Teaching Undergraduates to Use SPSS: Assignments and Rubrics

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Abstract

Learning to conduct research is one of the most important skills for an undergraduate hoping to pursue graduate work in the social sciences. Analyzing data using a program like SPSS is an essential part of this skill. SPSS is a flexible and powerful tool, but can be intimidating for first-time users. We present a series of assignments that take students from the basics of opening data files to the complexities of creating a professional conference poster. Each assignment requires two parallel analyses: the first includes step-by-step instructions and the second provides extra practice without detailed instructions. Later assignments require students to re-use the skills from earlier assignments, further reinforcing those early skills. We have also created a scoring rubric for each assignment to allow for straight-forward and fair grading. After completing these assignments, students will be better prepared for their graduate research projects.

Introduction

For many social sciences students, statistics is a particularly difficult course. If students are planning to attend graduate school, this course is required not just for graduation but also for success in their graduate program. If graduate students are completing empirical theses, statistics is needed not just to understand the research papers they are reading but to do their own analyses. Statistics courses often try to teach students both statistical concepts and how statistics are calculated using software. Integrating conceptual information and practical skills gives students the chance to build on their knowledge and understanding by applying it to actual datasets and research questions. Students are much more likely to see the importance of understanding statistical concepts if they can experience for themselves how they will use these concepts and skills in their own research.

SPSS is the most commonly used statistical package in the social sciences. Very few professionals resort to hand calculations for conducting data analyses when such a useful and comprehensive tool is readily available. However, the comprehensive nature of SPSS makes it intimidating to first-time users and therefore difficult to teach. We present SPSS assignments and accompanying grading rubrics as a means for instructors to teach students these important skills. Each assignment teaches the practical application of a concept that is frequently included in introductory statistics textbooks.

Assignments and Rubrics

The assignments begin with an introduction to SPSS, including how to open and save files. The series includes detailed, step-by-step instructions on how to obtain descriptive statistics, create graphs, conduct analyses on subgroups, use the syntax window to document commands, conduct correlational analyses, and make inferences about single, dependent, and independent samples using t-tests and confidence intervals. Furthermore, these assignments include instructions on how to describe results in sentences, present results in a paper, and draw conclusions based upon results. Students are given detailed instructions on how to integrate all this information both into a research report and a conference poster.

Students receive comprehensive feedback on their assignments, thanks to our detailed scoring rubrics. The detailed scoring rubrics give points for each step completed correctly and partial credit as appropriate. This feedback allows students to learn from mistakes they made in early assignments, so that they can complete later assignments correctly. Given the importance of attending to detail when completing data analyses, the assignments and grading rubrics put particular emphasis on teaching students to follow instructions.

Assignments for SPSS 22.0

1. Introduction to SPSS
2. SPSS Graphs
3. Syntax
4. Calculating Statistics for Subgroups
5. Recoding
6. Inferences about the Mean of a Single Sample
7. Comparing Independent Samples and Writing a Research Report
8. Comparing Dependent Samples
9. Correlation
10. Conference Poster on Sex Differences in Car Accidents

Assignment on Creating a Conference Poster

The final SPSS assignment is a culminating experience in which students create a conference poster. Students use what they have learned throughout the course to conduct a literature review, analyze data, and write up their results. Then they put the information into a format appropriate for a conference presentation, as shown below. Students find the creation of a conference poster exciting and meaningful and are proud of what they have learned and accomplished.

The assignment series and accompanying rubrics are available to instructors via the Open Science Framework at https://osf.io//umjk5/. We hope that other instructors find these assignments helpful, as they prepare their most promising undergraduates both for the rigors of the workplace and for graduate-level research.

Sex Differences in Car Accidents

Authors: Alexandria Bartlett, Jose Quiroz, Noah Martinez

Introduction

Previous research suggests car accident occurrence between male and female drivers differs in frequency. It is reported that on average male drivers are typically more likely to be involved in an accident than female drivers. It should be noted, though, there are multiple other factors influencing accident incidence than simply sex. While sex and gender role perceptions are thought to be an influencing factor on male driving behavior—as males may perceive masculinity in driving as a lack of seatbelts, speeding, over confidence, and generally more traffic offenses—there are the issues of age, experience, car characteristics, road circumstances, and genuinely unanticipated mistakes. The articles referenced actually refer to age, driver experience, and driver education level (secondary to social class) as being some of the more influential driver characteristics on accident occurrence. Overall tendencies of male drivers however, shown in previous studies, are consistent with the discussed risky behaviors and are seen in accidents whose cause can be categorized as active or passive. Such risky behaviors in males may initiate deliberate violations both with and without aggression (active), genuine mistakes where the desired consequence is not achieved (passive), and slips/lapses which are active and passive. A car accident is still considered a rare event; therefore, it cannot be assumed all risky behaviors always lead to an accident. This research study intends to examine and compare driver gender differences and subsequent frequency of car accidents ($H_0: \mu_1 = \mu_2$; $H_1: \mu_1 \neq \mu_2$).

Methods

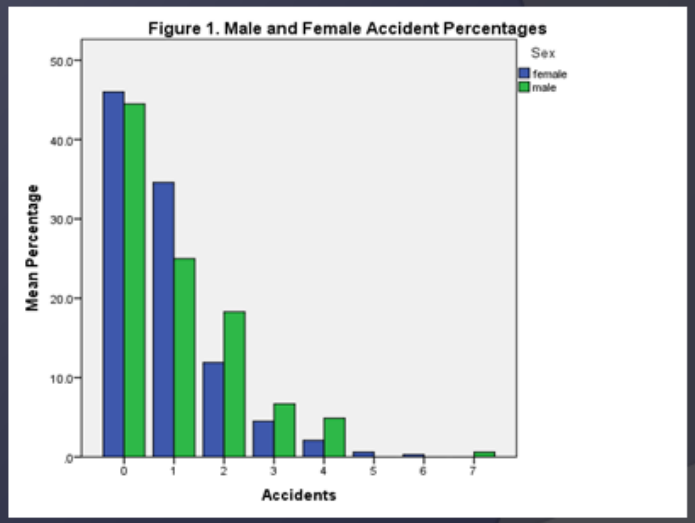
Participants In the 500 participant study, 335 are female, 164 are male, and 1 participant did not include their sex.

Procedure The study was administered on UNLV campus computers, over the internet, without supervision, and took participants about 15 minutes to complete the study. Participation was rewarded with course credit.

Measures "How Many Car Accidents Have You Been in, During Which You Were Driving?"

Results

On average, men have had slightly more car accidents, in which they are driving, than females ($t(498) = 1.92$, $p = 0.008$). The average number of car accidents in male drivers is 1.05, with standard deviation 0.10, and percentage of one or more car accidents being 55%. The average number of car accidents in female drivers is 0.85, with standard deviation 0.06, and percentage of one or more car accidents being 54%. Males are thus involved in more car accidents in comparison to females—although, the difference is not substantial. The 95% confidence interval for the mean difference in number of car accidents for men and women is (-0.01, 0.41). See Figure 1.



Discussion

Results suggest that male drivers are slightly more likely to be involved in a car accident than female drivers. These results may be attributed to males exhibiting riskier behavior while driving, which include but are not limited to: aggressive behaviors, perceived over confidence, and higher tendency to execute impulsive maneuvers.

Psy 210 **Conference Poster on Sex Differences in Car Accidents** **10 Marks**

Overview

The purpose of this assignment is to compare the number of car accidents that men and women have. The goal is to determine if one sex has more accidents than the other, on average. You will use an independent samples t-test to compare the number of accidents. You will present your results in a poster that includes a summary of previous research on this topic. You will submit your entire assignment (including the electronic version of the poster) through WebCampus.

The assignments contain the following sections:

Part 1: Literature Review and Writing the Introduction section
Part 2: Research Purpose
Part 3: Statistical Analysis
Part 4: Writing the Method section
Part 5: Writing the Results section
Part 6: Writing the Discussion section
Part 7: Formatting your Poster

This assignment is a lot of work. You should get started with the literature review immediately.

Part 1: Literature Review and Writing the Introduction section

The first part of your poster is the literature review and introduction.

1. Locate at least four sources that discuss car accidents. Try to find at least one source that talks about sex differences in car accidents. To locate sources, you could use either the UNLV Library website or Google Scholar. Save **pdf versions** of each source and email them to all team members. You will submit them with your final project.
2. Read your sources. Write one or two paragraphs, summarizing what you learned about car accidents. Be sure to use your own words. If you use someone else's exact words and do not put it in quotation marks, this is plagiarism. If you use someone else's exact words and you do put it in quotes, this is not plagiarism; however, the purpose of the introduction is to summarize what you found in your own words, and so you will not receive any credit for quoting other people. This section should be no less than 200 words and no more than 500 words.
3. Save your document. I recommend the file name "Psy 210 Assignment 11 document.docx"

Part 2: Research Purpose

1. State that the purpose of your research is to examine sex differences in car accidents. This is the last sentence of your introduction. Be sure to use your own words, though; you need to rephrase my words or else you are plagiarizing.

Part 3: Statistical Analysis

Open the Data File

1. Go to Dr. Barchard's website and open the Recoded Research Data.

Preparing the Dataset

SPSS is doing something strange. When you download the **Recoded Research Data** from Dr. Barchard's website, SPSS

Part 4: Writing the Method section

The second part of your poster is the Method section. The Method section has three subsections.

1. Participants: Write a SHORT paragraph to describe your participants using the Descriptive statistics you calculated in Part 3.
2. Procedures: Write a SHORT paragraph to describe how the data was collected in this study. To describe the procedures, **paraphrase** the following information: "Data was collected during a single 15 minute testing session. Participants completed the measures on the computer in a computer lab at UNLV. They were unsupervised. Participants received course credit in return for their participation."
3. Measures: Write a SHORT paragraph to give the precise wording of the question about car accidents. The wording is given in SPSS under the label for the variable.

Part 5: Writing the Results section

1. Write one or two sentences (no more!) to describe your findings regarding the car accidents for men (mean, standard deviation, and percentage). When writing up your results,
   a. Remember to write a sentence that can be understood by anyone (including people who have never taken a statistics course)
   b. Put the mean and standard deviation in parentheses. Use the abbreviation M for mean and SD for standard deviation. For example, Cats often have more than 4 kittens (M = 4.08, SD = 1.38).
2. Write one or two sentences (no more!) to describe your findings regarding the car accidents for women (mean, standard deviation, and percentage).
3. Write one sentence comparing the number of car accidents for men and women, based upon the Independent Sample t-test. Put your results in parentheses.
4. Write one sentence explaining the results of the 95% confidence interval for the difference of the means.
5. Make sure you have rounded your numbers appropriately.
6. Include a reference to Figure 1 somewhere in this paragraph.

Part 6: Writing the Discussion section

1. Write a short paragraph (no more than 100 words!) summarizing your findings and stating your overall conclusions about the research. Your summary should not include any of the numbers given in your results section; instead, it should include your interpretation of those numbers.

Part 7: Formatting your Poster

1. Copy the content of your Word document into PowerPoint and format it as a poster. **Here are the minimum requirements for the poster:**
   - The poster must be given on ONE slide in PowerPoint.
   - The PowerPoint slide must be at least 36 x 24 inches.
   - The font must be at least 24 point, so that it can be read from five feet away.
   - The poster must include a title, which gives the name of your poster and the names of all authors. Note, the authors are the Psy 210 students who worked on this poster.
   - The poster must include ALL of the text from your Word document, including the section titles (Introduction, Method, Results, and Discussion).
   - The poster must include your figure.
2. **If you are not sure how to create a PowerPoint poster, here are detailed instructions on how to create one:**
   a. Open PowerPoint.
   b. Click Design, Page Setup. Increase the width and height. Start with a width of 36 inches and a height of 24 inches. If you need to increase this later, you can.
   c. On the Home tab, click the New Slide drop down button. Select a Blank slide.
   d. You now have two slides. Delete the first slide by Right-Clicking on it and selecting Delete Slide.
   e. Insert a textbox for your title. To do this, click the Insert tab, and select Text Box. Make your textbox almost as wide as the poster.
   f. Type a title for your poster, including the name of the poster and the names of all authors.
   g. Increase the font size of your title and center the text within the box.
   h. Save your PowerPoint file as "Psy 210 Assignment 11 Poster.pptx".

Creating a Conference Poster — Scoring Key

FILES SUBMITTED	No credit (-2)		Partial credit (-1)	Full credit (0)	Points lost
					(10)
Output file submitted in pdf format.	File is missing.		File is not in pdf format.	File is submitted in pdf format.	
Syntax file submitted in pdf format.	File is missing.		File is not in pdf format.	File is submitted in pdf format.	
4 sources submitted in pdf format as sources about car accidents.	All files is missing.	No files are journal articles.	a. Files are not in pdf format. b. Some files are journal articles. c. 1-3 files are submitted.	All 4 files are submitted in pdf format.	
Draft of poster content submitted in Word format.	File is missing.		File is not in Word format.	File is submitted in Word format.	
Conference poster submitted in PowerPoint format.	File is missing.		File is not in PowerPoint format.	File is submitted in PowerPoint format.	
POSTER	**No credit (-2)**		**Partial credit (-1)**	**Full credit (0)**	**Points lost**
ORGANIZATION					(10)
Document has been given the correct file name.	File name is not "Psy 210 Assignment 11 Poster".			File name is "Psy 210 Assignment 11 Poster".	
All poster content is on one slide.	Poster content is across more than one slide.			All poster content is on one slide.	
Slide is at least 36 in x 24 in.	Slide is less than 36 in x 24 in.			Slide is 36 in x 24 in or larger.	
All fonts are at least 24 point.	Any font on poster is less than 24 point.			All font is 24 point or larger.	
A title is given that includes the name of the poster and the names of all the authors.	All information is missing.	There are more than 3 authors given.	a. Content is not all correct. b. Content is not all present.	Title of poster and authors' names are all present on slide.	
INTRODUCTION	**No credit (-2)**		**Partial credit (-1)**	**Full credit (0)**	**(20)**
Gave a title saying "Introduction" at the	Title is missing.	Title labels a section other than the	Title is not at the beginning of the	Title saying "Introduction" clearly	

Creating a Conference Poster — Scoring Key

The graph has appropriate X- and Y- axis labels.	The graph is missing.	X- and Y-axis labels are missing.	a. One axis is labelled. b. Axis labels are not clear. c. Labels are in the incorrect location.	X- and Y-axis have clear and appropriate labels (e.g., X: Number of Car Accidents; Y: Percent of People)	
The graph clearly displays the percent of men and women that had each number of accidents.	The graph is missing.	The graph displays information for a different variable.	Graph is unclear.	Graph clearly displays information.	
The graph includes a legend identifying which bars represent men and which bars represent women.	The graph is missing.	The legend is missing.	a. Legend is labelled incorrectly. b. Legend is not clear.	Legend clearly identifies which bars refer to percent of men and women.	
DISCUSSION					(12)
Gave a title above Discussion section saying "Discussion".	Title is missing.	Title labels a section other than the Discussion.	a. Title is not at the beginning of the section.	Title saying "Discussion" clearly labels the correct section.	
Discussion section is not more than 100 words.	Section is missing.	Section is more than 100 words.		Discussion section is 100 words or less.	
Section does not include any numbers from the Results section.	Section is missing.	Section includes statistical results.		Section does not include any numbers.	
Gave accurate general statement(s) about finding(s).	Section is missing.	Gave no accurate information.	Gave partially accurate statements about findings.	Gave completely accurate statements about findings.	
Gave appropriate interpretations of finding(s).	Section is missing.	Gave no appropriate interpretations.	Gave partially accurate interpretations.	Gave completely appropriate interpretations of findings.	
Section is clearly written.	Section is missing.	Section is completely unclear	Section is partially clear.	Section is completely clear.	

Sum total number of points lost. **Total points lost = _____ / 114**

Consult table below for scaled score. **Scaled score = ____ / 10**