Single Subject Designs

ScWk 240 Week 8 Slides
Group vs. Single Subject Designs

There are two broadly defined approaches to experimental research: group designs & single-subject designs.

Both approaches apply components of the scientific method to their approach to research.

The difference between group and single-subject designs lies in the manner in which the principles of the scientific method are put into operation in designing studies.
Single-Subject Designs
-- also called: Single Case and Single System Designs

Uses of SSD’s and SCD’s in Social Work

Requirements for SSD/SCD’s

Target problem identification (DV)
Quantification of data
Obtaining baselines
Graphic display of data

Designs(AB, ABAB, ABC/ABCD) and Examples

Time Series Designs and Examples

External Validity of SSD/SCD’s
Use of SSD/SCD’s Designs in SW

- Logic of time-series design
- Also called single-subject/single-system design, and N=1 studies
- Often the most relevant research topics for clinical practitioners
- Major limitations: Sample Sizes are small (usually 1) and problems with external validity
Setting Target Problems

Target problem(s):

- Decide desired outcome (=DV) to be measured
- Positive or negative indicator?
- Should occur frequently enough

⚠️ Triangulation
Developing Measurement Strategies

Target problem(s)

- **Who will measure it?** (1) self-monitoring, (2) practitioner, (3) significant others

- **Sources of data:** (1) self-report scale, (2) direct observation, (3) available records

- **Triangulation with multiple measures and observers are strongly preferred**
Quantification of Data

a) Frequency
b) Duration
c) Magnitude
Obtaining Baseline Phase

- Repeated measures before the intervention (=control phase)

- Attributes of a good baseline:
  1) Minimum of 5-10 measurements
  2) Stable
  3) Problem is not nearing resolution before the intervention
Celeration Lines/Charts

- Standardized method for charting and analyzing how frequency of behavior changes over time
- Various Standard Charts: Session/Daily/Weekly/Monthly/Yearly
- Consistent Display of Celeration (change)
- Acceleration = increasing performance
- Deceleration = decreasing performance
Interpreting Graphically Displayed Behavioral Data

- **Visual analysis**
  - Did behavior change in a meaningful way?
    - If so, to what extent can that change in behavior be attributed to the independent variable?

- **Identification of**
  - Variability
  - Level
  - Trend
Examples of Baseline Measures

(A) Increasing

(B) Decreasing

(C) Flat

(D) Cyclical

(E) Unstable

Figure 14-4  Alternative Baseline Trends
Baseline and Intervention Phases

Figure 14-5  Graph of Hypothetical Outcome after Extending a Baseline with an Improving Trend (AB Design)
Baseline and Intervention Phases

Figure 14-6  Graph of Two Hypothetical Outcomes with an Unstable Baseline (AB Design)

Figure 14-7  Graph of a Hypothetical Outcome Supporting Intervention Efficacy with an Improving Baseline (AB Design)
Graphic Display of Data

- X axis: (horizontal)
- Y axis: (vertical)
- Data points
- Labels: Baseline/A Phase, Intervention phase/B Phase
Interpreting Graphically Displayed Behavioral Data

- **Read the graph:**
  - Figure caption
  - Condition & axis labels
  - Location of numerical value & relative significance of scale breaks

- **Visually track each data path:**
  - Are data paths properly connected?
  - Is the graph distorted?
AB Design

- The basic and simplest design
- One baseline phase & one intervention phase

Advantage(s):

Disadvantage(s):

Retrospective baseline
ABAB Design

- Withdrawal/reversal design

- Advantage(s):

- Disadvantage(s):
ABAB Design (Examples)

**Figure 14-8** Graph of Hypothetical Outcome of ABAB Design Supporting Intervention Efficacy Despite Failure to Obtain a Reversal during Second Baseline

**Figure 14-9** Graph of Hypothetical Outcome of ABAB Design with Unclear Results
Multiple-Component Designs (ABC, ABCD)

- Add a third or fourth type of intervention

- Caution: carryover effect, order effect, irreversibility effect, history
Example of Multiple Component Design

![Graph of Hypothetical Outcome of Multiple-Component (ABCD) Design, with Unclear Results](Figure 14-14)
Replication

- *Replication* can enhance both *internal* and *external* validity.

*Be prepared for practical obstacles*
Time Series and Related Designs

**Notations:**

- \( X \) = introduction of stimulus, intervention, or treatment
- \( O \) = observation/measurement

**Time-series design**

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\begin{align*}
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Examples of Time Series Projects

Pattern 1

Pattern 2

Pattern 3

Figure 12-3 Three Patterns of Number of Time-Outs in a Longer Time-Series Perspective
External Validity

- Generalizability
- Representativeness of sample, setting and procedures
- Sampling and survey research