

Appendix

Recommended textbooks on HLMs and multilevel models, in general, beyond their application to SCED data:

- Goldstein, H. (1995). *Multilevel statistical models*. London, UK: Edward Arnold.
- Hox, J. J. (2010). *Multilevel analysis: Techniques and applications* (2nd ed.). New York, NY: Routledge.
- Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models* (2nd ed.). Thousand Oaks, CA: Sage

Articles illustrating how to use multilevel meta-analysis in SCED or using multilevel meta-analysis as part of a broader purpose:

- Baek, E. K., & Ferron, J. M. (2013). Multilevel models for multiple-baseline data: Modeling across-participant variation in autocorrelation and residual variance. *Behavior Research Methods*, 45, 65–74.
- Baek, E., Moeyaert, M., Petit-Bois, M., Beretvas, S. N., Van de Noortgate, W., & Ferron, J. (2014). The use of multilevel analysis for integrating single-case experimental design results within a study and across studies. *Neuropsychological Rehabilitation*, 24, 590–606.
- Dedrick, R. F., Ferron, J. M., Hess, M. R., Hogarty, K. Y., Kromrey, J. D., Lang, T. R. ... Lee, R. S. (2009). Multilevel modeling: A review of methodological issues and applications. *Review of Educational Research*, 79, 69–102.

- Gage, N. A., & Lewis, T. J. (2014). Hierarchical linear modeling meta-analysis of single-subject design research. *Journal of Special Education, 48*, 3–16.
- Heyvaert, M., Maes, B., Van den Noortgate, W., Kuppens, S., & Onghena, P. (2012). A multilevel meta-analysis of single-case and small-n research on interventions for reducing challenging behavior in persons with intellectual disabilities. *Research in Developmental Disabilities, 33*, 766–780.
- Heyvaert, M., Saenen, L., Maes, B., & Onghena, P. (2014). Systematic review of restraint interventions for challenging behaviour among persons with intellectual disabilities: focus on effectiveness in single-case experiments. *Journal of Applied Research in Intellectual Disabilities, 27*, 493–510.
- Heyvaert, M., Saenen, L., Maes, B., & Onghena, P. (2015). Comparing the percentage of non-overlapping data approach and the hierarchical linear modeling approach for synthesizing single-case studies in autism research. *Research in Autism Spectrum Disorders, 11*, 112–125.
- Moeyaert, M., Ferron, J., Beretvas, S., & Van Den Noortgate, W. (2014). From a single-level analysis to a multilevel analysis of single-case experimental designs. *Journal of School Psychology, 52*, 191–211.
- Moeyaert, M., Ugille, M., Ferron, J., Onghena, P., Heyvaert, M., & Beretvas, S. N. (2015). Estimating intervention effects across different types of single-subject experimental designs: Empirical illustration. *School Psychology Quarterly, 30*, 50–63.

Running head: HLM FOR SCED META-ANALYSIS

Suggested readings presenting the multilevel models as applied to SCED data, including formulas:

- Moeyaert, M., Ferron, J., Beretvas, S., & Van Den Noortgate, W. (2014). From a single-level analysis to a multilevel analysis of single-case experimental designs. *Journal of School Psychology, 52*, 191–211.
- Onghena, P., Michiels, B., Jamshidi, L., Moeyaert, M., & Van den Noortgate, W. (2018). One by one: Accumulating evidence by using meta-analytical procedures for single-case experiments. *Brain Impairment, 19*, 33-58.
- Pustejovsky, J. E., & Ferron, J. M. (2017). Research synthesis and meta-analysis of single-case designs. In J. M. Kauffman, D. P. Hallahan, & P. C. Pullen (Eds.), *Handbook of special education* (2nd ed.) (pp. 168-186). New York, NY: Routledge.
- Shadish, W. R., Kyse, E. N., & Rindskopf, D. M. (2013). Analyzing data from single-case designs using multilevel models: New applications and some agenda items for future research. *Psychological Methods, 18*, 385–405.
- Van den Noortgate, W., & Onghena, P. (2003). Combining single-case experimental data using hierarchical linear models. *School Psychology Quarterly, 18*, 325–346.
- Van den Noortgate, W., & Onghena, P. (2003). Hierarchical linear models for the quantitative integration of effect sizes in single-case research. *Behavior Research Methods, Instruments, & Computers, 35*, 1–10.
- Van den Noortgate, W., & Onghena, P. (2007). The aggregation of single-case results using hierarchical linear models. *The Behavior Analyst Today, 8*, 196–209.

Articles reporting simulation studies on the performance of two-level models for analyzing data from SCED studies:

- Ferron, J. M., Bell, B. A., Hess, M. R., Rendina-Gobioff, G., & Hibbard, S. T. (2009). Making treatment effect inferences from multiple-baseline data: The utility of multilevel modeling approaches. *Behavior Research Methods*, 41, 372–384.
- Ferron, J. M., Farmer, J. L., & Owens, C. M. (2010). Estimating individual treatment effects from multiple-baseline data: A Monte Carlo study for multilevel-modeling approaches. *Behavior Research Methods*, 42, 930–943.
- Ferron, J. M., Moeyaert, M., Van den Noortgate, W., & Beretvas, S. N. (2014). Estimating causal effects from multiple-baseline studies: Implications for design and analysis. *Psychological Methods*, 19, 493–510.
- Hembry, I., Bunuan, R., Beretvas, S. N., Ferron, J. M., & Van den Noortgate, W. (2015). Estimation of a nonlinear intervention phase trajectory for multiple-baseline design data. *The Journal of Experimental Education*, 83, 514–546.
- Heyvaert, M., Moeyaert, M., Verkempynck, P., Van Den Noortgate, W., Vervloet, M., Ugille, M., & Onghena, P. (2017). Testing the intervention effect in single-case experiments: A Monte Carlo simulation study. *The Journal of Experimental Education*, 85, 175–196.
- Jenson, W. R., Clark, E., Kircher, J. C., & Kristjansson, S. D. (2007). Statistical reform: Evidence-based practice, meta-analyses, and single subject designs. *Psychology in the Schools*, 44, 483–493.

- Moeyaert, M., Rindskopf, D., Onghena, P., & Van den Noortgate, W. (2017). Multilevel modeling of single-case data: A comparison of maximum likelihood and Bayesian estimation. *Psychological Methods*, 22, 760-778.
- Moeyaert, M., Ugille, M., Ferron, J., Beretvas, S., & Van Den Noortgate, W. (2013). Modeling external events in the three-level analysis of multiple-baseline across-participants designs: A simulation study. *Behavior Research Methods*, 45, 547-559.
- Mulloy, A.M. (2011). *A Monte Carlo investigation of multilevel modeling in meta-analysis of single-subject research data*. Doctoral dissertation, The University of Texas at Austin, USA. Retrieved from <http://hdl.handle.net/2152/ETD-UT-2011-08-3873>
- Vanderkerken, L., Heyvaert, M., Maes, B., & Onghena, P. (2013). Psychosocial interventions for reducing vocal challenging behavior in persons with autistic disorder: A multilevel meta-analysis of single-case experiments. *Research in Developmental Disabilities*, 34, 4515-4533.

Readings on reporting, relevant for meta-analysis and HLMs:

- Ferron, J. M., Hogarty, K. Y., Dedrick, R. F., Hess, M. R., Niles, J. D., & Kromrey, J. D. (2008). Reporting results from multilevel analyses. In A. A. O'Connell, & D. B. McCoach (Eds.), *Multilevel modeling of educational data* (pp. 391–426). Greenwich, CT: Information Age Publishing.
- Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P., ... & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *PLoS Medicine*, 6(7), e1000100.