

Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

Recap

Researching Crime and Justice Session 12: Descriptives Stats and Graphs Tutorial

Jose Pina-Sánchez

Tutorial Goals

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Univariate Analysis in SPSS

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Graphs in SPSS

- We are going to practice data analysis using SPSS
 - We will explore real research questions
 - $-\,$ Using real data, the teaching version of the CSEW
- We will practice using simple descriptive stats and tables
 - Univariate stats such as the mean, range and frequency tables
 - Bivariate analyses such as crosstabs and correlation coefficients
- And graphs too (briefly)
 - Univariate and bivariate

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- And graphs too (briefly)
 - Univariate and bivariate
- I am going to go over different procedures in SPSS
 - But it is really important that you replicate these procedures yourselves
 - And to make sure you understand what we are doing



Getting Started with SPSS

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• First, we need to install SPSS

- Which can be accessed from the IT Store (see announcement)
- Make sure you download the right version (Windows/Apple)
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- We also need to download the teaching version of the CSEW
 - You learnt how to do so using the UK Data Service with Kisby
 - To save time we are just going to get it from Minerva
 - Go to 'Learning Resources', open the folder 'Session 12: Descriptive Statistics'
 - Download the dataset (the '.sav' file)



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 - To save time we are just going to get it from Minerva
 - Go to 'Learning Resources', open the folder 'Session 12: Descriptive Statistics'
 - Download the dataset (the '.sav' file)
- Once saved you can open the dataset
 - Either from SPSS: Click on File (at the top-left corner) \rightarrow Open \rightarrow Data
 - $-\,$ Or simply by double-clicking on the dataset file

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• Let's practice running some univariate analyses

The simplest way to start exploring the content of a dataset

Univariate Analysis

- Remember, the first step to secondary data analysis is familiarising ourselves with the data
- We can use the CSEW and univariate stats to explore the following research questions
 - RQ1: What is the ethnic distribution of the CSEW sample?
 - RQ2: What is the proportion of people who experienced a crime in the last 12 months?
 - RQ3: How safe do people feel walking alone after dark?



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- First we need to find the variables providing information on those three questions
- To do so the Variable View in SPSS is really useful
 - In SPSS click on Variable View, on the bottom-left corner
 - We are mostly interested in the variables' Name, Label, Values, and Measure (see next slide)

Univariate Analysis

- $-\,$ You can expand the Label and Values columns to read them more clearly
- Once you have identified the three variables to explore the research questions consider their level of measurement
 - Remember, this is a key consideration in choosing the right technique
 - However, this version of the CSEW does not differentiate between Nominal and Ordinal variables
 - We can change this ourselves
 - Look at the Values used to code each of the three variables
 - $-\,$ If it says Nominal but should be Ordinal go ahead and change it



The Variable View Display

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Recap

• Let's explore the first research question

- What is the ethnic distribution of the CSEW sample?
- Let's try two approaches, one requesting SPSS to produce a frequency table, another based on the calculation of some descriptive stats

Univariate Analysis: RQ1

- Let's try calculating some descriptive stats first
 - Click on Analyze at the top menu \rightarrow Descriptive Statistics \rightarrow Descriptives
 - In the menu that opens up, double click on ethgrp2a then OK
 - Interpret the output; does it make sense?
 - See the next three slides for a visual description of this process
 - Let's try a different technique; close the output window (no need to save it)



Univariate Analysis: RQ1

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Univariate Analysis: RQ1

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19	136613	110.0	3.00	1.00	2.00	1.00	2.00	1.00	3.00	5.00	1.00	3.00	1.00
20	136842	090.0	1.00	2.00	7.00		1.00	2.00	1.00	3.00	1.00	4.00	1.00
21	147439	070.0	3.00	2.00	7.00		2.00	1.00	4.00	6.00	1.00	2.00	1.00
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Univariate Analysis: RQ1

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DESCRIPTIVES VARIABLES=ethgrp2a /STATISTICS=MEAN STDDEV MIN MAX.

Descriptives

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Descriptive Statistics

	Ν	Minimum	Maximum	Mean	Std. Deviation
Ethnic Group (5 categories)	8833	1.00	5.00	1.2443	.77937
Valid N (listwise)	8833				

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Descriptive	Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Ethnic Group (5 categories)	8833	1.00	5.00	1.2443	.77937
Valid N (listwise)	8833				

- Ethnicity is an example of a categorical/nominal variable
 - I.e. the different categories that compose it cannot be ranked
 - As such it only makes sense to describe it using tables

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Recap

- Let's now use a frequency table to explore how is ethgrp2a distributed
 - Click on Analyze \rightarrow Descriptive Statistics \rightarrow Frequencies
 - Double click on ethgrp2a then OK
 - Notice how this process is identical to what we did before only selecting *Frequencies* rather than *Descriptives*

Univariate Analysis: RQ1

- Interpret the output; does it make sense? Can you answer RQ1? Can you say something about the quality of the sample? Is it representative of the UK population?
- In the table you have produced, can you see what is the difference between *Percent* and *Valid Percent*?



Univariate Analysis: RQ1

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19	136613110.0	3.00	1.00	2.00	1.00	2.00	1.00	3.00	5.00	1.00	3.00	1.00	
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Univariate Analysis: RQ1

Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

Recap

FREQUENCIES VARIABLES=ethgrp2a /ORDER=ANALYSIS.

Frequencies

	Statistics								
Ethni	Ethnic Group (5 categories)								
N	Valid	8833							
	Missing	10							

Ethnic Group (5 categories)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	White	7954	89.9	90.0	90.0
	Mixed	88	1.0	1.0	91.0
	Asian or Asian British	403	4.6	4.6	95.6
	Black or Black British	288	3.3	3.3	98.9
	Chinese or Other	100	1.1	1.1	100.0
	Total	8833	99.9	100.0	
Missing	System	10	.1		
Total		8843	100.0		

Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

Recap

• Let's explore our second research question

— What is the proportion of people who experienced a crime in the last 12 months?

Univariate Analysis: RQ2

- The target variable (*bcsvictim*) is a binary variable
 - I.e. a categorical/nominal variable with only two categories
- For these type of variables you can also use descriptive stats
 - $-\,$ If coded as a (0,1) variable, then the mean represents the proportions of 1s
- Which can be obtained both from the *Descriptives* and the *Frequencies* menu



Univariate Analysis: RQ2

Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

 Recap

- Let's explore this question using some of the options available in the *Frequencies* menu
 - Go to Analyze \rightarrow Descriptive Statistics \rightarrow Frequencies
 - Drag (*bcsvictim*) into the right box
 - Within the Frequencies menu click on Statistics
 - Click on the Mean, Minimum, and Maximum
 - $-\,$ Back in the $Frequencies\,$ menu you can also click on Charts and request a Bar-chart
 - Click on OK and interpret your output
 - What is the proportion of people who experienced a crime in the last 12 months?
 - Can you find a way to use percentages in the y-axis of your bar-chart?



Univariate Analysis: RQ3

Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

- Let's now look at the third research question:
 - How safe do people feel walking alone after dark?
 - Find the target variable
 - Identify its level of measurement
 - Decide whether you would use a frequency table or some descriptive stats, or both
 - You now know how to do this, so go ahead and give it a try
 - Interpret your results; can you answer RQ3?
 - If you used a frequency table, did you notice the difference between *Percent* and *Valid Percent*? Which one would you use to report your findings?
 - If you used descriptive statistics, what do you make of them? Can you use them to answer RQ3? It is possible but tricky to use descriptive statistics with ordinal variables, that is why we normally use tables instead

Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

Recap

• Univariate analyses are straightforward and useful

- But cannot tell us anything on the relationship between variables

Bivariate Analysis

- E.g. Is crime victimisation associated with fear of crime?
- To do so we need bivariate (and multivariate) techniques
- We are going to practice using three common bivariate analyses
 - <u>Crosstabs</u>: To be used with categorical and ordinal variables without too many categories
 - Comparison of means: Used to calculate the mean of a scale, ordinal, or binary variable for the different categories in another categorical/binary variable
 - <u>Correlation coefficients</u>: Normally used between scale variables (Pearson's), but there are other options available using ordinal (Spearman's) variables

Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

Recap

- Let's use these three bivariate techniques to explore the following research questions
 - RQ4: Are there any gender differences in identifying 'the main cause of crime in Britain'?

Bivariate Analysis

- RQ5: Which ethnic group is more likely to be victimised?
- RQ6: Is fear of 'having your home broken into' associated with respondents' age?
- As before, identify first the variables that you will need to explore those questions
 - Look at the coding of their Values
 - And update the level of *Measurement* if necessary



Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

 Recap

• Are there any gender differences in identifying 'the main cause of crime in Britain'?

Bivariate Analysis: RQ4

- We can explore that question using a crosstab
 - Go to Analyze \rightarrow Descriptive Statistics \rightarrow Crosstabs
 - Drag cause2m to the Row box, and sex to the Column box, click OK
 - Interpret the output; can you answer the research question?
 - Go back to Analyze \rightarrow Descriptive Statistics \rightarrow Crosstabs
 - Before pressing OK go to Cells on the right margin of the menu
 - Make sure you tick Column Percentages before pressing Continue and OK again
 - See the next two slides for a visual description of this process
 - Is the output easier to interpret now? Can you answer the question now?



Bivariate Analysis: RQ4

Tutorial Goals

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Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

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Bivariate Analysis: RQ4

Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

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Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

Recap

- Which ethnic group is more likely to be victimised?
- We can explore this question using a crosstab (as before), but it might be neater to use a comparison of means

Bivariate Analysis: RQ5

- Go to Analyze \rightarrow Compare Means \rightarrow Means
- Drag bcsvictim to the Dependent List box, and ethgrp2a to the Layer box, then click OK
- See the next two slides for a visual description of this process
- Interpret the output; can you answer the research question?



Bivariate Analysis: RQ5

Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

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Bivariate Analysis: RQ5

Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

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Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

Recap

Bivariate Analysis: RQ6

- Is fear of 'having your home broken into' associated with respondents' age?
- Let's explore this question using a crosstab first
 - You know how to do that, so go ahead and give it a try (see procedure in slide 20)
 - Depending on which variable is set to Row and which to Column you might need to change where you want your Percentages in the Cells menu
 - Can you answer the research question? Is it easy to interpret the output?



Tutorial Goals

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Recap

- Let's try answering RQ6 using a correlation coefficient now
 - Go to Analyze \rightarrow Correlate \rightarrow Bivariate
 - Drag agegrp7 and wburgl into the Variables box
 - Untick *Pearson* and tick *Spearman* instead (Do you know why we are doing this?), press *OK*

Bivariate Analysis: RQ6

- See the next two slides for a visual description of this process
- Can you interpret this table? The key cell is the intersection of *Correlation Coefficient* across the two different variables
- Is the coefficient pointing at a positive or negative association? Is it a strong or weak association?
- Can you answer RQ6?
- Can you see how this procedure provides a clearer answer than the exploration we undertook using a crosstab?



Bivariate Analysis: RQ6

Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

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Bivariate Analysis: RQ6

Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

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Bivariate Analysis: RQ6

Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

Recap

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Nonparametric Correlations

Correlations

			Age group (7 bands)	How worried about having your home broken into?
Spearman's rho	Age group (7 bands)	Correlation Coefficient	1.000	.021
		Sig. (2-tailed)		.326
		N	8843	2193
	How worried about	Correlation Coefficient	.021	1.000
	having your home broken into?	Sig. (2-tailed)	.326	
		N	2193	2193

Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

Recap

• We are now going to practice how to build graphs in SPSS

Graphs

• Remember that we still need to think about levels of measurement

One-Dimensional Figures

Nominal	Ordinal	Scale
Bar/Piecharts	Bar/Piecharts & Hist.	Hist. & Density Function

Two-Dimensional Figures

	Nominal	Ordinal	Scale
Nominal	Bar/Piecharts	Histograms	Boxplot
Ordinal	Histograms		Box/Scatterplot
Scale	Boxplot	Box/Scatterplot	Scatterplot



Tutorial Goals

Accessing SPSS

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Recap

Graphs in SPSS: Using Analyze

- There are different ways of drawing graphs in SPSS
- We can request them using some of the different options available as part of different *Analyze* commands
 - These are specific types of graphs available for specific commands
 - Piecharts, barplots and histograms are available under Frequencies (within Descriptive Statistics)
 - Give it a try, see whether you can represent respondents' level of education graphically
 - Hint: within the Frequencies menu click on Charts
 - Would you use a histogram or a barchart? Why? Try them both and compare
 - Get a piechart too, and compare it to your previous barchart; Which one takes you longer to interpret?

Graphs in SPSS: Using Analyze

Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

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Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

Recap

Graphs in SPSS: the *Chart Builder*

- $\bullet\,$ Let's now learn how to make graphs using the $Chart\,Builder$
 - This is a more complex path, but is also the most useful
 - $-\,$ Once you know how it works, you can use it for all kinds of graphs
- Let's get started by producing the same barchart that we obtained using $Analyze \Rightarrow DescriptiveStatistics \Rightarrow Frequency$
 - Go to $Graphs \Rightarrow ChartBuilder \Rightarrow Bar$
 - In the Gallery menu choose Bar
 - Double click on the first barchart template (the one with brown bars)
 - Then drag educat3 to the x-axis

Tutorial Goals

Accessing SPSS

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Graphs in SPSS

Recap

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Chart Builder: Univariate Barcharts

Chart Builder: Univariate Barcharts

Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS





Chart Builder: Univariate Barcharts



Respondent education (5 categories)



Tutorial Goals

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Bivariate Analysis in SPSS

Graphs in SPSS

Recap

Chart Builder: Univariate Graphs

- This version of the CSEW includes a couple of interesting scale variables, eg. *Worry about being a victim of crime*
 - This is an index aggregating a set of variables from the questionnaire tapping on different dimensions of the same concept
 - What type of graph would you use to look at the distribution of this variable?
 - $-\,$ There are two types of graphs within the eight choices available in the $Graph \ Builder$ that would work equally well
 - $-\,$ Use the first table in slide 31 to inform your choice

Tutorial Goals

Accessing SPSS

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Recap

Chart Builder: Bivariate Graphs

- Let's now look at the relationship between two variables using graphs
- To do so let's explore the following research questions
 - RQ7: Are women more highly educated than men?
 - RQ8: Are women more worried about crime than men?
 - RQ9: Are perceptions of anti-social behaviour in their neighbourhood uniform across ethnic groups?
- As before, start by identifying the variables that you will need, and how they are measured

Bivariate Graphs: RQ7

Tutorial Goals

Accessing SPSS

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Graphs in SPSS

- How would you explore RQ7 (Are women more highly educated than men?) using graphs?
 - $-\,$ The following slide shows one way of doing so, see if you can replicate it using the $Chart \ Builder$
 - Make sure you place *educat3* in the x-axis
 - $-\,$ Figure out in which of the remaining empty boxes you need to place sex
 - Lastly consider whether you want to report absolute (*Counts*) or relative (*Percentages*) measures
 - $-\,$ This can be modified in the Statistics menu, on the right-hand side of the $Chart\ Builder$

Bivariate Graphs: RQ7

Tutorial Goals

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Bivariate Graphs: RQ8

Tutorial Goals

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Graphs in SPSS

- RQ8: Are women more worried about crime than men?
 - This is the relationship between a scale and a nominal (binary) variable
 - We then need a different type of graph to plot this relationship
 - The following slide shows one way of doing so using a bivariate histogram
 - See if you can replicate it using the Chart Builder
 - Can you answer RQ8?

Bivariate Graphs: RQ8

Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

Recap



Adult number 1 (respondent): Sex

Bivariate Graphs: RQ9

Tutorial Goals

Accessing SPSS

Univariate Analysis in SPSS

Bivariate Analysis in SPSS

Graphs in SPSS

- RQ9: Are perceptions of anti-social behaviour in their neighbourhood uniform across ethnic groups?
 - This is the relationship between a scale and a nominal variable with more than two categories
 - $-\,$ Can you figure out what kind of graph could be use to look at that? (see slide 31)
 - You can see it plotted in the next slide
 - Try to replicate it using the Chart Builder
 - After that we will see how to interpret it



Tutorial Goals

Accessing SPSS

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Bivariate Analysis in SPSS

Graphs in SPSS

Recap

GGraph



Bivariate Graphs: RQ9



Tutorial Goals

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Bivariate Analysis in SPSS

Graphs in SPSS

Recap

• Interpreting boxplots

- The boxes and whiskers represent the distribution of the scale variable (*Anti-social behaviour in their neighbourhood*)

Bivariate Graphs: Boxplots

- Separately for each of the categories of the nominal variable (*Ethnic group*)
- The boxes represent the inter-quartile range (i.e. the range covered from the top 25% to 75% values in the distribution)
- The line dividing the box is the median of the distribution
- The dots represent outliers (i.e. extreme cases), defined as 1.5 of the box-length away or further from the interquartile range
- $-\,$ and the length of the whiskers represents values higher than the 25% or lower than the 75% but not extreme enough to be considered outliers
- Can you answer RQ9?
 - Would you then say there is a relationship between ethnicity and perceived anti-social behaviour?

- Tutorial Goals
- Accessing SPSS
- Univariate Analysis in SPSS
- Bivariate Analysis in SPSS
- Graphs in SPSS
- Recap

- We have practised some key data analysis concepts and techniques
 - The different levels of measurement used in variables
 - Various univariate and bivariate statistics, tables and graphs

- $-\,$ We have seen how easy is to use these in SPSS
- And how with just some basic data analysis knowledge we can explore lots of important research questions
- To review and learn more about the content of today's workshop
 - See Bryman (2016) Chapter 16
 - Have a look as well at the several SPSS tutorials available online
 - I recommend particularly the set of videos uploaded on youtube by the LSE (see for example this one on how to describe and visualise a single continuous variable)
- You are now prepared for the quiz
 - You will have questions on the same concepts and techniques that we have practised today
 - Only using a different dataset (uploaded under 'Assessments')
 - Graphs are not part of the quiz