



Single-subject case studies have been reported for over two years in AHA Hippotherapy. Hopefully you have read them. Did you catch any of the validity and reliability issues that limit the conclusion that hippotherapy alone created the reported outcome? If a researcher makes a plan to control common validity and reliability errors, single subject designs can be very useful to support hippotherapy theory, establish a deeper knowledge base and define a bit of empirical evidence for best practice in hippotherapy. It is time now to create single subject research that yields conclusive evidence of a causal relationship between hippotherapy and a dependent variable.

The following points are strategies for single subject research. Use these strategies to plan and launch your own case study.

**Dependent variable** = the outcome measure, test or instrument used to detect change.

**Independent variable** = the intervention, treatment, or hippotherapy.

**Individual participants are the unit of analysis.**

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Each participant serves as his/her own control. Performance prior to intervention is compared to during and after intervention.

**Participation and Setting Description.** Another researcher should be able to use the descriptions of

## Research How-To Series Single-Subject Research

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participant, diagnosis, age to recruit their own subjects and repeat the study in another location. Thorough, rich detail is required.

### **Employ One or More Dependent Variables.**

- ▶ Dependent variables are operationally defined.
- ▶ Valid and consistent with direct observation or measure.
- ▶ Avoid subjective, anecdotal, broad, global statements that are difficult or impossible to translate into empirical evidence.
- ▶ Dependent variables are measured repeatedly within and across conditions to identify patterns of progress across time periods or phases.
- ▶ Compare the performance of each participant with his/her prior performance or score.
- ▶ Use inter-rater reliability to monitor and ensure proper use of the dependent variable.

**Train the Scorer.** Provide formal training for scorers. The person who tests or scores should be someone other than the researcher to keep data collection separate from data interpretation.

**Independent Variable is Actively, not Passively Manipulated.** Operationally define and systematically introduce and remove the intervention (hippotherapy). Record frequency and duration. Develop and describe the hippotherapy protocol.

### **Baseline Comparison.**

- ▶ Can be conditions "as usual".
- ▶ Compare performance or scores during these conditions with performance in the period of intervention (hippotherapy).
- ▶ A description of the baseline time period as well as

the hippotherapy time periods should be sufficiently precise to allow replication by another researcher.

- ▶ Record everything that happens to the subject in the time periods.
- ▶ Does hippotherapy create more change or influence the dependent variable more than the extraneous variables?

### Experimental Control.

- ▶ To satisfy threats to internal validity (maturation, testing error, selection error, etc.). Introduce and remove the independent variable (hippotherapy).
- ▶ Rival hypotheses are passage of time or maturation, measurement effects, testing bias, outside therapies.
- ▶ The design and pattern of testing before and after hippotherapy help to control the confounding variables that can influence the outcome for which you are hoping that hippotherapy only makes the difference.
- ▶ Your research hypothesis is a statement of belief that there will be an unequivocal relationship between the manipulation of the independent variable and change in the dependent variable/s.

### Visual Analysis vs. Statistical Analysis.

- ▶ A table or graph which gives a visual comparison of response or scores across conditions is not a statistical procedure or analysis.
- ▶ In visual analysis of data, there must be an obvious, specific pattern for a researcher to make the claim that the change in the dependent variable or outcome measure is solely a function or result of hippotherapy.
- ▶ Be careful reading and interpreting visual analyses. Do not jump to conclusions that are not supported by the data of tables or graphs.

### External Validity.

- ▶ Single subject designs test theoretical concepts or identify and validate effective clinical interventions.
- ▶ External validity from single subject research is enhanced through replication of the effects through different participants, different treating therapist, and different facility.
- ▶ Generality or boundaries of an intervention are established through systematic replication of effects across multiple researchers and multiple sites.
- ▶ External validity is also enhanced by detailed operational description of the participants, what exactly is done during hippotherapy.
- ▶ List all of the outside, extraneous, confounding, uncontrolled influences such as medical or therapeutic interventions.

**Representativeness.** Case studies are not representative of entire populations. Refrain from over-generalization. For example, if the single subject is 4 years old with x diagnosis, then the results are externally valid only for 4 year olds with x diagnosis.

### Research Question.

- ▶ Organize and select a design to provide detailed time-series analysis of change. Systematically introduce and remove hippotherapy.
- ▶ Focus on a diagnosis.
- ▶ Focus on an age or population.
- ▶ Focus on an impairment or dysfunction.
- ▶ Be concrete.
- ▶ State the question.
- ▶ The question drives the study.

**Single Subject Group Design.** Treatment effects in relationship to

group means. Even in the most successful group designs, there are individual subjects who do not benefit as much from hippotherapy or who are unchanged by hippotherapy. Identify and analyze the characteristics of these participants.

**Precursor to Control Group Designs.** Single subject studies produce reliable evidence to justify investment in large, expensive randomized control-group research

**Develop Objective Criteria for Hippotherapy as Evidence-Based Practice.** For decision-makers and third parties to determine if hippotherapy is evidence-based practice. Is hippotherapy a treatment or intervention approach that produces measurable benefits? If so, then create a research project at your practice site to investigate and demonstrate that hippotherapy is functionally related to the change in a dependent measure of impairment or dysfunction. For whom, by whom and when?