Research methods 08

Correlational Research

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Correlational research

Main characteristics

- **Studying the world as it is without trying to alter it**
  - Nature has done the experiment, the researcher tries to figure out the consequences
- **IV is measured not manipulated**
  - Variable of interest cannot be manipulated
  - It is unethical to manipulate the variable
  - It is not practical to manipulate the variable
- **Can measure covariation between IV and DV**

Correlational research

A comparison of designs…

- **Lab experiments**
  - Random Assignment
  - Manipulation of IV
- **Quasi-experiments**
  - No random assignment
  - Manipulation of IV
- **Correlational research**
  - No random assignment
  - No manipulation of IV

Correlational research: **Pros**

+ Why correlational research?

- Generalizability
- Realism/impact of variables is high
- Interest in individual differences (see Cronbach)
- Study of many variables at the same time
- Permits more variation in variables of interest
- Practicality

Correlational research: **Cons**

Disadvantages

- **Lack of control over IV**
- Correlational design a la Campbell & Stanley
  - X1 O1
  - X2 O2
  - X3 O3
  - Xn On

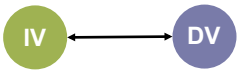
Correlational research as an extension of the case study

- All threats to internal validity are present
- **Correlation does not indicate causation, but causation does imply correlation**

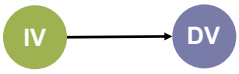
Establishing **causality**

Three criteria for establishing causality:

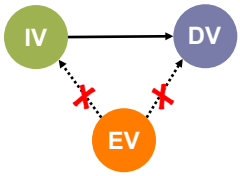
- Association



- Time Priority

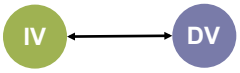


- Non-spurious Relationships



Establishing causality: **association**

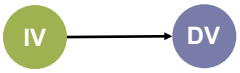
What is a correlation?



- Measure of linear relationship between 2 variables.
- **Positive correlation**:
  - The higher A, the higher B and the lower A, the lower B.
- **Negative correlation**:
  - The higher A, the lower B and the lower A, the higher B.
- The wider the range of variation on both variables, the higher the potential correlation.
- **Can establish association in a correlation study**

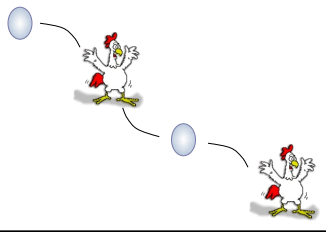
Establishing causality: **time priority**

What comes first?



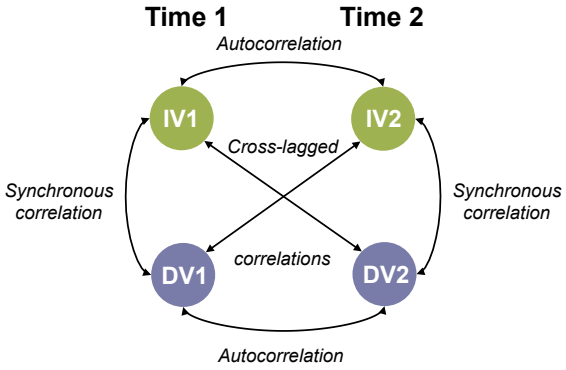
The IV precedes the DV

- Time priority cannot be established if IV and DV are measured simultaneously (e.g., in one survey).
- Sometimes time priority is build into the variable.
- Longitudinal study
  - IV is measured before DV
  - Problem?



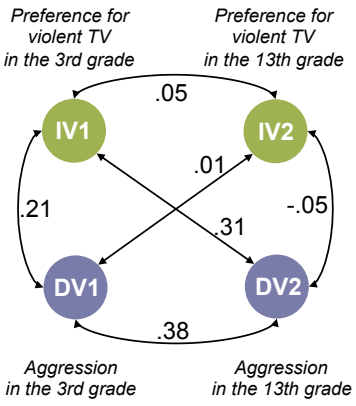
Establishing causality: **time priority**

Cross-lagged Panel Correlation (CLPC)



Establishing causality: **time priority**

Cross-lagged Panel Correlation (CLPC)



Example from Eron, L.D., et al. (1972)

Autocorrelations

IV1 IV2 DV1 DV2

- indicate how stable variables are over time
- indicate retest-reliability for stable variables

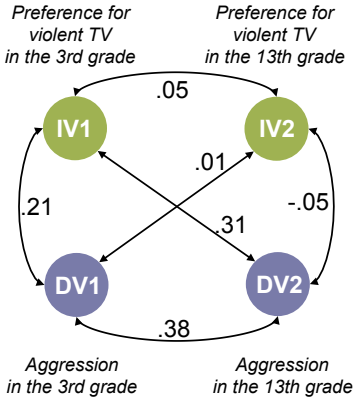
Synchronous correlations

IV1 DV1 IV2 DV2

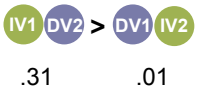
- If both synchronous correlations are equal, the relationship holds over time

Establishing causality: **time priority**

Cross-lagged Panel Correlation (CLPC)



Cross-lag correlations



- It is more likely that the preference for violent TV influences aggression than aggression influences the preference for violent TV.

Establishing causality: **time priority**

Cross-lagged Panel Correlation (CLPC)

- Limitations
  - Cross-lagged correlations are dependent on:
    - Time lapse between time1 and time2
    - The synchronous and autocorrelations
    - Spurious variables that influence both IV and DV
  - CLPC cannot solve time priority problem

Establishing causality:

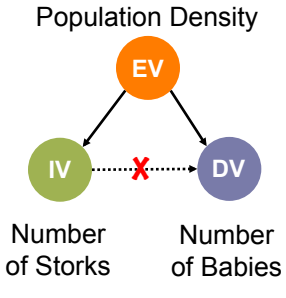
non-spurious relationships

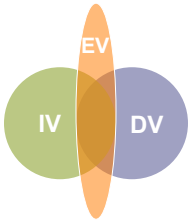
- A **spurious relationship** occurs when two variables are correlated, but not because of a direct connection
  - Correlation could be due to coincidence
    - http://tylervigen.com/
  - Correlation could be due to an unseen third variable

Establishing causality:

non-spurious relationships

- **Spurious relationship:** A third variable causes the relationship between IV and DV. The correlation between IV and DV is entirely determined by the third variable.

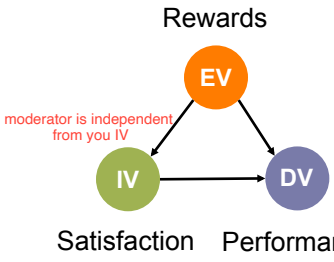


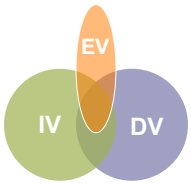


- IV and DV share no variance after removing the covariance of a third variable.
- Partial correlation = 0.

Establishing causality:
non-spurious relationships

- **Partial Explanation/Isolation:** The third variable influences the relationship between IV and DV. But it does not entirely determine the relationship.





- IV and DV still share variance after removing the covariance of the third variable.
- Partial correlation is smaller than the original correlation but it is different from 0.

Establishing causality:
non-spurious relationships

- **Partial correlation and multiple regression**
  - Allow for controlling significant but uninteresting variables (control variables).
  - Strengthen the correlational design by ruling out significant but uninteresting variables.
  - Do not establish causation because not all confounding variables can be controlled for.

Example of correlational research: **Ostroff et al. (2003)**

- Survey Data from 4,480 managers across 654 different organizations. In addition, 13,706 subordinates, 13,752 peers, and 3,994 supervisors provided gender and age data.
- IV1: Gender composition of supervised team
- IV2: Age composition of supervised team
- DV: Compensation of manager
- Results:
  - **The more female employees a manager supervises, the less the manager earns.**
  - **A manager who supervises older employees earns less than a manager who supervises younger employees.**
- Alternative explanations?

Example of correlational research: **Ostroff et al. (2003)**

- Control variables:
  - 1. Year in which the data for the manager were collected ranging from 1991 to 2000
  - 2. Performance of the manager
  - 3. Gender of the manager
  - 4. Years of managerial experience
  - 5. Highest educational level
  - 6. Age of manager
  - 7. Race of manager
  - 8. Organizational level
  - 9. Job category
  - 10. Years in current job position
  - 11. Number of employees supervised
  - 12. Functional area in which the manager works
  - 13. Industry

Establishing causality:
non-spurious relationships

- Rule out alternative explanations by predicting ***significant and non-significant*** relationships
- Measure other IVs that may also influence your DV and show that they don't
  - Example: Job satisfaction (IV) predicts organizational citizenship behaviors (DV), but… affective disposition does not (alternative IV)
- Measure other DVs that may be influenced by your IV and show that they are not
  - Example: Job satisfaction (IV) predicts organizational citizenship behaviors (DV), but… doesn't predict performance (alternative DV)

Cronbach (1957):
The two scientific disciplines of psychology

- **Experimental Psychology**
  - Interested only in variation the experimenter creates
  - Individual differences across subjects are considered random error
- **Correlational Psychology**
  - Interested only in existing variation
  - Different conditions or treatments which subjects are exposed to are considered random error
- Experiments focus on situational variables while correlational studies focus on individual differences.
- Advantage of uniting both disciplines: examination of person x situation interactions