Context and Implications Document for: Ongoing developments in meta-analytic and quantitative synthesis methods: Broadening the types of research questions that can be addressed

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Authors' Introduction

Meta-analysis is one of the most common methods for synthesising (i.e., combining and analysing) the findings from multiple research studies. Since its inception 40 years ago, meta-analytic methods have continued to be developed quickly, and new quantitative synthesis methods are emerging. In order to help researchers to keep on top of the latest developments, this paper provides an overview of the state of the art of meta-analytic and quantitative synthesis methods. Throughout, we signpost to the reader the growing diversity of research questions that can be addressed by this burgeoning suite of approaches.

Understanding the potential and pitfalls of meta-analysis and other quantitative synthesis methods, however, is not simply about knowing the differences between statistical models. Other issues need to be considered in order to conduct or consume quantitative syntheses. The second part of this paper is therefore concerned with key issues for quantitative synthesis beyond the statistical models, with a focus on issues most relevant to educational research. These include publication bias; interpreting meta-analytic results; the relation between meta-analytic methods and theory; and the future of quantitative synthesis methods in educational research.

We emphasise throughout the need to adopt fit-for-purpose methods; to be critical of the ways that syntheses are conducted and presented to their audiences; and to be creative and flexible when designing or critiquing quantitative syntheses.

Implications for Policy and Practice

Quantitative synthesis methods are being developed in response to the needs of their intended audiences—policymakers, decision-makers, and practitioners. Review users are asking more complex questions, regarding complex phenomena, and in more complex contexts. Indeed, much innovation is occurring because of the increasing diversity of questions being asked by review users that were too complicated for existing meta-analytic methods. There are at least three ways in which researchers are responding to policy and practitioner needs:

Understanding variation in the evidence base. The latest developments in quantitative synthesis methods generally involve more configurative approaches to synthesis—that is, approaches that attempt to organise, explore, or explain trends and variation in the data—as opposed to purely aggregating research findings to get an overall result. Disentangling diversity helps us to go beyond questions about "what works", towards questions about "for whom, why, under what circumstances", and so on.

Exploring comparative effectiveness. Policy-makers and practitioners often want to know about the comparative effectiveness of different interventions. In other words, of a range of possible options, which is most likely to work (and for whom)? New methods are helping reviewers to compare directly (and sometimes even rank) different interventions for the same outcomes.

Communicating real-world meaning. Policymakers, decision-makers, and practitioners are increasingly wanting to know the practical significance of a given intervention (e.g., how many more students will stay in school, etc.). Approaches to interpreting and communicating the real-world implications of meta-analytic results is an area that is still in development, but initial steps towards thinking about solutions to this problem are being taken.

Suggested reading

- The 2015 special issue of *Research Synthesis Methods* on the origins and history of modern meta-analysis (vol 6, issue 3) has a range of relevant and interesting papers; in particular, see Gene Glass's contribution, "Meta-analysis at middle age: a personal history". Many of the papers, particularly the commentaries, reflect on challenges and developments in meta-analytic methods beyond the scope of our paper.
- Mark Petticrew's (2015) paper, "Time to rethink the systematic review catechism? Moving from 'what works' to 'what happens'" (*Systematic reviews, 4*(36)), discusses critical issues relating to systematic reviews and research synthesis that need to be reconsidered.
- Gough, Thomas, and Oliver's (2012) paper, "Clarifying differences between review designs and methods" (*Systematic Reviews, 1*(28)), goes into detail about the difference between configuring and aggregating research in systematic reviews. This distinction is one of the driving forces behind synthesis methods development.

Focus Questions

1. How are quantitative synthesis methods, including meta-analysis, being developed to meet the increasingly diverse informational needs of policymakers, decision-makers, and practitioners?
2. Does the growing suite of quantitative synthesis methods make it more difficult to conduct, engage with, and critically appraise meta-analyses and systematic reviews? How can we help to mediate the challenges introduced by the expanding number of methods available for synthesis?
3. Does the development of new methods have implications for 'old' meta-analyses? For example, could this mean that some existing meta-analyses need to be re-analysed where more appropriate techniques have subsequently been developed?