Column: Tips on Research and Publication

DISCUSS YOUR FINDINGS WELL

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Discussion is the heart of any manuscript. The results obtained in the study get meaning through this section. The researcher confirms or refutes the stated hypothesis and provides context and explanations for the findings. A well-written discussion adds clarity and purpose to the manuscript and is well appreciated by the readers. Because of this, it should not be written in haste and requires thinking through.

Docherty and Smith mention the structural convention in the discussion section, which includes the "statement of principal findings, strengths, and weaknesses of the study, strengths and weaknesses in relation to other studies, discussing particularly any differences in results, the meaning of the study, and unanswered questions and future research." The study results are discussed along with a synthesis of previous research. Some value judgment is used while describing the results. However, the author should not go overboard and hype the findings.

Organization of the section

The discussion section includes the summary of major findings, comparison with previous studies, strengths and limitations, the generalizability of findings, implications, future directions, and conclusions. However, these subheadings are not generally used, unlike other sections such as methods and results. These sections are usually demarcated by a topic sentence (e.g., Limitations of the study include…).

Summary of the major findings: The first paragraph of the discussion section may summarize your most important findings. However, rather than copy-pasting the same from your abstract or results section, you should use different wordings.

Discussion of the major findings: Usually, it includes findings related to all the stated objectives and hypotheses. The findings are not a repetition of the results but stated in the context of existing literature, i.e., whether they are similar or different from other studies. This may require explanations and elaborations, specifically if the findings are discrepant. The discrepancies may be explained in light of the differences related to settings, patients, interventions, assessment tools, follow-up duration, and outcome measures. The researchers should not be selective in reporting studies that favour their hypothesis but present a balanced view of the studies for and against the findings. If there are several key findings, one way to report them is to organize them into separate paragraphs.

Discussion of other results: Following the discussion of the major findings, other findings that could be relevant are discussed. However, not all trivial findings should be included. There may be unexpected findings in the study, which may require some discussion as to why it occurred.

Strengths: Mention how this study overcame the limitations of the previous research. Sometimes, the novelty of the study can be mentioned. The credibility of your findings can be highlighted by pointing out the small confidence intervals you obtained and the findings

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of sensitivity analyses. Avoid sentences such as "this is the first (or the greatest or best) study…" which may be factually incorrect and may annoy the editors and reviewers.

Limitations: All studies will have some limitations. It is imperative that the authors identify and acknowledge them in the manuscript. If not stated, major limitations will attract post-publication reviews that critically evaluate the methodology and bring out errors. This can be embarrassing for the researchers (as well as the editors). Limitations can be related to study design, sample, tools, procedure, and analysis. Do not merely state the limitations, but explain them. Mention why this limitation is important, what you did to overcome this, and how it affects the study findings. For example, a survey sample from a social media platform could result in selection bias and lead to spurious findings. There is no need to enlist all the limitations of the study but include the important ones that could have affected the study findings. Discuss how the limitations impact the evidence quality and magnitude of bias.

Generalizability: This is the extent to which the findings can be extrapolated to other settings or populations. You can summarize your sample and setting and give a balanced view of generalizability. For example, based on a study in a hospital setting, it may not be appropriate to suggest that the same will apply to all in the community.

Implications: The meaning of the study findings should be discussed. It can be the clinical implications, including how the study findings may affect clinical practice. Other implications may be important in some studies, such as neurobiological, methodologic, economical, or ethical. Do not extrapolate the findings too much, which may be considered "hype." Bring in the magnitude of effect, i.e. effect sizes, while discussing the clinical implications. For example, using the number needed to treat (NNT) to discuss the importance of an intervention, or relative risk while discussing association with an exposure. Do not overemphasize the findings based only on significant p-values, which depends on the sample size.

Future directions: This is to inform the readers how the study can be done differently by overcoming the limitations identified. Avoid vague suggestions such as "more studies are needed in this area;" instead, give specific suggestions. For example, if a small sample, shorter duration of follow-up, or cross-sectional design did not allow you to reach a stronger conclusion, the same can be suggested for subsequent studies.

Conclusions: This includes a one- or two-sentence summary of the study's major findings in the context of the available evidence, and its implications, including generalizability. This is a synthesis of all that has gone into the discussion section.

Avoid common errors

Organize the section properly: The most common errors in not-so-well written manuscripts is the organization of the discussion section. Specifically, in the theses, discussion sections are organized into 'discussion of methodology' and the 'discussion of results.' Some submitted manuscripts also follow this organization, starting with the study's strengths and weaknesses, a discussion of sample characteristics, and then the study's main findings; this is not a preferred style in research papers. Also, the trivial or exploratory findings sometimes shadows the main findings, and the authors lose the opportunity to highlight the study findings.

Do not repeat what is mentioned in previous sections: There is no need to state the objectives again under discussion. Also, the methods and results need not be repeated. While discussing the methods and results, sometimes it may be needed; however, rephrase the sentence in such situations.

Do not present any results for the first time in discussion: The discussed findings should be mentioned under the results. Do not introduce findings only in the discussion.

Avoid using numbers: The exact numbers and figures are already mentioned under the results. In discussion, these values may be rounded off or written in words (e.g., 24.98% can be 25% or one-fourth). There is no need to repeat exact p values or "significant" in the discussion; instead, the findings are mentioned as higher or lower instead of "significantly different."

Avoid incorrect interpretation of the findings: Do not exaggerate or minimize the findings. Do not quote references that only support your finding, excluding the ones that contradict; give a balanced view of findings in these situations. The choice of words reflects the degree

of confidence you have in the findings (e.g., "We could demonstrate that…." "It is possible that…" "Maybe…"). Avoid superfluous interpretations such as discussing causality from an association in a cross-sectional study.

Use correct tense: Findings of the study are presented in the past tense (e.g., This study found that…). The significance of the findings is written in the present tense (e.g., These findings suggest that…).

Avoid flowery language: Do not use flowery language to describe the findings, as it does not add anything to science and may rather confuse the reader. The actual meanings sometimes get obscured. Also, the use of lengthy explanations can sometimes be boring.

All is well that ends well

The meaning of the study findings becomes apparent to the reader after reading the discussion. It is important to bring out the most important aspects of the study and place them in the context of existing knowledge. Although a little subjectivity gets into the discussion, try to be as objective as possible. As this style of writing requires a very clear understanding of the study design and findings as well as immersion in the related literature, the initial write-up should go through several rounds of revision before it is finalized. The researchers should be able to tell their stories well!

Suggested readings

Bagga A. Discussion: The heart of the paper. Indian Pediatr 2016;53:901-4.

Docherty M, Smith R. The case for structuring the discussion of scientific papers. BMJ 1999;318:12245.

Ng KH, Peh WC. Writing the discussion. Singapore Med J 2009;50:458-60.