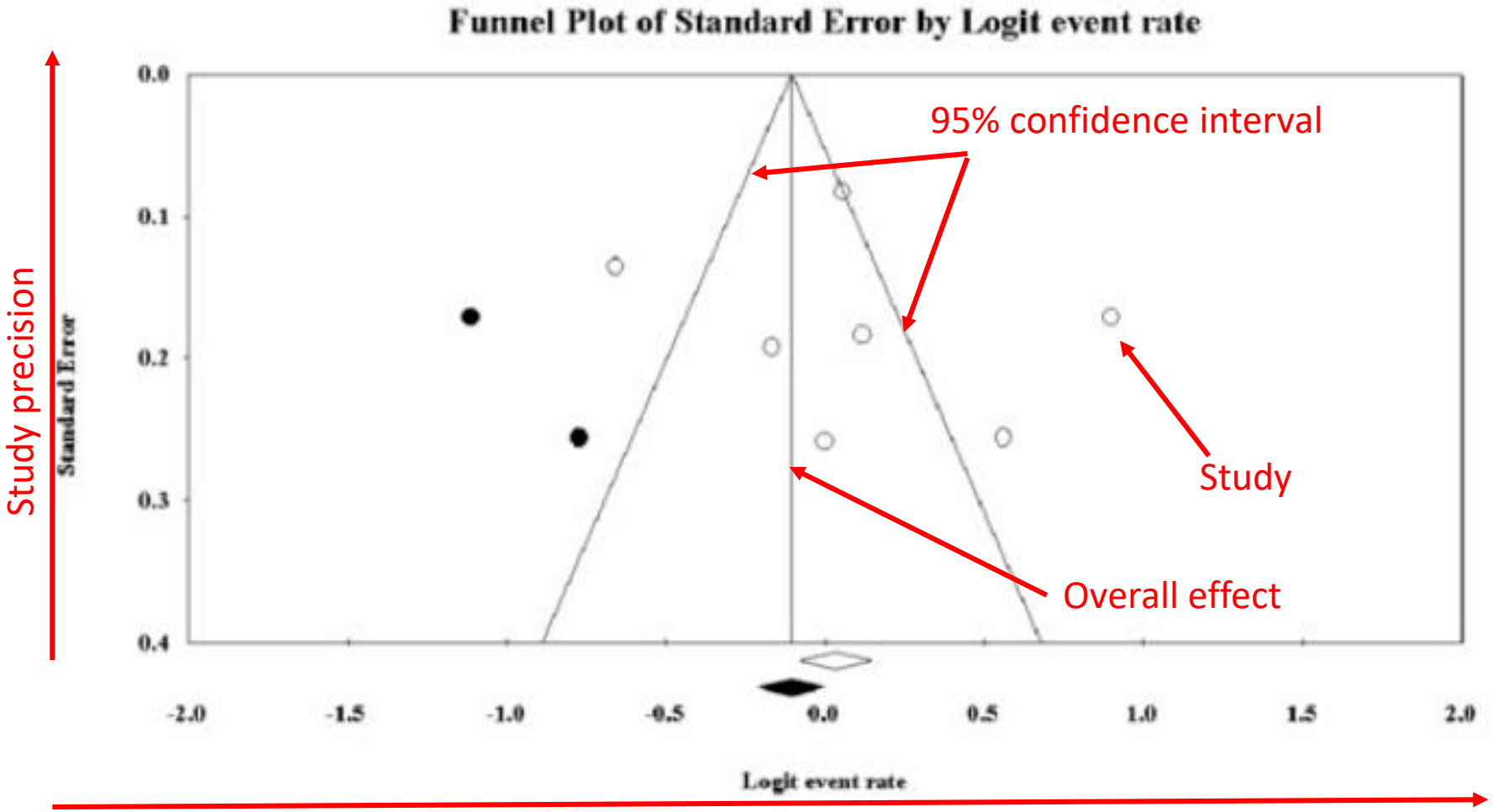
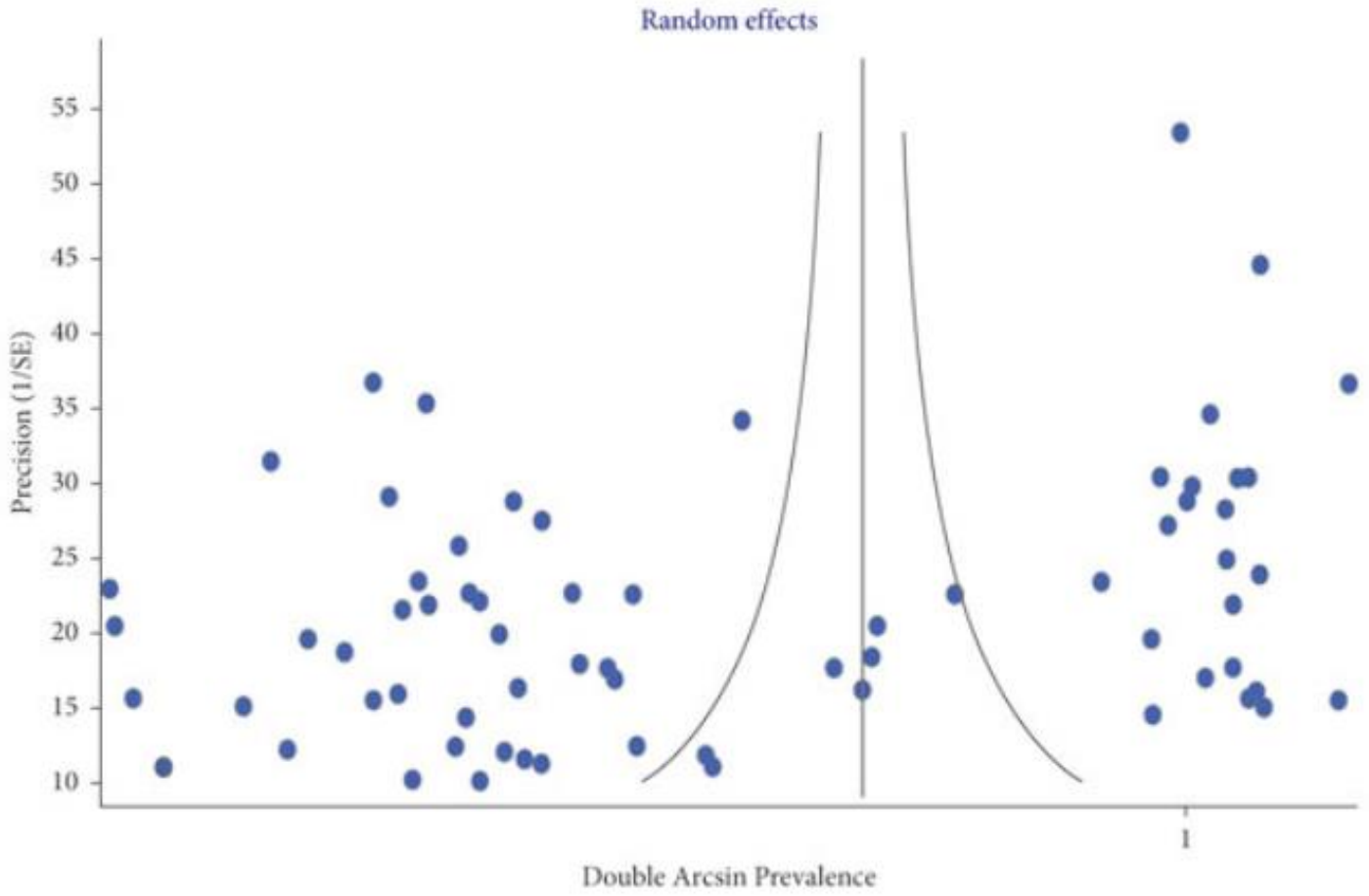


Figure 3. Funnel plot of studies investigating the knowledge of tooth fracture among physical education teachers.

Khaled Trabelsi, Roy Shephard, Roy Shephard,nSahar Zlitni, et al. Dental Trauma First-Aid Knowledge and Attitudes of Physical Education Teachers: A Systematic Review and Meta-Analysis of the Literature with Meta-Regressions. Education Sciences October 2019.



Funnel plot of global tooth-level prevalence of three-rooted PMFM (I).

- Not symmetrical

→heterogen studies

= they measured different thing, or with different devices, techniques etc.

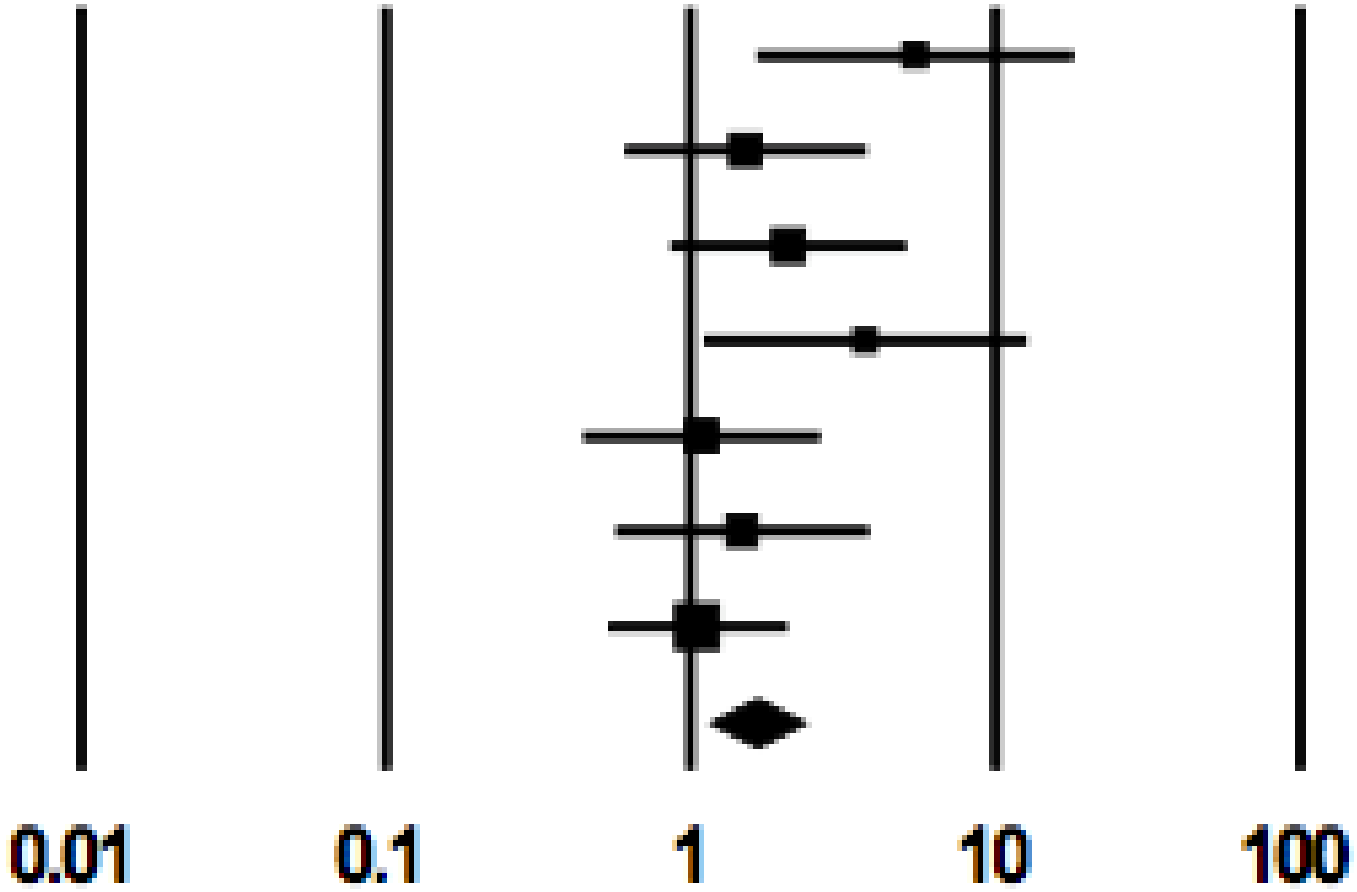
→missing studies

Aung NM, Myint KK. Three-Rooted Permanent Mandibular First Molars: A Meta-Analysis of Prevalence. Int J Dent. 2022 Mar 28;2022:9411076.

Forest plot

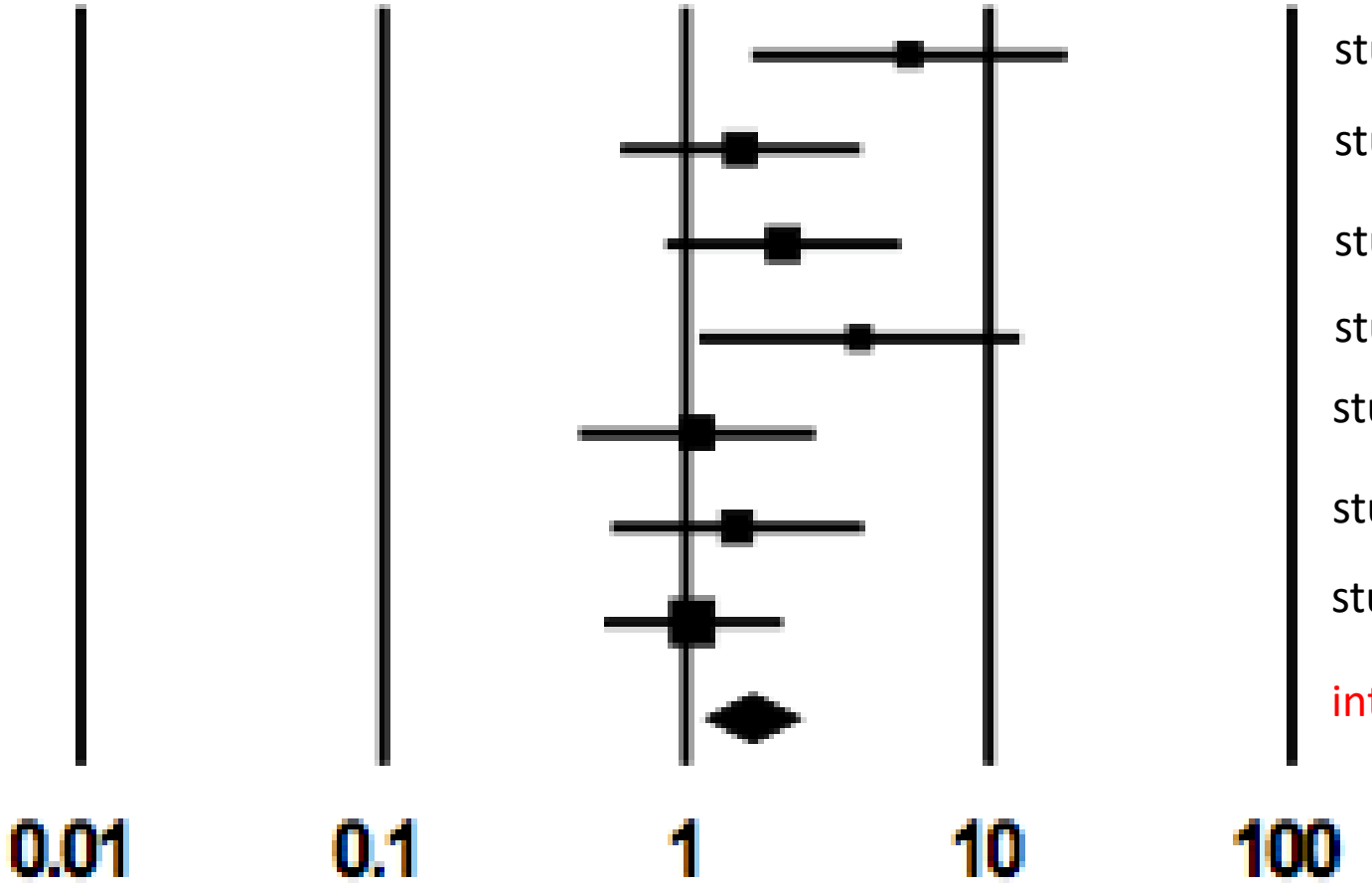
- A figure that summarizes the results of all studies considered
  - Heterogeneity testing
  - Descriptive statistics
  - Results of sensitivity analysis
  - Results of meta-regression

Forest plot for OR – odds ratio



Forest plot for OR – odds ratio

each line is a study



study 1: OR=8, 95%CI 3-13

study 2: OR=2, 95%CI 0.8-6

study 3: OR=3, 95%CI 0.9-8

study 4: OR=7, 95%CI 1.5-11

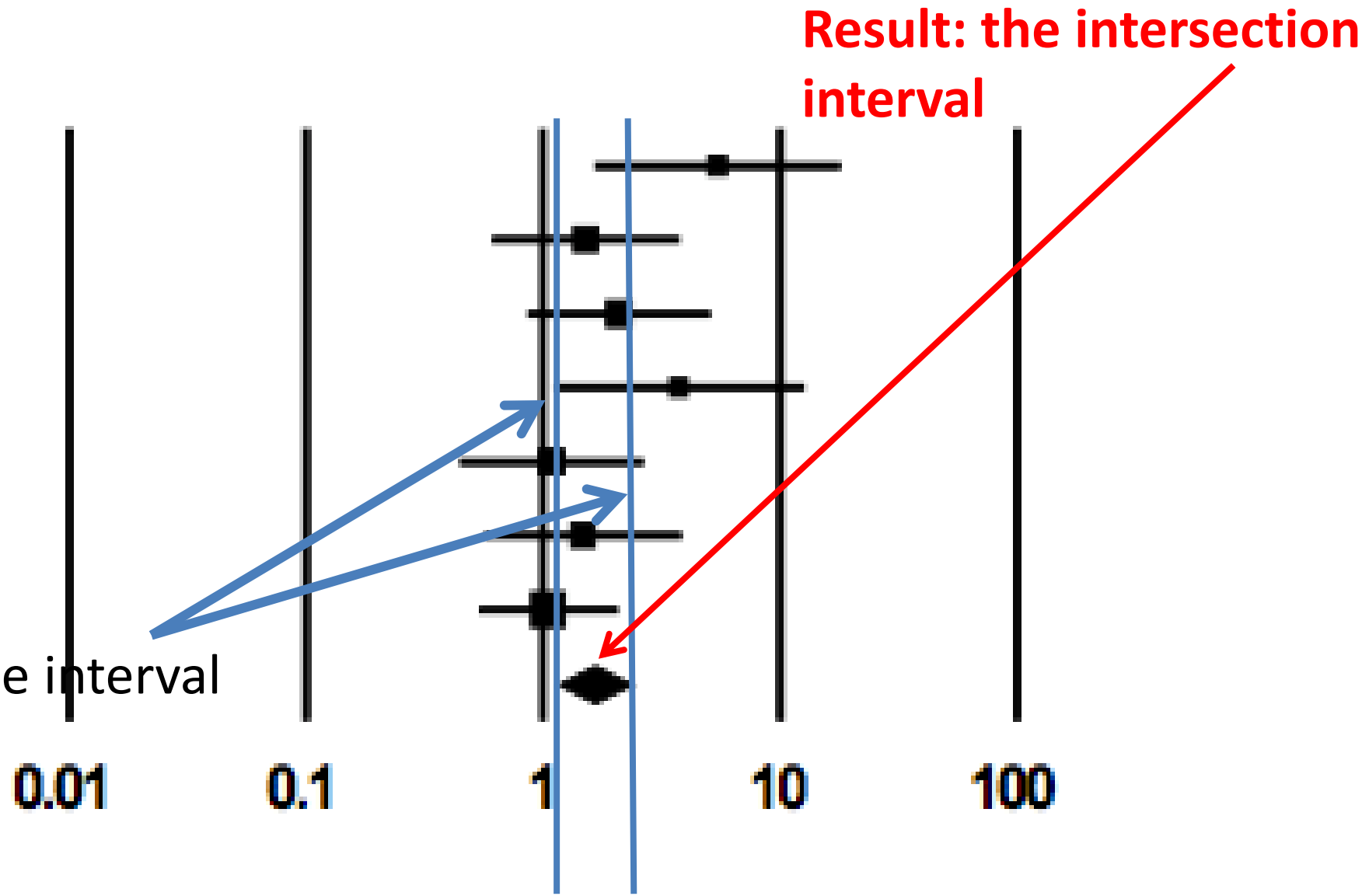
study 5: OR=1.1, 95%CI 0.7-4

study 6: OR=2, 95%CI 0.8-6

study 7: OR=1.1, 95%CI 0.8-3

intersection interval: 1.5-4

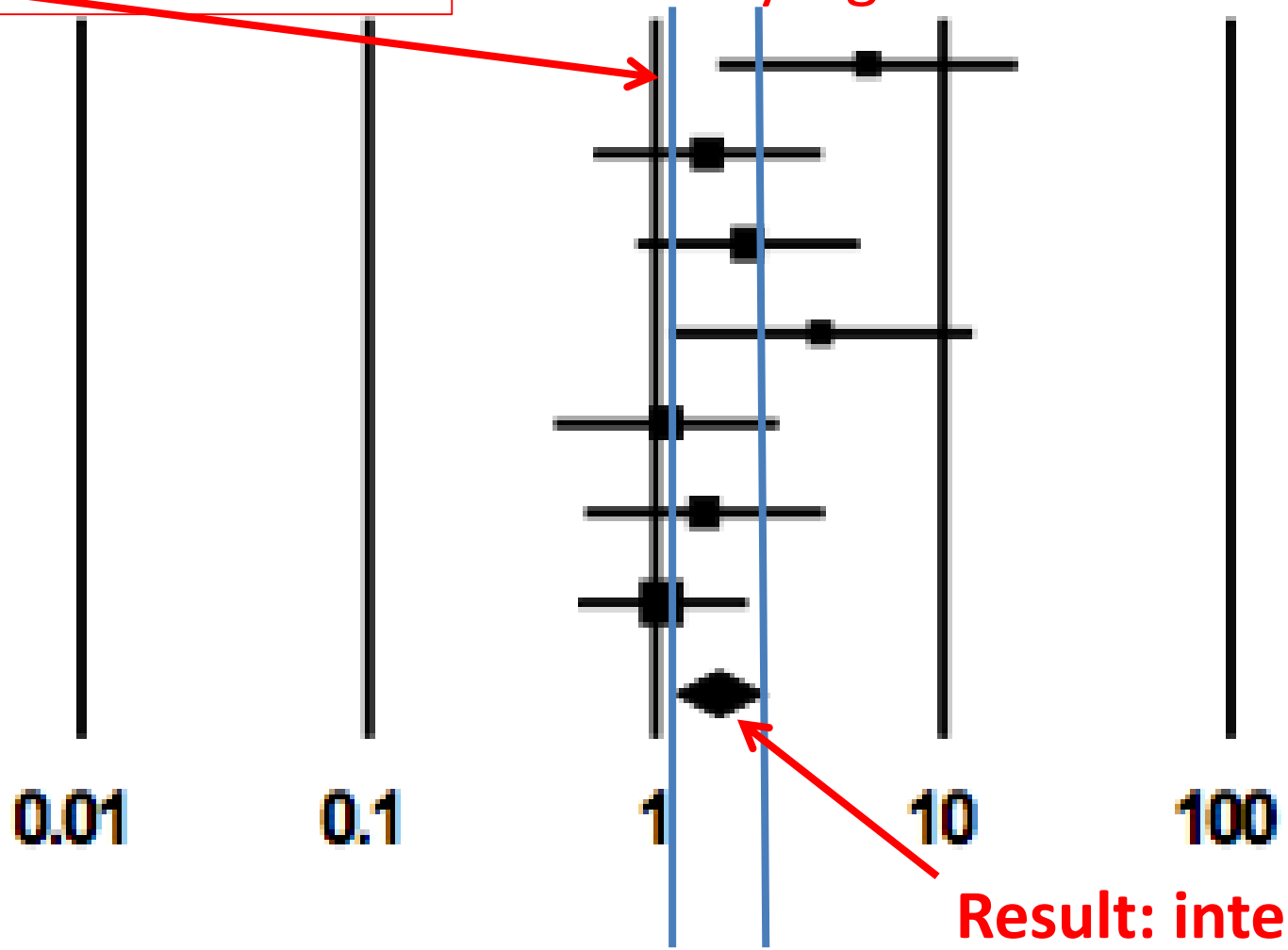
Forest plot


Result: the intersection interval
OR, Confidence interval
0.01
0.1
1
10
100

Forest plot

OR=1 is not in the intersection interval

so the result indicates the presence of a statistically significant risk factor



Result: intersection interval

Heterogeneity

- forest plot can be used
  - if the lines corresponding to the confidence intervals overlap, the homogeneity of the results is suggested, otherwise the heterogeneity of the results is suggested.

Inconsistency index I^2

to assess the degree of heterogeneity between studies,

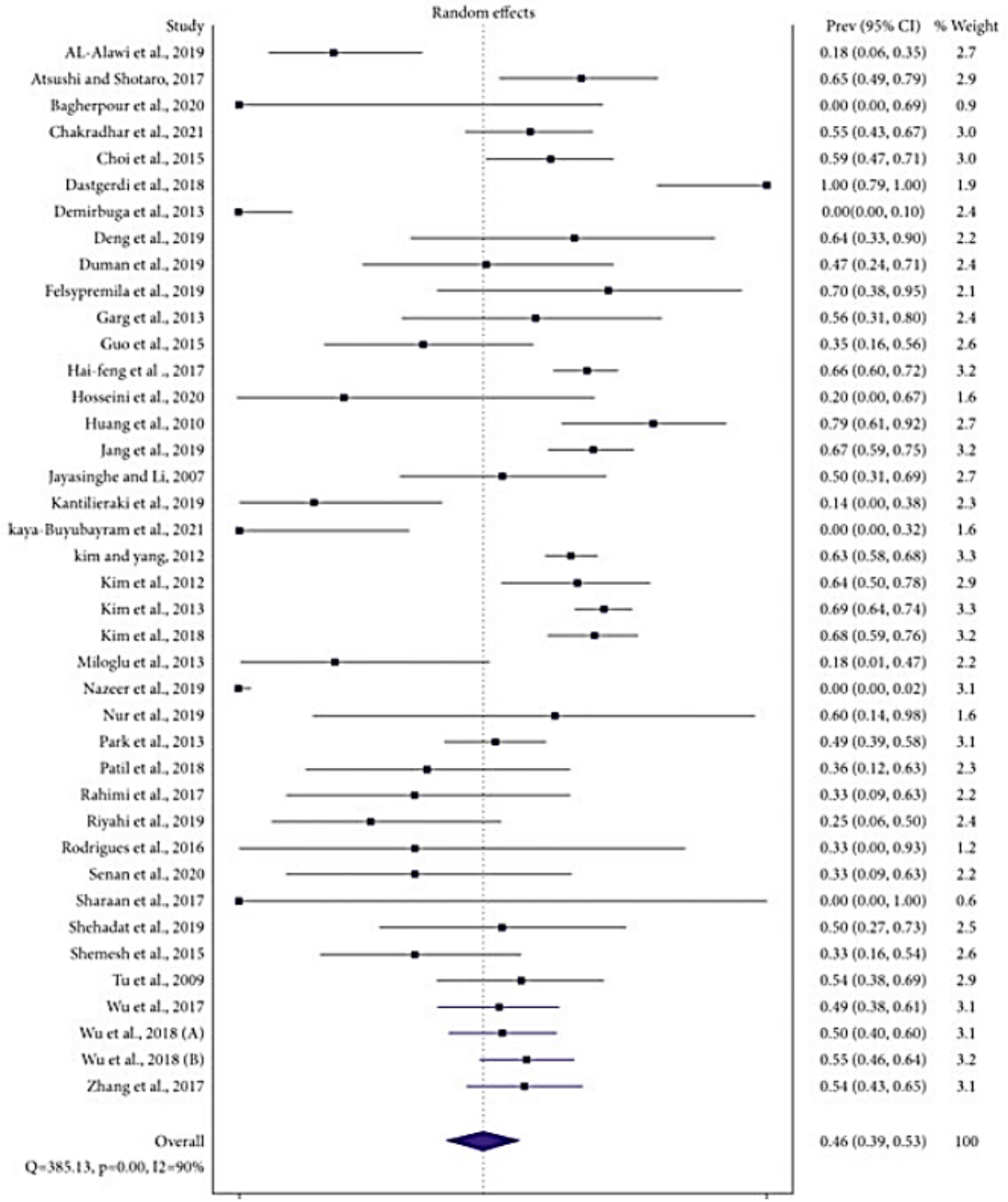
- values close to 0% indicating low heterogeneity
- values close to 100% high heterogeneity

(Higgins JPT, Green S (editors). *Cochrane Handbook for Systematic Reviews of Interventions* Version 5.1.0 [updated March 2011]. The Cochrane Collaboration, 2011. Available from www.handbook.cochrane.org.):

- 0% - 40% - heterogeneity probably unimportant
- 30% - 60% - may suggest moderate heterogeneity
- 50% - 90% - may suggest important heterogeneity
- 75% - 100% - may suggest very important heterogeneity

Statistical test for heterogeneity

- should be interpreted with caution, as the number of studies in meta-analyzes is usually low and therefore the test strength is small.
- Therefore, instead of the threshold of statistical significance of 0.05, the significance threshold of 0.10 can be used.



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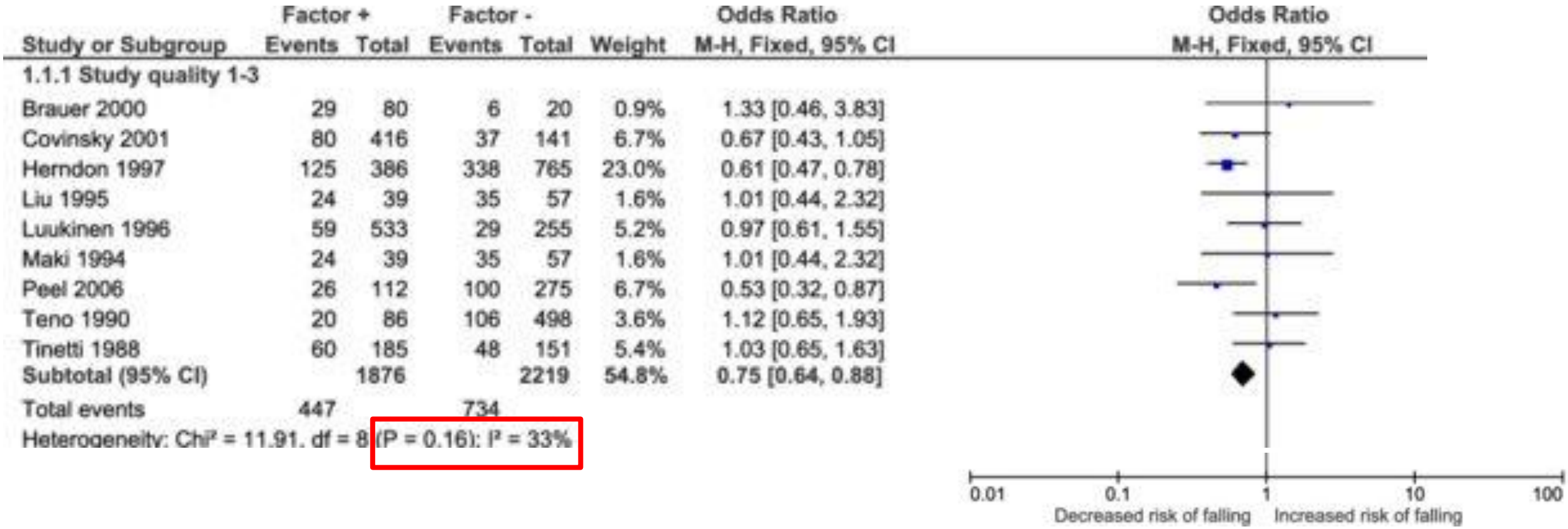

Physical activity versus sedentary lifestyle.
Fall risk in the elderly

Thibaud M, Bloch F, Tournoux-Facon C, Kemoun G. Impact of physical activity and sedentary behaviour on fall risks in older people: A systematic review and meta-analysis of observational studies. European Review of Aging and Physical Activity. April 2012:8(1);1-11

Conclusions

	Review	Systematic Review	Meta-analisys
Author	One author	≥ 2 authors	≥ 2 author
Search strategy	-	PICOS or protocol	PICOS or protocol
Analisys	Author opinion	Qualitative analysis	Statistical analysis with special techniques

Cochrane

- The Cochrane Collaboration – international network of specialists who produce, maintain and disseminate systematic reviews in the medical field
- www.cochrane.org
- 5000 systematic reviews
- 500 new reviews/year
- 500 updated reviews/year

Thank you!