Promises & Pitfalls of Modern Meta-Analysis

Amy L. Dent

April 24, 2015
Overview of Presentation
Overview of Presentation

• Importance of Integrating Research
• Defining Meta-Analysis
• Steps of Conducting a Meta-Analysis
• New Approach to Meta-Analysis
• Conclusion
Importance of Integrating Research
Importance of Integrating Research

• Across the social and behavioral sciences, the most topical areas of research are growing and diversifying faster than ever.
Importance of Integrating Research

- Across the social and behavioral sciences, the most topical areas of research are growing and diversifying faster than ever.
  - self-regulation
Importance of Integrating Research

• Across the social and behavioral sciences, the most topical areas of research are growing and diversifying faster than ever.

• The most trustworthy theoretical refinements and practical solutions take into account an entire body of empirical evidence.
Importance of Integrating Research

• Across the social and behavioral sciences, the most topical areas of research are *growing* and *diversifying* faster than ever.

• The most trustworthy theoretical refinements and practical solutions take into account an entire body of empirical evidence.

• As a result, empirically-grounded theoretical and practical progress is more challenging than ever.
Importance of Integrating Research

- Integrating research to produce this progress is thus an essential yet increasingly difficult goal.
Importance of Integrating Research

• Integrating research to produce this progress is thus an essential yet increasingly difficult goal.

• A *methodologically rigorous* and *substantively sound* way of doing so is necessary for confidently translating research into policy or practice.
Importance of Integrating Research

- Integrating research to produce this progress is thus an essential yet increasingly difficult goal.

- A methodologically rigorous and substantively sound way of doing so is necessary for confidently translating research into policy or practice.

- Meta-analysis uniquely accomplishes this ultimate goal of applied research.
Defining Meta-Analysis
Defining Meta-Analysis

• A systematic, comprehensive, and objective method of integrating and reconciling the empirical literature on a broad research question through a quantitative synthesis of primary studies or secondary datasets
Defining Meta-Analysis

- A *systematic*, comprehensive, and objective method of integrating and reconciling the empirical literature on a broad research question through a quantitative synthesis of primary studies or secondary datasets.
Defining Meta-Analysis

• A systematic, comprehensive, and objective method of integrating and reconciling the empirical literature on a broad research question through a quantitative synthesis of primary studies or secondary datasets
Defining Meta-Analysis

• A systematic, comprehensive, and objective method of integrating and reconciling the empirical literature on a broad research question through a quantitative synthesis of primary studies or secondary datasets
Defining Meta-Analysis

• A systematic, comprehensive, and objective method of integrating and reconciling the empirical literature on a broad research question through a quantitative synthesis of primary studies or secondary datasets.
Defining Meta-Analysis

• A systematic, comprehensive, and objective method of integrating and reconciling the empirical literature on a broad research question through a quantitative synthesis of primary studies or secondary datasets
Defining Meta-Analysis

• A systematic, comprehensive, and objective method of integrating and reconciling the empirical literature on a broad research question through a quantitative synthesis of primary studies or secondary datasets.
Defining Meta-Analysis

• A systematic, comprehensive, and objective method of integrating and reconciling the empirical literature on a broad research question through a quantitative synthesis of primary studies or secondary datasets
Defining Meta-Analysis

• A systematic, comprehensive, and objective method of integrating and reconciling the empirical literature on a broad research question through a quantitative synthesis of primary studies or secondary datasets
Situating Meta-Analysis Among Research Synthesis Strategies
Situating Meta-Analysis Among Research Synthesis Strategies

1. Qualitative Synthesis

2. Quantitative Synthesis
Situating Meta-Analysis Among Research Synthesis Strategies

1. Qualitative Synthesis
   integrating research through a *narrative* account of its characteristics

2. Quantitative Synthesis
Situating Meta-Analysis Among Research Synthesis Strategies

1. Qualitative Synthesis
   integrating research through a
   *narrative* account of its characteristics

2. Quantitative Synthesis
   integrating research through a
   *numeric* account of its characteristics
Situating Meta-Analysis Among Research Synthesis Strategies

1. Qualitative Synthesis
   integrating research through a narrative account of its characteristics

2. Quantitative Synthesis
   integrating research through a numeric account of its characteristics
Defining Meta-Analysis

• A systematic, comprehensive, and objective method of integrating and reconciling the empirical literature on a broad research question through a quantitative synthesis of primary studies or secondary datasets
Defining Meta-Analysis

• A systematic, comprehensive, and objective method of integrating and reconciling the empirical literature on a broad research question through a quantitative synthesis of primary studies or secondary datasets
Defining Meta-Analysis

• A systematic, comprehensive, and objective method of integrating and reconciling the empirical literature on a broad research question through a quantitative synthesis of primary studies or secondary datasets
Defining Meta-Analysis

• A systematic, comprehensive, and objective method of integrating and reconciling the empirical literature on a broad research question through a quantitative synthesis of primary studies or secondary datasets
Steps of Conducting a Meta-Analysis
Steps of Conducting a Meta-Analysis

1. Identify an area of research ripe for meta-analysis.
Steps of Conducting a Meta-Analysis

1. Identify an area of research ripe for meta-analysis.
2. Select a broad research question.
Steps of Conducting a Meta-Analysis

1. Identify an area of research ripe for meta-analysis.
2. Select a broad research question.
   - relation between constructs
   - effect of an intervention
   - difference between groups
Steps of Conducting a Meta-Analysis: Framing the Research Question
Steps of Conducting a Meta-Analysis: Framing the Research Question

What is the overall relation between self-regulation and academic achievement?
Steps of Conducting a Meta-Analysis: Framing the Research Question

What is the overall relation between self-regulation and academic achievement?

What theoretical and methodological factors moderate this overall relation?
Steps of Conducting a Meta-Analysis: Framing the Research Question

What is the overall relation between self-regulation and academic achievement?

What theoretical and methodological factors moderate this overall relation?

- specific construct
- grade level
- academic subject
Steps of Conducting a Meta-Analysis: Framing the Research Question

What is the *overall relation* between self-regulation and academic achievement?

What theoretical and *methodological* factors *moderate* this overall relation?

- type of self-regulation measure
- type of achievement measure
Steps of Conducting a Meta-Analysis: Framing the Research Question

What is the *overall relation* between self-regulation and academic achievement?

What theoretical and methodological factors *moderate* this overall relation?
Steps of Conducting a Meta-Analysis

1. Identify an area of research ripe for meta-analysis.
2. Select a broad research question.
3. Define the parameters of your meta-analysis.
Steps of Conducting a Meta-Analysis

1. Identify an area of research ripe for meta-analysis.
2. Select a broad research question.
3. Define the parameters of your meta-analysis.
   → relation between constructs
   → effect of an intervention
   → difference between groups
Steps of Conducting a Meta-Analysis: Defining the Parameters
Steps of Conducting a Meta-Analysis: Defining the Parameters

What is the *overall relation* between self-regulation and academic achievement?
Steps of Conducting a Meta-Analysis: Defining the Parameters

What is the overall relation between self-regulation and academic achievement?

... becomes ...

What is the overall relation between the capacities of self-regulation and academic achievement across childhood and adolescence?
Steps of Conducting a Meta-Analysis

1. Identify an area of research ripe for meta-analysis.
2. Select a broad research question.
3. Define the parameters of your meta-analysis.
4. Quantify the relation of interest.
Steps of Conducting a Meta-Analysis

1. Identify an area of research ripe for meta-analysis.
2. Select a broad research question.
3. Define the parameters of your meta-analysis.
4. Quantify the relation of interest.
   - relation between constructs  =  \( r \),  \( b^* \)
   - effect of an intervention  =  \( d \)
   - difference between groups  =  \( d \)
Steps of Conducting a Meta-Analysis

1. Identify an area of research ripe for meta-analysis.
2. Select a broad research question.
3. Define the parameters of your meta-analysis.
4. Quantify the relation of interest.
5. Specify inclusion & exclusion criteria.
Steps of Conducting a Meta-Analysis

1. Identify an area of research ripe for meta-analysis.
2. Select a broad research question.
3. Define the parameters of your meta-analysis.
4. Quantify the relation of interest.
5. Specify inclusion & exclusion criteria.
   - parameters of the meta-analysis (inclusion)
   - sample size (exclusion)
   - population characteristics (exclusion)
Steps of Conducting a Meta-Analysis

1. Identify an area of research ripe for meta-analysis.
2. Select a broad research question.
3. Define the parameters of your meta-analysis.
4. Quantify the relation of interest.
5. Specify inclusion & exclusion criteria.
6. Conduct a comprehensive literature search.
Steps of Conducting a Meta-Analysis

1. Identify an area of research ripe for meta-analysis.
2. Select a broad research question.
3. Define the parameters of your meta-analysis.
4. Quantify the relation of interest.
5. Specify inclusion & exclusion criteria.
6. Conduct a comprehensive literature search.
   - electronic databases
   - professional listservs & prominent scholars
   - references
Steps of Conducting a Meta-Analysis

1. Identify an area of research ripe for meta-analysis.
2. Select a broad research question.
3. Define the parameters of your meta-analysis.
4. Quantify the relation of interest.
5. Specify inclusion & exclusion criteria.
6. Conduct a comprehensive literature search.
   - electronic databases
   - professional listservs & prominent scholars
   - references
   - keep thorough records
Steps of Conducting a Meta-Analysis

1. Identify an area of research ripe for meta-analysis.
2. Select a broad research question.
3. Define the parameters of your meta-analysis.
4. Quantify the relation of interest.
5. Specify inclusion & exclusion criteria.
6. Conduct a comprehensive literature search.
7. Collect information from studies.
Steps of Conducting a Meta-Analysis

1. Identify an area of research ripe for meta-analysis.
2. Select a broad research question.
3. Define the parameters of your meta-analysis.
4. Quantify the relation of interest.
5. Specify inclusion & exclusion criteria.
6. Conduct a comprehensive literature search.
7. Collect information from studies.
   → theoretical & methodological moderators
   → effect size information
   → sample & setting characteristics
Steps of Conducting a Meta-Analysis

1. Identify an area of research ripe for meta-analysis.
2. Select a broad research question.
3. Define the parameters of your meta-analysis.
4. Quantify the relation of interest.
5. Specify inclusion & exclusion criteria.
6. Conduct a comprehensive literature search.
7. Collect information from studies.
8. Integrate findings.
Steps of Conducting a Meta-Analysis

1. Identify an area of research ripe for meta-analysis.
2. Select a broad research question.
3. Define the parameters of your meta-analysis.
4. Quantify the relation of interest.
5. Specify inclusion & exclusion criteria.
6. Conduct a comprehensive literature search.
7. Collect information from studies.
8. Integrate findings.
   → models of error
   → average weighted effect size
   → heterogeneity analysis
Steps of Conducting a Meta-Analysis

1. Identify an area of research ripe for meta-analysis.
2. Select a broad research question.
3. Define the parameters of your meta-analysis.
4. Quantify the relation of interest.
5. Specify inclusion & exclusion criteria.
6. Conduct a comprehensive literature search.
7. Collect information from studies.
8. Integrate findings.
9. Reconcile findings.
Steps of Conducting a Meta-Analysis

1. Identify an area of research ripe for meta-analysis.
2. Select a broad research question.
3. Define the parameters of your meta-analysis.
4. Quantify the relation of interest.
5. Specify inclusion & exclusion criteria.
6. Conduct a comprehensive literature search.
7. Collect information from studies.
8. Integrate findings.
9. Reconcile findings.
   → moderator analyses to explain variation
   → shifting unit of analysis
Steps of Conducting a Meta-Analysis

1. Identify an area of research ripe for meta-analysis.
2. Select a broad research question.
3. Define the parameters of your meta-analysis.
4. Quantify the relation of interest.
5. Specify inclusion & exclusion criteria.
6. Conduct a comprehensive literature search.
7. Collect information from studies.
8. Integrate findings.
9. Reconcile findings.
Steps of Conducting a Meta-Analysis

1. Identify an area of research ripe for meta-analysis.
2. Select a broad research question.
3. Define the parameters of your meta-analysis.
4. Quantify the relation of interest.
5. Specify inclusion & exclusion criteria.
6. Conduct a comprehensive literature search.
7. Collect information from studies.
8. Integrate findings.
9. Reconcile findings.
Thanks!

Dent, A. L. (in prep). Uncovering common ground: Using meta-analysis to identify and reconcile inconsistencies in the way constructs are labeled, defined, and measured.
Questions?

adent2@unl.edu
Collaborations?

adent2@unl.edu