

## Introduction Group Research Design: Causality and Internal Validity

### I. But first: Recruitment and Retention Procedures—Vulnerable Populations, and Ethnic Minority Populations

#### Student Report

\*\*\*Name a few strategies that helped the researchers recruit Latino adolescents for this study. Did anything surprise you about what the youth suggested?

- A. Community input into research design and ongoing advisory function (including community leader permission, as appropriate to the community)
- B. Culturally and linguistically appropriate recruitment materials
- C. Use of community representatives to assist in recruitment, as appropriate
- D. Flexible time and place of interviews or surveys
  - 1. Accommodations for after work hours
  - 2. Accessible site
  - 3. Day care & transportation considerations
  - 4. Culturally appropriate food
- E. Age- and culturally appropriate procedures to maintain participation (e.g. see Villarruel, et al. article about recruiting Latino adolescents)
- F. → For the Final Paper your Method section (under Study Procedures) will include your proposed recruitment strategies
- G. → Also, remember that your recruitment strategies have to comply with the requirements of proper Informed Consent, e.g. no coercion, participants fully informed, voluntary, etc.

#### Student Report

\*\*\* The authors use a research study (the efficacy of an intervention to reduce HIV sexual risk) as an example of recruitment strategies. Can you name the actual research design? (It's not mentioned in this article.)

## II. Establishing Causality

A. What is “causality”? The finding that change in one variable leads to change in another variable.

B. Here we are talking about explanatory research, and for the most part evaluative research.

1. Primary independent variable: “treatment”
2. Dependent variable: one or more “outcomes”

C. → Do all of your projects need to address causality? No—only if the research questions imply it.

D. Pre-requisites for determining a causal relationship between two variables?

1. The **cause precedes the effect** in time, e.g. First participants receive group therapy (independent variable), then a lowered level of group participants’ anxiety (dependent variable) occurs. If participants’ anxiety started being reduced prior to the initiation of group therapy, the causal connection is weaker. Other examples:

a) Parent education classes to improve parenting skills and prevent child abuse—you have to show that the parenting class preceded the improvements in parenting skills

b) Client satisfaction as a predictor of recovery from mental illness—it is still unclear in the research literature what comes first even though there is a clear association (see 2. below)

2. The variables are **empirically correlated** or associated with each other, e.g. those getting group therapy will have a reduced level of anxiety. Without an association between the variables, there can be no further exploration of causality.

3. The observed **empirical correlation cannot be explained away** by a third variable, a.k.a. “controlling rival hypotheses”—moderating variables--plausible alternatives to the original hypothesis. For example, the reduction of anxiety can’t be explained by other factors such as medication. The relationship between X and Y should not be *spurious*, defined as “only related indirectly due to the influence of the third variable.” Other examples:

a) Effects of case management on independent living for foster youth—are there resiliencies in the youth that might explain independent living regardless of case management?

b) Hospital morbidity as an indicator of quality—predisposing characteristics of patients (such as severity of illness upon admission) could be a rival hypothesis

E. The Ideal Experiment (“The Gold Standard” in evaluation design)

1. Establish time order of variables: IV must precede DV chronologically
2. Independent variable must be manipulated, e.g. treatment not offered to everyone.

Alternate ways to manipulate treatment (independent) variable

<b>Experimental Group</b>	<b>Control Group</b>
#1 Group gets experimental treatment	Group gets no treatment
#2 Group gets large amount of experimental treatment	Group gets small amount of experimental treatment
#3 Group gets experimental treatment	Group gets “treatment as usual” or alternative treatment

3. Randomly assign participants to experimental and control groups
4. Establish association between independent variable (the treatment) and the dependent variable (the outcome)
5. Control for rival hypotheses—something else besides the treatment variable should not explain the change in the outcome. **In most cases, the random assignment takes care of this (if it is done correctly).**

III. Internal and External Validity

A. ➔ **Note: Method section in papers must address internal validity and external validity issues (i.e. “The limitations of this study are...)! This would be discussed in the Research Design section.**

B. Internal validity—the degree to which an effect observed in an experiment was actually produced by the independent variable and not other factors (e.g. the rival hypotheses). These factors are usually not measured. ***The goal is to minimize threats to internal validity, and explain those that might have a role to play.*** What follows are the main threats to internal validity we’ll be dealing with in this course, and an example. The example will address a study of the effectiveness of Cognitive Behavioral Therapy on reducing symptoms of anxiety in older adults.

<b>Threat to Internal Validity and Definition:</b>	<b>Example:</b>
<b>History</b> —external events influence the outcome	Family visits reduce anxiety in older adult participants more so than the treatment
<b>Maturation</b> —changes in the participant over time (not related to the experimental treatment) influence the outcome	Progressive cognitive deterioration creates anxiety in some participants. These effects

	outpace the positive effects of CBT
<b>Testing</b> —the study’s measures affect the outcome	The questions used to measure anxiety level actually have a calming effect on participants
<b>Instrumentation changes</b> —changes in measurement or instrumentation confound results.	Midway through the study the student researcher leaves the agency and less well-trained staff try to continue the interviews measuring change in anxiety level
<b>Statistical regression</b> —extreme measurements may change merely by chance—usually caused by sampling those with extreme scores—“the only way to go is up.”	The sampling criteria only allow those with the most severe anxiety to participate in the study. (Even those in the control group may show some improvement just by chance.)
<b>Selection bias</b> —Non-comparable groups – the assignment procedure for the experimental and control groups is flawed or biased	Social workers want people on their caseloads to receive CBT—they influence the selection process for their more needy clients
<b>Treatment diffusion</b> —Treatment “contaminates” the control group.	Clinicians administering ‘treatment as usual’ to the control group attend a conference on CBT and, without realizing it, incorporate the basic CBT principles into their work

C. External validity—extent to which study results (i.e. causal relationship between IV and DV) can be generalized

1. Factors:

- a) Tied closely to sampling procedures—is sample representative of population?
- b) Also related to variables—do measures apply to others outside of the sample?
  - (1) Example: use of IQ test as an dependent variable for a sample of upper-SES children, not generalizable to lower urban SES children
  - (2) The intervention variable may not apply to others outside the sample, e.g. the effects of a talking therapy to college students not generalizable to less acculturated or indigenous peoples

2. A study can have *internal validity* and still lack *external validity*

D. Tradeoff decision--Internal vs. external validity-- Experimental designs sacrifice external validity in favor of internal validity.

1. The external vs. internal validity issue is a major focus of the debate about Evidence-based Practice (e.g. “Is the focus on experimental designs relevant to community settings?”)
2. Small samples, typical for experimental research designs, often can’t catch differences among subpopulations, such as ethnic groups. You might achieve a high level of internal validity at the expense of external validity.
3. Random assignment is difficult in community settings, or with interventions designed to address the entire community population (such as early prevention). You sacrifice internal validity in favor of external validity
4. A study might use sampling procedures to control for rival hypotheses (e.g. sampling only one ethnicity), thereby limiting external validity in favor of internal validity

E. There logistical and ethical limitations

1. How do you decide to withhold treatment from someone?
2. For tests of large scale policy (e.g. welfare reform) randomization is simply not possible except for tests of smaller interventions (such as alternative job training programs)

F. Barring major ethical limitations, participation in experiments is seen positively, depending on how the study is presented to participants

G. “Risks and benefits” in Informed Consent

\*\*\*What do you think about randomized control experiments in the real world, in agency settings?

**IV. Important concepts and definitions to learn (consult readings if not covered in class)**

- Rival hypothesis
- Causality, three conditions for
- Causality—definition
- Control group
- Experimental group
- External validity
- Internal validity
- Outcome
- Random assignment

- Rival hypothesis
- Spurious relationship (between variables)—plausible but incorrect due to a rival hypothesis
- Threats to internal validity
  - History
  - Maturation
  - Testing
  - Instrumentation changes
  - Statistical regression
  - Selection bias
  - Treatment diffusion