KORELASI

Aryan Eka Prastya Nugraha

2019

Correlation is primarily concerned with investigating whether a relationship exists and with determining its magnitude and direction. When two variables vary together, such as loneliness and depression, they are said to be correlated

In order to show quantitatively the extent to which two variables are related, it is necessary to calculate a correlation coefficient. There are many types of correlation coefficients, and the decision of which one to employ with a specific set of data depends on the following factors:

- The level of measurement on which each variable is measured
- The nature of the underlying distribution (continuous or discrete)
- The characteristics of the distribution of the scores (linear or nonlinear)

correlational technique the researcher uses, they have the following characteristics in common:

1. Two sets of measurements are obtained on the same individuals or on pairs of individuals who are matched on some basis.
2. The values of the correlation coefficients vary between +1.00 and –1.00. Both of these extremes represent perfect relationships between the variables, and 0.00 represents the absence of a relationship.
3. A *positive relationship* means that individuals obtaining high scores on one variable tend to obtain high scores on a second variable. The converse is also true, that is, individuals scoring low on one variable tend to score low on a second variable.
4. A *negative relationship* means that individuals scoring low on one variable tend to score high on a second variable. Conversely, individuals scoring high on one variable tend to score low on a second variable.

Requirements

- For each subject in the study, there must be *related pairs of scores*. That is, if a subject has a score on variable X, then the same subject must also receive a score on variable Y.
- The variables should be measured at least at the *ordinal level*.

Assumptions

- **Linearity**—The relationship between the two variables must be *linear*, that is, the relationship can be most accurately represented by a straight line.

- **Homoscedasticity**—The variability of scores along the Y variable should remain constant at all values of the X variable.

Example 1: Pearson Product Moment Correlation Coefficient

Assume that a researcher wishes to ascertain whether there is a relationship between grade point average (GPA) and the scores on a reading-comprehension (READ) test of 15 frst-year students. The researcher recorded the pair of scores below, together with their rankings.

Student	Read	Read_Rank	GPA	GPA_Rank
s1	38	13	2.1	13
s2	54	3	2.9	6
s3	43	10	3.0	5
s4	45	8	2.3	12
s5	50	4	2.6	7.5
s6	61	1	3.7	1
s7	57	2	3.2	4
s8	25	15	1.3	15
s9	36	14	1.8	14
s10	39	11.5	2.5	9.5
s11	48	5.5	3.4	2
s12	46	7	2.6	7.5
s13	44	9	2.4	11
s14	39	11.5	2.5	9.5
s15	48	5.5	3.3	3

Data Entry Format

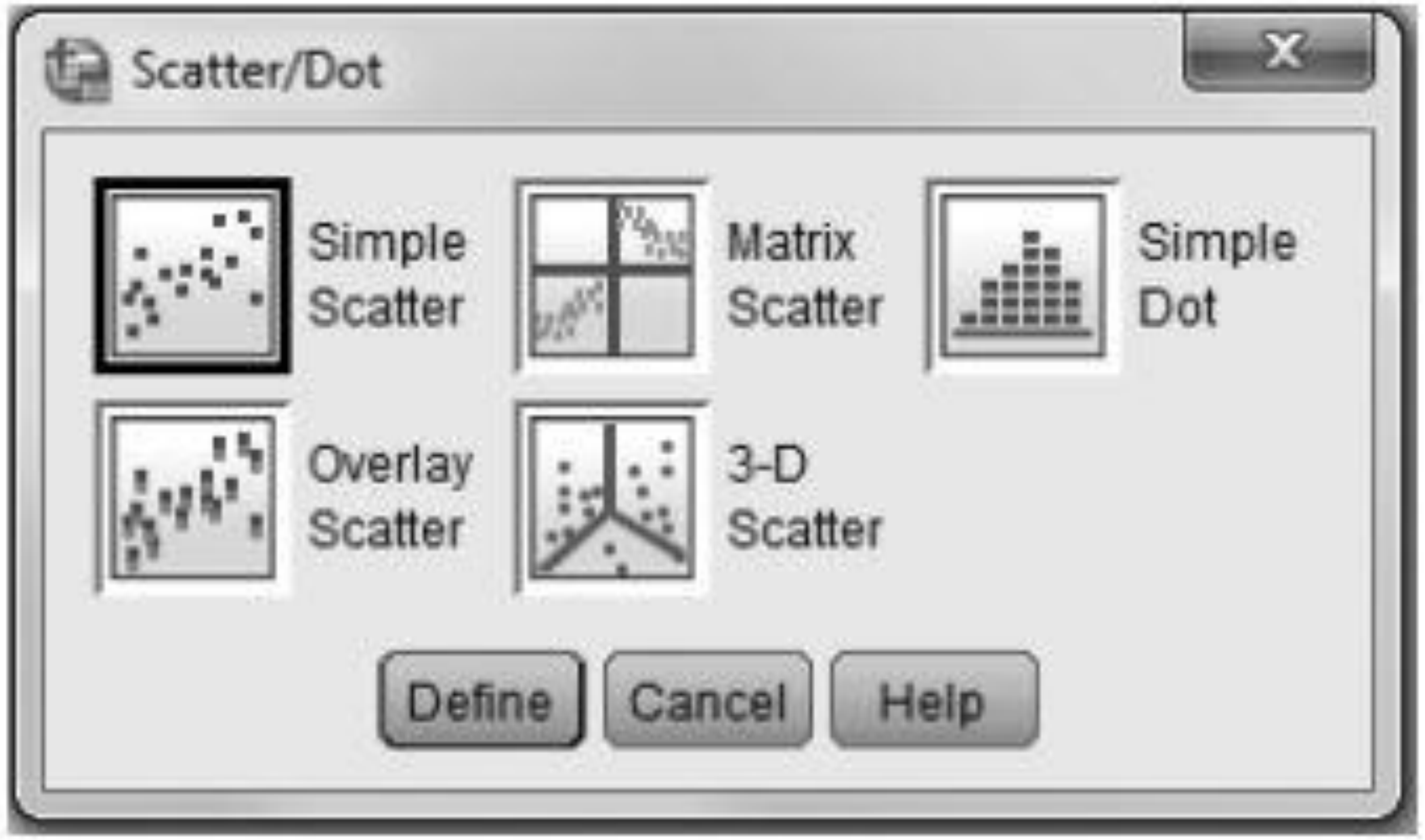
The data set has been saved under the name **CORR.SAV.**

Variables	Column(s)	Code
READ	1	Reading score
READ_RANK	2	Ranking
GPA	3	Grade point average
GPA_RANK	4	Ranking

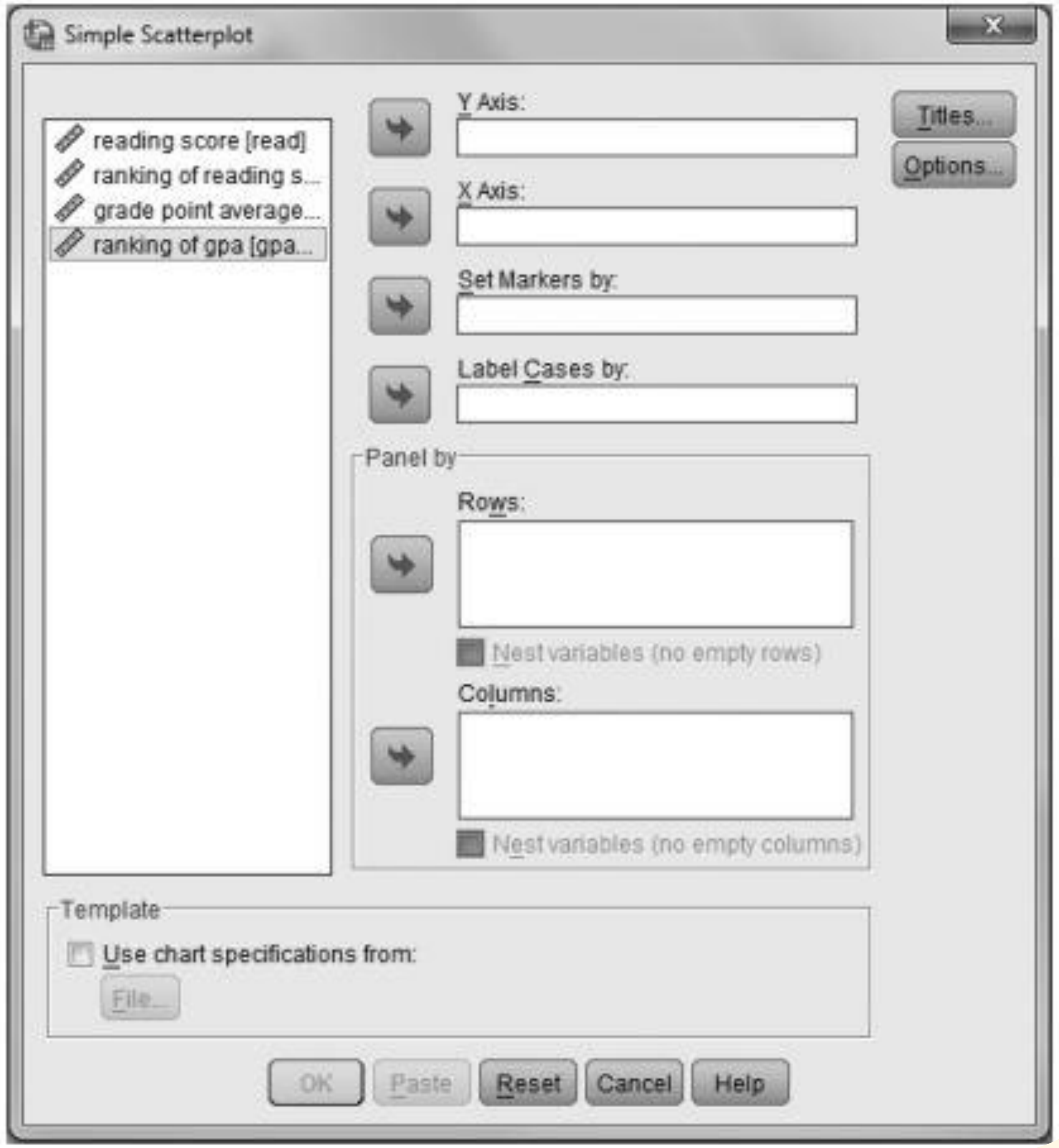
Testing Assumptions

1. From the menu bar, click **Graphs**, then **Legacy Dialogs**, and then **Scatter/Dot....** The following **Scatter/Dot** window will open. Click (highlight) the 

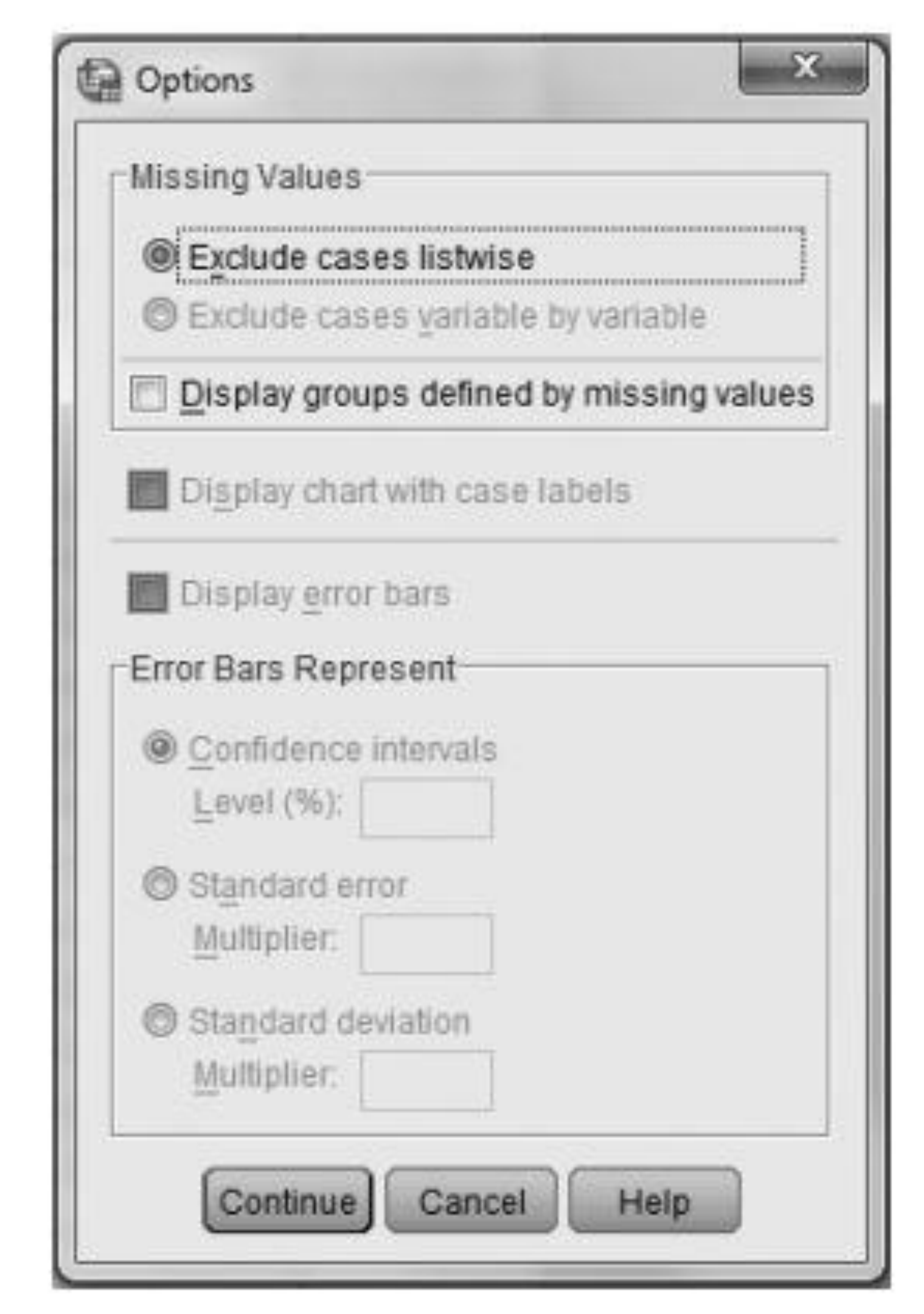
icon.



2. Click Define to open the **Simple Scatterplot** window below.

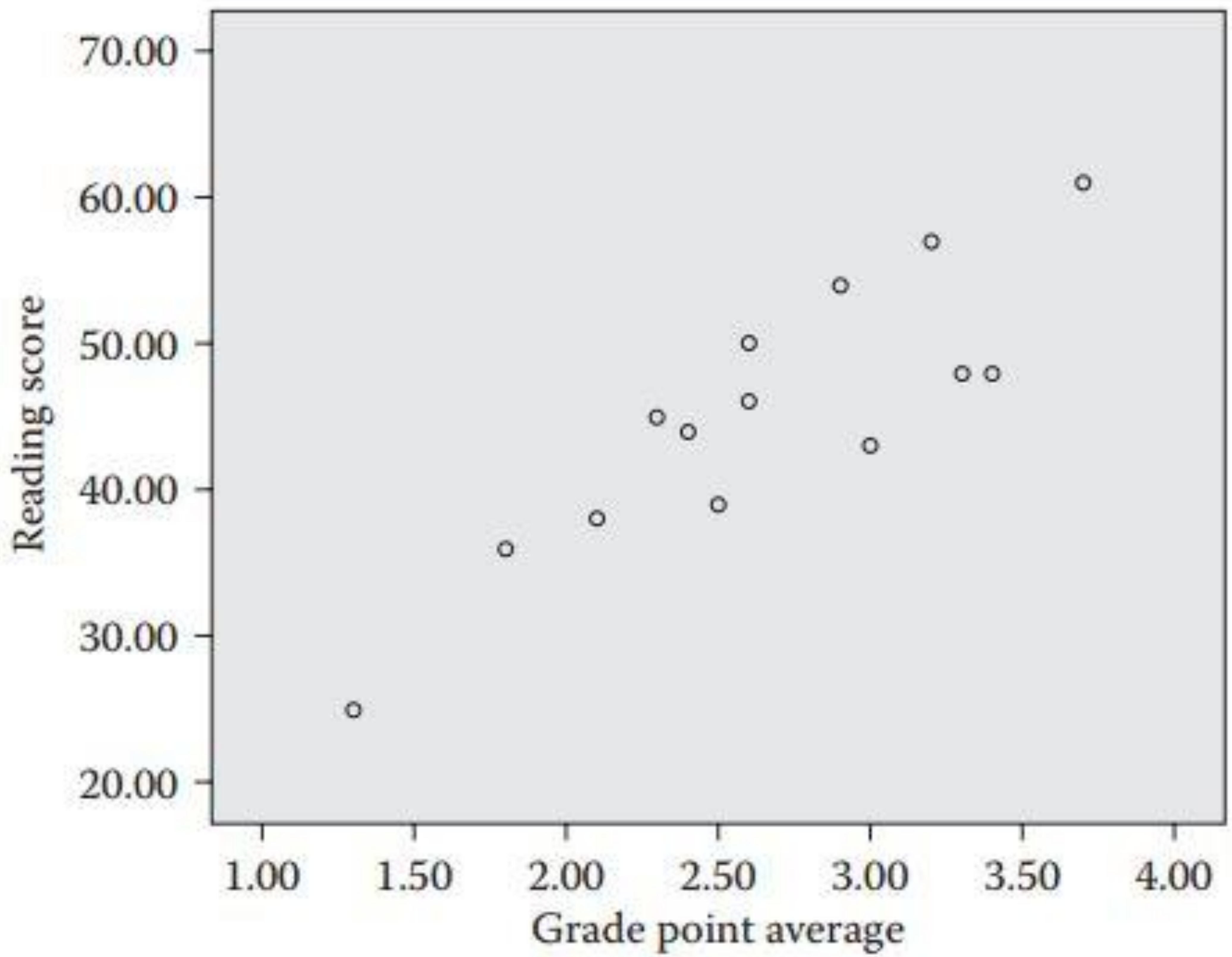



Simple Scatterplot
ranking of reading s...
ranking of gpa [gpa...
Y Axis:
reading score [read]
X Axis:
grade point average [gpa]
Set Markers by:
Label Cases by:
Panel by
Rows:
Nest variables (no empty rows)
Columns:
Nest variables (no empty columns)
Template
Use chart specifications from:
File...
Titles...
Options...
OK
Paste
Reset
Cancel
Help


Options
Missing Values
Exclude cases listwise
Exclude cases variable by variable
Display groups defined by missing values
Display chart with case labels
Display error bars
Error Bars Represent
Confidence intervals
Level (%):
Standard error
Multiplier:
Standard deviation
Multiplier:
Continue
Cancel
Help

Click Continue to return to the **Simple Scatterplot** window.

Scatterplot

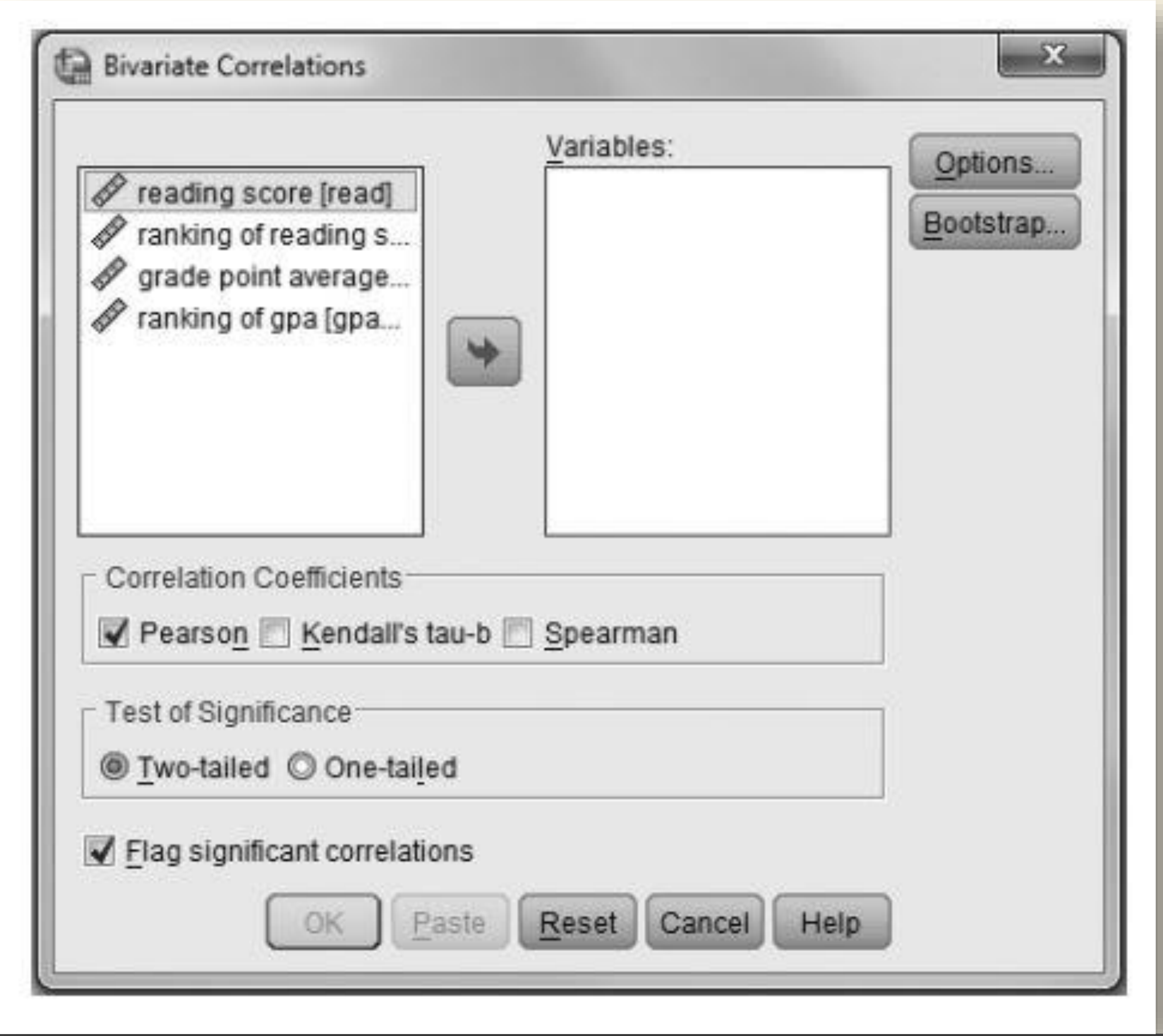


Interpretation

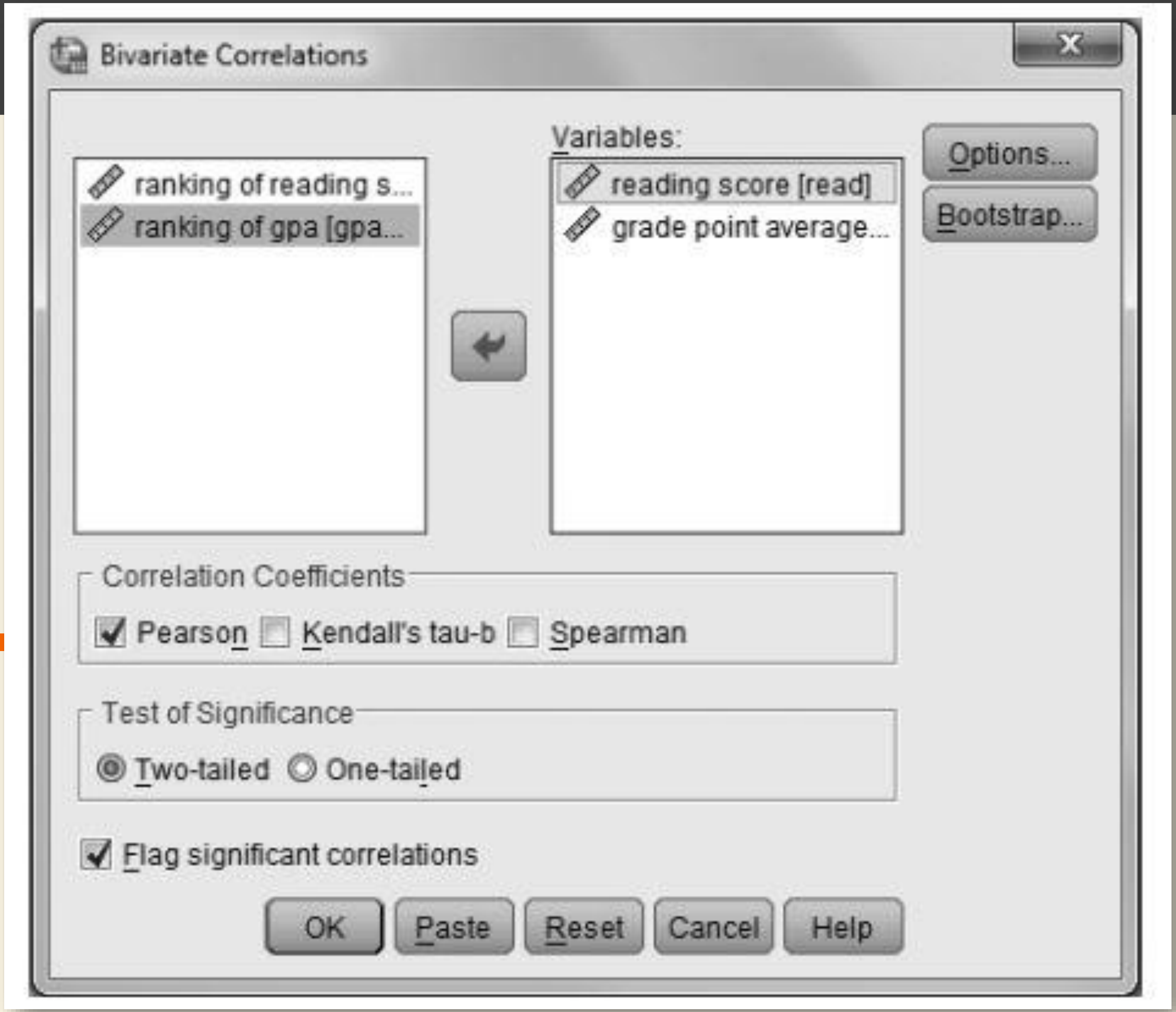
As can be seen from Figure 10.1, there is a linear relationship between the variables of reading score and grade point average, such that as reading score increases, so does grade point average.

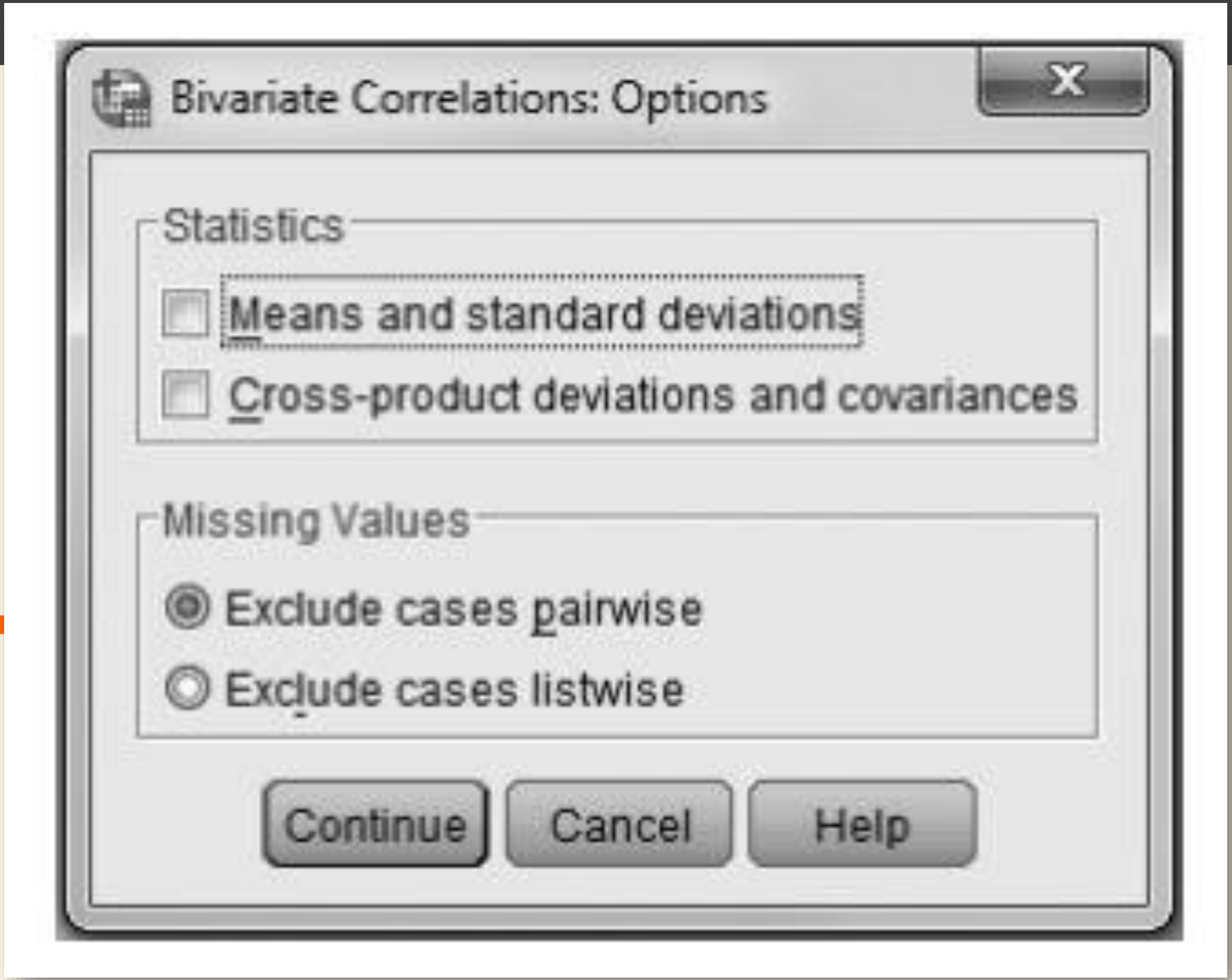
The fgure also shows that the homoscedasticity assumption is met, because the variability of the READ score remains relatively constant from one GPA score to the next. Heteroscedasticity is usually shown by a cluster of points that is wider as the values for the Y variable (READ) get larger.

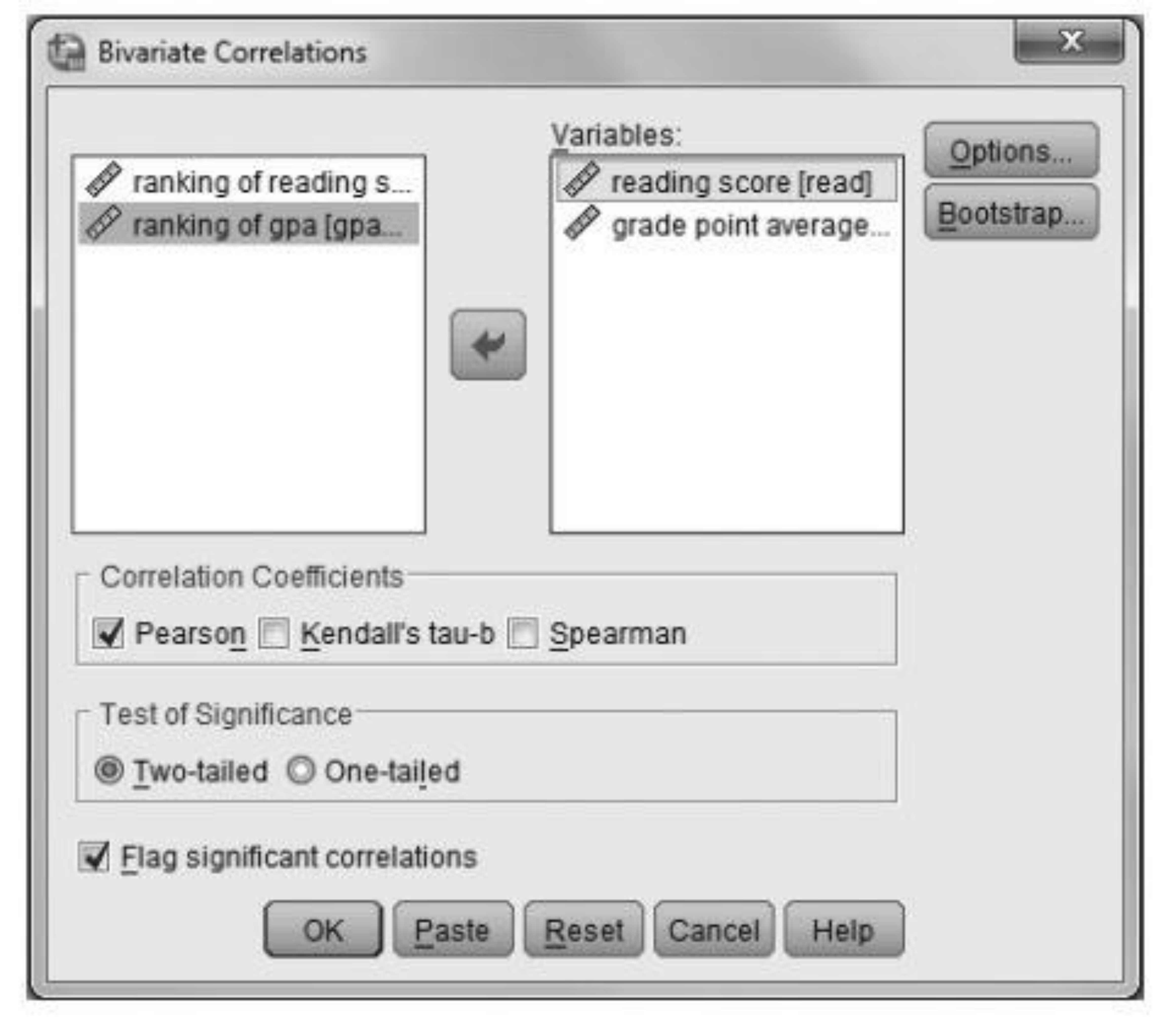
Windows Method: Pearson Product Moment Correlation



From the menu bar, click **Analyze**, then **Correlate,** and then **Bivariate….**The following **Bivariate Correlations** window will open.


Bivariate Correlations
ranking of reading s...
ranking of gpa [gpa...
Variables:
reading score [read]
grade point average...
Options...
Bootstrap...
Correlation Coefficients
Pearson
Kendall's tau-b
Spearman
Test of Significance
Two-tailed
One-tailed
Flag significant correlations
OK
Paste
Reset
Cancel
Help


Bivariate Correlations: Options
Statistics
Means and standard deviations
Cross-product deviations and covariances
Missing Values
Exclude cases pairwise
Exclude cases listwise
Continue
Cancel
Help


Bivariate Correlations
ranking of reading s...
ranking of gpa [gpa...
Variables:
reading score [read]
grade point average...
Options...
Bootstrap...
Correlation Coefficients
Pearson
Kendall's tau-b
Spearman
Test of Significance
Two-tailed
One-tailed
Flag significant correlations
OK
Paste
Reset
Cancel
Help

SPSS Output

Pearson Product Moment Correlation

Correlations

		Reading Score	Grade Point Average
reading score	Pearson Correlation	1	.867**
	Sig. (2-tailed)		.000
	N	15	15
grade point average	Pearson Correlation	.867**	1
	Sig. (2-tailed)	.000	
	N	15	15

** Correlation is significant at the 0.01 level (2-tailed).

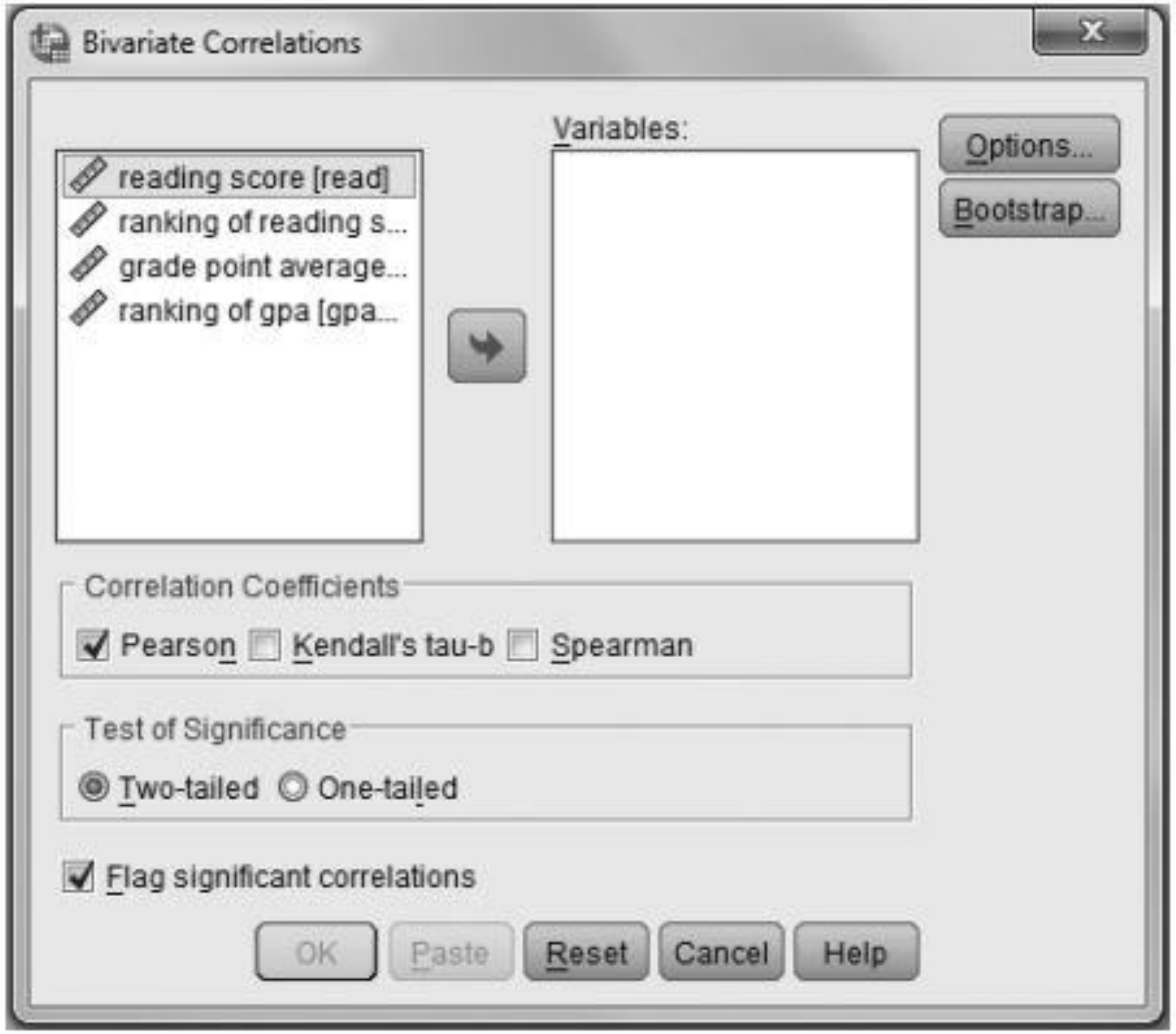
Results and Interpretation

The correlation between reading scores and grade point average is positive and statistically significant ($r = 0.867$, $p < .001$). This means that as the students' reading scores increase, so do their grade point averages. Please note that this interpretation in no way implies *causality*—that increases in reading scores caused increases in GPA scores. The significant relationship merely indicates that the two variables *covary*.

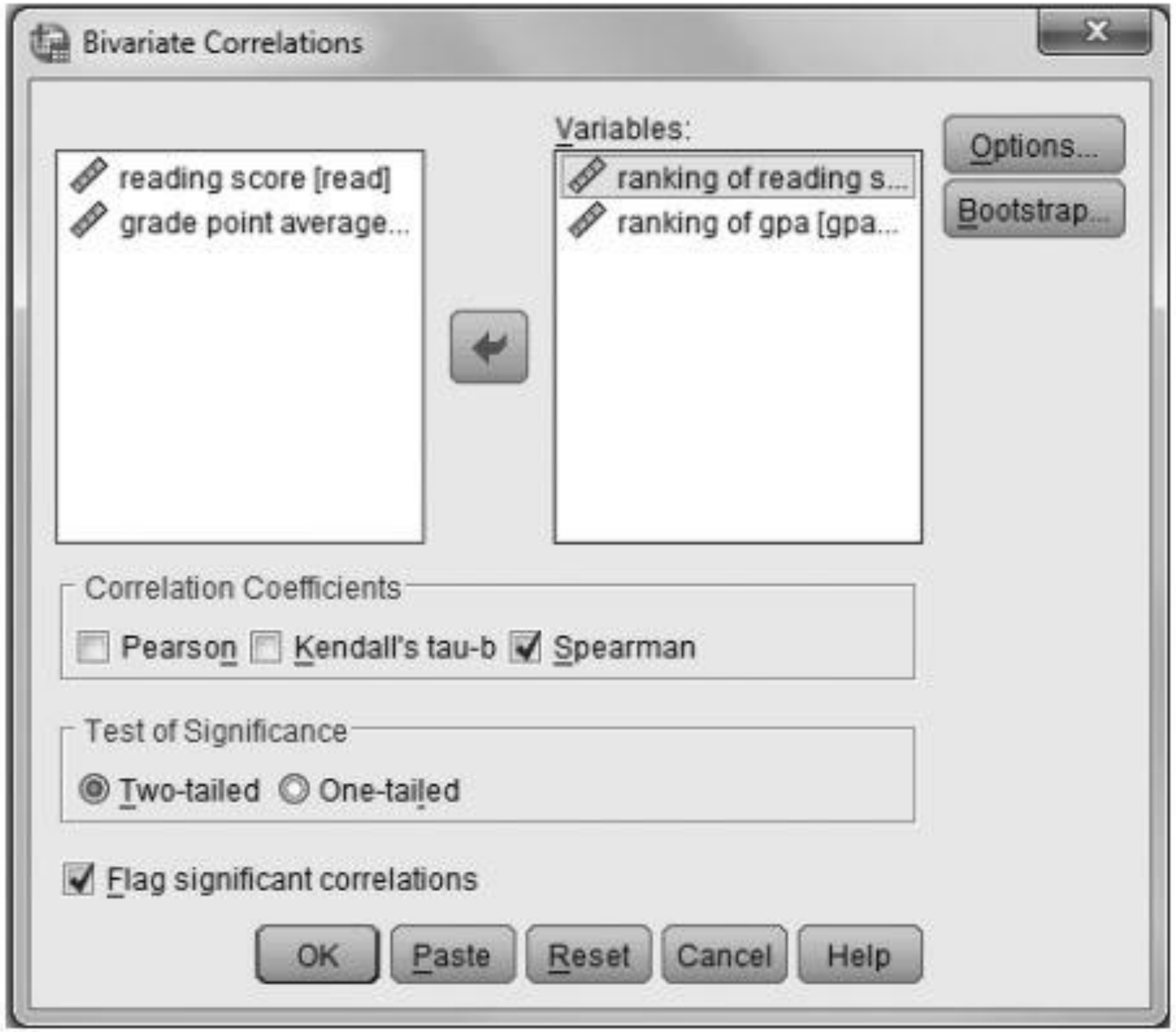
Example 2: Spearman Rank Order Correlation Coefficient

For this example, the same data set will be used. However, the rank order of the two variables (READ_RANK, GPA_RANK) will be used instead of their actual values as recorded. Thus, the computation for this coeffcient is not sensitive to asymmetrical distributions or to the presence of outliers.

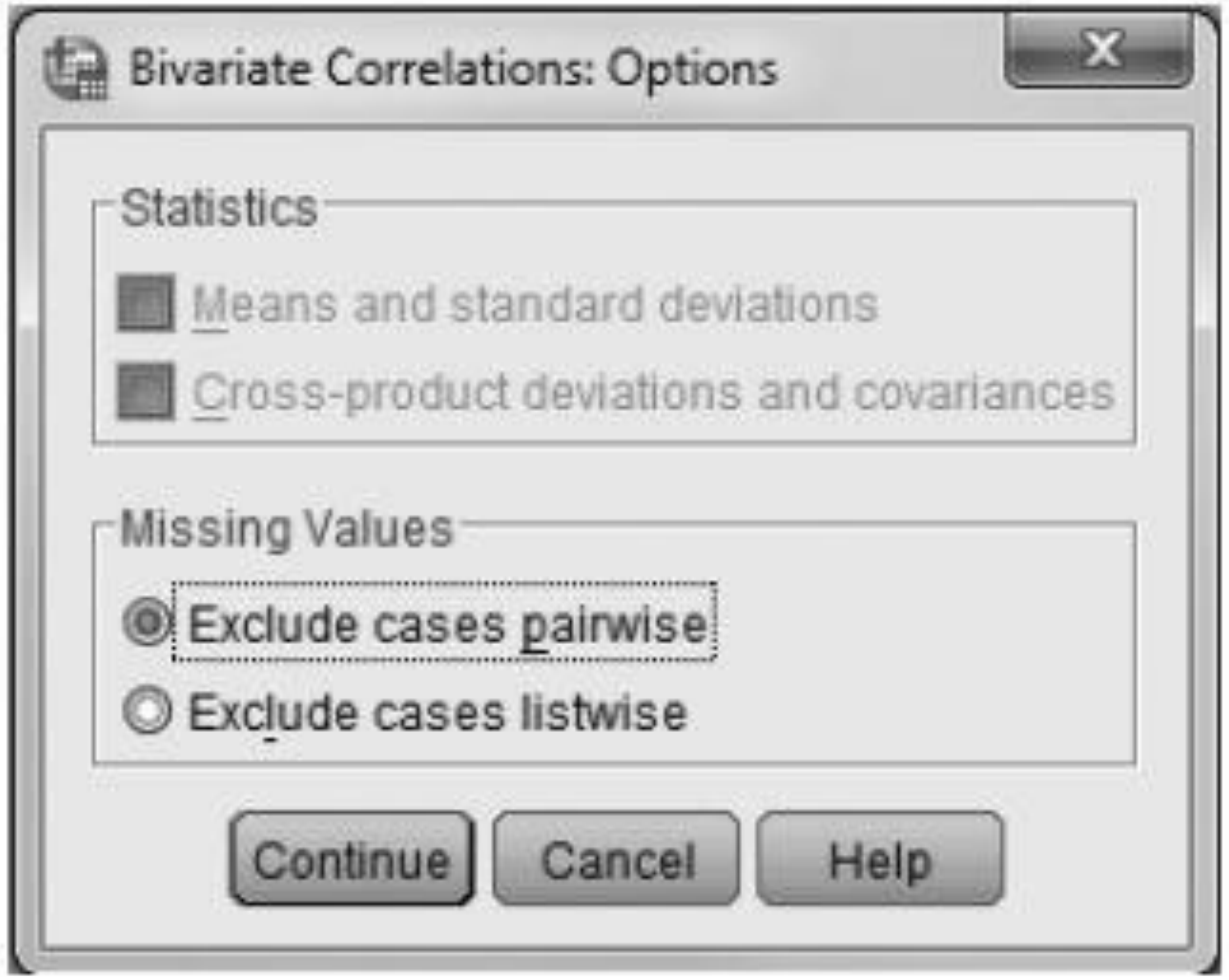
1. From the menu bar, click **Analyze**, then **Correlate,** and then **Bivariate….** The following **Bivariate Correlations** window will open.



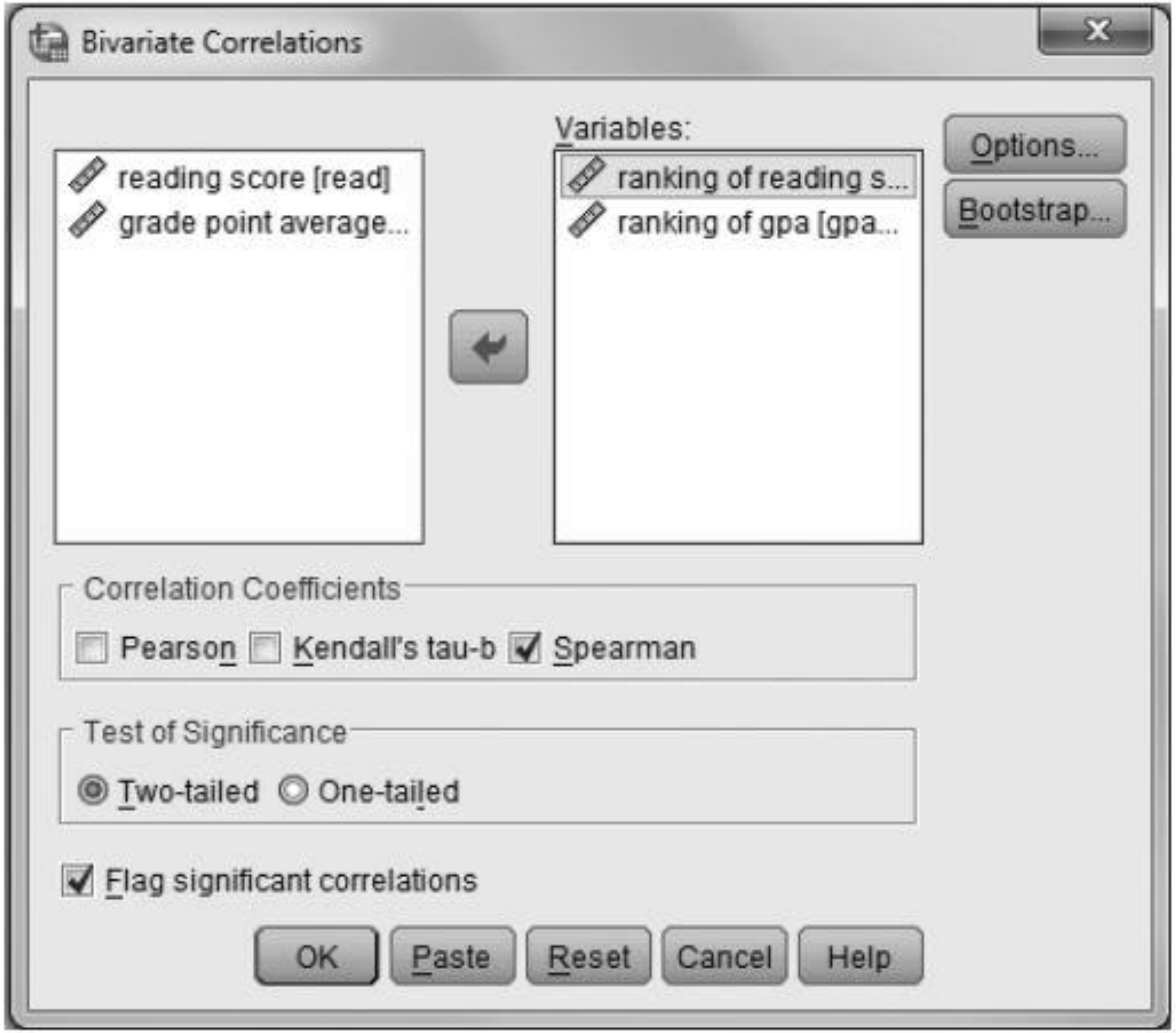
2. Transfer the **READ_RANK** and **GPA_RANK** variables to the **Variables:** field by clicking (highlight) them and then clicking . By default, SPSS will employ the **Pearson correlation analysis** (this field is checked). Uncheck the **Pearson** field and check the **Spearman** field.



3. Click Options... to open the **Bivariate Correlation: Options** window. Ensure that the **Exclude cases pairwise** field is checked.



4. Click Continue to return to the **Bivariate Correlations** window.



SPSS Output

Spearman Rank Order Correlation

Correlations

			Ranking of Reading Scores	Ranking of gpa
Spearman's rho	ranking of reading scores	Correlation Coefficient	1.000	.826**
		Sig. (2-tailed)	.	.000
		N	15	15
	ranking of gpa	Correlation Coefficient	.826**	1.000
		Sig. (2-tailed)	.000	.
		N	15	15

** Correlation is significant at the 0.01 level (2-tailed).

Results and Interpretation

The obtained Spearman rank-order coeffcient (rho = 0.826, $p < .001$) is highly similar in magnitude and direction to that in the Pearson correlation table . Thus, similar to the Pearson coeffcient, the Spearman coefficient indicates that as the students' ranked reading scores increase, so do their ranked grade point average scores.

Thank You!

Any Questions?