

# Calculating Basic Statistical Procedures in SPSS: A Self-Help and Practical Guide to Preparing Theses, Dissertations, and Manuscripts

**By:**

John R. Slate

Ana Rojas-LeBouef



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**C O N N E X I O N S**

Rice University, Houston, Texas

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# Chapter 1

## Introduction: Why a Book on Statistical Help for Graduate Students and Faculty?<sup>1</sup>



NOTE: This Chapter has been peer-reviewed, accepted, and endorsed by the National Council of Professors of Educational Administration (NCPEA) as a significant contribution to the scholarship and practice of education administration. Formatted and edited in Connexions by Theodore Creighton and Brad Bizzell, Virginia Tech, Janet Tareilo, Stephen F. Austin State University, and Thomas Kersten, Roosevelt University.

This chapter is part of a larger Collection (Book) and is available at: *Calculating Basic Statistical Procedures in SPSS: A Self-Help and Practical Guide to Preparing Theses, Dissertations, and Manuscripts*<sup>2</sup>

NOTE: Slate and LeBouef have written a "companion book" which is available at: *Preparing and Presenting Your Statistical Findings: Model Write Ups*<sup>3</sup>

### Authors Information

**John R. Slate** is a Professor at Sam Houston State University where he teaches Basic and Advanced Statistics courses, as well as professional writing, to doctoral students in Educational Leadership and Counseling. His research interests lie in the use of educational databases, both state and national, to reform school practices. To date, he has chaired and/or served over 100 doctoral student dissertation committees. Recently, Dr. Slate created a website, Writing and Statistical Help<sup>4</sup> to assist students and faculty with both statistical assistance and in editing/writing their dissertations/theses and manuscripts.

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<sup>1</sup>This content is available online at <<http://cnx.org/content/m37280/1.2/>>.

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<sup>3</sup><http://my.qoop.com/store/NCPEA-Publications-1781472103076212/>

<sup>4</sup><http://cnx.org/content/m37280/latest/www.writingandstatisticalhelp.com>

**Ana Rojas-LeBouef** is a Literacy Specialist at the Reading Center at Sam Houston State University where she teaches developmental reading courses. She recently completed her doctoral degree in Reading, where she conducted a 16-year analysis of Texas statewide data regarding the achievement gap. Her research interests lie in examining the inequities in achievement among ethnic groups. Dr. Rojas-LeBouef also assists students and faculty in their writing and statistical needs on the Writing and Statistical website, Writing and Statistical Help<sup>5</sup>

### Editors Information

**Theodore B. Creighton**, is a Professor at Virginia Tech and the Publications Director for NCPEA Publications<sup>6</sup>, the Founding Editor of Education Leadership Review,<sup>7</sup> and the Senior Editor of the NCPEA Connexions Project.

**Brad E. Bizzell**, is a recent graduate of the Virginia Tech Doctoral Program in Educational Leadership and Policy Studies, and is a School Improvement Coordinator for the Virginia Tech Training and Technical Assistance Center. In addition, Dr. Bizzell serves as an Assistant Editor of the NCPEA Connexions Project in charge of technical formatting and design.

**Janet Tareilo**, is a Professor at Stephen F. Austin State University and serves as the Assistant Director of NCPEA Publications. Dr. Tareilo also serves as an Assistant Editor of the NCPEA Connexions Project and as a editor and reviewer for several national and international journals in educational leadership.

**Thomas Kersten** is a Professor at Roosevelt University in Chicago. Dr. Kersten is widely published and an experienced editor and is the author of Taking the Mystery Out of Illinois School Finance<sup>8</sup>, a Connexions Print on Demand publication. He is also serving as Editor in Residence for this book by Slate and LeBouef.

## 1.1 Introduction: Why a Book for Helping Students and Faculty with SPSS and Writing Help?

In the past two decades of teaching basic and advanced statistical procedures, we have observed student after student who experienced difficulty with using the Statistical Package for the Social Sciences (SPSS) and with interpreting the voluminous output generated by SPSS. These difficulties, along with statistics anxiety experienced by many students, led us to develop a specific and detailed set of steps for students to follow. Students reported to us, over and over, how helpful the point-and-click steps were to them in allowing them to use SPSS. Some students, even with the steps, still managed to experience difficulty in being able to use SPSS successfully. As a result, we generated screenshots for every major point-and-click step. This combination of steps and screenshots has met with excellent student satisfaction and, most importantly for us as instructors, has enhanced their ability to be successful in using SPSS.

We have written this textbook in hopes of facilitating individuals' success in using SPSS for their statistical analyses and in interpreting the SPSS output properly. Graduate and undergraduate students who take a statistics course in which SPSS is used will find these steps and screenshots to be very practical and very easy to follow. Doctoral students, who completed their statistics course years ago, but who are now working on their dissertation data analysis will find this textbook to be a practical step-by-guide. Finally, faculty members who engage in scholarly activities but are years removed from their own statistics courses will find this textbook to be helpful.

We hope that you find our materials helpful to you in your use of SPSS and in your interpretation of SPSS output. This textbook reflects our efforts and interests in making statistical analysis less threatening and less anxiety-producing than many persons find it to be. Currently, great emphasis is placed on accountability in

<sup>5</sup><http://cnx.org/content/m37280/latest/www.writingandstatisticalhelp.com>

<sup>6</sup><http://www.ncpeapublications.org>

<sup>7</sup><http://ncpeapublications.org/about-elr.html>

<sup>8</sup><http://cnx.org/content/col10606/latest/>



educational settings. Being able to analyze data, of which an abundance clearly exists, in an interpretable way is essential, especially if we want to make the educational lives of our students better.

**John R. Slate, Sam Houston State University**

**Ana Rojas-LeBouef, Sam Houston State University**

*CHAPTER 1. INTRODUCTION: WHY A BOOK ON STATISTICAL HELP  
FOR GRADUATE STUDENTS AND FACULTY?*

## Chapter 2

# Calculating Descriptive Statistics<sup>1</sup>



NOTE: This Chapter has been peer-reviewed, accepted, and endorsed by the National Council of Professors of Educational Administration (NCPEA) as a significant contribution to the scholarship and practice of education administration. Formatted and edited in *Connexions* by Theodore Creighton and Brad Bizzell, Virginia Tech, Janet Tareilo, Stephen F. Austin State University, and Thomas Kersten, Roosevelt University.

### 2.1

This chapter is part of a larger Collection (Book) and is available at: *Calculating Basic Statistical Procedures in SPSS: A Self-Help and Practical Guide to Preparing Theses, Dissertations, and Manuscripts*<sup>2</sup>

NOTE: Slate and LeBouef have written a "companion book" which is available at: *Preparing and Presenting Your Statistical Findings: Model Write Ups*<sup>3</sup>

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<sup>4</sup><http://cnx.org/content/m37276/latest/www.writingandstatisticalhelp.com>

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## 2.2 Calculating Descriptive Statistics

In this set of steps, readers are provided with directions on calculating basic measures of central tendency (i.e., mean, median, and mode), measures of dispersion (i.e., standard deviation, variance, and range), and measures of normality (i.e., skewness and kurtosis). For detailed information regarding the advantages and limitations of each of the measures cited, readers are referred to the Hyperstats Online Statistics Textbook at <http://davidmlane.com/hyperstat/><sup>9</sup> or to the *Electronic Statistics Textbook* (2011) at <http://www.statsoft.com/textbook/><sup>10</sup>

### Step One

**First check the accuracy of your dataset.**

✓ Analyze

\* Descriptive Statistics

\* Frequencies

---

<sup>5</sup><http://cnx.org/content/m37276/latest/www.writingandstatisticalhelp.com>

<sup>6</sup><http://www.ncpeapublications.org>

<sup>7</sup><http://ncpeapublications.org/about-elr.html>

<sup>8</sup><http://cnx.org/content/col10606/latest/>

<sup>9</sup><http://davidmlane.com/hyperstat/>

<sup>10</sup><http://www.statsoft.com/textbook/>

The screenshot shows the SPSS Statistics Data Editor interface. The title bar reads "TAKS\_2009.sav [DataSet1] - SPSS Statistics Data Editor". The menu bar includes File, Edit, View, Data, Transform, Analyze, Graphs, Utilities, Add-ons, Window, and Help. The Analyze menu is open, showing a list of statistical procedures. The "Descriptive Statistics" submenu is also open, with "Frequencies..." selected. Other options in the Descriptive Statistics submenu include Descriptives..., Explore..., Crosstabs..., Ratio..., P-P Plots..., and Q-Q Plots... The data table in the background has two columns: CAMPUS and CH004. The first row is highlighted, and the data for the first 16 rows is as follows:

	CAMPUS	CH004
1	1902001	
2	1902041	
3	1902103	
4	1903001	
5	1903041	
6	1903101	
7	1904001	
8	1904041	
9	1904102	
10	1906002	
11	1906102	
12	1907001	
13	1907041	
14	1907101	
15	1907107	
16	1907110	

11

- ✓ Move over the independent variable/s
- ✓ Move over the dependent variable/s
- ✓ OK

<sup>11</sup><http://cnx.org/content/m37276/latest/figure1.1-thumb.png/image>

The screenshot shows the SPSS Statistics Data Editor window with a dataset named 'vised.sav [DataSet1]'. The dataset has the following columns: id, age, recodage, wifsiq, wiviq, wipiq, pc, inf, and cod. The data is displayed in a grid format. A 'Frequencies' dialog box is open, showing the 'Variable(s):' list with 'Verbal IQ (Wechsler Ve...' selected. The 'Display frequency tables' checkbox is checked. The dialog box also has buttons for 'Statistics...', 'Charts...', and 'Format...'. The 'OK' button is highlighted.

id	age	recodage	wifsiq	wiviq	wipiq	pc	inf	cod
654	.	.	93	100	86	8	12	6
733	.	.	82	78	90	7	4	5
734	.	.	88	81	99	7	7	7
735	.	.	90	91	90	.	.	.
736	.	.	81	78	87	9	6	10
654	.	.	93	100	86	8	12	6
733	.	.	82	78	90	7	4	5
734	.	.	88	81	99	7	7	7
735	.	.	90	91	90	.	.	.
736	.	.	81	78	87	9	6	10
40	.	.	.	.	.	.	.	.
5	.	.	.	.	.	.	.	.
109	.	.	.	.	.	.	.	.
574	.	.	.	.	.	.	.	.
575	.	.	.	.	.	.	.	.
576	.	.	.	.	.	.	.	.
577	.	.	.	.	.	.	.	.
578	.	.	.	.	.	.	.	.
579	.	.	.	.	.	.	.	.
580	.	.	.	.	.	.	.	.
581	.	.	.	.	.	.	.	.
582	.	.	.	.	.	.	.	.
27	.	.	.	.	.	.	.	.
100	.	.	.	.	.	.	.	.

- \* Uncheck the display "frequency tables" so that you are not provided with the frequencies of your data every time descriptive statistics are obtained.

Now check your output to see that the values for each of the variables is within the possible limits (e.g., 1 and 2 for gender). If your dataset is inaccurate, correct any inaccuracies before calculating any statistics.

#### To calculate descriptive statistics:

- ✓ Analyze
- \* Descriptive Statistics
- \* Frequencies
- \* Move over the dependent variable/s
- \* Do **NOT** move over the independent variable/s or any string variables
- \* Statistics

<sup>12</sup><http://cnx.org/content/m37276/latest/figure1.2.PNG/image>

The screenshot shows the SPSS Statistics Data Editor window with a data table and the Frequencies dialog box open. The data table has columns: group, id, age, recodage, wfsiq, wiviq, wipiq, pc, inf, and cod. The Frequencies dialog box is set to analyze the variable 'Verbal IQ (Wechsler Ve...)' and has the 'Display frequency tables' checkbox checked.

	group	id	age	recodage	wfsiq	wiviq	wipiq	pc	inf	cod
1	1	654	.	.	93	100	86	8	12	6
2	1	733	.	.	82	78	90	7	4	5
3	1	734	.	.	88	81	99	7	7	7
4	1	735	.	.	90	91	90	.	.	.
5	1	736	.	.	81	78	87	9	6	10
6	1	654	.	.	93	100	86	8	12	6
7	1	733	.	.	82	78	90	7	4	5
8	1	734	.	.	88	81	99	7	7	7
9	1	735	.	.	90	91	90	.	.	.
10	1	736	.	.	81	78	87	9	6	10
11	1	40	.	.	.	.	.	.	.	.
12	1	5	.	.	.	.	.	.	.	.
13	2	109	.	.	.	.	.	.	.	.
14	2	574	.	.	.	.	.	.	.	.
15	2	575	.	.	.	.	.	.	.	.
16	2	576	.	.	.	.	.	.	.	.
17	2	577	.	.	.	.	.	.	.	.
18	2	578	.	.	.	.	.	.	.	.
19	2	579	.	.	.	.	.	.	.	.
20	2	580	.	.	.	.	.	.	.	.
21	2	581	.	.	.	.	.	.	.	.
22	2	582	.	.	.	.	.	.	.	.
23	2	27	.	.	68	59	81	8	1	7
24	2	109	.	.	56	64	57	5	2	1
25	2	574	.	.	50	57	50	5	4	4

- \* Three basic measures of central tendency, upper right part of screen: mean, median, and mode.
- \* Three basic measures of variability, bottom left part of screen: variance, Standard Deviation, and range.
- \* Skewness [Note. Skewness refers to the extent to which the data are normally distributed around the mean. Skewed data involve having either mostly high scores with a few low ones or having mostly low scores with a few high ones.] Readers are referred to the following sources for a more detailed definition of skewness: [http://www.statistics.com/index.php?page=glossary&term\\_id=356](http://www.statistics.com/index.php?page=glossary&term_id=356)<sup>14</sup> and <http://www.statsoft.com/textbook/basic-statistics/#Descriptive%20statisticsb><sup>15</sup>
- \* Kurtosis [Note. Kurtosis also refers to the extent to which the data are normally distributed around the mean. This time, the data are piled up higher than normal around the mean or piled up higher than normal at the ends of the distribution.] Readers are referred to the following sources for a more detailed definition of kurtosis: [http://www.statistics.com/index.php?page=glossary&term\\_id=326](http://www.statistics.com/index.php?page=glossary&term_id=326)<sup>16</sup> and <http://www.statsoft.com/textbook/basic-statistics/#Descriptive%20statisticsb><sup>17</sup>

<sup>13</sup><http://cnx.org/content/m37276/latest/figure1.3.PNG/image>

<sup>14</sup>[http://www.statistics.com/index.php?page=glossary&term\\_id=356](http://www.statistics.com/index.php?page=glossary&term_id=356)

<sup>15</sup><http://www.statsoft.com/textbook/basic-statistics/#Descriptive%20statisticsb>

<sup>16</sup>[http://www.statistics.com/index.php?page=glossary&term\\_id=326](http://www.statistics.com/index.php?page=glossary&term_id=326)

<sup>17</sup><http://www.statsoft.com/textbook/basic-statistics/#Descriptive%20statisticsb>

The screenshot shows the SPSS Statistics Data Editor interface. The main window displays a data table with columns: group, id, age, recodage, wifsiq, wiviq, wipiq, pc, inf, and cod. The data is organized into three groups. A dialog box titled 'Frequencies: Statistics' is open, showing the following options:

- Percentile Values:**
  - Quartiles
  - Cut points for: 10 equal groups
  - Percentile(s):
  - Buttons: Add, Change, Remove
- Central Tendency:**
  - Mean
  - Median
  - Mode
  - Sum
  - Values are group midpoints
- Dispersion:**
  - Std. deviation
  - Minimum
  - Variance
  - Maximum
  - Range
  - S.E. mean
- Distribution:**
  - Skewness
  - Kurtosis

Buttons at the bottom of the dialog box: Continue, Cancel, Help.

18

\* Charts (optional, use only if you want a visual depiction of your data)

\* Histograms (optional, use only if you want a visual depiction of your data) with normal curve

<sup>18</sup><http://cnx.org/content/m37276/latest/figure1.4.PNG/image>



The screenshot shows the SPSS Statistics Data Editor interface. The main window displays a data table with columns: CAMPUS, CH004TR09R, CL004TR09R, CW004TR09R, and several 'var' columns. The data rows are numbered 1 through 28. Overlaid on the data table are two dialog boxes. The 'Frequencies' dialog box is open, showing 'CAMPUS' as the selected variable and the 'Display frequency tables' checkbox checked. The 'Frequencies: Charts' dialog box is also open, showing 'None' selected under 'Chart Type' and 'Frequencies' selected under 'Chart Values'. Other options include 'Bar charts', 'Pie charts', 'Histograms', and 'With normal curve'.

	CAMPUS	CH004TR09R	CL004TR09R	CW004TR09R	var	var	var	var	var	var	var
1	1902001	.	.	.							
2	1902041	.	.	.							
3	1902103	.	.	97							
4	1903001	.	.	.							
5	1903041	.	.	.							
6	1903101	89	.	97							
7	1904001	.	.	.							
8	1904041	.	.	.							
9	1904102	.	.	87							
10	1906002	.	.	.							
11	1906102	.	.	88							
12	1907001	.	.	.							
13	1907041	.	.	.							
14	1907101	.	.	.							
15	1907107	82	33	91							
16	1907110	82	33	91							
17	1908002	.	.	.							
18	1908041	.	.	.							
19	1908101	57	.	90							
20	1908102	57	.	90							
21	1909001	.	.	.							
22	1909101	.	.	70							
23	2901001	.	.	.							
24	2901002	.	.	.							
25	2901041	.	.	.							
26	2901101	.	.	.							
27	2901104	79	38	89							
28	2901105	.	.	.							

- \* Uncheck the display frequency tables so that you are not provided with the frequencies of your data every time descriptive statistics are obtained.
- \* OK

<sup>19</sup><http://cnx.org/content/m37276/latest/figure1.5.PNG/image>

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