Chapter 10

Writing Analysis and Results Sections

The analysis and results section usually follows the section on methods. In a proposal, the proposed method of analysis should be described; the anticipated results may also be discussed.

➢ Guideline 10.1 Organize the analysis and results section around the research hypotheses, purposes, or questions stated in the introduction.

This is an overarching guideline that helps your readers understand the organization of your results. Example 10.1.1 shows the three research questions posed in the introduction to a research report on economically disadvantaged preschoolers. It also shows a portion of the results. Notice how the results are organized around the three research questions.

Example 10.1.1

Research questions posed in the introduction:

Specifically, three questions guided this research: (a) Is parental involvement associated with program effectiveness in terms of students' achievement? (b) Is parental involvement associated with attendance rates? and (c) Is parental involvement associated with their children's desire to continue to take part in the program?

Portions of the results section, which illustrate the organization around the three research questions:

The first research question concerned the possible association between parental involvement and students' achievement. Table 1 shows the means and standard deviations on three achievement tests for two groups of students: students whose parents were highly involved and students whose parents were less involved. A statistically significant difference was found between....

To examine the second research question, parents' scores on the involvement scale were correlated with their children's attendance in program sessions. Specifically, the involvement scores were correlated with number of days attended. This analysis indicated that parents' involvement was significantly correlated with....

The third research question concerned the association between parental involvement and children's desire to continue to take part in the program. The analysis of the data on this question revealed....

➢ Guideline 10.2 Standard statistical procedures need only be named; it is usually not necessary to show formulas or calculations.

Likewise, it is usually unnecessary to name the particular computer program used to perform the analysis.

➢ Guideline 10.3 The scores of individual participants usually are not shown; instead, statistics based on the scores should be reported.

Suppose you had tested a random sample of 50 students in an elementary school with a standardized achievement test battery. Normally, you would *not* list the scores of individual children. Instead, you would provide summary statistics such as the mean and standard deviation. Note, however, that some instructors may require students who are writing term projects, theses, and dissertations to include participants' scores in an appendix so that the instructor can check the analysis.

➢ Guideline 10.4 Present descriptive statistics first.

For each set of continuous scores, provide information on central tendency and variability (usually means and standard deviations) before presenting correlation coefficients, if any, and the results of inferential statistical tests such as the *t* test. For example, correlation coefficients may provide direct information on a research hypothesis; even if this is the case, report measures of central tendency and variability first. These measures will show your reader what the average participant was like and how variable the group was.

For categorical (nominal) data, present frequencies and percentages before presenting the results of inferential statistical tests such as the chi square test.

Guideline 10.5 Organize large numbers of statistics ı tables, and give each table a number and descriptive tle (i.e., caption).

Tables are especially effective for helping readers compare groups. ıe table in Example 10.5.1 makes it easy to compare the ages of women ıd men.

Example 10.5.1

Table 1
Percentages of Women and Men in Various Age Groups

Age	Women (n = 830)	Men (n = 723)
18 years and under	4.8% (n = 40)	8.7% (n = 63)
19–24 years	9.9% (n = 82)	13.3% (n = 96)
25–34 years	18.2% (n = 151)	25.4% (n = 184)
35–44 years	22.8% (n = 189)	19.4% (n = 140)
45–54 years	20.0% (n = 166)	15.4% (n = 111)
55–64 years	13.7% (n = 114)	13.8% (n = 100)
65–74 years	5.3% (n = 44)	2.6% (n = 19)
75 years and over	5.3% (n = 44)	1.4% (n = 10)
Total	100.0%	100.0%

The titles of tables (also known as *captions*) should name the tatistics presented in the table and the variables that were studied. ;xample 10.5.2 shows four titles that do this.

Example 10.5.2

Table 1 *Number and Percentage of Participants by Gender and Welfare Status*

Table 2 *Means and Standard Deviations on Reading and Mathematics*

Table 3 *Intercorrelation Matrix for Voting-Behavior Variables*

Table 4 *Analysis of Variance for Mathematics Scores*

When separate tables are presented for two or more groups, the title ɔf each table should also name the group. Example 10.5.3 shows the titles ɔf tables for two different groups.

Example 10.5.3

Table 1 *Intercorrelation Matrix of Middle-Level Managers' Personality Scores*

Table 2 *Intercorrelation Matrix of Chief Executive Officers' Personality Scores*

➢ Guideline 10.6 When describing the statistics presented in a table, point out only the highlights.

Briefly describe the important points in each table you present. Because the values of the statistics are presented in a table, it is not necessary to repeat each value in your discussion of the results. This is illustrated in Example 10.6.1, which shows a statistical table, and Example 10.6.2, which shows the discussion of it. Note that in the discussion only certain specific statistics are mentioned in order to assist the reader in getting an overview of the tabled results.

Example 10.6.1

Table 1
Percentage of Substance Use in Past Month of Urban and Suburban Samples

	Drug A		Drug B		Drug C	
Grade	Urban	Suburban	Urban	Suburban	Urban	Suburban
11	33.6	23.2	13.1	14.0	5.2	4.3
12	34.2	24.1	13.9	13.8	4.7	4.8

Example 10.6.2

Table 1 shows the percentage of urban and suburban 11th and 12th graders who reported using three illicit drugs during the previous month. Overall, Drug A had the highest percentages reporting its use, with percentages for subgroups ranging from 23.2% to 34.2%. Use of Drug B was reported by much smaller percentages of students (from 13.1% to 14.0% for subgroups). Use of Drug C was reported by relatively small percentages of students, with the highest percentage being 5.2% for urban 11th graders. Consistent with the hypothesis, the most striking difference between urban and suburban students was in the reported usage of Drug A, with more than 10% more urban students than suburban students reporting its use.

➢ Guideline 10.7 Statistical figures (i.e., drawings such as bar graphs) should be professionally drawn and used sparingly in journal articles.

Figures may be used to organize and describe data. They usually take up more space, however, than would a corresponding statistical table. Because space in journals is limited, figures should be used sparingly. In term projects, theses, and dissertations, where space is not an issue, they may be used more frequently.

Because figures attract the eye better than tables, their best use is to present important data, especially striking data that might otherwise be overlooked in a table of statistical values. Example 10.7.1 shows such a figure, which illustrates a striking difference between the experimental groups and the control group on a scale from zero (no improvement) to 50 (outstanding improvement).

Like statistical tables, statistical figures should be numbered and given captions (titles) that name the variables and the statistics presented, which is done in the following example. Typically, figure numbers and titles are placed *below* the figures. For tables, they are placed *above*.

Example 10.7.1

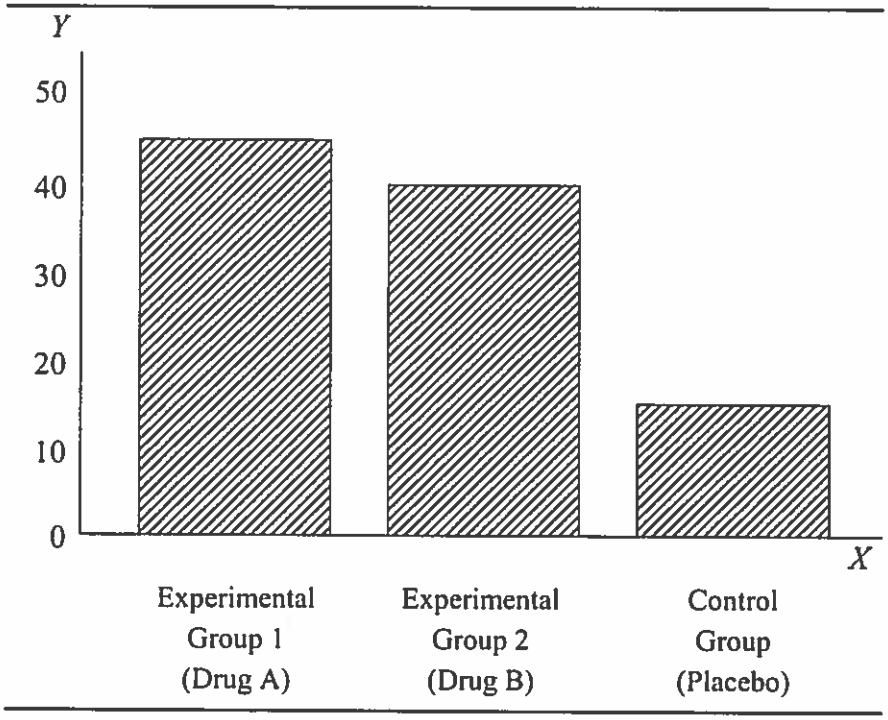

Figure 1. Mean improvement scores for three groups.

➢ Guideline 10.8 Statistical symbols should be underlined or italicized.

In Example 10.8.1, the statistical symbols (i.e., *t*, *df*, and *p*) are italicized. Without italics, "p" is just the letter "p." With italics, "*p*" stands for "probability." If you do not have the ability to italicize, underline the symbols; typesetters recognize underlining as a direction to italicize.

Example 10.8.1

The mean of the experimental group was significantly higher than the mean of the control group ($t = 2.310$, $df = 10$, $p < .05$, two tailed).

➢ Guideline 10.9 Use the proper case for each statistical symbol.

As statistical symbols, upper- and lowercase letters often stand for entirely different statistics. For example, a lowercase "*f*" stands for "frequency," while an uppercase "*F*" is an inferential statistic used in significance testing. Also, a lowercase "*t*" is the symbol for a statistic frequently used to test the difference between two means, while an uppercase "*T*" is a special type of standardized test score.

For some statistics, the upper- and lowercases stand for the same statistic but communicate important information about sampling, in which the lowercase indicates that the value is an estimate based on a sample while the uppercase indicates that the value is based on a population. For instance, researchers use "*m*" to stand for an estimated mean (an average) based on a sample but use "*M*" to stand for the mean when it is based on the population. The same is true for the symbols for the standard deviation ("*s*" and "*S*") and for number of cases ("*n*" for the number in a sample and "*N*" for the number in a population).[1]

➢ Guideline 10.10 Spell out numbers that are less than ten. Spell out numbers that start sentences.

The main exceptions to this guideline are when referring to elements in a numbered list such as "Chapter 1" and "Chapter 2" and when presenting precise numerical results (e.g., "The median equals 8").

[1] Symbols used for the mean and standard deviation may vary among researchers. Because statistics textbooks often use X-bar (an X with a bar over it) as the symbol for the mean, a small percentage of researchers use it instead of *m* or *M* in their research reports. In addition, some researchers prefer to use *sd* and *SD* instead of *s* or *S* as the symbol for the standard deviation.

➢ Guideline 10.11 Qualitative results should be organized and the organization made clear to the reader.

In qualitative studies, statistics are usually not reported. Instead, researchers report on major trends and themes that emerged from subjective and objective analyses of data such as transcribed interviews. The presentation of such results should be organized; consider using subheadings to guide the reader through the results. This is illustrated in Example 10.11.1, which is the first paragraph in the results section of a report on a qualitative study. Note that it provides readers with a description of the organization of the results. The remaining portion of the results (not shown in the example) is divided into three parts with subheadings suggested in the example (e.g., Educational Aspirations of Parents and Youth).

Example 10.11.1

Key findings of the current study are divided into three sections. The first section addresses parents' educational and occupational aspirations, as well as those of their youth. The second section discusses parental knowledge of youth aspirations. The final section delineates the barriers to attainment of aspirations from parent and youth perspectives, and their input on what resources they needed to attain their aspirations.[2]

See Chapter 13 for additional guidelines on reporting the results of qualitative research.

Exercise for Chapter 10

PART A

1. An "overarching guideline" for the organization of the analysis and results section is to organize them around what?

2. Is it usually necessary to show formulas and calculations in the analysis and results section of a research report?

[2] Behnke, Piercy, & Diversi (2004, pp. 21–22).

Chapter 11

Writing Discussion Sections

This chapter presents guidelines for writing the last section of a research report in a journal article or the last chapter of a thesis or dissertation, which typically begins with one of various headings such as *Summary and Discussion*, *Discussion and Conclusions*, *Conclusions and Implications*, or simply the term *Discussion*.

➢ Guideline 11.1 Consider starting the discussion with a summary.

Authors of long research reports, theses, and dissertations often begin their discussion section with a summary of the highlights of the material that preceded it. For short reports, a summary is usually not necessary.

➢ Guideline 11.2 Early in the discussion section, refer to the research hypotheses, purposes, or questions stated in the introduction.

Briefly restate the hypotheses, purposes, or questions and indicate whether the data support the hypotheses, whether the research purposes were achieved, or what answers were obtained for the research questions. Of course, you did this in the results section also—probably in some detail with a number of statistics. In the discussion, do not repeat all the details. Instead, reiterate only the highlights.

Following this guideline helps to refocus readers' attention on the fundamental purposes of the research report and sets the stage for other aspects of the discussion.

➢ Guideline 11.3 Point out whether results of the current study are consistent with the results and theories described in the introduction.

Because the review of the literature near the beginning of a research report helps set the stage for the current study, it is important to discuss at the end how the current findings relate to those reported earlier in the literature review as well as how they relate to theories described in the introduction. This is illustrated in Example 11.3.1 in which the researchers note that their results are inconsistent with those of an earlier study, which they described in the introduction to their research report. In contrast, they note that their results are consistent with a theory (i.e., they say that their results provide some support for the theory). The theory was first discussed in the introduction to the research report.

Example 11.3.1

Our findings indicate that the image of God as being present, accepting, and offering challenge to one's growth in life is associated with greater incidence of both religious practices and religiously motivated volitional behaviors. These data, thus, appear to provide preliminary evidence that, contrary to the findings of Lee and Early (2000), God-image and religious behavior are not independent of each other when....

These data appear to provide some support for the assertions of attachment theorists, that subjects' perceptions of God as a "stronger, wise, other" who is lovingly present would be associated with greater attachment to God via religious behavior. In particular....[1]

In the introduction to their research report, the authors of Example 11.3.2 discuss the fact that most of the previous research on gender differences in perceived attractiveness and body weight involved girls and women, especially female undergraduates and adolescents. They point out, however, that there is some "indirect" evidence that overweight women are less likely to be satisfied with their weight than overweight men. The example is drawn from the discussion section of their research report in which they used adults aged 20 to 29 as participants. As you can see, the researchers have come full circle by reviewing in their discussion section an important issue raised in their introduction.

[1] Buchko & Witzig (2003, p. 1146).

Example 11.3.2

A significant proportion of normal-weight men felt they were underweight, and an even larger percentage of overweight men thought they were normal weight. The opposite emerged for women: A large number of normal-weight women felt they were overweight. These findings support those from research with adolescents and university students, suggesting that weight misperceptions evident in early through late adolescence are also found in adults.[2]

➢ Guideline 11.4 Consider interpreting the results and offering explanations for them in the discussion section.

Following this guideline helps readers understand the results and put them in context. Since interpretations and explanations go beyond the data actually collected, researchers should be careful not to imply that they are data-based explanations; rather, they are possible explanations that are consistent with the data. The authors of Example 11.4.1 offer an explanation of their findings.

Example 11.4.1

It is interesting to speculate on possible reasons why the fear levels expressed by the 10-year-old children were so much greater than those expressed by the 8-year-old children in this study. One possibility is that the younger children did not have the conceptual background to fully understand the presentation made in the experimental setting. Specifically, they might have....

It is especially desirable to offer possible explanations for unexpected findings. In Example 11.4.2, the researchers were surprised to find that residential instability did not predict behavior problems in a sample of children age six and older.

Example 11.4.2

To our surprise, residential instability did not predict behavior problems and, in fact, children who had moved more often in the past year were less likely to have either internalizing or externalizing behavior problems.... Although not a definitive finding, a possible explanation is that some children may habituate to residential instability and be less affected by moving to a shelter than children who have experienced greater housing stability prior to becoming homeless.[3]

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[2] McCreary & Sadava (2001, p. 113).
[3] Buckner, Bassuk, Weinreb, & Brooks (1999, p. 253).

➢ Guideline 11.5 Mention important strengths and limitations in the discussion.

Strengths and limitations of the research methodology are sometimes first mentioned in the introduction or the section on methods. Because strengths and limitations can affect the interpretations of data described in the discussion section, it is usually appropriate to mention the most important ones in the discussion. The authors of Example 11.5.1 point out some strengths of their study. By pointing out that a study is especially strong methodologically, researchers encourage their readers to give more credence to their study, which is especially important if there are conflicting conclusions reached in weaker studies.

Example 11.5.1

The current study has several strengths. It collected information on IPV [intimate partner violence] from both partners, which enhances the probability of identification of spousal violence.... [In addition,] interviews with Hispanics were conducted in English or Spanish, which allows for inclusion of bilingual and monolingual respondents. [Third,] the longitudinal design allows for the assessment of incidence and recurrence of violence.[4]

Example 11.5.2 shows a statement regarding the limitations of a study. A frank discussion of limitations helps warn readers to be cautious in drawing conclusions from a study.

Example 11.5.2

Some limitations of the present research design...should be addressed. The samples were only Japanese university students, so the validity of the findings in different cultural settings is unknown. The present findings were based on university students' responses, not those of practicing managers and employees. In addition, students reported what they imagined they would do, not what they would actually do.[5]

Students who are writing theses and dissertations should provide detailed descriptions of the limitations of their research. Such statements will help to reassure their committee members that the students are knowledgeable of important methodological issues in their research. Students who are writing research reports as term projects should determine how detailed their professors want their discussions to be.

[4] Cactano, Ramisetty-Mikler, & McGrath (2004, p. 75).
[5] Matsui, Kakuyama, & Tsuzuki (2003, p. 1139).

➢ Guideline 11.6 It is usually inappropriate to introduce new data or new references in the discussion section.

The discussion section of a research report should be used to summarize and interpret what was presented earlier. The introduction of new data or references distracts from this purpose.

➢ Guideline 11.7 When possible, state specific implications in the discussion section.

The implications of a study are usually cast in the form of actions that individuals or organizations should take based on the results of the study. In Example 11.7.1, the researchers state an implication for burn teams that treat individuals with burn injuries.

Example 11.7.1

Our findings further suggest that psychological complaints are more prevalent than physical ones after burn injuries. This highlights the importance of burn teams attending to the needs of the "whole patient" rather than simply to physical domains. With the passage of time, important concerns such as unhappiness with appearance, posttraumatic stress, sleep problems, and sexual dysfunction may be increasingly salient but underaddressed patient concerns.[6]

After presenting data indicating that family factors are important in retaining soldiers as well as in supervisors' ratings of the soldiers, the authors of Example 11.7.2 (which is from the discussion section of their report) suggest a practical implication for the military. Note that they did not study their suggestion for giving soldiers adjusted schedules so that they could take care of family matters. Instead, the researchers are suggesting that this is a logical implication of their results.

Example 11.7.2

For example, leaders might allow a soldier time off for a child's dental appointment, while a post commander might designate Thursday afternoon after 1500 hours as a commander's time for family support. In addition, giving most soldiers time during normal working hours to handle family business [and] making work schedules as predictable as possible...are useful ways to improve

[6] Williams, Doctor, Patterson, & Gibran (2003, p. 193).

> the quality of military family life.... Morale can be improved by ensuring that soldiers are aware that leaders really do care about family concerns....[7]

If you have conducted a pilot study, you probably should hedge in your statement of implications by beginning the statement with a caution such as the one shown in Example 11.7.3.

Example 11.7.3

If the results obtained in this pilot study are confirmed in more definitive studies, the following implications should be considered by....

In a proposal, you should discuss the possible implications of the study. Sometimes this is done in the introduction, and sometimes it is done in the discussion section of a proposal. Example 11.7.4 shows how this might begin.

Example 11.7.4

If the research hypothesis is supported by the data collected in the proposed study, the implications will be as follows....

➢ Guideline 11.8 Be specific when making recommendations for future research.

It is uninformative to end a research report with a vague statement such as "Further research is needed." Instead, researchers should point out what specific directions this research might take in order to advance knowledge of a topic. Examples 11.8.1 and 11.8.2 illustrate the degree of specificity often found in research reports published in journal articles.

Example 11.8.1

Future research on tutorials such as the one used in the present study is needed to investigate several factors, including the following: (a) Which components of the tutorial contribute to its effectiveness? (b) What roles do social features of the tutorials play in children's progress? For example, does language that suggests a warm and caring tutor disposition tend to positively affect children's development more than on-task, take-charge directive language? and (c) Does tutor experience play a role? For example, do children tutored by tutors who continue from year to year tend to do better than others?[8]

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[7] Schumm, Bell, & Resnick (2001, p. 163).
[8] Fitzgerald (2001, p. 45).

Example 11.8.2

Further research should be directed at replication of the present study using a larger sample of Chinese adolescents in order to explore and understand their development more thoroughly. Moreover, a comparison of Chinese family environment and adolescent coping style with those of Western cultures would be useful in delineating universal as well as culture-specific components.

In addition, research should focus on examining various family-adolescent relationships when adolescents are in stressful circumstances....[9]

If you are writing a thesis or dissertation, you might be expected to ɟiscuss your suggestions for future research in more detail than shown in Ǝxamples 11.8.1 and 11.8.2.

Exercise for Chapter 11

PART A

1. According to this chapter, should discussion sections always begin with a summary? Explain.

2. Should writers refer to the literature cited at the beginning of their reports in their discussion sections? Why? Why not?

3. Is it acceptable for researchers to offer explanations for their results that go beyond the data actually analyzed?

4. Is it usually appropriate to introduce new references in the discussion section of a research report?

5. Is it appropriate for researchers to describe possible implications of their results, *or* should they just restrict themselves to an objective discussion of the actual data?

6. According to this chapter, is it appropriate to end a research report with only this sentence: "Further research is needed."? Explain.

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mid, Yue, & Leung (2003, p. 127).