

Discussion Sections in Academic Papers: The Opening Paragraphs

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The importance of water as an exposure pathway has received new attention due to several highly publicized local incidents in the US, yet the contribution of WPb to child Pb levels, especially those children with low to moderate levels is not well known. The current study investigated the associations between water metal concentrations and two biomarkers of Pb in a cross-sectional sample of Uruguayan children aged 5-8 yrs. The analysis found little evidence of an association between any of the water metal concentrations (WPb, WFe, WZn) and PbB in the sample as a whole, however there was an inverse association between WFe quantiles and PbU concentration. When the sample was split by iron deficiency status, distinct associations were found between water metal concentrations and Pb biomarkers within iron-replete children that consistently differed in direction across blood and urine Matrices.

In iron-replete children, WPb was positively related to PbU, but negatively related to PbB. The relationship was particularly stable for PbU, as the 2nd through 4th WPb quantiles remained associated with higher Pb levels even after adjusting for WFe and WZn (models 2, 3 and 4). It is possible that in iron-replete children, Pb is not able to compete for binding sites and higher levels of potential Pb exposure via drinking water are excreted in urine, especially as WPb levels overall are not very high (Markowitz et al., 1990a; Ruff et al., 1996; Bannon et al., 2002; Barbosa et al., 2005). Conversely, the negative relationship between higher WPb quantiles and PbB in iron-replete children, which initially seems contradictory, might be a reflection of the efficient excretion of Pb through the urinary pathway and the subsequent comparative reduction of circulating PbB in iron-replete children with low overall Pb exposure (Chatterjee et al., 2000; WHO, 2011; Markowitz et al., 1990a). Iron deficient children, though, showed no elevation in PbU with higher WPb quantiles, suggesting a greater proportion of Pb exposure was absorbed and retained (Markowitz et al., 1990a; Bannon et al., 2002; Barbosa et al., 2005).

Source: Ravenscroft et al. (2018) Drinking water lead, iron and zinc concentrations as predictors of blood lead levels and urinary lead excretion in school children from Montevideo, Uruguay. *Chemosphere* 212: 694-704

Provide brief context - The opening sentence provides a concise overview of the impetus for the study. This is an optional transition sentence before you summarize your key findings.

Restate the original research question - This is another optional transition sentence before you summarize your key findings. While you can start your Discussion section straight with the key findings, this can often feel too abrupt. Briefly contextualizing the study and restating the research questions are both ways to ease this transition. Don't spend more than 2-3 sentences on this set-up. Here, the author also provides additional methodological details.

Answer to the research question - This should be a direct answer to the primary research question posed in the Introduction. In this paper, the research question asked, "whether household drinking water in the city of Montevideo, Uruguay, is associated with children's PbB and urine Pb (PbU) levels." It's important to use clear signals to indicate that you are summarizing the primary finding. For example, this sentence begins with, "The analysis found..." Other options include, "Our results suggest that..." or "Our findings show that..." Your level of confidence in the strength of your findings should inform your word choice.

Summary of secondary analysis - The secondary results should follow the primary results.

Interpretation of finding - This sentence provides a mechanistic explanation for the observed results. The authors provide several citations to support this mechanism, thus contextualizing their findings within existing literature.

Interpretation of finding - Same general pattern as above, but here, the authors describe a finding that "initially seems contradictory." It is important to state clearly if any given result was unexpected and provide a potential explanation.

Purpose:

The discussion section contains the interpretation of your project's results and situates the implications of your findings within the larger literature. To do this effectively, discussion sections in academic papers often use a similar structure in their first paragraph. While some writers deviate from this structure, we present the most common elements below.

The goal of the first paragraph is to remind the reader of the purpose of your study, your results, and the most important implications of your findings. If your reader has just finished reading the results section, this summary reminds them of the broader context of your work. As many people often read papers out of order, it also serves to orient the reader who may have skipped or skimmed the introduction, methods, or results. In this way, the first paragraph should communicate the most important information about your work, almost like an abstract. It also foreshadows the structure of the discussion section. This foreshadowing will take shape differently depending on how you decide to organize your findings, but it may indicate that your organization will parallel the order of your research questions, objectives, or hypotheses, as described in the Introduction. Instead, you may suggest that you will structure the section to highlight the most impactful or surprising results. However you decide to structure the section, it will help the reader understand and mentally organize your findings if you provide some information on the organization of the following text. Next, you will begin the detailed interpretation of the results, typically starting with the second paragraph.

Structure:

Provide brief context - The opening sentence of the first paragraph provides a concise overview of the impetus for the study. This is an optional transition sentence before you summarize your key findings.

Restate the original research question - This is another optional transition sentence before you summarize your key findings. While you can begin your Discussion section with the key findings, this can often feel too abrupt. Briefly contextualizing the study and restating the research questions are both ways to ease this transition. Don't spend more than 2-3 sentences on this set-up. Here, the author also provides additional methodological details.

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Summary of secondary analysis - The secondary results should follow the primary results. In this study, the authors also aimed to, "...determine the extent to which the water content of Fe or Zn contributes to the association between water and blood/urine Pb concentrations."

Interpretation of finding - This sentence provides a mechanistic explanation for the observed results. The authors provide several citations to support this mechanism, thus contextualizing their findings within existing literature.