**Meta-Analysis**

**Spring 2015 Syllabus**

**Contact Information:**

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| **Instructor:** Michael T. Brannick, Ph.D. | **Office:** B-228 |
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**Course Information:**

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| **Class meets:** Monday |  |
| **Time:** 2:40-5:30 in B-106 (Beşeri Bilimler Binası). |  |
| **Office Hours:** Tuesday 1:40 – 2:30  and by request |  |

PREREQUISITE

Univariate Statistics (Regression, ANOVA, basics of statistics). Basic working knowledge of Excel.

REQUIRED TEXT

Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis*. Chichester, UK: Wiley.

COURSE DESCRIPTION

Meta-analysis refers to the quantitative analysis of study outcomes. Meta-analysis consists of a collection of techniques that attempt to analyze and integrate effect sizes (indices of the association between an independent variable and a dependent variable) that accrue from research studies. The course concerns how to conduct a meta-analysis and how to interpret the results. To this end we will (a) read a textbook on how to conduct such analyses, (b) read and critique applications of meta-analysis, (c) conduct original (small size) meta-analyses in areas of interest to students, and (d) read and discuss primary research that applies, develops, or critiques meta-analysis.

COURSE OBJECTIVES:

Upon successful completion of the course, the student can:

1. Conduct a meta-analysis
2. Find previous research
3. Code effect sizes and study characteristics
4. Choose appropriate statistical model(s) for the data
5. Correctly analyze and interpret the analysis of the data
6. Explain the benefits and drawbacks of meta-analysis.
7. Discuss the choice of models for meta-analysis.

**Course Calendar**

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| Week | Date | Topic | Text/Assignment | Read |
| 1 | 16/2 | Administration; Key concepts;  Sampling distributions  Excel computation  R - <http://cran.r-project.org/> | *APA JARS/MARS;*  *PRISMA*  **Install R** | [[1](#_ENREF_1)] (m)  [[2](#_ENREF_2)] (m)  [[3](#_ENREF_3)] (m)  [[4](#_ENREF_4)] (e) |
| 2 | 23/2 | Effect sizes – definition, computation & conversion  Software: Metafor (in R)  Discuss articles 1-7 | IMA Ch 1-9 ***H1 –effect sizes & sampling*** | [[5](#_ENREF_5)] (m)  [[6](#_ENREF_6)] (r)  [[7](#_ENREF_7)] (d) |
| 3 | 2/3 | Collecting data.  Computing the overall effect (SH & Hedges).  Fixed vs. Random Effects  Describe the nature of random  effects, the REVC, and their  impact on inference.  Discuss articles 8-10 | IMA Ch 10-14 Declare critique; **H2 – Sitzmann, McNatt fixed v. random** | [[8](#_ENREF_8)] (d)  [[9](#_ENREF_9)] (d)  [[10](#_ENREF_10)] (r) |
| 4 | 9/3 | Heterogeneity  Define, compute and apply  heterogeneity indices  including Q, I-squared and the  prediction interval.  Discuss articles 11-13 | *IMA Ch 15-18*  **H3 – compute het stats; Myers & Crowther**  Declare MA | [[11](#_ENREF_11)] (d)  [[12](#_ENREF_12)] (r)  [[13](#_ENREF_13)] (d) |
| 5 | 16/3 | Moderators  Define, compute, and interpret continuous and categorical moderators. Consider residual random-effects variance. Discuss 14-16.  **Virtual lecture (Berlin conference)** | *IMA Ch 19-21*  **H4 – compute categorical & continuous moderator analyses McLeod** | [[14](#_ENREF_14)] (d)  [[15](#_ENREF_15)] (d)  [[16](#_ENREF_16)] (r) |
| 6 | 23/3 | Dependencies  Compute summary effects for multiple time points or multiple DVs in the same sample;  Compute rater reliability analysis  Discuss 17-19 | *IMA Ch 23-26*  **H5 – compute with dependent ES** | [[17](#_ENREF_17)] (d)  [[18](#_ENREF_18)] (d)  [[19](#_ENREF_19)] (r) |

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| 7 | 30/3 | Vote Counting; Power; Graphs  Discuss problems with vote counting as a summary of effects. Consider power for different kinds of tests in meta-analysis. Produce funnel and forest plots with metafor.  Discuss 20 | *IMA 27 – 29*  **H6 – prepare summary and subgroup forest plots** | [[20](#_ENREF_20)] (m) |
| 8 | 6/4 | Publication bias; Sensitivity; Compute funnel plot asymmetry test; trim-and-fill analysis; detect and remove outliers. Discuss 21-24 | *IMA 30-34*  **H7 – compute funnel plot and sensitivity analysis** | [[21](#_ENREF_21)] (m)  [[22](#_ENREF_22)] (m)  [[23](#_ENREF_23)] (d)  [[24](#_ENREF_24)] (m) |
| 9 | 13/4 | Psychometric MA; Context  Compute meta-analysis according  to Hunter & Schmidt  Discuss 25-26 | *IMA 38-43* | [[25](#_ENREF_25)] (m)  [[26](#_ENREF_26)] (m) |
| 10 | 20/4 | Review – Best Practices; policies  Discuss 27-28 |  | [[27](#_ENREF_27)] (m)  [[28](#_ENREF_28)] (m) |
| 11 | 27/4 | Critique Presentations – students  present results of their critiques of  a published article | **Critique due** |  |
| 12 | 4/5 | Methods research – examine some  Examples of research on meta-  analysis methods |  | [[29](#_ENREF_29)] (m)  [[30](#_ENREF_30)] (m)  [[31](#_ENREF_31)] (m |
| 13 | 11/5 | MA Presentations – students  present the results of their group  projects | **Meta-analysis due** |  |
| 14 | 18/5 | MA Presentations |  |  |

\*parenthetical material following an article stands for: m = methodology, d = mean difference, r = correlation, e example.

# Projects

* 1. Critique a meta-analysis (you may form groups of 2 people to complete this task, or you may do it by yourself). Find a published meta-analysis in a refereed journal of your choice. The meta-analysis should report the original studies used in the analysis so that you can attempt to replicate their principal result. Photocopy your article and bring it to me by the end of the third week of class for approval (it should help your critique to have it in mind as we go through class, so the earlier you find your article, the better). Present your critique to the class. The idea is to help us all do a good job at meta-analysis, so *include both good and bad points*. The critique should contain:
     1. Article citation,
     2. A summary paragraph describing the central question(s) addressed by the author(s)
     3. Your list of the pros and cons, plus the explanations of each. You should have 1 to 3 things they did well and 1 to 3 that could have been done better.
     4. Your attempt at replication. Please give me a copy of the data in Excel format along with your critique.
     5. Present the critique to the class using PowerPoint.
  2. Conduct an original meta-analysis. You may form groups of 2 or 3 people to complete this task (you can do this project by yourself if you prefer). Either conduct an original meta-analysis or update an existing study. The domain should contain 10-20 studies so it is manageable in the short time we have for class. Declare your group and topic to me by the end of the fourth week of class. Despite the small sample size (N of studies), you must
     1. find original sources,
     2. code study characteristics,
     3. compute interrater reliability (hard if you are working alone, but you can persuade a friend to help via pizza or something),
     4. test for a moderator (that is, test for an association between effect size and at least one study characteristic).
     5. Write a paper according to APA format (as if you were submitting this for publication or a conference poster session). The maximum length of the paper is 15 pages, excluding tables and figures. Shorter is fine.
     6. Present the paper to the class using Powerpoint.

# Homework descriptions

1. Computing and converting effect sizes
2. Computing fixed- and random-effects analyses of *r* and *d*
3. Quantifying heterogeneity
4. Computing moderator analysis
5. Dependent effect sizes
6. Forest plots
7. Funnel plots and sensitivity analysis

# Grades

Homeworks and projects are due at the beginning of class. Homeworks are all due one week after they are assigned; you must work independently on the homeworks. Projects are due on the date listed in the course calendar; you are allowed to collaborate on the projects. Late homeworks and projects will lose 10 percent of their point value per day late.

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| Item | Percent of Grade | Criteria |
| Critique | 35 | Coverage of paper (domain, research question, methods used). Quality of critique (what did they do well? Poorly? What could / should they have done?) Clarity of expression and logical development. |
| Meta-analysis | 35 | Coverage of domain, research question. Quality of data analysis and reporting of findings. Arguments for the contribution to the literature. |
| Homework | 20 | Correct answers, reasonable descriptions. |
| Class participation | 10 | Willing and able to discuss readings. |

Attendance is not separately graded, but your class participation and/or project presentation grades will suffer if you are absent.

**Other**

Classroom recording and note taking for purpose of sale is forbidden. Should the syllabus require revision (e.g., natural disaster), I will send you an email and post the revision on the course website. If you will be absent from regularly scheduled class for religious reasons, please inform by the second class meeting. If you need accommodations for disabilities, please bring me directions from SDS.

Readings from Course Calendar

1. Association AP: **Reporting standards for research in psychology: Why do we need them? What might they be?** *American Psychologist* 2008, **63**:839-851.

2. Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gotzsche PC, Ioannidis JPA, Clarke M, Devereaux PJ, Kleijnen J, Moher D: **The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration**. *Annals of Internal Medicine* 2009, **151**:w65-w94.

3. Chan ME, Arvey RD: **Meta-analysis and the development of knowledge**. *Perspectives on Psychological Science* 2012, **7**(1):79-29.

4. Lee M, Ata RN, Brannick MT: **Malleability of weight-biased attitudes and beliefs: A meta-analysis of weight bias redicution interventions**. *Body Image* 2014, **11**:251-259.

5. Viechtbauer W: **Conducting meta-analysis in R with the metafor package**. *Journal of Statistical Software* 2010, **36**(3):1-48.

6. Morris SB, Daisley RL, Wheeler M, Boyer P: **A meta-analysis of the relationship between individual assessments and job performance**. *Journal of Applied Psychology* 2015, **100**(1):5-20.

7. McNatt DB: **Ancient Pygmalion joins contemporary management: A meta-analysis of the result**. *Journal of Applied Psychology* 2000, **85**:314-322.

8. Kisamore JL, Brannick MT: **An illustration of the consequences of meta-analysis model choice**. *Organizational Research Methods* 2008, **11**(35-53).

9. Sitzmann T, Kraiger K, Stewart D, Wisher R: **The comparative effectiveness of web-based and classroom instruction: A meta analysis**. *Pers Psychol* 2006, **59**:623-664.

10. Huang JL, Blume BD, Ford JK, Baldwin TT: **A Tale of Two Transfers: Disentangling Maximum and Typical Transfer and Their Respective Predictors**. *J Bus Psychol* 2015.

11. Myers TA, Crowther JH: **Social comparison as a predictor of body satisfaction: A meta-analytic review**. *Journal of Abnormal Psychology* 2009, **118**:683-698.

12. Wilson L: **Mass Shootings: A Meta-Analysis of the Dose-Response Relationship**. *Journal of Traumatic Stress* 2014, **27**:631-638.

13. Cadigan JM, Haeny AM, Martens MP, Weaver CC, Takamatsu SK, Arterberry BJ: **Personalized Drinking Feedback: A Meta-Analysis of In-Person Versus Computer-Delivered Interventions**. *Journal of Consulting and Clinical Psychology* 2014, **Advance online publication.**

14. Mazei J, Huffmeier J, Freund PA, Stuhlmacher AF, Bilke L, Hertel G: **A meta-analysis on gender differences in negotiation outcomes and**

**their moderators**. *Psychological bulletin* 2015, **141**(1):85-104.

15. Parks KM, Steelman LA: **Organizational wellness programs: A meta-analysis**. *J Occup Health Psych* 2008, **13**:58-68.

16. McLeod BD, Weisz JR, Wood JJ: **Examining the association between parenting and childhood depression: A meta-analysis**. *Clinical Psychology Review* 2007, **27**:986-1003.

17. Poston JM, Hanson WE: **Meta-analysis of psychological assessment as a therapeutic intervention**. *Psychological Assessment* 2010, **22**:203-212.

18. de Boer H, Donker AS, van der Werf MPC: **Effects of the attributes of educational interventions on students’ academic performance: A meta-analysis**. *Review of Educational Research* 2014, **84**(4):509-545.

19. Hermelin E, Lievens F, Robertson IT: **The Validity of Assessment Centres for the Prediction of Supervisory Performance Ratings: A meta-analysis**. *Int J Select Assess* 2007, **15**:405-411.

20. Cafri G, Kromrey JD, Brannick MT: **A meta-meta-analysis: Empirical review of statistical power, Type I error rates, effect sizes, and model selection of meta-analyses published in psychology**. *Multivariate behavioral research* 2010, **45**:239-270.

21. McDaniel MA, Rothstein HR, Whetzel DL: **Publication bias: A case study of four test vendors**. *Pers Psychol* 2006, **59**:927-953.

22. Ferguson CJ, Brannick MT: **Publication bias in psychological science: Prevalence, methods for identifying and controlling, and implications for the use of meta-analyses**. *Psychol Methods* 2011.

23. Turner EH, Matthews AM, Linardatos E, Tell RA, Rosenthal R: **Selective publication of antidepressant trials and its influence on apparent efficacy**. *New England Journal of Medicine* 2008, **358**:252-260.

24. Viechtbauer W, L. CMW: **Outlier and influence diagnostics for meta-analysis**. *Research Synthesis Methods* 2010, **1**:112-125.

25. Park TY, Shaw JD: **Turnover rates and organizational performance: A meta-analysis**. *Journal of Applied Psychology* 2013, **98**(2):268-309.

26. Whitener EM: **Confusion of confidence intervals and credibility intervals in meta-analysis**. *Journal of Applied Psychology* 1990, **75**:315-321.

27. Sharpe D: **Of apples and oranges, file drawers and garbage: Why validity issues in meta-analysis will not go away**. *Clinical Psychology Review* 1997, **17**:881-901.

28. Keppes S, McDaniel MA, Brannick MT, Banks GC: **Meta-Analytic Reviews in the Organizational Sciences: Two Meta-Analytic Schools on the Way to MARS (the Meta-Analytic Reporting Standards).** . *Journal of Business and Psychology* 2013, **28**:123-143.

29. Bonett DG: **Meta-analytic interval estimation for Pearson correlations**. *Psychological Methods* 2008, **13**:173-189.

30. Johnson BT, Low RE, MacDonald HV: **Panning for the gold in health research: Incorporating studies' methodological quality in meta-analysis**. *Psychology & Health* 2015, **30**(1):135-152.

31. Schild AHE, Voracek M: **Finding your way out of the forest without a trail of bread crumbs: development and evaluation of two movel displays of forest plots**. *Research Synthesis Methods* 2014.