

Student Guide to Writing and Data Analysis in Psychology

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Example Indicates that an example of this part appears in this section.

How to Use the Student Guide for Writing a Research Report in Psychology

Throughout the guide you will come across several different notations and sections that help to keep things organized. They include:

Features

Ψ APA Manual:

- This designates where information on a particular section can be found in the APA Manual.

Example→

- This designates short examples of a particular concept.

Using Word→

- This designates areas where directions for performing functions in Word are given.

General Information

- This section gives background information for entire sections.
- Often this section also gives the overall **Purpose:** (i.e. what the goal of a section is).

Specific Information/Sections

- This section divides larger sections into smaller, more manageable parts.
- Within each smaller section, specific information is given for that part only.

Nuts & Bolts

- This section provides information on the formatting and style of the particular section.

Detailed Examples

- Wherever possible, an example is provided in order to give you a visual representation of the principles from that section. Some examples contain notations (superscript numbers at the ends of sentences) that help explain the concept that is used in that sentence.

Using the Examples

- All sections should be double-spaced, examples are single-spaced to conserve space.
- Superscripts shown are used for illustrative purposes only, and are not part of APA style.
- Be sure to avoid unintentionally plagiarizing from examples.

Checklist

- This is intended to provide you with a quick and easy reference that you can refer to once you have a draft of your paper. It will help guarantee that your paper is ready for submission.

Title Page

General Information

- Appears on page 1

Ψ APA Manual: Page 10, 296, and 306 (example) of the APA Manual

Example→ the first page of this guide shows an APA style title page

Specific Information/Sections

1. Page Header

Ψ APA Manual: Page 288

- Appears at the top right of every page (except those with figures)

- Page Header is the first 2-3 words of the title, with the page number 5 spaces to the right

Example→ Student Guide 1

Using Word→ Click View → Headers and Footer, then type in information, hit the # button to insert the page number

2. Running Head

- Appears next on the page (if going top to bottom), and is justified to the left

- The words Running head appear, followed by a colon, than key terms from the title in CAPS (no more than 50 characters)

Example→ Running head: STUDENT GUIDE FOR WRITING

3. Title

- The title summarizes the main idea of your paper in 10-12 words (maximum)

- A good recipe to work with when reporting the results of an experiment is

Example→ (Dependent Variable) as a Function of (Independent Variable)

Example→ The Effects of (Independent Variable) on (Dependent Variable).

Example→ The Role of Arousal on the Interpersonal Attraction Between Strangers

- If you are using non-human populations, it's a good idea to mention it (animals, aliens etc.)

- Should be centered on the page, capitalize the first letter of important words only

- Double space with title followed by authors name, and institution each on own centered line

Example→ *please refer to the first page of this guide

Checklist

Title Page appears on page 1 of the paper

Page Header

Appears in the top right corner of every page

Comprised of the first 2-3 words of the title

Right justified with the page number 5 spaces to the right

Running head

Aligned on the left hand side of the page

After Running head:, key words from the title appear in ALL CAPS (50 characters max)

Title

Summarizes the main idea of your paper in 10-12 words max

For an experimental study, it mentions the general relationship between the IV and DV

Abstract

General Information

Ψ APA Manual: Page 12

- Provides a succinct summary of your entire paper
- Think of the abstract as the movie capsule to your cinematic masterpiece...based on the information provided in the abstract, people will learn about your paper and decide whether to read it
- It should give all key elements of the study. Based on the abstract alone, the reader should be able to get the gist of the study.
- Where possible avoid the need to reference other authors.
- Try to include as many key words or key terms as possible, it will help future researchers locate and make use of your work.
- Generally the abstract is the last thing you write, because it takes pieces from each of the other sections

Specific Information/Sections

Ψ APA Manual: Page 14

- What is being studied? What is the problem? (topic, hypotheses)
- Who was in the study? (participant information)
- How was it studied? What methodology was used? (methods)
- What did you find? What was/was not significant? (results)
- What does it mean? (discussion)

Nuts and Bolts

- Appears on page 2 of the paper
- The word Abstract should be centered as the top of the page
- Begin typing the body of the abstract on the very next double-spaced line
- This is a single paragraph in one block (no indentations), double-spaced
- The text should be a brief (100-120 words) comprehensive summary of the study

Detailed Example

Abstract

This study examines how levels of self-expansion and inclusion of other in self within the primary romantic relationship relate to desired personality differences in an extradyadic partner. A sample of 63 (12 males, 51 females) college students in dating relationships completed surveys assessing levels of self-expansion and inclusion of other in self, and how much they desired personality differences in an extradyadic partner. Self-expansion ($r = -.26, p = .04$) and inclusion of other in the self ($r = -.27, p = .03$) were both negatively correlated with desired personality differences. The findings suggest that when individuals experience low self-expansion or inclusion of other, they will report a greater desire for extradyadic partners who are different from the current partner.

Checklist

- Abstract appears on page 2 of the paper.
- The word Abstract is centered on the top of the page, without formatting (bold, italics, etc.).
- Typing Starts on the next double spaced line (using normal paragraphs).
- First line is NOT indented.
- Avoids referencing other authors where possible.
- Includes Key Information**
 - What is being studied? What is the problem? (topic, hypotheses)
 - Who was in the study? (participant information)
 - How was it studied? What methodology was used? (methods)
 - What did you find? What was/was not significant? (results)
 - What does it mean? (discussion)
- The section is sufficiently brief (between 100-120 words).
- With this alone, any reader will have a good idea of what my paper is all about.

Introduction

General Information

Ψ **APA Manual:** Page 15

- Gives reader a general sense of your topic; general research question; (lead-in)
- Tell why you did the study and why it is important (lead-in)
- Layout previous findings that are relevant to your paper, highlight connections to your work (body)
- Specifies your research plan (connection paragraph & hypotheses)

Specific Information/Sections

- *Although the introduction does not have explicit subsections, it follows a general order that includes:*

1. Lead-In of the Topic

Purpose: broadly introduces topic so that it appeals to a wide range of readers (1-2 paragraphs)

a) Attention Grabber

- Aimed at those who may not study your topic (or have limited knowledge) (1-2 sentences)
- Engaging/urging the reader to want to continue reading
- *Techniques* → quotes, statistics, anecdotes, general statements

b) Justification

- Why is your topic important? Why should anyone care? Why does this topic warrant an entire paper/study? What are the implications?
- Define/operationalize key concepts that might be ambiguous. Tell the reader the definition you are using for a particular term (e.g. How are you defining aggression?)

c) Purpose

- It is good to end the Lead-in with some insight into what you are trying to accomplish. (e.g. What is the main goal of this paper?)
- Be specific and to the point! Mention the key topics/points.

Example → “The purpose of this paper is to ...” “This study seeks to...”

2. Body/Literature Review

Purpose: gives reader a sense of the most important research done in the past on your topic

- The literature review of relevant work emphasizes pertinent findings or theories that contributed to your interest in the problem
- Assume the reader is generally familiar with the topic. Don't provide the entire history of the topic.
- Highlight the topics/points that are most important to the present study.
- When discussing past findings, use appropriate levels of detail. It's good to indicate who the participants were if it was a unique population, indicate the study design, etc. The name of the school where the study was conducted, how much they were paid, etc. should be left out.

Writing Tips: Literature Reviews

- The ideas are always the focus of the writing, NOT the authors. Cite at the end of sentences.
- Watch word choice, things are interpreted very specifically by readers. Similarly, watch overstating findings (e.g. the finding was extremely important) or editorializing (e.g. ___ was interesting).

Writing Tips: Outlining

- Use an outline to get your ideas organized.
- Topics should proceed from general to more specific, with little repetition of topics
- For additional information, please refer to the section on “Outlining” under **Writing Resources**

Writing Tips: Summarizing Articles

- Paragraphs should be focused. It is not good to discuss several different ideas in one paragraph.
- Paragraphs should be written so that they set-up the topic in the first sentence or two, provide information/support, then relate the information to the overall paper (i.e. what are the implications of the findings?)
- Please also see the section on “Summarizing Articles” under **Writing Resources**

Writing Tips: Transitions

- Transitions help show the reader how information relates (both between & within paragraphs)
- When transitioning, avoid saying “Another study...” Every study is “another study” Instead, focus on what this other study did/found different? There might be 98% similarity between the studies but transitions should highlight difference. **What does it add?**

Example→ “A study with similar methods finds the basic effect of X, but also found Y.”

Example→ Basic transition phrases for within paragraphs include: “Similarly,...” “In contrast,...”

3. The Present Study/Connection Between Past and Present/Statement of Purpose

Note: This section is referred to by several different names.

Purpose: further emphasizes the importance of what you are doing by demonstrating how your research fits into a long line of other important/interesting work

- Should make a connection between what you think will happen (hypotheses) and what led you to make these predictions (basis for this provided by literature review)
- The connection is a short paragraph right before hypotheses explicitly linking past literature to the current research. It generally contains three main pieces of information.

a) Focus of Previous Research - summarize main points (typically the main topics in your outline)

Example→ “Past research has looked at *a, b, and c*”

b) Shortcomings of Previous Research - point out areas with less research. These should relate to the study you describe in the Method (or are proposing)

Example→ “One area that past research has failed to address is _____”

c) How Your Study Builds on Previous Research- state how your study will address these shortcomings, what led to the new ideas, and how they will be tested.

- Here you will explain why you think the hypotheses will turn out as you predicted.
- You should also provide a very brief summary of the design (variables being used/manipulated; basic design)

4. Hypotheses

Purpose: to explicitly lay out the purpose and predictions of the present study

- this is typically right at the end of the introduction section.
- make sure you have stated your hypothesis in a clear and specific manner.
- be certain that the hypotheses make clear predictions about how you think the independent and dependent variables will relate to each other
- make sure your variables are clear (i.e. what is the IV, what is the DV, any levels?)
- if you have several hypotheses (e.g. for a factorial design), you may number the hypotheses to lend additional organization

Example→ “The present study was designed to...” or “The purpose of this study was to...”

Nuts and Bolts

- Starts on page 3 (*This is true for a full report that contains an Abstract on page 2*)
- To start text on a new page, DO NOT simply hit the enter key several times. Instead use a page break.

Using Word→ Click Insert → Break→Page Break→OK

- The Introduction starts with your exact title from the title page (centered) For example:

Student Guide for Writing a Research Report in Psychology

- Start typing the Lead-In on the next double spaced line. You should **not** type ‘Introduction’

Detailed Example (NOTE: Single-spaced for example purposes only.)**Lead-In Paragraph**Accuracy of Estimation Using Internal Anchoring Heuristics¹

If you were asked to estimate the number of jellybeans in a jar, would you make a random guess or would you base your estimate on available information? Over the years, researchers have been interested in the resources people use to respond to questions when the answer is not immediately obvious². This basic concept has been outlined in the theory of anchoring and adjustment, wherein people use previous or supplied knowledge as a starting point to modify and form an estimation of the correct answer (Tversky & Kahneman, 1974)³. This topic is important because of the myriad of decisions people routinely make. Thus, it is valuable to discover whether a person's available resources produce consistently accurate estimations, or if responses may be inaccurate guesses based on impertinent information⁴. This paper seeks to advance previous work on the theory of anchoring and adjustment by replicating a previous study (Smith, 1999) to determine the consistency of the effect. More specifically, the purpose of this study is to identify the anchors people use, how anchors relate to the question asked, and the accuracy of responses generated from the anchors⁵.

¹ **Title appears at the beginning of the Introduction.**

² **Attention Grabber. Start with a general/attention grabbing sentence.**

³ **Justification (define key terms). Operationally define any key terms.**

⁴ **Justification. Justify to readers why this topic is important and why they should read this.**

⁵ **Purpose Statement. Clearly state the purpose of your paper, and list the main topics that will be discussed in the body of the Introduction.**

The Present Study/Connection Between Past & Present/Statement of Purpose*The Present Study*

There has been a significant amount of research conducted in the past that has dealt with people's use of the anchoring and adjustment heuristic. Previous research has focused on the anchors that people use, the relevance of anchors to the question asked, and the accuracy of responses generated from the anchors¹. However, research done up to this point has not thoroughly replicated past research to determine if the results are consistent². This topic will attempt to advance previous research by replicating the study done by Smith (1999). This research will focus on the estimation techniques of college-aged students and the estimates they submit when given anchors. In the present study, two levels of anchoring (high and low) will be tested in relation to the task of estimating the number of jellybeans in a jar³. It is hypothesized that the level of the anchor received by the participants will affect their estimations. Those students that receive a low anchor will produce relatively low estimates of the number of jellybeans and the students that receive a high anchor will generate relatively high estimates⁴.

¹ **Focus of Previous Research. First sentence or two briefly summarizes the focus of previous research. This should be a summary/list of your main topics and should parallel the purpose statement from the lead-in.**

² **Shortcomings of Previous Research. Point out areas that research has not looked at. This should parallel the variables your study examines.**

³ **How Your Study Builds on Previous Work. Specifically state how your study addresses the shortcomings you mentioned in the previous section (#2). (Note: Because this depicts a replication, the logic of the hypotheses is much shorter)**

⁴ **List the specific hypotheses that your study will test.**

Checklist

- Starts on Page 3 of your paper.
- Page starts with your exact title from the title page (centered)
- Typing Starts on the next double spaced line (using normal paragraphs).
- You did not type 'Introduction'
- Lead-In / Attention Grabber Paragraph(s)**
 - Starts with a very general attention grabbing statement that interests many readers.
 - Justifies why the reader should care about this topic. Why is this important?
 - Defines any relevant constructs that may be ambiguous.
 - Gives an indication of what your paper is trying to accomplish. "The purpose of this paper is to..."
- Review of the Relevant Literature Paragraph(s)**
 - Order of the articles presented has been *well thought out* and demonstrates an underlying organization. You wrote this from an outline.
 - Organization follows general theme of going from general to progressively more specific.
 - The topics covered in the articles are interrelated such that they form a cohesive story (i.e. there are not any articles that do not fit in with your topic).
 - The order and organization of your articles funnel toward (naturally lead to) your specific topic/hypotheses.
 - Each article is thoroughly described (What were the hypotheses?, How was it studied?, What did they find?)
 - Articles are summarized through paraphrasing. Studies are not quoted.
 - You have avoided using quotes (except where 100% necessary).
 - The results/conclusions from each article are interpreted within the context of your paper's organization.
 - The topic of each article is linked to the topic in the previously discussed article
 - There are transitions between paragraphs that link the last idea in the previous paragraph to the first idea in the next paragraph (i.e. explicit connection between the ideas)
 - Gives reader a sense of the most important past research done on your topic
 - The review makes it seem as though a majority of previous literature naturally points to your study/topic as the next logical step.
- Connection Between Past & Present Research / Statement of Purpose Paragraph(s)**
 - Paper has a short paragraph right before the hypotheses explicitly linking past literature to the current research
 - Emphasizes the importance of what you are doing and demonstrates how your research fits into a long line of other important/interesting work
 - Makes a connection between what you think will happen (hypotheses) and why you think it will happen (basis for this provided by review of relevant literature).
 - Uses the general idea of "One area that past research has failed to address is ___"
- Hypotheses**
 - Gives general idea of how you will attempt to solve the problem.
 - Explains why you expect results that will confirm the hypotheses.
 - Hypotheses are stated in a clear and specific manner.
 - Hypotheses make clear predictions about how you think the independent and dependent variables will be related to each other.
 - All relevant constructs are clearly defined. (i.e. what is the IV, what is the DV, any levels?)

Method

General Information

Ψ APA Manual: Page 17

Purpose: this section gives a step-by-step description of what/how you ran your study.

- In a sense, it is a recipe for anyone that is interested in replicating your study
- After reading the method the reader should have a clear sense of exactly what took place

Four Main Sections of the Method

1. Participants
2. Apparatus (or Materials)
3. Design
4. Procedure

- The order of design & procedure is largely up to the researcher (in some cases the sections are combined)

Specific Information/Sections

1. Participants

Purpose: this is a description of those people that took part in your study

Key Information

- Number of participants (people are participants/respondents, animals are subjects)
- Gender distribution (# males, # females)
- Mean and range of the age of participants ($M = \#\#\#\#$, range = 18-88)
- Generalization about group (e.g. college sophomores, married couples, preschool children etc.)
- Location (where participants are from)
- How subjects were selected (random or convenience sampling, subject pool?)
- Why they were selected (was any incentive given? Credit, money, etc.)

2. Materials (or Apparatus)

Purpose: describes what materials you used and how they functioned

Key Information

a) Describing Questionnaires

- When using questionnaires provide (where available) reliability information (alpha), convergent/discriminant validity, example items, how scored, citation
- These are typically the dependent variables. Save discussion of how independent variable was manipulated for the Design section.

b) Describing Equipment

- When using a piece of equipment (computers, software, etc.), provide the model number, company, and state abbreviation of company location
- You must give the dimensions (and perhaps other descriptive details) of any important items used in the study.
- Standard equipment (e.g. furniture, stopwatches, pencils, paper etc.) should simply be mentioned—there is not typically a need to go into great detail

c) General Issues

- Be sure **not** to discuss procedures here, that is you should only describe the purpose of the apparatus and avoid talking about how it was used and/or administered
- A general guideline that is helpful is that sentences using action verbs are typically more appropriate for the procedure section

3. Design

Purpose: describe the variables/conditions that are included in the study; this section is especially important for experimental designs, but for some designs (i.e. surveys) this section is not necessary

Key Information

a) Variables

- What are your key variables of interest?
- Distinguish independent/dependent variables, including any levels in each IV
- Describe any variables that were controlled, very briefly describe why it was necessary
 - Operationalize any variable that needs to be explained/specified

b) Conditions

- What groups were there? Describe each in detail, be sure to note what is being controlled.
- Is there a specific control group? Placebo group?

c) Assignment to Group

- Describe how the subjects were assigned to groups, was it random or did certain people have to go into certain groups?

d) Experimental Design

- Discuss the experimental design you have chosen to use.
- Is it within-subjects or between subjects?
- Is it two-group, single-n, factorial, mixed?

4. Procedure

Purpose: describes how the study was carried out, what steps were taken etc.

Key Information

a) Setting

- Where did this take place?

b) Step-by-Step

- Summarize each step in the execution of the study (from sign-up to debriefing)
- Indicate what a typical test, trial, or session involved
- Describe any phases in the study and quote any instructions given to participants
- When referring to groups, use descriptive labels; avoid saying Group 1 or “the experimental group”, instead be more descriptive “the therapy group...”
- Do not refer to yourself, instead say “the experimenter” and “the participant”

Nuts and Bolts

- You shouldn't start a new page for this section
- The word **Method** should be centered at the start of the section
- Continue typing on the very next double-spaced line (i.e., there should be no extra blank lines)
- Be sure that this section sounds professional, assume you are writing for submission to a journal.
- The title of the Apparatus section can be Materials depending on what is more appropriate to your design (if you are using questionnaires/survey items, Materials is more appropriate)
- Subsections use second level headings, as a result they do not require a new page and are italicized/aligned left—you can check with the APA Manual for more elaborate organization/level schemes and their appropriate formatting
- Avoid unnecessary details like the data were displayed on the computer screen, recorded on the data sheet(s), participants used pens (unless of course the details are relevant to the problem being examined)

Detailed Example (NOTE: Single-spaced for example purposes only.)

Method

Participants

The participants in this study included # males and # females¹ college students from a medium sized private university in the Northeast². The participants ranged in age from # to #, with a mean age of ##.##³. A majority of the participants were Caucasian (#%), followed by Asian-American (#%), Latin-American (#%), African-American (#%), and Other (#%)⁴. #% of the participants were freshman, #% of the participants were sophomores, #% of the participants were juniors, and #% of the participants were seniors. Participants were recruited using a convenience sample from the undergraduate subject pool⁵. Each participant received credit for participation in this experiment⁶.

¹ # signs are used for this project until you get actual data (later in Project 4). When describing the sample, give exact numbers of participants, split by gender.

² Provide general idea of where the participants came from.

³ Provide both mean and range (instead of SD) of ages.

⁴ Give percentages to describe ethnicity & year in school.

⁵ Describe how the sample was obtained.

⁶ Describe how the sample was compensated.

Materials

Materials used for this experiment included a 16 ounce glass jar containing 120 multi-colored jellybeans, an estimation measure, and a demographic sheet¹.

*Global self-esteem*². This measure involves participants assessing the degree to which they feel either positively or negatively toward themselves (Rosenberg, 1965)³. The scale consists of questions like, “on the whole, I am satisfied with myself,” “at times I think I am no good at all,” and “I feel I do not have much to be proud of.”⁴ Participants are asked to “describe your response to each of the following statements” using a 4-point scale (1 = strongly disagree; 4 = strongly agree).⁵ This measure has been widely used and a reported alpha of .85. In the present study alpha was .87.⁶

*Estimation measure*⁷. The estimation questions, designed for the purpose of the present study, asked the participant “Are there more or less than (250, 50) jellybeans in the jar?” and then asked “How many jellybeans do you think are in the jar?” Responses for both items were given in an open-ended format. The first question served to manipulate the independent variable, while the second question was used to measure the dependent variable.

*Demographics*⁸. The demographic sheet asked the participants to give their age, gender, ethnic background, and year in college.

¹ General list of materials that need no further description.

² Sub-heading used to provide name of measure.

³ General description of measure, with appropriate citation.

⁴ Quote are given of a few sample items (pick the ones that best represent the scale).

⁵ Describe how participants responded (include directions and scale information)

⁶ Provide reliability information from original source, and the reliability obtained in your study.

⁷ Non-standardized measures are described using very similar information. Provide as much as possible.

⁸ Items in a demographic questionnaire are fairly standard (age, gender, ethnicity, year in school) and can be listed. However, provide information for any non-standard items.

Design

This experiment used a simple two-group experiment with a between-subjects design¹. The independent variable was the anchor given (250 or 50)² and the dependent variable was the estimation of the number of jellybeans in the jar by the participant³. The participants were placed into conditions using random assignment⁴.

1 General type of design.

2 Describe independent variable and the levels. If you have scenarios or special instructions for the levels of your independent variable, they would be provided here.

3 Describe dependent variable.

4 Describe how participants were assigned to condition.

Procedure

Participants signed up in advance for a time slot of ten minutes using the web-based participant pool¹. Participants were given an informed consent form upon arrival and asked to read along while the experimenter read the form aloud. Once informed consent was obtained the participants were given the questionnaire². The questionnaire contained four demographic questions and the estimation measure³. The participants were then given the following instructions⁴:

The purpose of this study is to measure estimation skills among college students. First, answer the demographic questions on this sheet. Your task will then be to look at this jar of jellybeans and estimate whether there are more or less jellybeans than the number on your sheet. Also, you will be asked to make an actual estimate of how many jellybeans you think are in the jar.

Once the participant had completed the questionnaire they were debriefed and asked to insure the confidentiality of the experiment by not explaining the details of the experiment to their classmates⁵.

1 Describe how participants signed up.

2 Provide general description of informed consent (assume the reader is generally familiar with this).

3 Describe the experience of a typical participant. Not your experience as the experimenter.

4 Provide exact wording of your instructions.

5 Provide general description of debriefing (you can assume the reader is generally familiar with this).

Checklist

- New page is not started for this section.
- The word Method is centered at the start of the section and is double-spaced with everything else.
- Typing Starts on the next double spaced line (using normal paragraphs).
- Section is organized into the following sections: Participants, Apparatus (or Materials), Design, Procedure)
- Each subsection does not require a new page and are italicized and aligned left.
- Have avoided unnecessary details throughout that are not directly relevant to the problem being examined.
- Participants**
 - Gives number of participants (and referred to as participants, not subjects)
 - Gives gender distribution (# males, # females).
 - Gives average and range of participant's age.
 - Gives generalization about the whole group (e.g. college sophomores, married couples, preschool children etc.)
 - Gives where participants are from.
 - Gives the method with which subjects were selected (random or convenience sampling)
 - Gives information regarding incentive for participation.
- Materials (Apparatus)**
 - All measures are listed.
 - For each measure you have provided any available info on the following: reliability information (alpha), convergent/discriminant validity, example items, how scored, relevant citation.
 - Description provided for each piece of equipment (computers, software, etc used (provide the model number, company, and state abbreviation of company location)
 - Dimensions (and other descriptive details) of any important items used in the study are given.
 - Procedures are not described here (i.e. how things were used or administered)
- Design**
 - Key variables of interest are described. (Distinguish IV/DV, any levels)
 - Describes variables that were controlled, and gives why this was necessary.
 - Further operationalizes variables where needed.
 - Describes the groups that comprise your design in detail, noting the control group.
 - Describes how participants were assigned to groups.
 - Describes the overall experimental design that you have used.
- Procedure**
 - Describes where the study took place.
 - Gives a step-by-step summary of the steps needed to run the study.
 - Indicates what a typical test, trial, or session involved
 - Describes any phases that the study had or any instructions that the subjects received.
 - Made use of descriptive labels when referring to groups.

Results

General Information

Ψ APA Manual: Page 20

Purpose: the purpose of this section is to report the outcomes of the statistical tests used to test hypotheses

Specific Information/Sections

- *Although the Results section does not have explicit subsections, it follows a general order that includes the following info:*

1) Descriptive Statistics

- Provides descriptive data by groups (Mean, Standard Deviation, etc.)

2) Statistical Test(s)

- How you analyzed your data (the test/procedure used, any data transformations)

3) Results

- The outcomes of the statistical tests (the actual numbers) (F , t , p , effect size, etc.)

- This part also refers to any relevant Tables/Figures that have been used to simplify the data

4) Summary

- Give a very basic statement of the results (what this indicates in terms of the hypotheses)

Writing Tips: Results

- Your primary responsibility is to have the statistics you conducted make sense to the reader
- Do not underestimate the role of good organization and a logical flow of ideas. Because you are dealing with numbers it is even MORE important here.
- Plan ahead for what statistics will be ore easily understood with a table or figure; the value of tables and figures for summarizing results is immeasurable
- For any result, give descriptive information (Mean, Standard Deviation, Percentages) before continuing to more sophisticated statistics; start simple → progressively more complex
- Avoid giving frequencies, percentages are much more informative (this is especially relevant for nominal data “56% of the sample were females” instead of “there were 34 females”)
- Reporting the exact p level for both significant and insignificant findings; whenever possible include an indication of effect size
- As you report statistical results, avoid going into detail about the implications of the tests, that it saved for the Discussion
- Avoid using prove and disprove in your writing, statistics only test and are unable to definitively prove anything. Remember the p level is the likelihood results happened by chance—it is never truly 0.
- Avoid implying causality if you did not use an experiment. Causality can only be claimed if an independent variable was manipulated by the experimenter. Otherwise, you can only demonstrate a relationship between variables (as in survey research).

Nuts and Bolts

- A new page is not needed for this section; a centered heading with the word “Results” is sufficient, continue on the next double-spaced line
- You should use subheadings in this section, especially if you are testing several hypotheses. For example in a factorial design you may have a subheading for each main effect, and a subheading for the interaction effect → organize by hypothesis or by DV.
- All statistical symbols are italicized

Detailed Examples (NOTE: Single-spaced for example purposes only.)

Results - Correlation

Results

Stress and Health Indicators (Hyp 1)

Means and standard deviations for the key variables are shown in Table 1. Correlations between stress and health indicators are shown in Table 2. As predicted stress was significantly related to days missed from work ($r = .38$), and doctor visits ($r = .63$). This indicates that those who reported more stress were also more likely to miss work and visit the doctor more frequently.

***OR, you could report the statistics this way...**

The hypothesized correlation between X and Y was significant, $r = .38, p = .03$.

Results - t-test

Results

Means and standard deviations for the two experimental conditions were: low anchor ($M = 84.96, SD = 42.82$), high anchor ($M = 111.07, SD = 42.64$). An independent samples t-test comparing the two anchors on the estimated number of jellybeans was conducted. Table 1 shows the results of that analysis. As can be seen from the table, the analysis was significant and had a moderate effect size; $t(152) = 1.59, p = .11$ (two-tailed), effect size (d) = .16. This indicates that there is a significant difference between anchors such that lower anchors produced lower estimations and high anchors elicited higher estimations. Results are also shown in Figure 1.

Results – ANOVA

Results

Means and standard deviations for the three experimental conditions on memory are shown in Table 1. A one-way analysis of variance comparing the three study techniques on test performance was conducted.

Memory

Semantic memory. For semantic memory, the results of this analysis were significant, $F(2,9) = 27.13, p = .02$, indicating a significant difference between study techniques. To determine if differences exist between sets of conditions a post-hoc (Tukey) analysis was conducted. As hypothesized, there were significant differences between the spaced practice only and the no technique conditions ($p = .02$), as well as the self-reference plus spaced practice conditions and the no technique condition ($p = .04$). Though not hypothesized, the self-reference plus spaced practice and no technique conditions were also significantly different ($p = .01$). The spaced practice only and no technique differences ($p = .33$).

Episodic memory. For episodic memory, ...

***Reporting the means without a table...**

Semantic memory. Means and standard deviations for the three experimental conditions were: spaced practice only ($M = 17.50, SD = 2.08$), self-reference plus spaced practice ($M = 23.50, SD = 1.29$), and no technique ($M = 15.50, SD = 1.29$). A one-way analysis of variance...

***Planned contrasts instead of post-hocs...**

Means and standard deviations for tests of all hypotheses are shown in Table 1.

Content Quiz

A one-way analysis of variance comparing the three study techniques on test of course content was conducted. The results of this analysis were significant, $F(2, 75) = 7.53, p = .003$, indicating a significant difference between study techniques. To determine if differences exist between sets of conditions several planned contrasts were conducted. As hypothesized, there were significant differences between the spaced practice only and the no technique conditions ($p = .04$), such that those with spaced practice performed better on the content test. The contrast of the spaced plus self-reference condition and the control condition ($p = .56$), and the spaced practice condition and the spaced plus self-reference condition were not significant ($p = .33$).

Results – Factorial (2-way) ANOVA

Results

Means and standard deviations for the four combinations (self/high, self/low, shallow/high, shallow/low) of the independent variables are shown in Table 1. A two-way factorial analysis of variance was computed with the level of encoding (self or shallow) and the level of time pressure (high or low) as the independent variables and number of words recalled as the dependent variable. The results for the two main effects were: level of encoding $F(1, 27) = 6.10, p = .02$, the effect size = .15 and the level of time pressure $F(1, 27) = 10.21, p = .004$, the effect size = .22. As hypothesized, those who encoded using the self recalled more words than those using shallow encoding. Also as hypothesized, those with low time pressure recalled more words than those with high time pressure. The results show there that the interaction between the independent variables was not significant $F(1, 27) = 0.09, p = .77$, the effect size = .002. Contrary to the hypothesis, the results were inconclusive for an interaction between encoding and time pressure.

Checklist

- A new page was not started for this section.
- The word Results is centered at the start of the section and is double-spaced with everything else.
- Typing starts on the next double spaced line (using normal paragraphs).
- Section is organized based on the hypotheses that were tested.
- For each hypothesis:**
 - Provides descriptive statistics by groups (Mean, Standard Deviation, Percentages).
 - Describes how you analyzed your data (what test/procedure did you use).
 - Describes the results of the statistical tests (the actual numbers).
 - Gives a very basic statement of the results (what this indicates in terms of the hypotheses)
- Uses and refers to tables and/or figures that help make the data easier to understand.
- Avoids going into detail about the implications of the tests (this is saved for the Discussion).
- Avoids using prove and disprove terminology. (*Statistics can only test and are unable to definitively prove anything. Remember the p level is the likelihood results happened by chance—it is never truly 0.*)

Discussion

General Information

Ψ **APA Manual:** Page 26

- Information in this section is based on the data etc. reported in the results section, and attempts to tie everything together

Purpose:

- 1) Summarize your hypotheses and the major findings related to them
- 2) Describe the importance, relevance, and implications of your findings
- 3) Link your present findings to past research
- 4) Describe the strengths, limitations, and future directions of the research
- 5) Provide general concluding paragraph for entire paper

Specific Information/Sections

- *Although the Discussion section does not have explicit subsections, it follows a general order that includes the following info:*

1. Restatement of Hypotheses

- Give a brief review of what you were trying to accomplish, refer to hypotheses. Combine and summarize to avoid making it overly repetitive.
- This section includes a non-technical summary of the findings (i.e. no statistical jargon)
- When there are a lot of hypotheses it is best to summarize and simultaneously state the outcomes.

Example→ “Contrary to the hypothesis...” “As hypothesized...”

2. Implications and Interpretation of Results

To compare the present findings to previous work, you will generally:

- State how your findings compare to past research (similar/different/etc.). Be specific and provide details as needed.

Example→ “The present study suggests X. In contrast, previous research found Y (cite).”

- Speculate why this might be. Here it is best to focus on design issues, as well as theory.

To explain findings in the context of other theories, you will generally:

- Identify the specific finding you mean.
- Relate to other theories as an explanation of why this was found.

Example→ "The present study found x. This may be due to the fact that a, b, c, & d."

- In this example, the a-d part is up to the author. If the thoughts do not originate from previous research, be sure to either use hedge wording (it's possible, likely etc.) If the ideas come from other research, be sure to cite.

- When generating explanations, try to think of things you have learned in other Psychology courses. Also be sure to provide enough background so the reader can understand the theory.

For either, be sure to address the following:

- What do the results mean to your topic in general? Why are the results important?
- How did the results bear on your hypotheses? Support? If not, how does this change your thinking?
- Always use other findings to help the reader understand your results.
- When comparing your findings to others, be sure to specify the exact finding from your study that you are discussing. That is, do not write “These findings suggest...” Instead write “The significant main effect for gender suggests...”

3. Strengths / Limitations of the Study

a) Strengths

- Mention any particularly strong points of your study
- **Things to Focus On:**
 - Did you develop some interesting method that can be used in the future?
 - Did you use strong sampling procedures? Was it cross-cultural?

b) Limitations

- Mention any obvious shortcomings of your study; this does not have to be an exhaustive list, just the main things that might qualify your results
- Include why a problem matters (e.g. limits external validity) using proper terminology
- **Things to Focus On:**
 - Was your sample representative? To what extent? (e.g. college sophomores only?, convenience sample?, geographically limited?)
 - Problems with the procedures, design, or measurement? Threats to internal validity?
 - If the study was correlational, note possible third variables and directionality issues.

4. Future Directions of Research

- Future directions are those things future studies on this topic should examine, above and beyond addressing any limitations in your design; (*where the thinking should go*)

a) Things to Focus On:

- Other variables that might be of interest
- Were there missing conditions or controls that should be included
- Look at mediating and/or moderating variables
- Look at competing hypotheses and/or theories that seek to explain similar results

5. General Conclusion

- Provides a very general summary of what was accomplished by the research; what was looked at, what was found (in the context of the hypotheses), and how knowledge has been advanced
- last sentence provides a general “take home message”

Nuts and Bolts

- A new page was not needed for this section; a centered heading with the word “Discussion” is sufficient, continue on the next double-spaced line
- If the Implications and Interpretation of Results are organized topically, headings can be used by topic
- A heading should be used for the Strengths/Limitations, Future Directions, and Conclusion sections

Detailed Example (NOTE: Single-spaced for example purposes only.)

Restatement of Hypotheses

Discussion

The hypothesis of this study was that those participants who received the low anchor of 50 would generate lower estimations of the amount of jellybeans in the jar, while those students who received the high anchor of 250 would elicit higher estimations¹. As hypothesized, low anchors produced significantly lower estimations while high anchors produced significantly higher estimations². Contrary to the hypothesis, gender did not influence estimates². This study successfully replicated the research conducted by Smith (1999) and added to the body of knowledge surrounding the theory of anchoring and adjustment.

¹ Restatement of hypothesis from the Intro. (if you have several hypotheses you would summarize them)

² Non-technical summary of what was found.

Implications and Interpretation of Results

The results of this study mimicked those that were discovered in Smith's (1999) jellybean study¹. Although the hypotheses of the two studies were different, the results both showed that young adults actively use anchoring and adjustment to make estimations in certain situations. The original jellybean study focused on the use of anchoring and adjustment by both children and adults and hypothesized that children would make higher estimates when given a specific anchor (Smith, 1999). Despite the fact that the hypothesis was not supported in this study, the results are still important for the development of the anchoring and adjustment theory (Smith, 1999). The original jellybean experiment was fundamental to the anchoring and adjustment theory because it provided a study that clearly demonstrated the basic idea of anchors and the process of adjustment. The findings of both the previous experiment and the current replication showed that there is a consistency of results across populations². This stability of conclusions helps to support the anchoring and adjustment model of estimation³.

The current findings also relate to findings of other research on anchoring and adjustment⁴. A study conducted in the past explored whether people used the anchoring and adjustment heuristic when estimating their partners answers to questions (Harry, Hoch, & Ragsdale, 1986). The researcher found that many of the respondents used their own personal responses as an anchor from which to adjust their estimation of their spouses' response (Harry et al., 1986)⁵. The results of the spousal estimation study compare closely to the results found in the present experiment. The researchers in the spousal estimation study depended on the respondents' use of the anchoring and adjustment heuristic in order to support their hypotheses (Harry et al., 1986). Similarly, in the present study, it was expected that the participants would utilize the anchor in order to formulate an estimation, without the knowledge that the anchor was intended for such use⁶.

A different approach to the study of anchoring and adjustment hypothesized that clinicians and psychologists utilize the anchoring and adjustment process to assess their clients (Ellis, Robins, Schult, Ladany, & Banker, 1990). Despite the fact that the hypothesis was not supported, the results can still be connected to the findings of the present study. It is possible that because of the level of education and the profession of the participants that was studied, the participants were aware of the theory of anchoring and adjustment and consciously avoided using this kind of shortcut⁷. These population and situational differences could account for the results and would show that when one is aware of such mental processes, the shortcuts can be avoided in favor of a more accurate course of action.

¹ **Place your results in the context of previous work. Did you find the same (or different) results?**

² **Direct comparison of current with previous study.**

³ **Concluding/summary statement of what the paragraph tells the reader.**

⁴ **Transition statement into the link between the present study and another area of research.**

⁵ **Summary of previous work.**

⁶ **Direct comparison to present study.**

⁷ **If previous work doesn't agree with the present findings, you should offer potential explanations.**

Strengths and Limitations

Strengths and Limitations

As with all studies, there were limitations that weakened the study. The participants came from a convenience sample that consisted of mostly college freshman from a European background¹. The relatively small number of participants overall was another constraint. Both of these limitations limit the ability of the present study to generalize to other populations². One of the most distinguishable limitations was that there was no empty control group included³. A third group that received no anchor, but still made an estimation, could have provided the researchers with a basis for comparison of the other two levels of the independent variable⁴.

Despite the limitations of the study, there were strengths that should be noted⁵. The study was closely replicated the original design and procedure used by Smith (1999). Furthermore, the random assignment of participants to the two conditions greatly increased the validity of the experiment and eliminated the threat of selection.

¹ Note the limitation, being sure to use appropriate terminology.

² Explain why it is a limitation.

³ Be sure to note problems with the design.

⁴ Provide a possible solution to design problems.

⁵ Note any strengths of the study, focusing on the design whenever possible.

Future Directions

Future Directions

Researchers who wish to expand upon the research done in this study may choose to include an empty control group in their experiment¹. This control group would be given an identical questionnaire as the two experimental groups, yet would simply be asked to generate an estimation without an anchor present. The control group would help to determine if anchor-generated answers produce significantly different guesses than those that would be determined without an available anchor.

Future studies may also wish to determine the level at which anchors become obsolete². It would be interesting to ascertain whether the participant continues to adhere to and utilize the anchor when the number is obviously significantly larger than the number of jellybeans in the jar. Using a multi-group experiment, the researcher could include many levels of the independent variable to determine the point at which the anchor has little to no effect on the estimation.

¹ Mention that future studies should fix any problems with the present study (and how that would be done).

² Suggest entirely new areas that future research should focus on. These should be new ideas and not related to limitations in the present study.

Conclusion

Conclusion

This study set out to replicate past research and obtain consistent results that would bolster past theories on the anchoring and adjustment heuristic¹. The hypothesis that participants would base their estimates of jellybeans on the anchor they were provided was supported². By reproducing results of previous work (Smith, 1999), this study helped to advance the theory of anchoring and adjustment by substantiating the hypothesis that anchors have a significant effect on estimation³. The theory of anchoring and adjustment may be a small piece to the large puzzle of heuristics, but it is an important concept that has roots in every aspect of society. By learning more about the process of anchoring and adjustment, researchers can continue to advance knowledge and create more theories that will delve into the complex workings of human intelligence⁴.

1 Summarize purpose of the study.

2 Summarize hypotheses and whether they were supported.

3 What are the implications of the study? What do we know now, that we didn't before?

4 Provide a final summary take-home point.

Checklist

- A new page was not started for this section.
- The word Discussion is centered at the start of the section and is double-spaced with everything else.
- Typing Starts on the next double spaced line (using normal paragraphs).
- This section is organized into the following sections: Restatement of Hypotheses, Implication/ Interpretation of Results, Strengths/Limitations, Future Directions, Conclusion.
- Restatement of Hypotheses**
 - Gives a brief review of what you were trying to accomplish (i.e. what was the purpose).
 - Summarizes the hypotheses that were tested.
- Implication/Interpretation of Results**
 - Section avoids statistical jargon and explains results in plain wording.
 - Gives the major findings related to the hypotheses. Support? Fail to support?
 - Explains what these findings mean to the topic in general.
 - Connects findings with literature reviewed in the introduction.
 - Connects new areas of research (related to the findings).
 - Uses theory to help explain the present findings.
- Strengths of Study**
 - Strong points in the design (sampling, procedure, etc.) are noted using proper terminology.
- Limitations of Study**
 - You have mentioned the obvious shortcomings of your study (i.e. the main things that might qualify your results).
 - Limitations focus on the design (sampling, procedure, etc.) and use proper terminology.
- Future Directions of This Research Area**
 - Discussed things that future studies on this topic should examine, above and beyond addressing any limitations in your design. Focus on the ideas!!
- General Conclusion**
 - Provides a very general summary of what was accomplished by the research.
 - Generally addresses: what was looked at, what was found, and how knowledge has been advanced.
 - Last sentence provides a general “take home message”

References

Nuts and Bolts

Ψ **APA Manual:** Page 215; Page 314 shows an example of an entire reference list.

- Starts on a new page
- Page starts with the word References (not Works Cited) centered on the page (it is **not** in CAPS, bold, italics, underline, etc.)
- References appear in alphabetical order based on the first author's last name.
- Judicious use of references such that there are sufficient numbers, without unnecessary references.

Ψ **APA Manual:** Pages 240-281 show formatting for all types of sources.

1. General "Rules" of APA Style References

- a) Purge other styles (e.g. MLA) from your brain. APA style has a unique format.
- b) No first names. Initials only.
- c) Nothing in **Bold**, or Underlined.
- d) Always double spaced, with no extra spaces between references.
- e) Everything after first line is indented

Detailed Example

** in the example, the first reference is a chapter from a book, the second is a journal article*

References

Aron, A., & Aron, E. N. (1996). Self and self-expansion in relationships. In G. J. O. Fletcher & J. Fitness (Eds.),

Knowledge structures in close relationships: A social psychological approach (pp. 344-352). Mahwah, NJ: Erlbaum.

Ellis, M.V., Robbins, E.S., Schult, D., Ladany, N., & Banker, J. (1990). Anchoring errors in clinical judgments:

Type I error, adjustment, or mitigation? *Journal of Counseling Psychology*, 37, 343-351.

Checklist

- Starts on a new page
- Page starts with the word References centered on the page (not Works Cited)
- References is **not** in ALL CAPS, bold, italics, or underline format.
- References appear in alphabetical order based on the first author's last name.
- Everything after first line is indented for each reference.
- The entire page is double-spaced with no extra spaces between references.
- There are no first names in the citation, initials only.
- You have a sufficient number of acceptable references (i.e. scholarly journals, edited academic books, etc.)
- Number of references is appropriate (i.e. there are not extra references included to pad the list).
- Journal Articles follow this general format: Author, A., Author, B., & Author, C. (Year). Title of the article. *Name of Journal*, 99, 72-89. [if this is unclear, please check the APA Manual]
- Ψ **APA Manual:** Formatting for other types of sources appears on pages 240-281.

Footnotes

General Information

- Use footnotes to convey information that would otherwise disrupt the flow of writing in the main text

Detailed Example

Footnotes

1. There were a total of 84 participants with 36 males and 48 females. Nine participants were excluded because participants did not appear to take the study seriously (ex. answering pages of questions with the same number, etc.). Eight participants were excluded because of relationship status. For example, those participants that reported they were engaged, married, or dating casually were excluded. One participant was excluded for not meeting the criteria of the study (i.e. he or she was not in a relationship at all). This sorting of data left a new total of 66 participants, all of which received a high packet score and were dating their partners exclusively.

Tables

General Information

- Purpose:** used to take sentences that would ordinarily be overly dense with info easier to understand
- If the table is too short (2 or fewer columns/rows), it would be best to display that info as sentence
 - Should supplement text, not duplicate
 - Should refer to table and tell reader what to look for
 - Table should be readable without text

Nuts and Bolts

- Ψ APA Manual:** Page 147, checklist on Page 175
- Triple check your formatting with the example provided in the Manual
 - Explain all abbreviations
 - Refer to tables by their number (Table 1 shows that...)

Detailed Examples

Note: Numbers in all tables are for example purposes only and do not represent real data.

1. Descriptive Statistics

Table 1

Means and Standard Deviations for Key Variables

Variable	Mean	Standard Deviation	N
Mood	4.28	1.58	64
Relationship Satisfaction	5.67	2.36	65
Commitment	5.91	.79	65
Passionate Love	3.58	.25	65

Note. Higher scores indicate a greater magnitude of each variable. All analyses are two-tailed.

2. Correlation

Table 1

Correlations Between Current Need for Self-Expansion and Other Constructs

Scale	1	2	3	4	5	6	7	8
1. Current Need for Self-Expansion	-	.33*	.36*	.23	.03	.24	.51**	.16
2. Mood		-	.16	.22	-.09	.62	.34*	-.01
3. Extraversion			-	.16	.13	.25	.56**	.36*
4. Agreeableness				-	.27	.29	.27	-.10
5. Conscientiousness					-	.02	.14	-.09
6. Neuroticism						-	.21	-.06
7. Openness							-	.25
8. Stress								-

Note. $n = 162$. Higher scores indicate a greater magnitude of each variable. All analyses are two-tailed.

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

3. Correlation and Descriptive Statistics Combined

Table 2

Descriptive Statistics and Correlations among Key Variables

	1	2	3	4	5	6
1. Growth	4.61 (1.17)					
2. Self-Expansion	-.17*	4.32 (1.09)				
3. Rediscovery of Self	.65***	-.33***	3.95 (1.73)			
4. Loss of Self	-.25**	.35***	-.18*	2.37 (1.35)		
5. Positive Emotions	.63***	-.25**	.55***	-.56***	4.23 (1.30)	
6. Negative Emotions	-.11	.14†	.01	.65***	-.46***	3.34 (1.40)

Note. $n = 155$. Higher scores indicate a greater magnitude of each variable. All analyses are two-tailed.

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

4. Two-Group/Between-Subjects (t-test)

Table 1

Gender Differences on Key Variables

Variable	Males	Females	<i>t</i>	Effect Size
Mood	4.28	2.33	4.98*	.48
Relationship Satisfaction	5.67	4.98	2.36	.31
Commitment	5.91	6.11	-1.78	.16
Passionate Love	3.58	6.25	-6.49**	.68

Note. $n = 62$. Higher scores indicate a greater magnitude of each variable. All analyses are two-tailed.

* $p < .05$. ** $p < .01$.

Alternate Example (particularly if you have fewer variables)

Table 1

Mean Number of Items Correct by Learning Technique

Group	N	Mean	SD	<i>t</i>	Effect Size
Spaced Rehearsal Only	6	16.67	2.16	-2.13*	.59
Spaced Rehearsal And Self-Reference	6	21.00	4.05		

Note. $n = 62$. Participants were scored on the number of test items they got correct. All analyses are two-tailed.

* $p < .05$.

5. Multi-Group/Between Subjects (One-way ANOVA)

Table 1

Descriptive Statistics

	Semantic Memory	Episodic Memory	<i>N</i>
Self-Reference Plus Spaced	Mean (SD)	Mean (SD)	#
Spaced Practice Only	Mean (SD)	Mean (SD)	#
No Technique	Mean (SD)	Mean (SD)	#

Note. A one-way analysis of variance comparing the three conditions on semantic memory was significant, $F(2, 9) = 27.13, p = .02$. A one-way analysis of variance comparing the three conditions on episodic was significant, $F(2, 9) = 8.52, p = .04$.

Alternate Example (ANOVA)

Table 1

Analysis of Variance for Studying Technique

Source	SS	df	MS	<i>F</i>	Effect Size
Between Groups	138.67	2	69.33	27.13**	.87
Within Groups	23.00	9	2.56		
Total	161.67				

Note. $n = 11$. Participants were scored on the number of test items they got correct.

* $p < .05$. ** $p < .01$.

Alternate Example (with Contrasts)

Table 1

Descriptive Statistics

	Spaced Practice and Self-Reference	Spaced Practice	No Technique	<i>N</i>
Math Test	5.23 (.18) _a	2.58 (.54) _{ab}	4.44 (.23) _b	30
Vocabulary Test	8.46 (1.54)	9.45 (.86) _a	4.87 (.62) _a	30
Content Quiz	3.33 (.12) _{ab}	4.44 (.22) _{bc}	5.55 (.34) _{ac}	30

Note. Means with subscripts in common are significantly different at the $p < .05$ level.

6. Factorial (Two-way ANOVA)

* Be sure to substitute information from your analysis in where needed (indicated in **BOLD** or #)

Table 1

Means and Standard Deviations for **IV1** and **IV2** on **DV**

Independent Variable 2	Independent Variable 1		Overall Mean
	Level 1	Level 2	
Level 1	Mean (SD)	5.23 (7.32)	##.##
Level 2	3.33 (1.33)	18.52 (8.21)	##.##
Overall Mean	##.##	##.##	

Note. N for each cell = ###¹. The main effect for **IV1** was significant $F(\mathbf{df}, \mathbf{df}) = \mathbf{#.#\#}, p = \mathbf{.##}$, effect size = $\mathbf{.##}$. The main effect for **IV2** and the interaction were not significant.

¹if not identical, give range

Figures

General Information

Purpose: summarizes info and increases readability

- Prefer tables for quantitative data because provide exact values, figures require estimation.
- Figures are very good at giving quick pattern of overall results (ideal for paper/poster presentations)
- Good way to display interactions

Writing Tips: Qualities of Good Figures

- Augments, instead of duplicates text
- Conveys essential facts
- Omits visually distracting detail
- Easy to read
- Easy to understand (purpose is readily apparent)
- Is consistent in style to other figures in article (lettering etc.)
- Carefully planned and organized
- Properly scaled (starts at 0 if appropriate) and is consistent with other figures

Nuts and Bolts

Ψ **APA Manual:** Page 176, checklist on Page 201

Detailed Examples

Note: Figures have been reduced in size for example purposes

1. Two-Group/Between-Subjects (t-test)

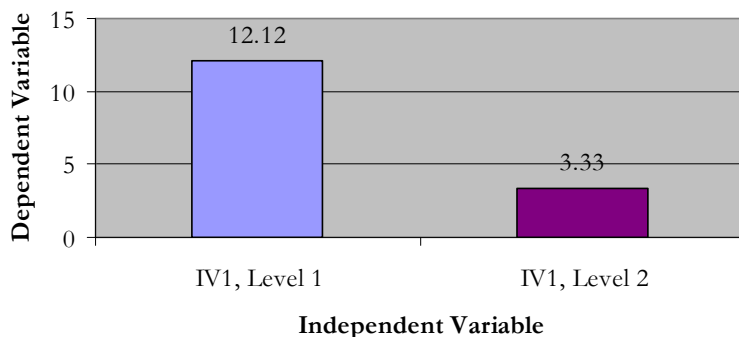


Figure 1. Mean Number of Items Correct by Learning Technique

2. Multi-Group/Between-Subjects (One-Way ANOVA)

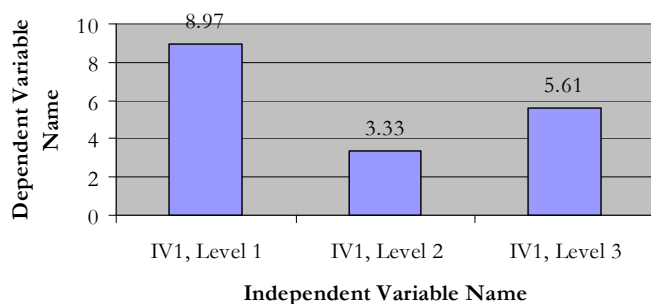


Figure 1. Mean Number of Days Sick by Exercise Technique

3. Factorial (Two-way ANOVA)

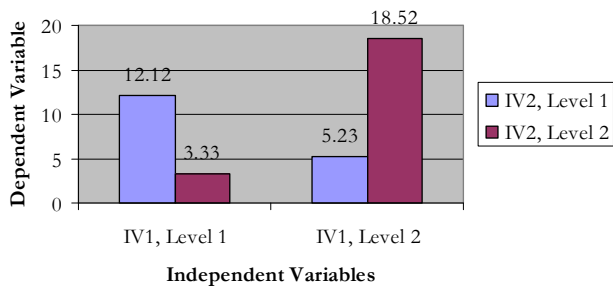


Figure 1. Means and Standard Deviations for IV1 and IV2 on DV

4. Mediation

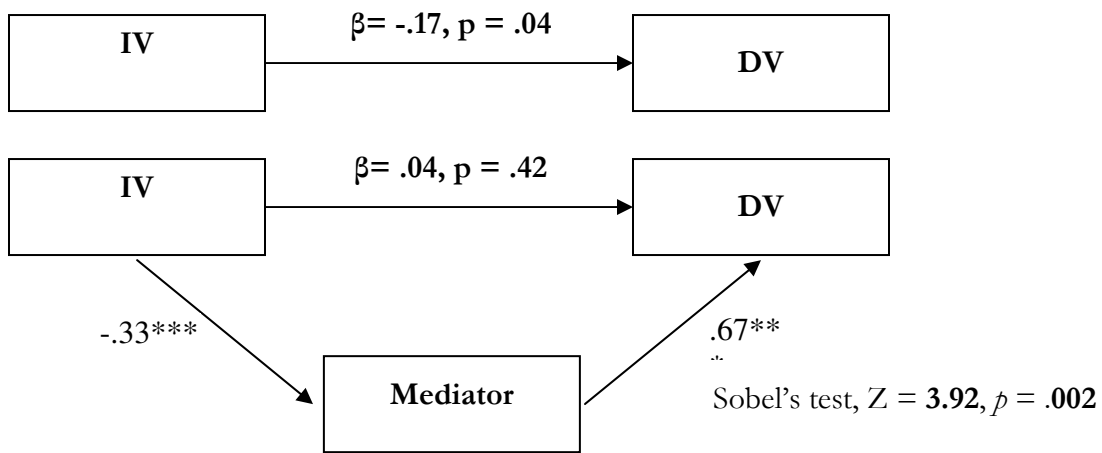


Figure 1. Mediation of the IV1 DV Relationship by Mediator

Writing Resources

APA vs MLA

	<u>APA Style</u>	<u>MLA Style</u>
Abstract?	Yes	No
Quotes?	Generally avoided. Instead it is preferable to paraphrase.	Generally okay to use.
How to Give Credit?	References	Works Cited
Reference (Book)	Lastname, Firstinitial. (Year). <i>Title of book</i> . Place of Publication: Publisher. Example → Seligman, M. E. P. (2002). <i>Authentic happiness</i> . New York, NY: Free Press.	Lastname, Firstname. <u>Title of Book</u> . Place of Publication: Publisher, Year of Publication. Example → Seligman, Martin. <u>Authentic Happiness</u> . New York: Free Press, 2002.
Reference (Journal)	Author(s). (Year). Title of article. <i>Title of Journal, Volume(Issue)</i> , pages. Example → Diener, E., & Seligman, M. E. P. (2002). Very happy people. <i>Psychological Science</i> , 13, 81-84.	Author(s). "Title of Article." <u>Title of Journal</u> Volume.Issue (Year): pages. Example → Diener, Edward and Martin Seligman "Very Happy People." <u>Psychological Science</u> 13 (2002): 81-84.
Parenthetical Citations	Author last name, comma, date of publication. (Baker, 2008)	Author last name and page number. No comma. (Baker 58)
Where to Cite	First use of information from another source. Example → Sentence 1 (CITE). Sentence 2. Sentence 3. Sentence 4. Sentence 5.	Last use of information from another source. Example → Sentence 1. Sentence 2. Sentence 3. Sentence 4. Sentence 5 (CITE).
Headers	First few words of the title and page number	Author's name and page number
Use of Author's First Name	Generally not ever used. First initials of first names appear in the References.	Used in the Works Cited.

Note. This table represents key differences between the two styles. It does not include how the styles are similar, and it not meant to be an exhaustive list.

Citations

Ψ **APA Manual:** Page 207

1. General Information

- Citations are provided for information given. (i.e. any information from a study you are paraphrasing, any portion of the paper that is not your own original thought, etc.)
- Citations are given for any information/ideas that are NOT your own.
- Be sure that any citation that appears in the text also appears in the Reference List.
- Cite at the first instance of using information from another source (end of first sentence). Do not wait until the end of the paragraph.
- Keep in mind that you must use YOUR OWN WORDS, not those borrowed from the original authors; give credit where credit is due PARAPHRASE and avoid quotes!!

2. General “Rules” of APA Style Citations

- a) Purge other styles (e.g. MLA) from your brain. APA style has a unique format.
- b) Always refer to the current APA Manual. Avoid relying on published articles, PsychInfo, etc.
- c) No first names. Initials only.
- d) Nothing in **Bold**, or Underlined.
- e) Author and Year always stay together. Don’t put the year at the end of sentence by itself.
- f) Cite each time you use information from a source.
- g) It is better (and more succinct) to cite at the end of sentences.
- h) Don’t write citations into the sentences.

Example→

Bad: In a study conducted by Klohnen and Luo (2003), it was found that those who scored high on avoidance were more attracted to fearful and dismissing partners.

Better: Those who scored high on avoidance were more attracted to fearful and dismissing partners (Klohnen & Luo, 2003).

3. Nuts & Bolts – Citations

- Citations follow the general (Author, Author, & Author, Year) format
- Following its first citation, sources with 3+ authors use the (Author et al., Year) format.
- Citations do not use page numbers, unless it is a direct quote.
- When there are multiple studies cited, they should be alphabetized by the first author’s last name
- Use (e.g. ____) when giving an example study (that is, when you are not giving an exhaustive list).

4. Detailed Example

One study has shown that the length of reference periods can effect the interpretation of emotional terms such as anger (Winkielman, Knauper, & Schwarz, 1998). Participants given a one-year reference period reported stronger feelings of anger, more serious events, and less frequent events (Winkielman et al., 1998). Misleading questions lead to inaccurate information about eyewitness events (Smith & Ellsworth, 1987). Research has shown that one way eyewitnesses are influenced by misleading questions is through experimenter knowledge (Smith & Ellsworth, 1987). A great deal of research has focused on eyewitness testimony (e.g. Porter, Spencer, & Birt, 2003; Scoboria, Kirsch, & Milling, 2002). More specifically, studies have focused on misleading questions (Loftus, 1974; Smith & Ellsworth, 1987).

5. Checklist - Citations

- Citations are provided for information given. (i.e. any information from a study you are paraphrasing, any portion of the paper that is not your own original thought, etc.)
- Citations follow the general (Author, Author, & Author, Year) format with no first names
- Citations appear at the ends of sentences (not in the actual sentence) where possible.
- Following its first citation, sources with 3+ authors use the (Author et al., Year) format.
- Citations do not use page numbers, unless it is a direct quote.
- When in doubt, the APA Manual has been consulted.

Outlining

1. General Information

- Before creating the outline, determine the topics you will cover, and a logical order for them.
- Organization should be topic based (i.e. NOT a list of articles). It is likely that one article will fit in several topics, and consequently will appear in several places in the intro
- Set your articles up in a coherent manner that will “tell a story” and set up the study you are doing
- Your intro should logically flow from one topical area to another; it should seem as though a majority of previous literature naturally points to your study/topic as the next logical step.
- There is not magic number for how many topics you should have. However, you should try to organize things so there are a few main topics with subtopics (as needed) under each.

2. Why Make an Outline?

- a) Helps to get you started without actually writing; avoids writer block
- b) Organizes ideas and helps you think out the logic behind your study.
- c) Emphasizes the need for transitions and smooth flow of ideas
- d) Points out parts of the paper that have sufficient references as well as those that need more work/literature searching/references
- e) SAVES TIME → minimizes number of drafts needed to have a good paper

Taking Notes on Articles

- Taking notes on your articles will greatly facilitate your comprehension of the material and eventual writing of your paper. Having a system for taking notes will allow you to organize information in an easily accessible fashion (something that is very useful when you have several articles that are similar). Further, taking good notes will help prevent accidental plagiarism (if you write from your notes instead of the article, its hard to use the author's words).

1. Tips for Taking Notes

- a) Plan on reading each article at least twice.
- b) As much as possible, have an idea of the topics/concepts you hope to include in your paper BEFORE taking notes. That way, you can pay extra attention to those areas as you read the article.
- c) As you read your source for the first time, highlight key information (Highlight parts of sentences instead of whole sentences or paragraphs. This will help avoid plagiarism as you write your paper).
- d) Make notes for yourself in the margins (thoughts you have, how things relate to your paper, etc.)
- e) Check the references! Highlight any key references so that you can track them down.
- f) After you have read the article, transfer your highlighting and notes into a computerized form.
- g) PARAPHRASE!! Avoid copying things word for word. This is a great time to start putting things into your own words. This way you won't have to worry as much about plagiarizing accidentally.
- h) Keep your notes short and be as succinct as possible. You want to create a resource that is easier to use than the original article. (i.e. its much easier to read 1 page of notes than 10 pages of an article)
- i) Remember, you notes are a reference for you. If there is too much to copy, (e.g. info about a scale) describe it briefly, then include a page number. Notes will be used along with the article.
- j) Be sure your notes include the following information:
 - **Citation** – APA Style (this way you can copy it into your Reference List later)
 - **General Topic** - What is the general area this source focuses on? (use key words)
 - **Sub-Topic(s)** – Any key subtopics? (be as specific as possible, use key words)
*** (Use the Topic sections to help determine where this article will fit in your outline)***
 - **Key Research from Intro:** List other research that relates to your topic. Include very brief topic and citation. *You should NOT use this information as something your article found. Rather the intro should be used as a means of finding other useful sources.*
 - **EMPIRICAL ARTICLE**
 - **Hypotheses** – What was the article testing? (use these to organize results/notes)
 - **Variable/Design Info** –IV/DVs? Hypotheses? Type of Design? Did they use any measures/manipulations/stimuli that may be relevant?
 - **Participants/Design Elements** – Who was in the study? College age? Married?
 - **Key Results** – What were their key findings? How do they relate to the hypotheses? Summarize ideas, not numbers (instead provide page numbers)
 - **REVIEW ARTICLE/CHAPTER**
 - **Key Theories and Ideas** – This should be a summary of the central ideas in the article/chapter. Typically these are supported by summaries of previous empirical articles rather than their own findings (i.e. chapter do NOT test hypotheses, but instead offer support from other studies).
 - **Thoughts/Big Picture** – What does this article add? What is special about it? Does it related to other articles you have? What articles is it similar to?
- k) Save your work electronically, and be consistent in your style & organization.
- l) Notice that you aren't really taking notes from the introduction of the article. However, you should read that section to help you understand the area better, and to help you find additional references.

This may seem like it takes a lot of time. However, taking quality notes will save you time in the long run by helping you understand your topic better, making you aware of key references, and making the writing of the paper MUCH easier!!!

2. Detailed Example – Empirical Article

Dijkstra, P., & Buunk, B. P. (1998). Jealousy as a function of rival characteristics: An evolutionary perspective. *Personality and Social Psychology Bulletin*, 24, 1158-1166.

General Topic: Jealousy; Rival Char. **Sub-Topic(s):** Characteristics of Rival (Other); Evolutionary Theory

Key Research from Intro:

- if rival better in key areas → more jealousy (DeSteno & Salovey, 1996)
- Males prefer physical features/age (Buss & Barnes, 1986; Kenrick et al., 1990)
- jealousy → rival has things valued by others (Mathes, 1991)

Variable/Design Info:

IV = 2 (high/low dominance) X 2 (high/low attractiveness) X 2 (Gender of Participant)

DV = Jealousy; Controlled for mate value (own attr to other sex); Between-Subjects Factorial Design

H1: Males be more jealous of dominance in rival

H2: Females be more jealous of physical attractiveness in rival

- how react when current (real or imagined) partner flirts with H/L dominance and H/L attractiveness rival
- each participant received one of 4 profiles/scenarios [described in article]; then asked how they would respond

Participants: 152 undergrads (77 F, 75 M); 51% involved in relationship; sample from Netherlands (not US)

Key Results:

- manips of attr & dominance were effective; high attr pictures seen as more dominant
- females report higher perceived mate value than males
- Hyp analyzed 2X2X2 ANOVA
- mate value significantly related to jealousy (low mate value → more jealous)
- Sig main effect for Phys. Attr (more attr rival → more jealous); No main effect for Dominance or Gender
- Males more jealous High Dom than Low Dom.;(main effect for Dominance)
 - (qualified by attr—more jealous of Dom, when rival low attr)
- Males had no main effect for Phys. Attr; Mate Value was related to jealousy scores
- Females more jealous High Phys Attr than Low Phys Attr; (main effect for Phys Attr)
- Females had no main effect for Dominance or Mate Value;
- report feeling significantly more jealous than several other traits [listed in article]
- a combination of several adjectives (as substitute for jealousy) yielded inconsistent results

Thoughts/Big Picture:

- use of pictures created problem of participants inferring characteristics (attr seen as assertive, confident, etc.)
- would be good to look at other traits than dominance (sense humor, kindness, intelligence, etc.)
- checked other affective responses but only jealous was influenced
- participants appeared to have no problem reporting jealousy (despite its negative connotation)
- similar to Bringle article, as well as the Buss article (all 3 of these articles would be good for a section of my paper about evolution & jealousy)

Summarizing an Article

1. General Information

a) Each paragraph is a “mini-paper”

- i. Introduction/Transition – this is a transition that links the ideas in the present paragraph to those in the previous one
- ii. Body – description of the key study details (method, hypotheses, results)
- iii. Conclusion/Implication – what does it mean? why is it important?

b) Each Paragraph Should Focus on One Idea

c) This summary style is most appropriate when describing a study that is central to your line of thinking, and/or uses a similar method.

2. Detailed Example

Past research has found that watching violent television leads to increases in aggressive behavior. It is also possible that other forms of media, such as video games, could also increase aggressive behavior¹. Twenty-eight children, ages 4-6 participated in a study in which they were randomly assigned to watch violent cartoons or play a violent video game (Silvern & Williamson, 1987)². It was hypothesized that playing the violent video games would result in more aggression³. However, the results indicated that watching cartoons and playing video games produced comparable levels of aggression⁴. This suggests that video games may have the same ability as television to promote aggression in children⁵.

¹ Introduction/Transition	⁴ Body - Hypotheses & Results
² Body - Method	⁵ Conclusion/Implication
³ Body - Hypotheses & Results	

Synthesizing Articles

1. General Information

- a) Rather than detail one study, you may generally cover several topics/findings in one paragraph.
- b) This is commonly done as a general lead-in to more specific information, or as a way to quickly catch the reader up on big areas of research that have been done previously.
- c) This is also common when you have dozens of references (i.e. every study does not warrant a full explanation of the participants, method, etc. as shown in Summarizing an Article).
- d) Transition phrases are used within the paragraph to link the general findings.

2. Detailed Example

**Note: For this example, please assume that the previous paragraph discussed TV and aggression. Now, you want to write a paragraph that generally covers findings related to violence and video games as a way to set up more specific information on this topic in subsequent paragraphs/sections. Here is one way to do that:*

Past research has found that watching violent television leads to increases in aggressive behavior. It is also possible that other forms of media, such as video games, could also increase aggressive behavior¹. In fact, a study comparing the influence of violent cartoons and violent video games found that both types of media produced similar levels of aggressive behavior (Silvern & Williamson, 1987)². Other studies have compared video games with different levels of violent content³. Two previous studies comparing the influence of playing violent versus non-violent video games found that playing violent video games resulted in more aggressive behavior (Anderson, & Dill, 2000; Bartholow & Anderson, 2002)⁴. Taken together, these results suggest that violent content, regardless of the type of media it is presented in, may be the key determinant of aggressive behavior⁵.

¹ Transition from Previous Section	⁴ Summary of Other Studies
² Summary of a Study's Finding	⁵ Conclusion/Implication
³ Transition Phrase	

General Writing Tips

1. Writing Style

a) Overall Style

Ψ **APA Manual:** Chapter 2 contains several good suggestions for writing style and grammar use.

- Good organization and logical flow of ideas are the foundation of good writing. OUTLINE!!!!
- Two short clear sentences are better than one long complicated sentence

Make sure that there are transitions between paragraphs that link the last idea in the previous paragraph to the first idea in the next paragraph

- A psychological report is a formal piece of technical writing.
 - Avoid writing how you talk with your friends in person or over email.
 - Avoid overly descriptive writing/flowery language like you might use in an English class.

Example→

- Phrases that are too informal:
- saying someone “did” something - saying a study “got” something

b) Word Choice – General

- Do not try to use big words if you are unsure of their meaning (i.e. easy on the thesaurus!)
- Avoid informal language; generally if it is not in the dictionary it ain't a word ☺

c) Word Choice – Remain Gender Neutral

- Ψ **APA Manual:** use gender neutral language, check pages 66-67; 70-71 for good suggestions

d) Word Choice – Causal vs. Correlational Language

- Don't say correlate unless you really mean correlate (i.e. non-experimental designs). Similarly, if it was an experiment, use causal language.

Example→

<u>Non-Experimental</u>	<u>Experimental</u>
<ul style="list-style-type: none"> - correlate - associate - relate - coincide 	<ul style="list-style-type: none"> - causes - predicts

** it is never appropriate to say “prove”**

e) Word Choice – Specificity of Terms

- Avoid saying a study was “interesting.” This is subjective. Interesting to you is boring to another.
- Avoid saying what a study “intended to” find. Science tests hypotheses, and remains value free.
- Studies “conclude” or “report”, things were not “found”

f) Hedge Wording

- Due to the nature of science, we are unable to state anything as a 100% definite fact. Instead, we deal with probability. Something is significant if we are at least 95% sure it is a real effect. As a result, we must avoid absolute declarations in our writing. Hedge wording helps make this clear.

Example→

- | | |
|---|---|
| <ul style="list-style-type: none"> - It seems... - It is likely... - It is possible... - It could be... | <ul style="list-style-type: none"> - This could indicate... - This suggests... - This appears to indicate... - One possibility is that... |
|---|---|

e) Say it Succinctly - Sentences

- Every sentence should have a purpose and should help support your point. Often a single word in another sentence can convey another sentence's entire point.

Example→

Bad: Those who spent more time in a hot classroom used more profanity. Participants were college students.

Better: College students who spent more time in a hot classroom used more profanity.

f) Say it Succinctly - Wordiness

- Avoid extraneous words, sentences, thoughts, etc. Aim for an economy of words by saying more with less. If the sentence can retain its meaning without those words, remove them.

Example→

- Phrases that can typically be omitted without changing the meaning of sentences:

- shown to be
- study that was done
- it was found that
- Research done in the past

g) Verb Tense – Past vs. Present

- Use past tense to describe what you did, how participants behaved, or what past studies found

Example→

- when talking about previous findings "...jealousy **was** positively correlated with..."
- when talking about present findings "...jealousy positively **correlates** with..."

h) Verb Tense – Passive Voice

- It is better to use active voice where the actor precedes the action. This way, the theory explains the outcomes vs. the outcomes are explained by the theory.

Example→

- Passive Voice: A decrease in employee sick days may be explained by a greater sense of fulfillment in their work.
- Active Voice: A greater sense of fulfillment in their work may explain a decrease in employee sick days.

2. Grammar

- The overall goal is to make the writing transparent. That is, the writing itself should be clear, concise, and organized. Avoid long, run-on sentences that contain too many clauses/ideas.
- Avoid contractions (e.g. *NOT* don't, *INSTEAD* do not)
- Do not end sentences with a preposition
- Keep verb tense consistent; avoid passive voice. Generally the Method & Results can be past tense, the Introduction & Discussion should be present.
- Spell check; do not turn things in with spelling errors → PROOFREAD!!!
- Make sure it is readable (have someone else look it over for readability) → PROOFREAD!!!
- Plan on making several revisions, it is simply impossible to get it right the first time
- When in doubt consult a book that deals with grammar (*Elements of Style* is fantastic)

3. Checklist - Writing

- Sufficient time and attention has been given to this project. It was not done “last minute.”
- Writing Style**
 - You have use YOUR OWN WORDS throughout. Even when paraphrasing in your own words you have cited the appropriate source of the ideas.
 - Sentences are succinct and to the point. They avoid extraneous words, and avoid stringing too many thoughts together with “and”, “or”, “commas”, “semicolons”, etc.
 - Extraneous words are avoided. (i.e. words that do not add to the ideas in the sentence are avoided)
 - Gender neutral wording is used (Check pages 70-71 in the APA Manual if you are unsure)
 - Informal language is avoided throughout.
 - The word prove is avoided, and is substituted with hedge wording (shows, demonstrates, illustrates, etc.)
 - Word usage is within your vocabulary (i.e. don't use the thesaurus to substitute words in that you don't understand)
 - The paper was written using notes and an outline.
 - The paper has been proofread.
 - The paper has been spell-checked.
 - The paper has been revised more than once.
- Grammar**
 - There are no contractions (don't, can't, won't, shouldn't, couldn't, etc.)
 - Sentences do not end with a preposition.
 - Verb tense is consistent.

Determining the Appropriate Statistical Analysis

Things You Need to Know

1. Scales of Measurement

- a. Is your variable categorical/nominal (i.e. distinct groups), or continuous/interval/ratio (i.e. scores on a scale)?

2. Nature of the Independent Variable

- a. How many group/levels are there?
 b. How many IVs are there (1 or more)?
 c. True vs. Quasi – for analyses we treat them the same
 d. Between-subjects or within-subjects

Summary Chart

<u>Design Elements</u>	<u>Example</u>	<u>Statistic</u>
Several items measuring the same construct	Want to see if 10 items thought to measure love, all measure the same thing.	Cronbach alpha (determines scale reliability)
2 categorical variables	Determine if number of males/females differs by year in school.	Chi-square
2 continuous variables	Determine association between intelligence and GRE scores.	Correlation (Bivariate)
3+ continuous variables (1 of which you are trying to predict that serves as the DV)	Want to determine what the best predictor is of counseling skill (college grades; emotional intelligence; hours of experience)	Regression (Linear)
<u>Two-Group/Simple Experiment:</u> 1 IV; 2 levels (Between-Subjects); 1 DV	Males vs Females on verbal ability	T-test for independent means
<u>Two-Group/Pre-Post Design:</u> 1 IV; 2 levels (Within-Subjects); 1 DV	Mood before and after an exercise program	T-test for dependent means (Paired Samples T-test)
<u>Multi-Group Design:</u> 1 IV; 3+ levels (Between-Subjects); 1 DV	Effectiveness of psychoanalysis vs. cognitive-behavioral vs. no treatment on depression	One-way Analysis of Variance (ANOVA)
<u>Multi-Group Design/Repeated Measures:</u> 1 IV; 3+ levels (Within-Subjects); 1 DV	Stress level measured each week following either a week of problem-focused coping; emotional-focused coping; or nothing.	GLM-Repeated Measures Analysis of Variance (ANOVA)
<u>Factorial Design:</u> 2+ IV; 2+ levels each (Between-Subjects); 1 DV	Want to test the effect of product advertising (magazine vs. tv) and product cost (low vs. high) on sales	GLM-Univariate (Factorial/Two-way ANOVA)
<u>Mixed Design:</u> 1 IV; 2+ levels (Between-Subjects) 1 IV; 2+ levels (Within-Subjects) 1 DV	Want to test if there is a change in willingness to help before/after a course on public service and if it varies by gender.	GLM-Repeated Measures Analysis of Variance (ANOVA)

Note. Chart uses names for statistical tests used in SPSS.

Analyzing Your Data with SPSS

Setting Up Your Data File

3. Create a Codebook for Your Data

- a) Print out a copy of your measures and give each & every individual item a SPSS variable name.
- b) Since each item gets its own name, you should have a system.
Example → item #1 of a satisfaction scale would be **satiso1**, item #2 would be **satiso2**, etc.
- c) Indicate the variable name for the scale's mean. Try to be systematic in your variable naming.
Example → **x_satis** (x_ indicates it's a mean of the satisfaction items);
pr_x_satis (pr_ indicates pretest mean) **ps_x_satis** (ps_ indicates posttest mean)
r_close07 (r_ indicates the variable has been reverse scored)
- d) Indicate how you are coding categorical variables. Place a number 1 next to Females and a number 2 next to Males so you know how the levels are coded.
- e) Also write a variable name for data entry comments at the end of your materials (e.g. **datanotes**).
 Later on, experimenter comments or things seen during data entry will be put here.

2. Renaming and Labeling Your Variables

**** = Need to Do This For Each Item/Variable**

a) Naming Variables**

1. Click on Variable View at bottom left hand corner
 In the *Name* column, click the cell in Row 1 → Enter the name from your codebook
2. Repeat as necessary for each variable.
3. Do not create variables for means etc. here. That will take place later.

b) Type**

1. What type of variable is it? Number? Letter? Etc.
2. Based on the type of information you wish to enter, choose the proper type:
 numbers=numeric (which is the default, so you do nothing); **words = string**
3. If you need to change it for a string, Click on the little gray box with 3 dots in it on the right side of the cell, once there click String and set the number of characters

c) Labeling Your Variables**

1. In the *Label* column, click the empty cell in the row for the variable you want to label
2. Type a brief description of your variable in that cell (be short but informative)

d) Renaming Values/Levels**

1. In the *Value* column, click the cell where it says None
2. Click on the little gray box with 3 dots in it on the right side of the cell
 - On the first line (Value), give the number value that appears in the data (1, 2, 3)
 - On the second line (Value Label), type the name of YOUR level.
Example → 1 = Male, 2 = Female OR 1= Fear Condition 2=Happy Condition
 (the codes are up to you and should appear in your codebook as well)
 - After each value, Click Add. Once you are done with each level Click OK.
3. Be sure to keep the difference between variable and levels straight. Gender is the variable, Female and Male are the levels (because it's a Nominal/Categorical variable). Age is a variable with no levels (because it's an Interval/Continuous variable)

e) What Order Should I Use?

- Its very likely that you will have different orders of your measures etc.

Two Ways to Handle This:

1. The best way is to create a different file for each order, then combine them afterward.
2. Alternately, you could set up the data file in one order and then carefully enter the data being sure to enter the right numbers under the right variables in the proper order.

f) Do a Test Run

1. Enter 1 or 2 data packets (perhaps from a pilot test, or from a fake set you create for this purpose) to make sure everything works and that no variables are missing.

Data Entry

1. **Keep Organized-** Be sure that you have a system for data entry. Save things in the same spot, on the same computer, etc. For longitudinal designs, make sure pre & posttest packets are stored together. Each participant's data will all go on one line in the data file.
2. **Document.** If you notice any abnormalities about the data as you enter it, and it is almost inevitable that you will, please be sure to note that in the data file in the appropriate variable (data entry comments). Examples of this would be large chunks of missing data, a person writing the same thing over and over, a person saying they are married and in another part that they are single, etc. etc.
3. **Give Yourself Credit.** When entering data please put your name in the data file for each packet of data you enter. Also, please initial the top page of every packet you enter. Also, please only start entering a packet if you know you are going to finish it. (*only necessary if more than one person is entering*)
4. **Slow & Accurate Wins The Race!** Data that is entered with errors hurts our ability to accurately test our hypotheses because it introduces "noise" or random error into the data. We all love to find significance so please enter data carefully. Please be especially careful when entering categorical variables (gender, ethnicity, etc.) so that if you enter a 3 and think that means "Junior" that the computer agrees with you (the proper category should show up in the data file). It's a good idea to check yourself every few variables to make sure you are being accurate. In light of this, please don't try to enter 100 packets all at once, or do data entry if you are tired or distracted.
5. **The Participant Wrote Something Weird.** This will definitely happen (e.g. How much do you love your partner? On a 1 – 7 scale some will write a 10). General rule of thumb is to always write whatever the participant wrote (i.e. if they wrote a 38 next to gender, you type that in). However, you should also note these things in the data entry comments variable. Also, if a participant skips something, you should skip it too (i.e. don't enter a 0 unless the participant wrote a 0). (similarly you make a note if you notice certain measures not working...lots of participants don't understand it etc.)
6. **Save, Save, Save Some More, Save It Again.** There are few things worse than lost data. Ok, maybe not that bad, but close. The main copy of the data file should always be saved on the computer's hard drive. However, every time you enter data, please save it twice. First to the computer, and then again to a memory key/flash drive. (*To be extra safe, send it to yourself on email.*)
7. **Don't Just Enter Data...** Enjoy it! Take a look at what people are writing, think about their answers and patterns in the data. What does it mean? Write down your ideas. ASK QUESTIONS! In every study there are angles we haven't thought of, variables we didn't think to measure, etc.
8. **Data Is Confidential.** Keep in mind that all data is confidential and can not be linked to participants in any way. Things you see in the data can not under any circumstance be shared outside of the research setting. We are ethically obligated to respect and maintain participant's privacy.

Cleaning Your Data

1. **Order Your Materials by Participant Number**
2. **Run Descriptives**
 - a) Analyze → Descriptive Statistics → Descriptives → Put ALL Variables to Box on the Right → Click **OK**
 - b) Examine Minimum/Maximum Portion of the Output for “impossible numbers” (i.e. if the maximum value for a variable is 78, but the scale only goes from 1-7...you have a typo)
 - c) Consult original data and fix error
3. **Random Check**
 - a) Randomly select 10-20 data packets (depending on size of data set)
 - if multiple people entered your data be sure to check at least 2 from each person
 - b) Double check the accuracy of the data entry
 - c) Assess the quantity and severity of the mistakes.
 - Were there a lot? If so, you should re-enter ALL data
 - Was something consistently entered wrong (i.e. males were a two sometimes, but a 1 other times)? If so, you **MUST** check all data packets on that variable.

Using Your Syntax File

1. Once you have set up the data transformation, statistic etc. properly, and selected all of the desired options, click **PASTE** (not OK). This will add this statistic to your existing Syntax file (if you have several open, it will be added to the one opened most recently).
2. Save this file as you would any other (be sure it ends in .sps)
3. Before each set of syntax, add a comment that describes what the syntax is for (be sure there is a blank line before and after the comment)

Example → COMMENT this tests the influence of gender on disclosure Hyp 1
4. To run the syntax (your data file must have numbers in it, as well as the variable names the syntax file is looking for), select **RUN** from the drop down menu, then click on **ALL**.

Recode Any Reverse Scored Items

1. **Consult Original Article**
 - a) Look back at your article for which items in the scale should be reverse-scored.
 - b) If that is not available use your own judgment (in consultation with your research advisor)
2. **Recode in SPSS**
 - a) Determine the variables you need to reverse, as well as the scale they are based upon (i.e. is it a 1-7 scale, or a 1-10, etc.); Note these items in your codebook with an “**R**”
 - b) **In the Data File...Transform → Compute → Find Variable in List**
 - Click **Arrow** to put Variable under Numeric Expression
 - Type Variable Name in Target Variable with **r_** before it → Click **Type and Label**
 - Type “Reversed” and then the variable name → **Continue**
 - c) In the Numeric Expression Box...Type the number that represents the upper end of the scale + 1 (e.g. for a 1-7 scale you would type 8, for a 1-10 scale you would type 11, etc.) in front of the variable name followed by a minus sign. This would leave you with:

8 – VARIABLE NAME or 11 – VARIABLE NAME in the box.
 - d) Click **OK** to run the analysis (Click **PASTE** if you want it added to Syntax)
 - e) NOTE: You must do this for each variable separately
 - f) **BE EXTREMELY CAREFUL ABOUT RUNNING REVERSE SCORE SYNTAX MULTIPLE TIMES ON A DATA SET.**

Create Scores for Scales (i.e. Means)

1. Determine the Items that Comprise the Scale

1. Typically you would look back at the original article from which the scale was taken.
2. In other cases you will have created the scale yourself, so you will use the items that you planned on including.

2. Recode in SPSS

1. Determine the variables you need to include in each scale.

2. In the Data File... Transform → Compute

- In the Numeric Expression Box Type MEAN, then Type (
- Find Variables in List → Click **Arrow** to put Variable under Numeric Expression
- After each new variable you enter, Type a comma (e.g. variable name,)
- Do this for all variables that need to be included, at the end Type)
 - it should look something like: MEAN (variable, variable, variable)
- Type Variable Name in Target Variable (use x_ at the beginning to designate mean)
- Click **Type and Label** → Type “Mean of” and then the scale’s name
- **Continue**

3. Click **OK** to run the analysis (Click **PASTE** if you want it added to Syntax)
4. NOTE: You must repeat these steps for each mean separately

Performing a Median Split

1. In the Data File... Transform → Visual Bander

- Move the variables that you need to split from the Left box, to Right box
- Click Continue

2. In the new window, highlight your variable in the Scanned Variable List (this will make bars show up in the middle of the new screen)
3. In the box next to Banded Variable, type your new variable name (ex. Cat_love ...for categorized love)
4. Click Make Cutpoints (lower left side)
 - Click Equal Percentiles Based on Scanned Cases
 - In the box next to Number of Cutpoints, type 1 (this will make the Width 50% automatically)
5. Click **OK** to run the analysis (Click **PASTE** if you want it added to Syntax)

Calculating Relationship Length

1. In the Data File... Transform → Compute

- In the Numeric Expression Box Type (
- Find Variable in List → Click **Arrow** to put Years Variable under Numeric Expression
- Multiply by 52; Type)+(
- Find Variable in List → Click **Arrow** to put Months Variable under Numeric Expression
- Multiply by 4; Type)+(
- Find Variable in List → Click **Arrow** to put Weeks Variable under Numeric Expression
- Type)

2. Click **OK** to run the analysis (Click **PASTE** if you want it added to Syntax)

Example → $(\text{leng_yr} * 52) + (\text{leng_mn} * 4) + (\text{leng_wk})$

Calculating Scale Reliability

1. - Analyze → Scale → Reliability Analysis

- Highlight all of the items from the scale in the left side box; Click **Arrow**
- Click **Statistics** (this will open a new menu)
 - Click all boxes under the headings “Descriptives for” “Summaries” & “Inter-item”
 - Once done, Click **Continue**

2. Click **OK** to run the analysis (Click **PASTE** if you want it added to Syntax)

Descriptive Statistics

- Analyze → Descriptive Statistics → Frequencies; Once the smaller box opens up...
 - Highlight the variables you want to include from the box on the left, then Click the **Arrow**
 - Click **Statistics...** from the menu *Select*: mean, std deviation...Click **Continue**
 - Click **OK** to run the analysis (Click **PASTE** if you want it added to Syntax)

Correlations

- Analyze → Correlate → Bivariate; Once the smaller box opens up...
 - Highlight the variables you want to include from the box on the left, then Click the **Arrow**
 - Click **Options...** from the menu *Select*: means and standard deviations...Click **Continue**
 - Click **OK** to run the analysis (Click **PASTE** if you want it added to Syntax)

t-test for independent means

- Analyze → Compare Means → Independent Samples T Test; Once the smaller box opens up...
 - Highlight the dependent variables you want to include from the box on the left, then Click the **Arrow** button next to the Test Variable(s) Box
 - Highlight the independent variable you are testing from the box on the left, then Click the **Arrow** button next to the Grouping Variable Box
 - Under Grouping Variable, Click **Define Groups**; In the box that opens...
 - Enter the values that represent groups in the variable (ex. 1 for males, 2 for females)
 - Click **Continue**
 - Click **OK** to run the analysis (Click **PASTE** if you want it added to Syntax)

t-test for dependent means (Paired Samples)

- Analyze → Compare Means → Paired Samples T Test; Once the smaller box opens up...
 - Click the variable that represents your pretest; then click the variable that represents your posttest;
 - Click the **Arrow** button in the middle to place the pair under “Paired Variables”
 - Click **OK** to run the analysis (Click **PASTE** if you want it added to Syntax)

ANOVA

- Analyze → Compare Means → One-Way ANOVA; Once the smaller box opens up...
 - Highlight the dependent variables you want to include from the box on the left, then Click the **Arrow** button next to the Dependent List Box
 - Highlight the independent variable you are testing from the box on the left, then Click the **Arrow** button next to the Factor Box (*the variable you add must be categorical*)
 - Click **Options...** from the menu *Select*: Descriptives...Click **Continue**
 - Click **Post Hoc...** from the menu *Select*: Bonferroni...Click **Continue**
 - Click **OK** to run the analysis (Click **PASTE** if you want it added to Syntax)

ANOVA (Repeated Measures & Mixed Designs)

- Analyze → General Linear Model → Repeated Measures...

- Once the smaller box opens up...
 - Name your within-subjects(WS) variable (where it says factor1); Enter number of levels
 - Click **ADD** (or repeat steps above if you have other WS variables); If done, Click **Define**
- Highlight the pretest (or level 1) WS variable. Click the **Arrow** button next to the Within-Subjects Variable (this should put your variable in the space previously occupied by __?__(1))
- Highlight the posttest (or level 2) WS variable. Click the **Arrow** button next to the Within-Subjects Variable (this should put your variable in the space previously occupied by __?__(2))
 - Repeat as necessary for additional levels/combinations
- Highlight any between-subjects (BS) variables you want to include, then Click the **Arrow** button next to the Between-Subjects Factors Box (*the variable you add should be categorical*)
- Highlight any covariates you want to include, then Click the **Arrow** button next to the Covariates Box
- Click **Post Hoc**...move variable(s) to the right with arrow, *Select: Bonferroni*....Click **Continue**
- Click **Options** (the last button in the series of buttons on the right)
 - Highlight all variables on the Left, move variable(s) to the right with arrow
 - Click box next to Compare Main Effects; from the box right below *Select: Bonferroni*
 - From the menu below *Select: Descriptives*
 - Click **Continue**
- Click **OK** to run the analysis (Click **PASTE** if you want it added to Syntax)

Factorial (2-way) ANOVA

- Analyze → General Linear Model ' Univariate... This opens the *Univariate* dialog box. All of the variables in your data file should be displayed in the variable list on the left. It is up to you to tell SPSS which variables are IVS and which are DVs.

- Start by defining your dependent variable. (highlight and arrow it to the right side)
- Next, define your independent variables (Fixed Factor) (move variables over)

You should still be in the *Univariate* dialog box...

 - Click the **Options** button (the last button in the series of buttons on the right)
 - This will bring up the Univariate: Options dialog box.
 - Click the little box in front of Descriptive statistics. (under Display, middle of box)
 - Click the **Continue** button
- Click **OK** to run the analysis (Click **PASTE** if you want it added to Syntax)

Calculating Effect Sizes

The nature and use of effect sizes

Tests of significance (i.e. p levels) report the likelihood that our results happened by chance ($p < .05$ means there is less than 5% likelihood that our result happened by chance). Effect-size measurements, however, tell us the strength of the relation between our variables. That is, effect sizes tell us the magnitude (i.e. **size**) of the experimental outcome (i.e. **effect**). These calculations are useful because they allow researchers (perhaps as part of a meta-analysis) to compare effects across different studies.

<u>Correlation</u>	r^2
<u>t-test</u>	$\sqrt{[t^2 / (t^2 + df)]}$ <p>OR... $d = X_1 - X_2 / s$</p>
<u>One-Way ANOVA</u>	$\sqrt{[\text{Between Groups SS} / (\text{Within Groups SS} + \text{Total SS})]}$
<u>Repeated-Measures ANOVA</u>	$\eta_p^2 = \text{SS}_{\text{effect}} / (\text{SS}_{\text{effect}} + \text{SS}_{\text{error}})$ <p>OR... $\eta^2 = \text{SS}_{\text{effect}} / \text{SS}_{\text{total}}$</p>
<u>Factorial ANOVA</u>	$R^2_{\{\text{Effect}\}} = \text{SS}_{\{\text{Effect}\}} / (\text{SS}_{\text{Corrected Total}} - \text{SS}_{\{\text{Other Effect 1}\}} - \text{SS}_{\{\text{Other Effect 2}\}})$

Works Consulted

NOTE: This is a listing of the works I consulted when writing this guide and is ***not*** intended to demonstrate proper APA style for a reference section. Consult the APA Manual, pages 240-281 when writing the References

American Psychological Association (2001). *Publication manual of the American Psychological Association* (5th ed.).

Washington, D.C.: Author.

Plonsky, M. (2000). *Psychology with style: A hypertext writing guide*. www.uwsp.edu/psych/apa4b.htm (15 May 2001).

Rosnow, R. L., & Rosnow, M. (2003). *Writing Papers in Psychology* (6th ed.). Belmont, CA: Wadsworth.