RQ 7: Reaction time to emotional facial expressions
Linear regression

Descriptive Statistics

	Mean	Std. Deviation	N
Reaction Time in ms	857.57	257.368	135
Gender	1.53	.501	135
Intensity of Emotion	2.61	1.099	135

Correlations

		Reaction Time in ms	Gender	Intensity of Emotion
Pearson Correlation	Reaction Time in ms	1.000	.861	-.964
	Gender	.861	1.000	-.849
	Intensity of Emotion	-.964	-.849	1.000
Sig. (1-tailed)	Reaction Time in ms	.	.000	.000
	Gender	.000	.	.000
	Intensity of Emotion	.000	.000	.
N	Reaction Time in ms	135	135	135
	Gender	135	135	135
	Intensity of Emotion	135	135	135

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.967[a]	.936	.935	65.846

a. Predictors: (Constant), Intensity of Emotion, Gender

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8303655.547	2	4151827.773	957.599	.000[b]
	Residual	572307.535	132	4335.663		
	Total	8875963.081	134			

a. Dependent Variable: Reaction Time in ms

b. Predictors: (Constant), Intensity of Emotion, Gender

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	95.0% Confidence Interval for B Upper Bound
1	(Constant)	1246.249	56.364		22.111	.000	1134.756	1357.742
	Gender	79.316	21.448	.154	3.698	.000	36.889	121.742
	Intensity of Emotion	-194.931	9.777	-.833	-19.937	.000	-214.272	-175.590

a. Dependent Variable: Reaction Time in ms

- SPSS returns several tables, the first shows descriptive statistics, the second presents correlation results, after that the model summary and regression results are listed
- The first row of the *ANOVA* table shows whether the overall regression is significant
- The second row and third row of the Coefficients table show the results for the two predictors, the *Standardized Coefficients Beta* indicates direction and strength of the effect
- In this case, we find that the overall model is significant. Moreover, both gender and intensity of emotion significantly predict reaction time

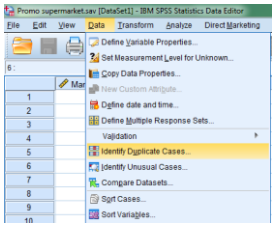
RQ 8: Effect of supermarket promotion on sales

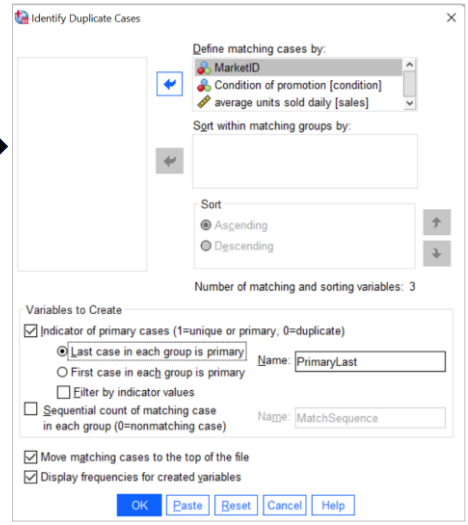
- Data from 133 supermarkets, effect of supermarket promotion on sales
- 3 promotion conditions: control, price reduction, price reduction + advertisement
- 2 variables: condition of promotion, average daily sale

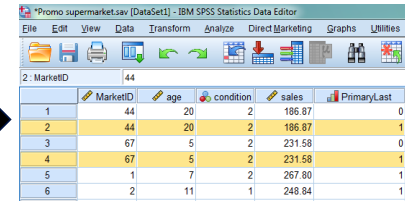
☛ Did the two types of promotion have an effect on sales?

- Duplicate cases
- One-way ANOVA: Did the two types of promotion have an effect on sales?

RQ8: Effect of supermarket promotion on sales
Duplicate cases







	MarketID	age	condition	sales	PrimaryLast
1	44	20	2	186.87	0
2	44	20	2	186.87	1
3	67	5	2	231.58	0
4	67	5	2	231.58	1
5	1	7	2	267.80	1
6	2	11	1	248.84	1

- Select *Identify Duplicate Cases…* in the tab *Data*
- Select all variables and add them to the box *Define matching cases by:*
- Click *OK*

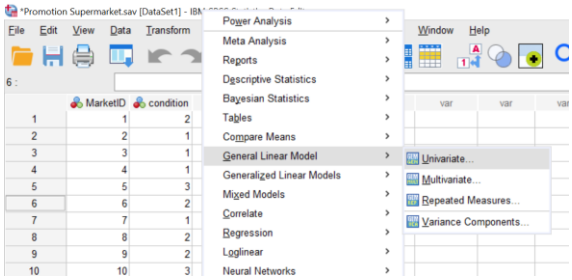
- SPSS has now resorted the data set, so that duplicate cases are listed at the top
- In this case, we find that the markets 44 and 67 have duplicate entries

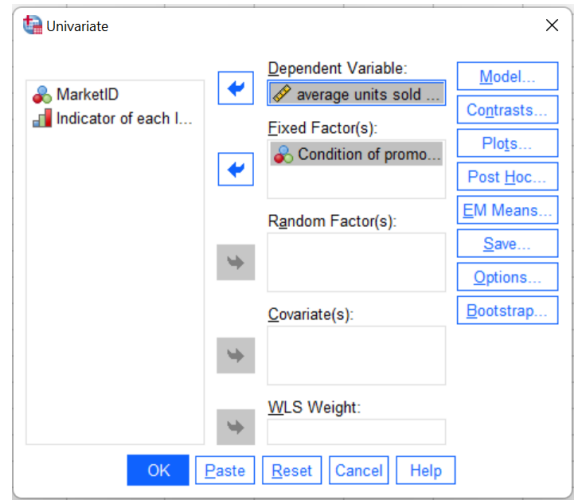
RQ8: Effect of supermarket promotion on sales
Duplicate cases

	MarketID	condition	sales	PrimaryLast	var	var	var
1	44	2	186.87	0			
2	44	2	186.87	1			
3	67	2	231.58	0			
4	67	2	231.58	1			
5	1	2	267.80	1			
6	2	1	248.84	1			
7	3	1	247.89	1			
8	4	1	251.21	1			
9	5	3	276.48	1			
10	6	2	259.82	1			
11	7	1	250.36	1			
12	8	2	260.79	1			
13	9	2	291.74	1			
14	10	3	290.56	1			
15	11	3	270.81	1			
16	12	2	258.19	1			
17	13	2	284.84	1			
18	14	3	308.08	1			
19	15	1	247.04	1			
20	16	1	255.42	1			

- Since markets 44 and 67 exist twice in the data set, we delete one of each
- Select the two rows you want to delete (press the Ctrl or cmd key)
- Right-click on the mouse to open a small window with several options, click on *Clear*

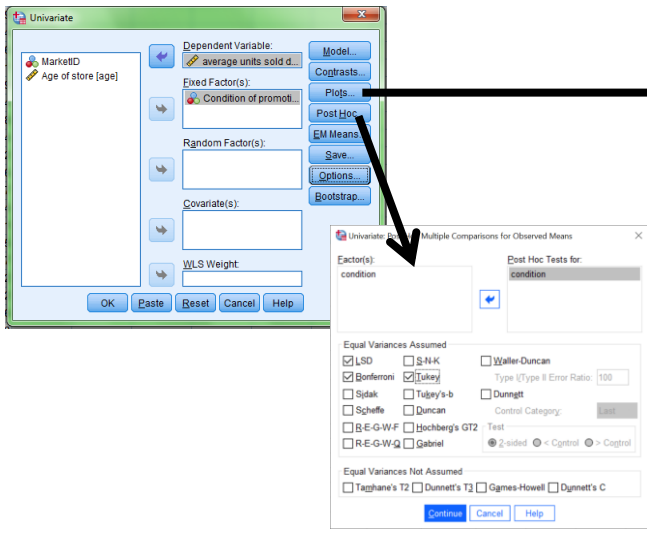
RQ8: Effect of supermarket promotion on sales
One-way ANOVA

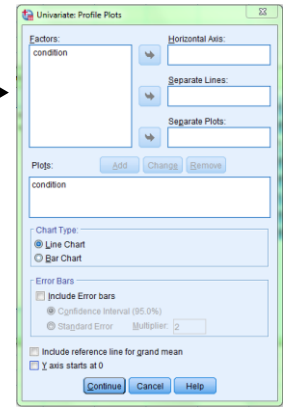




- Select *Univariate…* under *General Linear Model* in the tab *Analyze*
- Add the variable average units sold to the *Dependent Variable* box
- Add the variable Condition of promotion to the *Fixed Factor(s)* box

RQ8: Effect of supermarket promotion on sales
One-way ANOVA

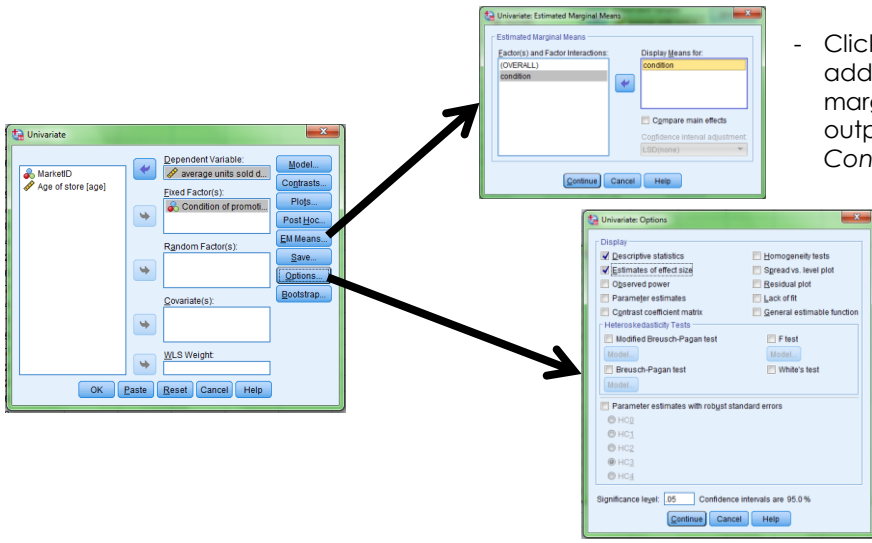




- Click on *Plots…*
- Add *condition* to horizontal axis
- Select *Add* to add the Plot

Click on *Post Hoc…* and add the variable *condition* to the box on the right, then select the post hoc tests you want to run (Tukey, Bonferroni and LSD), then click *Continue*

RQ8: Effect of supermarket promotion on sales
One-way ANOVA



- Click on *EM Means...* to add estimated marginal means to the output, then click on *Continue*

- Click on *Options...* to add statistics to the output, then click on *Continue*
- Click *OK* in the main window to start the analysis

RQ8: Effect of supermarket promotion on sales
One-way ANOVA

Between-Subjects Factors

		Value Label	N
Condition of promotion	1	control	47
	2	price reduction	45
	3	price reduction and advertisement	41

Descriptive Statistics

Dependent Variable: average units sold daily

Condition of promotion	Mean	Std. Deviation	N
control	186.7340	31.92507	47
price reduction	215.4553	35.93417	45
price reduction and advertisement	223.8083	30.45851	41
Total	207.8807	36.39105	133

- SPSS returns several tables, including frequencies in the between-subject factor, descriptive statistics and the results of the analysis
- By checking the *Sig.* value in the row *condition* of the table *Tests of Between-Subjects Effects* you can find that there is a main effect for the supermarket promotion
- Partial Eta Squared is a measure of effect size, in this case it indicates a large effect for the promotion (>0.14)

Tests of Between-Subjects Effects

Dependent Variable: average units sold daily

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	34000.607[a]	2	17000.304	15.695	.000	.195
Intercept	5772256.54	1	5772256.54	5329.191	.000	.976
condition	34000.607	2	17000.304	15.695	.000	.195
Error	140808.122	130	1083.139			
Total	5922320.70	133				
Corrected Total	174808.729	132				

a. R Squared = .195 (Adjusted R Squared = .182)

RQ8: Effect of supermarket promotion on sales
One-way ANOVA

Estimated Marginal Means

1. Grand Mean

Dependent Variable: average units sold daily

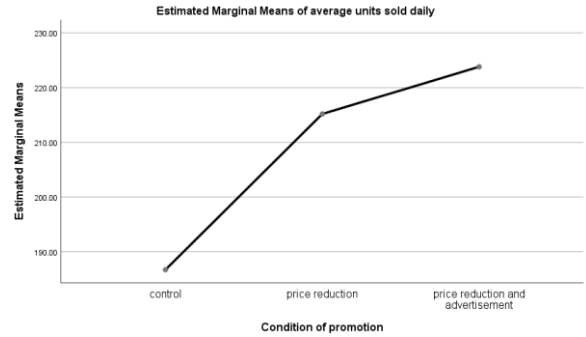
Mean	Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
208.666	2.858	203.011	214.321

2. Condition of promotion

Dependent Variable: average units sold daily

Condition of promotion	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
control	186.734	4.801	177.237	196.231
price reduction	215.455	4.906	205.749	225.161
price reduction and advertisement	223.808	5.140	213.640	233.977

- The *Estimated Marginal Means* tables return descriptive statistics and confidence intervals for each promotion condition
- The plot makes it easy to visualise the main effect

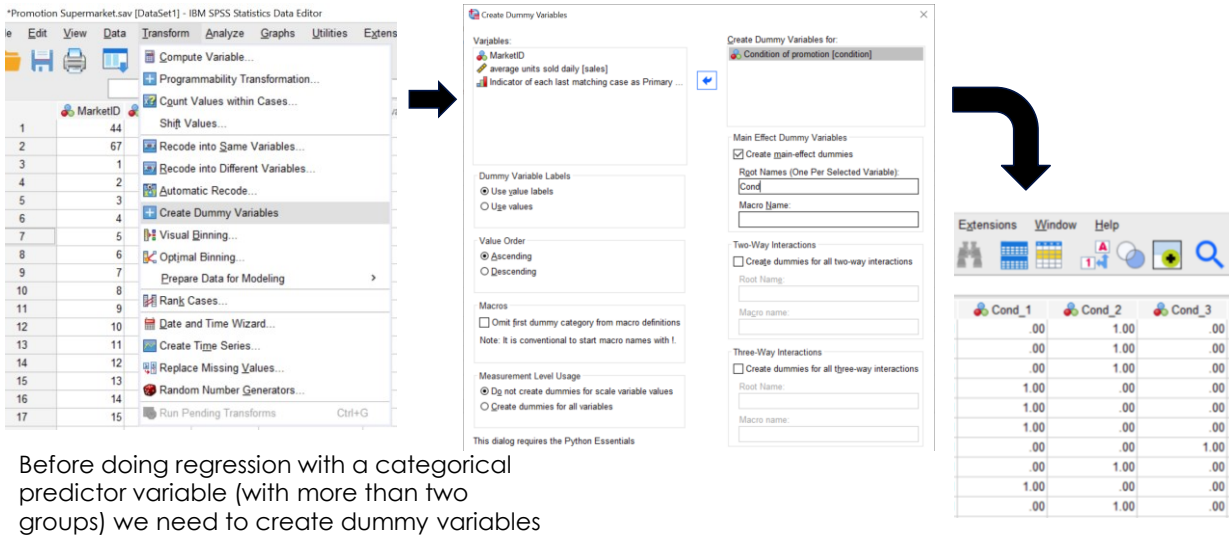


RQ8: Effect of supermarket promotion on sales
One-way ANOVA

	(I) Condition of promotion	(J) Condition of promotion	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	control	price reduction	-28.7213*	6.86406	<.001	-44.9950	-12.4476
		price reduction and advertisement	-37.0743*	7.03303	<.001	-53.7486	-20.3999
	price reduction	control	28.7213*	6.86406	<.001	12.4476	44.9950
		price reduction and advertisement	-8.3530	7.10548	.470	-25.1991	8.4931
	price reduction and advertisement	control	37.0743*	7.03303	<.001	20.3999	53.7486
		price reduction	8.3530	7.10548	.470	-8.4931	25.1991
LSD	control	price reduction	-28.7213*	6.86406	<.001	-42.3010	-15.1416
		price reduction and advertisement	-37.0743*	7.03303	<.001	-50.9883	-23.1602
	price reduction	control	28.7213*	6.86406	<.001	15.1416	42.3010
		price reduction and advertisement	-8.3530	7.10548	.242	-22.4103	5.7044
	price reduction and advertisement	control	37.0743*	7.03303	<.001	23.1602	50.9883
		price reduction	8.3530	7.10548	.242	-5.7044	22.4103
Bonferroni	control	price reduction	-28.7213*	6.86406	<.001	-45.3691	-12.0735
		price reduction and advertisement	-37.0743*	7.03303	<.001	-54.1318	-20.0167
	price reduction	control	28.7213*	6.86406	<.001	12.0735	45.3691
		price reduction and advertisement	-8.3530	7.10548	.726	-25.5863	8.8803
	price reduction and advertisement	control	37.0743*	7.03303	<.001	20.0167	54.1318
		price reduction	8.3530	7.10548	.726	-8.8803	25.5863

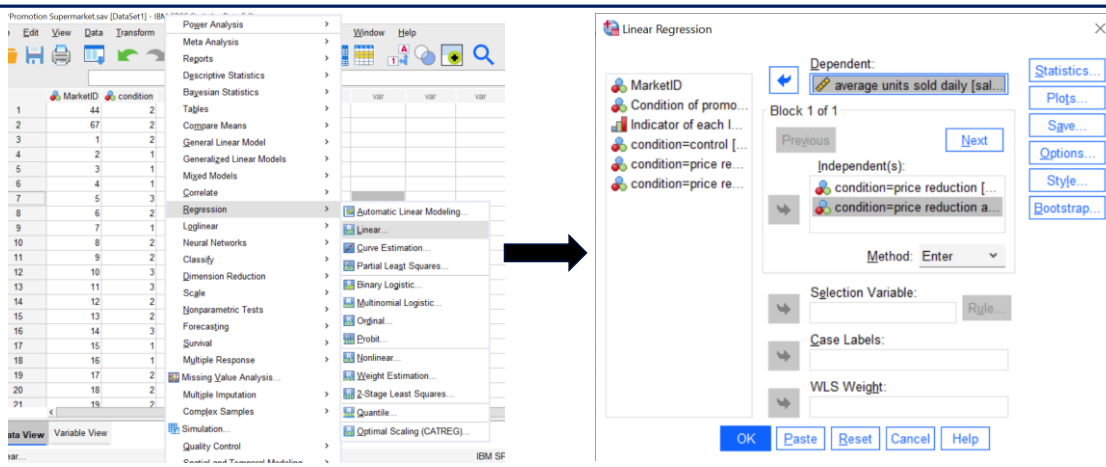
- SPSS also reports the requested *Post Hoc Tests* Tukey, LSD and Bonferroni
- All conditions are compared with each other
- SPSS reports the mean difference between the two compared groups, the standard error and significance of the comparison, as well as the confidence interval
- Here, we find significant comparisons between the control condition and the price reduction condition, as well as between the control condition and the price reduction and advertisement condition. The two experimental conditions do not differ from each other significantly, though.
- Tukey, Bonferroni and LSD come to the same conclusions. For real analyses, you would have pre-selected one of these to use

RQ8: Effect of supermarket promotion on sales
Alternative: linear regression



Before doing regression with a categorical predictor variable (with more than two groups) we need to create dummy variables

RQ8: Effect of supermarket promotion on sales
Alternative: linear regression



Add two of the three dummy variables as independent variables. The dummy variable you leave out will be your reference group – the coefficients will represent differences from this reference group

RQ8: Effect of supermarket promotion on sales
Alternative: linear regression

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.441[a]	.195	.182	32.91108

a. Predictors: (Constant), condition=price reduction and advertisement, condition=price reduction

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	34000.607	2	17000.304	15.695	<.001[b]
	Residual	140808.122	130	1083.139		
	Total	174808.729	132			

a. Dependent Variable: average units sold daily

b. Predictors: (Constant), condition=price reduction and advertisement, condition=price reduction

→ Matches the between-subjects effects table in one-way ANOVA

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	186.734	4.801		38.898	<.001
	condition=price reduction	28.721	6.864	.375	4.184	<.001
	condition=price reduction and advertisement	37.074	7.033	.472	5.271	<.001

→ Matches the mean differences in post-hoc tests table in one-way ANOVA

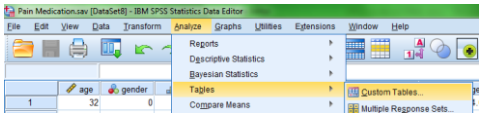
RQ 9: Effect of new pain treatment

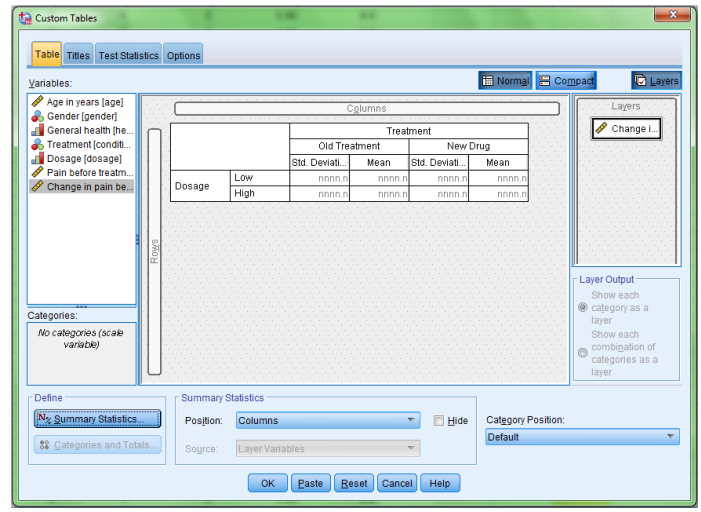
- Data set from RQ6

☛ Has the pain treatment helped the participants? Did the dosage influence the effectiveness of the treatment?

  - Custom tables: get descriptive statistics for each participant group
  - Two-way ANOVA: condition by dosage
  - Formatting graphs in output

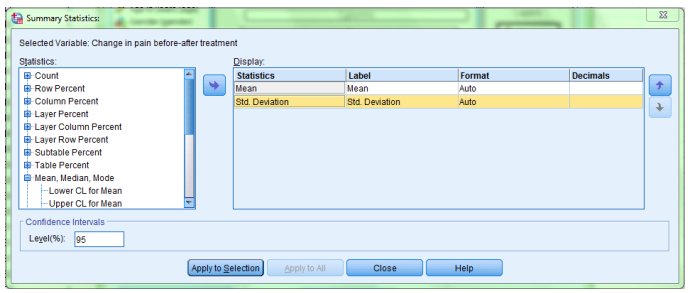
RQ 9: Effect of new pain treatment
Custom Tables





- Select *Custom Tables...* under *Tables* in the tab *Analyze*
- From the variable list on the left, pull the categorical variables by which you want to group your table to the *Columns* and *Rows* boxes in the preview
- On the top right, click on the button *Layers* to open the right hand box
- Drag the variable for which you want to receive statistics into the *Layers* box
- On the bottom left, click on the button *Summary Statistics...* (see next slide)

Custom Tables



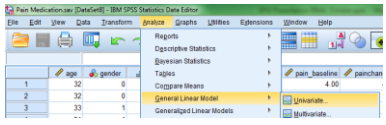
Custom Tables

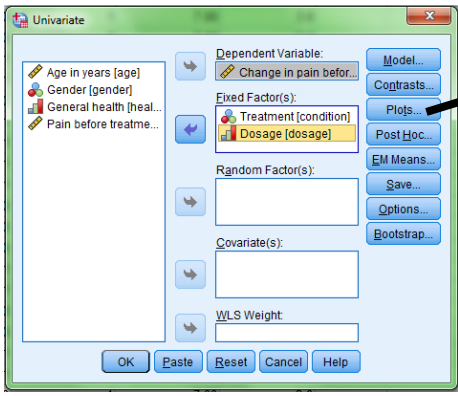
Change in pain before-after treatment

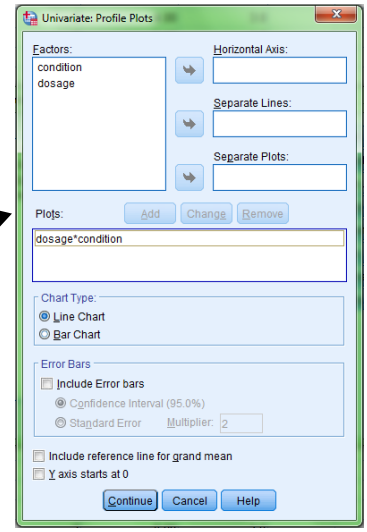
		Treatment			
		Old Treatment		New Drug	
		Standard Deviation	Mean	Standard Deviation	Mean
Dosage	Low	.7	2.1	.8	4.8
	High	.8	3.6	1.1	7.0

- From the Statistics box on the left, choose the statistics you want to receive and add them to the box on the right
- Click on *Apply to Selection* (nothing will happen), then click on *Close*
- In the main window click *OK*
- The output shows the selected statistics for each of the groups created by the categorical variables

RQ 9: Effect of new pain treatment
Two-way ANOVA

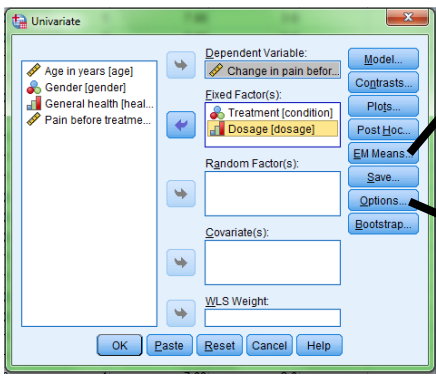




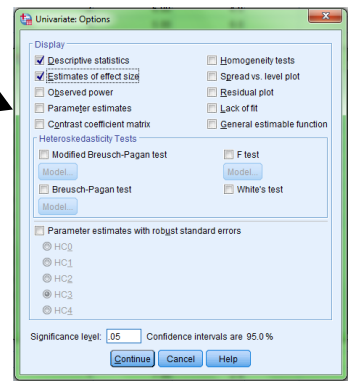


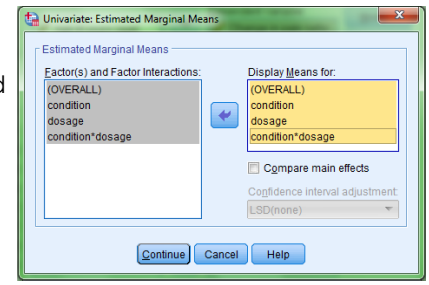
- Select *Univariate…* under *General Linear Model* in the tab *Analyze*
- Add the variable *Change in pain* to the *Dependent Variable* box
- Add the variables *Treatment* and *Dosage* to the *Fixed Factor(s)* box
- Click on *Plots…* to configure a plot for the output, then click *Continue*
- This time we don't need post hoc tests as our two fixed factors only have two levels

RQ 9: Effect of new pain treatment
Two-way ANOVA



- Click on *EM Means…* and choose the variables you want to receive estimated marginal means for





- Under *Options…* select which statistics you want to receive, in this case *Descriptive statistics* and *Estimates of effect size*

RQ 9: Effect of new pain treatment
Two-way ANOVA

Univariate Analysis of Variance

Between-Subjects Factors

		Value Label	N
Treatment	0	Old Treatment	30
	1	New Drug	30
Dosage	1	Low	30
	2	High	30

Descriptive Statistics

Dependent Variable: Change in pain before-after treatment

Treatment	Dosage	Mean	Std. Deviation	N
Old Treatment	Low	2.067	.7037	15
	High	3.600	.8281	15
	Total	2.833	1.0854	30
New Drug	Low	4.800	.7746	15
	High	7.000	1.0690	15
	Total	5.900	1.4468	30
Total	Low	3.433	1.5687	30
	High	5.300	1.9678	30
	Total	4.367	1.9997	60

Tests of Between-Subjects Effects

Dependent Variable: Change in pain before-after treatment

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	195.000[a]	3	65.000	88.925	.000	.827
Intercept	1144.067	1	1144.067	1565.173	.000	.965
condition	141.067	1	141.067	192.990	.000	.775
dosage	52.267	1	52.267	71.505	.000	.561
condition * dosage	1.667	1	1.667	2.280	.137	.039
Error	40.933	56	.731			
Total	1380.000	60				
Corrected Total	235.933	59				

a. R Squared = .827 (Adjusted R Squared = .817)

- The *Univariate Analysis of Variance* tables present frequencies in the between-subject factor, descriptive statistics and the results of the analysis
- By checking the *Sig.* value in the row *condition* of the table on the right you can find that there is a main effect for the treatment condition, *Partial Eta Squared* shows a large effect size
- There is also a large main effect for dosage
- The interaction (row *condition*dosage*) is not significant (p=0.137)

RQ 9: Effect of new pain treatment
Two-way ANOVA

Estimated Marginal Means

1. Grand Mean

Dependent Variable: Change in pain before-after treatment

Mean	Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
4.367	.110	4.146	4.588

2. Treatment

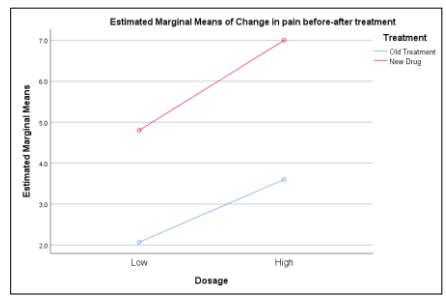
Dependent Variable: Change in pain before-after treatment

Treatment	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Old Treatment	2.833	.156	2.521	3.146
New Drug	5.900	.156	5.587	6.213

3. Dosage

Dependent Variable: Change in pain before-after treatment

Dosage	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Low	3.433	.156	3.121	3.746
High	5.300	.156	4.987	5.613



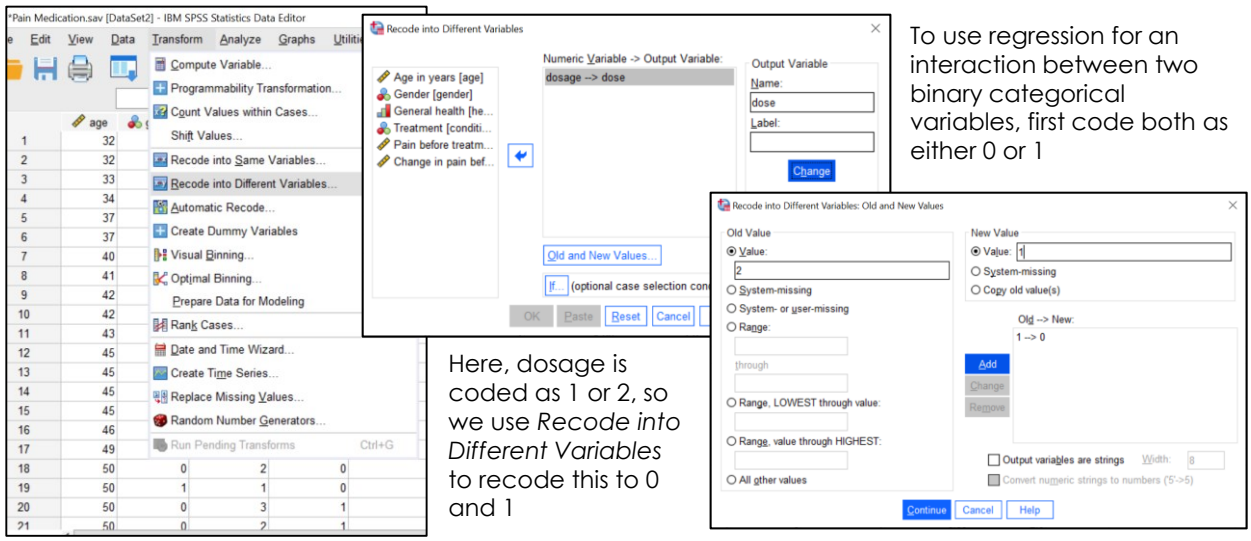
4. Treatment * Dosage

Dependent Variable: Change in pain before-after treatment

Treatment	Dosage	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Old Treatment	Low	2.067	.221	1.624	2.509
	High	3.600	.221	3.158	4.042
New Drug	Low	4.800	.221	4.358	5.242
	High	7.000	.221	6.558	7.442

- The *Estimated Marginal Means* tables return confidence intervals for the main effect and the interaction variables
- The plot makes it easy to visualise the two main effects
- Here we have approximately parallel lines (no interaction)

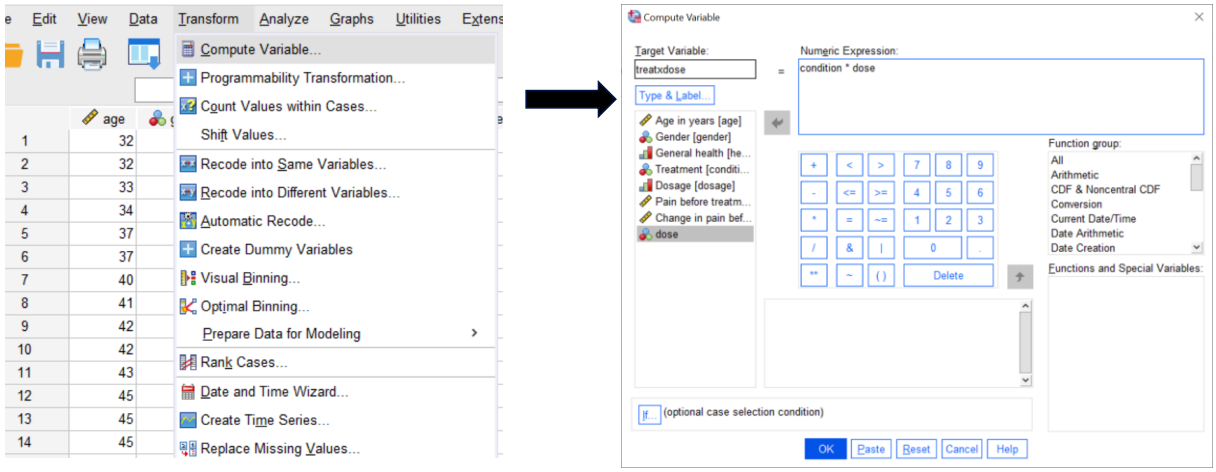
RQ 9: Effect of new pain treatment
Alternative: linear regression



To use regression for an interaction between two binary categorical variables, first code both as either 0 or 1

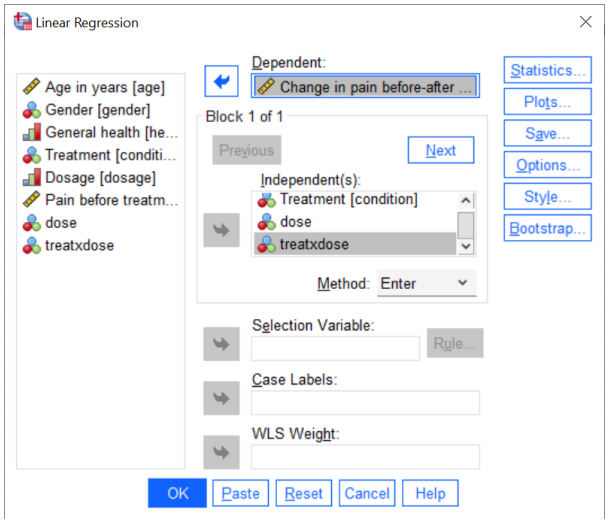
Here, dosage is coded as 1 or 2, so we use *Recode into Different Variables* to recode this to 0 and 1

RQ 9: Effect of new pain treatment
Alternative: linear regression



We then create an interaction term, by using *Compute Variable* to create a new variable that equals treatment condition multiplied by dosage

RQ 9: Effect of new pain treatment
Alternative: linear regression



We can now put our binary categorical variables and interaction variable into the regression model.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	195.000	3	65.000	88.925	<.001[b]
	Residual	40.933	56	.731		
	Total	235.933	59			

a. Dependent Variable: Change in pain before-after treatment

b. Predictors: (Constant), treatxdose, dose, Treatment

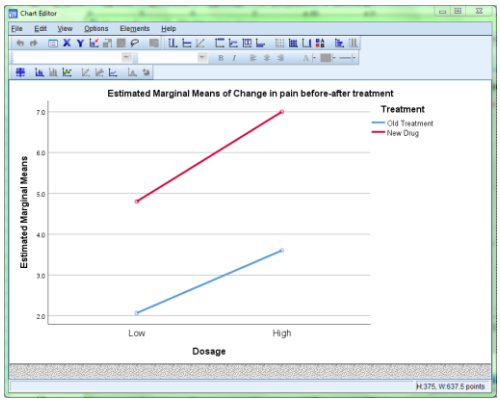
Coefficients[a]

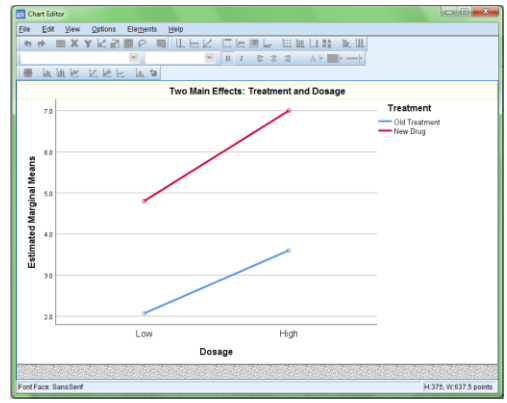
Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	2.067	.221		9.362	<.001
	Treatment	2.733	.312	.689	8.755	<.001
	dose	1.533	.312	.387	4.912	<.001
	treatxdose	.667	.441	.146	1.510	.137

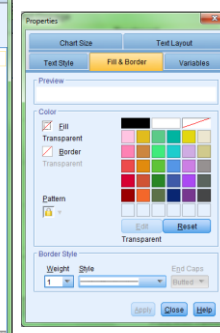
a. Dependent Variable: Change in pain before-after treatment

RQ 9: Effect of new pain treatment
Formatting graphs

- Double-click on the plot in the output to open the *Chart Editor*
- Double-click on the titles to edit, click once more to change the wording

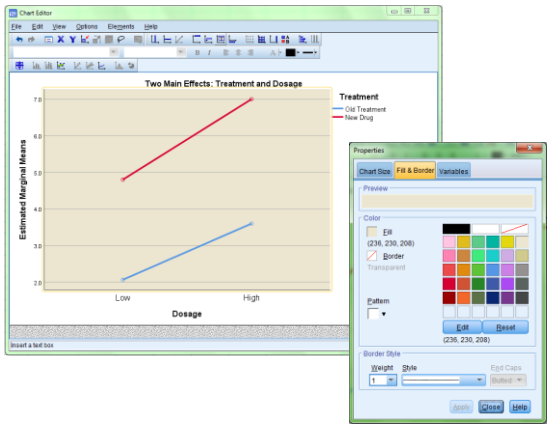




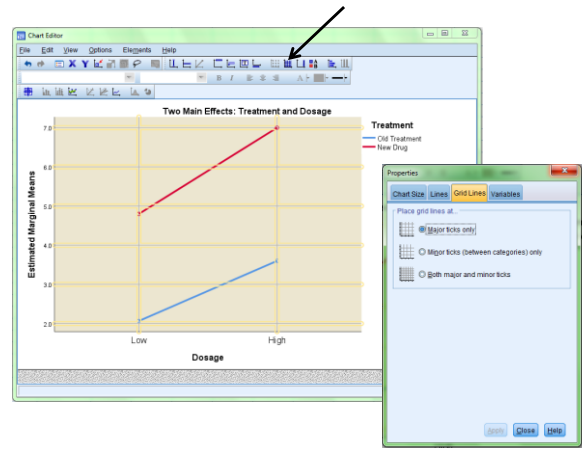


RQ 9: Effect of new pain treatment
Formatting graphs

- Double-click on the plot background to open more formatting options



- Click on the grid symbol to add a grid to the chart



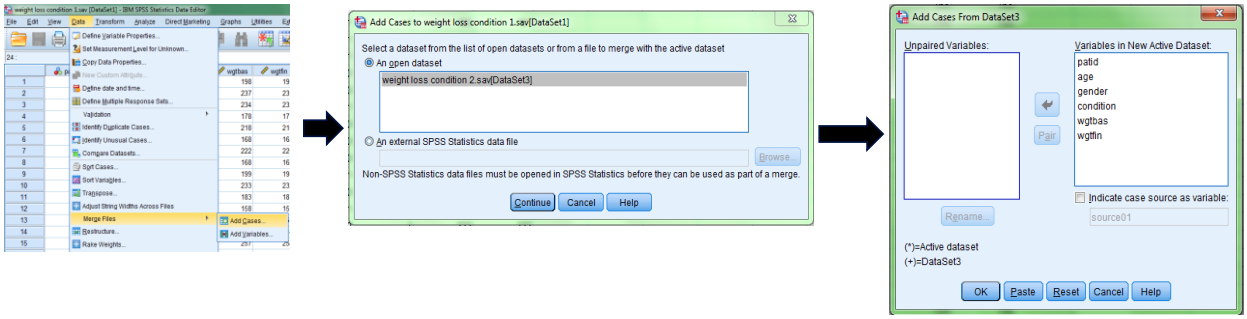
RQ 10: Effect of weight loss programme

- Data set of 64 participants who participated in a weight loss study
- 4 variables: gender, condition (control or treatment), weight at baseline, weight at finish

☛ Have participants in the weight loss treatment condition lost more weight?

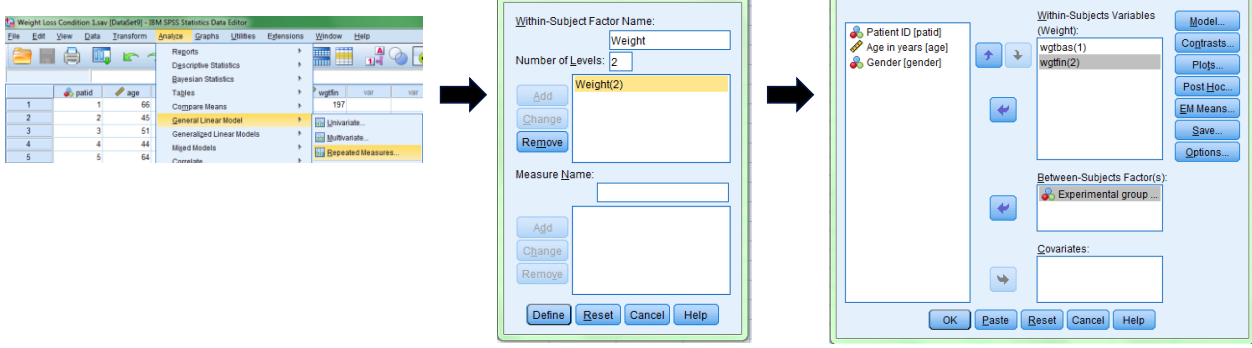
- Merge files: condition and treatment
- Repeated/mixed ANOVA
- Cleaning output
- Formatting tables
- Exporting graphs and tables

RQ 10: Effect of weight loss programme
Merge files



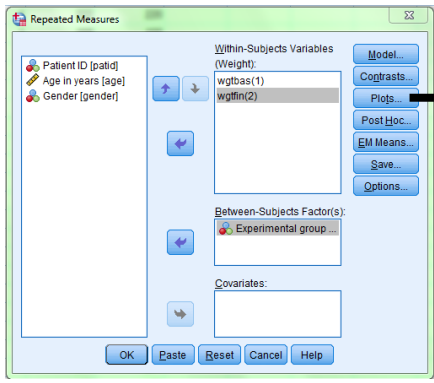
- Make sure that the two data sets that you want to merge are opened in SPSS, work in weight loss condition 1.sav
- Select *Add Cases…* under *Merge Files* in the tab *Data*
- Select the weight loss condition 2.sav in the box and click *Continue*
- Check that there are no unpaired variables in the left box, then click *OK*

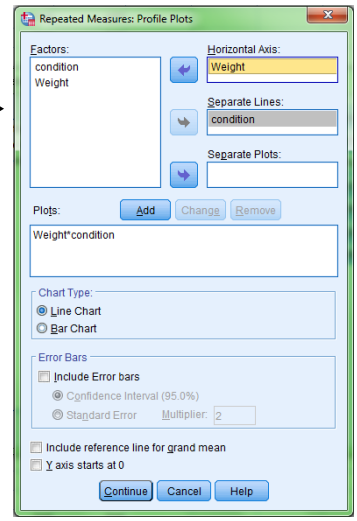
RQ 10: Effect of weight loss programme
Repeated/mixed ANOVA



- Select *Repeated Measures…* under *General Linear Model* in the tab *Analyze*
- Give a name to the Within-Subject Factor and enter "2" in the box asking for the number of levels of this variable (weight baseline and weight finish), then click *Define*
- Drag the variables wgtbas and wgtfin into the *Within-Subjects Variables* box, then add the experimental group variable to the *Between-Subjects Factor(s)*box

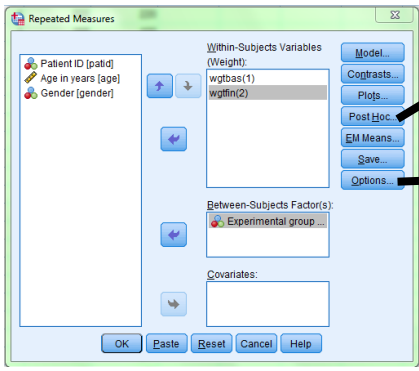
RQ 10: Effect of weight loss programme
Repeated/mixed ANOVA

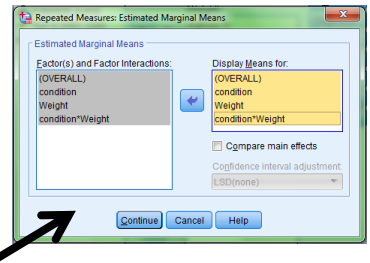


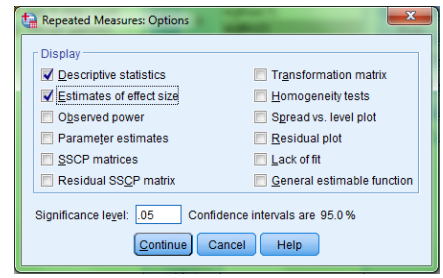


- Click on *Plots*...to configure a plot. Remember to assign the separate lines to the categorical variable. Then click *Continue*
- We don't need post hoc tests as our factors only have two levels

RQ 10: Effect of weight loss programme
Repeated/mixed ANOVA







- Go to *EM Means*... to choose the variables you would like to receive estimated marginal means for
- Under *Options*... select which statistics you want to receive, in this case *Descriptive statistics* and *Estimates of effect size*
- Click Continue and OK

RQ 10: Effect of weight loss programme
Repeated/mixed ANOVA

- The Repeated Measures ANOVA returns several tables, including frequencies in the between-subject factor, descriptive statistics and the results of the analysis
- Since we only have two levels in our within-subject factor, we can ignore the Mauchly's Test of Sphericity, as sphericity is assumed

Between-Subjects Factors

		Value Label	N
Experimental group	1	Control	32
	2	Treatment	32

Descriptive Statistics

	Experimental group	Mean	Std. Deviation	N
Weight Baseline	Control	198.72	32.908	32
	Treatment	198.38	32.928	32
	Total	198.55	32.656	64
Final weight	Control	197.63	32.750	32
	Treatment	194.13	32.953	32
	Total	195.88	32.638	64

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Weight	Pillai's Trace	.740	176.253[b]	1.000	62.000	.000	.740
	Wilks' Lambda	.260	176.253[b]	1.000	62.000	.000	.740
	Hotelling's Trace	2.843	176.253[b]	1.000	62.000	.000	.740
	Roy's Largest Root	2.843	176.253[b]	1.000	62.000	.000	.740
Weight * condition	Pillai's Trace	.498	61.488[b]	1.000	62.000	.000	.498
	Wilks' Lambda	.502	61.488[b]	1.000	62.000	.000	.498
	Hotelling's Trace	.992	61.488[b]	1.000	62.000	.000	.498
	Roy's Largest Root	.992	61.488[b]	1.000	62.000	.000	.498

a. Design: Intercept + condition
Within Subjects Design: Weight

b. Exact statistic

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Epsilon[b] Huynh-Feldt	Epsilon[b] Lower-bound
Weight	1.000	.000	0	.	1.000	1.000	1.000

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept + condition
Within Subjects Design: Weight

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

RQ 10: Effect of weight loss programme
Repeated/mixed ANOVA

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Weight	Sphericity Assumed	228.445	1	228.445	176.253	.000	.740
	Greenhouse-Geisser	228.445	1.000	228.445	176.253	.000	.740
	Huynh-Feldt	228.445	1.000	228.445	176.253	.000	.740
	Lower-bound	228.445	1.000	228.445	176.253	.000	.740
Weight * condition	Sphericity Assumed	79.695	1	79.695	61.488	.000	.498
	Greenhouse-Geisser	79.695	1.000	79.695	61.488	.000	.498
	Huynh-Feldt	79.695	1.000	79.695	61.488	.000	.498
	Lower-bound	79.695	1.000	79.695	61.488	.000	.498
Error(Weight)	Sphericity Assumed	80.359	62	1.296			
	Greenhouse-Geisser	80.359	62.000	1.296			
	Huynh-Feldt	80.359	62.000	1.296			
	Lower-bound	80.359	62.000	1.296			

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Weight	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Weight	Linear	228.445	1	228.445	176.253	.000	.740
Weight * condition	Linear	79.695	1	79.695	61.488	.000	.498
Error(Weight)	Linear	80.359	62	1.296			

Tests of Between-Subjects Effects

Measure: MEASURE_1
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	4978195.695	1	4978195.695	2303.093	.000	.974
condition	118.195	1	118.195	.055	.816	.001
Error	134014.609	62	2161.526			

- These three tables contain the results of the ANOVA
- By checking the *Sig.* value in the rows of *Weight* and *Weight*condition* of the *Tests of Within-Subjects Contrasts* table you can find that there is a main effect for weight change, as well as a significant interaction between the condition and weight change, Partial Eta Squared shows a large effect size in both cases
- The *Tests of Between-Subjects Effects* table reveals that there is no significant main effect of the condition

RQ 10: Effect of weight loss programme
Repeated/mixed ANOVA

Estimated Marginal Means

1. Grand Mean

Measure: MEASURE_1

Mean	Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
197.211	4.109	188.996	205.425

2. Experimental group

Measure: MEASURE_1

Experimental group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Control	198.172	5.812	186.555	209.789
Treatment	196.250	5.812	184.633	207.867

3. Weight

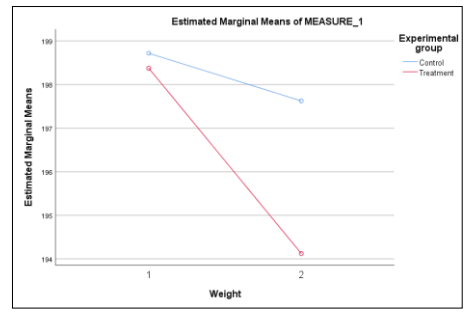
Measure: MEASURE_1

Weight	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	198.547	4.115	190.322	206.772
2	195.875	4.106	187.666	204.084

4. Experimental group * Weight

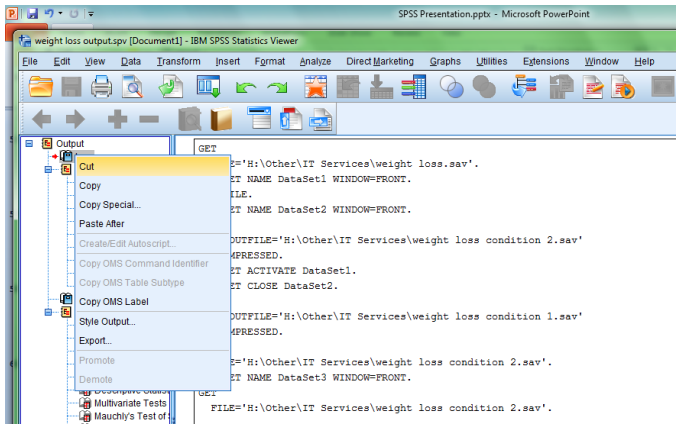
Measure: MEASURE_1

Experimental group	Weight	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Control	1	198.719	5.819	187.087	210.351
	2	197.625	5.807	186.016	209.234
Treatment	1	198.375	5.819	186.743	210.007
	2	194.125	5.807	182.516	205.734



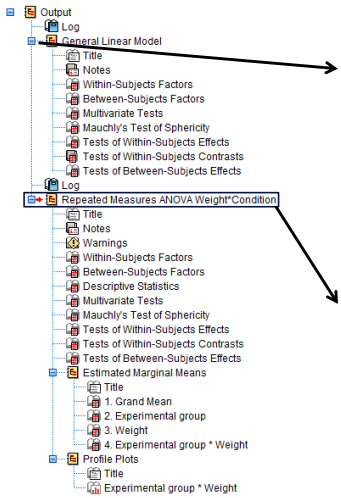
- The *Estimated Marginal Means* tables return confidence intervals for the main effect and the interaction variables
- The plot makes it easy to visualise the interaction of the two factors

RQ 10: Effect of weight loss programme
Cleaning Output



- The Logs in the output explain which calculations SPSS exactly ran, however, they also clog up the output, making it hard to keep the overview
- To delete them from the output, right-click on the log and select the *Cut* option

RQ 10: Effect of weight loss programme
Cleaning Output



- If you do not want to delete a test or log from the output but you want to hide it to gain more overview, you can click on the minus symbols next to the mother tabs

- You might want to give your analyses different names so they are not all called the same
- Double-click on the rows you want to rename and start editing

RQ 10: Effect of weight loss programme
Formatting tables

Double-click on the table you want to format to activate it

- To change the headings in the table, double-click on the heading in question and edit

- To delete unnecessary rows or columns, select the respective cells and right-click to get to the option *Delete*

Tests of Within-Subjects Effects

Measure MEASURE_1

Source		F	p Sig.	Partial Eta Squared	Type III Sum of Squares	df	Mean Square
Weight	Sphericity Assumed	176.253	.000	.740	228.445	1	228.445
	Greenhouse-Geisser	176.253	.000	.740	228.445	1.000	228.445
	Huynh-Feldt	176.253	.000	.740	228.445	1.000	228.445
	Lower-bound	176.253	.000	.740	228.445	1.000	228.445
Weight * condition	Sphericity Assumed	61.488	.000	.498	79.695	1	79.695
	Greenhouse-Geisser	61.488	.000	.498	79.695	1.000	79.695
	Huynh-Feldt	61.488	.000	.498	79.695	1.000	79.695
	Lower-bound	61.488	.000	.498	79.695	1.000	79.695
Error(Weight)	Sphericity Assumed				80.359	62	1.296
	Greenhouse-Geisser				80.359	62.000	1.296
	Huynh-Feldt				80.359	62.000	1.296
	Lower-bound				80.359	62.000	1.296

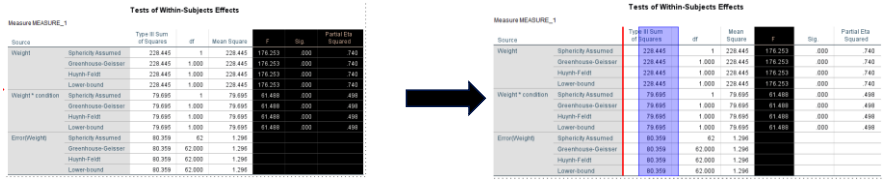
Tests of Within-Subjects Effects

Measure MEASURE_1

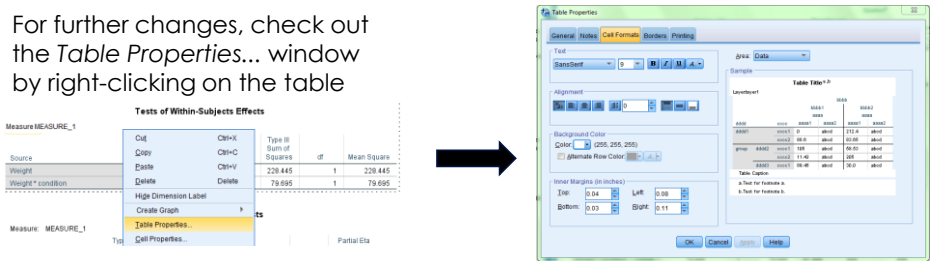
Source		F	p	Partial Eta Squared	Type III Sum of Squares	df	Mean Square
Weight	Sphericity Assumed	176.253	.000	.740	228.445	1	228.445
	Greenhouse-Geisser	176.253	.000	.740	228.445	1.000	228.445
	Huynh-Feldt	176.253	.000	.740	228.445	1.000	228.445
	Lower-bound	176.253	.000	.740	228.445	1.00	
Weight * condition	Sphericity Assumed	61.488	.000	.498	79.695		
	Greenhouse-Geisser	61.488	.000	.498	79.695	1.00	
	Huynh-Feldt	61.488	.000	.498	79.695	1.00	
	Lower-bound	61.488	.000	.498	79.695	1.00	
Error(Weight)	Sphericity Assumed				80.359		
	Greenhouse-Geisser				80.359	62.00	
	Huynh-Feldt				80.359	62.00	
	Lower-bound				80.359	62.00	

RQ 10: Effect of weight loss programme
Formatting tables

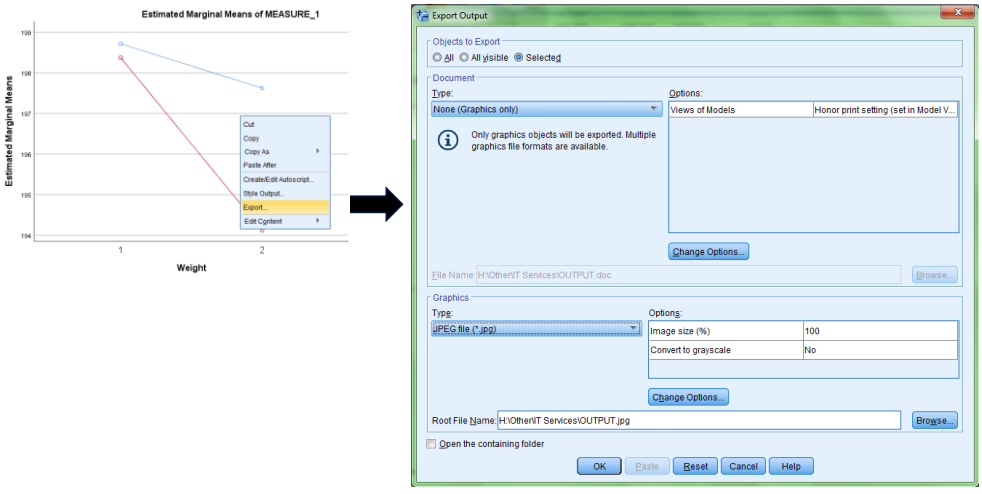
To change the order of the rows or columns, select the respective cells and drag them to the desired place



For further changes, check out the *Table Properties...* window by right-clicking on the table

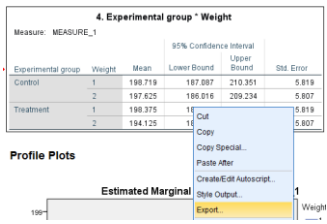


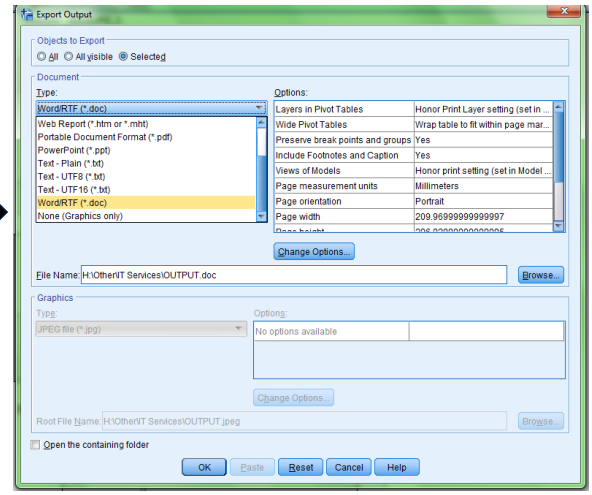
RQ 10: Effect of weight loss programme
Exporting graphs



- Right-click on the graph to show the options and click on *Export...*
- In the document section, select the type *None (Graphics only)*
- In the Graphics section, select the type of format you want to export to
- Click on *Browse...* to select the folder where you want to save the exported file to
- Click *OK*

RQ 10: Effect of weight loss programme
Exporting tables





- Right-click on the table to show the options and click on *Export...*
- In the document section, select the type of format you want to export to
- Click on *Browse...* to select the folder where you want to save the exported file to
- Click *OK*

Additional features of SPSS

Syntax window

- File which gathers all the code produced during analysis
- Can be used to keep track of actions
- Can be used to reproduce analysis easily
- Can be used to modify output (especially graphs) without having to re-do lots of steps

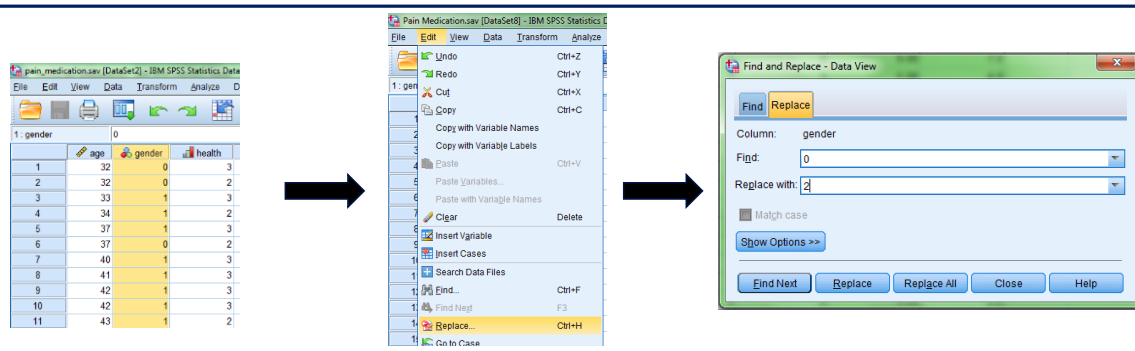
Additional Functionality

- Find and Replace
- Explore Data (including normality tests)
- Crosstabs
- Reliability Analysis
- SPSS Settings

Find and Replace

- Can exchange specific values of a column by finding and replacing them
- Similar to *recode into same variables*
- E.g. changing coding of male gender from 0 to 2 in the pain medication data

Find and Replace

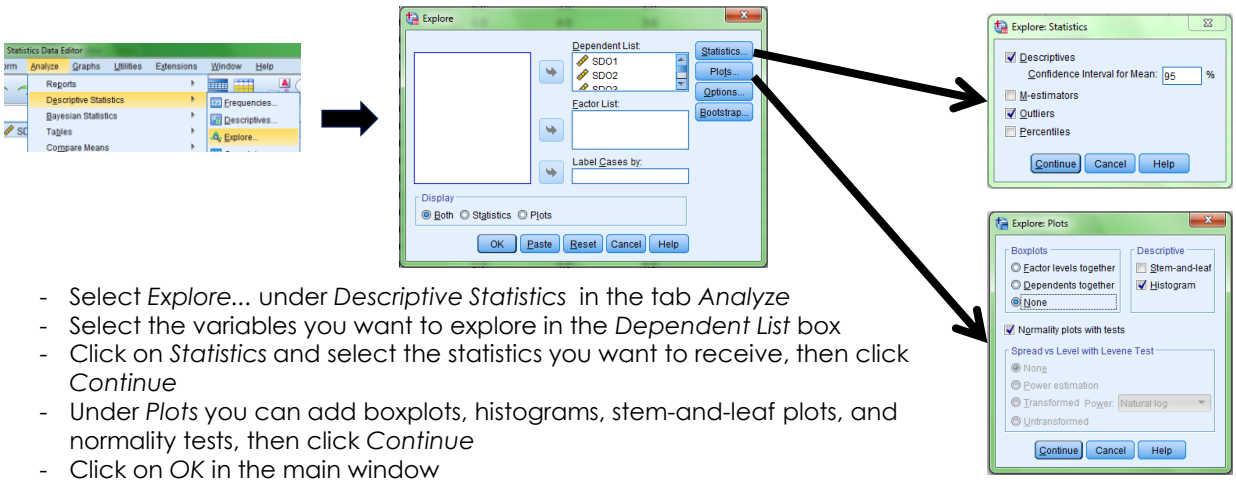


- Select the column in which you want to replace the values by clicking on the variable name
- Click on *Find...* in the tab *Edit*
- Select the tab *Replace,* then define which value you want to find and which value you want to replace it with
- Click on *Replace All* to replace the values in the selected column

Explore data

- Presents descriptive statistics
- Can return extreme values
- Can create histograms, boxplots, Q-Q plots and stem-and-leaf plots
- Can test for normal distribution
- Use Reliability data

Explore data



- Select *Explore...* under *Descriptive Statistics* in the tab *Analyze*
- Select the variables you want to explore in the *Dependent List* box
- Click on *Statistics* and select the statistics you want to receive, then click *Continue*
- Under *Plots* you can add boxplots, histograms, stem-and-leaf plots, and normality tests, then click *Continue*
- Click on *OK* in the main window

Explore data

Descriptives

			Statistic	Std. Error
SDO1	Mean		3.966	.0789
	95% Confidence Interval for Mean	Lower Bound	3.810	
		Upper Bound	4.122	
	5% Trimmed Mean		4.018	
	Median		4.000	
	Variance		.734	
	Std. Deviation		.8567	
	Minimum		2.0	
	Maximum		5.0	
	Range		3.0	
	Interquartile Range		1.0	
	Skewness		-.681	.223
	Kurtosis		.041	.442
SDO2	Mean		4.559	.0596

Extreme Values

			Case Number	Value
SDO1	Highest	1	22	5.0
		2	27	5.0
		3	28	5.0
		4	29	5.0
		5	32	5.0[a]
	Lowest	1	113	2.0
		2	102	2.0
		3	98	2.0
		4	73	2.0
		5	72	2.0[b]
SDO2	Highest	1	4	5.0
		2	6	5.0
		3	7	5.0
		4	9	5.0

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SDO1	.287	118	.000	.831	118	.000
SDO2	.362	118	.000	.624	118	.000
SDO3	.327	118	.000	.738	118	.000
SDO4	.381	118	.000	.623	118	.000
SDO5	.269	118	.000	.858	118	.000
SDO6	.326	118	.000	.685	118	.000

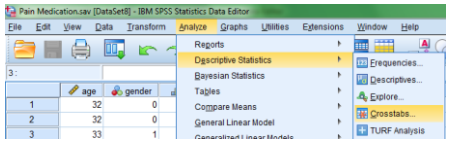
a. Lilliefors Significance Correction

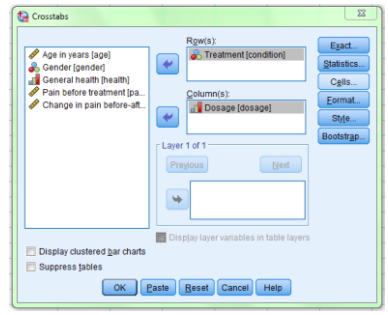
- SPSS returns a table with the standard set of descriptive statistics
- If the *Outliers* option was selected under *Statistics*, SPSS displays the most extreme values for each variable
- If the *Normality plots with tests* option was selected under *Plots,* SPSS returns Kolmogorov-Smirnov and Shapiro-Wilk test results. In both cases, significant results indicate that the distribution is significantly non-normal
- SPSS returns the requested plots

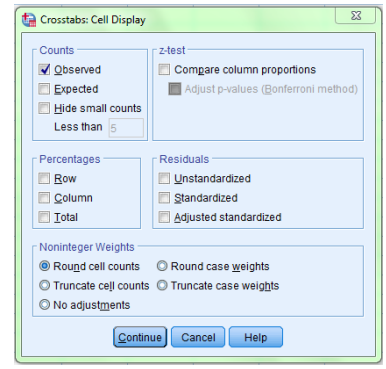
Crosstabs

- Allows you to create tables which group the sample according to categorical variables
- Simple version of custom tables
- Use pain medication data

Crosstabs





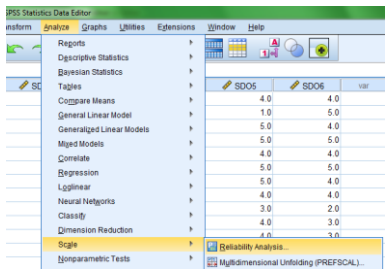


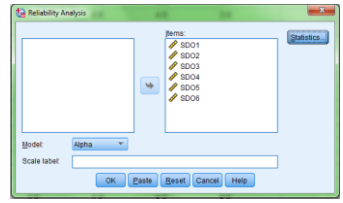
- Select *Crosstabs…* under *Descriptive Statistics* in the tab *Analyze*
- Add the variable Treatment and Dosage into the boxes for *Row(s)* and *Coloumn(s)*
- Click on *Cells...* to specify the content of the cells of the crosstabs, in this case we want the observed count in order to see how many people are in each condition, then click *Continue*
- Click *OK*

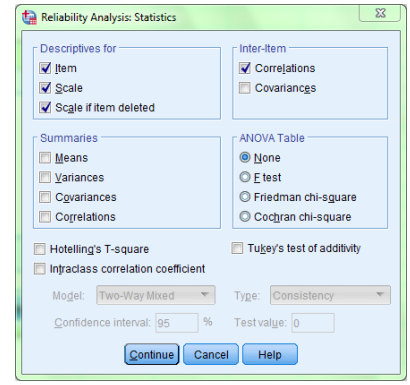
Reliability Analysis

- Allows you to assess internal reliability of a questionnaire with several items
- Returns Cronbach's Alpha
- Can request Cronbach's Alpha if items were deleted

Reliability Analysis







- Select *Reliability Analysis...* under *Scale* in the tab *Analyze*
- Select the item variables you want to test and add them to the box on the right
- Open the *Statistics...* window and select the statistics of interest, then click *Continue*
- Click *OK* in the main window

Reliability Analysis

1

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.701	.727	6

2

Item Statistics

	Mean	Std. Deviation	N
SDO1	3.966	.8567	118
SDO2	4.559	.6477	118
SDO3	4.441	.6608	118
SDO4	4.525	.8135	118
SDO5	3.788	1.0115	118
SDO6	4.449	.7578	118

3

Inter-Item Correlation Matrix

	SDO1	SDO2	SDO3	SDO4	SDO5	SDO6
SDO1	1.000	.450	.449	.320	.297	.274
SDO2	.450	1.000	.438	.459	.117	.476
SDO3	.449	.438	1.000	.265	.294	.301
SDO4	.320	.459	.265	1.000	.022	.335
SDO5	.297	.117	.294	.022	1.000	.114
SDO6	.274	.476	.301	.335	.114	1.000

4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
SDO1	21.763	6.200	.545	.326	.622
SDO2	21.169	6.860	.583	.427	.625
SDO3	21.288	6.959	.535	.309	.637
SDO4	21.203	6.933	.389	.249	.675
SDO5	21.941	6.962	.239	.135	.743
SDO6	21.280	6.972	.428	.254	.663

5

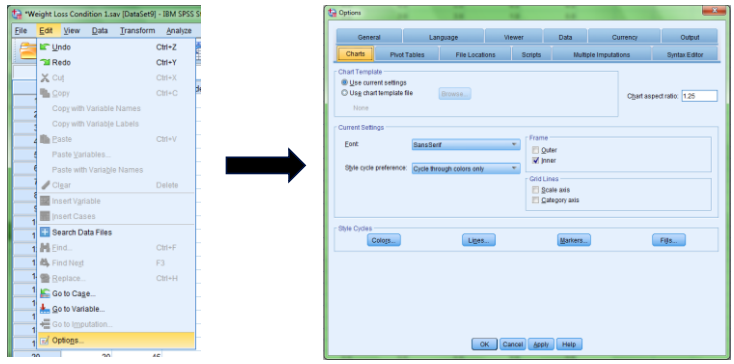
Scale Statistics

Mean	Variance	Std. Deviation	N of Items
25.729	9.259	3.0429	6

- The first table shows the overall Cronbach's Alpha, when all 6 items are included
- The second table depicts item statistics, the third table shows the requested inter-item correlations
- In the last column of table 4 you can find the potential Cronbach's Alpha when deleting the respective item
- Table 5 shows the statistics of the scale when including all 6 items

SPSS Settings

- Can set defaults for the formatting of charts, tables, outputs generally, etc.



Further Exercises

1. For the condition variable in the pain_medication file, find and replace the control group's value from 0 to 1 and the treatment group's value from 1 to 2.
2. In the pain_medication file, create crosstabs with the categorical variables gender and general health to find out how many participants fall into each group.
3. In the breakfast file, explore the satiety variables and check whether they are normally distributed. Use a syntax file to perform this task.