CEMASTEA Training on Data Analysis

GETTING STARTED: Planning for a study

Several decisions and actions to be made:

1. What is the purpose of the study?
2. What will be the title of the study?
3. Why is the overall objective of the study?
4. What are the specific objectives of the study?
5. What methodology will be employed in carrying out the study?
6. How will the findings be presented?

Key sections of study report

1. Introduction
2. Literature Review
3. Design and Methodology
4. Findings
5. Conclusion and Recommendations
6. References
7. Annexes

IMPACT OF SMASE IN-SERVICE EDUCATION AND TRAINING (INSET) PROGRAMME IN TEACHING AND LEARNING: A TRACER STUDY OF PRIMARY AND SECONDARY SCHOOLS IN KENYA

Main research question

What is the impact of SMASE INSET on teaching and learning in primary and secondary schools in Kenya?

Specific research questions

1. How has the SMASE INSET affected learner achievement?
2. To what extent are teachers who have attended SMASE INSET using learner-centred pedagogies?
3. What are the principals' perceptions of the SMASE INSET influence on the teacher's classroom practice?
4. What are the teacher's perceptions of the influence of the SMASE INSET on their classroom practice?
5. What are the learners' perceptions of their classroom experience in learning mathematics and science?
6. What kind of support exists in schools for effectively implementing SMASE INSET teaching and learning strategies?

Tools Development Matrix

Specific Questions	Variables	Type of variables	Measurement Scale	Name of tool	Specific Items
How has the SMASE INSET affected learner achievement?					
To what extent are teachers who have attended SMASE INSET using learner-centred pedagogies?					
What are the principals' perceptions of the SMASE INSET influence on the teacher's classroom practice?					
What are the teacher's perceptions of the influence of the SMASE INSET on their classroom practice?					
What are the learners' perceptions of their classroom experience in learning mathematics and science?					
What kind of support exists in schools for effectively implementing SMASE INSET teaching and learning strategies?					
Background Information					

Dummy Output Tables and Graphs

For each research question, how will the data be presented?
e.g., How has the SMASE INSET affected learner achievement?

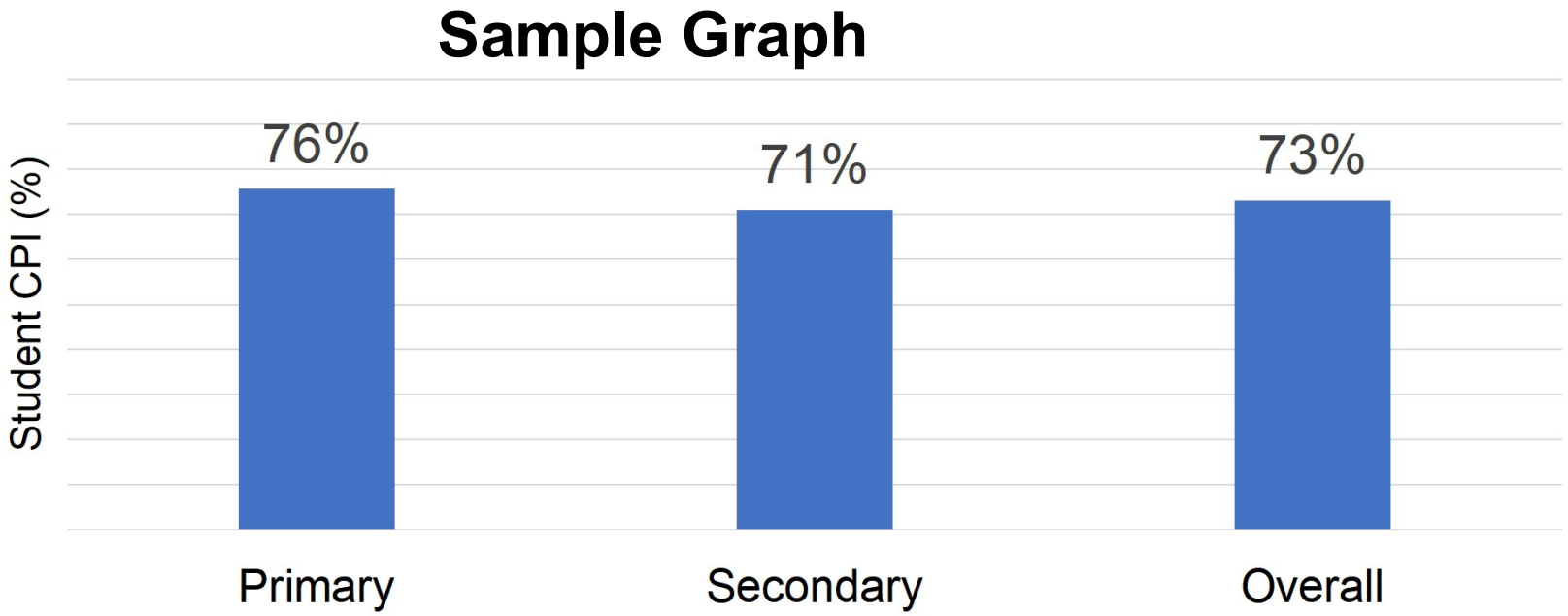


Figure 4: Learner perception of classroom practice

Dummy Output Tables and Graphs

For each research question, how will the data be presented?
e.g., How has the SMASE INSET affected learner achievement?

Sample Graph

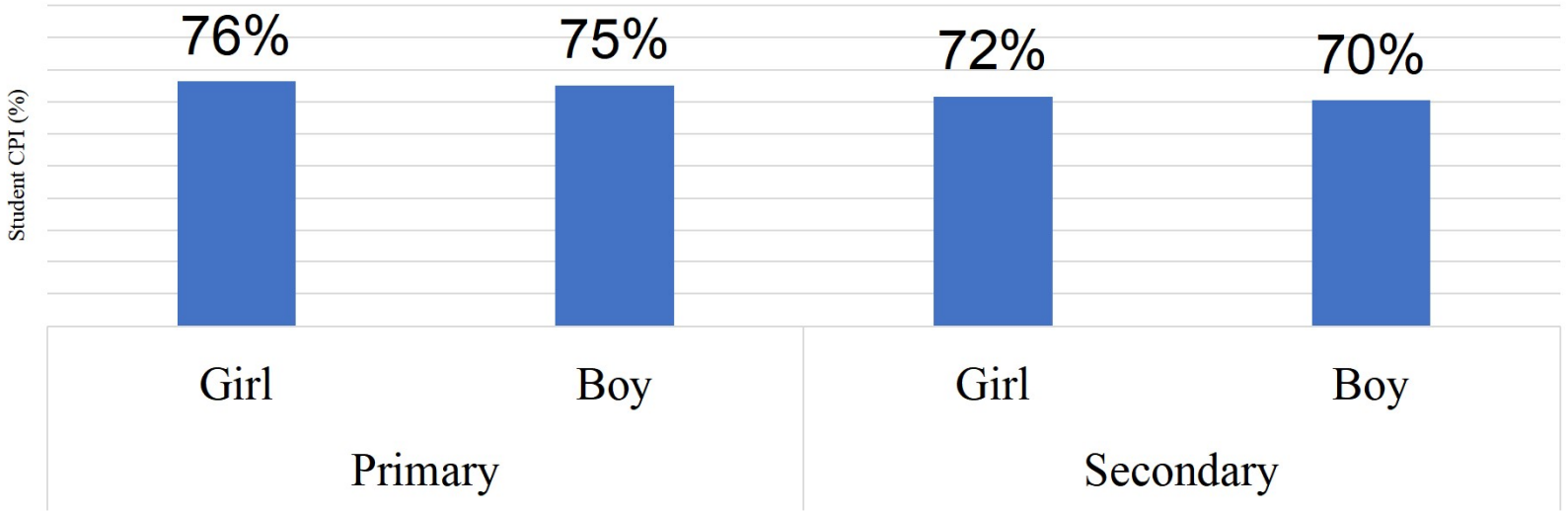


Figure 5: Student CPI by School Level and Gender and School Level

Statistics

Types of Variables

- **Nominal:** lowest scale, rank only (equality or difference, same or not-the-same).
- **Ordinal:** scale with rank and order only. Measures equality, difference, greater than, less than. However it does not measure the actual distances between the ranks
- **Interval**: scale measures rank, order and differences between ranks: sameness, differences between ranks, greater than, less than, equality or intervals, no true zero.
- **Ratio:** this scale measures rank, order, differences between ranks and there is an absolute zero or true zero.

Statistics

1. **Descriptive statistics**
   a. Percentages, means, ratios and proportions
   b. Reduce massive amount of data into manageable sizes, summarization, organisation and description of data
   c. Enable visualisation of trends
2. **Inferential statistics**
   a. Correlation, Regression, Chi-Square, T-Tests, ANOVA
   b. Allow generalizations, conclusions, estimates, decisions, predictions and inferring characteristics of the population from the sample characteristics

Statistics

1. **Descriptive Analysis**
   a. Means, Frequency, Percentages
2. **Data Quality Checks:** Tests of Normality, Reliability of scales, Factor Analysis
3. **Assess Relationships:** Correlation, Regression, Chi-Square
4. **Group Comparisons**
   a. T-Tests: Independent, Paired samples, One Sample
   b. ANOVA: One Way ANOVA, ANCOVA, MANOVA
4. **Trend Analysis**
   a. **Repeated Measures ANOVA**
   b. **Times Series**

Overview of SPSS

a. **SPSS**: Statistical Package for Social Sciences
b. Statistical analyses, manipulating data, generating tables & graphs
c. Analysis of descriptive & advanced inferential statistics
d. Tools for manipulating & recoding data, computing new variables, merging and aggregating datasets
e. Display data in the form of tables and graphs

Overview of SPSS

SPSS has 6 different windows, but 3 are commonly used: *Data Editor, Output Viewer, Syntax Editor, Pivot Table Editor, Chart Editor, and Text Output Editor.*

a. **Data Editor** : open at start-up and used to enter and store data
b. **Output Viewer:** opens automatically when you execute an analysis
c. **Syntax Window:** used to execute commands and is an alternative to the dialog box

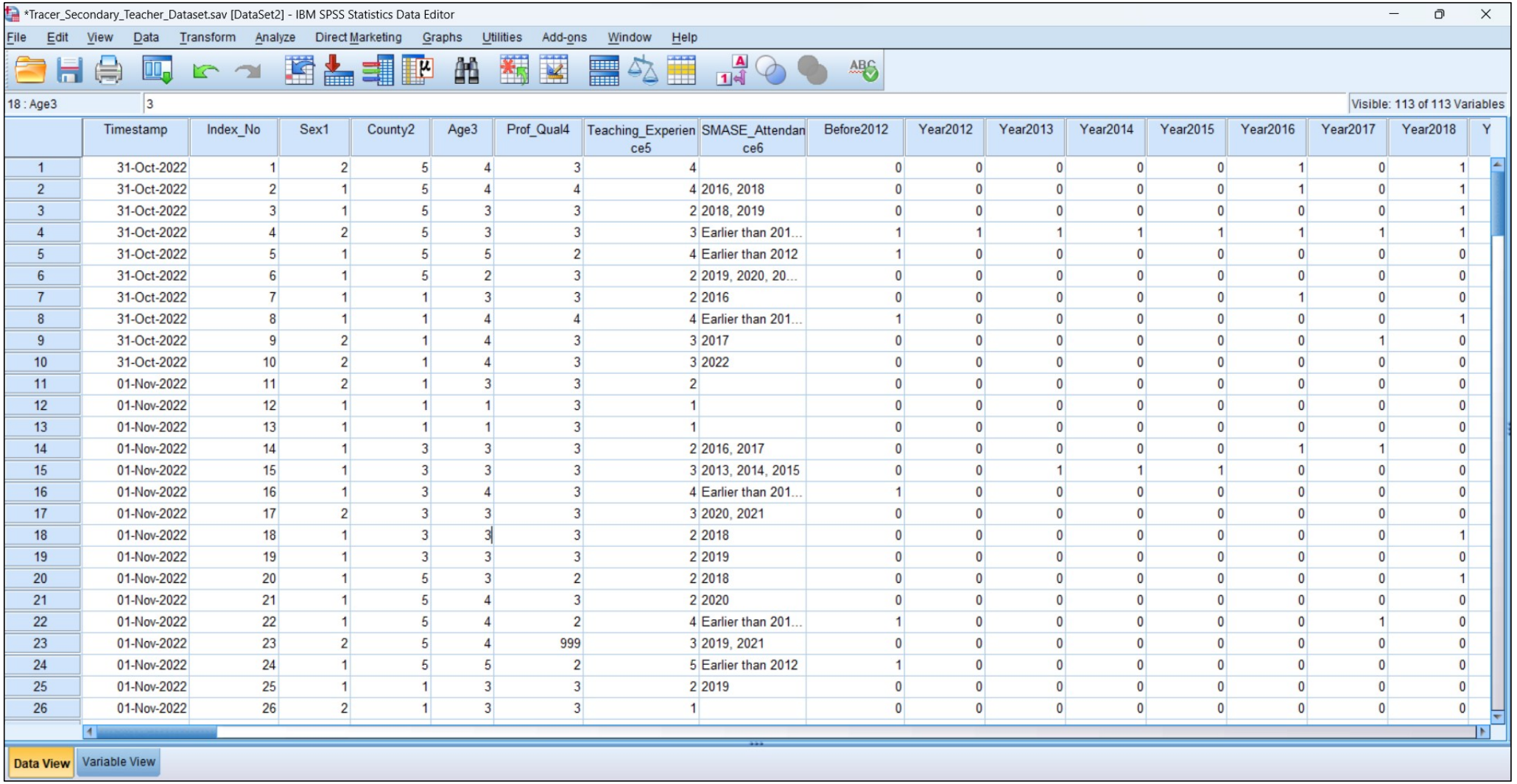
Overview of SPSS

- Starting SPSS
- Opening an existing data file
- Working with data files
- SPSS windows
- Menus
- Dialog boxes
- Closing SPSS
- Getting help

ENTERING DATA IN SPSS

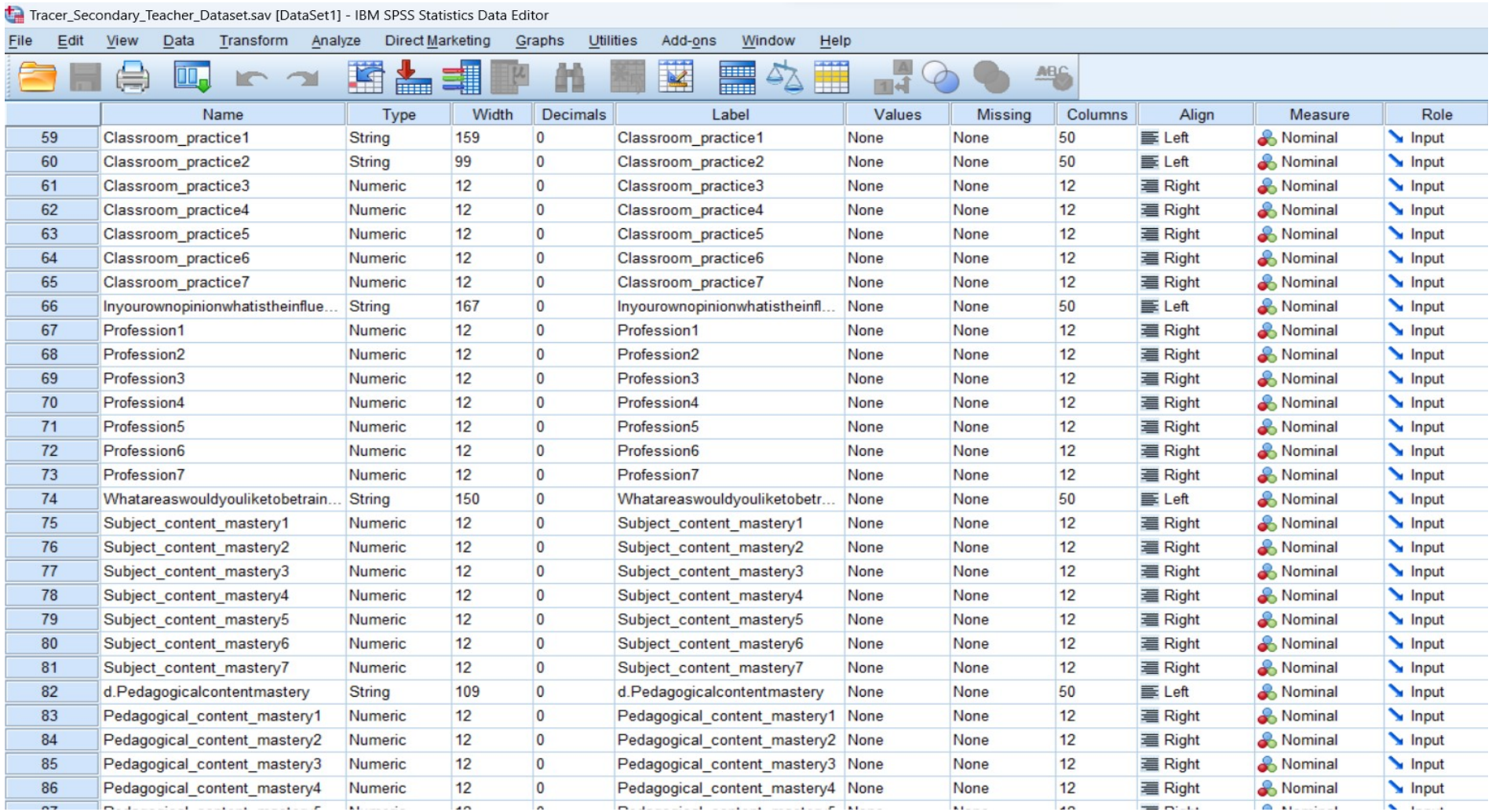
- **Data Editor:** displays the contents of the working dataset
- Spreadsheet format with variables in columns and cases in rows
- Two sheets in data editor: Data View & Variable View

Data Editor Window



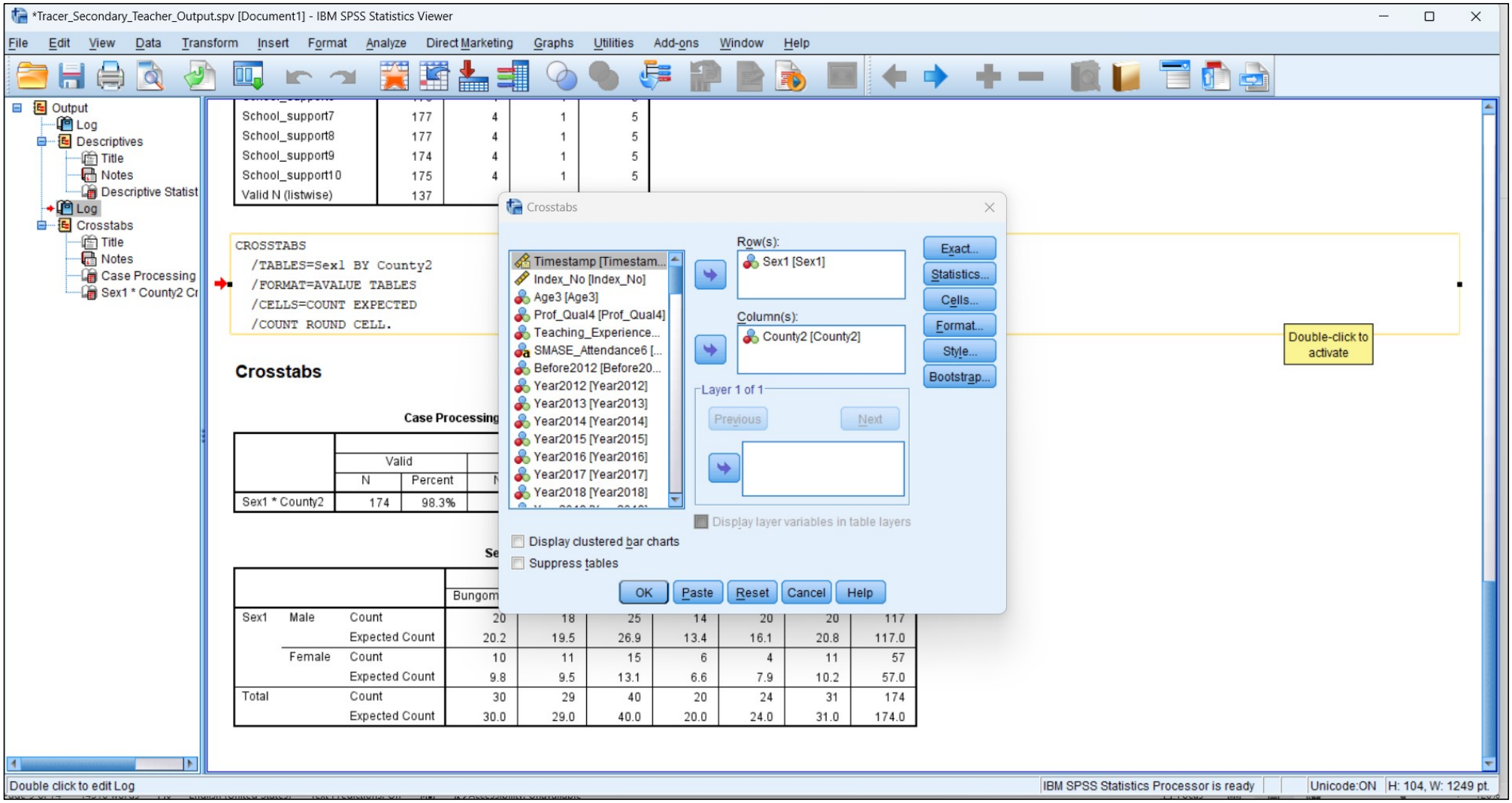
	Timestamp	Index_No	Sex1	County2	Age3	Prof_Qual4	Teaching_Experience5	SMASE_Attendance6	Before2012	Year2012	Year2013	Year2014	Year2015	Year2016	Year2017	Year2018	Y
1	31-Oct-2022	1	2	5	4	3	4		0	0	0	0	0	1	0	1	
2	31-Oct-2022	2	1	5	4	4	4	2016, 2018	0	0	0	0	0	1	0	1	
3	31-Oct-2022	3	1	5	3	3	2	2018, 2019	0	0	0	0	0	0	0	1	
4	31-Oct-2022	4	2	5	3	3	3	Earlier than 201...	1	1	1	1	1	1	1	1	
5	31-Oct-2022	5	1	5	5	2	4	Earlier than 2012	1	0	0	0	0	0	0	0	
6	31-Oct-2022	6	1	5	2	3	2	2019, 2020, 20...	0	0	0	0	0	0	0	0	
7	31-Oct-2022	7	1	1	3	3	2	2016	0	0	0	0	0	1	0	0	
8	31-Oct-2022	8	1	1	4	4	4	Earlier than 201...	1	0	0	0	0	0	0	1	
9	31-Oct-2022	9	2	1	4	3	3	2017	0	0	0	0	0	0	1	0	
10	31-Oct-2022	10	2	1	4	3	3	2022	0	0	0	0	0	0	0	0	
11	01-Nov-2022	11	2	1	3	3	2		0	0	0	0	0	0	0	0	
12	01-Nov-2022	12	1	1	1	3	1		0	0	0	0	0	0	0	0	
13	01-Nov-2022	13	1	1	1	3	1		0	0	0	0	0	0	0	0	
14	01-Nov-2022	14	1	3	3	3	2	2016, 2017	0	0	0	0	0	1	1	0	
15	01-Nov-2022	15	1	3	3	3	3	2013, 2014, 2015	0	0	1	1	1	0	0	0	
16	01-Nov-2022	16	1	3	4	3	4	Earlier than 201...	1	0	0	0	0	0	0	0	
17	01-Nov-2022	17	2	3	3	3	3	2020, 2021	0	0	0	0	0	0	0	0	
18	01-Nov-2022	18	1	3	3	3	2	2018	0	0	0	0	0	0	0	1	
19	01-Nov-2022	19	1	3	3	3	2	2019	0	0	0	0	0	0	0	0	
20	01-Nov-2022	20	1	5	3	2	2	2018	0	0	0	0	0	0	0	1	
21	01-Nov-2022	21	1	5	4	3	2	2020	0	0	0	0	0	0	0	0	
22	01-Nov-2022	22	1	5	4	2	4	Earlier than 201...	1	0	0	0	0	0	1	0	
23	01-Nov-2022	23	2	5	4	999	3	2019, 2021	0	0	0	0	0	0	0	0	
24	01-Nov-2022	24	1	5	5	2	5	Earlier than 2012	1	0	0	0	0	0	0	0	
25	01-Nov-2022	25	1	1	3	3	2	2019	0	0	0	0	0	0	0	0	
26	01-Nov-2022	26	2	1	3	3	1		0	0	0	0	0	0	0	0	

Variable View Window

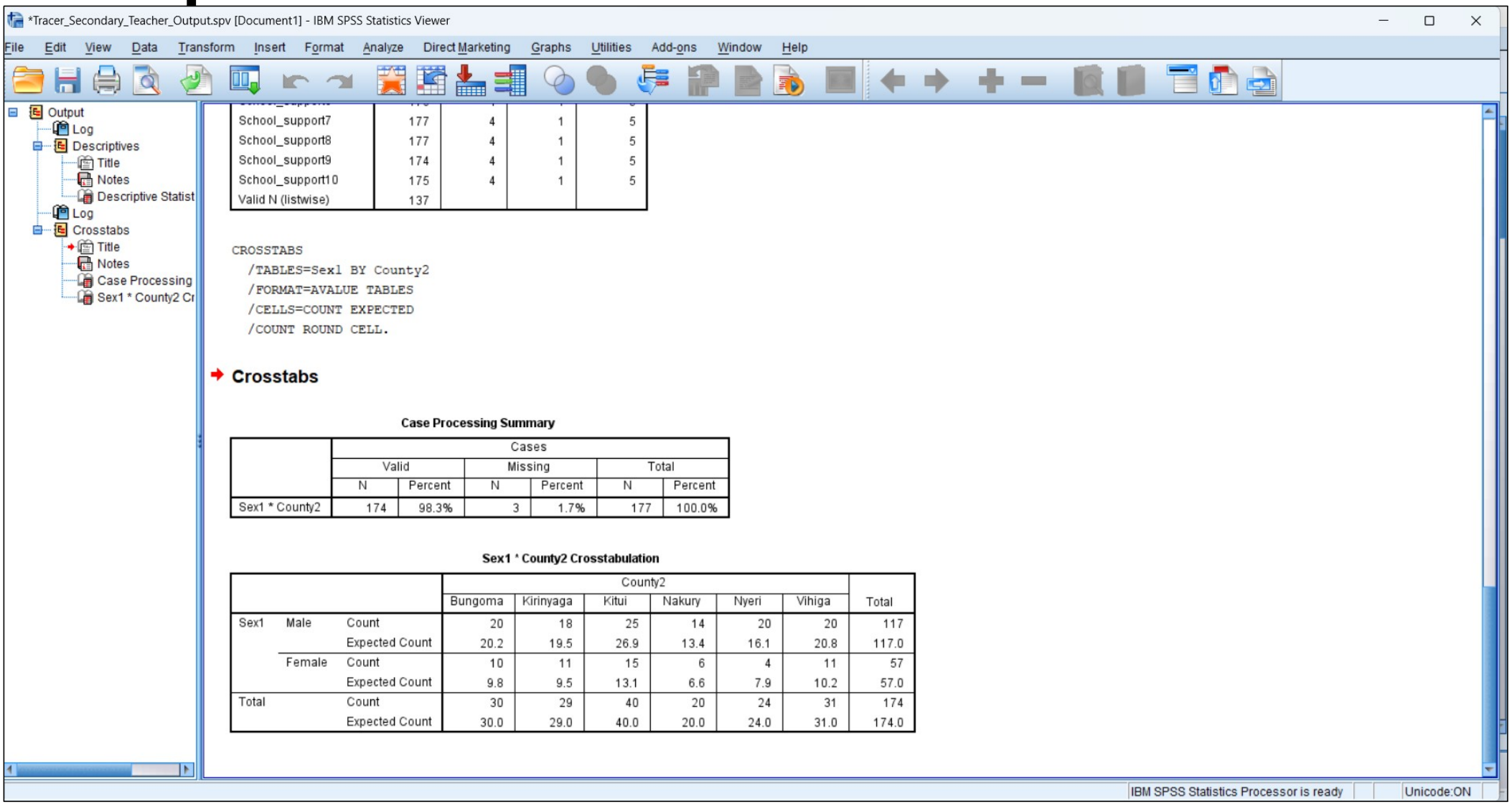


	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
59	Classroom_practice1	String	159	0	Classroom_practice1	None	None	50	Left	Nominal	Input
60	Classroom_practice2	String	99	0	Classroom_practice2	None	None	50	Left	Nominal	Input
61	Classroom_practice3	Numeric	12	0	Classroom_practice3	None	None	12	Right	Nominal	Input
62	Classroom_practice4	Numeric	12	0	Classroom_practice4	None	None	12	Right	Nominal	Input
63	Classroom_practice5	Numeric	12	0	Classroom_practice5	None	None	12	Right	Nominal	Input
64	Classroom_practice6	Numeric	12	0	Classroom_practice6	None	None	12	Right	Nominal	Input
65	Classroom_practice7	Numeric	12	0	Classroom_practice7	None	None	12	Right	Nominal	Input
66	Inyourownopinionwhatistheinflue...	String	167	0	Inyourownopinionwhatistheinfl...	None	None	50	Left	Nominal	Input
67	Profession1	Numeric	12	0	Profession1	None	None	12	Right	Nominal	Input
68	Profession2	Numeric	12	0	Profession2	None	None	12	Right	Nominal	Input
69	Profession3	Numeric	12	0	Profession3	None	None	12	Right	Nominal	Input
70	Profession4	Numeric	12	0	Profession4	None	None	12	Right	Nominal	Input
71	Profession5	Numeric	12	0	Profession5	None	None	12	Right	Nominal	Input
72	Profession6	Numeric	12	0	Profession6	None	None	12	Right	Nominal	Input
73	Profession7	Numeric	12	0	Profession7	None	None	12	Right	Nominal	Input
74	Whatareaswouldyouliketobetrain...	String	150	0	Whatareaswouldyouliketobetr...	None	None	50	Left	Nominal	Input
75	Subject_content_mastery1	Numeric	12	0	Subject_content_mastery1	None	None	12	Right	Nominal	Input
76	Subject_content_mastery2	Numeric	12	0	Subject_content_mastery2	None	None	12	Right	Nominal	Input
77	Subject_content_mastery3	Numeric	12	0	Subject_content_mastery3	None	None	12	Right	Nominal	Input
78	Subject_content_mastery4	Numeric	12	0	Subject_content_mastery4	None	None	12	Right	Nominal	Input
79	Subject_content_mastery5	Numeric	12	0	Subject_content_mastery5	None	None	12	Right	Nominal	Input
80	Subject_content_mastery6	Numeric	12	0	Subject_content_mastery6	None	None	12	Right	Nominal	Input
81	Subject_content_mastery7	Numeric	12	0	Subject_content_mastery7	None	None	12	Right	Nominal	Input
82	d.Pedagogicalcontentmastery	String	109	0	d.Pedagogicalcontentmastery	None	None	50	Left	Nominal	Input
83	Pedagogical_content_mastery1	Numeric	12	0	Pedagogical_content_mastery1	None	None	12	Right	Nominal	Input
84	Pedagogical_content_mastery2	Numeric	12	0	Pedagogical_content_mastery2	None	None	12	Right	Nominal	Input
85	Pedagogical_content_mastery3	Numeric	12	0	Pedagogical_content_mastery3	None	None	12	Right	Nominal	Input
86	Pedagogical_content_mastery4	Numeric	12	0	Pedagogical_content_mastery4	None	None	12	Right	Nominal	Input

Output View Window



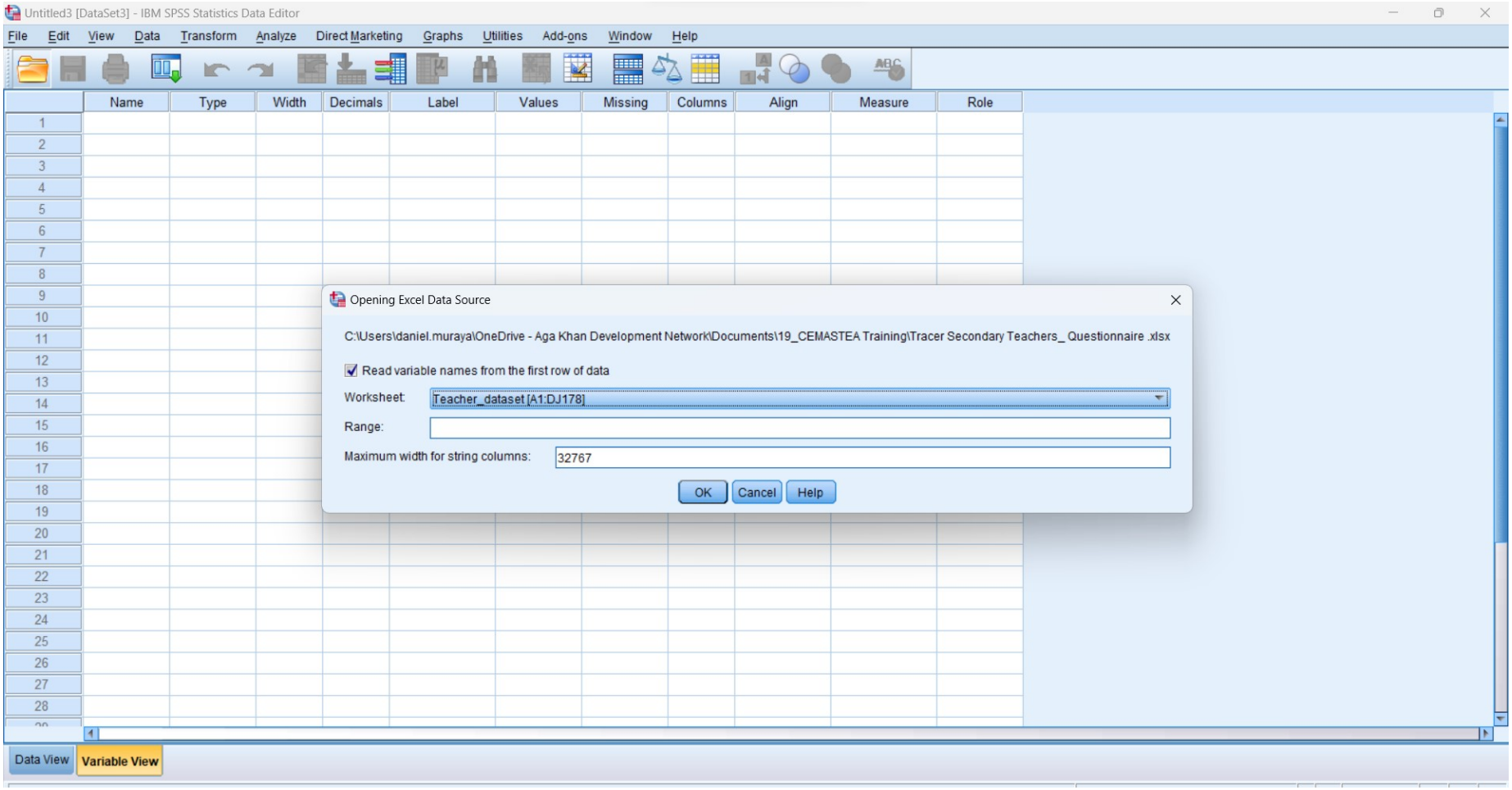
Output View Window



ENTERING DATA IN SPSS

- Data can be entered directly into SPSS
- Data imported from other applications

IMPORTING DATA INTO SPSS



IMPORTING DATA INTO SPSS

- **Importing data from other applications e.g. MS excel**
- To open an Excel file: **File, Open...**
- Select the desired location on disk using the *Look in* option
- Next, select Excel from the *Files of type* drop-down menu.

IMPORTING DATA INTO SPSS

- Select a spreadsheet from within the Excel Workbook
- Option of reading variable names from the Excel directly into SPSS

MODIFYING & ORGANIZING DATA

Creating and Defining Variables

- Variable & value
- Defining variables: for interpretation of outputs and enable SPSS to understand the data
- Define variables in Variable view tab

MODIFYING & ORGANIZING DATA

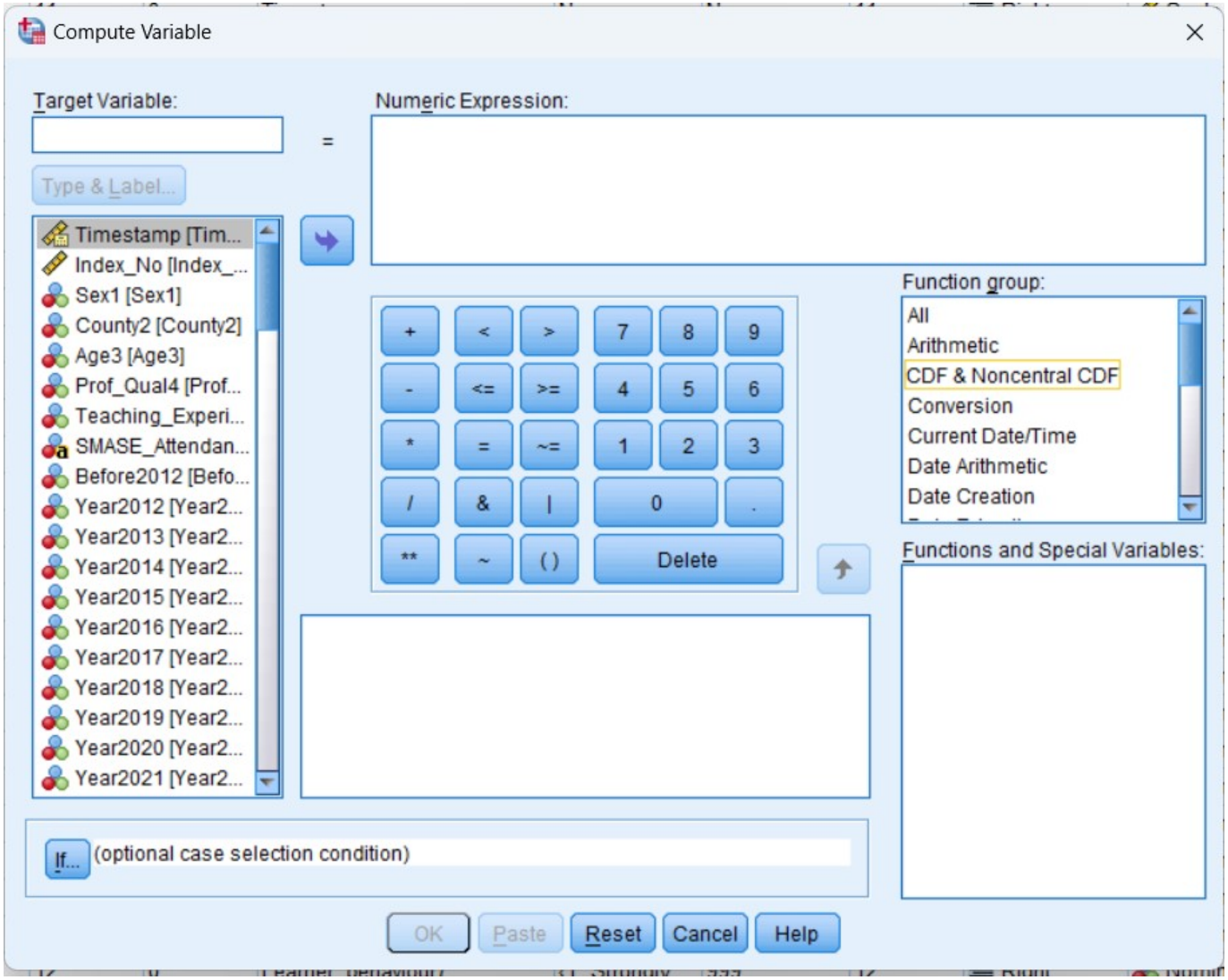
- Data Type
- Width
- Decimal
- Label
- Values
- Missing Values
- Measure

MODIFYING AND ORGANIZING DATA

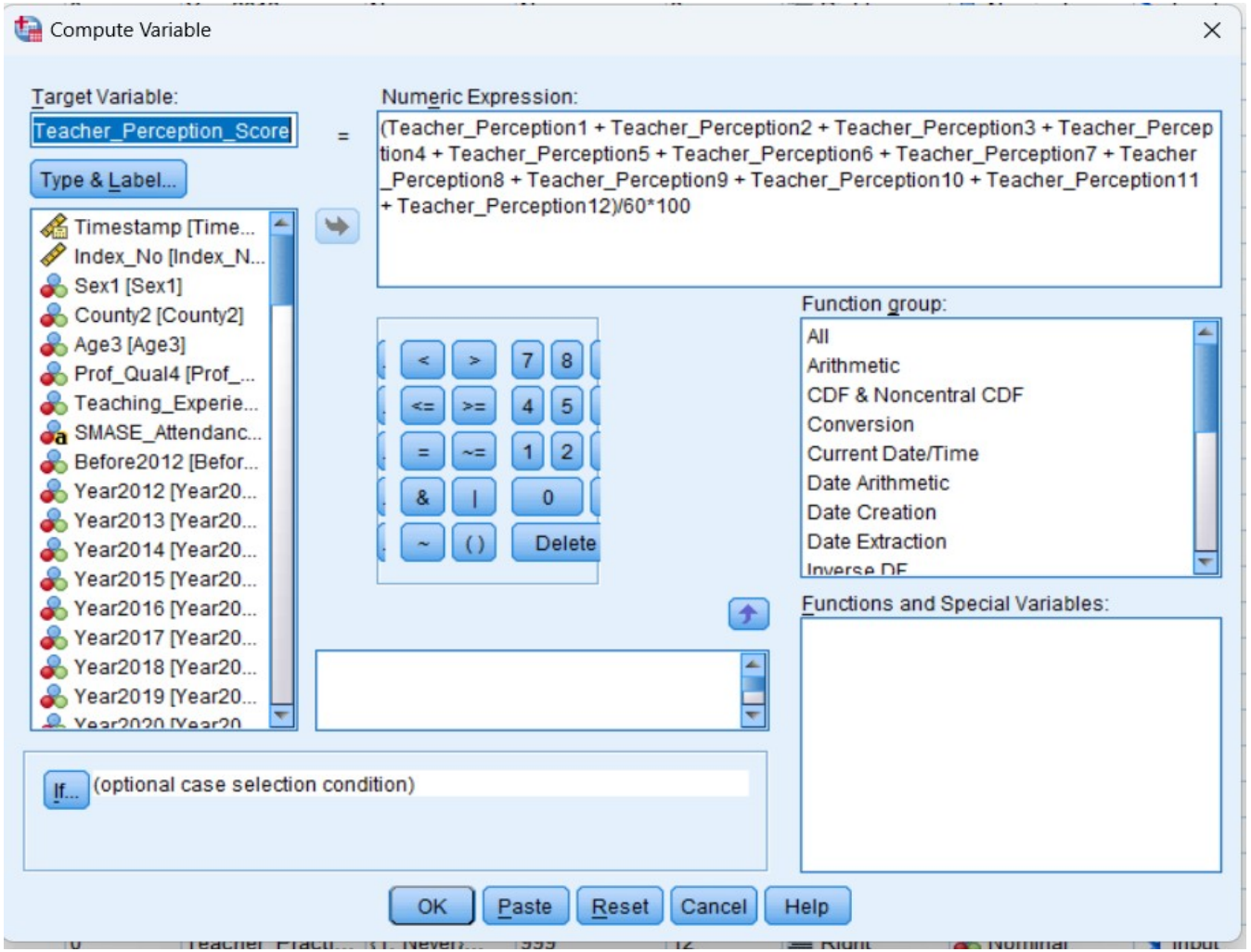
Manipulating data

- **Inserting and Deleting Cases and Variables**
- **Transforming variables:** Computing New Variables, Recoding Variables, Replacing Missing Values

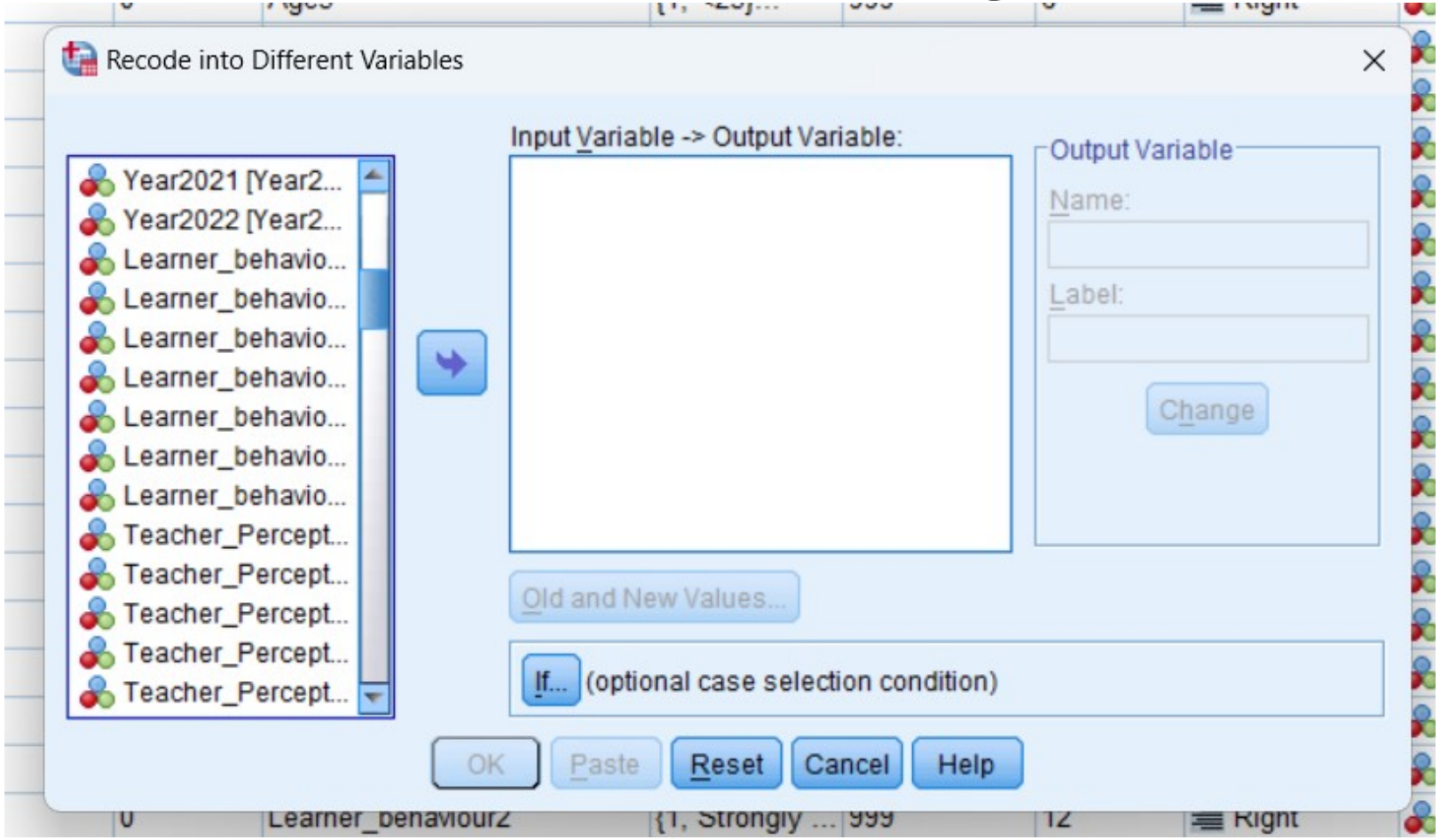
Computing a New Variable



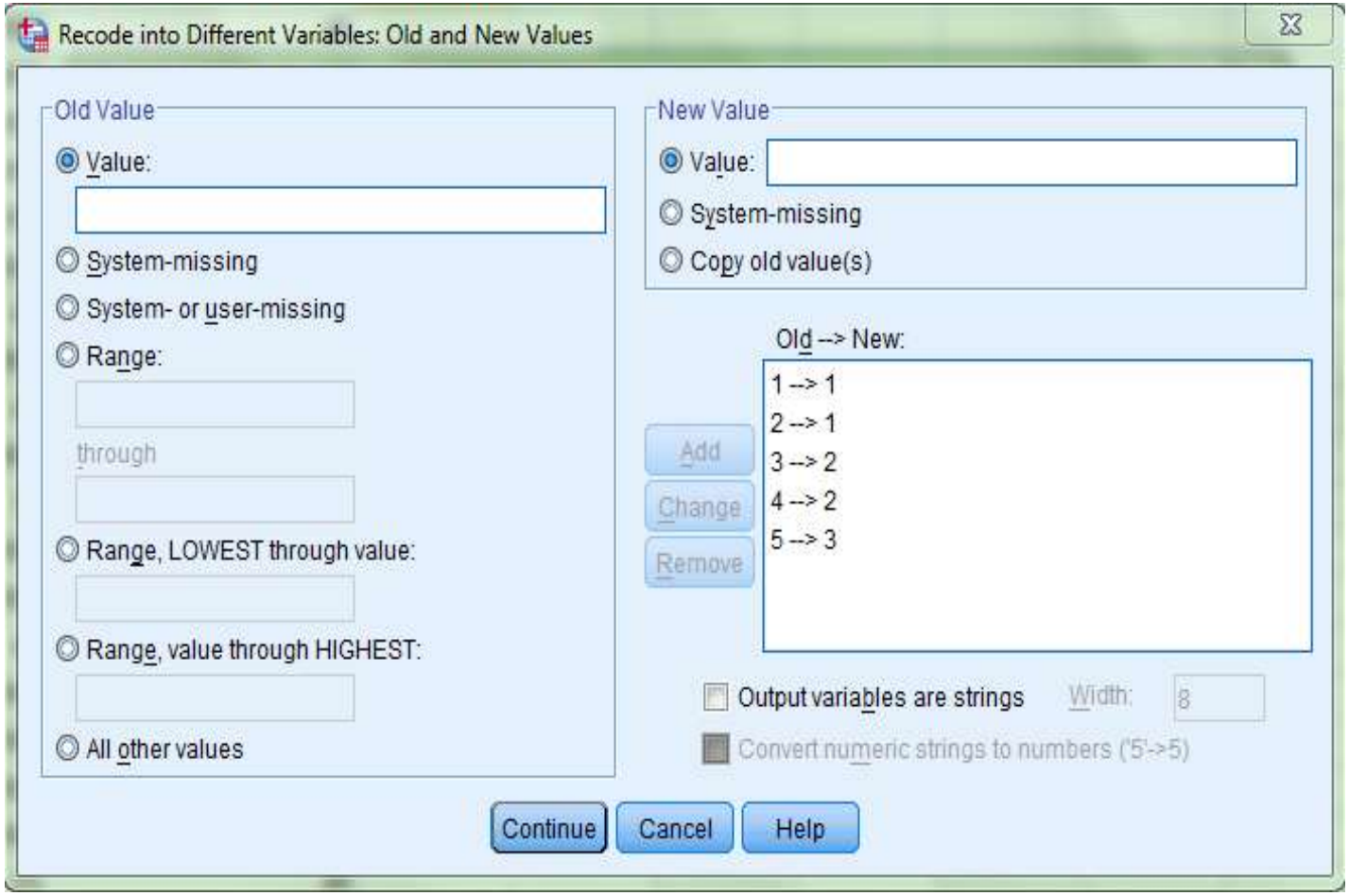
Computing a New Variable – Teacher Perception Score



Recoding Variables



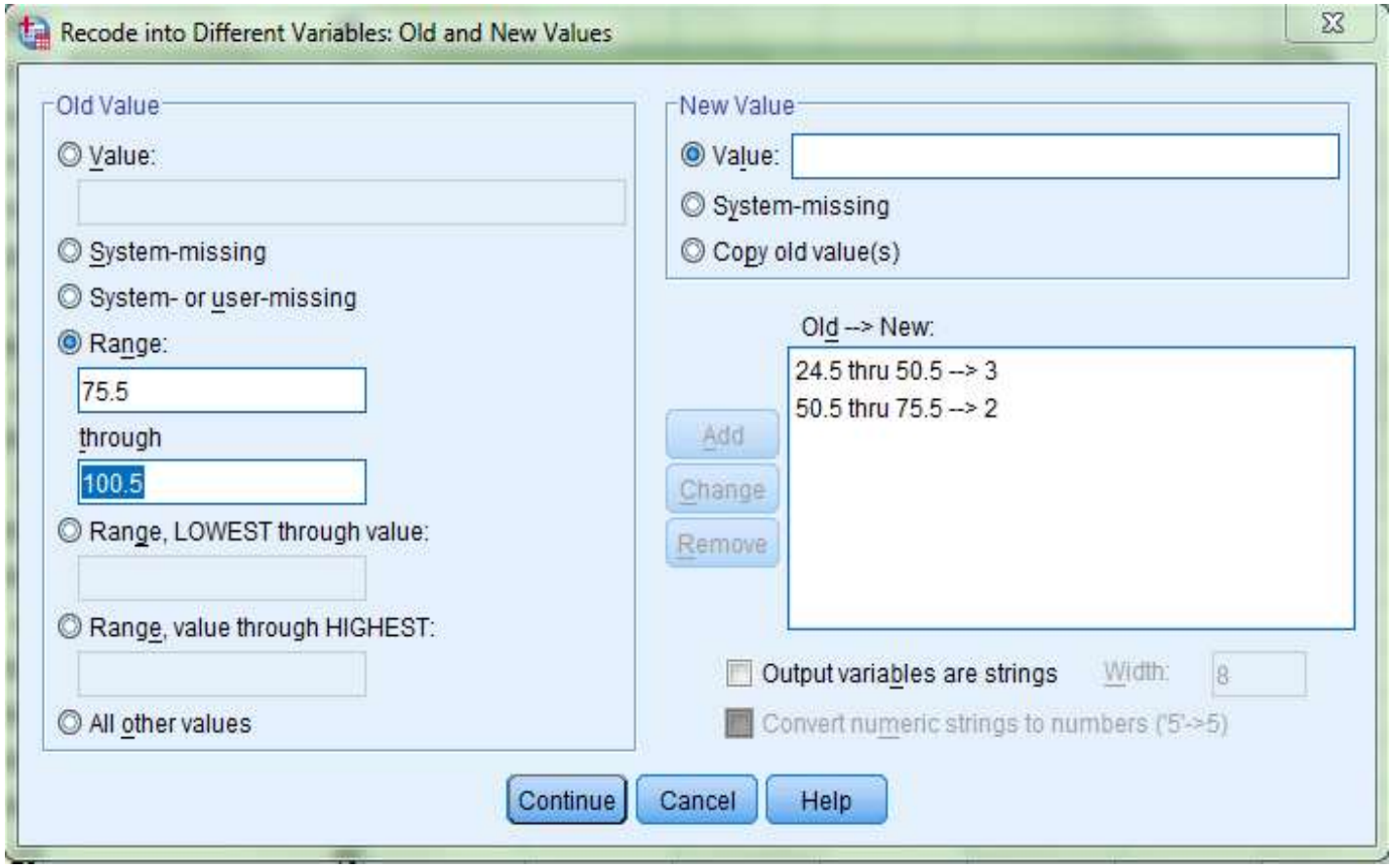
Recoding Variables



Recoding a Continuous Variable into Groups

- In some cases, you may establish benchmarks for teacher perception score score and then compute the proportion of cases that follow under each category
- For example, you may want to classify self-efficacy into three categories: (a) high; (b) medium; (c) low.

Recoding a Continuous Variable into Groups



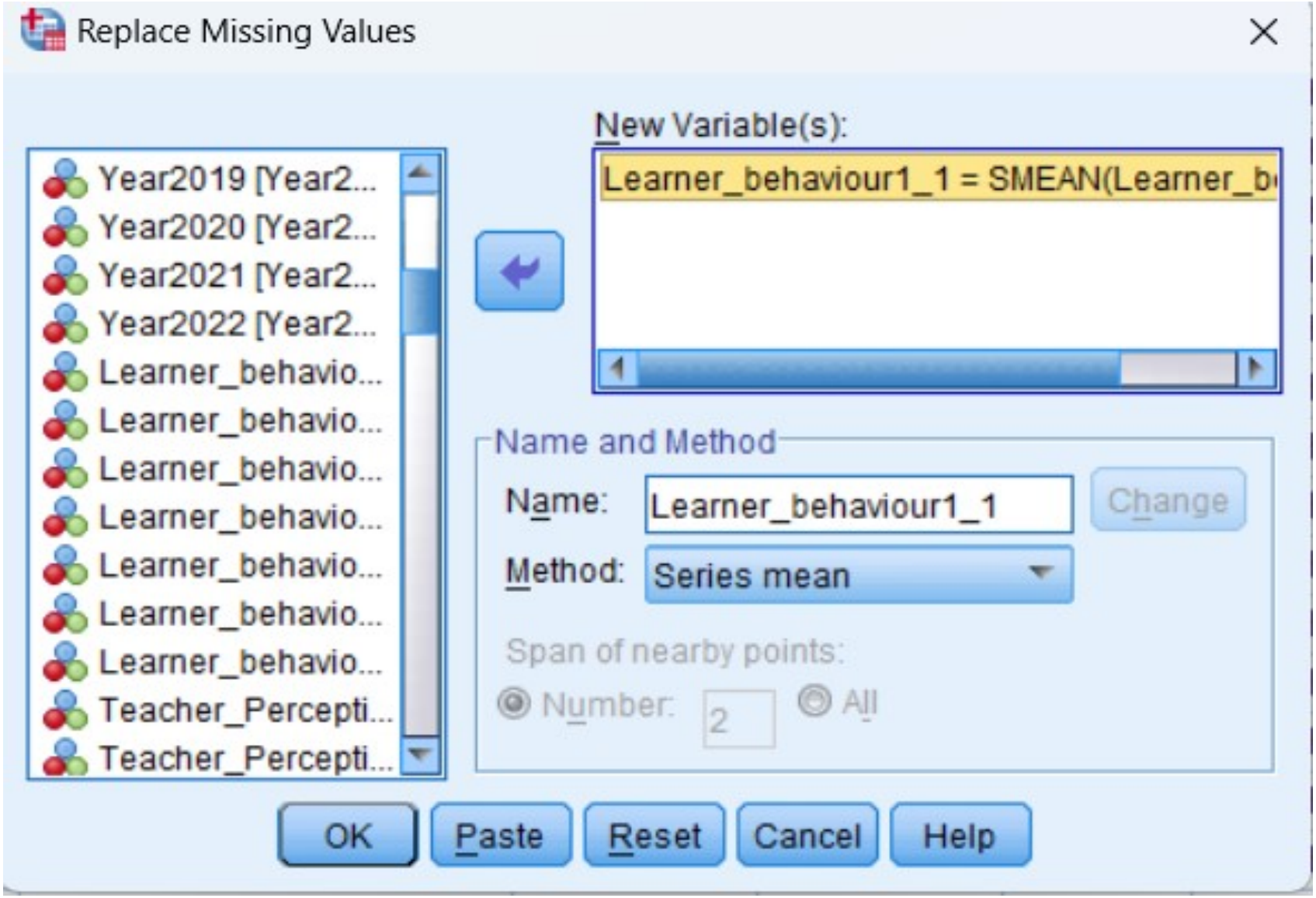
Work To Do

- Recode the **teacher perception score** into a new variable with three categories:
  - High
  - Medium
  - Low
- **Hint!:** Remember to use the lower and upper class limits

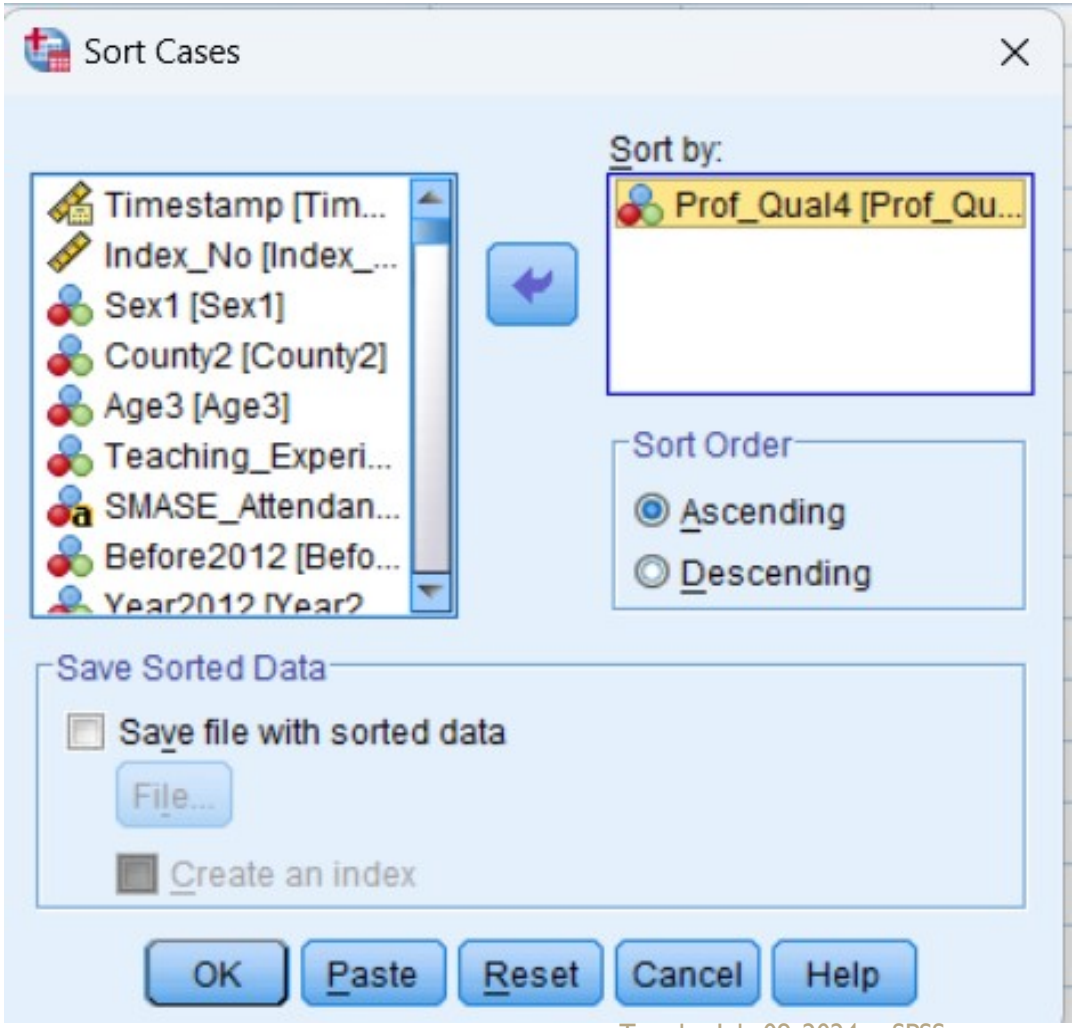
Replacing Missing Values

- ***Replacing Missing Categorical Values:*** category of '***unknown***'
- ***Replacing Missing Continuous Values***
- SPSS have 5 methods
  a. Series mean
  b. Mean of nearby points
  c. Median of nearby points
  d. Linear interpolation;
  e. Linear trend at point

Replacing Missing Values



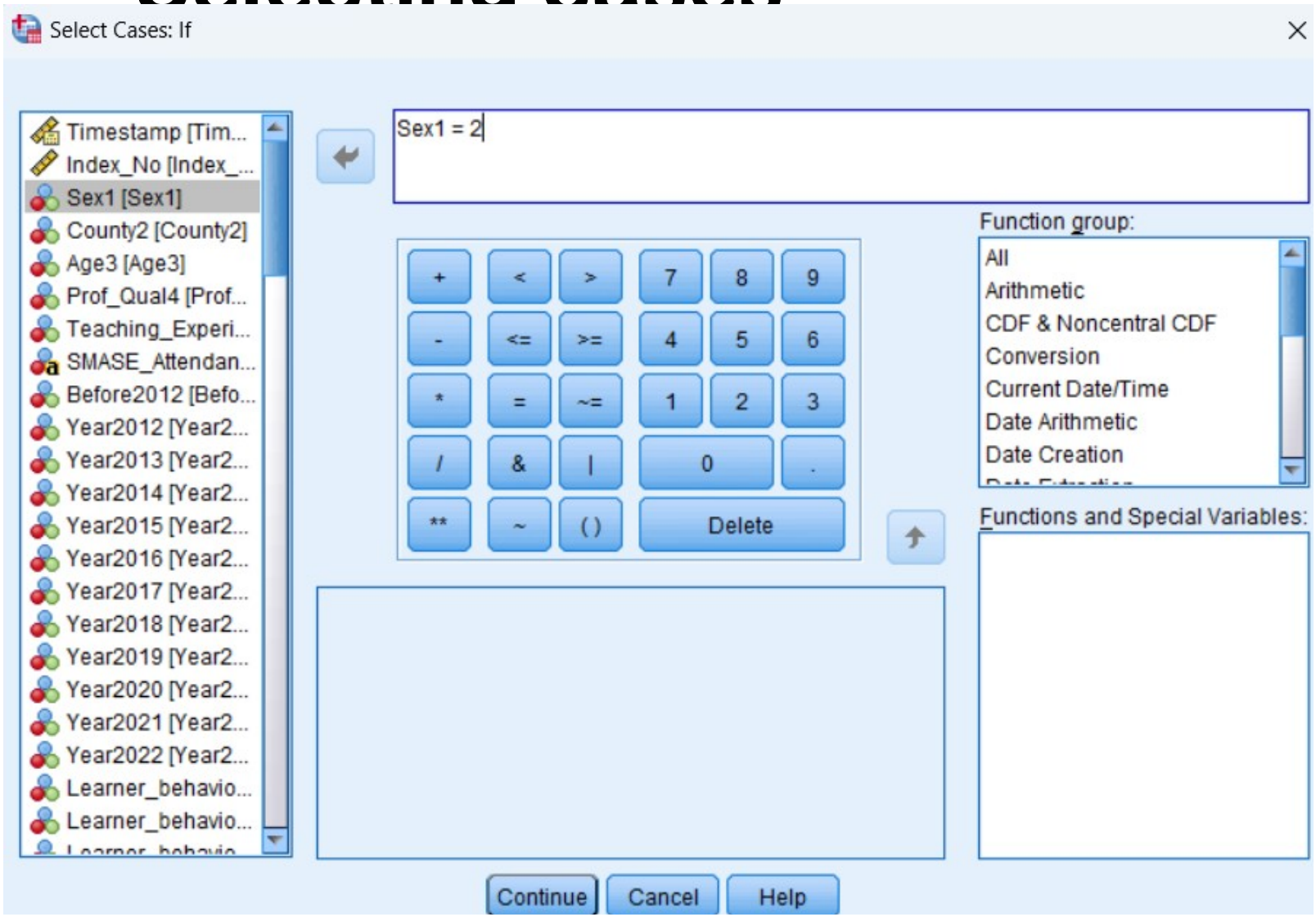
Sorting


Sort Cases
Timestamp [Tim...
Index_No [Index_...
Sex1 [Sex1]
County2 [County2]
Age3 [Age3]
Teaching_Experi...
SMASE_Attendan...
Before2012 [Befo...
Year2012 [Year2
Sort by:
Prof_Qual4 [Prof_Qu...
Sort Order
Ascending
Descending
Save Sorted Data
Save file with sorted data
File...
Create an index
OK
Paste
Reset
Cancel
Help

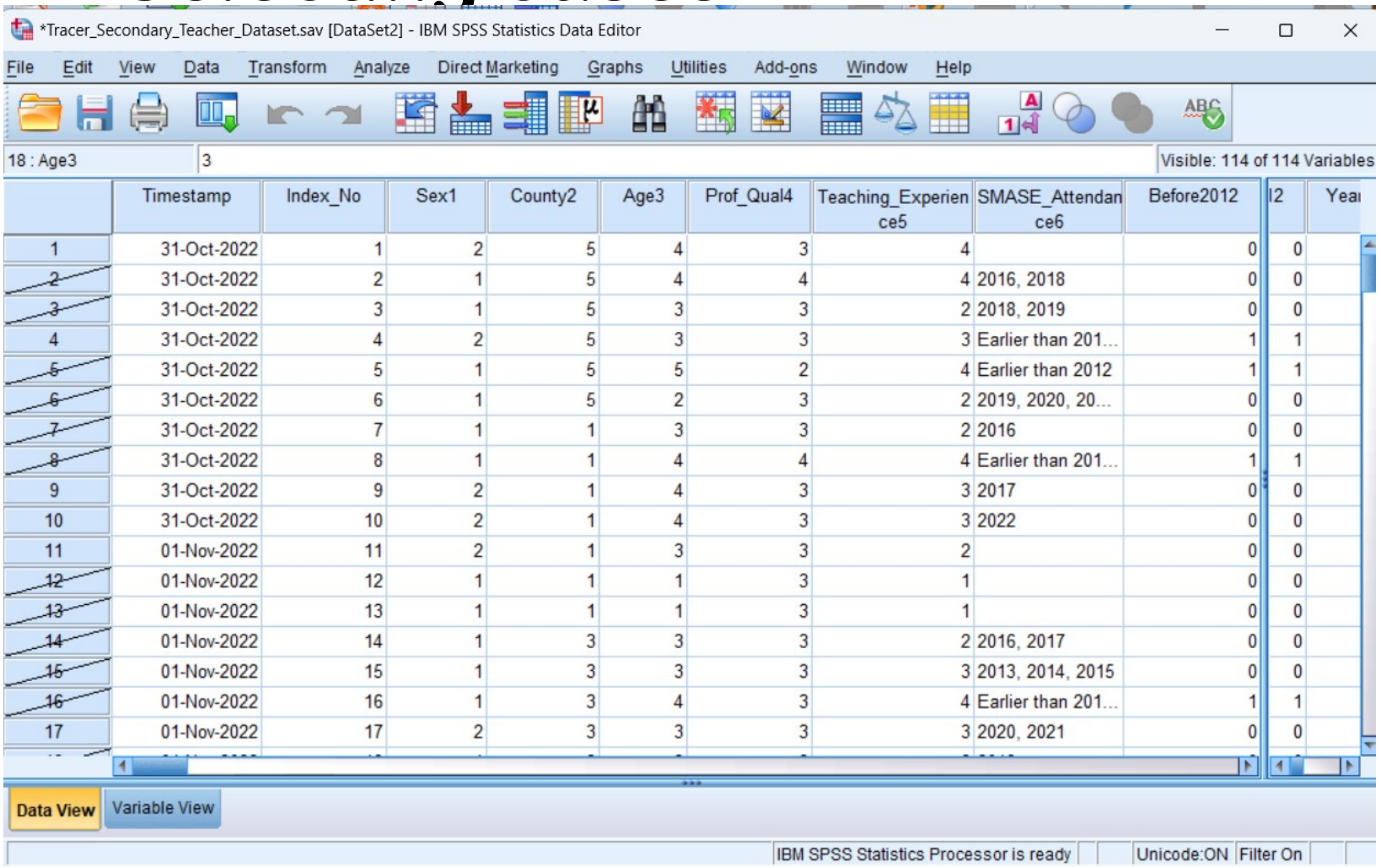
Merging Datasets

- Merging Cases
- Merging Variables

Selecting cases



Selecting cases

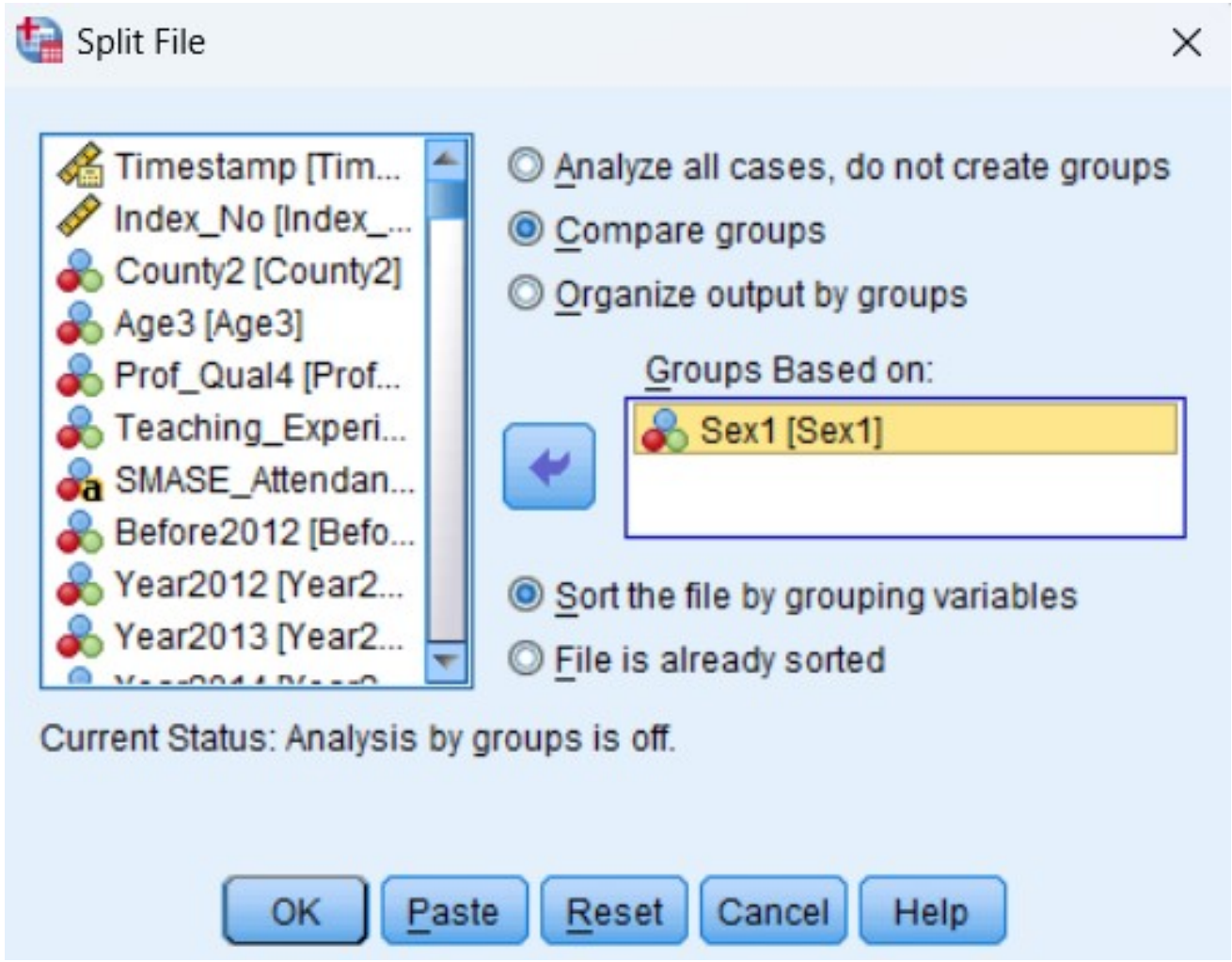


	Timestamp	Index_No	Sex1	County2	Age3	Prof_Qual4	Teaching_Experience5	SMASE_Attendance6	Before2012	I2	Year
1	31-Oct-2022	1	2	5	4	3	4		0	0	
2	31-Oct-2022	2	1	5	4	4	4	2016, 2018	0	0	
3	31-Oct-2022	3	1	5	3	3	2	2018, 2019	0	0	
4	31-Oct-2022	4	2	5	3	3	3	Earlier than 201...	1	1	
5	31-Oct-2022	5	1	5	5	2	4	Earlier than 2012	1	1	
6	31-Oct-2022	6	1	5	2	3	2	2019, 2020, 20...	0	0	
7	31-Oct-2022	7	1	1	3	3	2	2016	0	0	
8	31-Oct-2022	8	1	1	4	4	4	Earlier than 201...	1	1	
9	31-Oct-2022	9	2	1	4	3	3	2017	0	0	
10	31-Oct-2022	10	2	1	4	3	3	2022	0	0	
11	01-Nov-2022	11	2	1	3	3	2		0	0	
12	01-Nov-2022	12	1	1	1	3	1		0	0	
13	01-Nov-2022	13	1	1	1	3	1		0	0	
14	01-Nov-2022	14	1	3	3	3	2	2016, 2017	0	0	
15	01-Nov-2022	15	1	3	3	3	3	2013, 2014, 2015	0	0	
16	01-Nov-2022	16	1	3	4	3	4	Earlier than 201...	1	1	
17	01-Nov-2022	17	2	3	3	3	3	2020, 2021	0	0	

Splitting Files

- You may want to perform analysis on different groups within the same dataset, for example, comparing gender differences

Splitting Files



Summarizing Data

Descriptive statistics

- **Categorical variables**

Proportion of Teachers by County

Frequencies and Percentages

Analyze

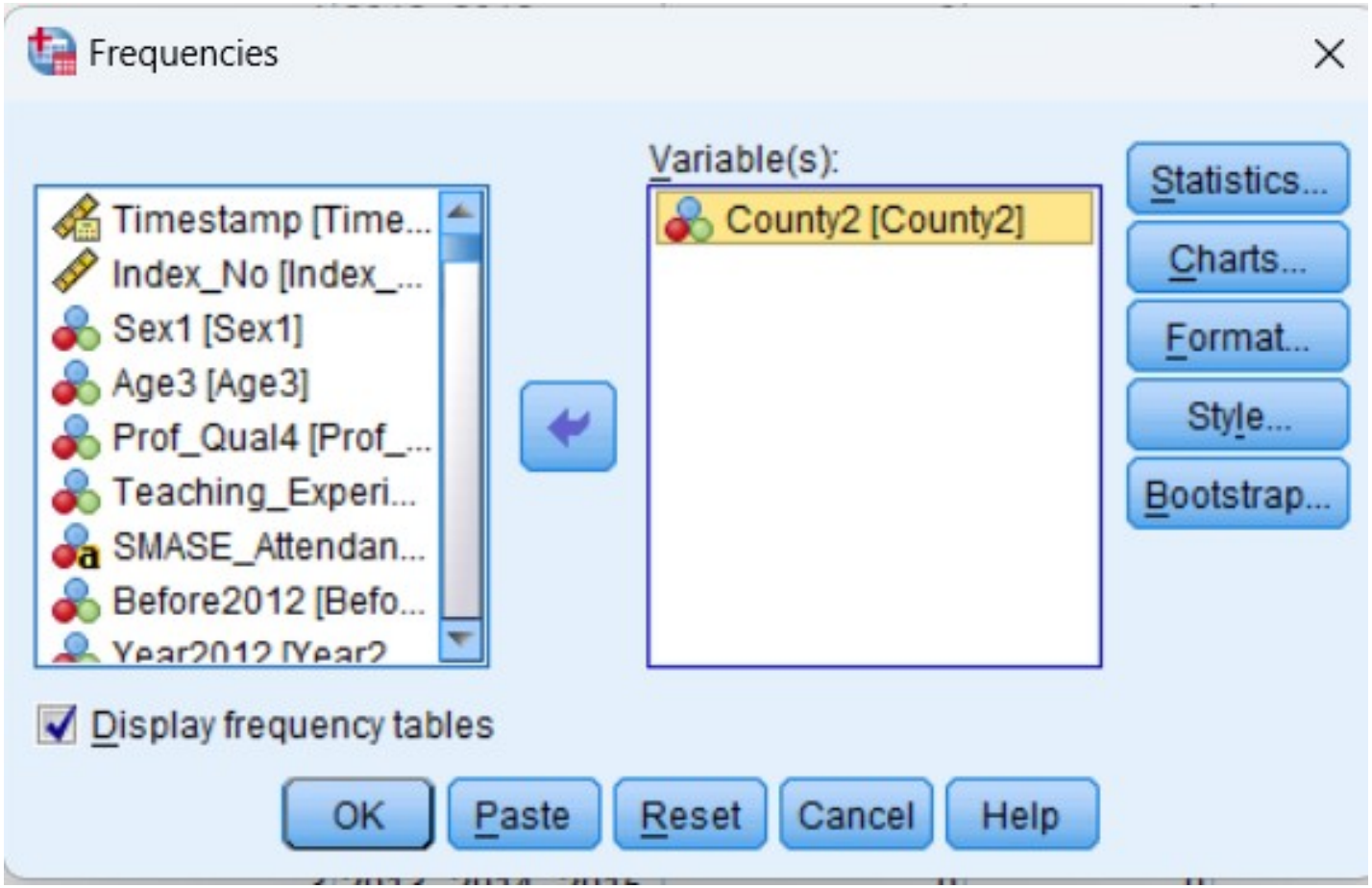
Descriptive Statistics

Frequency

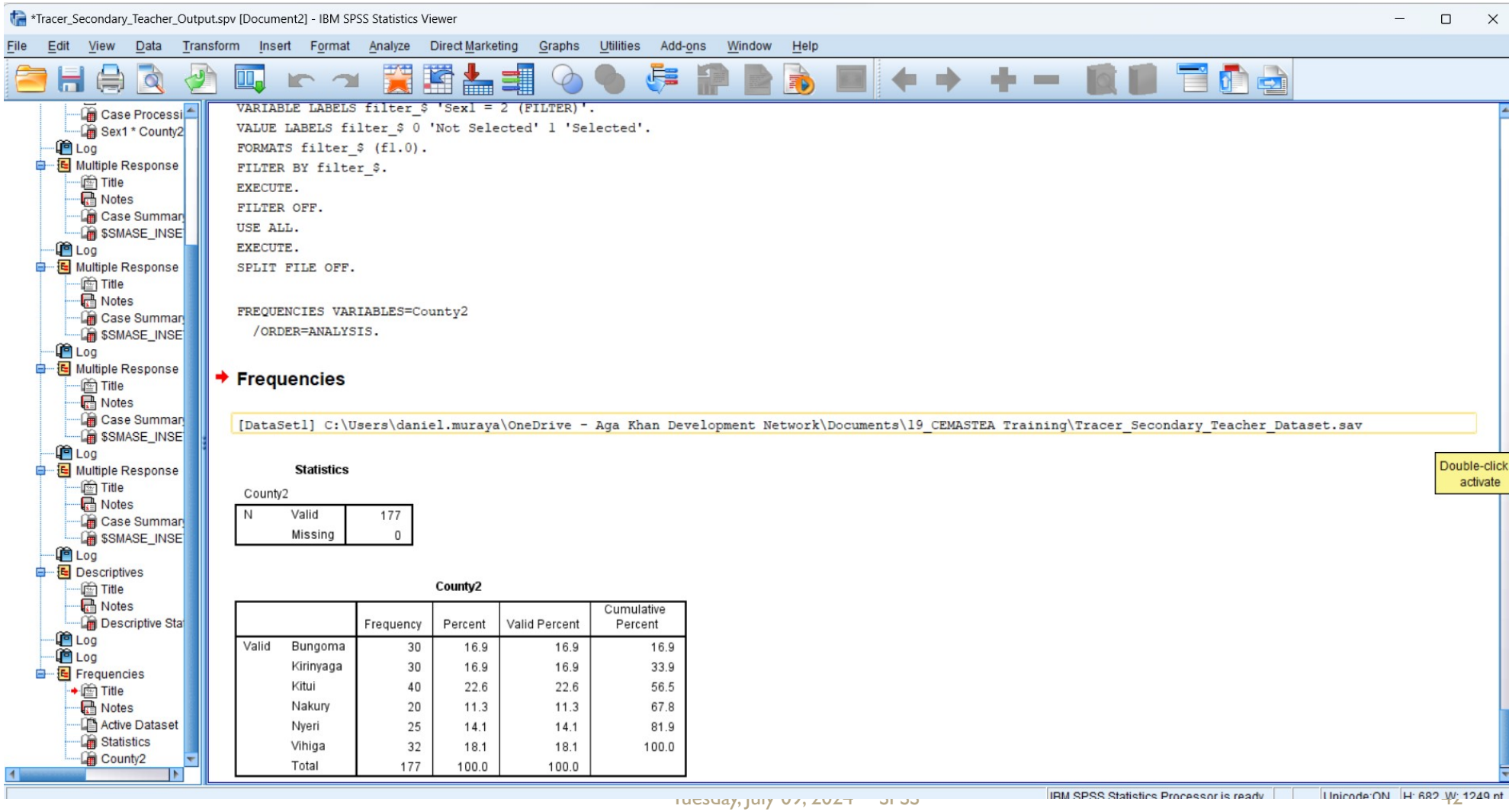
Select **'County'** and transfer to **'Variables Window'**

- Click **'OK'**

Proportion of Teachers by County



Proportion of Teachers by County



‘Work To Do’

1. Proportion of Teachers by Gender
2. Proportion of Teachers by Professional Qualification
3. Proportion of Teachers by Gender
4. Proportion of Teacher by Subject

Summarizing Data

Cross-tabulations

- What is the proportion of Teachers by Gender and County?

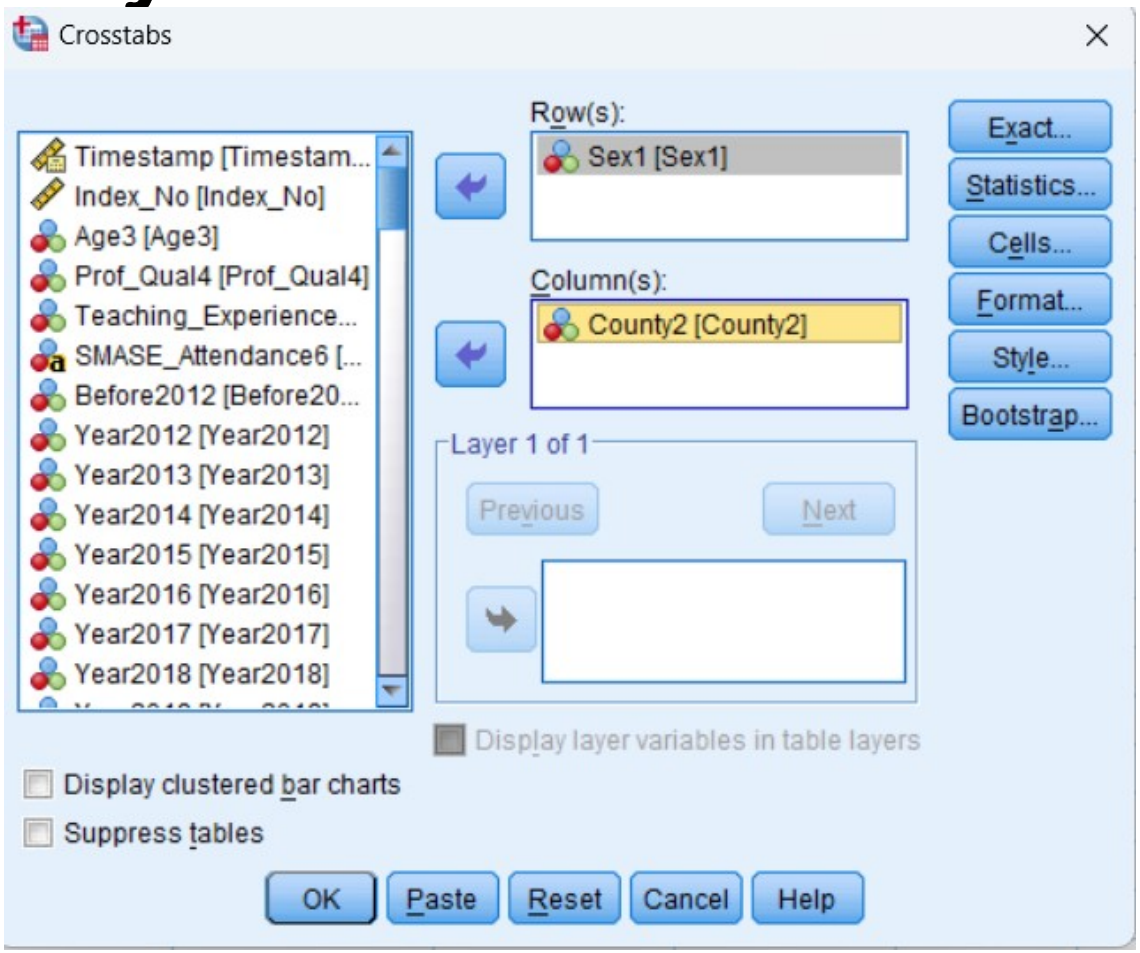
  Analyze

  Descriptive Statistics

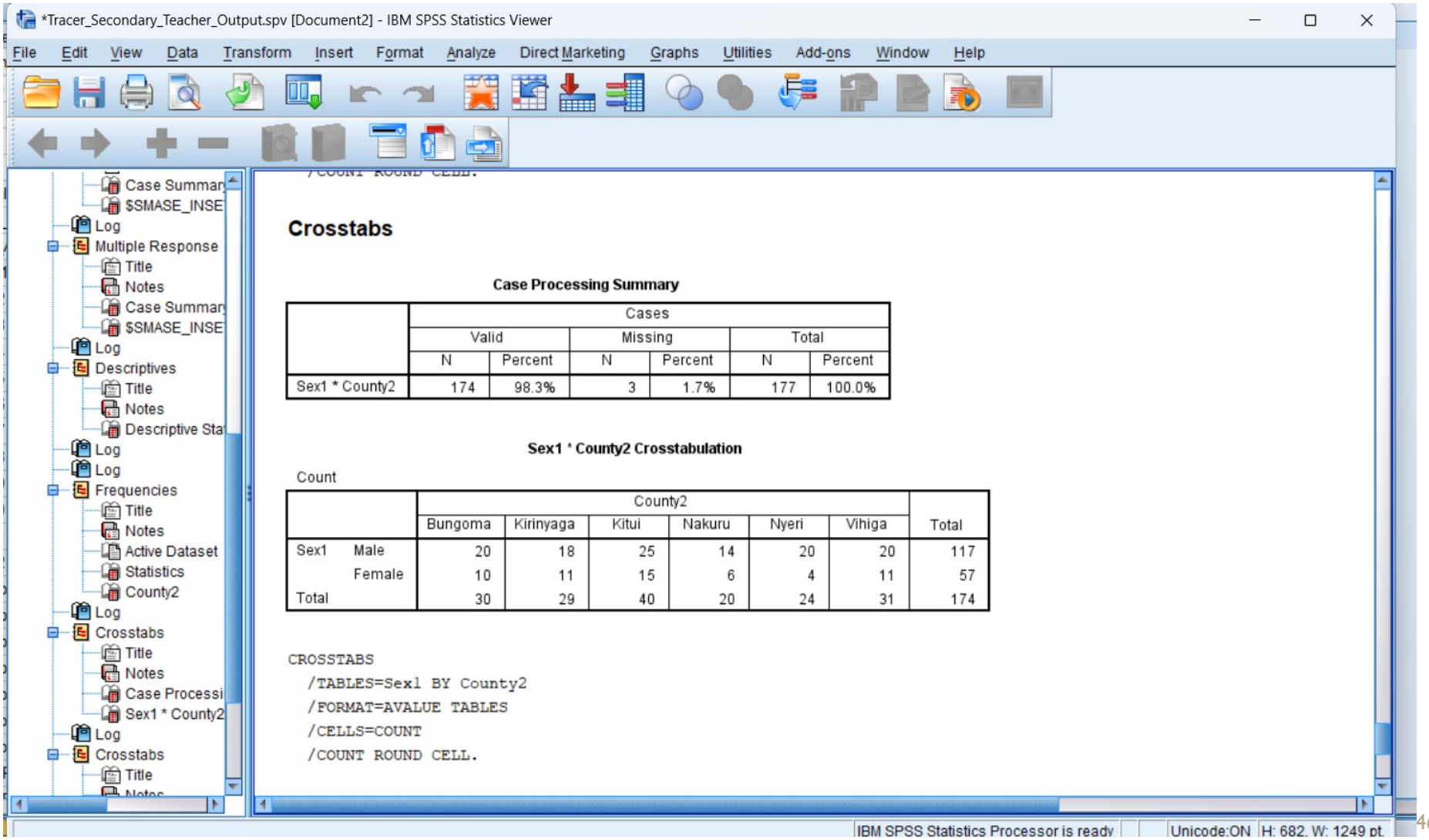
  Crosstab

- Select **'Gender'** and transfer to **'Row(s)'**
- Select **'County'** and transfer to **'Column (s)'**

Cross-Tabulation: Gender & County



Cross-Tabulation: Gender & County



‘Work to Do’

Conduct Cross tabulations to determine the proportion of teachers by:

1. Gender and professional qualification
2. Identify other relevant tabulations

Summarizing Data

Descriptive Statistics

- **Continuous variables**
- [Means, Variance, Standard Deviations, Standard Error of the Mean, Range]

Teacher Mean Perception Score

Data

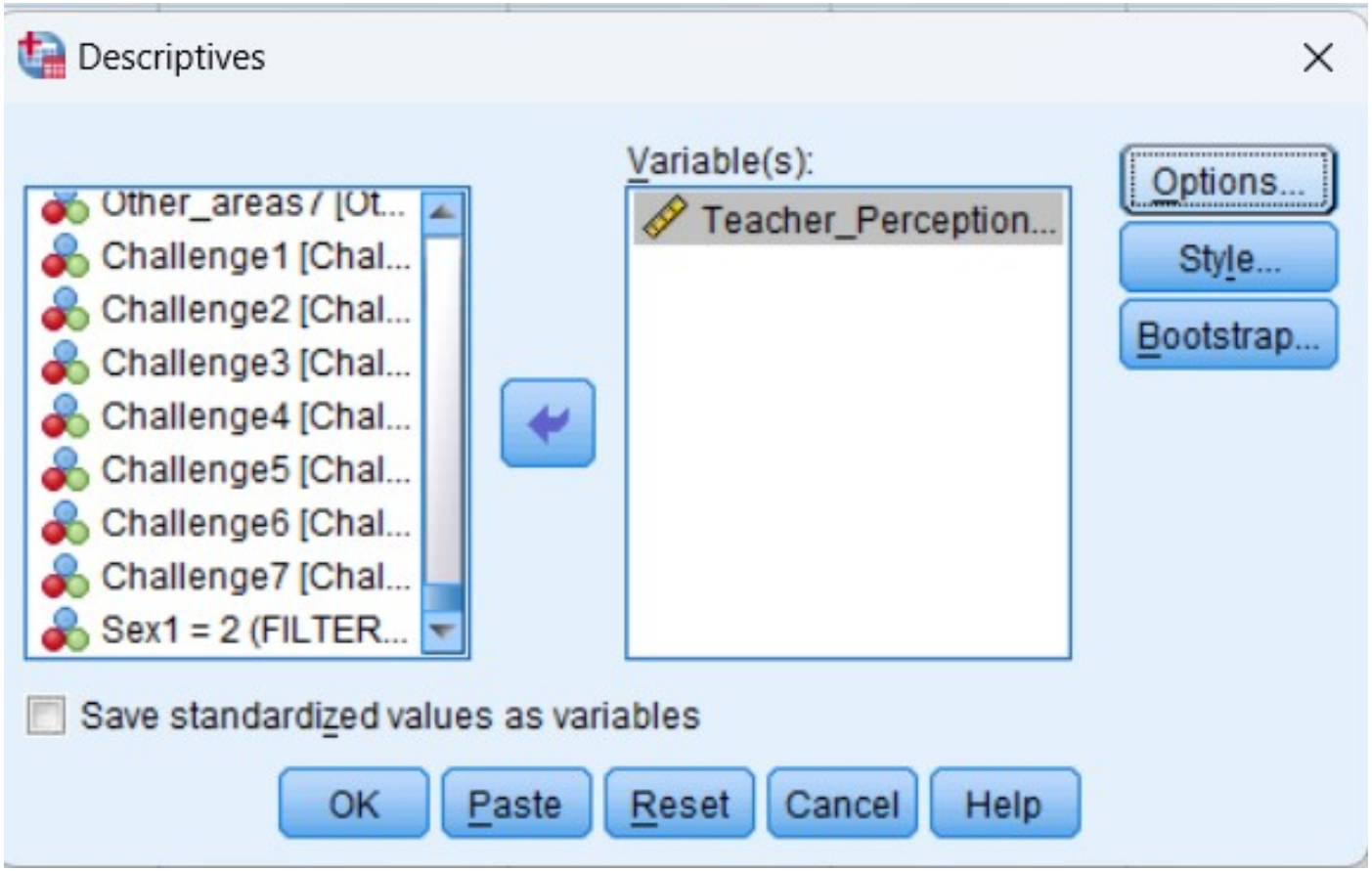
Split File

Select **'Compare Groups'**

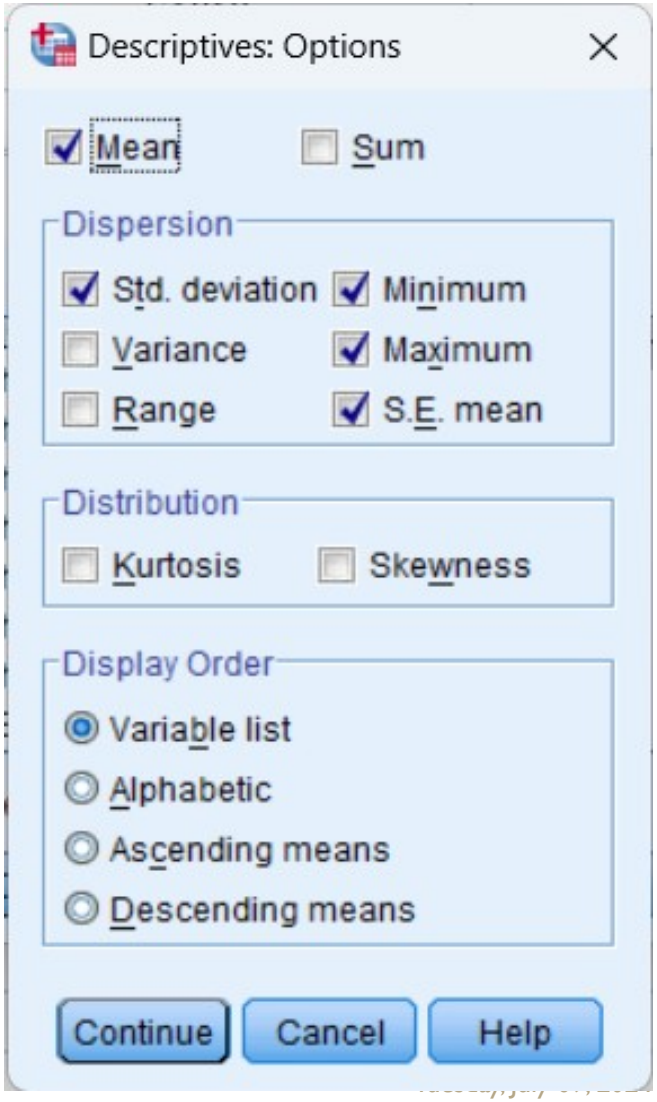
Select **'Gender'**

Click **'OK'**

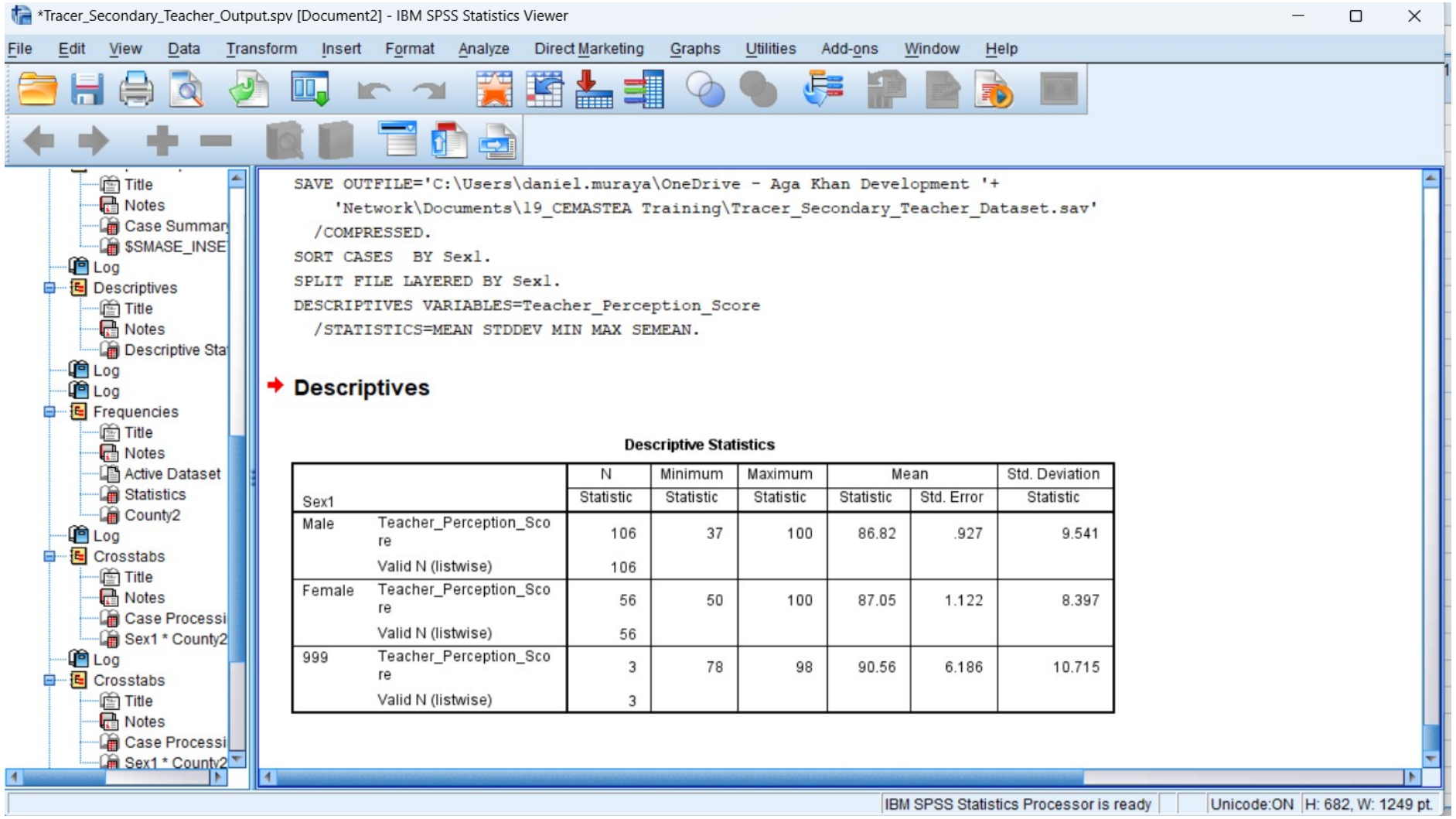
Summarizing Data



Summarizing Data



Summarizing Data



Sex1		N	Minimum	Maximum	Mean		Std. Deviation
		Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
Male	Teacher_Perception_Score	106	37	100	86.82	.927	9.541
	Valid N (listwise)	106					
Female	Teacher_Perception_Score	56	50	100	87.05	1.122	8.397
	Valid N (listwise)	56					
999	Teacher_Perception_Score	3	78	98	90.56	6.186	10.715
	Valid N (listwise)	3					

Work to Do

Use the Split File Data option to compute descriptive statistics for:

1. Teacher Perception Score by County
2. Teacher Perception Score by Age
3. Teacher Perception Score by Bungoma and Kirinyaga Counties only.

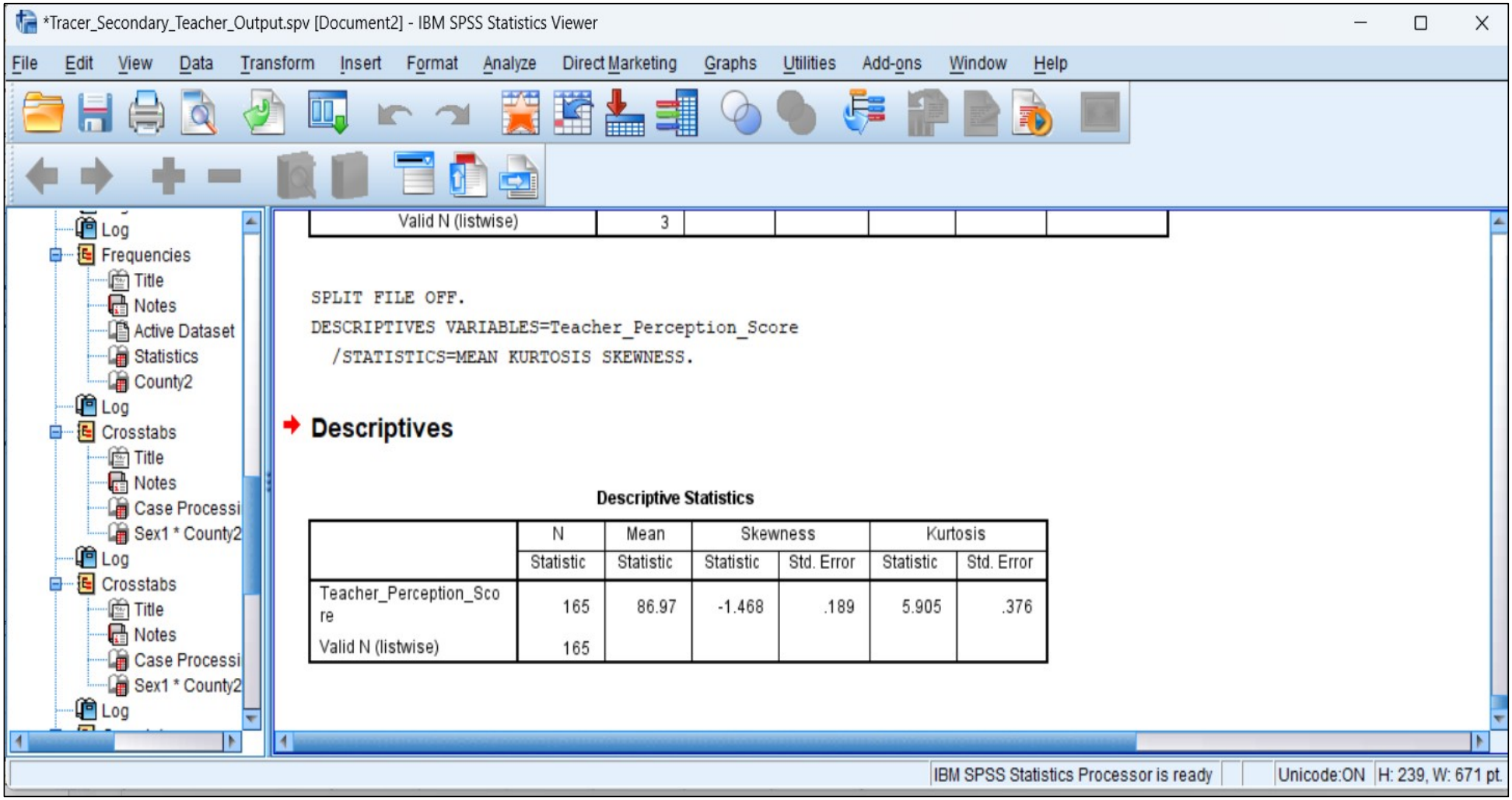
Assessing Normality - *Kurtosis & Skewness*

Two measures of normality are *Kurtosis* and *Skewness*.

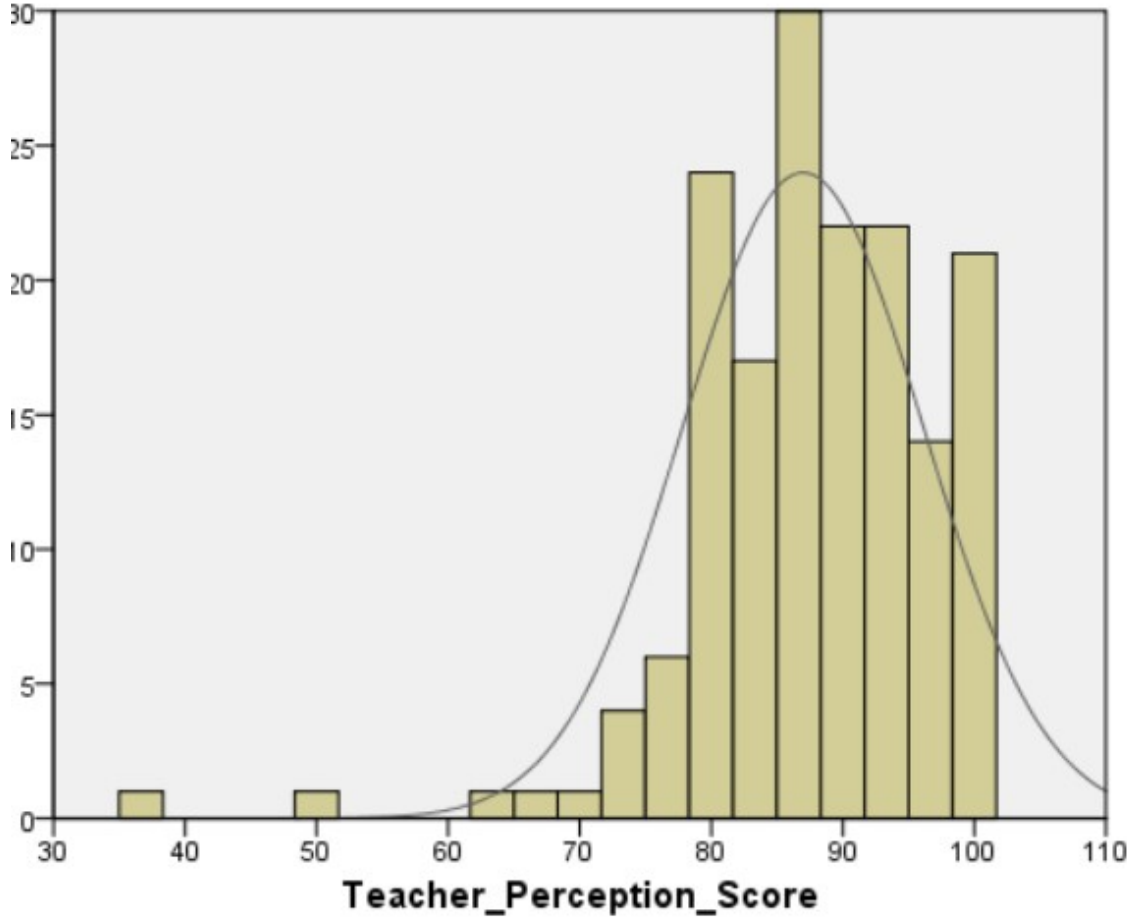
Kurtosis

- **A** measure of the '*peakedness*' or the '*flatness*' of a distribution.
- A value near zero indicates a shape close to normal
- A positive value indicates a distribution more peaked than normal
- A negative values indicates a shape flatter than normal.
- A kurtosis value between ±1.0 normal

Assessing Normality – Teacher Perception Score



Assessing Normality

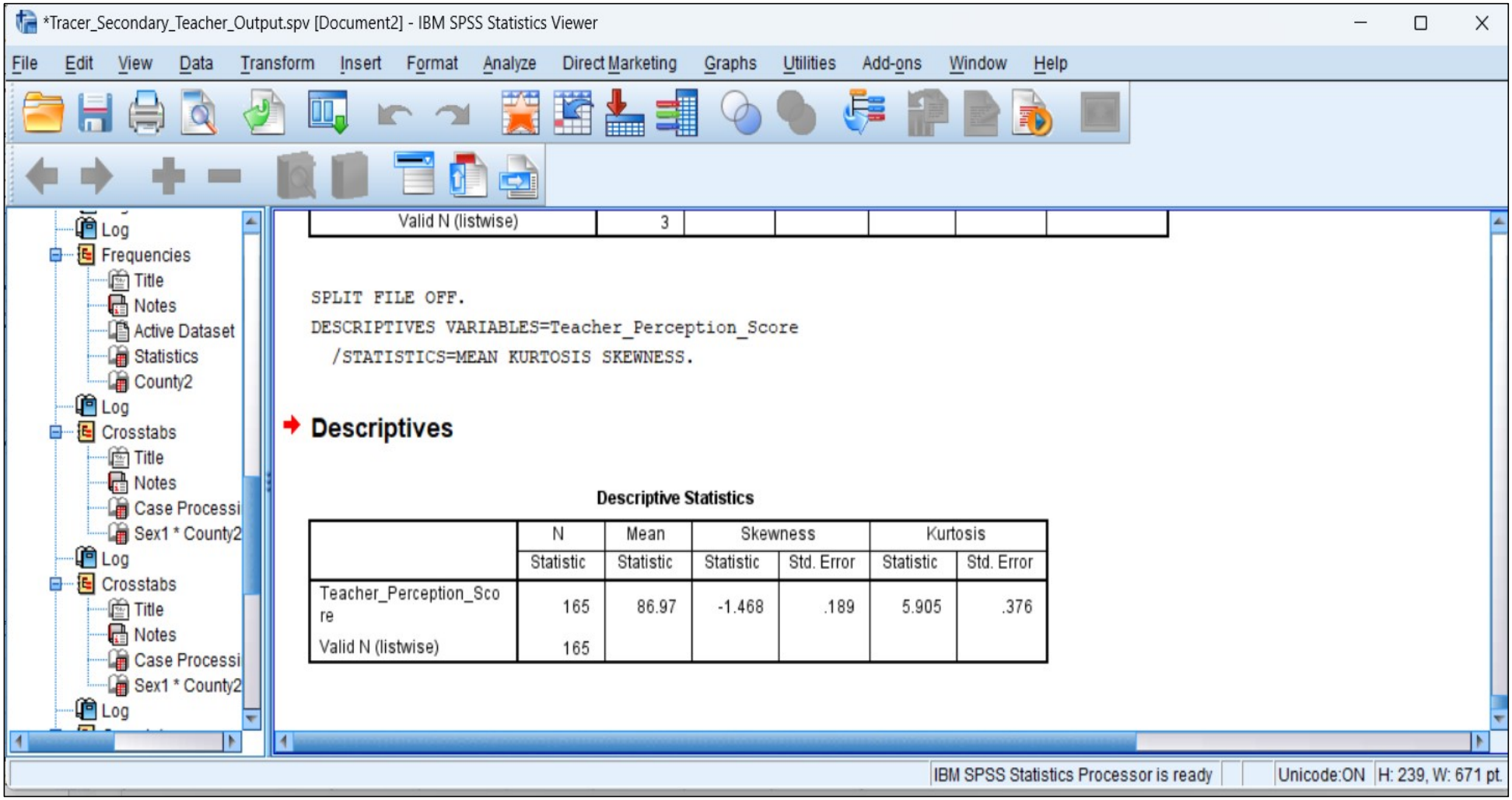


Assessing Normality

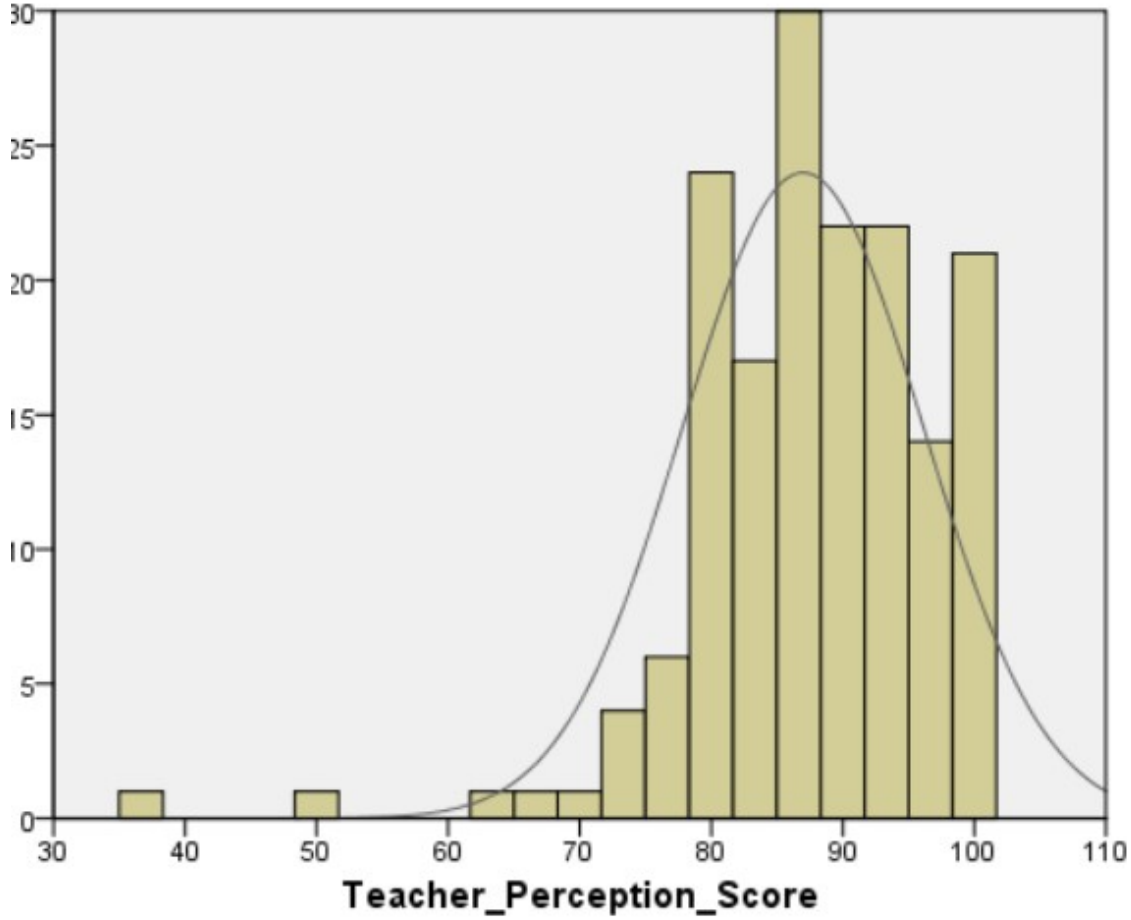
Skewness

- Skewness measures the extent a distribution deviates from symmetry around the mean
- A value of zero (0) represents a balanced distribution
- A positive Skewness indicates a greater number of smaller values
- A negative Skewness indicates a greater number of larger values
- A Skewness value between ±1.0 is normal

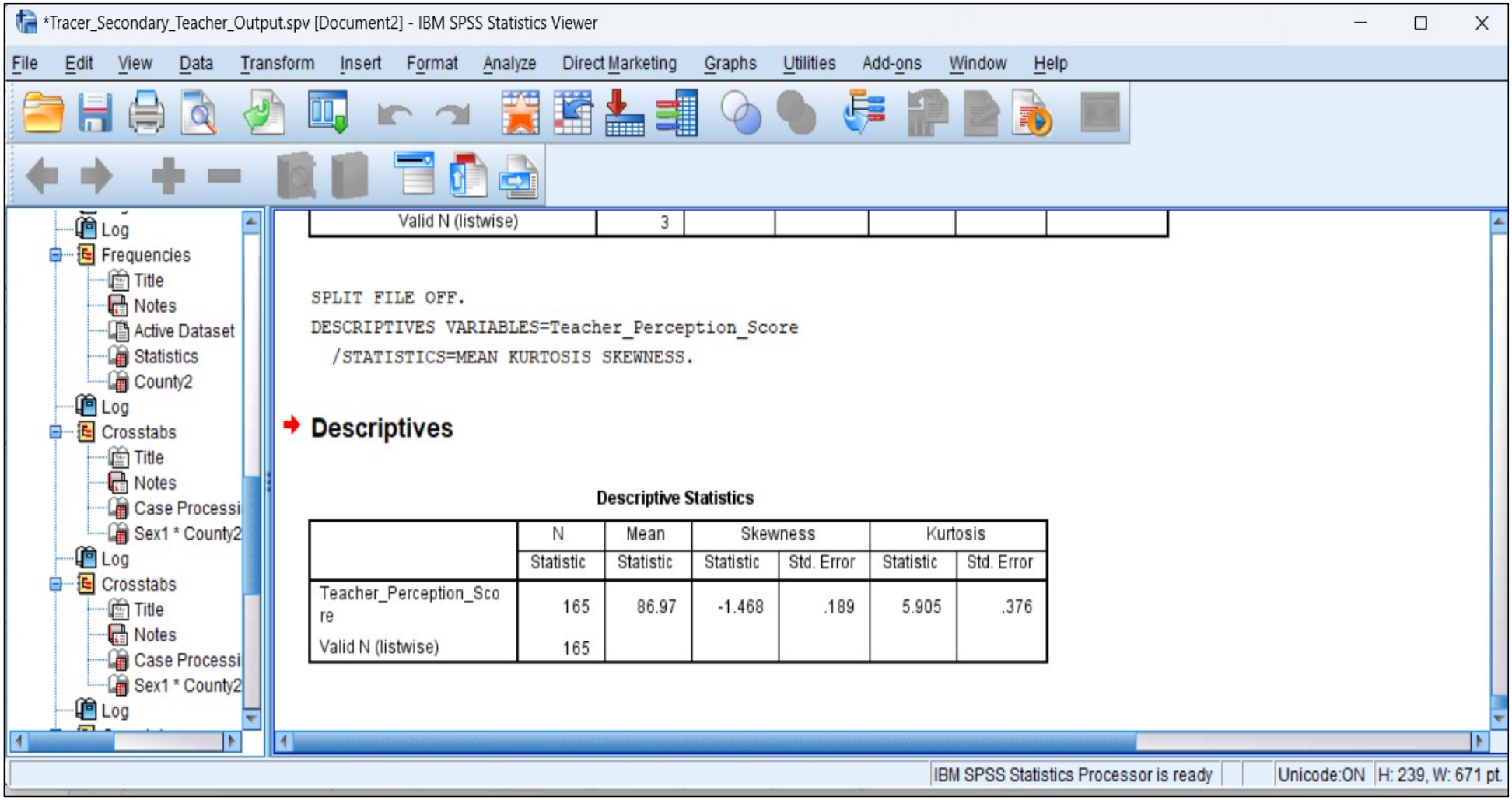
Assessing Normality – Teacher Perception Score



Assessing Normality

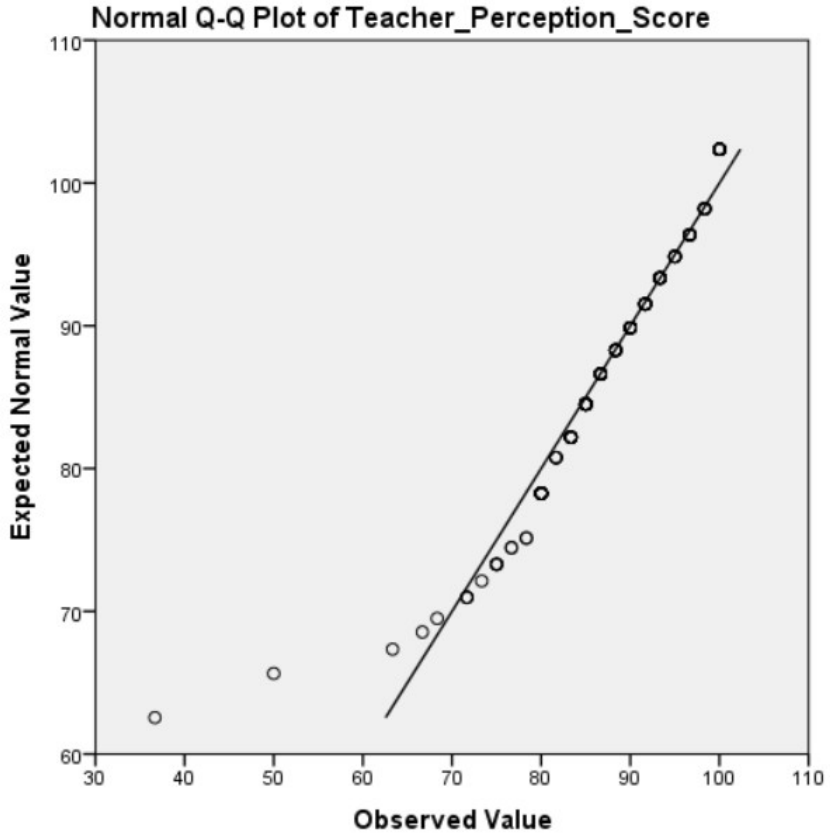


Assessing Normality – Teacher Perception Score



Assessing Normality – Q-Q plots

Teacher_Perception_Score



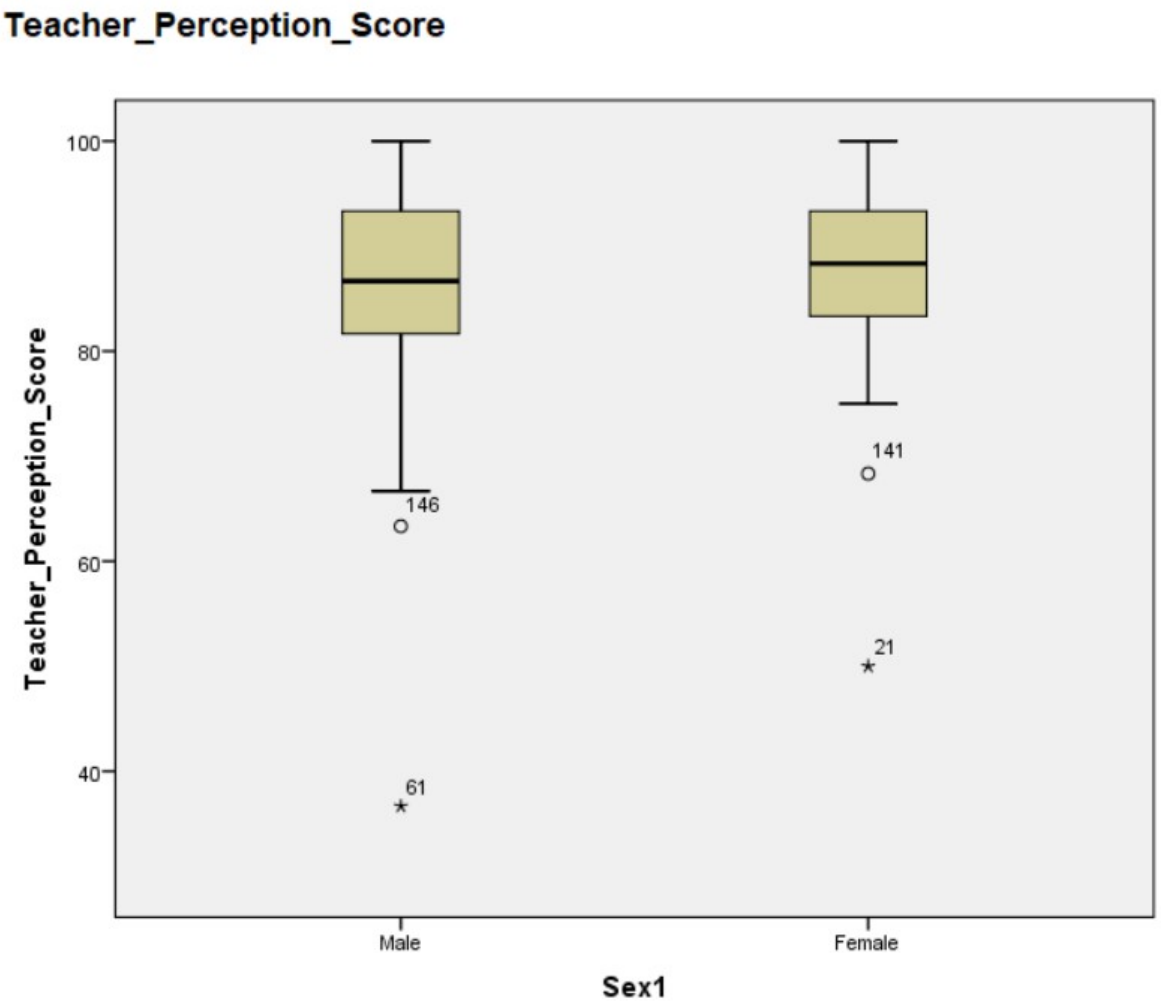
Using Graphs to Describe & Explore Data

- SPSS possess two graphing procedures: **Legacy Dialogs Graphs** & **Chart Builder** graphs.
- **Chart Builder** was introduced with SPSS version 14

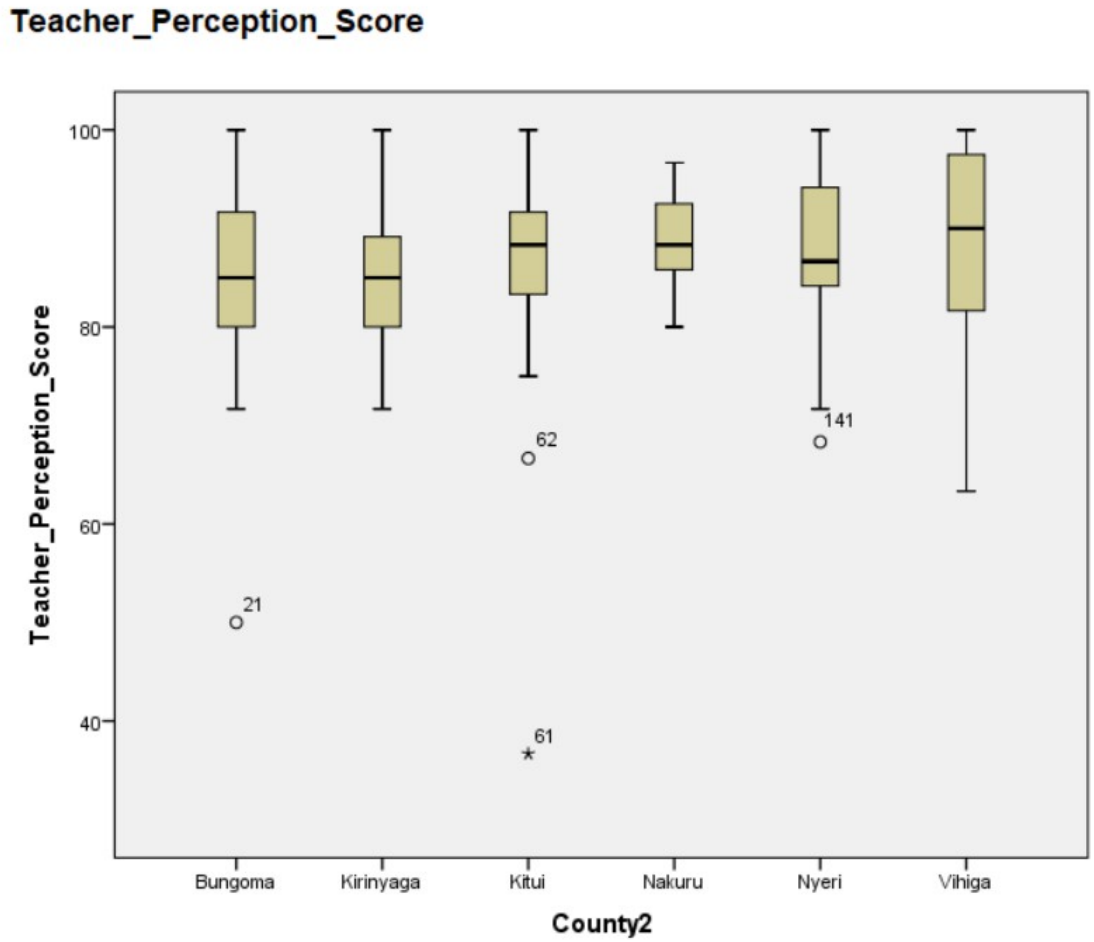
Using Graphs to Describe & Explore Data

1. Bar graphs
2. Line graphs
3. Pie charts
4. Box plots
5. Histograms
6. Scatter plots

Using Graphs to Describe & Explore Data – Box Plots



Using Graphs to Describe & Explore Data – Box Plots



Work to Do

Generate the following graph bar graphs;

1. A bar graph of Teacher Perception Score by Gender
2. A box plot of Teacher Perception Score by Gender

Construction of Composite Scores

- A major challenge in research is that some variables are complex concepts & cannot be measured using one single item
- Researchers therefore design several items that measure such concepts
- Collectively the individual items constitute a scale & their summation generate a measure in form of a composite score
- The quality of the scale is important

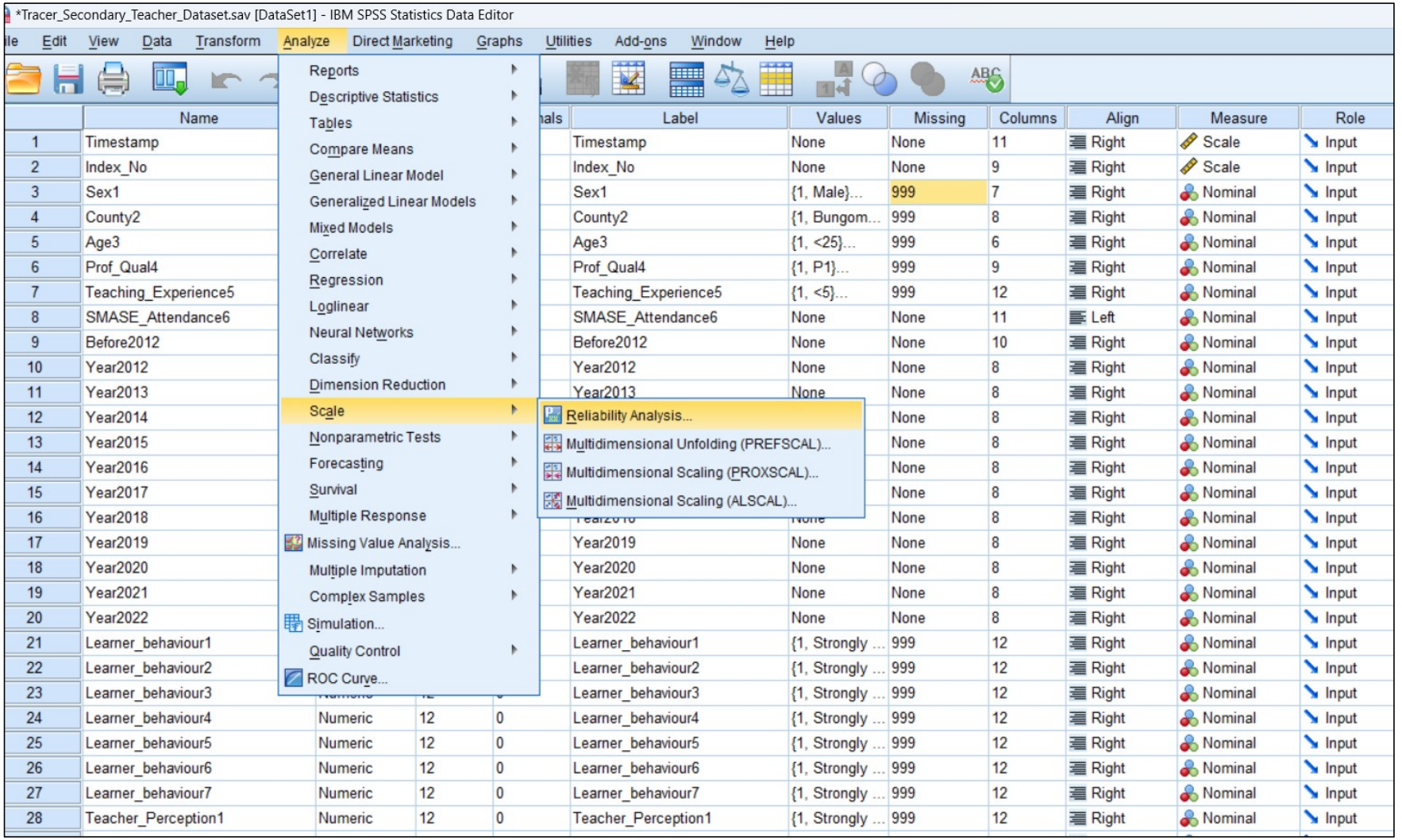
Examples of Composite Scores

1. **Teacher Perception Score -12 items**

Reliability

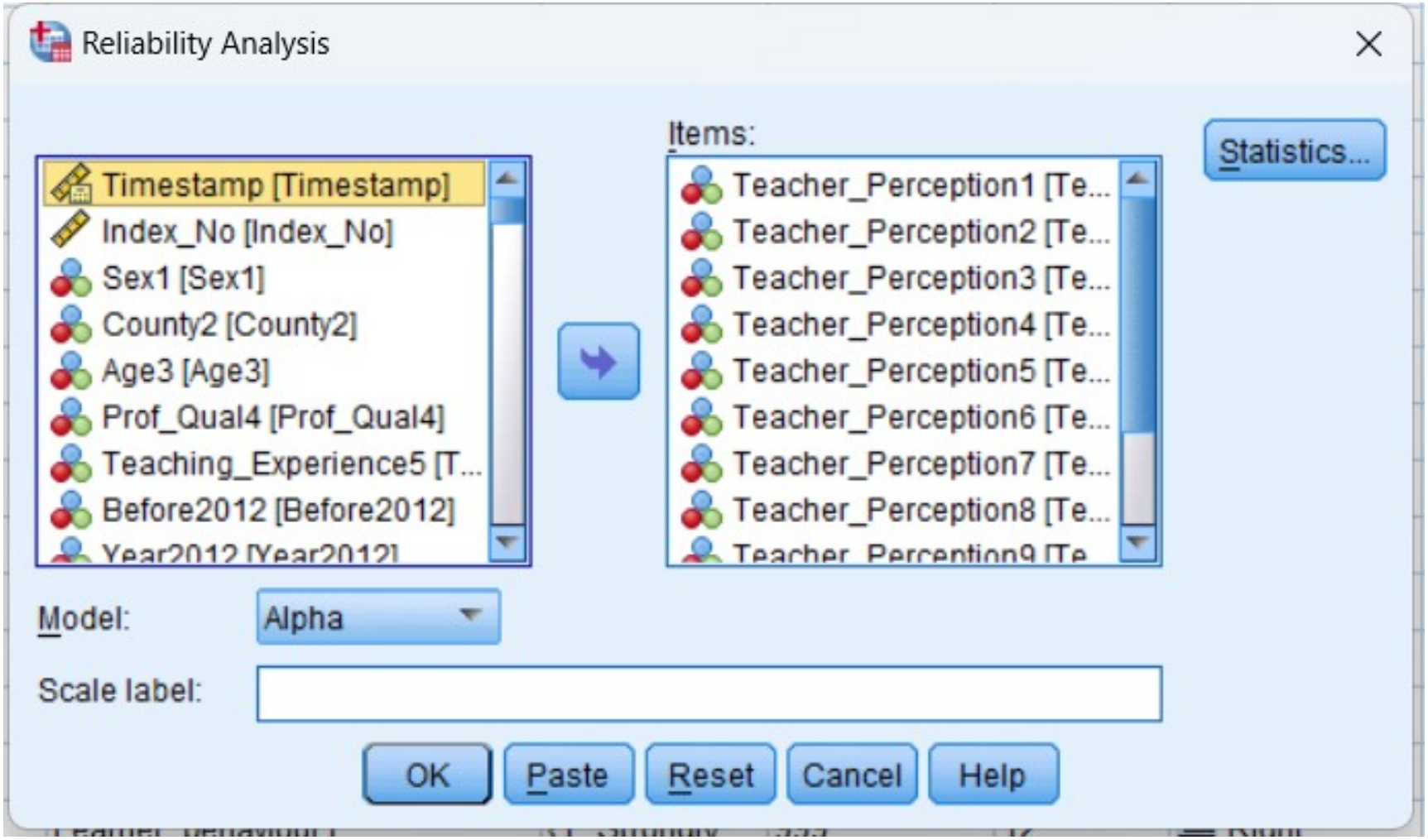
- For a composite score to be useful, the scale on which it is based must be reliable
- The Cronbach Alpha is one measure of reliability in SPSS
- Measures the internal consistency of the items returns a coefficient ranging from 0-1
- General consensus for a reliable scale is coefficient of 0.7 or above.

Reliability (Teacher Perception Score)



	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	Timestamp				Timestamp	None	None	11	Right	Scale	Input
2	Index_No				Index_No	None	None	9	Right	Scale	Input
3	Sex1				Sex1	{1, Male}...	999	7	Right	Nominal	Input
4	County2				County2	{1, Bungom...	999	8	Right	Nominal	Input
5	Age3				Age3	{1, <25}...	999	6	Right	Nominal	Input
6	Prof_Qual4				Prof_Qual4	{1, P1}...	999	9	Right	Nominal	Input
7	Teaching_Experience5				Teaching_Experience5	{1, <5}...	999	12	Right	Nominal	Input
8	SMASE_Attendance6				SMASE_Attendance6	None	None	11	Left	Nominal	Input
9	Before2012				Before2012	None	None	10	Right	Nominal	Input
10	Year2012				Year2012	None	None	8	Right	Nominal	Input
11	Year2013				Year2013	None	None	8	Right	Nominal	Input
12	Year2014						None	8	Right	Nominal	Input
13	Year2015						None	8	Right	Nominal	Input
14	Year2016						None	8	Right	Nominal	Input
15	Year2017						None	8	Right	Nominal	Input
16	Year2018						None	8	Right	Nominal	Input
17	Year2019				Year2019	None	None	8	Right	Nominal	Input
18	Year2020				Year2020	None	None	8	Right	Nominal	Input
19	Year2021				Year2021	None	None	8	Right	Nominal	Input
20	Year2022				Year2022	None	None	8	Right	Nominal	Input
21	Learner_behaviour1				Learner_behaviour1	{1, Strongly ...	999	12	Right	Nominal	Input
22	Learner_behaviour2				Learner_behaviour2	{1, Strongly ...	999	12	Right	Nominal	Input
23	Learner_behaviour3				Learner_behaviour3	{1, Strongly ...	999	12	Right	Nominal	Input
24	Learner_behaviour4	Numeric	12	0	Learner_behaviour4	{1, Strongly ...	999	12	Right	Nominal	Input
25	Learner_behaviour5	Numeric	12	0	Learner_behaviour5	{1, Strongly ...	999	12	Right	Nominal	Input
26	Learner_behaviour6	Numeric	12	0	Learner_behaviour6	{1, Strongly ...	999	12	Right	Nominal	Input
27	Learner_behaviour7	Numeric	12	0	Learner_behaviour7	{1, Strongly ...	999	12	Right	Nominal	Input
28	Teacher_Perception1	Numeric	12	0	Teacher_Perception1	{1, Strongly ...	999	12	Right	Nominal	Input

Reliability (Teacher Perception Score)



Reliability (Teacher Perception Score)

Reliability

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	165	93.2
	Excluded[a]	12	6.8
	Total	177	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.892	12

‘Work to Do’

1. Using the Teacher dataset, determine the reliability of;
   a. ***Teacher practice score***
   b. ***Learner behaviour score***
   c. ***School support score***
2. In all cases, write a statement on the reliability of the scales as appropriate
3. What other scales will be important to construct in your work? (look through the objectives of the study, questionnaire and data and establish other relevant scales that you will need to construct)

Inferential Statistics

- **Choosing Bivariate Statistics in Data Analysis**

Bivariate Correlation

- Most common forms of data analysis
- underlies many other analyses,
- support conclusions after primary analyses
- *Correlations* are a measure of the linear relationship between two continuous variables
- A correlation coefficient has a value ranging from -1 to 1
- Magnitude, direction, significance

Bivariate Correlation

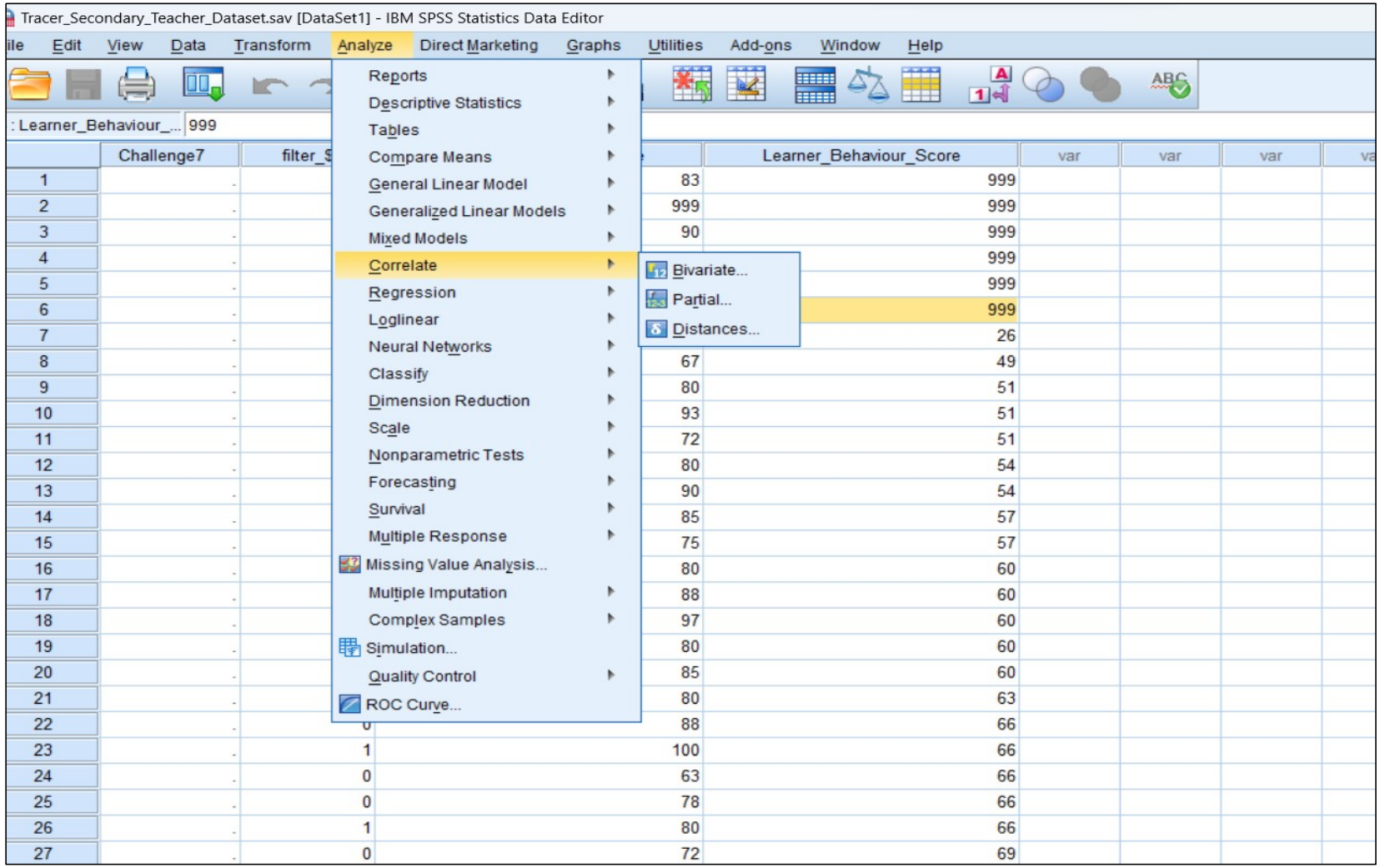
Example

Amount of money spent on monthly expenses and amount of money earned per month

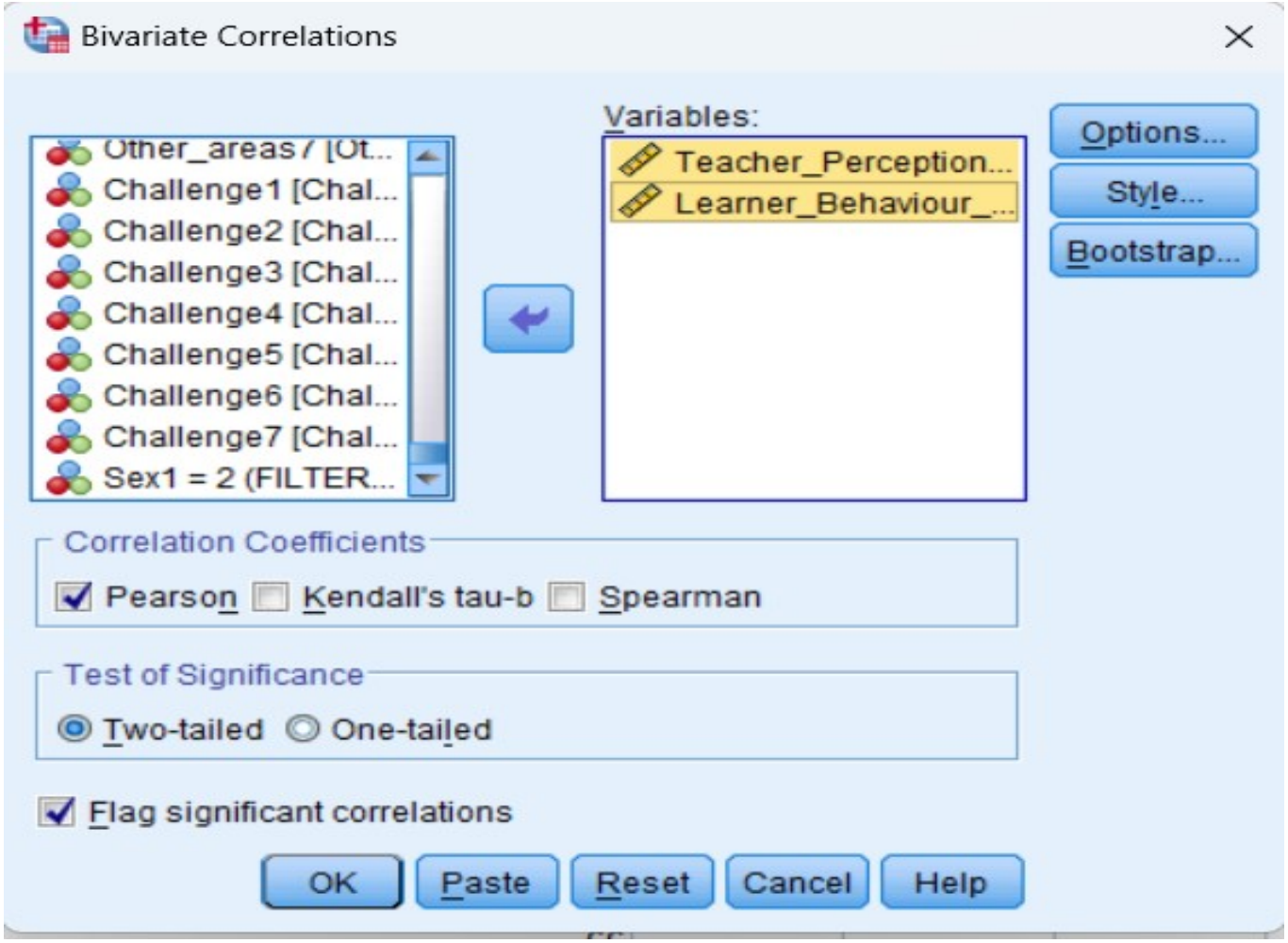
Hypothesis

- **H_o:** There is no relationship between teacher practice score and learner behaviour score
- **H_a:** There is a relationship between teacher practice score and learner behaviour score

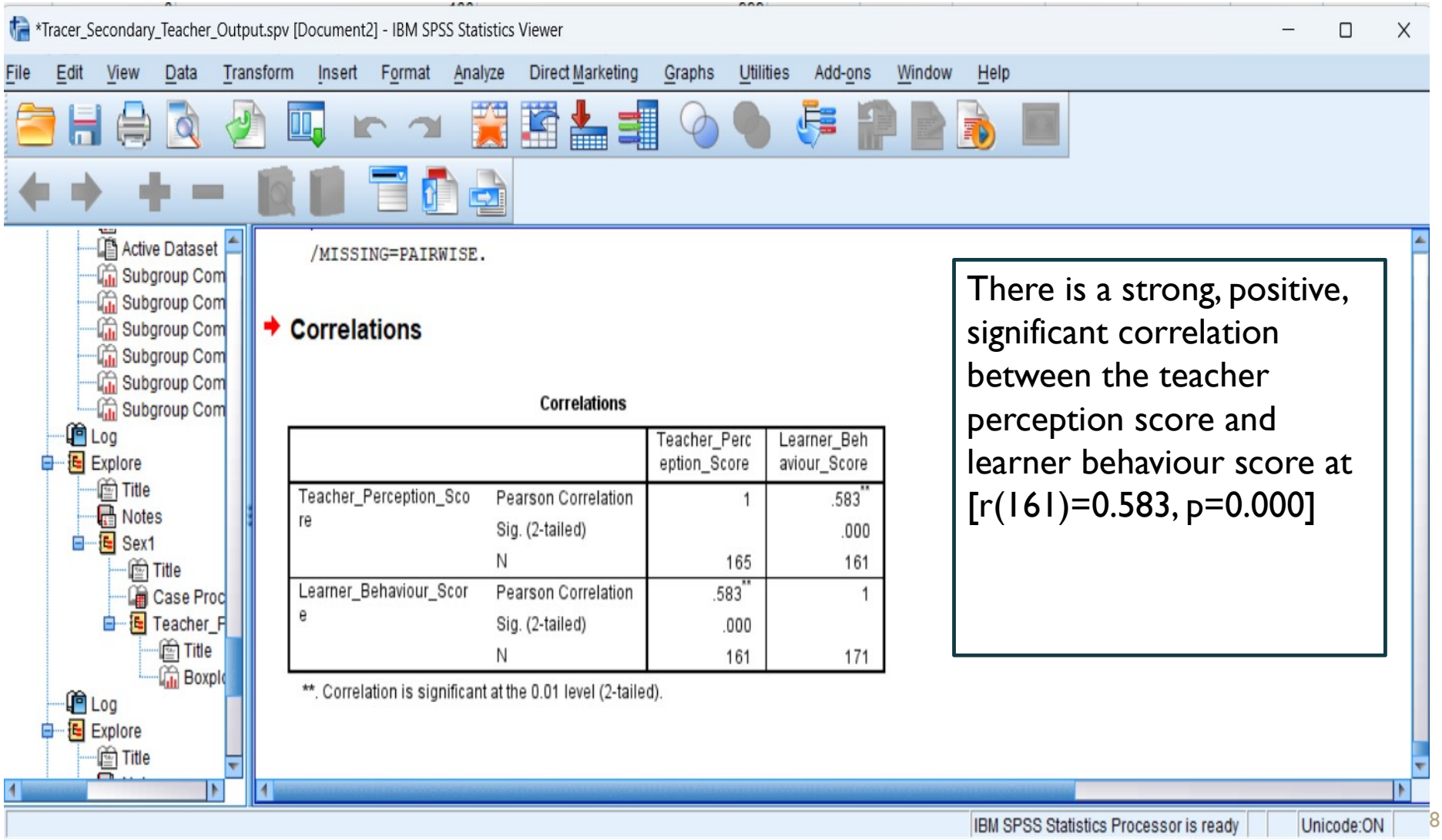
Bivariate Correlation



Bivariate Correlation



Bivariate Correlation



There is a strong, positive, significant correlation between the teacher perception score and learner behaviour score at [r(161)=0.583, p=0.000]

‘Work To Do’

1. ***Write down the Ho and Ha for each of the scores and establish the correlations;***
   a. *Teacher Perception Score and Teacher Practice*
   b. *Teacher Perception Score and School Support Score*
2. ***Based on the dataset, what other correlations will be relevant in your work?*** Formulate the hypotheses (Ho and Ha)

Regression

- Regression is used to investigate the effect of one or more predictor variables (independent variable) on an outcome variable (dependent variable)
- How well does one or more independent variables will predict the value of a dependent variable?

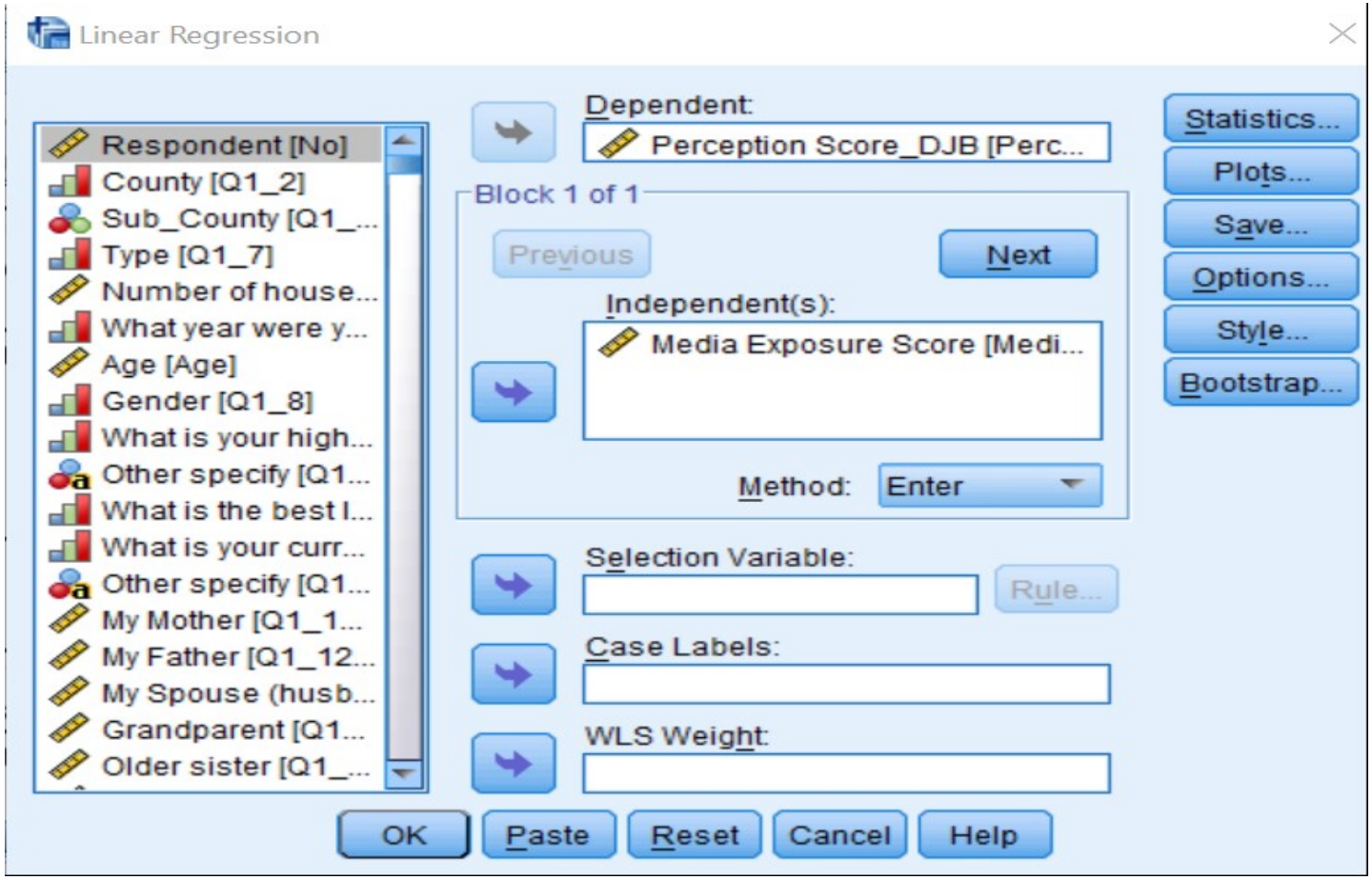
Regression

Do the School Support Score predict Teacher Practice Score?

Ho: *The School Support Score is not a Significant Predictor of the Teacher Practice Score*

Ha: *The School Support Score is a Significant Predictor of the Teacher Practice Score*

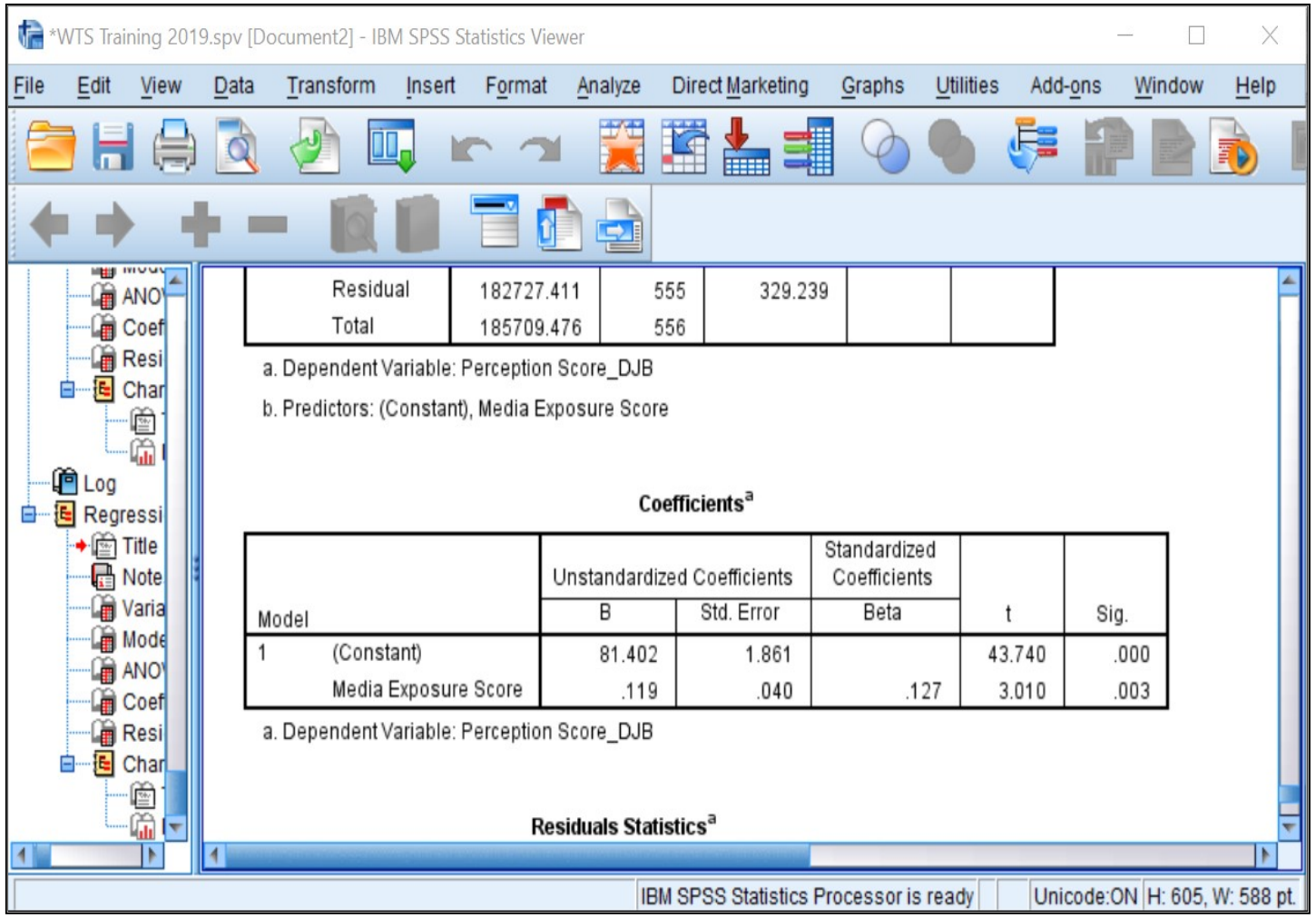
Simple Regression



Regression

a. *Perception Score DJB and Shujaaz Info Source Score*
b. *Shujaaz Info Source Score and Media Exposure Score*
c. *Media Exposure Score and Mobile Use Score*
d. *Perception Score DJB and Media Exposure Score*

Simple Regression



‘Work To Do’

1. Is the Mobile Phone Use Score a predictor of Media Exposure Score?
2. Is the Media Exposure Score a Predictor of Shujaaz Information Source Score?
    a. Formulate the hypotheses (Ho and Ha)
    b. Test the hypothesis and make a statement of the results
3. What other regressions are relevant in your work?

Multiple Regression

Using a combination of potential predictor variables to determine the most viable model?

Multiple Regression

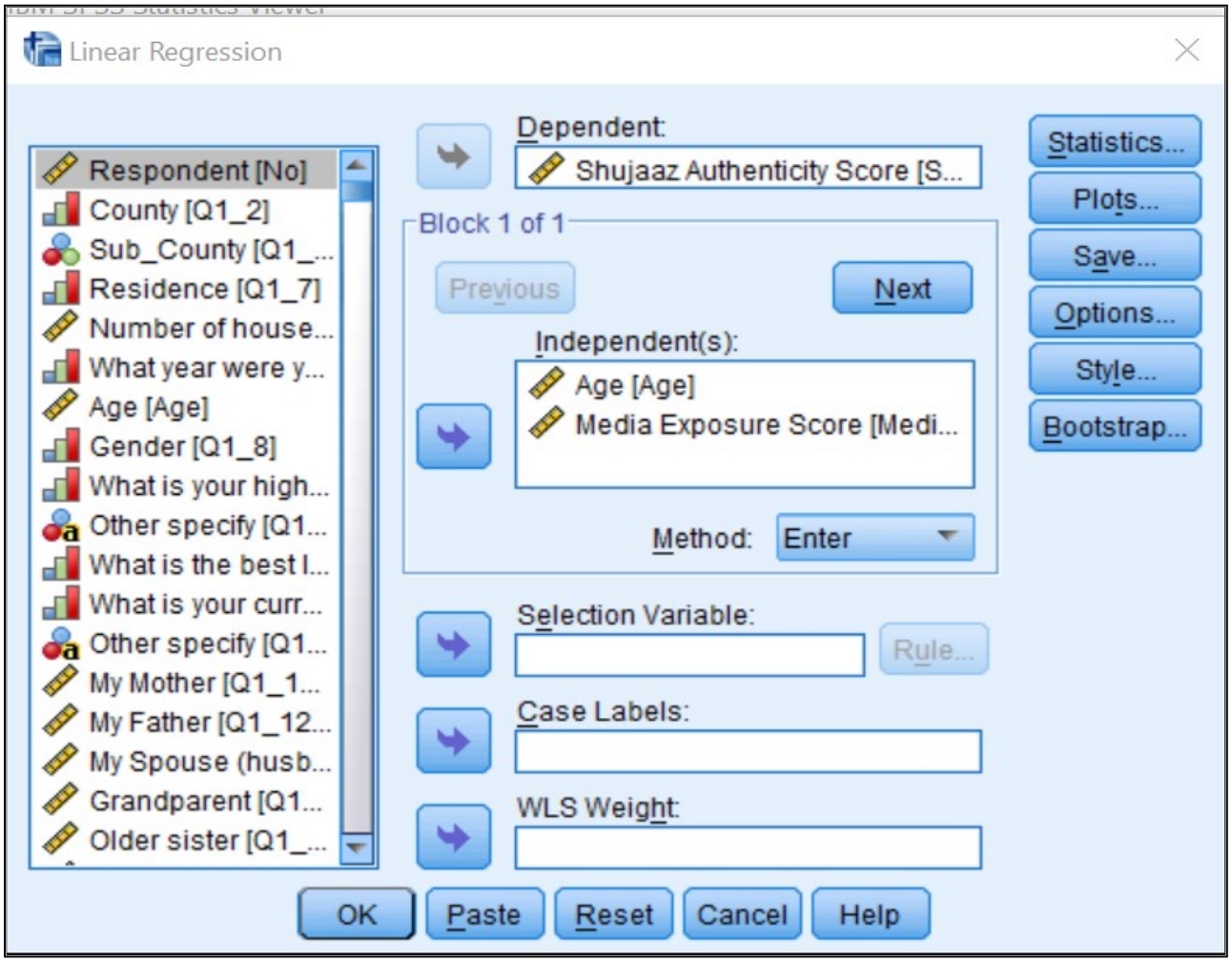
WORK To DO

Which variables predict Shujaaz Authenticity Score?

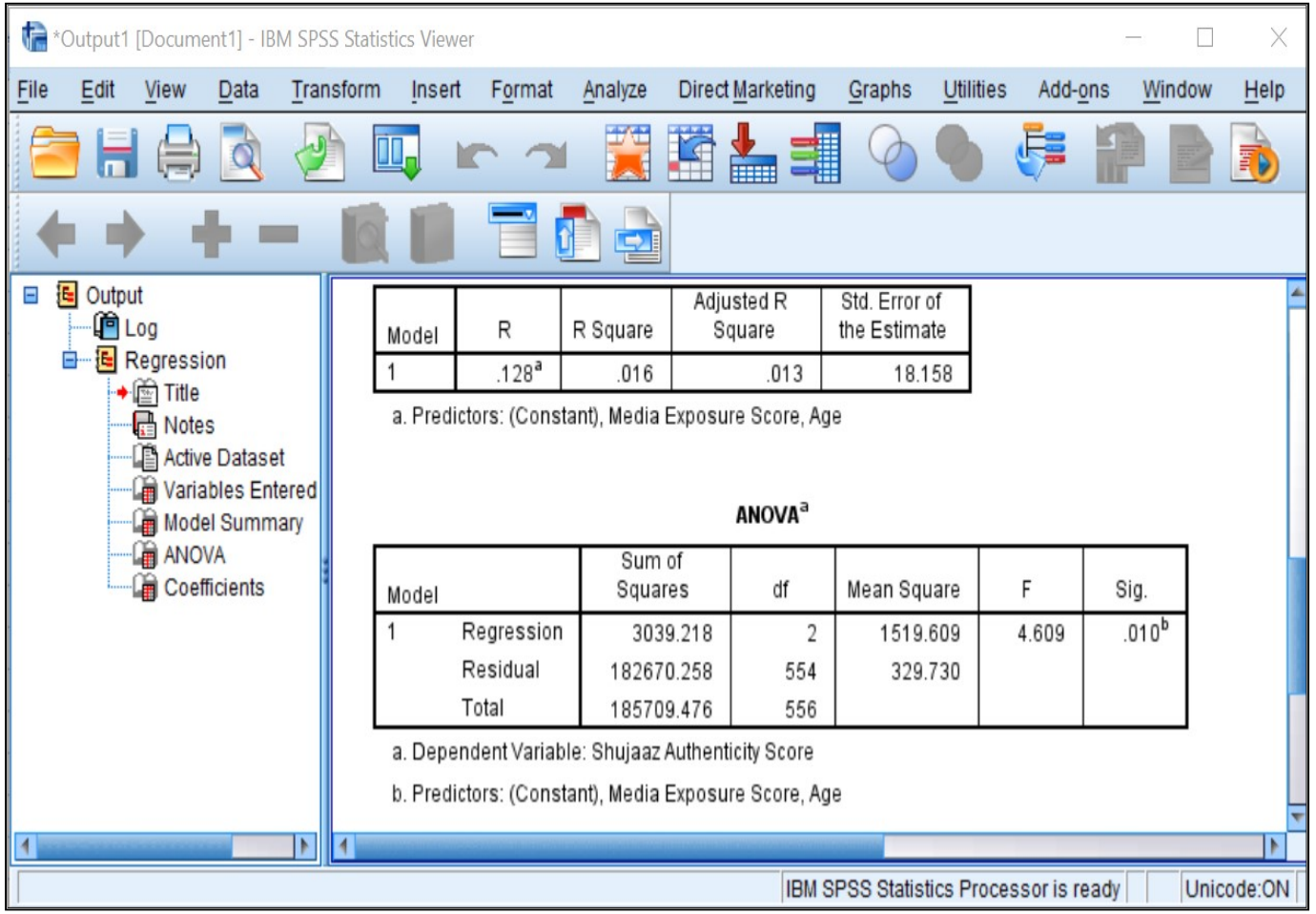
Ho: *Age and media exposure score are not significant predictors of Shujaaz Authenticity score*

Ha: *Age and media exposure score are significant predictors of Shujaaz Authenticity score*

Multiple Regression



Multiple Regression



Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.128[a]	.016	.013	18.158

a. Predictors: (Constant), Media Exposure Score, Age

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3039.218	2	1519.609	4.609	.010[b]
	Residual	182670.258	554	329.730		
	Total	185709.476	556			

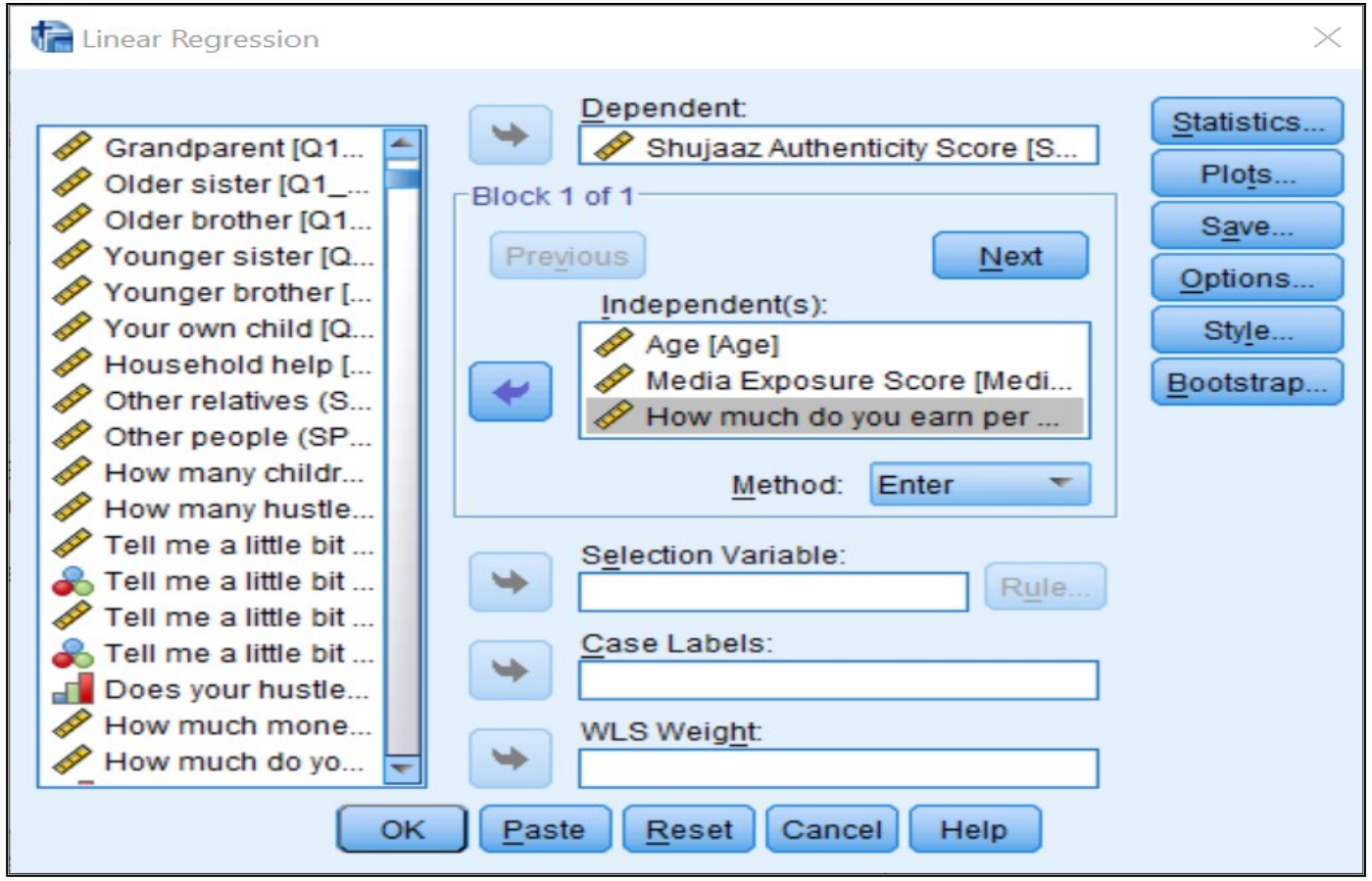
a. Dependent Variable: Shujaaz Authenticity Score

b. Predictors: (Constant), Media Exposure Score, Age

What To Do

Conduct multiple regression determine the influence of ***amount of money earned per month, media exposure score, age on Shujaaz authenticity score***

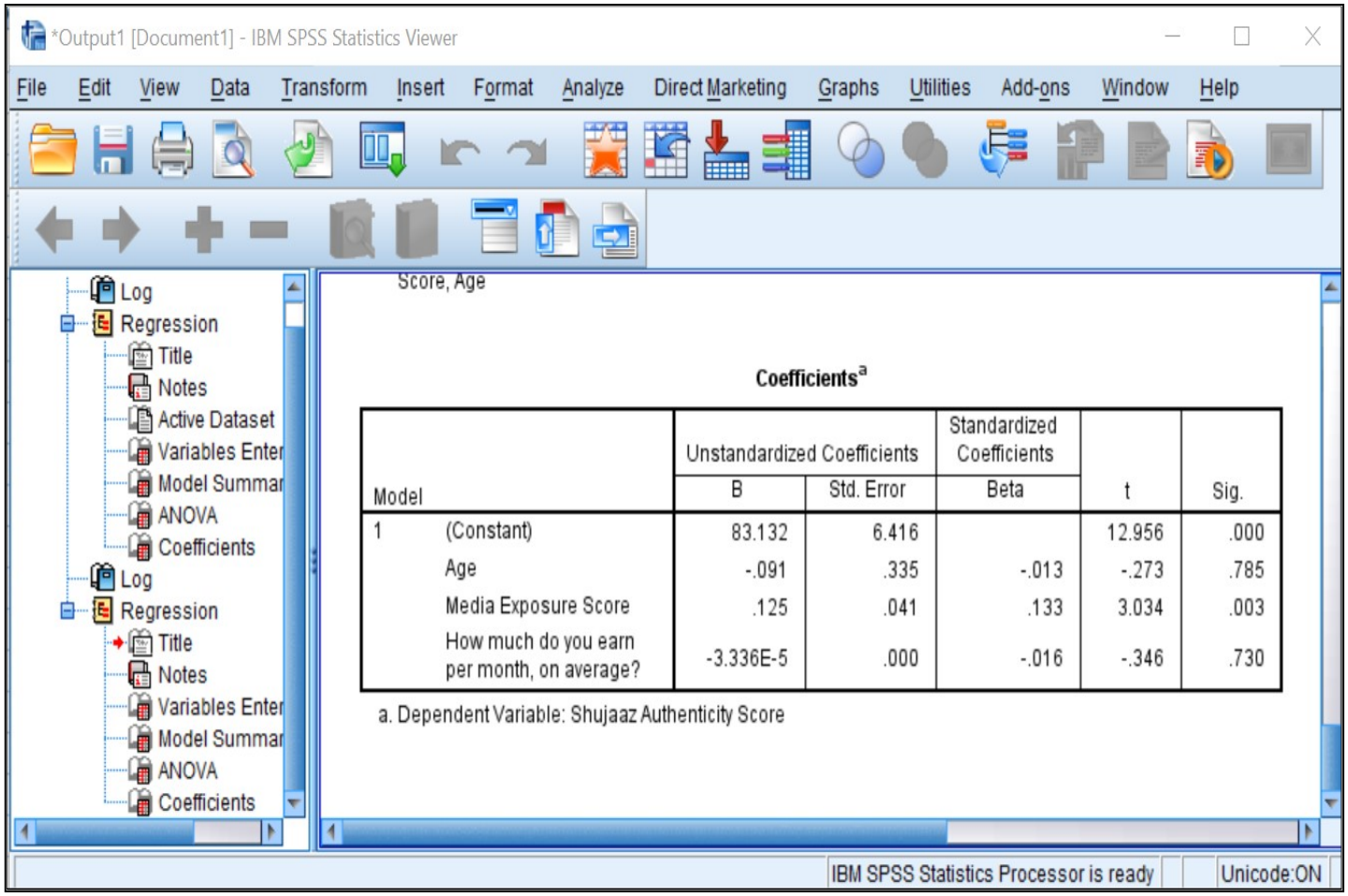
What To Do


Linear Regression
Grandparent [Q1...
Older sister [Q1_...
Older brother [Q1...
Younger sister [Q...
Younger brother [...
Your own child [Q...
Household help [...
Other relatives (S...
Other people (SP...
How many childr...
How many hustle...
Tell me a little bit ...
Tell me a little bit ...
Tell me a little bit ...
Tell me a little bit ...
Does your hustle...
How much mone...
How much do yo...
Dependent:
Shujaaz Authenticity Score [S...
Block 1 of 1
Previous
Next
Independent(s):
Age [Age]
Media Exposure Score [Medi...
How much do you earn per ...
Method:
Enter
Selection Variable:
Rule...
Case Labels:
WLS Weight:
Statistics...
Plots...
Save...
Options...
Style...
Bootstrap...
OK
Paste
Reset
Cancel
Help

Factor Analysis

- "Factors" also called "latent variables" or "components" are underlying concepts that are not observable
- Factor analysis make meaning of what is observed as variable
- Also to remove redundant variables
- Principal Component Analysis (PCA) is one of the commonly used method in factor analysis

What To Do


*Output1 [Document1] - IBM SPSS Statistics Viewer
File Edit View Data Transform Insert Format Analyze Direct Marketing Graphs Utilities Add-ons Window Help
Log
Regression
Title
Notes
Active Dataset
Variables Enter
Model Summar
ANOVA
Coefficients
Log
Regression
Title
Notes
Variables Enter
Model Summar
ANOVA
Coefficients
Score, Age
Coefficients[a]
Model
Unstandardized Coefficients
B
Std. Error
Standardized Coefficients
Beta
t
Sig.
1 (Constant) 83.132 6.416 12.956 .000
Age -.091 .335 -.013 -.273 .785
Media Exposure Score .125 .041 .133 3.034 .003
How much do you earn per month, on average? -3.336E-5 .000 -.016 -.346 .730
a. Dependent Variable: Shujaaz Authenticity Score
IBM SPSS Statistics Processor is ready
Unicode:ON

Chi-Square Test

- Chi-square is the most frequently used non-parametric test
- Two types of Chi-square (χ^2) tests
- χ^2 test for goodness-of-fit
- χ^2 test of independence

χ^2 Test of Independence

- Chi-square test for independence is used to evaluate whether two *categorical variables* are independence
- Classic example is gender and risk

Question

Is the risk category of the respondent independent of their gender?

χ^2 Test of Independence

Hypothesis

H_o: *Gender and risk category of 15-24 year old Kenyan are independent*

H_a: *Gender and risk category of 15-24 year old Kenyan are not independent*

χ^2 Test of Independence

In SPSS

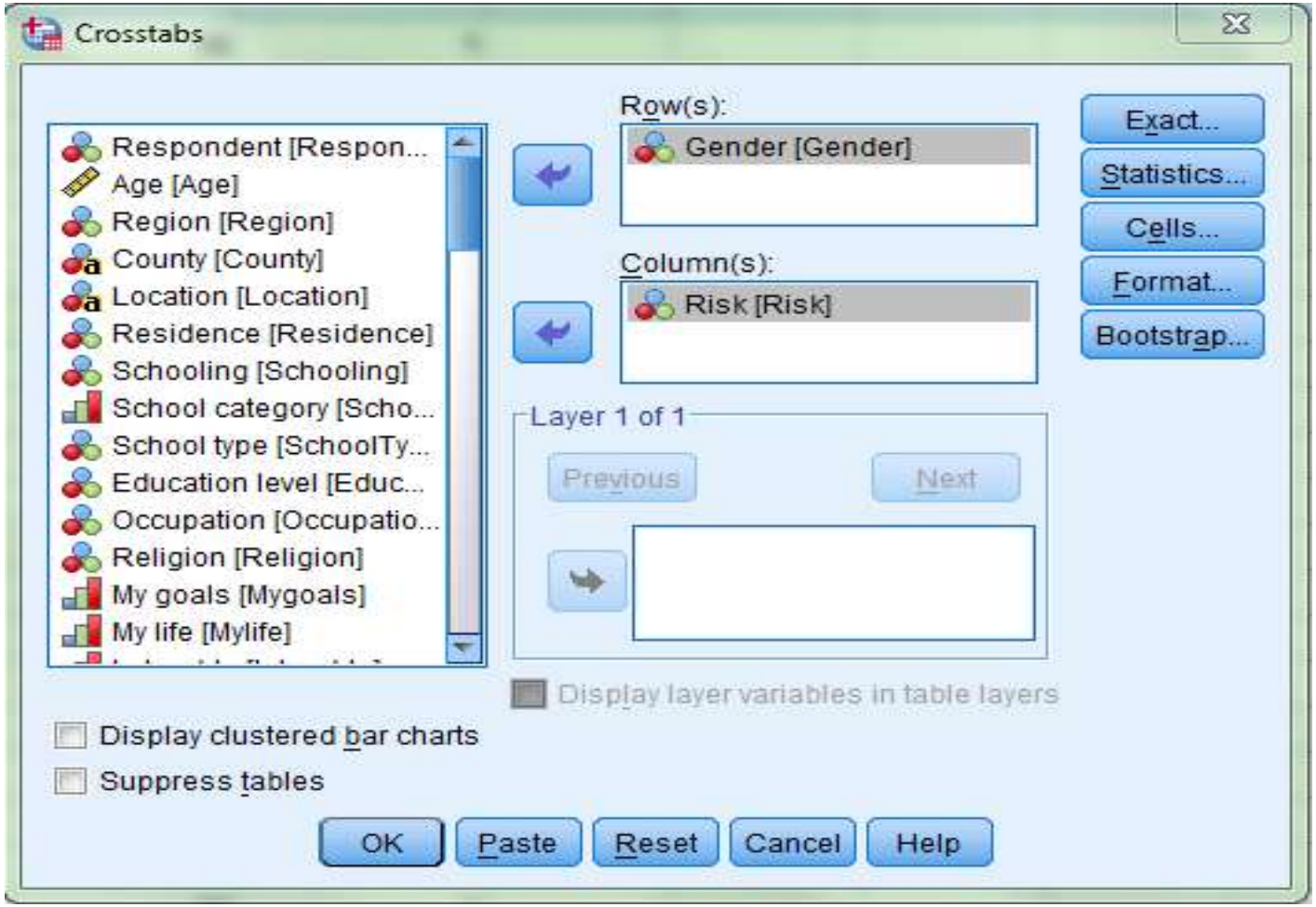
Analyze

Descriptives

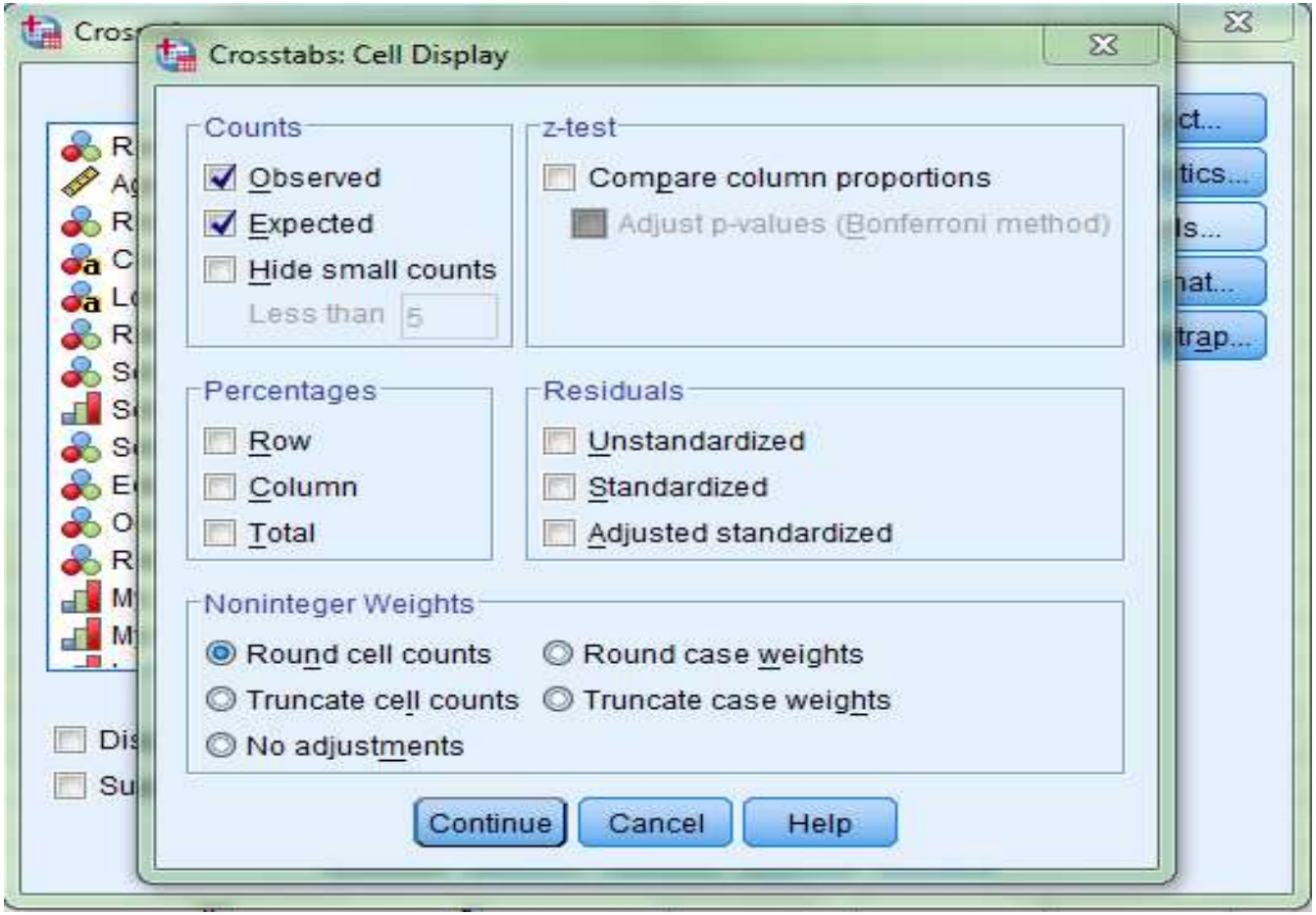
Crosstabs

- In the resulting dialog box, select *Gender* and transfer to the **Rows** and **s**elect *Risk* and transfer to **Columns**

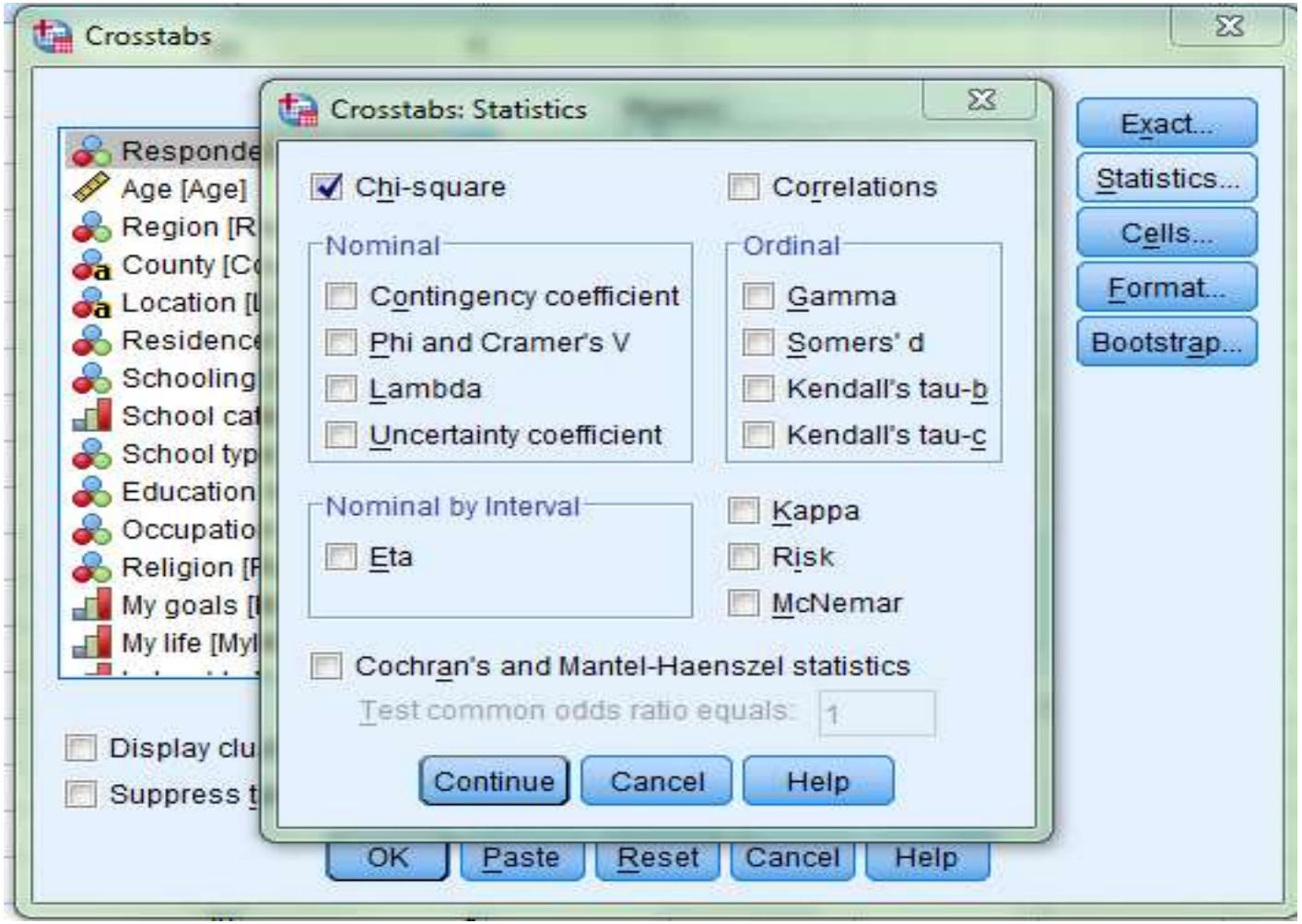
χ^2 Test of Independence



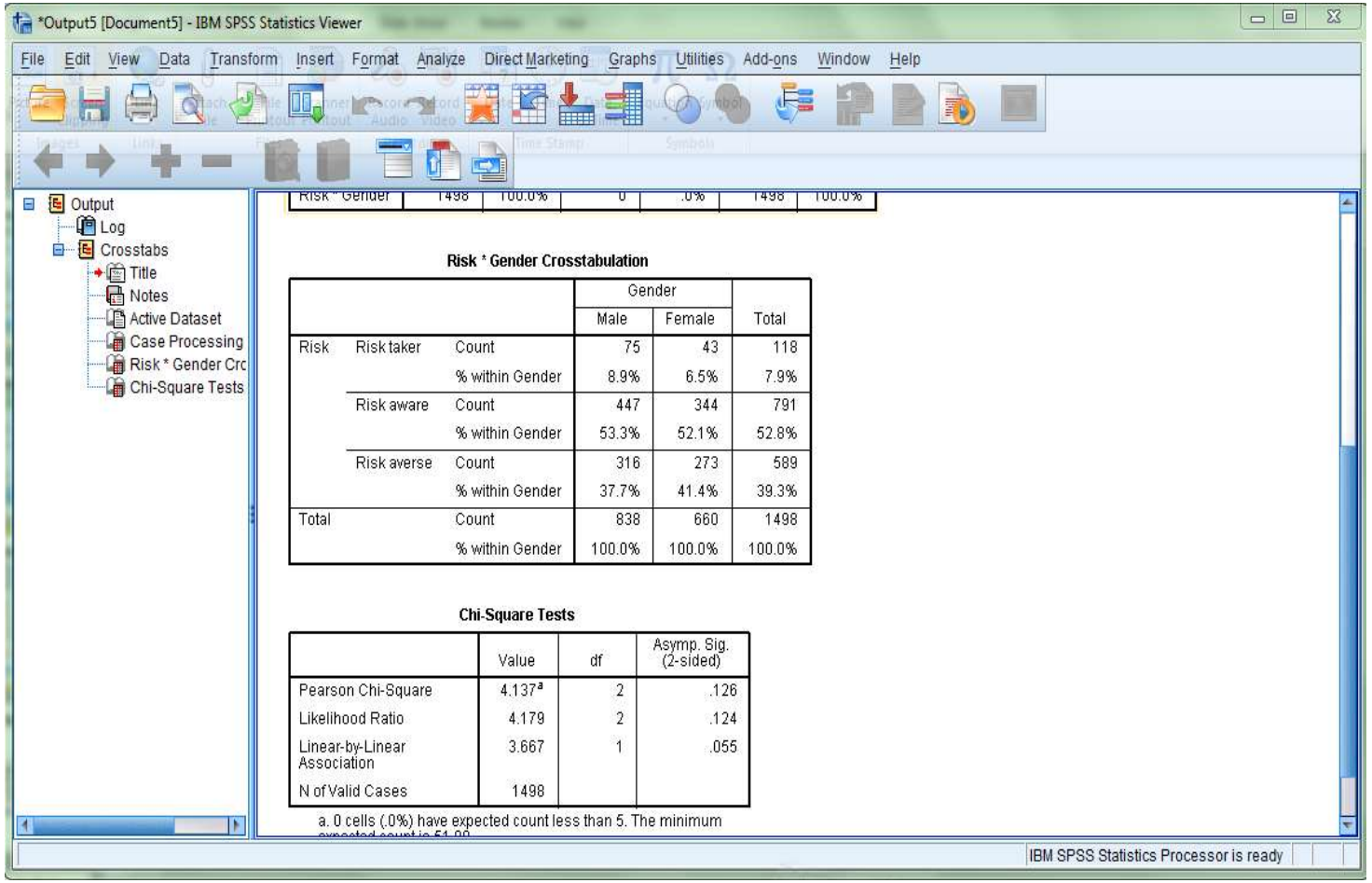
χ^2 Test of Independence



χ^2 Test of Independence



χ^2 Test of Independence



χ^2 Test of Independence

Findings

The results in Table……show that gender and risk category are independent at χ^2 =4.137, df=2, p=0.126. Therefore, the H_o is rejected. In conclusion, gender is not a determinant of the risk category of Kenyans 15-24 years old

What are the program implications or recommendations?

‘Work To Do’

Further activities

Conduct χ^2 Tests and report on the findings:

1. Test for the independence of ***Gender*** and ***residence***
2. Test for the independence of ***Gender*** and ***Seen-Shujaaz***
3. Test for the independence of ***Gender*** and ***Read-Shujaaz***
4. Test for the independence of ***Risk*** and ***AgeGroup***
5. Test for the independence of ***Gender*** and ***AgeGroup***

T-Tests

There are three T-Tests;

a. one sample T-test
b. Independent Samples T-Test
c. Paired Samples T-Test

Independent Samples T-Tests

The Independent Samples T-Test is for testing mean differences between two groups, for example between male and female

Independent Samples T-Tests

Case

The ***WTS*** want to know whether there are gender differences in Shujaaz Authenticity Score between male and female Kenyan Youth 15-24 years

Independent Samples T-Tests

Hypothesis

$H_{o:}$ *there is no statistically significant mean difference in Shujaaz Authenticity Score between male and female Kenyan Youth 15-24 years*

$H_{a:}$ *there is a statistically significant mean difference in Shujaaz Authenticity Score between male and female Kenyan Youth 15-24 years*

Independent Samples T-Tests

In SPSS

Analyze

Compare means

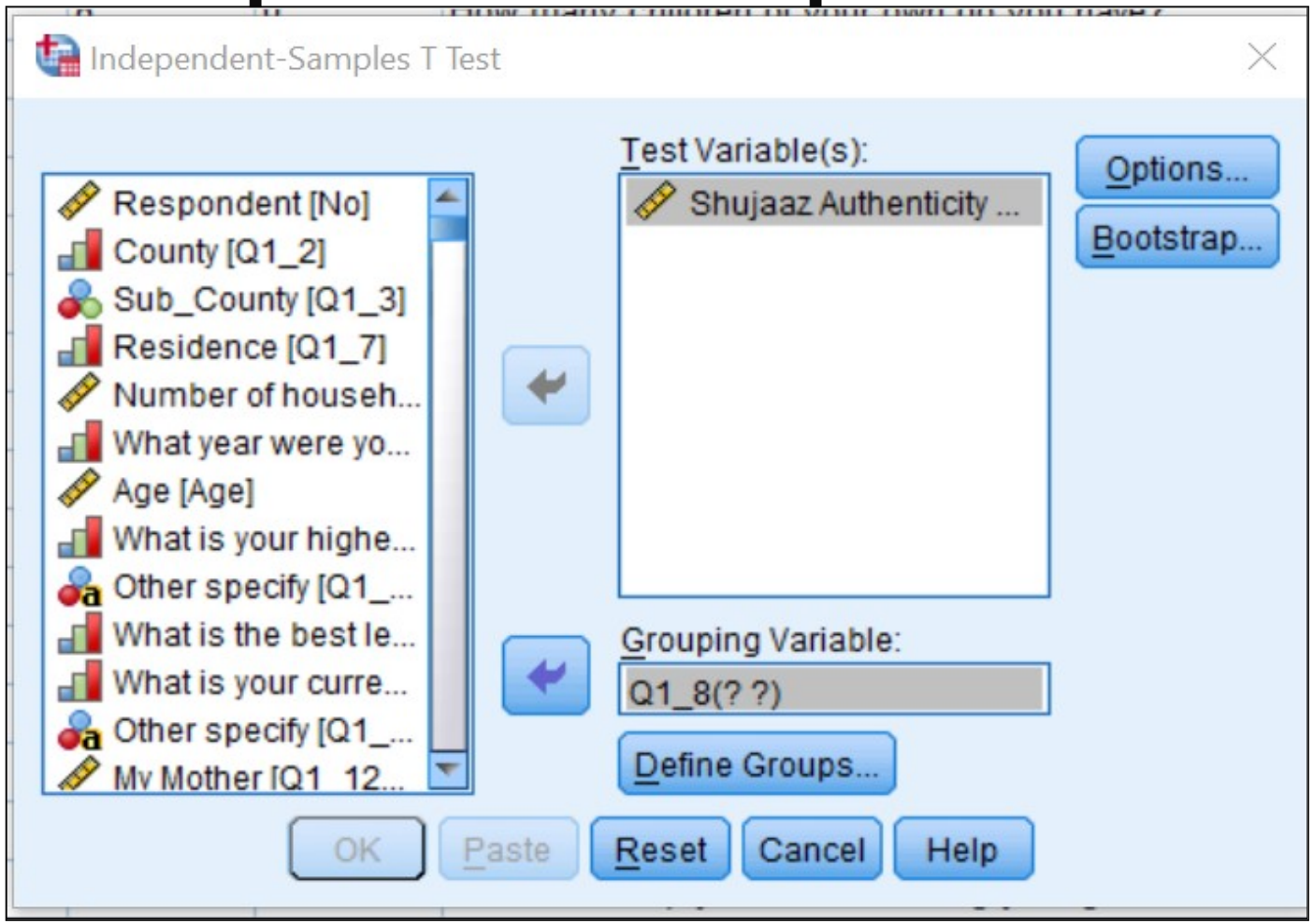
Independent Samples T-Test

Select and transfer the dependent variable **(Shujaaz Authenticity Score)** into the **'Test Variable'**

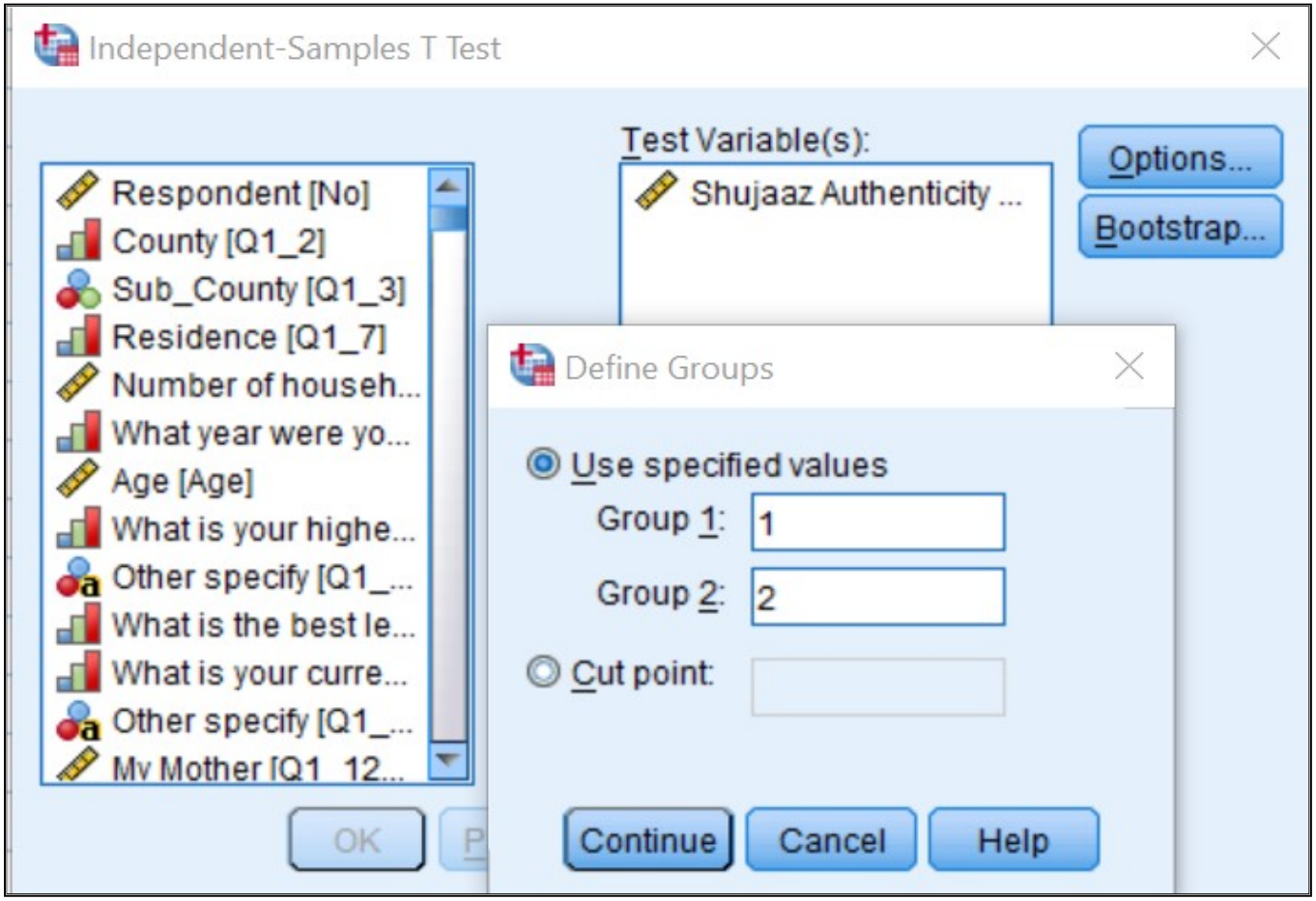
Select and transfer independent variable (gender) into the **'Grouping Variable'**

Define Groups (This gives two groups); assign the Groups their respective values

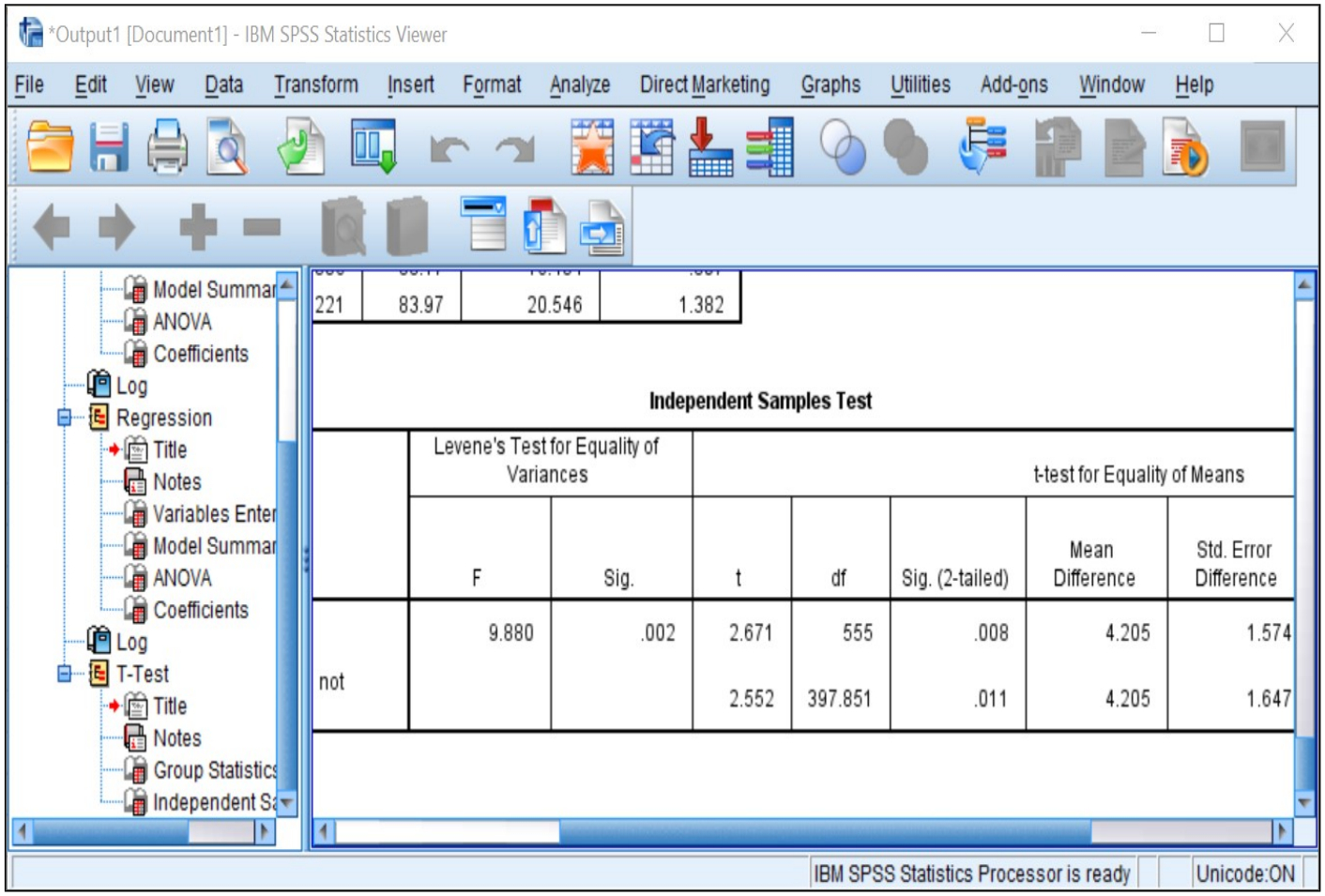
Independent Samples T-Tests



Independent Samples T-Tests



Independent Samples T-Tests



Independent Samples T-Tests

Findings

The results in Table……show that male had a higher mean Shujaaz Authenticity Score of 88 compared to female score of 84 and this mean difference between these two groups was statistically significant at t=2.671, df=555, p=0.008 and the H_o is rejected. In conclusion, there is a gender difference in the Shujaaz Authenticity Score of Kenyan Youth 15-24 year olds in favour of male youth

What is the implications of this finding on the program? Any recommendations?

‘Work To Do’

Further T-Test Exercises

Conduct Independent Samples T Tests and report the findings on:

1. Shujaaz Authenticity Score of Male respondents by AgeGroup
2. Shujaaz Authenticity Score of Female respondents by AgeGroup

Analysis of Variance (ANOVA)

- ANOVA used to compare more than two groups and it is an extension of the t-test developed by R.A. Fisher.
- Hence the **statistics** is 'F'

Types of ANOVA

Several types of ANOVA that can be conducted depending on the question at hand

1. One Way Between Subjects ANOVA
2. Two Way Between Subjects ANOVA
3. One Way Within Subjects ANOVA
4. Analysis of Covariance (ANCOVA)
5. Repeated Measures ANOVA
6. Multivariate Analysis of Variance (MANOVA)

One Way Between Subjects ANOVA

- Unlike the Independent Samples T-Test, in One-Way-ANOVA, a comparison can be made between more than two groups
- One-Way ANOVA means that you have exactly one dependent variable (always continuous variable) and exactly one independent variable (always categorical variable)
- One-Way ANOVA is global test that tells a significant difference exist but does not tell where the difference is located

One Analysis of Variance (ANOVA)

Example

- Are there significant differences in the Self Efficacy Scores of Respondents in different Risk Categories

Analysis of Variance (ANOVA)

Example

H_o: There is no significant different in mean Self Efficacy Scores for Respondents in different Risk Categories

H_a: There is a significant different in mean Self Efficacy Scores for Respondents in different Risk Categories

Or

H_o: $\mu_1 = \mu_2 = \mu_3$

H_a: $\mu_1 \neq \mu_2 \neq \mu_3$

One Way Between Subjects ANOVA

In SPSS;

Analyze

Compare mean

One-Way ANOVA

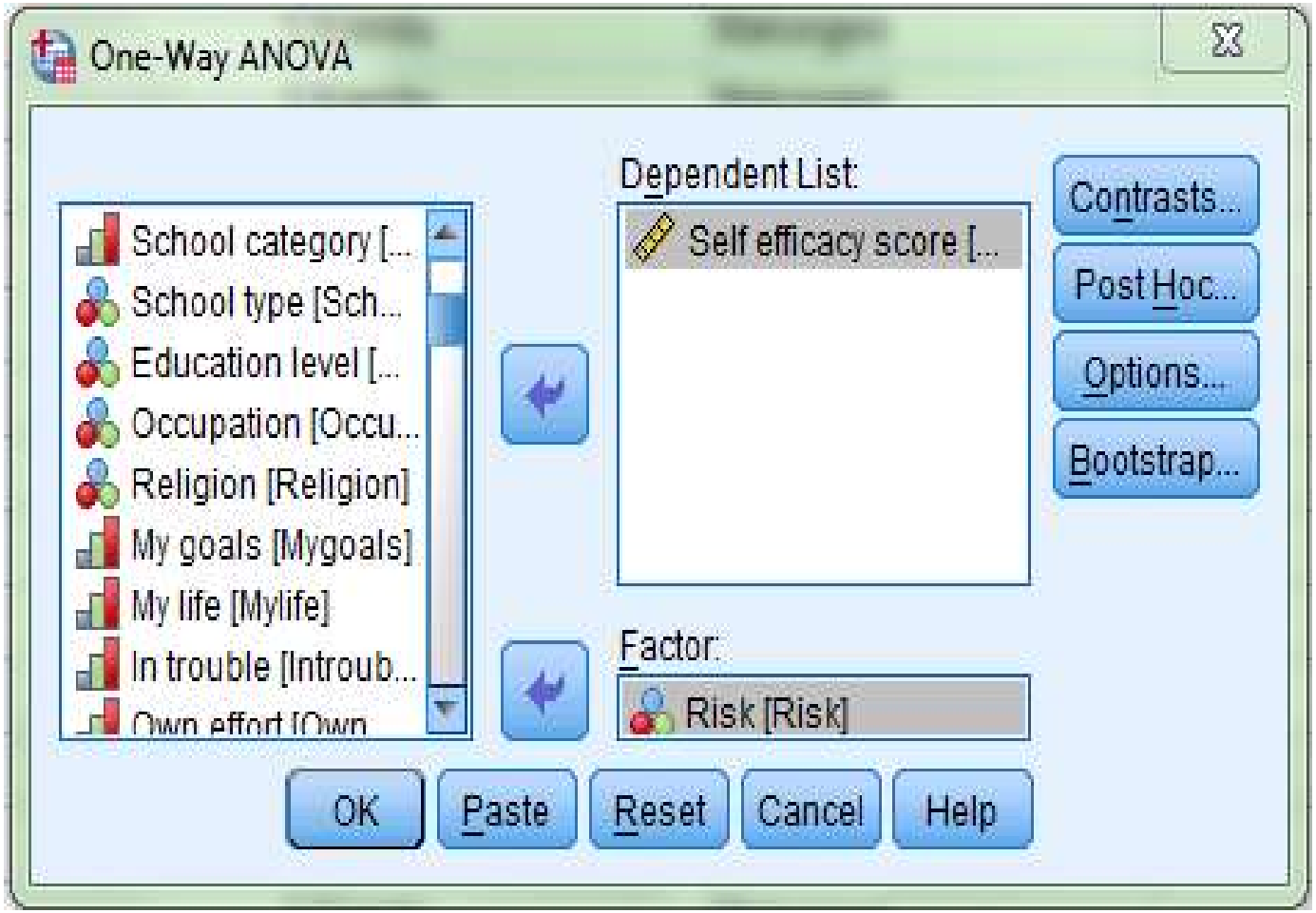
Select **'Self-Efficacy Score'** and transfer to **'Dependent List'**

Select **'Risk'** and transfer to **'Factor'**

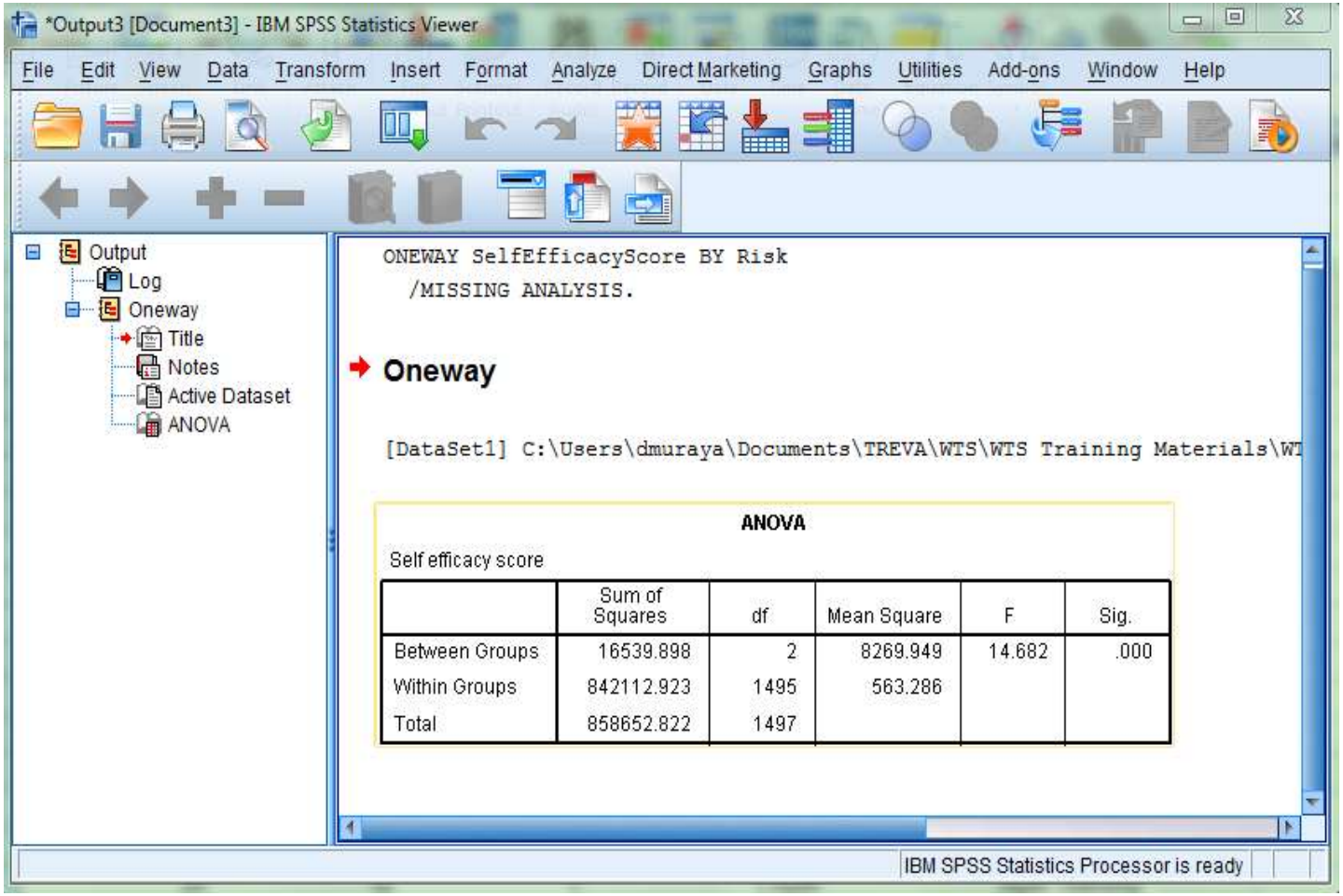
Click **'Ok'**

Output

One Way Between Subjects ANOVA



One Way Between Subjects ANOVA



One Way Between Subjects ANOVA

Findings

The results in Table….show that there was a statistically significant difference in mean self-efficacy score in the 3 category of respondents at $F(2,1495)=14.682$, $p<0.05$. Therefore the H_o is rejected and in conclusion the Risk category was a determinant of self-efficacy score.

Since there were 3 categories of risks, we don't know which category had a higher self-efficacy score

Pairwise Post Hoc Multiple Comparison Tests

- *This test is used to locate significant differences in more than one group (global test)*
- *This test compares every pair in the group and whether the difference is significant*
- *Therefore, it calculate the mean difference between every two groups and looks for significance*

Pairwise Post Hoc Multiple Comparison Tests

In SPSS;

Analyze

Compare mean

One-Way ANOVA

Select **'Self-Efficacy Score'** and transfer to **'Dependent List'**

Select **'Risk'** and transfer to **'Factor'**

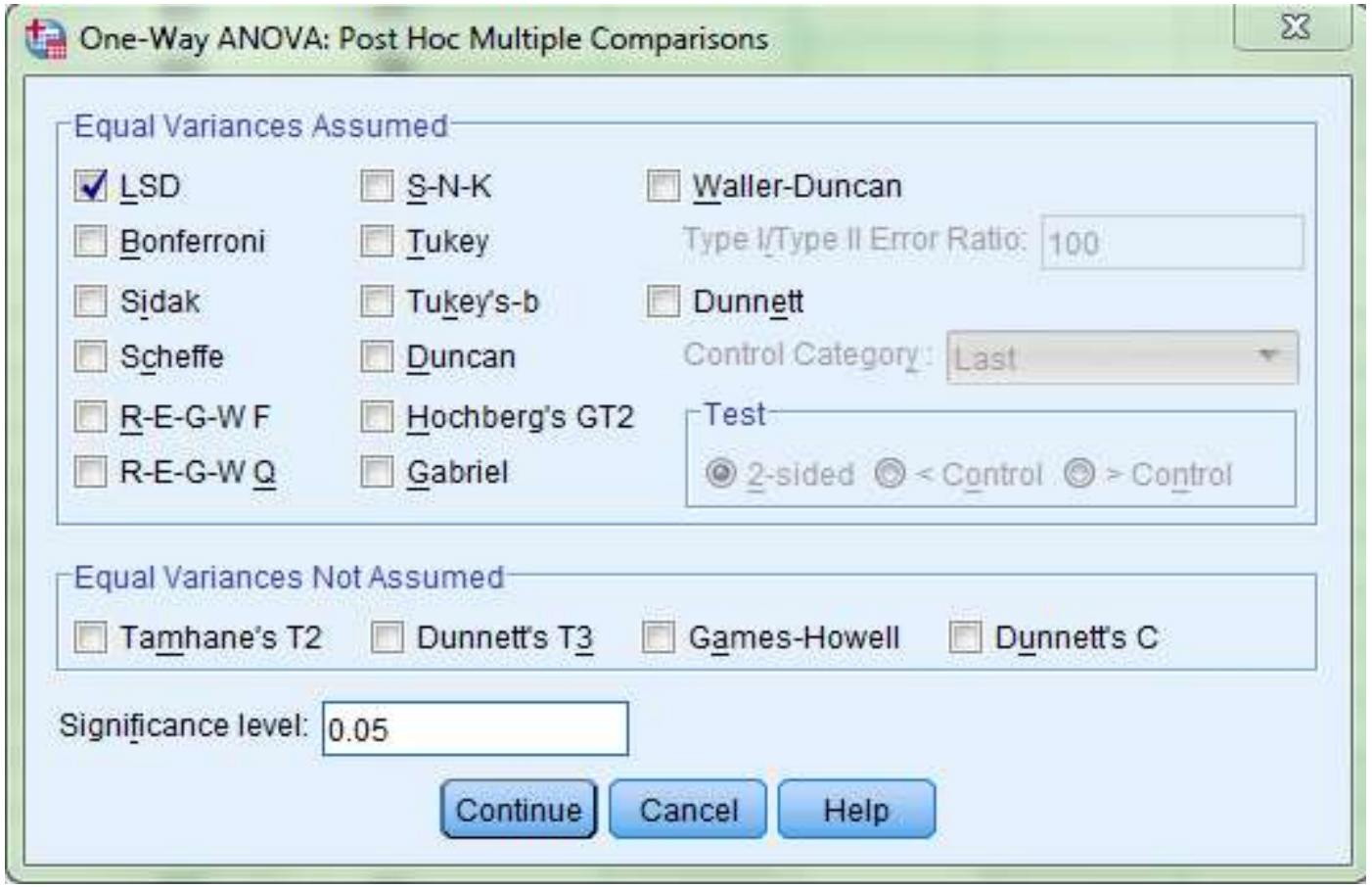
Click 'Post hoc'

In the **Equal Variances Assumed** select **'LSD'**

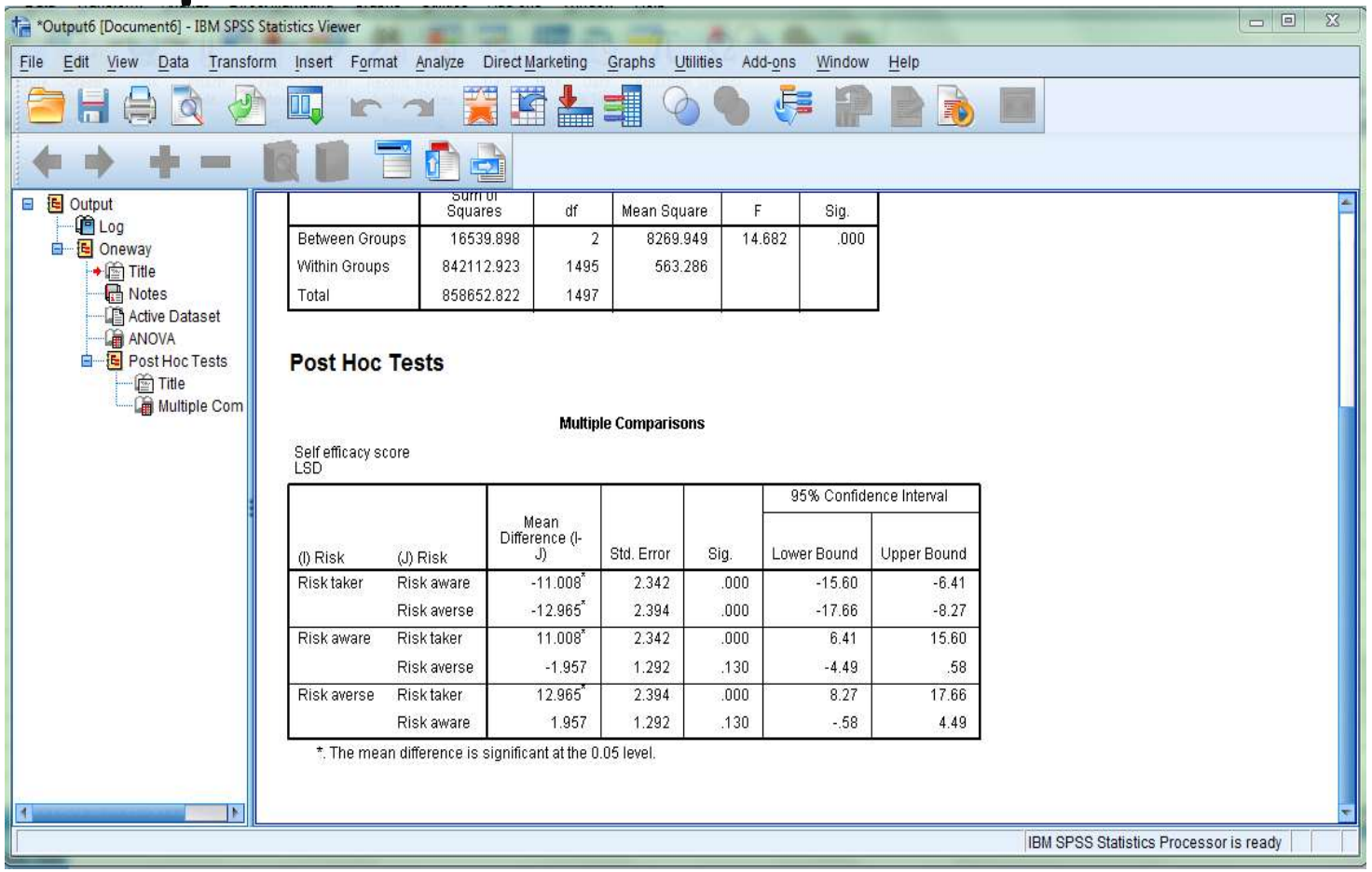
Click **'Continue',** Click **'Ok'**

Out put

Pairwise Post Hoc Multiple Comparison Tests



Pairwise Post Hoc Multiple Comparison Tests



	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	16539.898	2	8269.949	14.682	.000
Within Groups	842112.923	1495	563.286		
Total	858652.822	1497			

Post Hoc Tests

Multiple Comparisons

Self efficacy score
LSD

(I) Risk	(J) Risk	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Risk taker	Risk aware	-11.008*	2.342	.000	-15.60	-6.41
	Risk averse	-12.965*	2.394	.000	-17.66	-8.27
Risk aware	Risk taker	11.008*	2.342	.000	6.41	15.60
	Risk averse	-1.957	1.292	.130	-4.49	.58
Risk averse	Risk taker	12.965*	2.394	.000	8.27	17.66
	Risk aware	1.957	1.292	.130	-.58	4.49

*. The mean difference is significant at the 0.05 level.

Pairwise Post Hoc Multiple Comparison Tests

- *The significant differences were located between risk takers and risk aware and risk takers and risk averse in favour of risk aware and risk averse respectively*
- *No significant differences between risk aware and risk averse groups*

Options and Contrasts in One-Way ANOVA

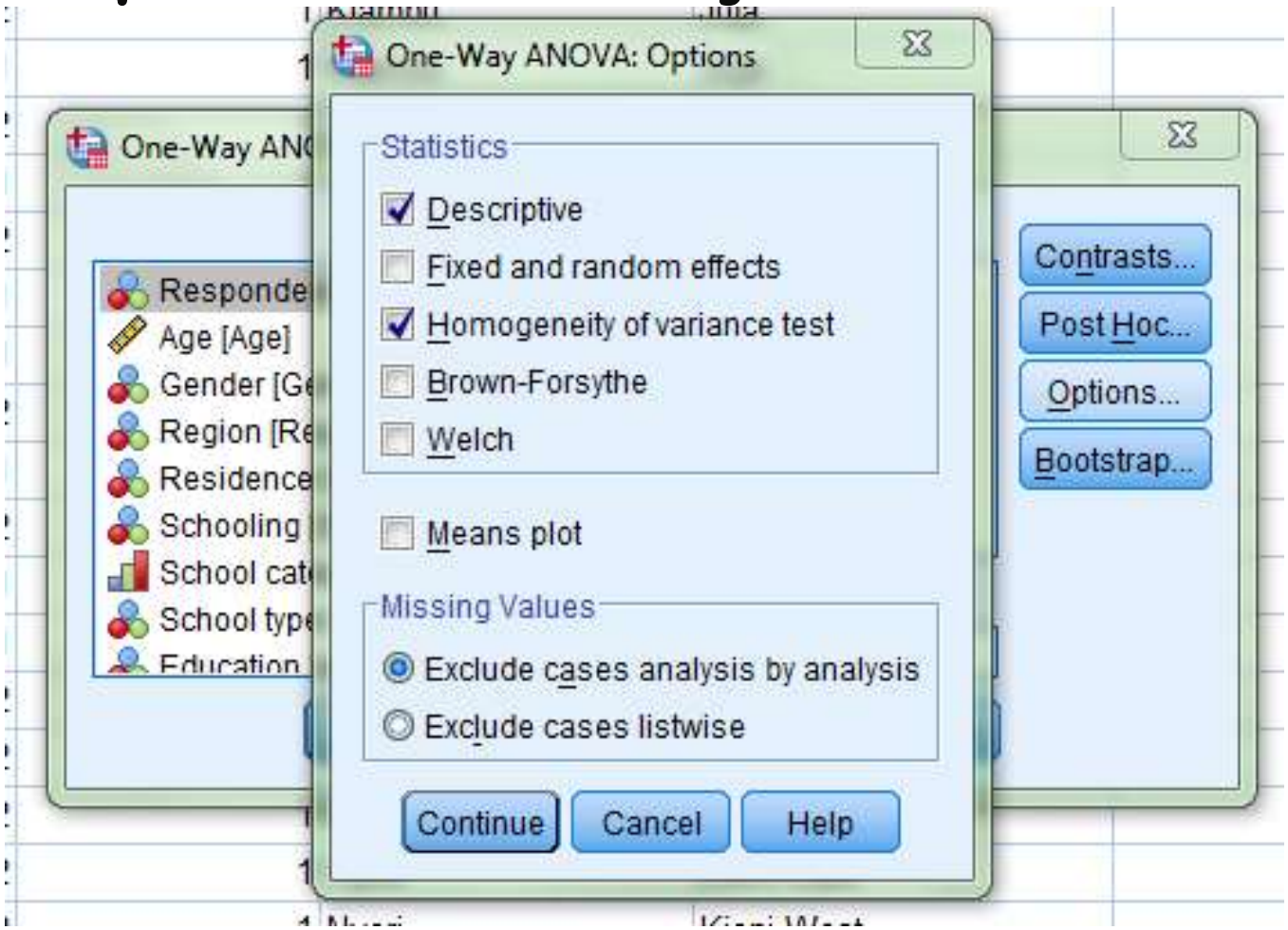
- *One-Way ANOVA has 2 addition facilities that are very useful: Options and Contrasts*
- *Options allows 2 important computations:*
  a. ***Descriptive statistics*** *(Mean, SD, SE, 95% Confidence Limits, Max & Min Scores)*
  b. ***Test of Homogeneity of Variance***

‘Options’ in One-Way ANOVA

Click: *‘Options’*

Select: *‘Statistics’ and ‘Homogeneity of Variance’*

‘Options’ in One-Way ANOVA

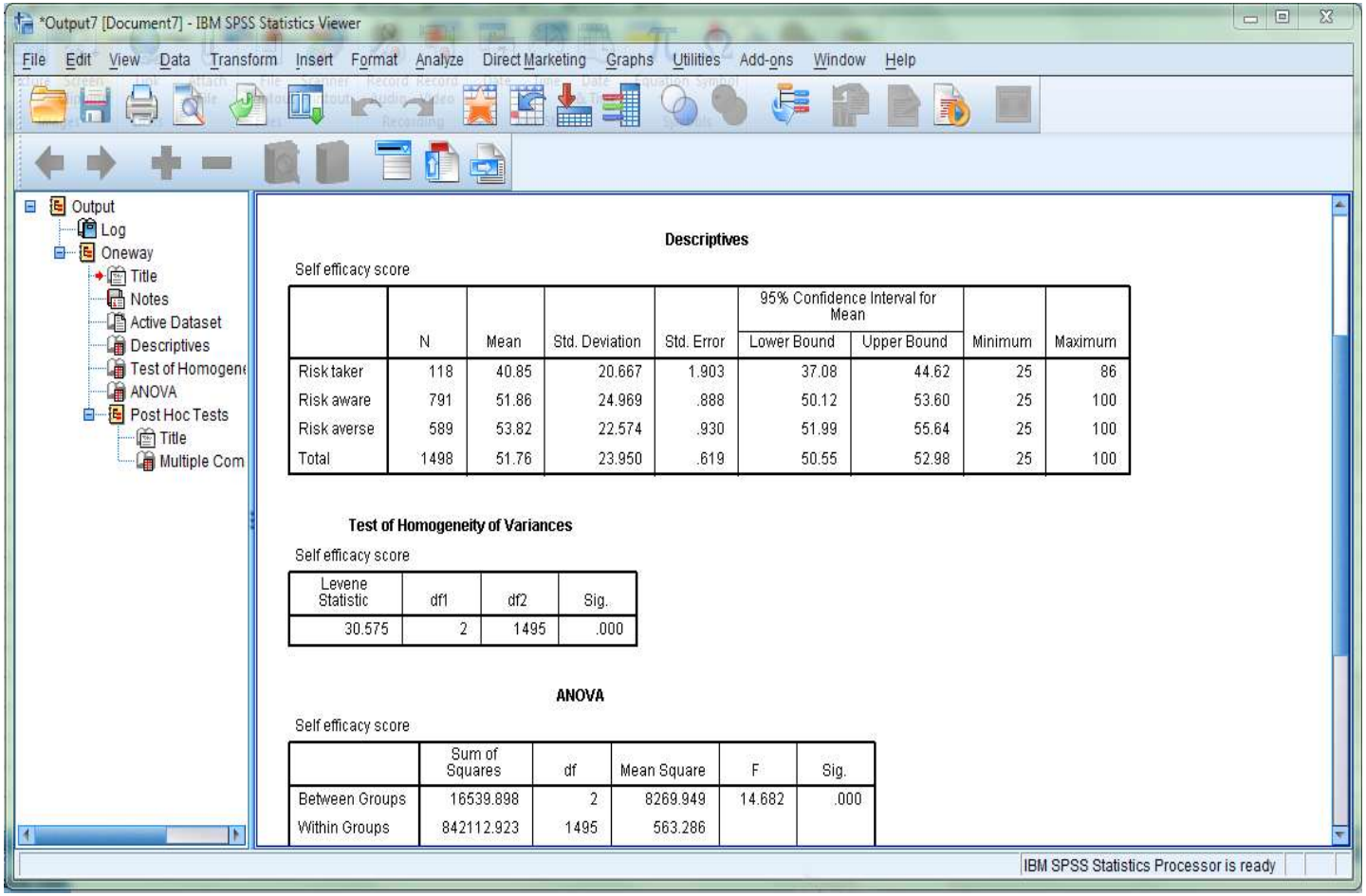


‘Options’ in One-Way ANOVA

Click: ***‘Continue’***

Click: ***‘OK’***

‘Options’ in One-Way ANOVA



What To Do 'One-Way ANOVA'

Determine whether there are statistically significant differences in Self-Efficacy Score based:

- *Education level*
- *First Saw Shujaaz*
- *Listening Frequency*

Two-Way Between Subjects ANOVA

- When we want to determine the effect of more than one independent variable on one dependent variable, Two-way ANOVA would be used
- Two-Way ANOVA means that you have exactly one dependent variable (always continuous variable) and exactly two independent variable (always categorical variable)
- For example, it is possible to find out how the Self-Efficacy Score is affected by both First Saw Shujaaz and Read ShuJaaz

Two-Way Between Subjects ANOVA

Hypothesis

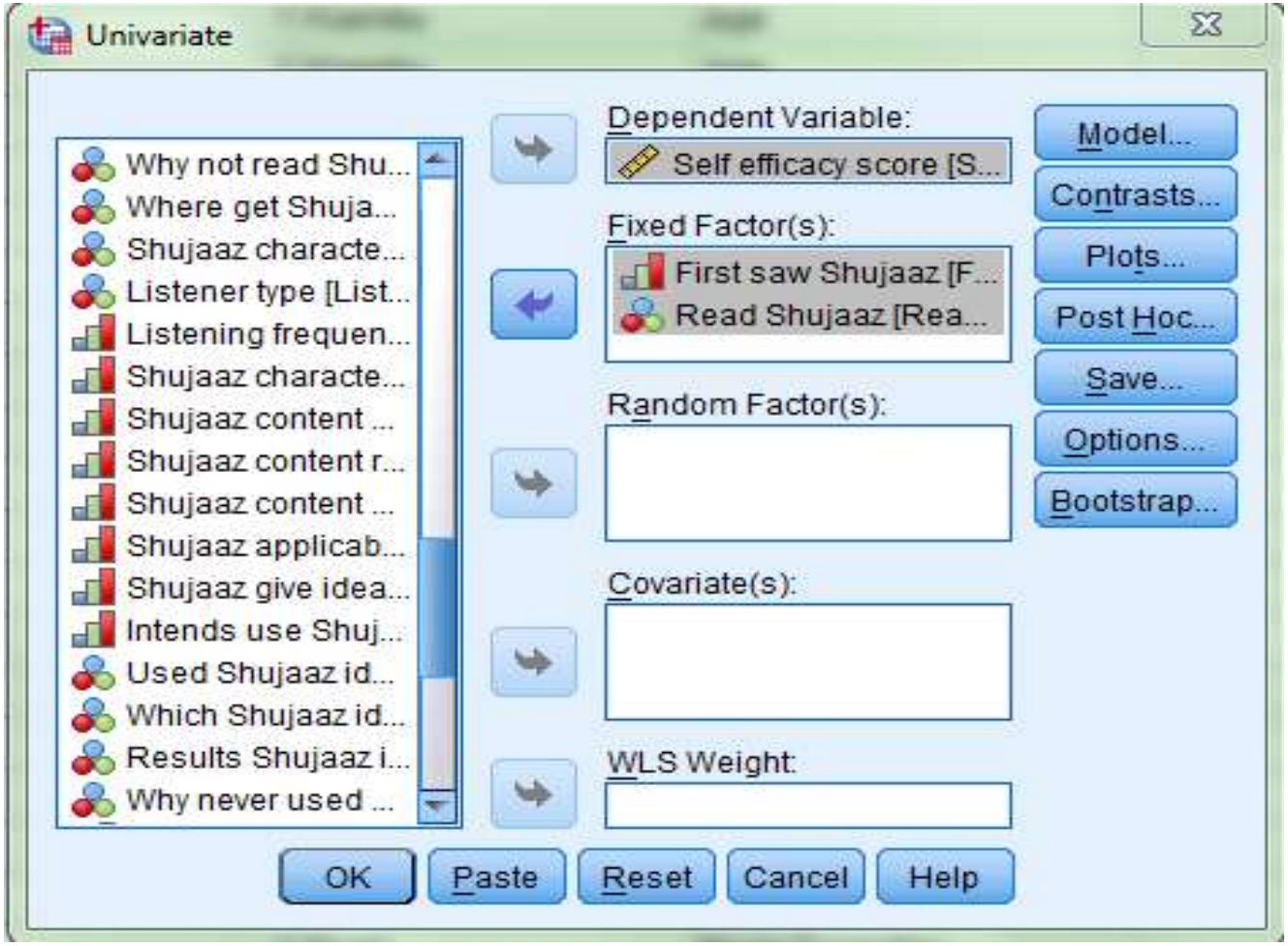
- **H_o:** There is no significant difference Self-Efficacy Score based on First Saw Shujaaz and Read Shujaaz and their interaction
- **Ha:** There is significant difference Self-Efficacy Score based on First Saw Shujaaz and Read Shujaaz and their interaction

Two-Way Between Subjects ANOVA

In SPSS

- Analyze, General Linear Model, Select Univariate
- Select the Self-Efficacy Score (Dependent Variable) and transfer to Dependent Variable List
- Select the First Saw Shujaaz and Read Shujaaz (Independent Variables) and transfer to the Fixed Factors List

Two-Way Between Subjects ANOVA

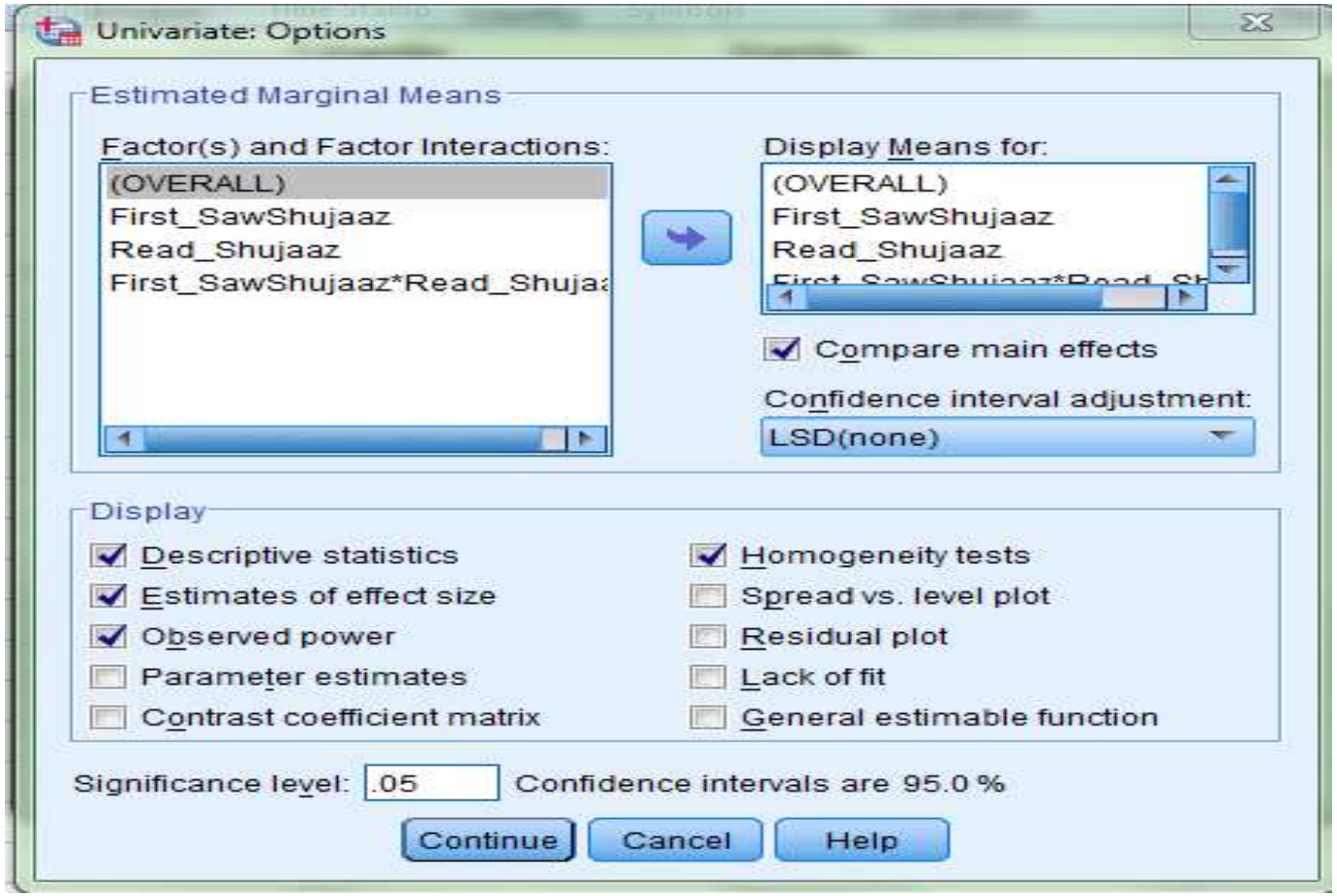


Two-Way Between Subjects ANOVA

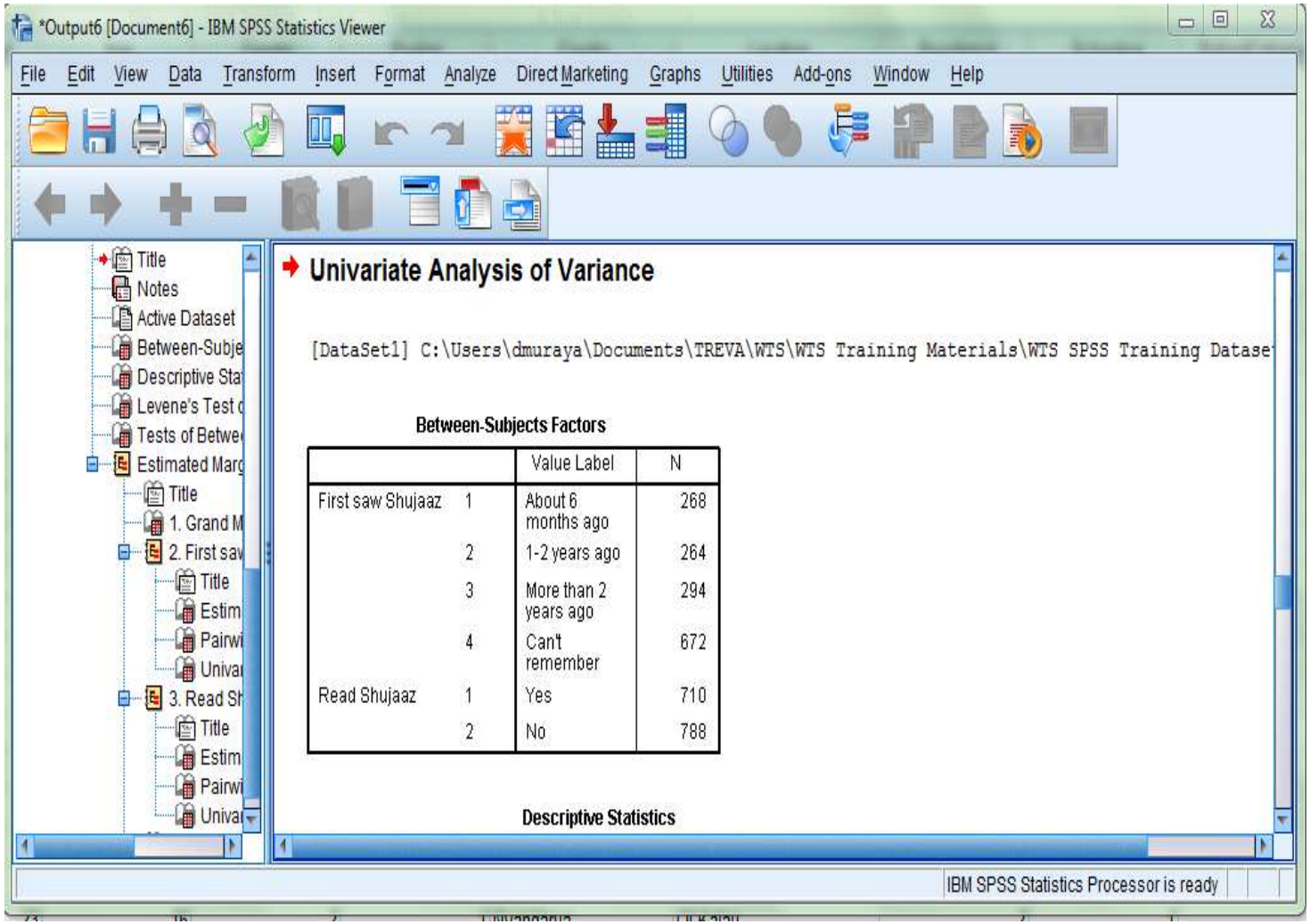
In SPSS

- Click Options and Select:
  - Descriptives
  - Estimates of effect size
  - Observed power
  - Homogeneity tests
- Click Continue, Click Ok

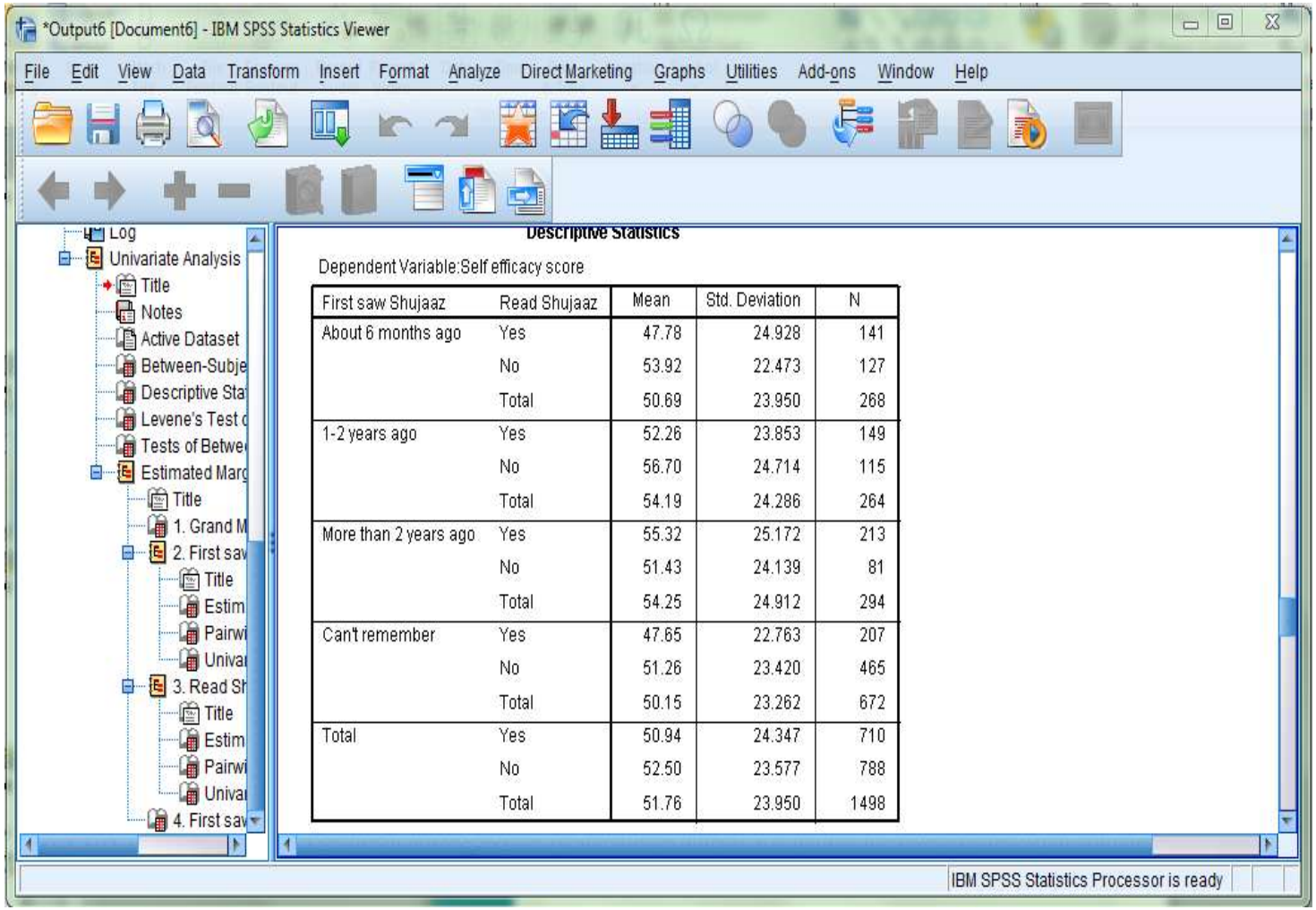
Two-Way Between Subjects ANOVA



Two-Way Between Subjects ANOVA

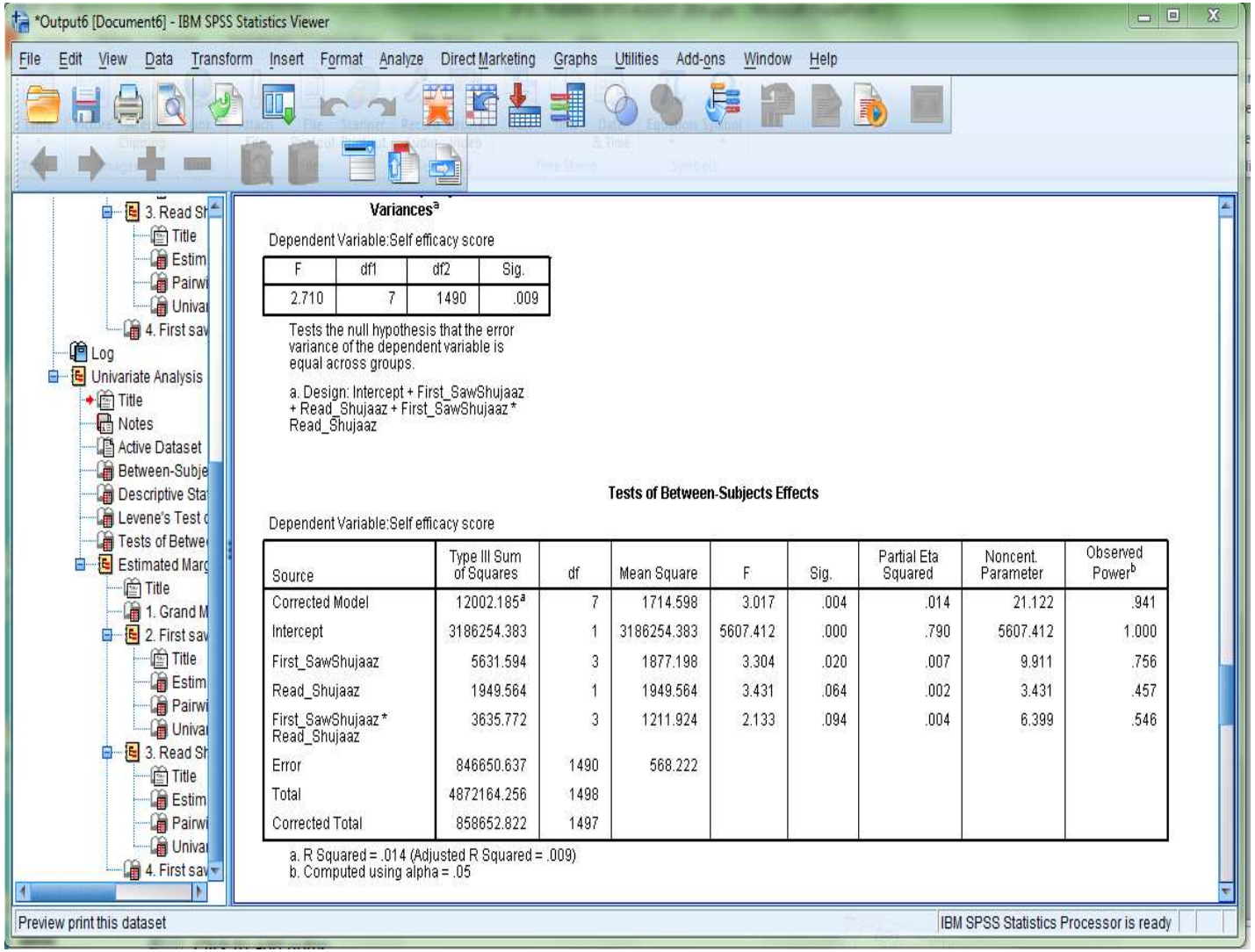


Two-Way Between Subjects ANOVA



First saw Shujaaz	Read Shujaaz	Mean	Std. Deviation	N
About 6 months ago	Yes	47.78	24.928	141
	No	53.92	22.473	127
	Total	50.69	23.950	268
1-2 years ago	Yes	52.26	23.853	149
	No	56.70	24.714	115
	Total	54.19	24.286	264
More than 2 years ago	Yes	55.32	25.172	213
	No	51.43	24.139	81
	Total	54.25	24.912	294
Can't remember	Yes	47.65	22.763	207
	No	51.26	23.420	465
	Total	50.15	23.262	672
Total	Yes	50.94	24.347	710
	No	52.50	23.577	788
	Total	51.76	23.950	1498

Two-Way Between Subjects ANOVA



‘What To Do’

Using the WTS Dataset and conduct Two-Way ANOVA and determine the effect of:

1. Gender & Read Shujaaz on Self-Efficacy Score
2. Read Shujaaz & Risk on Self-Efficacy Score
3. Read Shujaaz & Risk on Self-Efficacy Score
4. Occupation & Education level on Self-Efficacy Score

Binary Logistics Regression

1. The goal is to predict membership in a target group from scores on one or several predicator variables
2. Predictor variable may be quantitative or categorical

Assumptions

1. Outcome variable is binary / dichotomous (Y/N, Rural/Urban
2. Categories of outcome variable are exhaustive and mutually exclusive
3. Each person is known to be a member of one group or the other

Binary Logistics Regression

Reference Group

1. The membership group of interest:
2. Residence: Are females likely to be found in Rural areas compared to males?
3. Question: Does gender predict residence?

Binary Logistics Regression

Odds

1. Computed by dividing the number of times on outcome of interest does happen by the number of times when it does not happen
2. Minimum Odds is 0 while maximum is ∞
3. If Odd < 1; target event is less likely and if Odd > 1; target event more likely, if Odd=1; target event has equal chance of happening or not happening

Odds Ratio

1. Odds for the reference group against the other group and vice versa

USE STATISTICS WISELY FOR DECISION MAKING