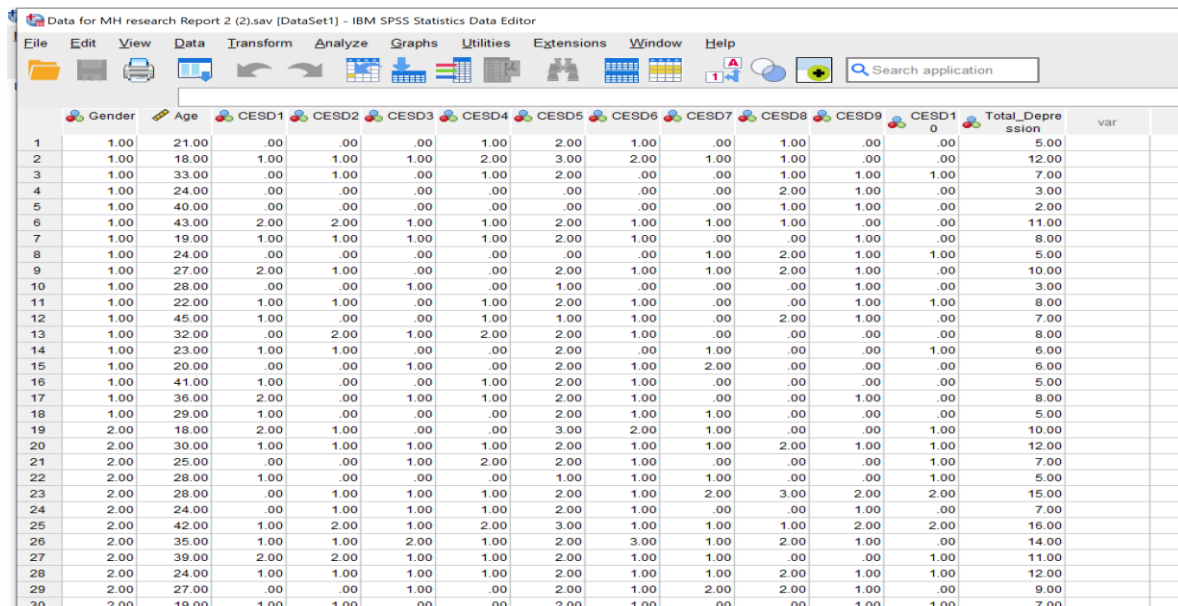


Independent (or unrelated) t-test on SPSS.

So in this example, the aim of the study is to explore if there are gender differences in depression scores using the Center for Epidemiologic Studies Depression Scale Revised (CESD-R10). With this scale you calculate the scores for the 10 items (Reverse scoring Question 5 and 8 – this has ALREADY been done). As you can see from the image below (and the document) the total depression score for all of the participants has already been calculated. A score of 10 or more is considered depressed and the higher the score the more depressive symptoms that individual is experiencing.

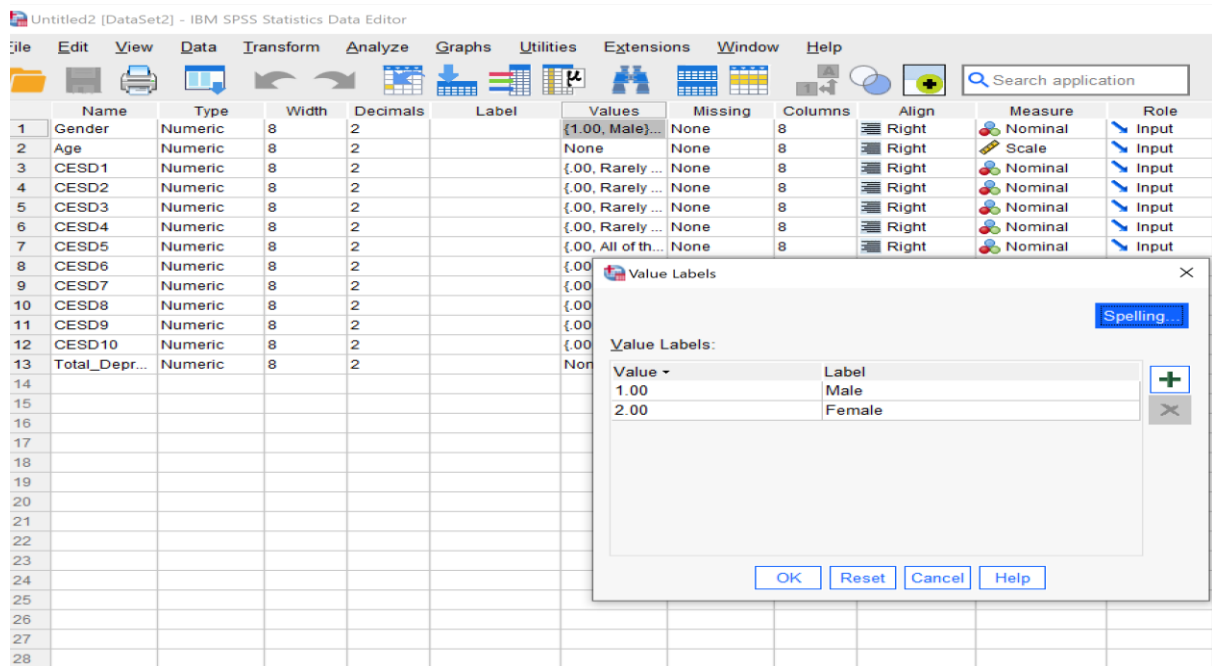
The aim of the study is to investigate if there are gender differences in depression scores in the sample obtained.



	Gender	Age	CESD1	CESD2	CESD3	CESD4	CESD5	CESD6	CESD7	CESD8	CESD9	CESD10	Total_Depression	var
1	1.00	21.00	.00	.00	.00	1.00	2.00	1.00	.00	1.00	.00	.00	5.00	
2	1.00	18.00	1.00	1.00	1.00	2.00	3.00	2.00	1.00	1.00	.00	.00	12.00	
3	1.00	33.00	.00	1.00	.00	1.00	2.00	.00	.00	1.00	1.00	1.00	7.00	
4	1.00	24.00	.00	.00	.00	.00	.00	.00	.00	2.00	1.00	.00	3.00	
5	1.00	40.00	.00	.00	.00	.00	.00	.00	.00	1.00	1.00	.00	2.00	
6	1.00	43.00	2.00	2.00	1.00	1.00	2.00	1.00	1.00	1.00	.00	.00	11.00	
7	1.00	19.00	1.00	1.00	1.00	1.00	2.00	1.00	.00	.00	1.00	.00	8.00	
8	1.00	24.00	.00	.00	.00	.00	.00	.00	1.00	2.00	1.00	1.00	5.00	
9	1.00	27.00	2.00	1.00	.00	.00	2.00	1.00	1.00	2.00	1.00	.00	10.00	
10	1.00	28.00	.00	.00	1.00	.00	1.00	.00	.00	.00	1.00	.00	3.00	
11	1.00	22.00	1.00	1.00	.00	1.00	2.00	1.00	.00	.00	1.00	1.00	8.00	
12	1.00	45.00	1.00	.00	.00	1.00	1.00	1.00	.00	2.00	1.00	.00	7.00	
13	1.00	32.00	.00	2.00	1.00	2.00	2.00	1.00	.00	.00	.00	.00	8.00	
14	1.00	23.00	1.00	1.00	.00	.00	2.00	.00	1.00	.00	.00	1.00	6.00	
15	1.00	20.00	.00	.00	1.00	.00	2.00	1.00	2.00	.00	.00	.00	6.00	
16	1.00	41.00	1.00	.00	.00	1.00	2.00	1.00	.00	.00	.00	.00	5.00	
17	1.00	36.00	2.00	.00	1.00	1.00	2.00	1.00	.00	.00	1.00	.00	8.00	
18	1.00	29.00	1.00	.00	.00	.00	2.00	1.00	1.00	.00	.00	.00	5.00	
19	2.00	18.00	2.00	1.00	.00	.00	3.00	2.00	1.00	.00	.00	1.00	10.00	
20	2.00	30.00	1.00	1.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00	1.00	12.00	
21	2.00	25.00	.00	.00	1.00	2.00	2.00	1.00	.00	.00	.00	.00	7.00	
22	2.00	28.00	1.00	.00	.00	.00	1.00	1.00	1.00	.00	.00	1.00	5.00	
23	2.00	28.00	.00	1.00	1.00	1.00	2.00	1.00	2.00	3.00	2.00	2.00	15.00	
24	2.00	24.00	.00	1.00	1.00	1.00	2.00	1.00	.00	.00	1.00	.00	7.00	
25	2.00	42.00	1.00	2.00	1.00	2.00	3.00	1.00	1.00	1.00	2.00	2.00	16.00	
26	2.00	35.00	1.00	1.00	2.00	1.00	2.00	3.00	1.00	2.00	1.00	.00	14.00	
27	2.00	39.00	2.00	2.00	1.00	1.00	2.00	1.00	1.00	.00	.00	1.00	11.00	
28	2.00	24.00	1.00	1.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00	1.00	12.00	
29	2.00	27.00	.00	.00	1.00	.00	2.00	1.00	2.00	2.00	1.00	.00	9.00	
30	2.00	19.00	1.00	1.00	.00	.00	2.00	1.00	.00	.00	1.00	1.00	7.00	

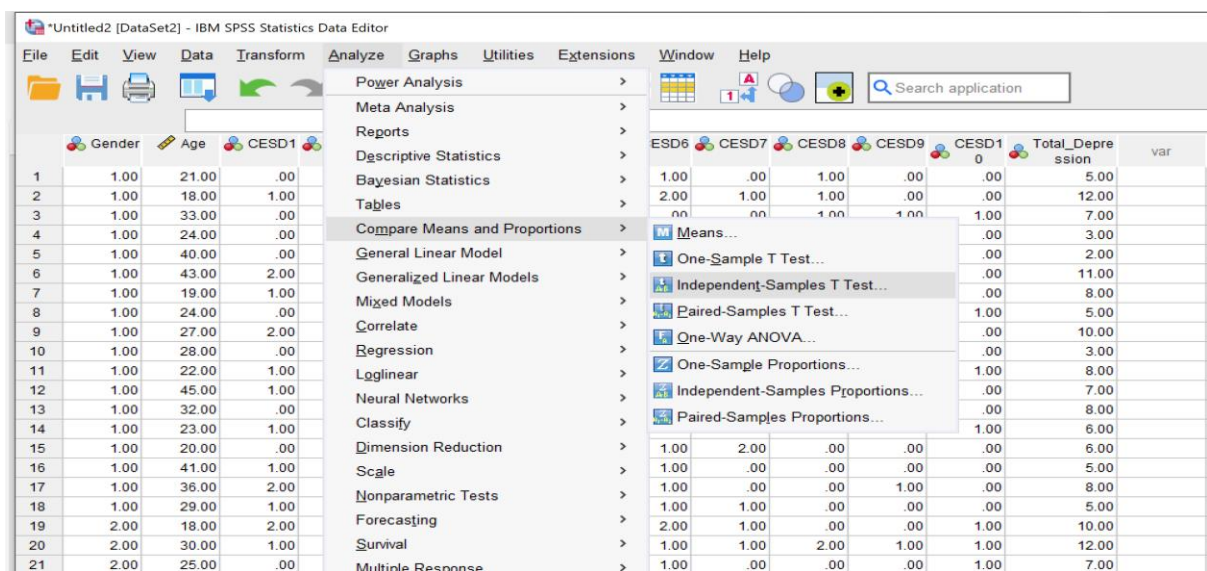
So as noted, we have individual scores of each question from each participant, the Total Depression Scores (which will be the DV), we also have the age of the participant, and the Gender of the participant (the IV) in this case – 1 = Male and 2 = Female.

By clicking variable view on SPSS (bottom of the screen) the values column gives a description of what the numbers mean if applicable. As you can for the gender column (only) the value of 1 represents Male and the value of 2 represents Female. This needed to be manual imputed into SPSS by clicking the value button and imputing these values in.

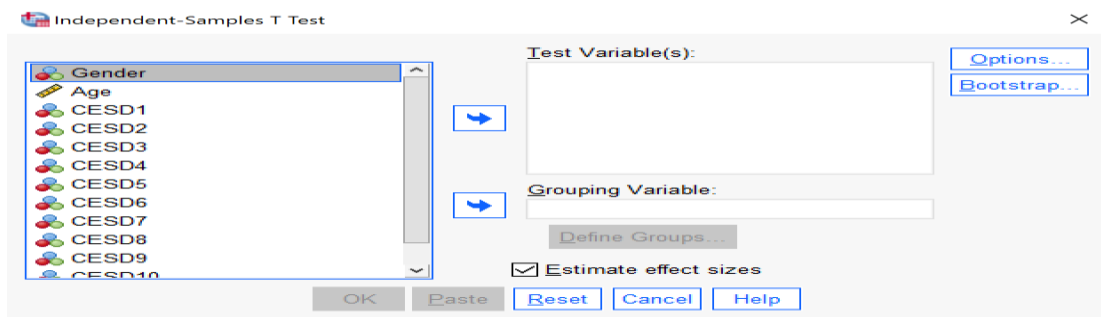


So now we have our data in good order. We can run the analysis.

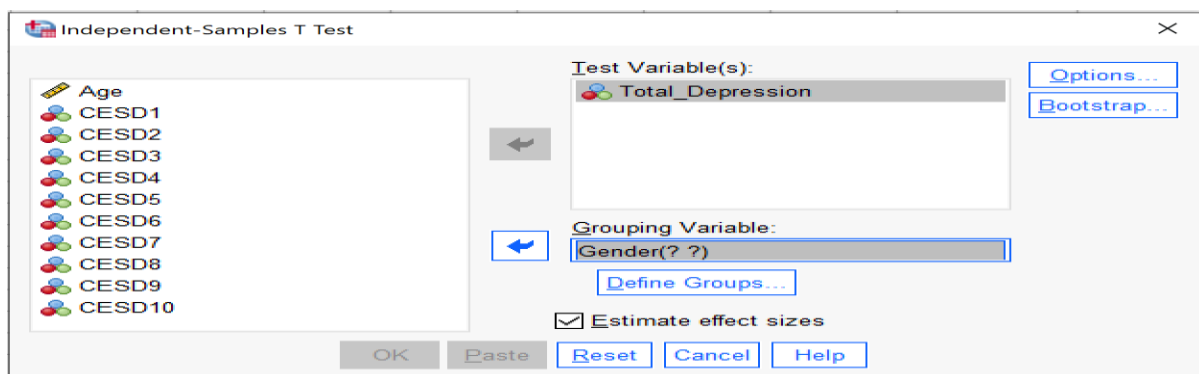
So back in Data view, go to Analyse, then click compare means and proportions, then Independent Samples -T-Test (as below).



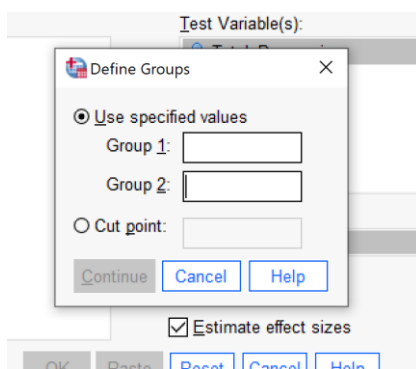
This will then give you the following dialogue box.



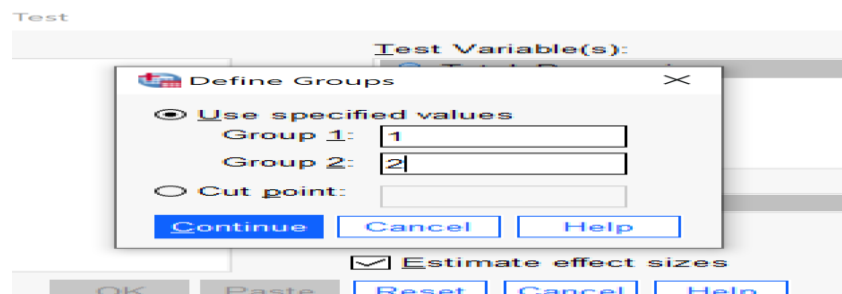
In the box on the left, there is the list of variables in your data file, you have to tell SPSS which one represents the Test Variable(s) and the Grouping variable. The test variable is basically the dependent variable in your study, in this case, the total depression scores. So select this by clicking over total_depression and then move it to the test variable(s) box using the arrow button next to this box. The grouping variable is the independent variable in your study, in this case, this is gender so select gender and move this to the Grouping Variable box using the arrow button next to this box:



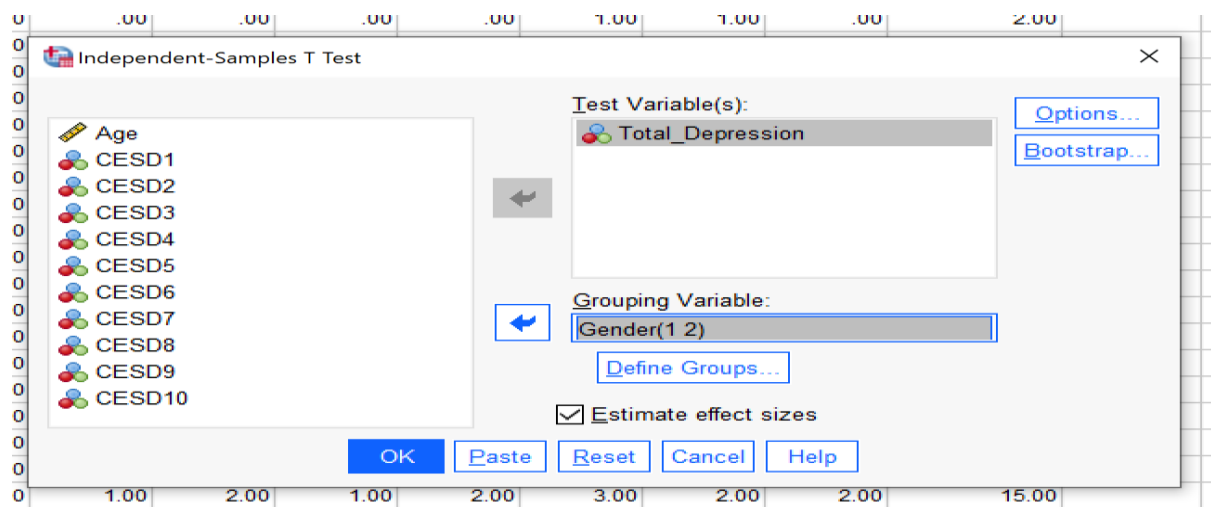
Notice that now, the 'define groups' button has become active – you need to specify the values used for each group, so click on this button to get the following dialogue box:



This is quite simple, group 1 (Males) is represented by the value '1', group 2 (Females) is represented by the value '2'. So simply type in these values in the two boxes and click continue:



This will return you to the main dialogue box



To get SPSS to do the t-test, just click **OK** and SPSS will do the analysis. The first part of the output is a table of **Group Statistics**: whichs allow you to see the direction of the difference between the two groups (Males and Females). We can see that, the males (group '1') have a lower mean total depression score (Mean = 6.61, SD = 2.73) than the female (group '2', mean score of 10.42, SD = 3.53).

➔ T-Test

Group Statistics					
	Gender	N	Mean	Std. Deviation	Std. Error Mean
Total_Depression	Male	18	6.6111	2.72545	.64240
	Female	12	10.4167	3.52803	1.01845

The next table contains the results of the t-test:

Independent Samples Test												
Levene's Test for Equality of Variances						t-test for Equality of Means						
		F		Sig.	t	df	Significance		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							One-Sided p	Two-Sided p			Lower	Upper
Total_Depression	Equal variances assumed	1.480		.234	-3.331	28	.001	.002	-3.80556	1.14260	-6.14606	-1.46505
	Equal variances not assumed				-3.160	19.497	.003	.005	-3.80556	1.20413	-6.32148	-1.28963

There are quite a lot of details in this table, most of which can be ignored. For your purposes, you just need to note the following:

1. The figures you need for your results are in the 'Equal variances assumed row' (the row highlighted in the above table).
2. you just need to note the values of 't', 'df' (the degrees of freedom) and 'sig (2-tailed)'

The 't' value (-3.331) is the test statistic. The degrees of freedom (*in this case 28*) is the figure that you need if you are going to check the significance of your result manually using the statistical tables. The sig (2-tailed) (*in this case .002*) value is the exact probability that your results occurred by chance alone

How do I check if the result is significant?

Look at the sig (2-tailed). The rule for interpreting this is simple: if your sig (2-tailed) value is less than or equal to .05, then the difference between your two groups is statistically significant. The value of sig here (.002) is less than .05 indicating a statistically significant result.

However, note that the sig value is for a two-tailed test (i.e. cases where the research hypothesis is two-tailed). What happens if you employed a one-tailed (directional) hypothesis. This is very simple, you can look at the "one sided significance" figure at the table above or you can just simple divide the two-tailed value by two. In this case, $.002/2 = .001$, again a significant result. Remember though it is important to check the means score so you can confirm the direction of the significance was in the direction you were predicting. So to conclude, the results of the t-test indicate that the difference between the two groups was statistically significant. To report the t-test results, just quote the t-value, the degrees of freedom (df), whether or not the significance level was less than .05 and whether a one or two-tailed test was employed. This can be done in just one sentence:

An unrelated t-test indicated that the difference between the two groups was statistically significant ($t = -3.331$, $df = 28$, $p = .002$, two-tailed test)

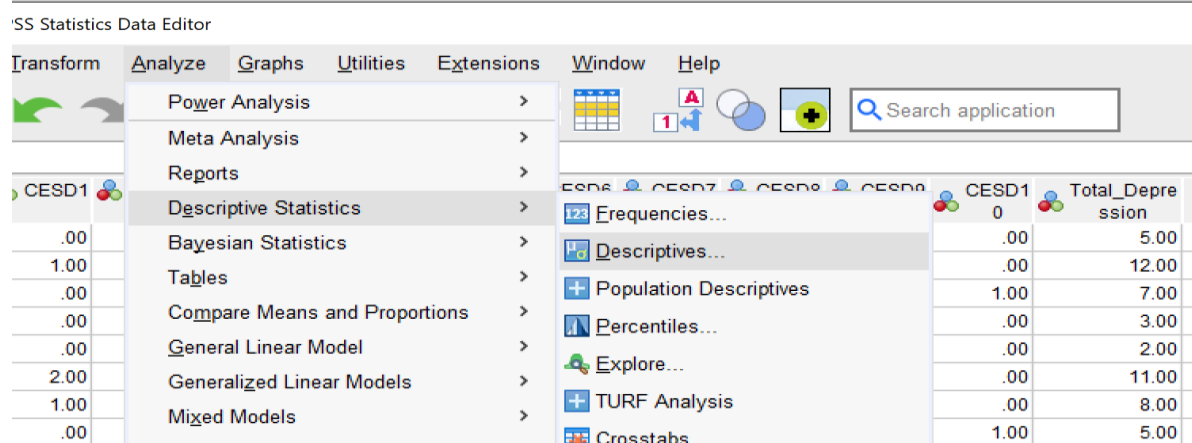
Checking for descriptive statistics in SPSS.

Another useful tool of SPSS is to check through the descriptive statistics, so this might give us additional useful information about the study (e.g. the mean age of the participants).

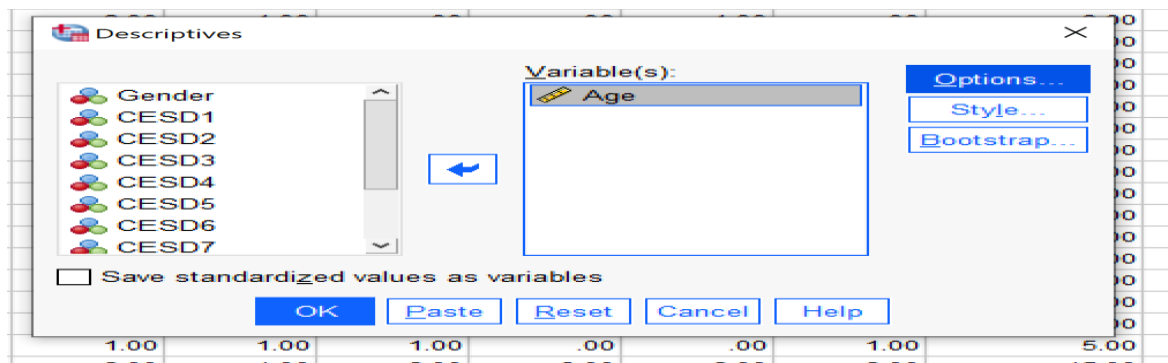
	Gender	Age	CESD1	CESD2	CESD3	CESD4	CESD5	CESD6	CESD7	CESD8	CESD9	CESD10	Total_Depression	var
1	1.00	21.00	.00	.00	.00	1.00	2.00	1.00	.00	1.00	.00	.00	5.00	
2	1.00	18.00	1.00	1.00	1.00	2.00	3.00	2.00	1.00	1.00	.00	.00	12.00	
3	1.00	33.00	.00	1.00	.00	1.00	2.00	.00	.00	1.00	1.00	1.00	7.00	
4	1.00	24.00	.00	.00	.00	.00	.00	.00	.00	2.00	1.00	.00	3.00	
5	1.00	40.00	.00	.00	.00	.00	.00	.00	.00	1.00	1.00	.00	2.00	
6	1.00	43.00	2.00	2.00	1.00	1.00	2.00	1.00	1.00	1.00	.00	.00	11.00	
7	1.00	19.00	1.00	1.00	1.00	1.00	2.00	1.00	.00	.00	1.00	.00	8.00	
8	1.00	24.00	.00	.00	.00	.00	.00	.00	1.00	2.00	1.00	1.00	5.00	
9	1.00	27.00	2.00	1.00	.00	.00	2.00	1.00	1.00	2.00	1.00	.00	10.00	
10	1.00	28.00	.00	.00	1.00	.00	1.00	.00	.00	.00	.00	.00	3.00	
11	1.00	22.00	1.00	1.00	.00	1.00	2.00	1.00	.00	.00	1.00	1.00	8.00	
12	1.00	45.00	1.00	.00	.00	1.00	1.00	1.00	.00	2.00	1.00	.00	7.00	
13	1.00	32.00	.00	2.00	1.00	2.00	2.00	1.00	.00	.00	.00	.00	8.00	
14	1.00	23.00	1.00	1.00	.00	.00	2.00	.00	1.00	.00	.00	1.00	6.00	
15	1.00	20.00	.00	.00	1.00	.00	2.00	1.00	2.00	.00	.00	.00	6.00	
16	1.00	41.00	1.00	.00	.00	1.00	2.00	1.00	.00	.00	.00	.00	5.00	
17	1.00	36.00	2.00	.00	1.00	1.00	2.00	1.00	.00	.00	1.00	.00	8.00	
18	1.00	29.00	1.00	.00	.00	.00	2.00	1.00	1.00	.00	.00	.00	5.00	
19	2.00	18.00	2.00	1.00	.00	.00	3.00	2.00	1.00	.00	.00	1.00	10.00	
20	2.00	30.00	1.00	1.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00	1.00	12.00	
21	2.00	25.00	.00	.00	1.00	2.00	2.00	1.00	.00	.00	.00	1.00	7.00	
22	2.00	28.00	1.00	.00	.00	.00	1.00	1.00	1.00	.00	.00	1.00	5.00	
23	2.00	28.00	.00	1.00	1.00	1.00	2.00	1.00	2.00	3.00	2.00	2.00	15.00	
24	2.00	24.00	.00	1.00	1.00	1.00	2.00	1.00	.00	.00	1.00	.00	7.00	
25	2.00	42.00	1.00	2.00	1.00	2.00	3.00	1.00	1.00	1.00	2.00	2.00	16.00	
26	2.00	35.00	1.00	1.00	2.00	1.00	2.00	3.00	1.00	2.00	1.00	.00	14.00	
27	2.00	39.00	2.00	2.00	1.00	1.00	2.00	1.00	1.00	.00	.00	1.00	11.00	
28	2.00	24.00	1.00	1.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00	1.00	12.00	
29	2.00	27.00	.00	.00	1.00	.00	2.00	1.00	2.00	2.00	1.00	.00	9.00	
30	2.00	19.00	1.00	1.00	.00	.00	2.00	1.00	.00	.00	1.00	1.00	7.00	

So here we have our data set again, but this time we want to find out descriptive statistics on the age of the participants.

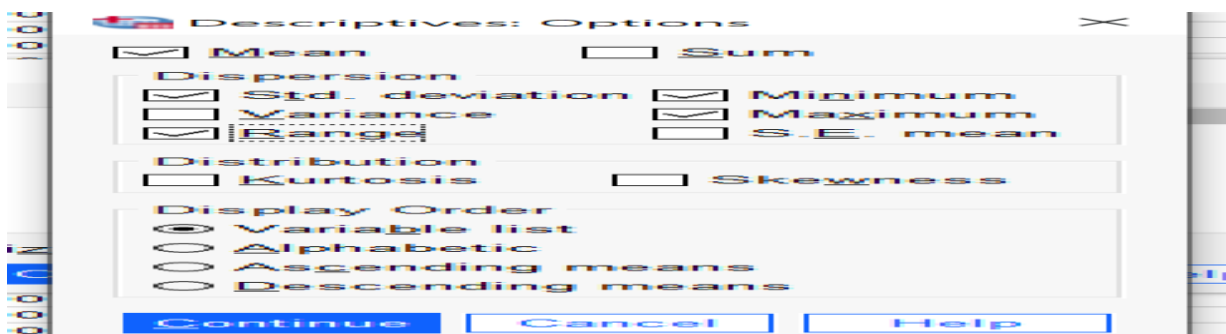
We click on analyse..... then descriptive statistics then descriptives.



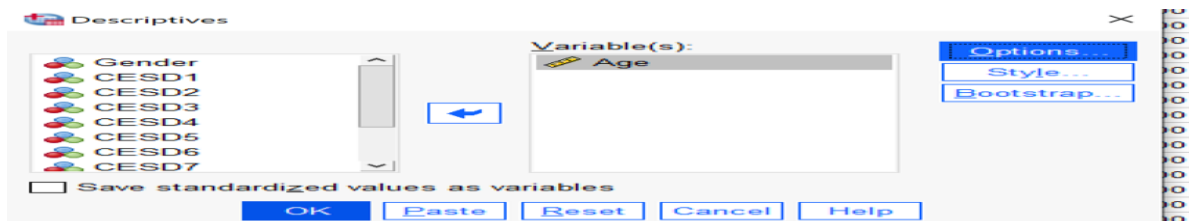
The following dialogue box below will pop up. So in this case we want to find out more descriptive information about the age of the participants. Select Age from the box on the left and using the arrow key in the centre place the age into the Variable(s) box and then click **options (NOT OK JUST YET!)**



The following dialog box will appear.



As default – Mean, Std. Deviation, Minimum and Maximum are selected. It is recommended to **also** select range and then click continue.



Now click ok – and the output should appear.

Descriptives

Descriptive Statistics						
	N	Range	Minimum	Maximum	Mean	Std. Deviation
Age	30	27.00	18.00	45.00	28.8000	8.08319
Valid N (listwise)	30					

Here you can see the mean age (28), Standard Deviation – (8.08), Minimum age (18), Maximum age (45) and the Range (27) of the 30 Participants.