The Question of Attribution: Using Quasi-Experimental Designs to Demonstrate Impact
Agenda

✘ Causal Inference & Validity
✘ Threats to Internal Validity
✘ Quasi-Experimental Designs
  X Pretest-Posttest
  X Interrupted Time-Series
  X Regression Discontinuity
Learning Outcomes

Participants will be able to:

✘ Describe why internal validity is important
✘ Identify threats to internal validity
✘ Recognize several study designs and some of the ways they address threats to internal validity
Attribution

Making claims about causation
When we say something is valid, we make a judgment about the extent to which relevant evidence supports that inference as being true or correct.

Shadish, Cook, & Campbell
Validity Typology

× Statistical Conclusion Validity
× Construct Validity
× External Validity
× Internal Validity
Threats to Validity

Specific reasons why we can be partly or completely wrong when we make an inference
<table>
<thead>
<tr>
<th>Threats to Internal Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Selection</strong></td>
</tr>
<tr>
<td>Systemic differences in respondent characteristics that could also cause the effect.</td>
</tr>
<tr>
<td><strong>History</strong></td>
</tr>
<tr>
<td>Events occurring concurrently with treatment could cause the observed effect.</td>
</tr>
<tr>
<td><strong>Maturation</strong></td>
</tr>
<tr>
<td>Naturally occurring changes over time could be confused with a treatment effect.</td>
</tr>
<tr>
<td><strong>Regression</strong></td>
</tr>
<tr>
<td>When units are selected for their extreme scores, they will often have less extreme scores when measured again; can be confused with a treatment effect.</td>
</tr>
<tr>
<td><strong>Attrition</strong></td>
</tr>
<tr>
<td>Loss of respondents to treatment can produce artificial effects if that loss is systematically correlated with other confounding factors.</td>
</tr>
<tr>
<td><strong>Testing</strong></td>
</tr>
<tr>
<td>Exposure to a test can affect scores on subsequent exposures to that test, and can be confused with a treatment effect.</td>
</tr>
</tbody>
</table>
Quasi-Experimental Designs

Identifying and reducing plausibility of alternative causal explanations
Types of Quasi-experimental Designs

- Pretest-Posttest Designs
- Interrupted Time Series Designs
- Regression Discontinuity Designs
Pretest – Posttest Designs
Without and with control groups
One-Group Pretest-Posttest Design

Observation_1 \quad \text{Treatment} \quad \text{Observation}_2
One-Group Pretest–Posttest Design Using a Double Pretest

\[ \text{Observation}_1 \quad \rightarrow \quad \text{Observation}_2 \quad \rightarrow \quad \text{Treatment} \quad \rightarrow \quad \text{Observation}_3 \]
One-Group Pretest–Posttest Design Using a Nonequivalent Dependent Variable

Observation$_{1A}$
Observation$_{1B}$

Treatment

Observation$_{2A}$
Observation$_{2B}$
Repeated Treatment Design

Observation_1
Treatment
Observation_2
Treatment
Observation_3
Treatment
Observation_4
Untreated Control Group Design with Dependent Pretest and Posttest Samples
Untreated Control Group Design with Double Pretest Design

Observation₁ → Observation₂ → Treatment → Observation₃

Observation₁ → Observation₂ → Observation₃
Untreated Control Group Design with Switching Replications
Interrupted Time-Series Design

Change in Intercept

Change in Slope
Interrupted Time-Series Designs

Obs1  Obs2  Obs3  Obs4  Obs5  Obs6

Obs7  Obs8  Obs9  Obs10  Obs11  Obs12

Treatment
Interrupted Time Series Designs with No-Treatment Control Group
Interrupted Time - Series Designs

Removing Treatment

Adding Multiple Replications
Interrupted Time-Series Designs with Switching Replications
Regression Discontinuity Designs
Regression Discontinuity with Treatment Effect
THANKS!

Any questions?