**Meta-Analysis**

The review and empirical synthesis of quantitative results from research (published and/or unpublished), generally composed of the following processes:

1. Problem formulation
   * A clear purpose for the review: characterize state-of-knowledge, aggregate power, influence policy, refine future research…
   * Formulating a precise question: *Y* = *f*(*Treatment*, *Covariates*) + ε
2. Literature review and collection
   * Identification of existing research on topic
   * Clarify research literature searching techniques
   * Address fit between conceptualization of the phenomena and how it is operationalized by researchers in practice
   * Inclusion criteria
3. Coding research (coding manual and forms)
   * Characteristics of the publication
   * Characteristics of the sample and population
   * Characteristics of the research design and methods
   * Statistical outcomes and effect sizes
4. Data reliability and management
   * Methodological adequacy
   * Reliability coding
   * Database structure
5. Data analysis
   * Summary statistics
   * Overall effect-size analysis, confidence intervals
   * Moderator analyses
   * Weighted least squares, mixed-effects modeling
6. Reporting
   * Address methods of the synthesis
   * Address substantive and methodological issues
   * Summarize statistical synthesis results and modeling results
   * Address issues related to precision and certainty
   * Assess gaps in research and generalizability issues

References

Cooper, H.M. (1998). *Synthesizing research: A guide for literature reviews* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Cooper, H., & Hedges, L.V., Valentine, J.C. (Eds.). (2009). *Handbook of research synthesis and meta-analysis* (2nd ed.). New York, NY: Russell Sage Foundation.

Cooper, H.M., Nye, B., Charlton, K., Lindsay, J., & Greathouse, S. (1996). The effects of summer vacation on achievement test scores: A narrative and meta-analytic review. *Review of* *Educational Research, 66*, 227-268.

Harwell, M., & Maeda, Y. (2005). Deficiencies of reporting in meta-analyses and some remedies. *The Journal of Experimental Education, 76*(4), 403-428.

Harwell, M.R., Maeda, Y., & Lee, K. (2004, April). *Replicating and extending White’s (1982) meta-analysis of the relationship between SES and student achievement*. Paper presented at the annual meeting of the American Educational Research Association, San Diego, CA.

Harwell, M., LeBeau, (2010). Student eligibility for a free lunch as an SES measure in educational research. *Educational Researcher, 39*(2), 120-131.

Hedges, L.V., & Olkin, I. (1985). *Statistical methods for meta-analysis*. Academic Press: Orlando.

Hunt, M. (1997). *How science takes stock: The story of meta-analysis*. New York: Russell Sage Foundation.

Hyde, J.S., & Fennema, E., & Lamon, S.J. (1990). Gender differences in mathematics performance: A meta-analysis. *Psychological Bulletin*, 1*07*, 139-155.

Light, R.J., & Pillemer, D.B. (1984). *Summing up: The science of reviewing research*. Cambridge, MA: Harvard University Press.

Lipsey, M.W., & Wilson, D.B. (2001). *Practical meta-analysis*. Thousand Oaks, CA: Sage Publications.

Rodriguez, M.C. (2003). Construct equivalence of multiple-choice and constructed-response items: A random effects synthesis of correlations. *Journal of Educational Measurement, 40*, 163-184.

Rodriguez, M.C. (2005). Three options are optimal for multiple-choice items: A meta-analysis of 80 years of research. *Educational Measurement: Issues and Practice, 24*(2), 3-13.

Rodriguez, M.C., & Maeda, Y. (2006). Meta-analysis of coefficient alpha. *Psychological Methods, 11*(3), 306-322.