

Abstract Title Page
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Title: Achieved Relative Intervention Strength: Models and Methods

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Abstract Body

Limit 5 pages single spaced.

Background/context:

Description of prior research, its intellectual context and its policy context.

Treatment fidelity (i.e., integrity) can be defined as the extent to which an intervention is delivered as intended. Inevitable slippage between the specified and implemented intervention means that any treatment effects must be attributed not to the theoretical intervention model but to the model as implemented. Ideally, fidelity assessments would follow a specific course, beginning with a full characterization of the intervention “in theory” by outlining: the constructs and processes being manipulated (change model), the essential components of the intervention and required support services (logic model), and the context of implementation within the school year (operational model). Explication of these models leads to the development of reliable and valid measures of *achieved* intervention fidelity (Cordray & Pion, 2006), and the integration of fidelity measures into outcomes analysis. Without measuring achieved fidelity in both treatment and control conditions we are unable to determine whether differences in outcomes (or lack thereof) are due to achieved fidelity in the treatment conditions or the presence of core intervention components in the control condition. An intervention may have a high degree of achieved fidelity, but fail to have effects because it does not differ from the control conditions on core intervention components (i.e., small achieved relative strength).

Purpose / objective / research question / focus of study:

Description of what the research focused on and why.

This paper outlines a method of determining the achieved relative strength of an intervention by calculating the extent to which core intervention components are present in both the treatment and control condition (Hulleman & Cordray, 2009). Using data from several examples we demonstrate how to calculate ARS indices, and subsequently how to incorporate them into analyses of intervention effectiveness.

Setting:

Description of where the research took place.

The results from three different samples are reported in this paper. Sample 1 was collected in an experimental laboratory on a college campus. Sample 2 was collected within an undergraduate class. Sample 3 was obtained from secondary data analysis of Reading First data.

Population / Participants / Subjects:

Description of participants in the study: who (or what) how many, key features (or characteristics).

Sample 1: This sample consists of introductory psychology students at a major mid-Western university who participated in the experiment for course credit. Participants volunteered to visit our research laboratory and participate in a randomized experiment.

Sample 2: This sample consists of introductory psychology students at a major mid-Western university who participated in the experiment for course credit. Students completed the experimental intervention as part of an introductory psychology course assignment.

Sample 3: This sample consists of secondary data analysis from the Reading First Implementation report (U.S. Department of Education, 2008).

Intervention / Program / Practice:

Description of the intervention, program or practice, including details of administration and duration.

The randomized intervention in the first two samples (the psychology laboratory and the college classroom) was a curricular intervention designed to encourage participants to make connections between the material they were studying and their own lives (for a more complete description of the intervention see Hulleman & Cordray, 2009; Hulleman, Godes, Hendricks, & Harackiewicz, in press; and Hulleman & Harckiewicz, in press). In both studies students were randomly assigned to the treatment group or the control group. Treatment participants selected a topic they were studying (either mental math in the laboratory or a topic from their introductory psychology class in college classroom) and wrote about how it connected to their lives, or to the lives of someone they knew. In the control condition, participants selected a topic and wrote a summary of what they had been learning in the laboratory or the classroom.

Reading First is a policy intervention intended to ensure all children can read at grade level or above. Reading First provides funds to Title I schools to increase the amount of teacher professional development to K-3 teachers regarding scientifically-based reading instruction. The exact nature of the additional resources is up to each individual school to determine. For more details see U.S. Department of Education (2008).

Research Design:

Description of research design (e.g., qualitative case study, quasi-experimental design, secondary analysis, analytic essay, randomized field trial).

All three samples utilized randomized control trials. Sample 1 and 2 were randomized at the student level, whereas the Reading First sample a nationally-representative sample of Reading First schools and non-Reading First Title I schools (U.S. Department of Education, 2008).

Data Collection and Analysis:

Description of the methods for collecting and analyzing data.

Data was collected individually from participants in Samples 1 and 2. Data were analyzed using multiple regression. In the Reading First sample, a nationally-representative sample of Reading First and non-Reading First Title I schools were collected (Moss et al., 2008). We used the raw data from the implementation report (e.g., means and SD's, frequencies, etc.) to calculate our indices of achieved relative strength. Achieved relative strength (ARS) indices are calculated as the degree of fidelity within the treatment group minus the degree of fidelity within the control group divided by the pooled standard deviation (see Hulleman & Cordray, 2009, for more details on calculations). ARS indices represent the standardized difference in treatment implementation between the treatment and control group, and as such are indicative of relative treatment strength (Cordray & Pion, 2006).

Findings / Results:

Description of main findings with specific details.

In two randomized control trials of a motivational intervention, one in the laboratory and the other in the classroom, we demonstrate that the ARS indices are positively correlated with student motivational outcomes. In secondary analyses of Reading First data we show how ARS indices can be created and combined in more complex, multi-component interventions. One of the principle findings in this sample is that implementation fidelity of Reading First core components is already high in the control condition, thus diminishing the impact of randomization to the Reading First program.

Conclusions:

Description of conclusions and recommendations based on findings and overall study.

Across three randomized experiments, we demonstrated how to compute the ARS and how it can be utilized to understand the results of experiments. The motivation intervention examples demonstrate consistency across three different methods of calculating achieved relative strength, and how treatment fidelity diffuses when moving from more controlled to less controlled settings. The Reading First example demonstrates the importance of assessing core intervention components in control conditions as the average level of implementation of Reading First components in control conditions was quite high, thus diminishing the achieved relative strength of the intervention.

Appendices

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Appendix A. References

References are to be in APA version 6 format.

- Cordray, D. S. & Pion, G. M. (2006). Treatment strength and integrity: Models and methods. In R. R. Bootzin & P. E., McKnight (Eds.), *Strengthening research methodology: Psychological measurement and evaluation (pp 103-124)*. Washington, DG: American Psychological Association.
- Cordray, D. S. & Hulleman, C. (2009, June). Assessing intervention fidelity: Models, methods and modes of analysis. Presentation at the Institute for Education Sciences 2009 Research Conference, Washington, D.C.
- Dane, A. V., & Schneider, B. H. (1998). Program integrity in primary and early secondary prevention: Are implementation effects out of control? *Clinical Psychology Review*, 18(1), 23-45.
- Dusenbury, L., Brannigan, R., Falco, M., & Hansen, W. B. (2003). A review of research on fidelity of implementation: Implications for drug abuse prevention in school settings. *Health Education Research*, 28, 237-256.
- Fixsen, D. L., Naoom, S. F., Blasé, K. A., Friedman, R. M., & Wallace, F. (2005). *Implementation research: A synthesis of the literature*. Tampa, FL: University of South Florida, Louis de la Parte Florida Mental Health Institute, The National Implementation Research Network (FMHI Publication #231).
- Hulleman, C. S., & Cordray, D. (2009). Moving from the lab to the field: The role of fidelity and achieved relative intervention strength. *Journal of Research on Intervention Effectiveness*, 2(1), 88-110.
- O'Donnell, C. L. (2008). Defining, conceptualizing, and measuring fidelity of implementation and its relationship to outcomes in K-12 curriculum intervention research. *Review of Educational Research*, 78(1), 33-84.
- U.S. Department of Education, Office of Planning, Evaluation and Policy Development, Policy and Program Studies Service, *Reading First Implementation Evaluation Final Report*, Washington, D.C., 2008.

Appendix B. Tables and Figures
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