

How to write a research paper :

There is a standard, preferred way to write an original research paper. For format, we follow the IMRAD structure. The acronym, IMRAD stands for *I*ntroduction, *M*ethods, *R*esults *A*nd *D*iscussion.

IMRAD has dominated academic, scientific, and public health journals since the second half of the twentieth century. It is recommended in the “Uniform Requirements for Manuscripts Submitted to Biomedical Journals”. The IMRAD structure helps to eliminate unnecessary detail and allows relevant information to be presented clearly in a logical sequence.

Here is a description of the IMRAD sections, along with a few comments and suggestions.

Introduction

The *Introduction* sets the stage for your presentation. It has three parts: what is known, what is unknown, and what your hypothesis, or aim is.

- Keep this section short, and write for a general audience (clear, concise, and as nontechnical as you can be).
- Take your readers through the three steps ending with your specific question.
- Emphasize how your study fills in the gaps (the unknown), and explicitly state your research question.
- Do not answer the research question.
- Remember to leave details, descriptions, speculations, and criticisms of other studies for the *Discussion*.

Methods

The *Methods* section gives a clear overview of what you did.

- Give enough information that your readers can evaluate the persuasiveness of your study.
- Describe the steps you took, as in a recipe, but be wary of too much detail.
- If you are doing qualitative research, explain how you picked your subjects to be representative.
- You may want to break it into smaller sections with subheadings.
 - **EXAMPLE :** When, where, authority or approval, sample selection, data collection (how), follow-up, method of analysis.
- Cite a reference for commonly used methods or previously used methods rather than explaining all the details.
- Flow diagrams and tables can simplify explanations of methods.
- You may use first person voice when describing your methods.

Results

The *Results* section summarizes what the data show.

- Point out relationships, and describe trends.
- Avoid simply repeating the numbers that are already available in the tables and figures. Data should be restricted to tables as much as possible.
- Be the friendly narrator, and summarize the tables; do not write the data again in the text.
 - **EXAMPLE :** If you had a demographic table with a row of ages, and age was not significantly different among groups, your text could say, “The median age of all subjects was 47 years. There was no significant difference between groups (Table).” This is preferable to, “The mean age of group 1 was 48.6 (7.5) years and group 2 was 46.3 (5.8) years, a nonsignificant difference.”
- Break the *Results* section into subsections, with headings if needed.
- Complement the information that is already in the tables and figures, and remember to repeat and highlight in the text only the most important numbers.
- Use the active voice in the *Results* section, and make it lively.
- Reserve comments on the meaning of your results for the *Discussion* section.

Discussion

The *Discussion* section gives you the most freedom. Most authors begin with a brief reiteration of what they did. *Every* author should restate the key findings and answer the question noted in the *Introduction*.

- Focus on what your data prove, not what you hoped they would prove.
- Start with “We found that...” (or something similar), and explain what the data mean.
- Anticipate your readers' questions, and explain why your results are of interest.
- Then compare your results with other people's results. This is where that literature review you did comes in handy.
- Discuss how your findings support or challenge other studies.
- Do not provide a long review of the literature—discuss only previous work that is directly pertinent to your findings.
- Point out unanswered questions and future directions.
- Give the big-picture implications of your findings, and tell your readers why they should care.
- End with the main findings of your study, and do not travel too far from your data.
- Remember to give a final take-home message along with implications.

Notice that this format does not include a separate *Conclusion* section. The conclusion is built into the *Discussion*.

Other parts of your research paper independent of IMRAD include:

Tables and figures are the foundation for your story. They are the story. Editors, reviewers, and readers usually look at titles, abstracts, and tables and figures first. Figures and tables should stand alone and tell a complete story. Your readers should not need to refer back to the main text.

Abstracts can be free-form or structured with subheadings. Always follow the format indicated by the publisher. Begin your abstract with the background of your study, followed by the question asked.

Next, give a quick summary of the methods used in your study. Key results come next with limited raw data if any, followed by the conclusion, which answers the questions asked (the take-home message).

Reference

Cooper ID. How to write an original research paper (and get it published). *J Med Libr Assoc.* 2015;103(2):67–68. doi:10.3163/1536-5050.103.2.001