Correlational research is used to describe the relationship between two or more naturally occurring variables.
- Is age related to political conservatism?
- Are highly extraverted people less afraid of rejection than less extraverted people?
- Is depression correlated with hypochondriasis?
- Is I.Q. related to reaction time?

Correlational Research

Some factors are impossible to manipulate experimentally
- Personality
- Demographic categories

Most variables that cannot be studied experimentally can be studied correlationally
- Variables are measured
- Relationship among variables is assessed

It is unethical to manipulate some variables
- Severe illness
- Brain injury

Why Use a Correlational Design?

A Note on Terminology

In correlational research
- the terms predictor variable and criterion/outcome variable are used to describe the variables
  - The terms IV and DV may be used but do not have the same meaning as when used in true experiments
    - In correlational research, independent variable is not manipulated
    - There is no presumption that dependent variable “depends on” the independent variable, only that a relationship exists
      - No attempt to explain relationship
      - No attempt to control variables
  - Therefore, one cannot draw causal conclusions from correlational research
Correlational Studies

- Simply measures 2 variables [usually two scores (X and Y) from same individual] or scores on 1 variable between 2 related individuals
- Degree and nature of relationship
  - descriptive or predictive
- Correlation coefficients
  - Expresses degree of linear relatedness between two variables
  - Varies between -1.00 and +1.00
  - Strength of relationship is indicated by absolute value of coefficient
  - Stronger as shared variance increases

TWO TYPES OF CORRELATION

<table>
<thead>
<tr>
<th>If X...</th>
<th>And Y...</th>
<th>The correlation is</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increases in value</td>
<td>Increases in value</td>
<td>Positive or direct</td>
<td>The taller one gets (X), the more one weighs (Y).</td>
</tr>
<tr>
<td>Decreases in value</td>
<td>Decreases in value</td>
<td>Positive or direct</td>
<td>The fewer mistakes one makes (X), the fewer hours of remedial work (Y) one participates in.</td>
</tr>
<tr>
<td>Increases in value</td>
<td>Decreases in value</td>
<td>Negative or inverse</td>
<td>The better one behaves (X), the fewer in-class suspensions (Y) one has.</td>
</tr>
<tr>
<td>Decreases in value</td>
<td>Increases in value</td>
<td>Negative or inverse</td>
<td>The less time one spends studying (X), the more errors one makes on the test (Y).</td>
</tr>
</tbody>
</table>

Direction and Strength of Relationship: Correlation Scatterplot

Strong Positive Relationship

Correlation Scatterplot

Relationship?
Correlation Scatterplot

Y

X

Strong Negative Relationship

Correlation Scatterplot

Y

X

No Relationship

Form of the Relationship

- Linear
  - Data points cluster around a straight line
  - Measured with Pearson r

Form of the Relationship

- Monotonic
  - Relationship is one-directional
  - i.e. consistently positive or negative
  - Amount of increase not necessarily constant
  - Measured with Spearman r
**Other Indices of Correlation**

- **Spearman rank-order correlation** – used when variables are measured on an ordinal scale (the numbers reflect the rank ordering of participants on some attribute)
- **Phi coefficient** – used when both variables are dichotomous
- **Point-biserial correlation** – used when only one of the variables is dichotomous

**Applications**

- Prediction
  - Warning signs of suicide
  - Relapse to drug taking
  - IQ and intelligence of parents
  - Longevity
- Predictor variable (known)
- Criterion variable (unknown)

**Reliability**

- Consistency/stability of measurements
- Test – retest reliability = relationship between original and follow-up measurements

**Validity**

- Does measurement procedure measure what it claims to?
- Are test scores strongly related to scores from established test measuring same construct?

*... Was we have the intelligence, if we had any, please run.*
Evaluating Theories

- Nature/nurture and intelligence
- Twin studies

Guessing Correlations

<table>
<thead>
<tr>
<th>Plot A</th>
<th>Plot B</th>
<th>Plot C</th>
<th>Plot D</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Plot A" /></td>
<td><img src="image2.png" alt="Plot B" /></td>
<td><img src="image3.png" alt="Plot C" /></td>
<td><img src="image4.png" alt="Plot D" /></td>
</tr>
</tbody>
</table>

Strengths of Correlational Strategy

- Simply record what exists naturally
- Id relationships indicating further investigation
- Allows researchers to investigate variables couldn’t manipulate ethically
- High external validity
Weaknesses of Correlational Strategy

- Low internal validity
- Third Variable Problem
- Directionality Problem

> 2 Variables

- Multiple Regression
  - Set of predictor variables to predict one criterion variable
    1. To derive an equation that predicts scores on some criterion variable from a set of predictor variables
    2. To explain variation in a DV in terms of its degree of association with members of a set of IVs
      - E.g. various facets of narcissism to predict performance on ToM
      - E.g. religious, political affiliation on IQ

Cautionary Note

- Predictor variables ONLY predict, do NOT explain relationships!
- Descriptive only!

CORRELATION DOES NOT INFER CAUSATION