Overview

IBM SPSS (Statistical Package for the Social Sciences) is a data management and analysis product produced by <u>IBM SPSS</u>, Inc. in Chicago, Illinois. Among its features are modules for statistical data analysis, including descriptive statistics such as plots, frequencies, charts, and lists, as well as sophisticated inferential and multivariate statistical procedures like analysis of variance (ANOVA), factor analysis, cluster analysis, and categorical data analysis. SPSS is particularly well-suited to survey research, though by no means is it limited to just this topic of exploration.

SPSS is a modular product. That is, it requires the Base System module to run, but you may wish to use other modules to carry out specific analyses not supported by the Base product. The current version is 20.0 Lehman College has a site license for a much earlier version which is serviceable and has all the features you might need to handle your data.

Many of the features we will use in this beginner session are intended to introduce you to some common sense data manipulation. These include:

Starting SPSS

Entering small sets of data directly into SPSS

Importing larger sets of data from Excel spreadsheets into SPSS

Using SPSS to create descriptions of your data (frequencies, descriptions, central tendency, variability, correlations)

Starting SPSS

Click the Start button, Programs, the relevant software group, SPSS, and click on the SPSS icon.

The initial **SPSS** screen should appear, showing the *Data Editor* window, with the *Data View* window on top, and a tab at the foot of the screen giving access to the *Variable View* window. This is superimposed by a smaller window headed SPSS for Windows which you can temporarily discard by clicking on the **Cancel** button. You can switch between *Data View* and *Variable View* by clicking the appropriate tab.

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Getting help

You can obtain help on SPSS at any time during your SPSS session. Features such as being able to search for specific topics are included. To access the online help system, click on the **Help** menu and **Topics** to display the following window:



The *Contents* panel contains a list of broad topics, represented by icons of books. Double-clicking on any book will expand the contents. Selecting any one of these topics by double-clicking will provide you with the information in that topic.

If you know exactly what you want, or you wish to refer to a statistical term or a specific piece of jargon, you may prefer to use the *Index* tab. An alphabetic list of terms and topics will appear, and you can enter a term to search for. If too many similar topics are shown, use the vertical scroll bar to view the rest of the list, and double-click the topic you want.

Use **Search** to locate a **Help** topic. Within the **Search** box, enter a keyword that you would like to find help on. All **Help** topics that contain the keyword will be displayed, not just topics that begin with that word (as in the **Index**).

Opening/Importing files from Excel and opening existing SPSS files

Data organization and the Data Editor

Opening a data file

The first task will be to retrieve a simple data file to see how data is organized within SPSS. To do this using the menu:

• From the **File** menu, select **Open**, then select the **Data** from the resulting sub-menu.

The following dialog box will appear:

In the dialog box pictured opposite, you select the file from the list of files. You can select different drives and directories by clicking the drop-down arrow next to the *Look in* box.

You can retrieve files created by software packages such as Excel by selecting one of the file types from the pull down list in the *Files of Type* box. This will be covered later in the course. The first file we are going to use is called **sample.xls**

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Since your files for this workshop are on a flash/thumb drive, pick the drive and type of file and click OPEN.



You will see the following asking you if you want to include column heads as variable names, say yes and OK

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The Data View window will contain the following data:

You can switch between variable view and data view by clicking on the tabs.

I have adjusted the width of the variables in the data view so that all columns are in view by dragging the cells that have the variable names to make them smaller and the variable widths to 3.

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We now need to label the variables and indicate the values.

The variable label can be the same as the variable name as the names are already explicit.

The values must be added in the values column using the numbers assigned and the names as in the codes given below. (It is good to have a code book/sheet to remind you of the codes assigned at the beginning of the development of the survey/database.)

Level 1=freshman; 2=sophomore; 3=junior; 4=senior

Sex 1= male; 2=female

Ethnic 1=AA/Black; 2=Latino/Hispanic; 3=White; 4=Asian; 5 = Other

Math 1=algebra; 2=geometry; 3= Math A; 4=Math B; 5=Integrated Algebra; 6=pre-calculus

Mgrade as shown

Science 1=living environment; 2=biology; 3=earth science; 4=chemistry

Sgrade as shown

GPA as shown

Once the labels and values are in the SPSS file you should save it. SPSS will save it as a .sav file so that it can be opened for further work in SPSS without having to re-label, etc.

The next step is to explore the data using the various descriptive tools afforded by SPSS.

Let's look at some of the tabs: File



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Using SPSS to create descriptions of your data (Frequencies, Descriptions, Charts)

Under the Analyze Tab/Descriptive Statistics you will find: Frequencies, Descriptives, Explore, Crosstabs and Ratio.

Frequencies

A frequency distribution is a summary of how often different scores occur within a sample of scores.

For example, let's suppose that you are collecting data on how many hours of sleep college students get each night. After conducting a survey of 30 of your classmates, you are left with the following set of scores:

7, 5, 8, 9, 4, 10, 7, 9, 9, 6, 5, 11, 6, 5, 9, 10, 8, 6, 9, 7, 9, 8, 4, 7, 8, 7, 6, 10, 4, 8

In order to make sense of this information, you need to find a way to organize the data. A frequency distribution is commonly used to categorize information so that it can be interpreted quickly in a visual way. In our example above, the number of hours each week serves as the categories and the occurrences of each number are then tallied.

Using the information from a frequency distribution, researchers can then calculate the <u>mean</u>, <u>median</u>, <u>mode</u>, range and standard deviation. Frequency distributions are often displayed in a table format (as you can see in the example found below), but they can also be presented graphically using a histogram.

Hours of Sleep Each Night	Frequency
4	3
5	3
6	4
7	5
8	5
9	6
10	3
11	1
Total	30

Example of a Frequency Distribution

In order to generate a frequency distribution for the data we are working with you select Analyze/Descriptives/Frequencies and will see the following selection box.

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This enables you to select any or all variables by highlighting those you wish to plot and using the arrow in the middle to move them to the right box for use. The program does not care if the variables are nominal or scaled. It will do the same process for all.

After you have moved the variables of interest over you can also select statistics

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For some of the variables (scaled) these are relevant for the nominal variables the statistics are not relevant. So let's not choose this now but choose Continue and go back to run the frequencies.

The output is on the next several pages

NEW FILE. DATASET NAME DataSet1 WINDOW=FRONT. GET FILE='F:\111SPSS workshops\sample with labels and values.sav'. DATASET NAME DataSet2 WINDOW=FRONT. FREQUENCIES VARIABLES=level sex Ethnic math mgrade science sgrade GPA

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Frequencies

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		labels and values.sav
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		class	sex	ethnicity	math	Mgrade	science
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Statistics					
sgrade GPA					
Ν	Valid	145	145		
	Missing	0	0		

Frequency Table

			class		
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	sophomore	48	33.1	33.1	33.1
	junior	89	61.4	61.4	94.5
	senior	8	5.5	5.5	100.0
	Total	145	100.0	100.0	

			sex		
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	53	36.6	36.6	36.6
	female	92	63.4	63.4	100.0
	Total	145	100.0	100.0	

	ethnicity					
		Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	AA/Black	60	41.4	41.4	41.4	
	Latino/Hispanic	62	42.8	42.8	84.1	
	White	19	13.1	13.1	97.2	
	Asian	1	.7	.7	97.9	
	Other	3	2.1	2.1	100.0	
	Total	145	100.0	100.0		

			math		
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	algebra	2	1.4	1.4	1.4
	geometry	44	30.3	30.6	31.9
	Math A	2	1.4	1.4	33.3
	Math B	48	33.1	33.3	66.7
	Pre-calculus	42	29.0	29.2	95.8
	7	2	1.4	1.4	97.2
	9	4	2.8	2.8	100.0
	Total	144	99.3	100.0	
Missing	System	1	.7		
Total		145	100.0		

	Mgrade						
					Cumulative		
		Frequency	Percent	Valid Percent	Percent		
Valid	45	1	.7	.7	.7		
	55	8	5.5	5.5	6.2		
	65	20	13.8	13.8	20.0		
	68	1	.7	.7	20.7		
	70	12	8.3	8.3	29.0		
	74	1	.7	.7	29.7		
	75	14	9.7	9.7	39.3		
	79	2	1.4	1.4	40.7		
1	80	16	11.0	11.0	51.7		
1	85	14	9.7	9.7	61.4		
1	87	1	.7	.7	62.1		
1	88	1	.7	.7	62.8		
	89	4	2.8	2.8	65.5		
1	90	17	11.7	11.7	77.2		
	91	1	.7	.7	77.9		
1	92	3	2.1	2.1	80.0		
1	93	2	1.4	1.4	81.4		
1	94	3	2.1	2.1	83.4		
1	95	2	1.4	1.4	84.8		
1	96	4	2.8	2.8	87.6		
1	97	1	.7	.7	88.3		
1	98	4	2.8	2.8	91.0		
1	99	3	2.1	2.1	93.1		
1	100	10	6.9	6.9	100.0		
	Total	145	100.0	100.0			

		sci	ence		
					Cumulative
		Frequency	Percent	Valid Percent	Percent
Valid	living environment	29	20.0	20.0	20.0
	biology	47	32.4	32.4	52.4
	earth science	16	11.0	11.0	63.4
	Chemistry	52	35.9	35.9	99.3
	5	1	.7	.7	100.0
	Total	145	100.0	100.0	

sgrade					
				Cumulative	
	Frequency	Percent	Valid Percent	Percent	
Valid 50	2	1.4	1.4	1.4	
55	2	1.4	1.4	2.8	
65	6	4.1	4.1	6.9	
68	1	.7	.7	7.6	
70	3	2.1	2.1	9.7	
74	1	.7	.7	10.3	
75	8	5.5	5.5	15.9	
77	1	.7	.7	16.6	
79	2	1.4	1.4	17.9	
80	21	14.5	14.5	32.4	
82	1	.7	.7	33.1	
84	1	.7	.7	33.8	
85	33	22.8	22.8	56.6	
88	3	2.1	2.1	58.6	
89	2	1.4	1.4	60.0	
90	26	17.9	17.9	77.9	
91	1	.7	.7	78.6	
92	4	2.8	2.8	81.4	
93	2	1.4	1.4	82.8	
94	1	.7	.7	83.4	
95	5	3.4	3.4	86.9	
96	3	2.1	2.1	89.0	
97	1	.7	.7	89.7	
98	6	4.1	4.1	93.8	
99	2	1.4	1.4	95.2	
100	7	4.8	4.8	100.0	
Total	145	100.0	100.0		

GPA					
					Cumulative
		Frequency	Percent	Valid Percent	Percent
Valid	65	1	.7	.7	.7
	70	8	5.5	5.5	6.2
	74	2	1.4	1.4	7.6
	75	7	4.8	4.8	12.4
	76	2	1.4	1.4	13.8
	78	1	.7	.7	14.5
	79	5	3.4	3.4	17.9
	80	11	7.6	7.6	25.5
	81	3	2.1	2.1	27.6
	82	5	3.4	3.4	31.0
	83	10	6.9	6.9	37.9
	84	5	3.4	3.4	41.4
	85	9	6.2	6.2	47.6
	86	5	3.4	3.4	51.0
	87	11	7.6	7.6	58.6
	88	7	4.8	4.8	63.4
	89	10	6.9	6.9	70.3
	90	18	12.4	12.4	82.8
	91	4	2.8	2.8	85.5
	92	7	4.8	4.8	90.3
	93	3	2.1	2.1	92.4
	94	1	.7	.7	93.1
	95	1	.7	.7	93.8
	96	5	3.4	3.4	97.2
	97	1	.7	.7	97.9
	98	3	2.1	2.1	100.0
	Total	145	100.0	100.0	

Now it is clear that in cases where we have an extensive range of values it is difficult to interpret the output. Therefore you can recode the variables so that you get ranges. In the case of grades you can **recode** into categories of grades:

<65

65-74

75-84

85-94

95-100

This is done under the Transform tab. Since we may later want to use the scaled grades as they are we should recode into new variables. We will name these variables as follows:

Mgrade = mathgr Sgrade = sciegr GPA = average

Then we can rerun the data for the mathgr, sciegr and average and will get the following

FREQUENCIES VARIABLES=mathgr sciegr average /ORDER=ANALYSIS.

Frequencies

	Notes	
Output Created Comments		05-Mar-2013 13:06:19
Input	Data	F:\111SPSS workshops\sample with labels and values.sav
	Active Dataset	DataSet1
	Filter	<none></none>
	Weight	<none></none>
	Split File	<none></none>
	N of Rows in Working Data File	145
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data.
Syntax		FREQUENCIES VARIABLES=mathgr sciegr average /ORDER=ANALYSIS.
Resources	Processor Time	00 00:00:00.000
	Elapsed Time	00 00:00:00.000

[DataSet1] F:\111SPSS workshops\sample with labels and values.sav

Statistics						
		mathgr	sciegr	average		
Ν	Valid	145	145	145		
	Missing	0	0	0		

Frequency Table

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	9	6.2	6.2	6.2
	2	34	23.4	23.4	29.7
	3	32	22.1	22.1	51.7
	4	46	31.7	31.7	83.4
	5	24	16.6	16.6	100.0
	Total	145	100.0	100.0	

sciegr								
		Frequency	Percent	Valid Percent	Cumulative Percent			
Valid	1	4	2.8	2.8	2.8			
	2	11	7.6	7.6	10.3			
	3	34	23.4	23.4	33.8			
	4	72	49.7	49.7	83.4			
	5	24	16.6	16.6	100.0			
	Total	145	100.0	100.0				

average								
		Frequency	Percent	Valid Percent	Cumulative Percent			
Valid	2	11	7.6	7.6	7.6			
	3	49	33.8	33.8	41.4			
	4	75	51.7	51.7	93.1			
	5	10	6.9	6.9	100.0			
	Total	145	100.0	100.0				

Descriptives

Once your data is in SPSS you may want to be able to characterize the set as to central tendency (including the mean, median and mode) and variability (standard deviation, range).

Central Tendency

MEAN. Score that represents the balance point of the distribution. The sum of all scores divided by the number of scores.

MEDIAN. The middle score in the distribution; 50% of scores fall above this score and 50% fall below.

MODE. The mode is the score which appears the most frequently. Distributions may be bi- or tri-modal.

Variability

RANGE. The range is the total distance in scores from the highest to the lowest score. It can be affected by spurious scores and outliers; unusually low or high scores.

INTERQUARTILE RANGE. The IQ provides a more stable measure of the variability by using the 75% and 25% percentile scores to determine the range.

VARIANCE AND STANDARD DEVIATION. The most widely used and respected measures of variability or spread. They are based on squared deviation scores for the differences between each score and the mean. Variance and Standard Deviation are central to many inferential statistical tests. In some cases where means are too close to reveal significant differences variability among groups can be exceedingly high and lead to interesting conclusions.

The descriptives can be found at Analyze/Descriptive Statistics/Descriptives. This opens a window that looks much like that for the Frequencies. Choose and move over the three variables: mgrade, sgrade and GPA that are scaled variables and then click on options to choose the output you want.

DESCRIPTIVES VARIABLES=mgrade sgrade GPA /STATISTICS=MEAN STDDEV MIN MAX.

Descriptives

	Notes	
Output Created Comments		05-Mar-2013 13:09:32
Input	Data	F:\111SPSS workshops\sample with labels and values.sav
	Active Dataset	DataSet1
	Filter	<none></none>
	Weight	<none></none>
	Split File	<none></none>
	N of Rows in Working Data File	145
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	All non-missing data are used.
Syntax		DESCRIPTIVES VARIABLES=mgrade sgrade GPA
		ĬSTATISTICS=MEAN STDDEV MIN MAX.
Resources	Processor Time	00 00:00:00.000
	Elapsed Time	00 00:00:00.000

[DataSet1] F:\111SPSS workshops\sample with labels and values.sav

Descriptive Statistics						
	Ν	Minimum	Maximum	Mean	Std. Deviation	
Mgrade	145	45	100	80.70	13.042	
sgrade	145	50	100	84.86	9.980	
GPA	145	65	98	85.04	6.864	
Valid N (listwise)	145					

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