

Today:

- **Review of test**
- **Group designs and internal validity**
- **Questions about Literature Review (note: due date now 10/30/08 at beginning of class)**

Group Designs: Pre-experimental, Experimental & Quasi-Experimental designs

“The great secret of doctors...is that most things get better by themselves; most things, in fact, are better in the morning.”

Dr Lewis Thomas, President, Memorial Sloan-Kettering Institute for Cancer Research 1976

I. Review:

A. What are the three requirements to show causality?

1. _____ **Time ordering**
2. _____ **Association or correlation between IV and DV**
3. _____ **Change in DV not caused by third variable (rival hypothesis)**

B. In a study of the effectiveness of a parent education group on improving parenting skills, some parents may get parenting advice from friends during the experiment. **Give an example of a rival hypothesis** What is the rival hypothesis? (Answer: getting advice from friends.)

II. What is “*research design*”? The decisions made in planning and conducting your research so as to best answer your research questions.

A. Research designs can be *cross-sectional* (“a point in time”), or *longitudinal* (“different points in time”)

B. Cross sectional designs are typical for descriptive research (e.g. “What is the prevalence of mental illness in the homeless population?”)

C. Longitudinal designs are typical in evaluative research. Testing a treatment almost always requires obtaining data at different points in time

***As you look through the various types of Groups Designs (see Appendix 2.), which ones are cross-sectional?

→Note: for your project, your specific research design will be described in the Method section, under the subheading Research Design

III. Group Designs – now we’re only talking about evaluative topics—testing the effects (or effectiveness) of treatment interventions, new programs, policy changes

R	Random assignment
O	Observation or measurement (of dependent variable Y)
O ₁ , O ₂	Observations or measurements (of dependent variable Y) at time 1 and time 2
X	Intervention, treatment or event (independent variable)

IV. Classical experimental design—the Pretest Posttest Control Group Design

- A. Sample selected from population by either probability or non-probability sampling
- B. Random assignment of sample to either experimental or control group
- C. Take pretest measurement(s) prior to intervention
- D. Take posttest measurement(s) after intervention

V. Quasi-experimental designs (“not quite experimental”)—such as the Nonequivalent Comparison Group Design

- A. When randomized assignment is not possible
- B. Utilizes *comparison* rather than control group
- C. Same design as the Pretest Posttest Control Group Design, *but without randomized assignment*
- D. Relies on accurate matching of subjects
- E. Nonequivalent” refers to the lack of randomized assignment. The validity of this design depends instead on the extent to which the groups’ subjects are *matched* by the important variable characteristics (gender, ethnicity, baseline functioning, etc.) (Clumsy terminology alert: the word “non-equivalent” is misleading here!)
- F. Control vs. Comparison—What’s the difference?

1. Control groups are derived from random assignment

- a) A control group is what the experimental group would be like *had*

it not been exposed to the intervention

- b) Randomization is meant to make the groups equivalent
2. Comparison group designs control for rival hypotheses by matching subjects (without random assignment) on important variables, such as
- a) Ethnicity
 - b) Age
 - c) Baseline dependent variables scores
 - d) Etc., but, you can't control everything. (That's the weakness of this design.)

***How do you decide which variables to match for the participants in the treatment and comparison groups?

VI. Pre-experimental design

- A. While the easiest design to implement,
- B. No random assignment, and
- C. No controls over threats to internal validity

VII. Relationship of design to specific threats to internal validity

- A. *Internal validity* – the degree to which an effect observed in an experiment (e.g. change in the dependent variable) was actually produced by the experimental stimulus (e.g. treatment) and not the result of other factors (rival hypotheses)
- B. *Threats to internal validity* – the rival hypotheses
- C. These rival hypotheses can be categorized (see Appendix 1.).

→ Note: if your research question or hypothesis implies *causality*, then your Method section should discuss the potential threats to internal validity and why your research design does or does not address them.

Discussion of Zanis article

***Student Report:

1. The literature review is merged with the Introduction (typical in shorter articles). What does the literature review accomplish?
2. What is the overall group research design type (quasi- vs. experimental)? And what specific design? (Joanne Murphy, Yadira Tena)

Group Exercise Research Designs (see below)

Important concepts and definitions to learn

- Cross-sectional design
- Longitudinal design
- Case control design
- Internal validity
- Threats to internal validity (from handout)
- Experimental designs (from handout)
- Quasi-experimental designs (from handout)
- Pre-experimental designs (from handout)
- Notation for group designs (R,O,X etc)
- Fidelity of intervention

VIII. Next Week's Focus:

- A. Final thoughts about Group Designs: External Validity
- B. Single Systems Designs
- C. Introduction to Qualitative Research

***Study Questions for Student Report next week:

Bradshaw, W., & Roseborough, D. (2004). Evaluating the effectiveness of cognitive behavioral treatment of residual symptoms and impairment in Schizophrenia. *Research on Social Work Practice, 14*(2) 112-120.

1. Locate and summarize the study's hypotheses
2. The study uses an "aggregated single case design." What does this mean?

Group Exercise:

You are evaluating the effectiveness of a new parenting skills training program for parents in the child welfare system. Class divides into four sections. Each section is assigned one of the following scenarios of pre-experimental designs:

- A. A “one-shot case study” design
- B. A one-group pretest, posttest design
- C. Posttest only design with non-equivalent comparison group

Your tasks:

1. Discuss *three* threats to internal validity as they relate to your specific design (See Appendix 1. below)
2. Pick one quasi-experimental design and discuss how it would improve the study (e.g. minimize threats to internal validity) (See Appendix 2. Below)
3. Pick one true experimental design and discuss how that design would improve the study even further (e.g. minimize threats to internal validity)

Appendix 1.

Threats to Internal Validity, with Example (A study of the effectiveness of CBT in reducing anxiety in older adults)

Threat to Internal Validity and Definition:	Example:
History —external events influence the outcome	Family visits reduce anxiety in older adult participants more so than the treatment
Maturation —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 are larger than positive effects of CBT
Testing —the study’s measures affect the outcome	The questions used to measure anxiety level actually have a calming effect on participants
Instrumentation changes —changes in measurement or instrumentation confound results.	Midway through the study the anxiety scale is revised
Statistical regression —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.
Selection bias —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
Treatment diffusion —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

Summary of Group Designs

Design	Notation	Example
Pre-experimental		
One shot case study	X O	A convenience sample of participants are provided CBT and their anxiety is measured afterwards
1 group pretest posttest	O₁ X O₂	Same as above, except a measurement of anxiety is taken before the intervention
Posttest only design with non-equivalent comparison group	X O O	A non-randomly assigned comparison group getting “treatment as usual” is compared to the CBT group after the intervention
Quasi-experimental		
Pretest, posttest non-equivalent comparison group	O₁ X O₂ O₁ O₂	The treatment and comparison groups are well-matched on important variables, then measured before and after the intervention
Simple interrupted time series	O_{1...O_n X O_{n... O_{final}}}	One group of participants is measure several times before and after CBT
Interrupted time series with non-equivalent comparison group	O_{1...O_n X O_{n... O_{final}}} O_{1...O_n O_{n... O_{final}}}	Two groups are measured several times before and after the CBT: the treatment group and a well-matched comparison group getting “treatment as usual”
True Experimental		
Pretest, posttest control group	R O₁ X O₂ R O₁ O₂	Randomly assigned CBT and “treatment as usual” groups compared pre- and post-
Posttest only control group	R X O R O	Randomly assigned CBT and “treatment as usual” groups compared once after treatment
Alternate treatment design with posttest (treatment A compared to treatment B compared to no treatment)	R O₁ X_A O₂ R O₁ X_B O₂ R O₁ O₂	Comparing randomly assigned CBT, “treatment as usual” (comparison) and a no-treatment (comparison) group

Notation:

R = Randomized assignment

O = Observation or measurement of dependent variable

X = Intervention occurred

