introduction to meta analysis michael borenstein

Introduction to Meta-Analysis: Mastering the Michael Borenstein Approach

Meta-analysis. The very term might evoke images of complex statistical procedures and impenetrable jargon. But in reality, this powerful research synthesis technique allows us to glean meaningful insights from multiple studies on a single topic, providing a more robust and comprehensive understanding than any single study could offer alone. This post serves as your comprehensive guide to understanding meta-analysis, specifically leveraging the expertise presented in Michael Borenstein's seminal work. We'll explore the core concepts, practical applications, and common pitfalls, equipping you with the knowledge to critically appraise and even conduct your own meta-analyses. Prepare to unlock the power of aggregated research data!

Understanding the Foundation: What is Meta-Analysis?

Meta-analysis isn't simply summarizing individual studies; it's a statistical technique that combines the results of multiple independent studies addressing the same research question. Think of it as a "study of studies." By combining data from these disparate sources, meta-analysis can identify overall trends, patterns, and effect sizes that individual studies might miss due to small sample sizes or inherent variability. This enhanced statistical power allows for more precise conclusions and stronger evidence-based recommendations.

Michael Borenstein, a leading figure in the field, has significantly contributed to making meta-analysis more accessible and understandable. His books, particularly "Introduction to Meta-Analysis," provide a clear and structured approach to understanding and conducting this powerful methodology. We'll delve into the key concepts outlined in his work to help you navigate this essential research methodology.

Why Use Meta-Analysis? The Power of Synthesis

Several compelling reasons justify the use of meta-analysis:

Increased Statistical Power: Combining data from multiple studies increases the overall sample size, leading to a more precise estimate of the true effect size. Small individual studies may yield insignificant results, but when combined, a significant effect may emerge.

Resolution of Conflicting Results: Meta-analysis can help resolve discrepancies between individual studies. By statistically weighting studies based on their sample size and quality, it can identify potential biases and inconsistencies.

Identification of Moderators and Mediators: This powerful technique can identify factors that influence the magnitude of the effect being studied (moderators) and the mechanisms through which the effect occurs (mediators). This adds depth and richness to the understanding of the research question.

Improved Generalizability: By synthesizing findings across diverse studies, meta-analysis enhances the generalizability of the results, suggesting broader implications and applications.

Cost-Effectiveness: Meta-analysis is often more cost-effective than conducting a new large-scale study, especially when substantial research already exists on a topic.

Key Concepts from Borenstein's "Introduction to Meta-Analysis"

Borenstein's book provides a structured approach to understanding and conducting meta-analyses, making it an essential resource for both beginners and experienced researchers. Let's explore the core concepts:

1. Effect Size: This is a crucial concept representing the magnitude of the relationship between variables in a study. Borenstein explains various effect size measures, emphasizing their appropriate application depending on the type of data (e.g., means, proportions, correlations). Understanding effect sizes is paramount for comparing results across different studies.

1. Weighting Studies: Studies aren't treated equally in a meta-analysis. Borenstein highlights the importance of weighting studies based on their sample size and precision. Studies with larger sample sizes and smaller standard errors receive greater weight, reflecting their greater contribution to the overall estimate.

1. Heterogeneity: This refers to the variability in effect sizes across studies. Borenstein details various statistical methods for quantifying and exploring heterogeneity, identifying potential sources of variation, and deciding whether a fixed-effects or random-effects model is more appropriate.

1. Publication Bias: The tendency for studies with statistically significant results to be published more frequently than those with null findings can skew meta-analytic results. Borenstein addresses strategies to detect and mitigate the impact of publication bias.

1. Sensitivity Analysis: Borenstein emphasizes the importance of performing sensitivity analyses to assess the robustness of the findings to changes in the analysis methods or inclusion criteria. This helps determine the reliability and generalizability of the results.

A Detailed Outline of Borenstein's "Introduction to Meta-Analysis"

Here’s a simplified outline of the key components of Michael Borenstein's book:

Introduction: Setting the stage for meta-analysis, defining its purpose and benefits.
Chapter 1: Basic Concepts: Introducing key terms, effect sizes, and the fundamentals of combining study results.
Chapter 2: Data Preparation and Coding: Practical guidance on extracting relevant data from individual studies and preparing it for analysis.
Chapter 3: Fixed-Effects and Random-Effects Models: Explaining the differences and appropriate application of these two fundamental models.
Chapter 4: Heterogeneity and its Sources: Understanding and addressing the variability in effect sizes across studies.
Chapter 5: Publication Bias: Detecting and mitigating the impact of publication bias on meta-analytic results.
Chapter 6: Subgroup Analysis: Exploring how different subgroups of studies might influence the overall effect.
Chapter 7: Meta-Regression: Using meta-regression to explore relationships between study characteristics and effect sizes.
Chapter 8: Reporting and Interpreting Results: Properly communicating findings and interpreting the results in a meaningful context.
Conclusion: Summarizing key takeaways and emphasizing the value and limitations of meta-analysis.

Detailed Explanation of Outline Points

1. Introduction: This sets the stage, explaining what meta-analysis is, its benefits over traditional literature reviews, and provides a roadmap for

the subsequent chapters.

1. Basic Concepts: This section rigorously defines crucial terms such as effect size (e.g., Cohen's d, odds ratio), confidence intervals, and the statistical basis for combining results from different studies. The concept of weighting studies based on their precision is introduced.

1. Data Preparation and Coding: This crucial chapter addresses the practical challenges of extracting relevant data from primary studies. It emphasizes the importance of consistent data extraction, dealing with missing data, and employing appropriate coding techniques to prepare the data for analysis using statistical software.

1. Fixed-Effects and Random-Effects Models: This chapter explains the core differences between these two approaches. Fixed-effects models assume a single true effect size underlying all studies, while random-effects models account for variability between studies, providing a more conservative estimate. The choice of model depends on the presence and extent of heterogeneity.

1. Heterogeneity and its Sources: This is a critical section. Heterogeneity signifies variability in effect sizes across studies. Borenstein discusses methods to quantify heterogeneity (e.g., I^2) and explores potential sources, such as differences in study populations, interventions, or measurement methods.

1. Publication Bias: This chapter explores the pervasive problem of publication bias, where studies with significant findings are more likely to be published than those with null results. Various methods for detecting and mitigating publication bias are presented, including funnel plots and statistical techniques.

1. Subgroup Analysis: This involves exploring the effects within different subgroups of studies based on characteristics like sample size, population characteristics, or intervention type. Subgroup analysis

helps understand the conditions under which the effect is stronger or weaker.

1. Meta-Regression: Meta-regression is a powerful technique that allows researchers to statistically explore the relationship between study characteristics (e.g., sample size, age of participants) and effect sizes. This can reveal potential moderators of the effect.

1. Reporting and Interpreting Results: This final chapter emphasizes the importance of clearly and accurately reporting meta-analytic findings. It highlights the need to provide sufficient detail about the methods, results, and limitations of the analysis. Proper interpretation of confidence intervals and p-values is also stressed.

Conclusion: This summarizes the key concepts, highlights the strengths and limitations of meta-analysis, and underscores its role in evidence-based decision-making.

Frequently Asked Questions (FAQs)

1. What software is best for conducting a meta-analysis? Several statistical packages can perform meta-analyses, including R (with packages like `metafor`), Stata, and RevMan. The choice often depends on familiarity and the specific needs of the analysis.

1. What are the limitations of meta-analysis? Meta-analyses are only as good as the studies they include. Poor-quality studies or publication bias can significantly affect the results. Furthermore, meta-analyses cannot establish causal relationships.

1. How do I determine the appropriate effect size measure? The choice of effect size measure depends on the type of data. For continuous outcomes, Cohen's d or standardized mean difference is often used; for binary outcomes, odds ratios or risk ratios are common.

1. What is the difference between a fixed-effects and a random-effects model? A fixed-effects model assumes a single true effect size, while a random-effects model accounts for between-study variability.

1. How do I assess heterogeneity in a meta-analysis? Heterogeneity is typically assessed using statistics like I^2 and the Q-statistic. Values of I^2 above 50% often suggest substantial heterogeneity.

1. How do I address publication bias in a meta-analysis? Methods for addressing publication bias include visual inspection of funnel plots, statistical tests for asymmetry, and sensitivity analyses.

1. What is the role of sensitivity analysis in meta-analysis? Sensitivity analysis involves repeating the analysis with different assumptions or inclusion criteria to assess the robustness of the results.

1. How do I interpret the results of a meta-analysis? The results should be interpreted considering the confidence intervals, heterogeneity, and potential sources of bias. Consider whether the findings are clinically meaningful.

1. Can meta-analysis prove causality? No, meta-analysis cannot prove causality. It can only demonstrate the strength and consistency of an association between variables across multiple studies.

Related Articles

1. "Understanding Effect Sizes in Meta-Analysis": This article provides a detailed explanation of various effect size measures and their interpretation.

1. "Dealing with Missing Data in Meta-Analysis": A guide to handling missing data and its impact on the results.

1. "Assessing Heterogeneity in Meta-Analysis: A Practical Guide": In-depth exploration of heterogeneity and its implications.

1. "Publication Bias in Meta-Analysis: Detection and Mitigation": Comprehensive overview of publication bias and strategies to address it.

1. "Subgroup Analysis in Meta-Analysis: A Step-by-Step Approach": Detailed guide to performing and interpreting subgroup analyses.

1. "Meta-Regression in Meta-Analysis: Exploring Moderators": Explores the use of meta-regression to identify moderators of effects.

1. "Choosing Between Fixed-Effects and Random-Effects Models in Meta-Analysis": A comparison of the two models and guidance on selecting the most appropriate one.

1. "Reporting Meta-Analyses: Guidelines and Best Practices": A guide to effectively communicating meta-analytic results.

1. "The Importance of Sensitivity Analysis in Meta-Analysis": A detailed discussion of the role of sensitivity analysis in enhancing the robustness of findings.

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series of separate studies. Meta-analysis has become a critically important tool in fields as diverse as medicine, pharmacology, epidemiology, education, psychology, business, and ecology. Introduction to Meta-Analysis: Outlines the role of meta-analysis in the research process Shows how to compute effects sizes and treatment effects Explains the fixed-effect and random-effects models for synthesizing data Demonstrates how to assess and interpret variation in effect size across studies Clarifies concepts using text and figures, followed by formulas and examples Explains how to avoid common mistakes in meta-analysis Discusses controversies in meta-analysis Features a web site with additional material and exercises A superb combination of lucid prose and informative graphics, written by four of the world's leading experts on all aspects of meta-analysis. Borenstein, Hedges, Higgins, and Rothstein provide a refreshing departure from cookbook approaches with their clear explanations of the what and why of meta-analysis. The book is ideal as a course textbook or for self-study. My students, who used pre-publication versions of some of the chapters, raved about the clarity of the explanations and examples. David Rindskopf, Distinguished Professor of Educational Psychology, City University of New York, Graduate School and University Center, & Editor of the Journal of Educational and Behavioral Statistics. The approach taken by Introduction to Meta-analysis is intended to be primarily conceptual, and it is amazingly successful at achieving that goal. The reader can comfortably skip the formulas and still understand their application and underlying motivation. For the more statistically sophisticated reader, the relevant formulas and worked examples provide a superb practical guide to performing a meta-analysis. The book provides an eclectic mix of examples from education, social science, biomedical studies, and even ecology. For anyone considering leading a course in meta-analysis, or pursuing self-directed study, Introduction to Meta-analysis would be a clear first choice. Jesse A. Berlin, ScD Introduction to Meta-Analysis is an excellent resource for novices and experts alike. The book provides a clear and comprehensive presentation of all basic and most advanced approaches to meta-analysis. This book will be referenced for decades. Michael A. McDaniel, Professor of Human Resources and Organizational Behavior, Virginia Commonwealth University

introduction to meta analysis michael borenstein: Introduction to Meta-Analysis Michael Borenstein, Larry V. Hedges, Julian P. T. Higgins, Hannah R. Rothstein, 2021-04-06 This book provides a clear and thorough introduction to meta-analysis, the process of synthesizing data from a series of separate studies. The first edition of this text was widely acclaimed for the clarity of the presentation, and quickly established itself as the definitive text in this field. The fully updated second edition includes new and expanded content on avoiding common mistakes in meta-analysis, understanding heterogeneity in effects, publication bias, and more. Several brand-new chapters provide a systematic "how to" approach to performing and reporting a meta-analysis from start to finish. Written by four of the world's foremost authorities on all aspects of meta-analysis, the new edition: Outlines the role of meta-analysis in the research process Shows how to compute effects sizes and treatment effects Explains the fixed-effect and random-effects models for synthesizing data Demonstrates how to assess and interpret variation in effect size across studies Explains how to avoid common mistakes in meta-analysis Discusses controversies in meta-analysis Includes access to a companion website containing videos, spreadsheets, data files, free software for prediction intervals, and step-by-step instructions for performing analyses using Comprehensive Meta-Analysis (CMA)TM Download videos, class materials, and worked examples at www.Introduction-to-Meta-Analysis.com

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introduction to meta analysis michael borenstein: *Common Mistakes in Meta-Analysis* Michael Borenstein, 2019-08-15

introduction to meta analysis michael borenstein: Publication Bias in Meta-Analysis

Hannah R. Rothstein, Alexander J. Sutton, Michael Borenstein, 2005-11-18 Publication bias is the tendency to decide to publish a study based on the results of the study, rather than on the basis of its theoretical or methodological quality. It can arise from selective publication of favorable results, or of statistically significant results. This threatens the validity of conclusions drawn from reviews of published scientific research. Meta-analysis is now used in numerous scientific disciplines, summarizing quantitative evidence from multiple studies. If the literature being synthesised has been affected by publication bias, this in turn biases the meta-analytic results, potentially producing overstated conclusions. Publication Bias in Meta-Analysis examines the different types of publication bias, and presents the methods for estimating and reducing publication bias, or eliminating it altogether. Written by leading experts, adopting a practical and multidisciplinary approach. Provides comprehensive coverage of the topic including: Different types of publication bias, Mechanisms that may induce them, Empirical evidence for their existence, Statistical methods to address them, Ways in which they can be avoided. Features worked examples and common data sets throughout. Explains and compares all available software used for analysing and reducing publication bias. Accompanied by a website featuring software, data sets and further material. Publication Bias in Meta-Analysis adopts an inter-disciplinary approach and will make an excellent reference volume for any researchers and graduate students who conduct systematic reviews or meta-analyses. University and medical libraries, as well as pharmaceutical companies and government regulatory agencies, will also find this invaluable.

introduction to meta analysis michael borenstein: Handbook of Meta-analysis in Ecology and Evolution Julia Koricheva, Jessica Gurevitch, Kerrie Mengersen, 2013-04-21 Meta-analysis is a powerful statistical methodology for synthesizing research evidence across independent studies. This is the first comprehensive handbook of meta-analysis written specifically for ecologists and evolutionary biologists, and it provides an invaluable introduction for beginners as well as an up-to-date guide for experienced meta-analysts. The chapters, written by renowned experts, walk readers through every step of meta-analysis, from problem formulation to the presentation of the results. The handbook identifies both the advantages of using meta-analysis for research synthesis and the potential pitfalls and limitations of meta-analysis (including when it should not be used). Different approaches to carrying out a meta-analysis are described, and include moment and least-square, maximum likelihood, and Bayesian approaches, all illustrated using worked examples based on real biological datasets. This one-of-a-kind resource is uniquely tailored to the biological sciences, and will provide an invaluable text for practitioners from graduate students and senior scientists to policymakers in conservation and environmental management. Walks you through every step of carrying out a meta-analysis in ecology and evolutionary biology, from problem formulation to result presentation Brings together experts from a broad range of fields Shows how to avoid, minimize, or resolve pitfalls such as missing data, publication bias, varying data quality, nonindependence of observations, and phylogenetic dependencies among species Helps you choose the right software Draws on numerous examples based on real biological datasets

introduction to meta analysis michael borenstein: *Applied Meta-Analysis for Social Science Research* Noel A. Card, 2015-10-06 Offering pragmatic guidance for planning and conducting a meta-analytic review, this book is written in an engaging, nontechnical style that makes it ideal for graduate course use or self-study. The author shows how to identify questions that can be answered using meta-analysis, retrieve both published and unpublished studies, create a coding manual, use traditional and unique effect size indices, and write a meta-analytic review. An ongoing example illustrates meta-analytic techniques. In addition to the fundamentals, the book discusses more advanced topics, such as artifact correction, random- and mixed-effects models, structural equation representations, and multivariate procedures. User-friendly features include annotated equations; discussions of alternative approaches; and Practical Matters sections that give advice on topics not often discussed in other books, such as linking meta-analytic results with theory and the utility of meta-analysis software programs. ÿ

introduction to meta analysis michael borenstein: Doing Meta-Analysis with R Mathias

Harrer, Pim Cuijpers, Toshi A. Furukawa, David D. Ebert, 2021-09-15 Doing Meta-Analysis with R: A Hands-On Guide serves as an accessible introduction on how meta-analyses can be conducted in R. Essential steps for meta-analysis are covered, including calculation and pooling of outcome measures, forest plots, heterogeneity diagnostics, subgroup analyses, meta-regression, methods to control for publication bias, risk of bias assessments and plotting tools. Advanced but highly relevant topics such as network meta-analysis, multi-three-level meta-analyses, Bayesian meta-analysis approaches and SEM meta-analysis are also covered. A companion R package, dmetar, is introduced at the beginning of the guide. It contains data sets and several helper functions for the meta and metafor package used in the guide. The programming and statistical background covered in the book are kept at a non-expert level, making the book widely accessible. Features • Contains two introductory chapters on how to set up an R environment and do basic imports/manipulations of meta-analysis data, including exercises • Describes statistical concepts clearly and concisely before applying them in R • Includes step-by-step guidance through the coding required to perform meta-analyses, and a companion R package for the book

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introduction to meta analysis michael borenstein: Statistical Methods for Meta-Analysis Larry V. Hedges, Ingram Olkin, 2014-06-28 The main purpose of this book is to address the statistical issues for integrating independent studies. There exist a number of papers and books that discuss the mechanics of collecting, coding, and preparing data for a meta-analysis , and we do not deal with these. Because this book concerns methodology, the content necessarily is statistical, and at times mathematical. In order to make the material accessible to a wider audience, we have not provided proofs in the text. Where proofs are given, they are placed as commentary at the end of a chapter. These can be omitted at the discretion of the reader.Throughout the book we describe computational procedures whenever required. Many computations can be completed on a hand

calculator, whereas some require the use of a standard statistical package such as SAS, SPSS, or BMD. Readers with experience using a statistical package or who conduct analyses such as multiple regression or analysis of variance should be able to carry out the analyses described with the aid of a statistical package.

introduction to meta analysis michael borenstein: Cochrane Handbook for Systematic Reviews of Interventions Julian P. T. Higgins, Sally Green, 2008-11-24 Healthcare providers, consumers, researchers and policy makers are inundated with unmanageable amounts of information, including evidence from healthcare research. It has become impossible for all to have the time and resources to find, appraise and interpret this evidence and incorporate it into healthcare decisions. Cochrane Reviews respond to this challenge by identifying, appraising and synthesizing research-based evidence and presenting it in a standardized format, published in The Cochrane Library (www.thecochranelibrary.com). The Cochrane Handbook for Systematic Reviews of Interventions contains methodological guidance for the preparation and maintenance of Cochrane intervention reviews. Written in a clear and accessible format, it is the essential manual for all those preparing, maintaining and reading Cochrane reviews. Many of the principles and methods described here are appropriate for systematic reviews applied to other types of research and to systematic reviews of interventions undertaken by others. It is hoped therefore that this book will be invaluable to all those who want to understand the role of systematic reviews, critically appraise published reviews or perform reviews themselves.

introduction to meta analysis michael borenstein: How Science Takes Stock Morton Hunt, 1997-04-24 Policymakers, medical practitioners, and the public alike face an increasingly bewildering flood of new and often contradictory scientific studies on almost every topic. Whether the issue is the the best treatment for breast cancer, the need for prenatal food programs to improve the health of poor infants and mothers, or the ability of women to succeed in scientific professions, the healthy growth of modern science has at times done more to stir up controversy than to establish reliable knowledge. But now scientists in several fields have developed a sophisticated new methodology called meta-analysis to address this problem. By numerically combining diverse research findings on a single question, meta-analysis can be used to identify their central tendency and reach conclusions far more reliable than those of any single investigation. How Science Takes Stock vividly tells the story of meta-analysis through the eyes of its architects and champions, and chronicles its history, techniques, achievements, and controversies. Noted science author Morton Hunt visits key practitioners and recounts their use of meta-analysis to resolve important scientific puzzles and longstanding debates. Does psychotherapy work, and if so what form works best? Does spending federal money on education really improve student performance? Can a single enzyme significantly decrease the risk of heart attack? Do boot camps reduce juvenile delinquency? With each account, Hunt illustrates the major components of the meta-analytic method, reveals strategies for resolving practical and theoretical problems, and discusses the impact of meta-analysis on the science and policy communities. In many cases, he demonstrates how meta-analysts have gone a step further to determine the causes of earlier discrepancies. In this way they not only identify successful approaches to the question at hand, but also clarify the conditions under which they will work best. Hunt also portrays the important but frequently controversial business of doing meta-analysis for legislators and government agencies, particularly in sensitive areas of social policy. How Science Takes Stock demonstrates how the statistical techniques of meta-analysis produce more accurate data than the standard literature review or the old-fashioned process of tallying up the results of each scientific study as if they were votes in an election to decide the truth. Hunt also addresses issues of quality control in each phase of the meta-analytic process, and answers skeptics who claim that the dissimilarities between studies are often too significant for meta-analysis to be any more than an apples and oranges approach. This volume conveys the power of meta-analysis to help social policymakers and health professionals resolve their most pressing problems. How Science Takes Stock concludes with a discussion of the future of meta-analysis that examines its potential for further refinements, its growth in the scientific literature, and exciting

new possibilities for its future use. An appendix by meta-analysis expert Harris Cooper offers some finer points on the mechanics of conducting a meta-analytic investigation.

introduction to meta analysis michael borenstein: *The Handbook of Research Synthesis and Meta-Analysis* Harris Cooper, Larry V. Hedges, Jeffrey C. Valentine, 2019-06-14 Research synthesis is the practice of systematically distilling and integrating data from many studies in order to draw more reliable conclusions about a given research issue. When the first edition of The Handbook of Research Synthesis and Meta-Analysis was published in 1994, it quickly became the definitive reference for conducting meta-analyses in both the social and behavioral sciences. In the third edition, editors Harris Cooper, Larry Hedges, and Jeff Valentine present updated versions of classic chapters and add new sections that evaluate cutting-edge developments in the field. The Handbook of Research Synthesis and Meta-Analysis draws upon groundbreaking advances that have transformed research synthesis from a narrative craft into an important scientific process in its own right. The editors and leading scholars guide the reader through every stage of the research synthesis process—problem formulation, literature search and evaluation, statistical integration, and report preparation. The Handbook incorporates state-of-the-art techniques from all quantitative synthesis traditions and distills a vast literature to explain the most effective solutions to the problems of quantitative data integration. Among the statistical issues addressed are the synthesis of non-independent data sets, fixed and random effects methods, the performance of sensitivity analyses and model assessments, the development of machine-based abstract screening, the increased use of meta-regression and the problems of missing data. The Handbook also addresses the non-statistical aspects of research synthesis, including searching the literature and developing schemes for gathering information from study reports. Those engaged in research synthesis will find useful advice on how tables, graphs, and narration can foster communication of the results of research syntheses. The third edition of the Handbook provides comprehensive instruction in the skills necessary to conduct research syntheses and represents the premier text on research synthesis. Praise for the first edition: The Handbook is a comprehensive treatment of literature synthesis and provides practical advice for anyone deep in the throes of, just teetering on the brink of, or attempting to decipher a meta-analysis. Given the expanding application and importance of literature synthesis, understanding both its strengths and weaknesses is essential for its practitioners and consumers. This volume is a good beginning for those who wish to gain that understanding. —Chance Meta-analysis, as the statistical analysis of a large collection of results from individual studies is called, has now achieved a status of respectability in medicine. This respectability, when combined with the slight hint of mystique that sometimes surrounds meta-analysis, ensures that results of studies that use it are treated with the respect they deserve....The Handbook of Research Synthesis is one of the most important publications in this subject both as a definitive reference book and a practical manual.—British Medical Journal When the first edition of The Handbook of Research Synthesis was published in 1994, it quickly became the definitive reference for researchers conducting meta-analyses of existing research in both the social and biological sciences. In this fully revised second edition, editors Harris Cooper, Larry Hedges, and Jeff Valentine present updated versions of the Handbook's classic chapters, as well as entirely new sections reporting on the most recent, cutting-edge developments in the field. Research synthesis is the practice of systematically distilling and integrating data from a variety of sources in order to draw more reliable conclusions about a given question or topic. The Handbook of Research Synthesis and Meta-Analysis draws upon years of groundbreaking advances that have transformed research synthesis from a narrative craft into an important scientific process in its own right. Cooper, Hedges, and Valentine have assembled leading authorities in the field to guide the reader through every stage of the research synthesis process—problem formulation, literature search and evaluation, statistical integration, and report preparation. The Handbook of Research Synthesis and Meta-Analysis incorporates state-of-the-art techniques from all quantitative synthesis traditions. Distilling a vast technical literature and many informal sources, the Handbook provides a portfolio of the most effective solutions to the problems of quantitative data integration. Among the statistical

issues addressed by the authors are the synthesis of non-independent data sets, fixed and random effects methods, the performance of sensitivity analyses and model assessments, and the problem of missing data. The Handbook of Research Synthesis and Meta-Analysis also provides a rich treatment of the non-statistical aspects of research synthesis. Topics include searching the literature, and developing schemes for gathering information from study reports. Those engaged in research synthesis will also find useful advice on how tables, graphs, and narration can be used to provide the most meaningful communication of the results of research synthesis. In addition, the editors address the potentials and limitations of research synthesis, and its future directions. The past decade has been a period of enormous growth in the field of research synthesis. The second edition Handbook thoroughly revises original chapters to assure that the volume remains the most authoritative source of information for researchers undertaking meta-analysis today. In response to the increasing use of research synthesis in the formation of public policy, the second edition includes a new chapter on both the strengths and limitations of research synthesis in policy debates

introduction to meta analysis michael borenstein: *Systematic Reviews and Meta-Analysis* Jacqueline Corcoran, Vijayan Pillai, 2008-02-13 When used in tandem, systematic reviews and meta-analysis-- two distinct but highly compatible approaches to research synthesis-- form a powerful, scientific approach to analyzing previous studies. But to see their full potential, a social work researcher must be versed in the foundational processes underlying them. This pocket guide to Systematic Reviews and Meta-Analysis illuminates precisely that practical groundwork. In clear, step-by-step terms, the authors explain how to format topics, locate and screen studies, extract and assess data, pool effect sizes, determine bias, and interpret the results, showing readers how to combine reviewing and meta-analysis correctly and effectively. Each chapter contains vivid social work examples and concludes with a concise summary and notes on further reading, while the book's glossary and handy checklists and sample search and data extraction forms maximize the boo'ks usefulness. Highlighting the concepts necessary to understand, critique, and conduct research synthesis, this brief and highly readable introduction is a terrific resource for students and researchers alike.

introduction to meta analysis michael borenstein: The Oxford Handbook of Personnel Assessment and Selection Neal Schmitt, 2013-12-15 Employee selection has long stood at the practical forefront of industrial/organizational psychology. Today's social, business, and economic climates require ongoing adaptations by those who select organizations' personnel, and research on the topic helps gauge the impact of these adaptations and their implications for human performance and potential. The Oxford Handbook of Personnel Assessment and Selection codifies the wealth of new research surrounding employee selection (web-based assessments, social networking, globalization of organizations), situating them alongside more traditional practices to establish the best and most relevant research for both professionals and academics. Comprising chapters from authors in both the private sector and academia, this volume is organized into seven parts: (1) historical and social context of the field of assessment and selection; (2) research strategies; (3) individual difference constructs that underlie effective performance; (4) measures of predictor constructs; (5) employee performance and outcome assessment; (6) societal and organizational constraints on selection practice; and (7) implementation and sustainability of selection systems. While providing a comprehensive review of current research and practice, the purpose of this handbook is to provide an up-to-date profile of each of the areas addressed and highlight current questions that deserve additional attention from researchers and practitioners. This compendium is essential reading for industrial/organizational psychologists and human resource managers.

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meta-analysis... A useful hands-on guide for practitioners who want to familiarize themselves with the fundamentals of meta-analysis and get started without having to plough through theorems and proofs. —Journal of Applied Statistics Statistical Meta-Analysis with R and Stata, Second Edition provides a thorough presentation of statistical meta-analyses (MA) with step-by-step implementations using R/Stata. The authors develop analysis step by step using appropriate R/Stata functions, which enables readers to gain an understanding of meta-analysis methods and R/Stata implementation so that they can use these two popular software packages to analyze their own meta-data. Each chapter gives examples of real studies compiled from the literature. After presenting the data and necessary background for understanding the applications, various methods for analyzing meta-data are introduced. The authors then develop analysis code using the appropriate R/Stata packages and functions. What's New in the Second Edition: Adds Stata programs along with the R programs for meta-analysis Updates all the statistical meta-analyses with R/Stata programs Covers fixed-effects and random-effects MA, meta-regression, MA with rare-event, and MA-IPD vs MA-SS Adds five new chapters on multivariate MA, publication bias, missing data in MA, MA in evaluating diagnostic accuracy, and network MA Suitable as a graduate-level text for a meta-data analysis course, the book is also a valuable reference for practitioners and biostatisticians (even those with little or no experience in using R or Stata) in public health, medical research, governmental agencies, and the pharmaceutical industry.

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regarding these mergers. Combined with data on outcomes, this policy information enables analysis of, and creates new insights into, mergers, merger policies, and the effectiveness of remedies in preventing anticompetitive outcomes. After an overview of mergers, merger policy, and a common approach to merger analysis, Kwoka offers a detailed analysis of the studied mergers, relevant policies, and chosen remedies. Kwoka finds, first and foremost, that most of the studied mergers resulted in competitive harm, usually in the form of higher product prices but also with respect to various non-price outcomes. Other important findings include the fact that joint ventures and code sharing arrangements do not result in such harm and that policies intended to remedy mergers—especially conduct remedies—are not generally effective in restraining price increases. The book's uniquely comprehensive analysis advances our understanding of merger decisions and policies, suggests policy improvements for competition agencies and remedies, and points the way to future research.

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