Correlations

Lesson 2.1.6 | AS research methodology

Core ideas

A correlation shows whether two measured variables are related.

A positive correlation means both variables tend to increase together.

A negative correlation means one variable tends to increase as the other decreases.

A correlation coefficient shows the direction and strength of the relationship, from -1 to +1.

Scattergraphs help students see patterns, outliers and whether the relationship is strong or weak.

Correlation does not prove causation because a third variable or reverse direction could explain the relationship.

Correlations

Lesson 2.1.6 | AS research methodology

Key terms

Correlation: A relationship between two measured variables.

Positive correlation: A relationship where both variables tend to increase together.

Negative correlation: A relationship where one variable increases as the other decreases.

No correlation: No clear relationship between the two variables.

Scattergraph: A graph showing paired scores for two variables.

Correlation coefficient: A number from -1 to +1 showing direction and strength.

Third variable: Another factor that may explain a relationship between two variables.

Causation: One factor directly producing a change in another.

Further detail and evidence

Co-variables are the two measured variables in a correlation. Operationalise each precisely, such as minutes of sleep recorded in a diary and number of words correctly recalled; neither variable is manipulated in a correlational study.

The correlation coefficient describes linear association: its sign gives direction and its absolute size gives strength. A coefficient near zero means little linear association, not proof that no possible relationship exists. Inspect a scatter graph for unusual points or non-linear patterns.

Correlations

Lesson 2.1.6 | AS research methodology

Applying the ideas

Longer REM periods accompanied longer dream reports in Dement and Kleitman. Both REM minutes and report word count were measured. Talkativeness or forgetting can influence report length. Do not relabel the measured co-variables as manipulated IV and DV.

Worked example: Interpret a correlation coefficient of +0.72 between revision time and test score. A coefficient of +0.72 suggests a fairly strong positive correlation. Students who revise for longer tend to have higher test scores, because the plus sign shows the variables move in the same direction. However, this does not prove revision caused the higher scores because other factors, such as prior knowledge or motivation, could also affect performance.

Worked example: Assess one limitation of using a correlation to study stress and sleep. A limitation is that a correlation may show that higher stress is connected with less sleep, but it cannot prove which variable caused the other. Stress might reduce sleep, poor sleep might increase stress, or a third variable such as workload could affect both. This makes correlations useful for spotting relationships but limited for explaining cause and effect.

Evaluation and connections

Correlations permit prediction and study variables that cannot ethically be manipulated. They do not establish direction of cause or eliminate third variables. A positive correlation is not automatically desirable, and a negative one is not automatically harmful. Keep the operational definitions attached to the relationship.