Internal and External Validity

ScWk 240

Week 5 Slides (2\textsuperscript{nd} Set)
Defining Characteristics

- When research is designed to investigate cause and effect relationships (explanatory research) through the direct manipulation of an independent variable and control of extraneous variables. Review of Terms:

  - **Independent variable** – the variable being manipulated
  - **Dependent variable** – the variable in which the effect of the manipulation of the independent variable is observed
  - **Researcher manipulation and control** – choice of treatments, choice of a research design, use of specific procedures, etc.
Selecting Your Research Question(s)

Consider using the FINER Framework

Is Your Research Question:

- Feasible
- Interesting
- Novel
- Ethical
- Relevant
Manipulation in Research

Manipulation

- The researcher’s decisions related to what constitutes the independent variable
- Active and assigned variables
  - Active variables are those the researcher actively manipulates
    - Choice of an instructional strategy
    - A particular intervention approach
  - Assigned variables are those that cannot be manipulated by the researcher but are of interest:
    - Gender
    - Race
Control in Research

Control

- The researcher’s efforts to remove the influence of any *extraneous* variables that might have an effect on the dependent variable
- The goal is to be assured the only differences between groups is that related to the independent variable
  - Participant variables – characteristics of the subjects
    - Pre-existing functioning levels
    - Differences in attitudes
  - Environmental variables – characteristics of the context
    - Intervention materials
    - Differences in the time available for treatment between groups
Reliability

- Implies that the same data would have been collected each time over repeated tests/observations.

- Would a particular technique (or survey question) yield the same result each time?
  - “Did you go to your support group last week?” vs. “How many times have you been to these support groups in your life?”

- Reliability does **not** ensure accuracy.
  - Taken from Babbie, E.
External and Internal Validity

- **Internal Validity** – the degree to which the results are attributable to the independent variable and not some other rival explanation

- **External Validity** – the extent to which the results of a study can be generalized
Threats to Internal and External Validity – Questions:

- Are the investigator’s conclusions correct?
- Are the changes in the independent variable indeed responsible for the observed variation in the dependent variable?
- Might the variation in the dependent variable be attributable to other causes?
Causal Inference

Three conditions of causality:

1. Cause precedes the effect
2. Cause and effect must correlate
3. No third variable involved
Correlations

Relationships between variables can be either:

- Strong or weak
- Positive or negative

Strongest (perfect) positive correlation is +1
Strongest (perfect) negative correlation is -1

No correlation (unrelated variables) is 0

A weak positive relationship is 0.2
A weak negative relationship is -0.2
Internal Validity

- Confidence that changes in Dependent (DV) Variable are actually caused by the Independent Variable (IV)

- Validity (in measurement)
Why is Internal Validity Important?

- We often conduct research in order to determine cause-and-effect relationships.

- Can we conclude that changes in the independent variable caused the observed changes in the dependent variable?

- Is the evidence for such a conclusion good or poor?

- If a study shows a high degree of internal validity then we can conclude we have strong evidence of causality.

- If a study has low internal validity, then we must conclude we have little or no evidence of causality.
Internal Validity (Cont.)

Eight **Threats** to Internal Validity:

- Factors other than IV affects DV:
  1. History
  2. Maturation (passage of time)
  3. Testing
  4. Instrumentation
Internal Validity (Cont.)

Eight Threats to Internal Validity (Cont.):

5. Statistical regression
6. Research reactivity
7. Selection biases
8. Attrition (experimental mortality)
External Validity

- Generalizability
- Representativeness of sample, setting and procedures
- Sampling and survey research
Threats to External Validity

- Pre-test treatment interaction
- Multiple treatment interference
- Selection treatment interaction
- Specificity of variables
  - Participants
  - Operational definition of the treatment
  - Operational definition of the dependent variable
  - Specific times
  - Specific circumstances
- Treatment diffusion and inconsistencies