Discussion Section for Research Papers

Parts of a Research Paper
- Abstract
- Introduction
- Literature Review
- Methodology
- Findings/Results
- Discussion
- Conclusion

The discussion section is one of the final parts of a research paper, in which an author describes, analyzes, and interprets their findings. They explain the significance of those results and tie everything back to the research question(s). In this handout, you will find a description of what a discussion section does, explanations of how to create one, sample discussion sections, and a culminating activity to practice identifying the parts of the discussion section.

What is the Purpose of a Discussion Section?

The discussion reviews the findings and puts them into the context of the overall research. It brings together all the sections that came before it and allows a reader to see the connections between each part of the research paper. In a discussion section, the author engages in three necessary steps: interpretation, analysis, and explanation. An effective discussion section will tell a reader why the research results are important and where they fit in the current literature, while also being self-critical and candid about the shortcomings of the study.

How Does a Discussion Section Differ from a Conclusion?

A conclusion summarizes parts of the paper. A discussion, however, is a much more thorough and rigorous examination of the results. It requires the author to interpret those results by looking at *how* or *why* they are the way they are. Additionally, the discussion section is the space where the author acknowledges the limits of the research and identifies gaps for future research. Finally, this section investigates the implications of the research based on the findings and results, and it draws meaningful conclusions from those implications. So, where a conclusion is brief and touches on the main points of the paper, the discussion is much longer and more detailed.

How Is a Discussion Section Structured?

Each discussion section will vary based on the discipline and the subject of the paper. However, six basic rules can be applied to every discussion section to create a framework.

- **First,** summarize the ***key findings*** from the research and link them to the initial research question. Seek to answer this question: What should readers take away from this paper?

- **Second,** place the findings in ***context***. This step will involve going back to the literature review section and analyzing how the results fit in with previous research.

- **Third,** mention and discuss ***any unexpected results***. Describe the results and provide a reasonable interpretation of why they may have appeared. Additionally, if an unexpected result is significant to the research question, be sure to explain that connection.

- **Fourth,** address *limitations or weaknesses in the research*. Addressing limitations helps build your credibility as a writer, because the reader sees that you have thought critically about what your study does and does not cover.

- **Fifth,** provide a brief look at *potential follow-up research studies*. Recommend a few areas where further investigation may be crucial. However, don't go overboard with the suggestions, as they can leave a reader thinking more about the gaps in the paper rather than the actual findings.

- **Sixth (and finally),** conclude with a *restatement* of the most significant findings and their implications. Explain why the research is important and remind readers of the connections it has to outside material, such as existing literature or an aspect of the field that is affected by the study.

Sample Discussion Sections

These two sample discussion sections will help demonstrate the six basic parts outlined above.

[Key finding] Our 20-year analysis of snakebites in California showed a well-correlated inverse relationship between snakebite incidence and severe drought phases, with a predictable increase of snakebites following precipitation. *[Placing findings in context]* This is in contrast to popular press reports of increased snakebites with drought conditions [29,30], and Central American research that reported increased incidence of snakebite during high temperatures of El Niño Southern Oscillation (ELSO) [9]. This study also analyzed the effect of altitude and precipitation on the periodicity of regional snakebites, and *[Key finding]* found that while climate changes had a predictable effect on incidence, snakebites clustered in regions with the highest precipitation [9] [...] After accounting for seasonal trends, *[Restating a key finding]* we observed that prior precipitation was a strong predictor of snakebites, with incidence peaks following the heavy precipitation years of 2006 and 2011 […] *[Limitation]* We cannot exclude the possibility that changes in the medical culture or technology of snakebite reporting may be a confounding variable. *[Recommendation for follow-up research]* While we believe these limitations have not impacted the primary outcome of the study, future work could seek to include additional controls.

Source: Phillips et al., "Snakebites and climate change in California, 1997-2017," *Clinical Toxicology*, 2019.

The above discussion section was split between a dedicated "Discussion" section and a section exclusively covering "Limitations." The authors presented their key findings and placed them into the context of pre-existing literature and research. They restated those findings and then

discussed the limitations of their study, followed by recommendations for future research that could possibly address or overcome those limitations.

[Key finding] Moose in the contiguous United States are considered highly vulnerable to climate change. *[Key finding]* Their cold-adapted morphology and physiology make them sensitive to increasing temperatures, and they experience particularly high exposure to warm temperatures at the southern edge of their range (Lenarz et al., 2009; Ruprecht et al., 2016; Weiskopf et al., 2019). *[Key finding]* Our habitat suitability models indicated that moose occurred in locally cooler areas within the Northeast, confirming that they select for cooler areas, even at this regional scale. *[Placing findings in context]* Moreover, in many of these areas, at least 50% of days were warmer than previously-identified thresholds at which moose respiration rates begin to increase (McCann et al., 2013; Renecker & Hudson, 1986)...*[Key finding]* Our results show that temperature is associated with changes in habitat suitability and habitat use at multiple scales; however, it is not clear from our study whether these patterns are true adaptations (i.e., that they confer a fitness benefit). *[Limitation/placing findings in context]* Our models are based on occurrence data and thus do not consider the effects of behaviour on other population-level differences, such as population density and reproductive rates (Hoy et al., 2018)...*[Restating key findings]* This study suggests that adaptive capacity might enable even sensitive species to persist in the face of rapid climate change. *[Restating key findings]* Our results highlight opportunities for decreasing moose vulnerability to climate change in the Northeast (e.g., through restoring and protecting thermal refuges such as closed-canopy forests or forested wetlands in warm areas, Wattles et al., 2018a)...

[Recommendation for follow-up research] Next steps include incorporating future changes in land cover and forest biomass, investigating interactions with co-occurring species (e.g., parasites, predators and white-tailed deer, Weiskopf et al., 2019), mapping climate change refugia that can be protected from other stressors to enable persistence of moose, and attempting to identify selective gene regions that have evolved to enable moose to persist in warmer condition.

Source: Teitelbaum et al., "Habitat use as indicator of adaptive capacity to climate change," *Diversity and Distributions*, 2021.

The above discussion section used a pattern for each of its key findings: it talked about the finding(s), mentioned the relevant literature, and then addressed any limitations and needs for follow-up studies if necessary. It used this pattern to interpret and analyze the most important

results effectively. Finally, it stated the overarching conclusion that could be drawn from the results and presented its final recommendations for future research.

What Should Be Avoided in a Discussion Section?

A discussion section has a few possible pitfalls, but these issues can be navigated easily by remaining aware of what not to do.

- **Don't rewrite the results section:** A discussion section does go over the most significant results, but it also must provide *interpretation and analysis* instead of a simple summary of the findings.

- **Don't draw conclusions from the findings without support:** All the explanations of the key results should be firmly backed up by evidence found in the paper's data or references. Remember to stay within the bounds of the study; don't speculate and wander into another discipline without support.

- **Don't bring up new information:** The discussion is about examining the information already presented earlier in the paper. Adding new information in this section will confuse a reader and derail the flow of ideas. If new information does come up, put it in the results section.

- **Don't cherry-pick the results to analyze:** Some results and findings won't answer the research question, won't answer it the way they were expected to, or will be simply unexpected. That's perfectly fine—a discussion section is simply the place to write about why or how this may have happened. Avoid ignoring those results in favor of only the ones that support your research question(s).

Activity: Identify the Parts of a Discussion Section

Navigate to Google Scholar or your library database. Find several articles on a high interest topic for your chosen field (e.g., *shock wave physics* for mechanical engineering or *islet transplantation* for nutrition). Consider choosing articles from peer-reviewed journals, which you can search for by applying a filter. Open several articles and make observations about their discussion section. Based on the rules and examples listed above, can you identify the six basic features of the discussion? Below are some guiding questions to think about when practicing.

1. **Key findings:** Does the discussion present the key results and analyze them for their importance and meaning?

2. **Context:** Does the discussion reference pre-existing literature to show where the findings either fit in or disagree?

3. **Unexpected results**: If there are any, does the discussion mention them and analyze them as well for how they occurred or why?

4. **Limitations:** Does the discussion bring up limitations or shortcomings and address how they affected the overall study?

5. **Recommendations:** Does the discussion point out where future research may be helpful or necessary?

6. **Restatement:** Does the discussion restate and emphasize its most significant results and their meanings?

References

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