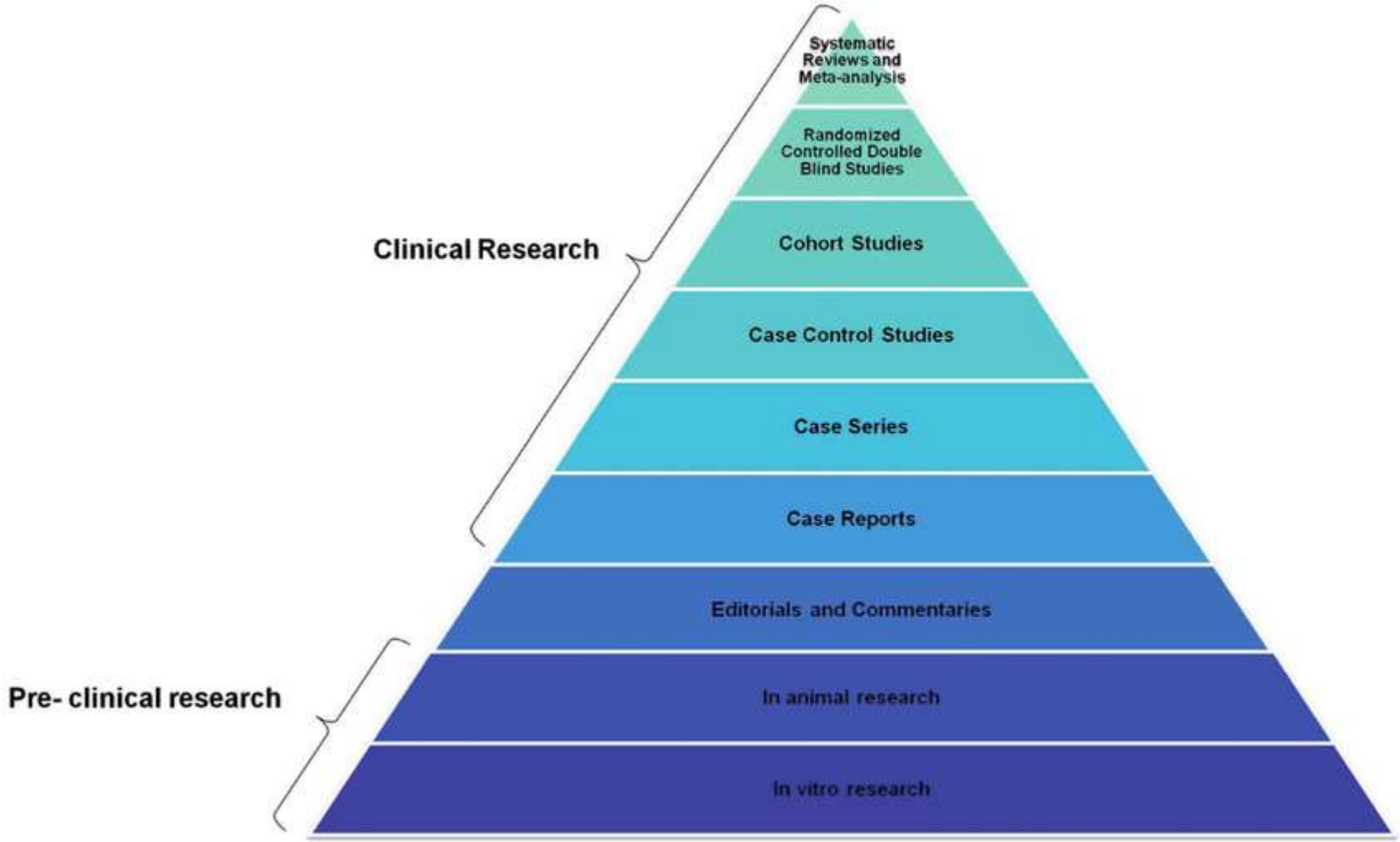
Systematical reviews and meta-analysis – short guide

- **To be completed until 11.02.2026 23:59 PM**

https://forms.microsoft.com/r/4bmPCnkUYs

Types of research

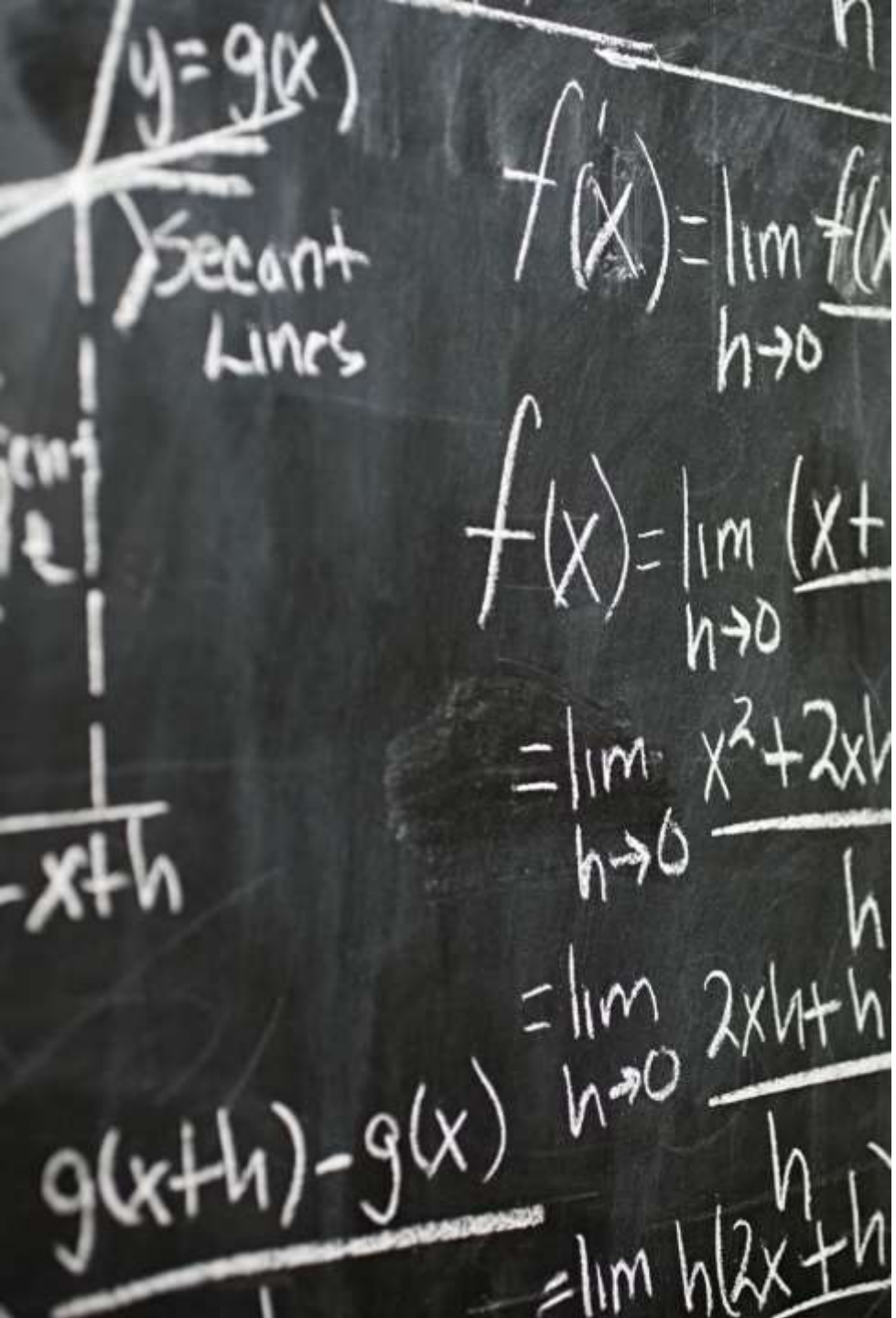


Types of syntheses

- Syntheses
- Systematic syntheses
- Meta-analisys

=Narrative syntheses

Combination of methods



syntheses

- Synthesis = synthesis of specialized literature = narrative synthesis
- It reflects the specialist's own approach to the problem – subjective
  - The specialist chooses his own relevant literature
  - Slightly affected by systematic errors

Synthesis

- Utility:
  - Updating knowledge
  - Possibly appreciation of possible further developments
  - Introduction of an article
- Disadvantage => Errors = own opinion
  - It actually conveys the (argued) message desired by the specialist

Systematic synthesis

- A method of summarizing knowledge, using a well-defined search methodology in all available scientific literature and a critical evaluation of the studies
- One question - try to synthesize knowledge in a narrow field
- In general narrative - qualitative results
- It may also include a combined statistical evaluation of individual results = meta-analysis
- The "best" source = Cochrane library

Research question

- Simple
- Important
- Useful
- Feasible

Finding information

- Simple research of literature is not enough; not all studies are published; the publication of unfavorable results may be discouraged by research sponsors.
- Sometimes in the study, significant results may be exaggerated and those that do not identify significant differences may be neglected, being considered by researchers uninteresting (systematic publication error)
- Researchers who are not native English speakers often find publications in this language demanding and publish their papers with negative results in less accessible national journals.

Finding information on the internet

- You will need to create a searching strategy
- PICO (T) can help
- For each component of the search look for the synonymy

Finding information on the internet – Example

Research question: How are mobile apps currently being used to help individuals with high blood pressure eat healthier diet?

Keyword 1: Mobile Apps

Mobile application(s), mobile technology(ies), mobile healthcare, mHealth

Keyword2: Diet

Diet, nutrition

Keyword 3: Blood pressure

Hypertension, high blood pressure

Finding information on the internet – Example

- https://www.youtube.com/watch?v=xGYFDrORpzA

Meta - analysis

- Common effect
  - **Correlations**
  - **Proportion**
  - **Relative risk**
  - **Attributable risk**
  - **Odds Ratio (OR)**
  - **AOC …**

Extracting the articles

- The methodology of the systematical reviews require that two members of the research team to independently perform the study selection. In case of differences, a senior researcher should be consulted.
- For all recruited studies, the original articles will be saved in full format for review. You can't work on abstracts

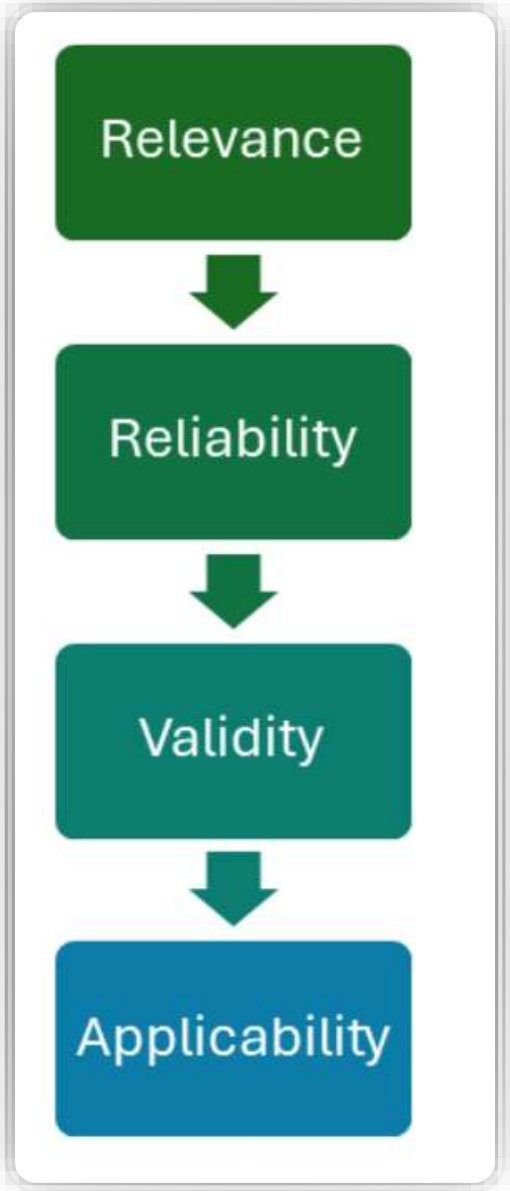
"Pollution" given by studies with systematic errors

GIGO

Garbage in

Synthesis

Garbage out



Assessing the quality of the articles

Relevance:

- **Is the research method/study design appropriate for answering the research question?**
- **Are specific inclusion / exclusion criteria used?**

Reliability:

- **Is the effect size practically relevant? How precise is the estimate of the effect? Were confidence intervals given?**

Validity:

- **Were there enough subjects in the study to establish that the findings did not occur by chance?**
- **Were subjects randomly allocated? Were the groups comparable? If not, could this have introduced bias?**
- **Are the measurements/ tools validated by other studies?**

Quality Assessment tools

- Quality Assessment tools are questionnaires created to help you assess the quality of a variety of study designs.
- There are appraisal tools for most kinds of study designs. You should choose a Quality Assessment tool that matches the types of studies you expect to see in your results.

What will contain the special part of the thesis?

- Introduction
- Material and method
- Results
- Discussions
- Conclusion

introduction

- Very short justification of the importance of the topic
- Unresolved issues (contradictions regarding the chosen topic)
- The research question

Material and method

- Research question
- Which databases will be used?
- What is the searching strategy?
- What is the research phrase?
- Which are the inclusion criteria? Which are the exclusion criteria?
- What quality assessment tool will be used?
- (If meta-analysis) Which statistical parameter will be used to quantify the effect?
- (If meta-analysis) Which statistical software will be used? What level of significance?

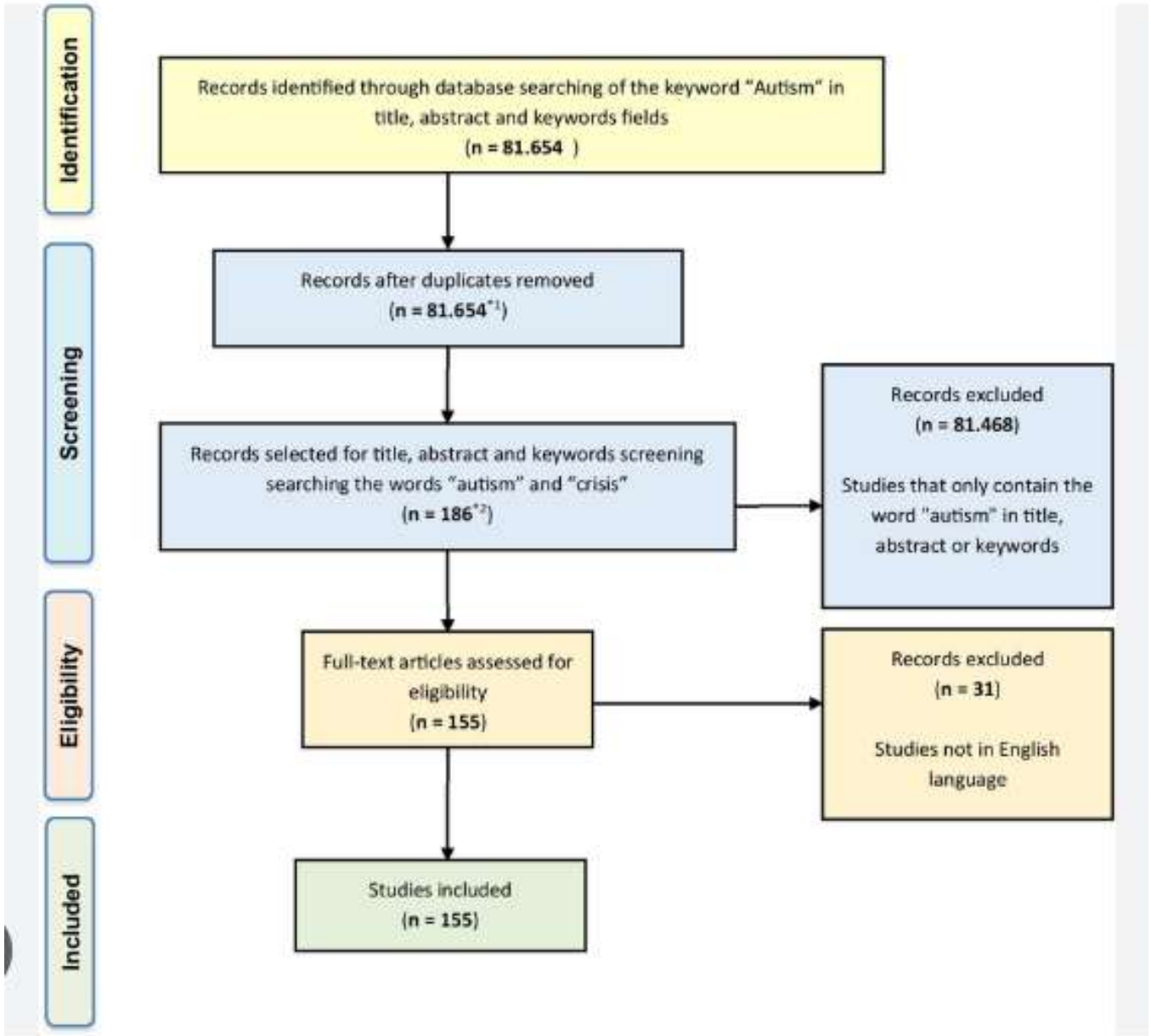
PRISMA Flow Diagram

Article analysis sheets

Quality assessment report

Forest plot (meta-analysis)

Funnel plot (meta-analysis)



Prisma flow diagram

Identification of the studies

Identification of the findings

Identification of the studies

- Chosen name (AuthorYear)
- Article title
- Authors
- Year
- Centers

ChosenName

Sample size

Statistical parameters

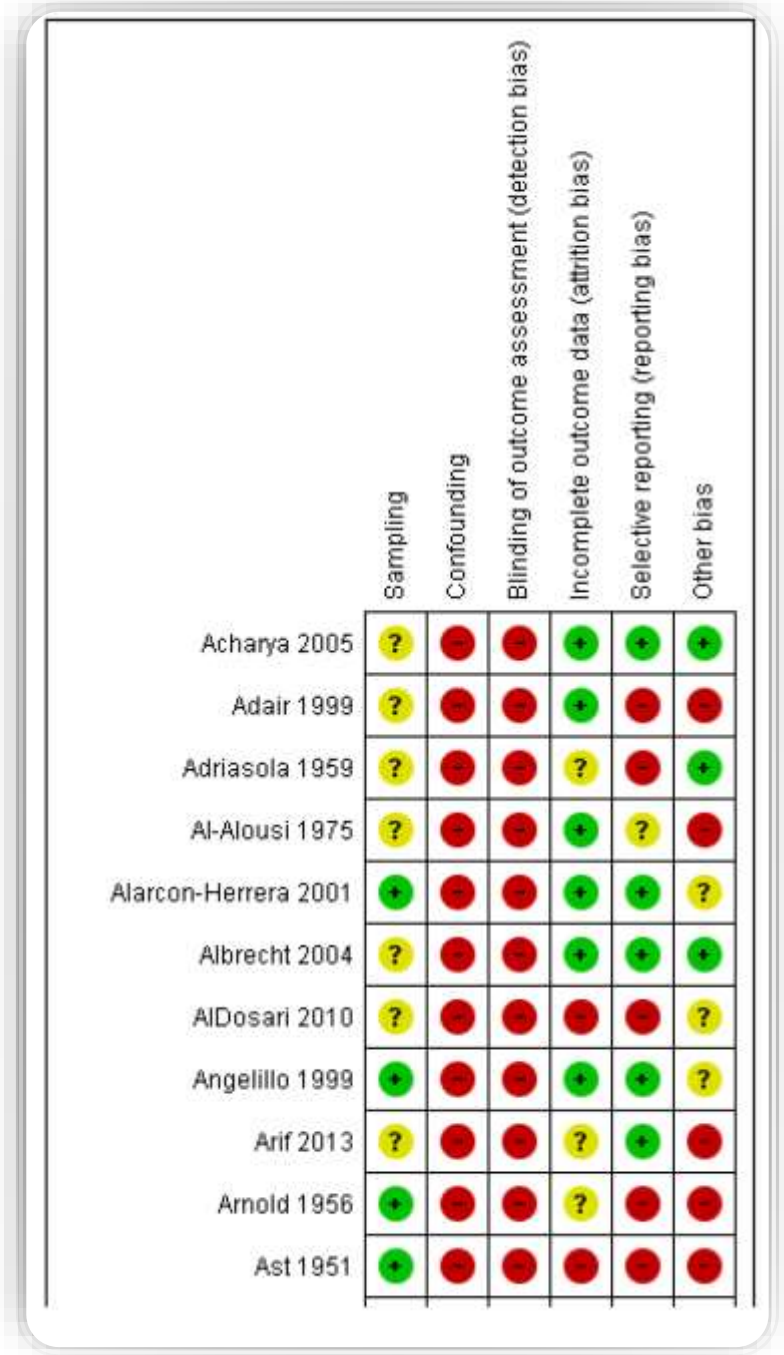
Findings

Limitations

Particularities

Comments...

Quality assessment report



Narrative presentation of the results

Discussion about each study

Explanations concerning common findings

Explanations concerning differences between findings

Conclusion

MAIN COMMON FINDINGS

MAJOR DIFFERENCES IN FINDINGS (IF EXISTS)

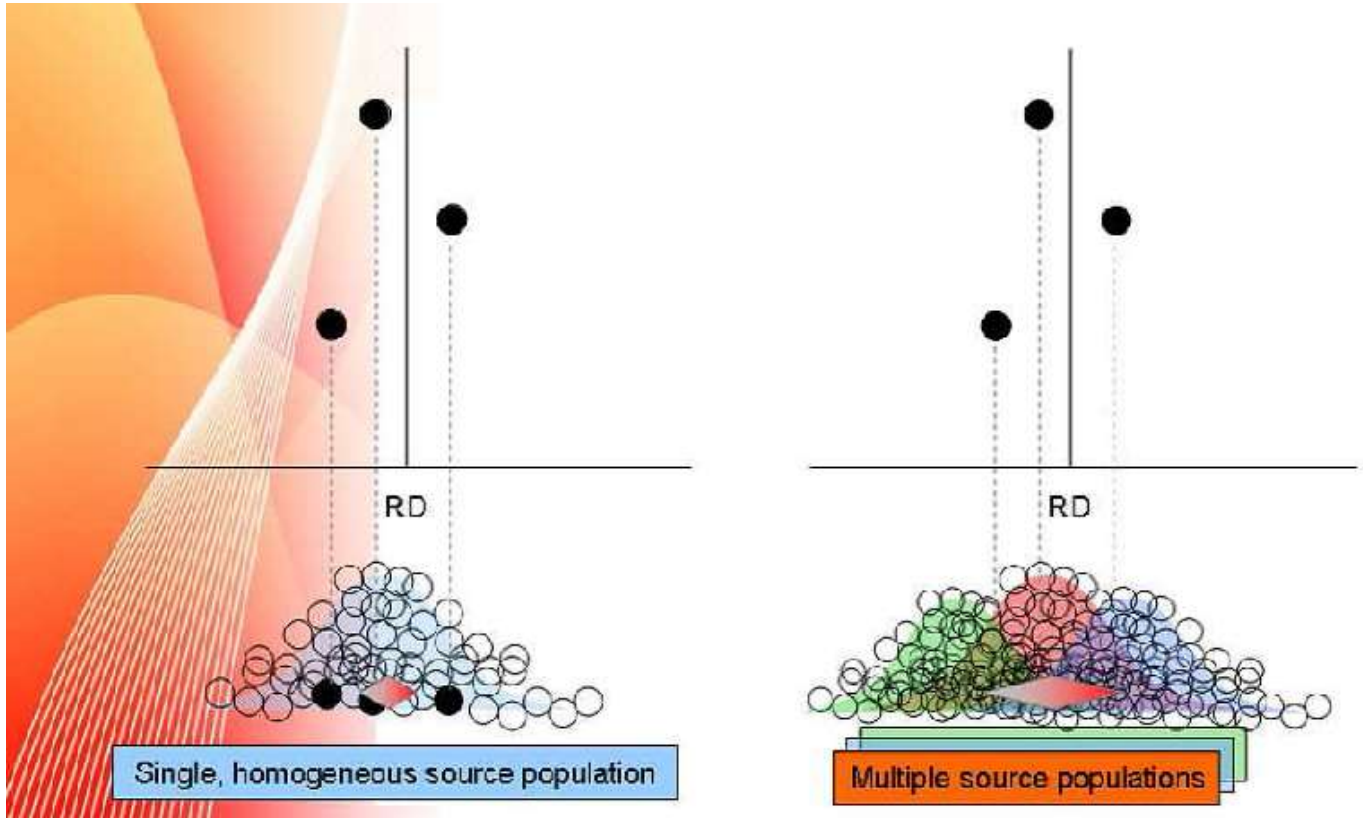
IMPLICATION IN PRACTICE

Meta-analysis

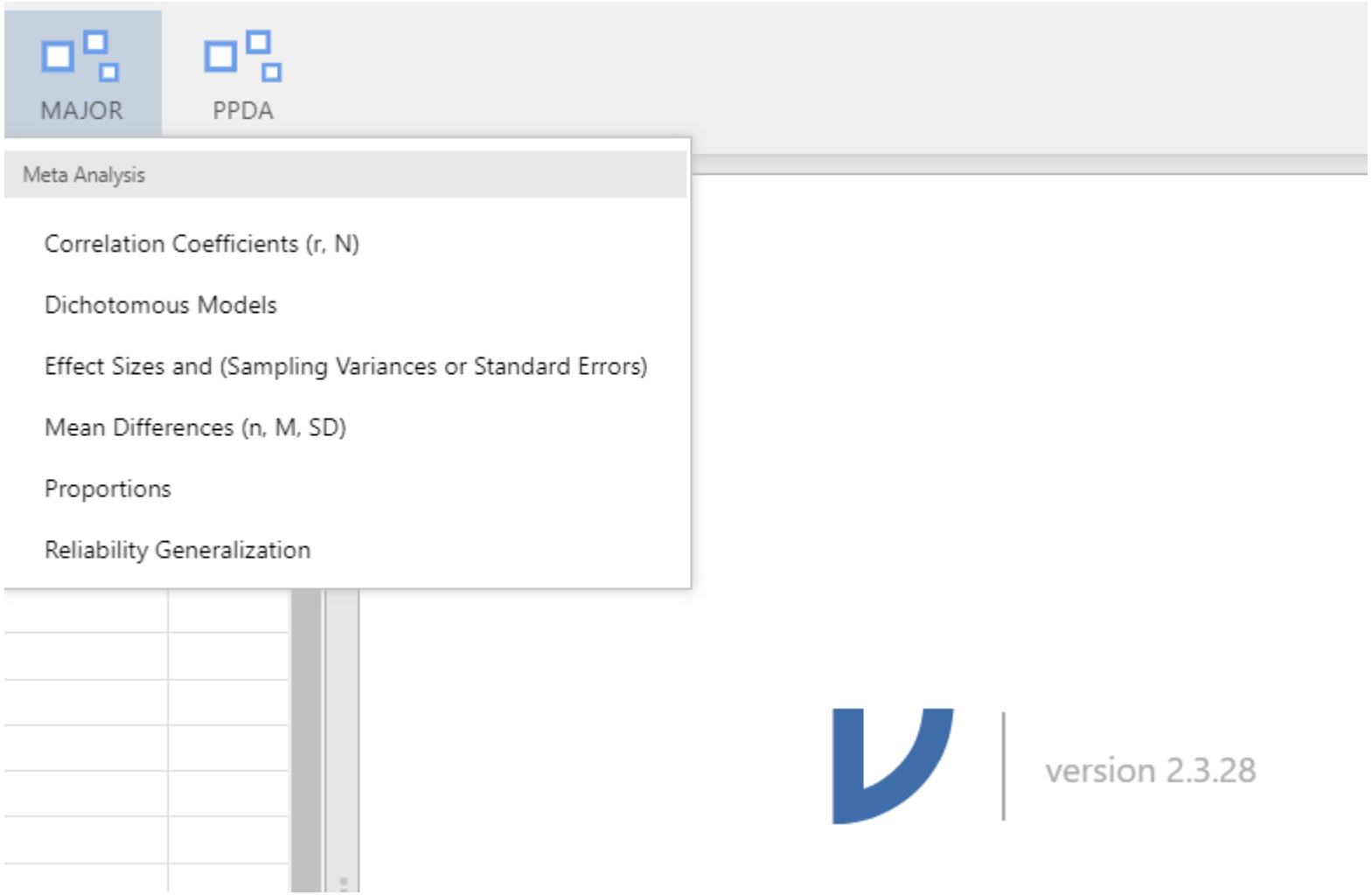
- *Combined processing of data from multiple studies in order to produce a single estimate*
- The purpose of the meta-analysis is to combine the results of various studies to make a conclusive estimate through a multifactorial analysis in which
  - the risk factor or treatment is a predictive variable
  - and the study is the second variable - fixed.

Mathematical models

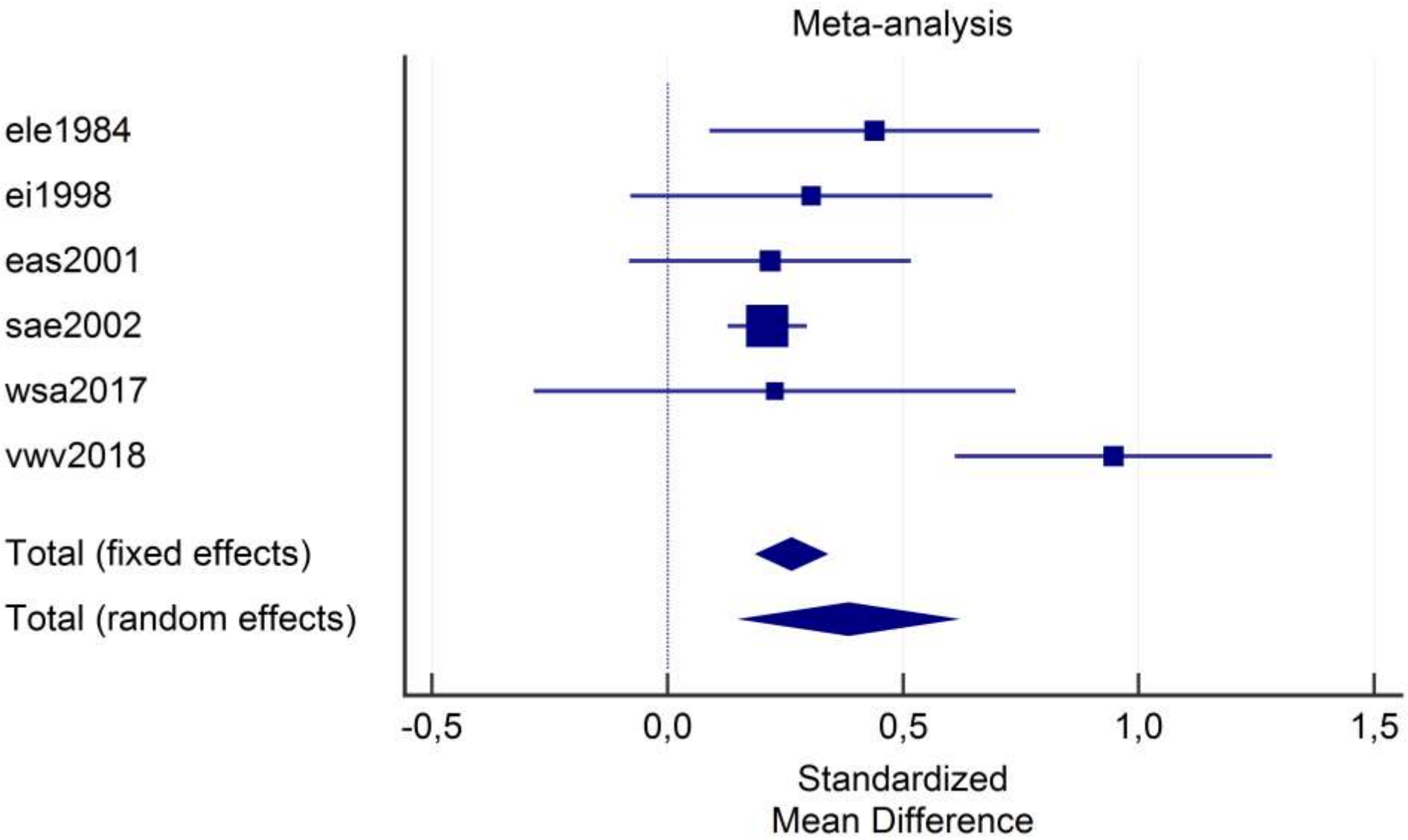
- Fixed effect model - all studies come from the same statistical distribution - the differences between them are due to chance - the narrower confidence interval
- Random effect model - studies come from different statistical distributions - wider confidence interval



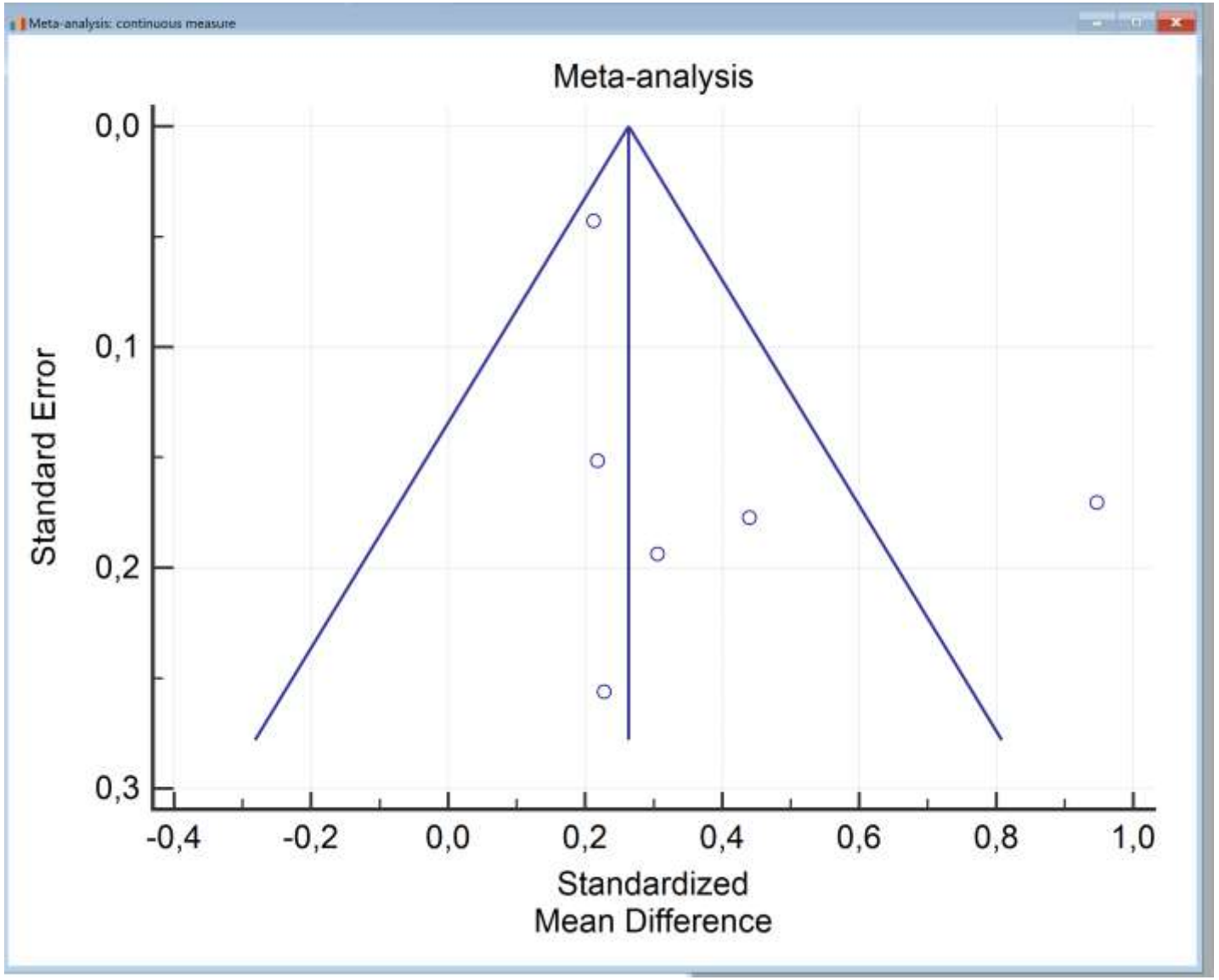
Statistical software – jamovi, major module



Forest plot


Meta-analysis
ele1984
ei1998
eas2001
sae2002
wsa2017
vwv2018
Total (fixed effects)
Total (random effects)
-0,5
0,0
0,5
1,0
1,5
Standardized
Mean Difference

Funnel plot chart



Inconsistency index

- can be used to assess the degree of heterogeneity between studies,
- values close to 0% indicating low heterogeneity and values close to 100% high heterogeneity
  - 0% - 40% - heterogeneity probably unimportant
  - 30% - 60% - may suggest moderate heterogeneity
  - 50% - 90% - may suggest significant heterogeneity
  - 75% - 100% - may suggest very important heterogeneity
- it also has a statistical test

www.info.umfcluj.ro