


Basics of Writing Original Research Papers

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Among all article types, original research papers are the ones sought the most by academic journals for publication. This paper aims to summarize the key points of writing research papers and makes the third paper in a series of editorial papers previously published in Archives of Neuropsychiatry dedicated to the basics of writing review papers (1) and case reports (2).

Research papers are articles which explain why and how a particular research study is conducted, its findings and contributions to science. Their aim is to provide new evidence and knowledge to their field and share the analysis and inferences of the researcher-author. The evidence brought up by research articles which have been published after meticulous peer review process, lay out the foundations for both scientific progress and up to date medical practices.

Original research articles are inseparable from the research itself and their preparation should preferably start within the early phases of the research study (3, 4). The first draft of the research paper is reviewed and revised multiple times until the final draft gets ready for submission to a journal. The final draft must be in line with international guidelines, and also follow the instructions for authors of the journal chosen. The ICMJE (International Committee of Medical Journal Editors) recommendations are a set of guidelines followed by high prestige medical journals and can be utilized for writing research papers in line with international standards (5).

It is worth noting that different criteria might apply to different types of research studies. The EQUATOR network (Enhancing the Quality and Transparency of Health Research) lists internationally accepted guidelines developed for accurate reporting of different research types conducted in the field of medicine (6). It should be kept in mind as a convenient source while writing research papers. The most widely accepted guidelines for the reporting of different research study types are listed below:

Randomized trials: CONSORT (7)

Observational studies: STROBE (8)

Nonrandomized/quasi-experimental studies: TREND (9)

Diagnostic studies: STARD (10)

Qualitative research: SRQR (11)

Animal research: ARRIVE (12)

Just like any other academic papers, research papers should be written with scientific language which is brief, concise, clear and to the point (13). The sentences should be short and comprehensible. Compound sentences should be avoided when possible. The paragraphs should consist of three or four sentences. Each paragraph should describe just one idea. Whereas general knowledge must be written in present tense, newly acquired knowledge or findings of the actual study must be written in past tense (13). Lately, it is recommended to use active voice instead of passive voice (14).

There are no certain rules for where to start writing a research paper. Starting in the order it will be published is not only unnecessary but might also be improper (13). Every author has their own preferences and style. For example, many authors prefer to start with the section which they find easiest to write*. Forming a framework which consists of section titles and subtitles and then working on them freely, is another practical method which the author of this paper prefers.

Highlights

- Original research papers provide novel contributions to science.
- Research papers are written in “introduction, methods, results and discussion” format.
- The hypothesis of the research study must be clearly stated at the end of the introduction.
- International guidelines should be used for accurate reporting.

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Traditionally, original research papers are written in “introduction, methods, results, and discussion (IMRaD)” format (5). While the introduction tells why, the methods tell how the study is conducted. The results section presents the findings, and the discussion explains the meaning of them. This main structure is accompanied by the title, abstract, key words and references. In addition, tables, figures, acknowledgements and supplementary files support the research paper as needed.

Title is the most read and most important part of an original research paper just as any other academic papers. Writing the title requires special consideration, as it presents and promotes the whole paper. A good research paper title should be both concise and comprehensive, moreover descriptive and attractive. Questioning titles are not proper for original research papers but should be saved for papers which handle controversial topics such as letter to the editor or perspective papers etc. (13).

Abstract is an independent and brief representative of the main text. It must be perfectly in line with the main text and have the same subtitles which are introduction, methods, results and discussion. Therefore, abstract is usually written after all other sections of the article are completed. Every change and revision made to the main text must be reflected in the abstract as well.

The major objective of the introduction section is to persuade the reader of the necessity of the study. To achieve this goal, it summarizes what is known, followed by what is not known about the topic of concern, forming a background for the research question. Introduction ends up stating the aim and hypothesis of the study. It is essential to write the hypothesis clearly and precisely. In general, the introduction section consists of three or four paragraphs. It must start presenting specific information directly related to the research question and must avoid repeating well-known general knowledge which makes the introduction unnecessarily long.

The methods section is the most detailed part of an original research article. It verifies how well the research hypothesis is tested and determines the validity of the research paper. Methods are usually presented in subsections: sample (participants), study design, tools and instruments, statistics, and ethics.

The sample subsection provides information about the number, sociodemographic features and the recruitment process of participants along with the inclusion and exclusion criteria, dropouts and the reasons for dropouts. Design subsection explains the type of the study (e.g. observational, experimental, retrospective/prospective etc.), its timeline, and the tools and procedures used. Tools and instruments subsection lists all the evaluation tools used, citing the validity and reliability studies for the scales and tests; and stating the brand, model and production date of the devices. The statistics should explain which statistical test has been used for which data analysis specifically. For example, instead of saying “numeric variables were compared with t test”, the correct style should be “the mean age of patient and control groups were compared with independent samples t test”.

Depending on the journal's instructions, ethics can both be explained under a separate ethics subtitle in the methods section, or inside the participants or study design subsections. It can also be an independent section at the end of the paper. In the ethics section, the date and registration number of the ethical committee approval, the international protocols that had been followed and ethical principles applied should be explained. In addition, it should be stated that all the participants had provided written informed consent.

The results section presents the data and findings of the study via text, tables and figures. Text and tables and figures should not overlap but complete each other. Most of the time, it is not possible to present all

the findings. When this is the case, findings which answer the research question best should be given. The most fundamental issue should be to present the findings objectively and without bias whether they support the hypothesis or not (13). If there is a large amount of data, some of the findings can be presented as supplementary files.

The discussion is the section where the authors show their creativity and make analysis, comments and inferences. The meaning and importance of the findings are explained and reframed in this section. The findings of the study are compared with the findings of previous studies and the differences and similarities along with their reasons are examined. Towards the end of the discussion the advantages and limitations of the study are disclosed along with the measures taken to avoid the limitations and why they did not work. Discussion ends referring to the potential contributions of the study to its field and making suggestions for future research.

Original research articles not only present the findings of research studies, but also analyze and interpret these findings objectively and discuss their potential contributions. Every research article forms a novel pathway for upcoming research and triggers new studies. Research papers should be written by the research team with the same meticulousness paid to conduct the research study and spending the necessary time and effort. Utilization of international guidelines will help accurate and thorough reporting of research studies which will increase the chances of their publication.

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