

Recent volumes include:

Key Concepts in Sport Psychology
John M D Kremer, Aidan Moran,
Cathy Craig and Graham Walker

Key Concepts in Sports Studies
Stephen Wagg, Belinda Wheaton,
Carlton Brick and Jayne Caudwell

**Key Concepts in Sport and Exercise
Sciences**
David Kirk, Carlton Cooke, Anne
Flinthoff and Jim McKenna

Key Concepts in Tourist Studies
Melanie Smith, Nicola MacLeod and
Margaret Hart Robertson

Key Concepts in Leisure Studies
David Harris

Key Concepts in Public Health
Frances Wilson and Andi Mabhala

Key Concepts in Health Psychology
Ian Albery and Marcus Munafò

Key Concepts in Health Studies
Chris Yull, Iain Crinson and Eilidh
Duncan

MICHAEL ATKINSON

The SAGE Key Concepts series provides students with accessible and authoritative knowledge of the essential topics in a variety of disciplines. Cross-referenced throughout, the format encourages critical evaluation through understanding. Written by experienced and respected academics, the books are indispensable study aids and guides to comprehension.

Key Concepts in Sport and Exercise Research Methods



Los Angeles | London | New Delhi
Singapore | Washington DC

Meta-Analysis

Among the most luxurious aspects of life as a graduate student is the sheer amount of time one is given to simply read and learn. Reviewing literature never seemed like an onerous task. Today, I struggle at great length to find an hour or two during the week to sit and read; to direct attention towards what others in my field are saying, proposing and advancing. But all is not lost! What if students and colleagues publish systematic reviews of literature they have undertaken? Could this be possible? Indeed it is, and we call them meta-analyses. In the past decade I have come to cherish reviews of literature published as meta-analyses of a subject. A meta-analysis on a topic of one's interest is a gift sent from the divine. There are differences in how meta-analyses are constructed or utilised in separate sub-disciplines, but their popularity is growing quickly.

WHAT IS THIS CONCEPT?

The short, definitional answer is that a meta-analysis is an expansive literature review designed to collate, synthesise and summarise extant evidence or theory on a very narrow subject of interest. Normally, meta-analyses are performed using quantitative findings on a subject. By far the most common use of meta-analysis has been in *quantitative literature reviews*. These are review articles where the researcher selects a research finding or statistical effect that has been investigated in primary research under a large number of different circumstances – say, for example, important studies documenting the statistical effects of walking for 30–45 minutes per day on the risk of contracting a cardiovascular disease (CVD). They then use meta-analysis to help them describe the overall strength of the effect (the impact of walking on CVD), and under what empirical circumstances it is stronger or weaker. Recently, as knowledge of meta-analytic techniques has become more widespread, researchers have begun to use *meta-analytic summaries* within primary research papers. In this case, meta-analysis is used to provide information supporting a special theoretical statement or hypothesis being tested by a researcher, usually about the overall strength or consistency of a relationship within the studies being conducted. We therefore use previously published meta-analysis to justify our own research project's hypotheses.

The two most often noted approaches to qualitative meta-analysis are the 'metaphoric translation' approach within the field of ethnography (Noblit and Hare, 1988) and a thematic synthesis approach most often associated with grounded theory development (Patterson et al., 2001). These approaches fall within traditional qualitative inquiry, highlight the importance of context, and both tend to focus on research questions that seek the meaning of 'lived experiences' of groups and individuals. For example, the research questions have often been in regard to the exploration of the meaning of illness or health. The work of Shao (1991) and the application of his work by Patterson, Thorne, Canam and Jillings (2001) suggest that a qualitative meta-synthesis should include an analysis of theory (meta-theory), an analysis of method (meta-method) and an analysis of findings (meta-analysis). What a lot of analyses! This means we summarise what we know theoretically, how we tend to know this, and what, specifically, about a subject we think we know. When someone conducts a meta-analysis using this tactic, there is a tendency to call the approach a 'triangulated' meta-analysis.

WHY IS THIS RELEVANT TO ME?

The answer pertaining to a meta-analysis's relevance is somewhat of a methodological no-brainer. If I set out on a course of quantitative, experimental research to examine the effects of 45 minutes of brisk walking (daily, over three months) on one's health, the very first thing I would do is consult the literature in search of a meta-analysis on the subject. Meta-analyses are not replacements for one's own reading or familiarity with a body of knowledge, but they do provide a useful starting point to examine the aggregate effect of walking on health. The meta-analysis could suggest the need for alternative hypotheses than those studied to date, along with alternative protocols and alternative samples. But quantitative meta-analyses serve additional purposes. As 'diagnostic' papers, they cull diverse studies with (often) small sample sizes into a larger pool of subjects. Rather than examining the impact of walking on a group of 25, 129, or 13, or 67, when the separate studies are pooled together, the people included in the analysis might range in the hundreds or thousands. The problem of extracting meaningful statistical inferences from small sample sizes is then partly solved. If the goal of quantitative research is to produce generalised statements of relationship between two or more variables, then pooled and aggregately analysed data provide a step in the right direction. With respect to qualitative research, meta-analyses (or meta-syntheses) are invaluable

for their summary of both the main theoretical ways of seeing a field of study, but also for their systematic review of what is known about a topic of interest. Qualitative meta-analyses are more than summaries of effects and dominant theories tested, they are attempts to define the body of knowledge pertaining to a subject. The path-breaking meta-analytic work on chronic illness by Patterson, Thorne, Canam and Jillings (2001) illustrates how patterns of thinking about a subject can be shifted when researchers perform a meta-analysis well.

SHOW ME HOW IT'S USED!

Unlike many of the concepts and techniques discussed in this book, the process of performing a meta-analysis is fairly prescribed. For example, two main sources provide information and guidance on how to conduct a quantitative meta-analysis. First, the CONSORT (Consolidated Standards of Reporting Trials) Group is an international group of medical journal editors, clinical trialists, epidemiologists and methodologists who provide advice on how to report and analyse clinical trial research. The CONSORT group's endorsement of the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement on how to conduct a meta-analysis has been influential in creating an international set of standards for conducting and publishing meta-analyses. The aim of the PRISMA Statement is to help authors improve the reporting of systematic reviews and meta-analyses. We have focused on randomised trials, but PRISMA can also be used as a basis for reporting systematic reviews of other types of research, particularly evaluations of interventions. PRISMA may also be useful for critical appraisal of published systematic reviews, although it is not a quality assessment instrument, to gauge the quality of a systematic review. The PRISMA Statement (formerly QUOROM Statement) consists of a 27-item checklist and a four-phase flow diagram that researchers should use when selecting studies to be included in a meta-review, and gives advice as to how the data should be interpreted.

Second, perhaps the best-known source for meta-analyses is called 'The Cochrane Collaboration', a group of over 18,000 specialists in health care who systematically review randomised control trials on the effects of prevention, treatments and rehabilitation as well as health systems interventions. When appropriate, they also include the results of other types of research. Cochrane reviews are published in *The Cochrane Database of Systematic Reviews* section of the Cochrane Library, which to date includes 6,244 articles; 4,130 reviews; and 1,911 protocols for

additional reviews being conducted. The Cochrane Group provides a handbook for systematic reviewers of interventions, where they suggest that each systematic review should contain the following main sections:

- Background;
- Objectives;
- Methods of the review;
- Results;
- Conclusion and discussion.

According to the Cochrane group, there are seven steps for preparing and maintaining a systematic review:

1. Formulating a problem;
2. Locating and selecting studies;
3. Critical appraisal of studies;
4. Collecting data;
5. Analysing and presenting results;
6. Interpreting results;
7. Improving and updating reviews.

Although less frequently cited than the PRISMA Statement or the Cochrane method, the MOOSE (Meta-Analysis of Observation Studies in Epidemiology) is another template for performing meta-reviews.

The method of conducting qualitative meta-analyses is not nearly as delineated and collectively agreed upon as in the quantitative scenario. Qualitative meta-analysis is a set of techniques analogous to the comparative analysis method favoured by grounded theorists for synthesising qualitative studies. Qualitative meta-analysis was most notably championed by Noblit and Hare (1988), as a technique for deriving higher-order theoretical understandings of a subject from multiple qualitative studies. The overall aim of meta-ethnography is to achieve greater understanding of a subject by attaining a level of conceptual or theoretical development beyond that achieved in any individual empirical study alone. There are four general stages of a qualitative meta-analysis: the development of a search strategy to locate studies; the application of inclusion/exclusion criteria to studies (criteria generally include how to detect a 'sound' versus a poor qualitative study); quality appraisal of each study; and the integration/synthesis of study findings (which may or may not include a review of dominant theories and methods employed). The qualitative

meta-analysis method itself involves selecting relevant empirical studies to be synthesised, then reading them repeatedly and noting down key themes or concepts running across the studies.

PROBLEMS, PITFALLS AND CONTROVERSIES

Several main criticisms apply to both quantitative and qualitative meta-analyses, and others to one group alone. First, decisions about which studies are included or excluded in a meta-analysis are neither clear nor objective in many cases. Second, meta-analysts are criticised for lumping chalk and cheese together for comparison. When studies of the same subject vary considerably in their shape, content and production, can they be legitimately standardised and aggregated? Third, there is a perceived bias in meta-analysis for published research – which has a tendency to only report statistically (quantitative) or conceptually (qualitative) ‘significant’ results; and therefore totally ignores findings that might be important but do not meet rigidly applied methodological criteria and conventions.) Fourth, all published data has already been reduced in scope, volume and content from the ‘raw’ data collected in studies.

Perhaps the most consequential criticism of quantitative meta-analysis is that the study itself is not ‘scientific’ *per se*. While statistical techniques are employed to analyse effect sizes, the study itself is not based on traditional scientific, controlled, double-blind designs. Biases in sample inclusion, comparisons of non-standardised data and the inclusion of methodologically weak or suspect studies in a meta-analysis are equally problematic. On these grounds, based on the vested interests of a particular researcher conducting a meta-analysis (say, to illustrate no difference in walking every day and the reduction of CVD) one or another way to select the appropriate studies for inclusion could be devised to determine the results in advance. With respect to qualitative meta-analysis, one major problem stands out as a potential Achilles heel of the approach. If qualitative research itself is openly criticised for losing a bit of ‘reality’ or everyday meaning through the interpretation filtration process undertaken by researchers in the field (as I interpret other people’s interpretations of reality and then summarise them conceptually!), then meta-analysis presumes one can unproblematically interpret people’s (researchers’) interpretations of people’s (subjects’) interpretations of reality. Try saying that one 10 times fast.

See also: Causality; Translation.

KEY READINGS

- Borenstein, M. (2009) *Introduction to Meta-Analysis*. New York: Wiley.
- Cooper, H. (2009) *Research Synthesis and Meta-Analysis*. London: Sage.
- Lipsey, M. and Wilson, D. (2001) *Practical Meta-Analysis*. London: Sage.
- Noblit, G. and Hare, R. (1988) *Meta-Ethnography: Synthesising Qualitative Studies*. Newbury Park, CA: Sage Publications.
- Patterson, B., Thorne, S., Canam, C. and Jillings, C. (2001) *Meta-Study of Qualitative Health Research: A Practical Guide to Meta-Analysis and Meta-Synthesis*. Thousand Oaks, CA: Sage.
- Rosenthal, R. (1991) *Meta-Analytic Procedures for Social Research*. London: Sage.
- Shao, S. (1991) 'Meta-theory, meta-method, meta-data analysis. What, why, and how?' *Sociological Perspectives* 34: 377-390.
- Sutton, A., Jones, D., Abrams, K., Sheldon, T. and Song, F. (2000) *Methods for Meta-Analysis in Medical Research*. London: John Wiley.

Ontology

I could devote pages and pages to the complex philosophical discussion of ontology and academic research, but I will not. Ontological questions have preoccupied academic thinking and modern disciplines for ages. Disciplines in the humanities, social science, physical sciences and the arts all weigh in on a variety of ontological perspectives and positions. I could be wrong, but I firmly believe one's ontological stance is the very cornerstone of one's entire research career, let alone the foundation of a single research project in one's subject of interest. Ontological questions and positions are no laughing matter, and before anyone can embark on a quest to know something, they must possess an idea about what can be known at all. Determining the latter is the beginning of one's relationship with the idea of ontology

WHAT IS THIS CONCEPT?

Ontology may be defined as a special branch of philosophy pertaining to central metaphysical questions about the world. Okay, I know that is probably a very confusing set of ideas to manage at once. Metaphysics is