

# LET – Maths, Stats & Numeracy

## Correlation

**Definition 0.1.** Correlation analysis measures how closely related two variables are.

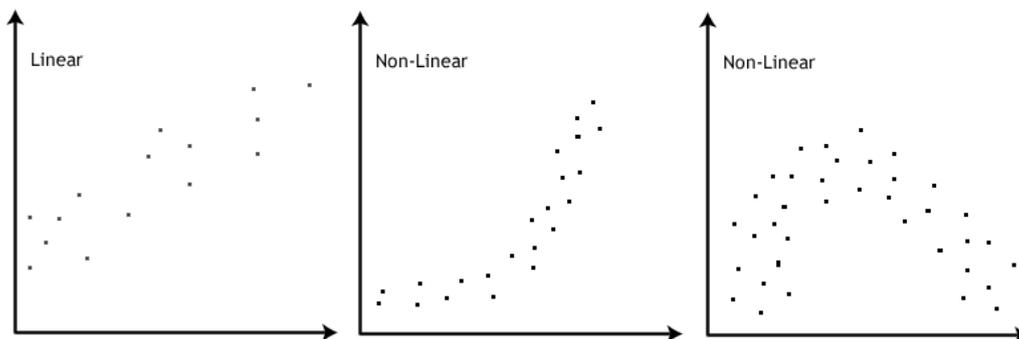
- A positive correlation indicates that both variables tend to increase or decrease together.
- A negative correlation indicates that as one variable increases the other tends to decrease.
- It is important not to confuse correlation with causation!

The strength of a correlations is measured between 0 and 1.

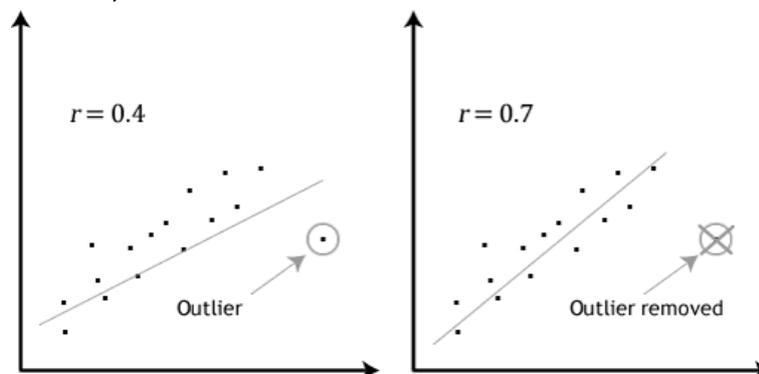
- 0.00 – 0.19 is a very weak correlation/no correlation.
- 0.2 – 0.39 a weak correlation.
- 0.4 – 0.59 is a moderate correlation.
- 0.6 – 0.79 is a strong correlation.
- 0.8 – 1 is a very strong correlation.

There are two main measurements of correlation analysis, Pearson's  $r$  and Spearman's  $\rho$ .

Pearson's  $r$  is a **parametric** measurement of correlation. This means, it assumes your data is approximately normally distributed. Both your variables of interest need to be scale data. There should be a linear relationship between your variables.



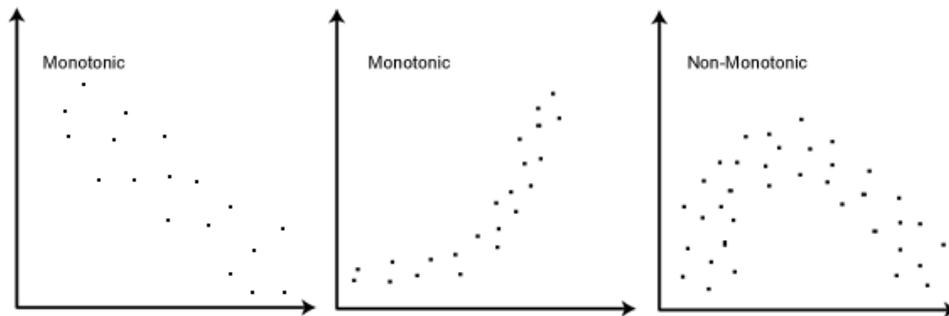
There should be no significant outliers (NB: you will have to **prove** a particular point is an outlier before you can remove it).



Follow these Steps to perform a Pearson's  $r$  correlation in SPSS:

- (1) Again click on "Analyze", then go to "Correlate" and click on "Bivariate".
- (2) Enter the variables whose relationship you want to measure into the "Variables" box.
- (3) Then click "OK".

Spearman's  $\rho$  is a **non-parametric** measurement of correlation. This means, it makes no assumptions on the distribution. Your data should be ordinal or scale in SPSS. There is a monotonic relationship between your variables.



To perform a Spearman's  $\rho$  correlation in SPSS you need to follow these steps:

- (1) Again click on "Analyze", then go to "Correlate" and click on "Bivariate".
- (2) Enter the variables whose relationship you want to measure into the "Variables" box.
- (3) Under "Correlation Coefficients" un-tick "Pearson" and tick "Spearman".
- (4) Then click "OK".

Interpret the result using the scale above. SPSS also generates a significance value (Sig). The significance (or p-value) of your correlation is the probability of getting the results you got if the two variables were unrelated. In general you want this number to be small, usually less than 0.05 or 0.01.

Images obtained from: <https://statistics.laerd.com/spss-tutorials/spearmans-rank-order-correlation-using-spss-statistics.php>