PSY 250

Correlational Studies
Chapter 12

Correlational Research

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

Why Use a Correlational Design?

- 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

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

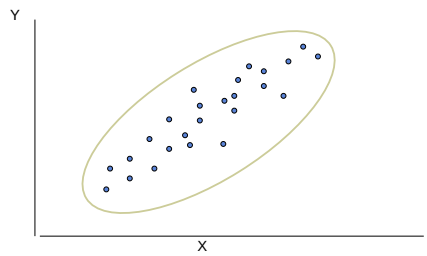
Correlational Studies

- 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

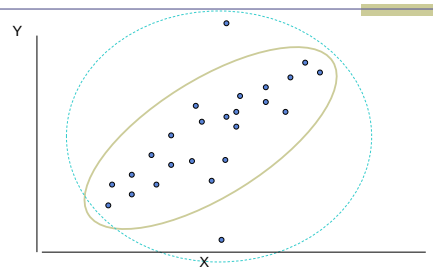
If X…	And Y…	The correlation is	Example
Increases in value	Increases in value	Positive or direct	The taller one gets (X), the more one weighs (Y).
Decreases in value	Decreases in value	Positive or direct	The fewer mistakes one makes (X), the fewer hours of remedial work (Y) one participates in.
Increases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

Direction and Strength of Relationship: Correlation Scatterplot



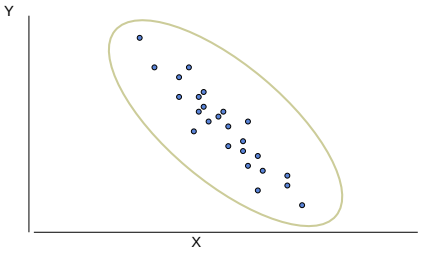
Strong Positive Relationship

Correlation Scatterplot



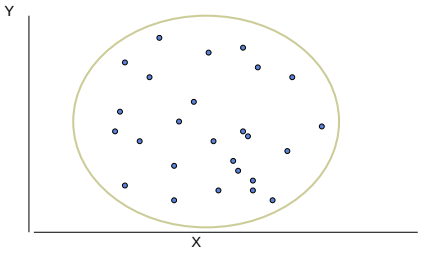
Relationship ?

Correlation Scatterplot



Strong Negative Relationship

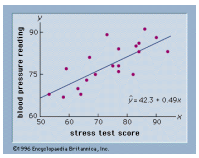
Correlation Scatterplot

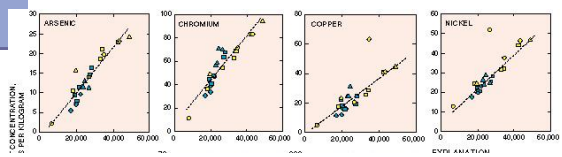


No Relationship

Form of the Relationship

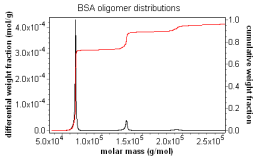
- Linear
  - Data points cluster around a straight line
  - Measured with Pearson r

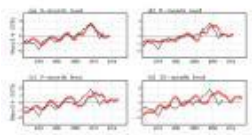




Form of the Relationship

- 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

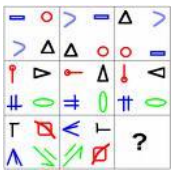
- **Spearman rank-order correlation** –used when variables are measured on an ordinal scale (the numbers reflect the rank ordering of participants on some attribute)
- **Phi coefficient** – used when both variables are dichotomous
- **Point-biserial correlation** – used when only one of the variables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

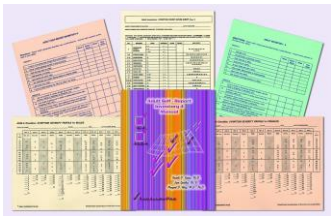
Applications

- 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





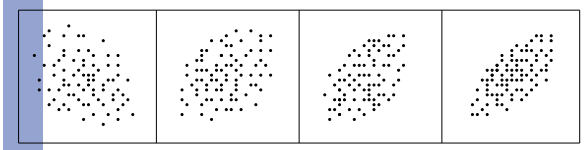
Validity

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

Evaluating Theories

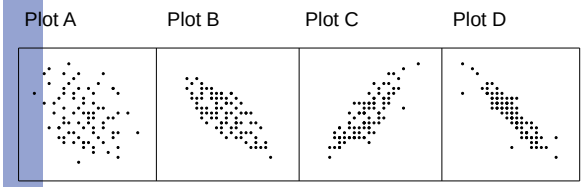
- Nature/nurture and intelligence
  - Twin studies

Guessing Correlations



r = -.23	[x] A	[ ] B	[ ] C	[ ] D
r = .33	[ ] A	[x] B	[ ] C	[ ] D
r = .40	[ ] A	[ ] B	[x] C	[ ] D
r = .61	[ ] A	[ ] B	[ ] C	[x] D

Guessing Correlations



r = -.85	[ ] A	[x] B	[ ] C	[ ] D
r = -.75	[ ] A	[ ] B	[ ] C	[x] D
r = -.29	[x] A	[ ] B	[ ] C	[ ] D
r = .75	[ ] A	[ ] B	[x] C	[ ] D

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

> 2 Variables

- Can look at relationship between two variables while controlling the influence of other potentially confounding variables
- Can enter predictor variables one at a time into regression to see how each adds to the prediction after others have already been considered

Cautionary Note

- Predictor variables ONLY predict, do NOT explain relationships!
- Descriptive only!
- CORRELATION DOES NOT INFER CAUSATION