

Research Methods

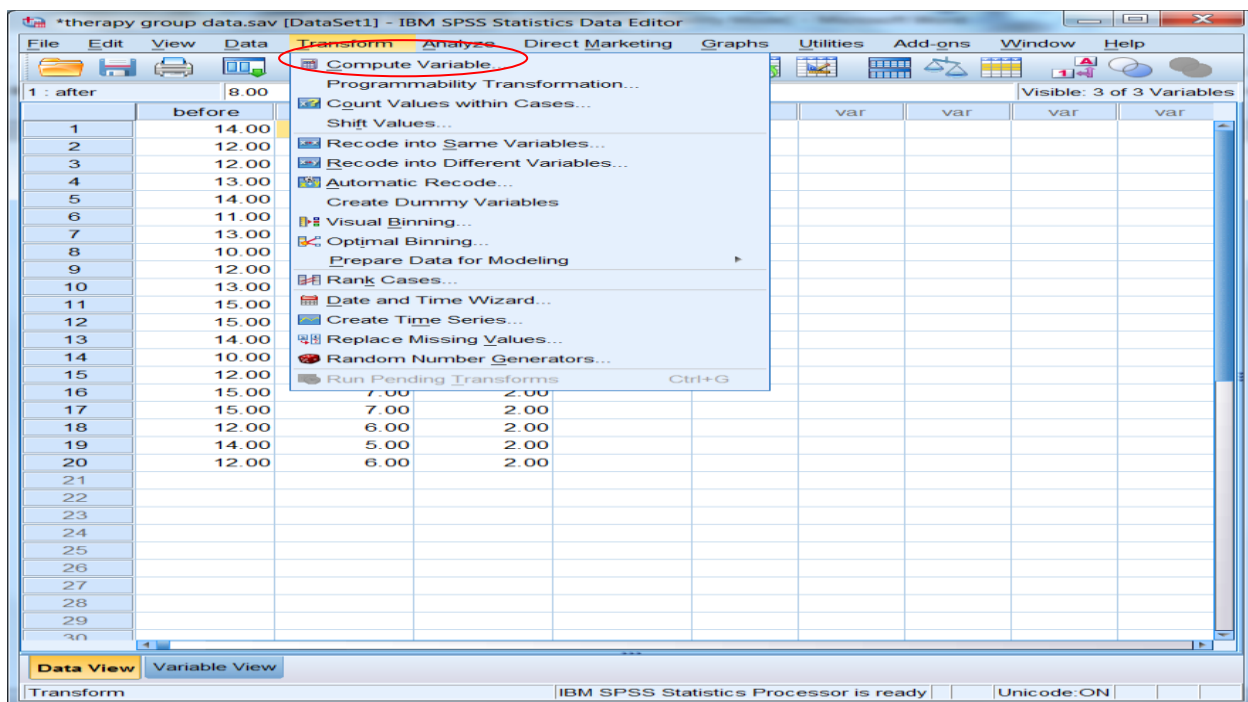
Tests of Difference

Unrelated t-test on SPSS

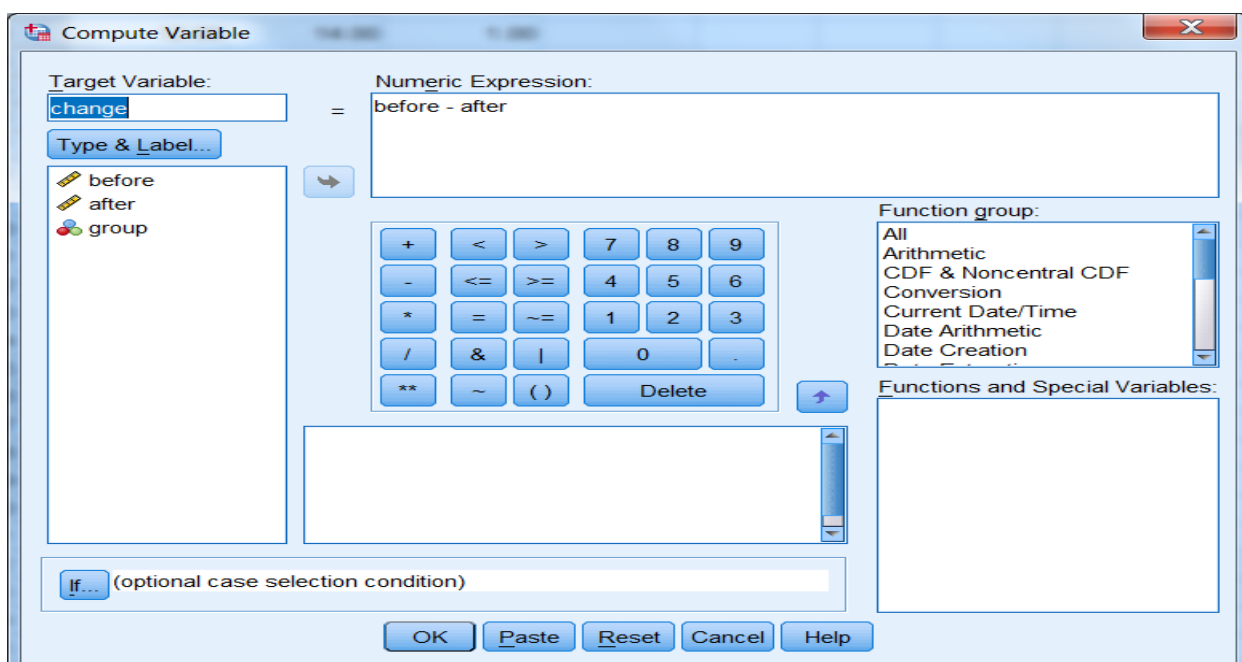
In session on descriptive statistics, we set up the basic data file containing each child's beginning and end of year well-being scores, plus the group to which each child was allocated ('therapy' versus 'counselling') and calculated the change in well-being scores.

How to compute the change

Select **Transform**, **Compute variable**



Name the target variable – **change**. Move '**before**' across to the right insert – (minus) and move the '**after**' across to the right. **OK**



	before	after	group	change	var	var	var	var	var
1	14.00	8.00	1.00	6.00					
2	12.00	7.00	1.00	5.00					
3	12.00	14.00	1.00	-2.00					
4	13.00	9.00	1.00	4.00					
5	14.00	6.00	1.00	8.00					
6	11.00	4.00	1.00	7.00					
7	13.00	13.00	1.00	.00					
8	10.00	3.00	1.00	7.00					
9	12.00	12.00	1.00	.00					
10	13.00	7.00	1.00	6.00					
11	15.00	12.00	2.00	3.00					
12	15.00	6.00	2.00	9.00					
13	14.00	6.00	2.00	8.00					
14	10.00	5.00	2.00	5.00					
15	12.00	5.00	2.00	7.00					
16	15.00	7.00	2.00	8.00					
17	15.00	7.00	2.00	8.00					
18	12.00	6.00	2.00	6.00					
19	14.00	5.00	2.00	9.00					
20	12.00	6.00	2.00	6.00					
21									
22									
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We are now going to compare the change scores of the two groups to see if there was a larger improvement in the 'therapy' children. To do this, we will use the unrelated t-test.

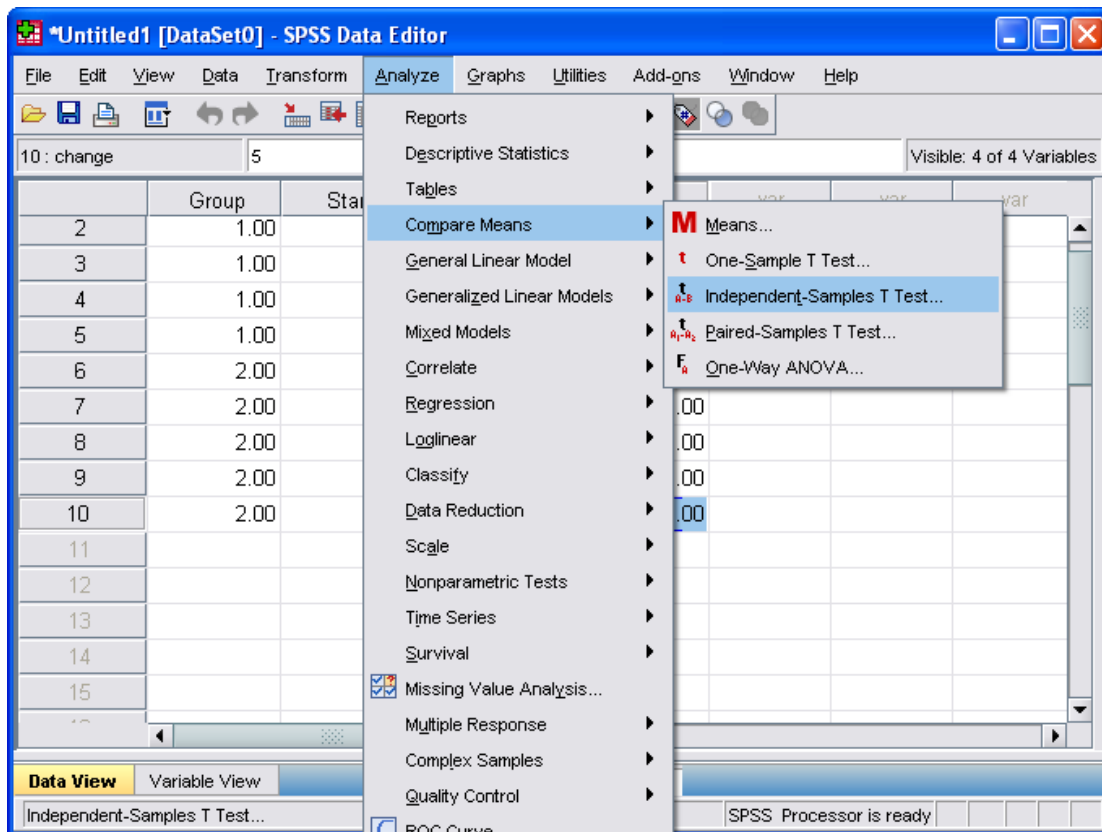
Obtain the data file.

If you have saved the data file from last week, you just need to access this file. The variables of interest to us for this analysis are 'group' and 'change'.

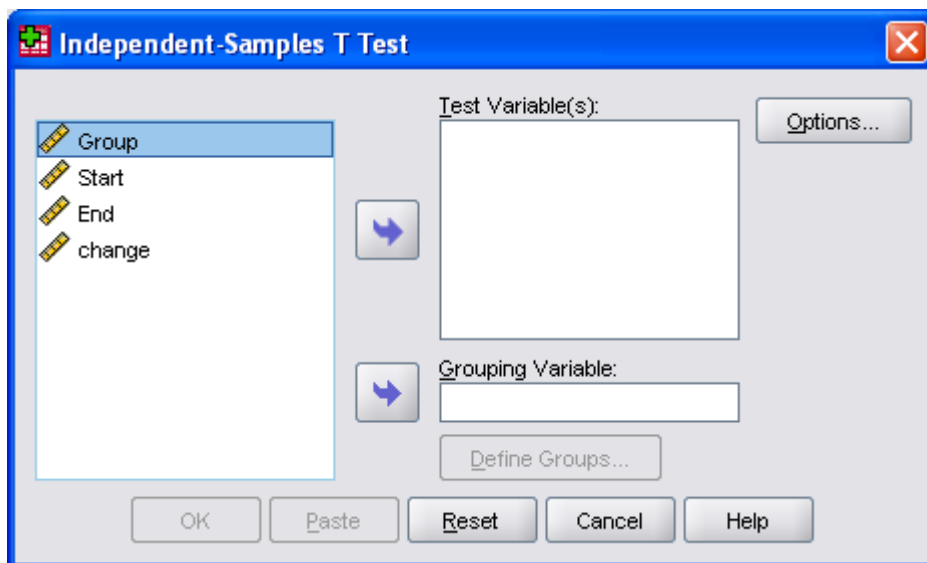
You will have two columns of data – a column representing the group to which the children were allocated (1= 'therapy', 2= 'counselling'), plus each child's change score.

Do the t-test.

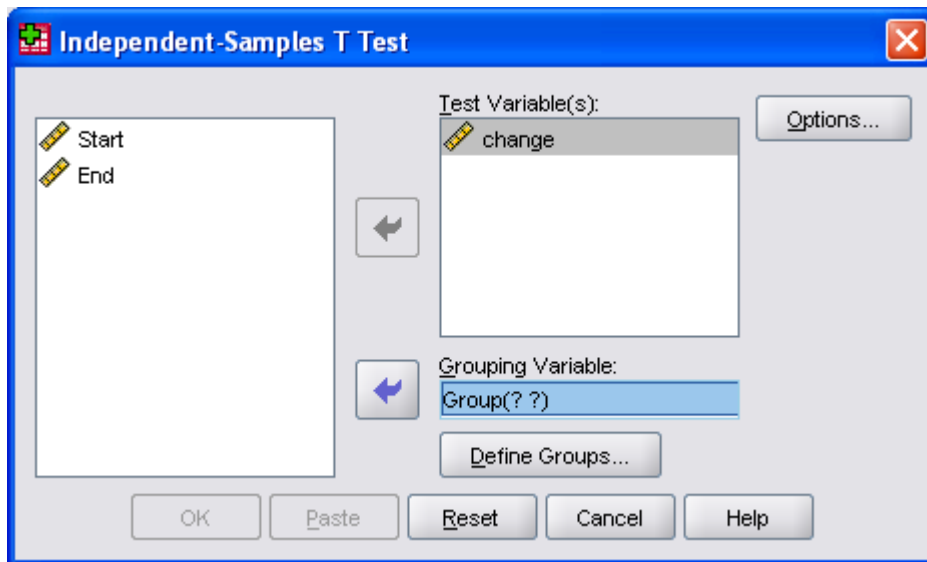
Go to the **analyse** menu at the top select '**compare means**'. From this sub-menu select **independent samples t-test**:



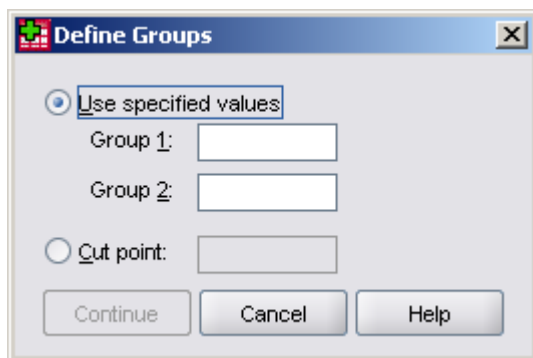
This will give you the following dialogue box:



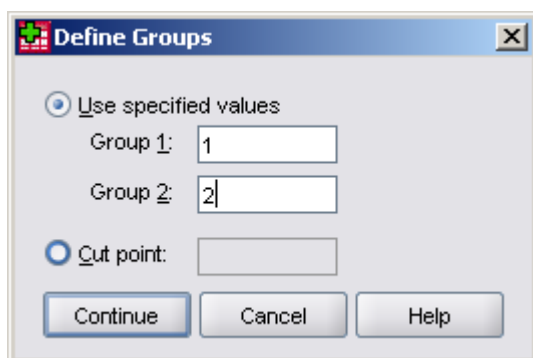
In the box on the left, there is the list of **variables** in your data file, you have to tell SPSS which one represents the **Test Variable(s)** and the **Grouping variable**. The test variable is basically the dependent variable in your study, in this case, the wellbeing change scores. So select this by clicking over *change* 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, the group to which each child belongs, so select *group* and move this to the Grouping Variable box using the arrow button next to this box:



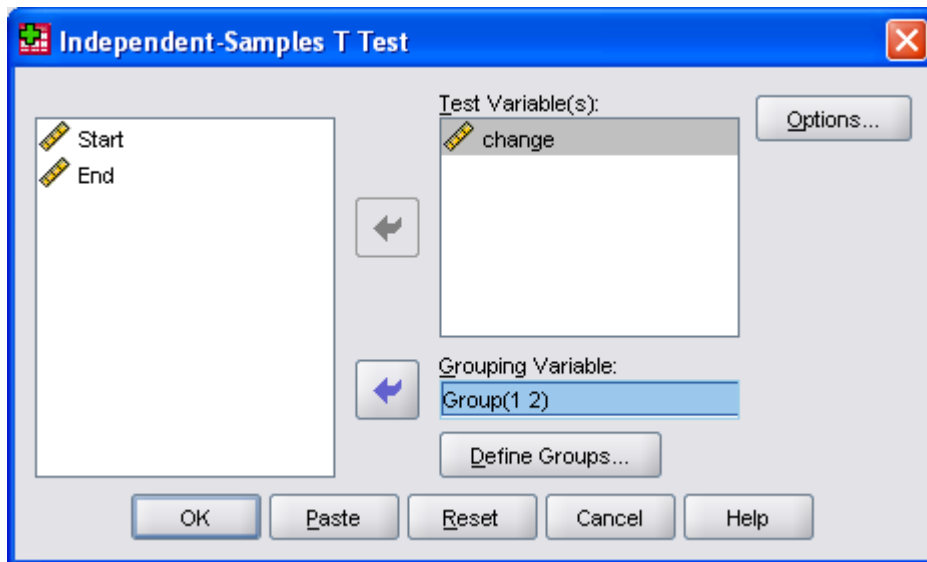
Notice that now, the '**define groups**' button has become active – you need to specify the values used for each group, so click on this button to get the following dialogue box:



This is quite simple, group 1 (the 'therapy' group) is represented by the value '1', group 2 (the 'counselling' group) 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**: group which allow you to see the direction of the difference between the two groups of children. We can see that, the therapy children (group '1') have a lower mean change score (4.1) than the counselling children (group '2', mean score of 6.9).

Group Statistics					
	group	N	Mean	Std. Deviation	Std. Error Mean
change	Play therapy	10	4.1000	3.51030	1.11006
	Counselling	10	6.9000	1.91195	.60461

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	Sig. (2-tailed)
change	Equal variances assumed	4.409	.050	-2.215	18	.040
	Equal variances not assumed			-2.215	13.908	.044

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)' (figures in bold in the above table)

The 't' value (-2.215) is the test statistic. The degrees of freedom 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) 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 (.005) 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). You will recall that we employed a **one-tailed** test for this study (i.e. we made a directional prediction that the therapy group would have higher change scores). So how do we obtain a one-tailed significance value? Very simple, just **divide the two-tailed value by two**. In this case, $.040/2 = .020$, again a significant result. 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 ($t = -2.215$, $df = 18$, $p = .020$, one-tailed test).