



# METHODS IN BEHAVIORAL RESEARCH

Thirteenth Edition

**Paul C. Cozby**  
**Scott C. Bates**

**Mc  
Graw  
Hill**  
Education

## **Methods in Behavioral Research**

# Methods in Behavioral Research

THIRTEENTH EDITION

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*For Jeanne King and Dennis Berg,  
my extraordinary friends.*  
—PCC

*For Krystin, whom I met near a water fountain  
and forever changed my life.*  
—SCB

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## Preface

*Methods in Behavioral Research* guides students toward success by helping them study smarter and more efficiently. Supported by SmartBook®, McGraw-Hill Education’s adaptive and personalized reading experience, Cozby and Bates provide helpful pedagogy, rich examples, and clear voice in their approach to methodological decision making.

IN THE NEW THIRTEENTH EDITION, our highest priority for *Methods in Behavioral Research* remains: Clear, concise, and accurate communication of concepts, using the most up-to-date, interesting examples.

In this edition we have added to and updated our examples and clarified concepts throughout. We continue to enhance learning by describing important concepts in several contexts throughout the book; research shows that redundancy aids understanding. We have also added a new *Check Your Learning* feature that is designed to encourage students to apply material and reinforce critical concepts in each chapter. The targets for the *Check Your Learning* feature were identified using empirical data from SmartBook.

## OPEN SCIENCE AND REPRODUCIBILITY

The thirteenth edition includes new coverage of the Open Science movement and reproducibility as it relates to designing, conducting, and evaluating behavioral science. The chapter “Observational Methods” discusses the Open Science movement in relation to conducting archival research and making data publicly available to encourage replication. “Generalization” grapples with the current issue of reproducibility in behavioral science.

## ORGANIZATION

The organization of *Methods in Behavioral Research* generally follows the sequence involved in planning and conducting a research investigation. “Scientific Understanding of Behavior” gives an overview of the scientific approach to knowledge and distinguishes between basic and applied research. Where to Start discusses sources of ideas for research and the importance of library research. “Ethics in Behavioral Research” focuses on research ethics; ethical issues are covered in depth here and emphasized throughout the book. “Fundamental Research Issues” introduces validity and examines psychological variables and the distinction between experimental and nonexperimental approaches to studying relationships among variables. “Measurement Concepts” focuses on measurement issues, including reliability and validity. Nonexperimental research approaches—including naturalistic observation, cases studies, and content analysis—are described in 

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“Observational Methods.” “Asking People About Themselves: Survey Research” covers sampling as well as the design of questionnaires and interviews. “Experimental Design and Conducting Experiments” present the basics of designing and conducting experiments. Factorial designs are emphasized in “Complex Experimental

Designs”. “Single-Case, Quasi-Experimental, and Developmental Research” discusses the designs for special applications: single-case experimental designs, developmental research designs, and quasi-experimental designs. “Understanding Research Results: Description and Correlation” and “Understanding Research Results: Statistical Inference” focus on the use of statistics to help students understand research results. These chapters include material on effect size and confidence intervals. Finally, “Generalization” discusses generalization issues, meta-analyses, and the importance of replications.

Appendixes on communicating research findings, ethical standards, and conducting statistical analyses are included as well. Appendix A presents a thorough treatment of current APA style plus an example of an actual published paper as illustration. The APA Ethics Code is included in Appendix B as a resource rather than a section of the chapter on research ethics. Appendix C provides examples of formulas and calculations to help students conduct and present their own research.

## FLEXIBILITY

Chapters are relatively independent, providing instructors maximum flexibility in assigning the order of coverage. For example, chapters on research ethics and survey research methods are presented early in the book, but instructors who wish to present this material later in a course can easily do so. It is also relatively easy to eliminate sections of material within most chapters.

## FEATURES

*Clarity.* The thirteenth edition retains the strength of direct, clear writing. Concepts are described in a variety of contexts to enhance understanding.

*Compelling examples.* Well-chosen research examples help students interpret challenging concepts and complex research designs.

*Illustrative articles.* For most chapters we selected an article from the professional literature that demonstrates and illustrates the content of the chapter in a meaningful way. Each article provides an interesting, engaging, and student-relevant example as a chapter-closing capstone exercise. In each case, an APA-style reference to a published empirical article is included, along with a brief introduction and summary. Three to five key discussion questions provide an applied, critical thinking-oriented, and summative learning experience for the chapter.

A new feature called **Check Your Learning** invites students to review difficult concepts as they read. Topics include:

- Identifying examples of research questions for basic and applied research
- Levels of risk for research scenarios
- Identifying variables

- Scales of measurement
- Observation methods
- Connecting design types with definitions
- Staged manipulations
- Determining relationships between coefficients
- Statistical tests and the scales of variables

*Decision-making emphasis.* Distinguishing among a variety of research designs helps students understand when to use one type of design over another.

*Strong pedagogy.* Learning Objectives open each chapter. Review and activity questions provide practice for students to help them understand the material. Key terms are listed at the end of each chapter, and many are also defined in the Glossary at the end of the book.



*Methods in Behavioral Research* is available to instructors and students in traditional print format as well as online within McGraw Hill Connect<sup>®</sup>, a digital assignment and assessment platform. Connect includes assignable and assessable videos, quizzes, exercises, and interactive activities, all associated with learning objectives for *Methods in Behavioral Research*. These online tools make managing assignments easier for instructors, and learning and studying more motivating and efficient for students.

**New! Power of Process**, now available in Connect for Research Methods, guides students through the process of critical reading, analysis, and writing. Faculty can select or upload their own content, such as journal articles, and assign analysis strategies to gain insight into students' application of the scientific method. For students, Power of Process offers a guided visual approach to exercising critical thinking strategies to apply before, during, and after reading published research.

## BETTER DATA, SMARTER REVISIONS, IMPROVED RESULTS

Students study more effectively with Smartbook. SmartBook is the first and only adaptive reading experience on the market.

- **Make It Effective.** SmartBook creates a personalized reading experience by highlighting the most impactful concepts a student needs to learn at that moment in time. This ensures that every minute spent with SmartBook is returned to the student as the most value-added minute possible.
- **Make It Informed.** The reading experience continuously adapts by highlighting content based on what the student knows and doesn't know. Real-time reports quickly identify the concepts that require more attention from individual students—or the entire class. SmartBook detects the content a student is most likely to forget and brings it back to improve long-term knowledge retention.

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Students help inform the revision strategy.





- **Make It Precise.** Systematic and precise, a “heat map” tool collates data anonymously collected from the thousands of students who used Connect for Research Methods’ SmartBook.
- **Make It Accessible.** The information is graphically represented in a “heat map” showing specific concepts with which students have the most difficulty. By reviewing and revising these concepts, we can make them more accessible for students.

## PERSONALIZED GRADING, ON THE GO, MADE EASIER

The first and only analytics tool of its kind, Connect Insight® is a series of visual data displays—each framed by an intuitive question—to provide at-a-glance information regarding how your class is doing. Instructors receive instant student performance matched with student activity, view real-time analytics so instructors can take action early and keep struggling students from falling behind, and be empowered with a more valuable and productive connection between themselves and their students with the transparency Connect Insight provides in the learning process.

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- **Make It Dynamic.** Connect Insight puts real-time analytics in your hands so you can take action early and keep struggling students from falling behind.
- **Make It Mobile.** Connect Insight travels from office to classroom, available on demand wherever and whenever it’s needed.

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## CHANGES TO THE THIRTEENTH EDITION

The thirteenth edition of *Methods in Behavioral Research* includes numerous updates and new references. Here

is a list of major changes as they appear by chapter.

## *Chapter 1*

- Updated introduction on the importance of understanding research.
- Updated Figure 2 replaces the example of television with playing violent video games.
- Updated illustrative article.

## *Chapter 2*

- New opening section on exploring past research.
- New example of a “transition” paragraph in a research paper.
- New discussion of the importance of literature reviews and how they compare with meta-analysis.
- New discussion of why it can be difficult to evaluate the quality of a source in today’s world of online and social media.
- New Figure 3, “Anatomy of a Basic Reference.”
- New section, “Types of Research Reports,” describes literature review articles, theory articles, and empirical articles.
- New organization that leads students from research questions, hypotheses, and predictions, through sources of ideas, into the types of research reports and into how to identify good sources.
- New illustrative article on using laptops in class.

## *Chapter 3*

- Refined discussion and new photo of the Milgram experiment.
- Updated discussion on the preamble to the APA ethics code.
- New discussion on privacy and the ethical responsibility of researchers.
- New discussion of federal regulations of IRBs, especially what is meant by systematic and generalizable knowledge.

## *Chapter 4*

- Clarified the definition of construct validity.

## *Chapter 5*

- Refinement of the introduction to the discussion of reliability, making it more accessible to students.
- Updated discussion of measurement error.
- Updated table, “Indicators of Construct Validity of a Measure.”

## *Chapter 6*

- Updated example of archival research involving a recent study on Twitter posts.
- New section on the Open Science movement related to data accessibility.

### *Chapter 7*

- Updated Figure 1 includes new data on annual prevalence of teenage marijuana use.
- Updated section on formulating questions on attitudes and beliefs when constructing questionnaires.
- New discussion on online surveys, including information on Amazon Mechanical Turk method of recruiting participants for data collection.
- Added discussion on Interactive Voice Response.
- New example of sampling.
- New illustrative article: “Experimental Design.”

### *Chapter 9*

- Refined discussion on quantifying observed behaviors.
- New illustrative article: “Conducting Experiments.”

### *Chapter 10*

- Revised illustrative article: “Complex Experimental Designs.”

### *Chapter 11*

- New illustrative article: “A Longitudinal Study.”

### *Chapter 13*

- Added discussion on choosing a sample size.

### *Chapter 14*

- Added an in-depth note on the Open Science initiative and the replication crisis in psychology.

## **ADDITIONAL RESOURCES**

**Instructor’s Manual:** Designed to provide a wide variety of resources for presenting the course, the instructor’s manual includes learning objectives, ideas for lectures and discussions, laboratory demonstrations, and activities aligned specifically to facilitate a clearer knowledge of research methods.

**Test Bank:** By increasing the rigor of the test bank development process, McGraw-Hill has raised the bar for student assessment. A coordinated team of subject-matter experts methodically vetted each question and each set of possible answers for accuracy, clarity, and effectiveness. Each question is further annotated for level of difficulty, Bloom’s taxonomy, APA learning outcomes, and corresponding coverage in the text. page xviii

Structured by chapter, the questions are designed to test students’ conceptual, applied, and factual

understanding.

**Lecture Presentation:** PowerPoint slides are provided that present key points of the chapter, along with supporting visuals. All of the slides can be modified to meet individual needs.

**Image Gallery:** The complete set of figures and tables from the text are available for download and can be easily embedded into PowerPoint slides.

## ACKNOWLEDGMENTS

Many individuals helped to produce this and previous editions of this book. The portfolio manager at McGraw-Hill was Nancy Welcher; we are also indebted to the editors of previous editions, Franklin Graham, Ken King, Mike Sugarman, and Krista Bettino, for their guidance. We are extremely grateful for the input from numerous students and instructors, including the following individuals, who provided detailed reviews for this edition:

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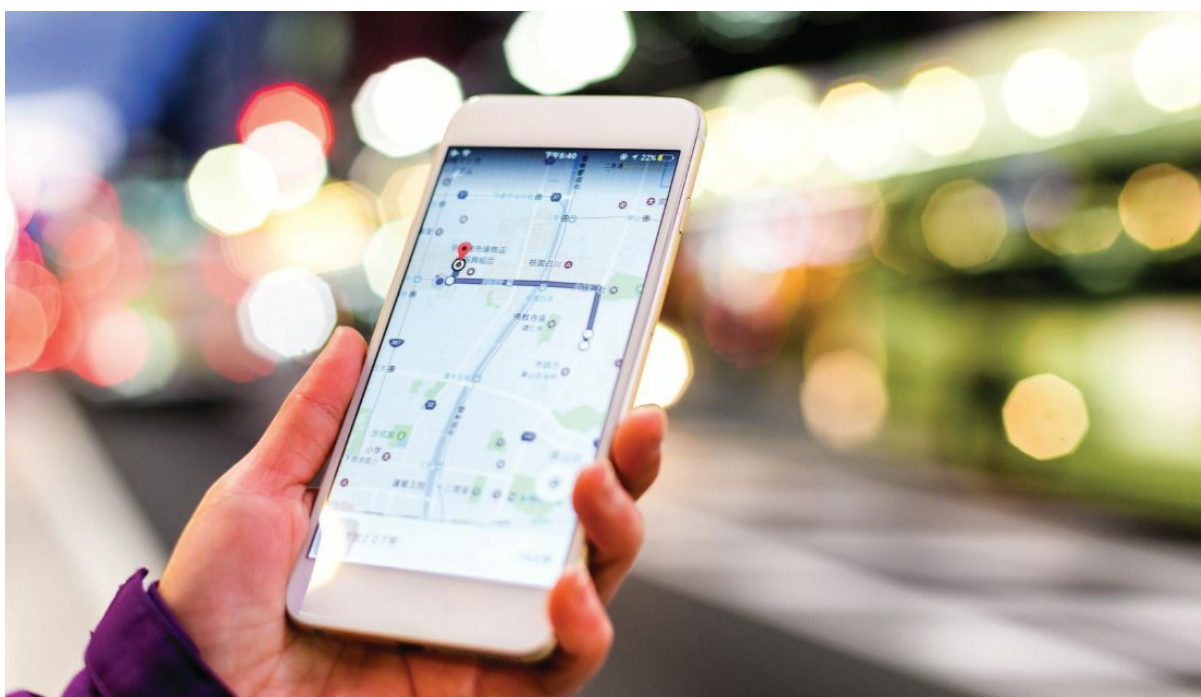
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# 1

## Scientific Understanding of Behavior



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### LEARNING OBJECTIVES

- Describe why it is important to understand research methods.
- Describe the scientific approach to understanding behavior, and contrast it with pseudoscientific research.
- Define and give examples of the four goals of scientific research: description, prediction, determination of cause, and explanation of behavior.
- Discuss the three elements for inferring causation: temporal order, covariation of cause and effect, and elimination of alternative explanation.
- Define, describe, compare, and contrast basic and applied research.

**DO SOCIAL MEDIA SITES LIKE FACEBOOK AND INSTAGRAM IMPACT OUR RELATIONSHIPS?** What causes alcoholism? How do our early childhood experiences affect our later lives? How do we remember things, what causes us to forget, and how can memory be improved? Why do we

procrastinate? Why do some people experience anxiety so extreme that it disrupts their lives while others—facing the same situation—seem to be unaffected? How can we help people who suffer from depression? Why do we like certain people and dislike others? How can employers nurture employee well-being in a high-stress workplace?

Curiosity about questions like these is probably the most important reason many students decide to take courses in the behavioral sciences. Science is the best way to explore and answer these sorts of questions. In this book, we will examine the methods of scientific research in the behavioral sciences. In this introductory chapter, we will focus on ways in which knowledge of research methods can be useful in understanding the world around us. Further, we will review the characteristics of a scientific approach to the study of behavior and the general types of research questions that concern behavioral scientists.



## IMPORTANCE OF RESEARCH METHODS

We are continuously bombarded with research results: The *New York Times* runs many articles with titles like “Parents Should Avoid Comments on a Child’s Weight,” “Abortion Is Found to Have Little Effect on Women’s Mental Health,” and “Insomniacs Are Helped by Online Therapy.” The *Washington Post* declared, “Large study supports ‘weekend warrior’ approach to lifetime fitness.” Meanwhile, over on cable news, CNN reports that “Facebook can actually make us more narrow-minded,” while Fox News notes that “Alcohol ads should be banned from sporting events, says study.” MSNBC told us to buy a pet—“Kids with pets have less anxiety”—but *People Magazine* tells us, hold on, “Your Beloved Cat Could Be Making Your PMS Worse!” Even BuzzFeed gets into the act, letting the bookstore owners among us know that a “New Study Finds That Filling Bookstores with the Scent of Chocolate Makes You Shop Longer,” and BuzzFeed also wondered, “Is America Having a ‘Friendship Slump’?”

Articles, books, websites, and social media posts make claims about the beneficial or harmful effects of particular diets or vitamins on one’s sex life, personality, or health. There are frequent reports of survey results that draw conclusions about our views on a variety of topics—who we will vote for, what we think about a product, where we stand on political hot topics of the day.

The key question is, How do you evaluate such reports? Do you simply accept the findings because they are supposed to be scientific? A background in research methods will help you read these reports 

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page 3 critically, evaluate the methods employed, and decide whether the conclusions are reasonable. Learning about research methods will help you think critically.

Many occupations require the use of research findings. For example, mental health professionals must make decisions about treatment methods, assignment of clients to different types of facilities, medications, and testing procedures. Such decisions are made on the basis of research; to make good decisions, mental health professionals must be able to read the research literature in the field and apply it to their professional lives. Similarly, people who work in business environments frequently rely on research to make decisions about marketing strategies, ways of improving employee productivity and morale, and methods of selecting and training new employees. Educators must keep up with research on topics such as the effectiveness of various teaching strategies or programs to deal with special student problems. It is useful to have a knowledge of research methods and the ability to evaluate research reports in many fields.

It is also important to recognize that scientific research has become increasingly prominent in public policy decisions. Legislators and political leaders at all levels of government frequently take political positions and propose legislation based on research findings. Research may also influence judicial decisions: A classic example of this is the *Social Science Brief* that was prepared by psychologists and accepted as evidence in the landmark 1954 case of *Brown v. Board of Education*, in which the U.S. Supreme Court banned school segregation in the United States. One of the studies cited in the brief was conducted by Clark and Clark (1947), who found that when allowed to choose between light-skinned and dark-skinned dolls, both Black and White children preferred to play with the light-skinned dolls (see Stephan, 1983, for a further discussion of the implications of this study).

Behavioral research on human development has influenced U.S. Supreme Court decisions related to

juvenile crime. In 2005, for instance, the Supreme Court decided that juveniles could not face the death penalty (*Roper v. Simmons*), and the decision was informed by neurological and behavioral research showing that the brain, social, and character differences between adults and juveniles make juveniles less culpable than adults for the same crimes. Similarly, in the 2010 Supreme Court decision *Graham v. Florida*, the Supreme Court decided that juvenile offenders could not be sentenced to life in prison without parole for non-homicide offenses. This decision was influenced by research in developmental psychology and neuroscience. The court majority pointed to this research in their conclusion that assessment of blame and standards for sentencing should be different for juveniles and adults because juveniles lack adults' maturity, ability to resist pressures from peers and others, and personal sense of responsibility (Clay, 2010).

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Research is also important when developing and assessing the effectiveness of programs designed to achieve certain goals—for example, to increase retention of students in school, influence people to engage in behaviors that reduce their risk of contracting HIV, or teach employees how to reduce the effects of stress. We need to be able to determine whether these programs are successfully meeting their goals.

Finally, research methods are important because they can provide us with the best answers to questions like those we posed at the outset of the chapter. Research methods can be the way to satisfy our native curiosity about ourselves, our world, and those around us.

## WAYS OF KNOWING

We opened this chapter with several questions about human behavior and suggested that scientific research is a valuable means of answering them. How does the scientific approach differ from other ways of learning about behavior? People have always observed the world around them and sought explanations for what they see and experience. However, instead of using a scientific approach, many people rely on *intuition* and *authority* as primary ways of knowing.

## *Intuition & Anecdote*

Most of us either know or have heard about a married couple who, after years of trying to conceive, adopt a child. Then, within a very short period of time, they find that the woman is pregnant. This observation leads to a belief that adoption increases the likelihood of pregnancy among couples who are having difficulties conceiving a child. People usually go one step further and offer an explanation for this effect—such as, that the adoption reduces a major source of marital stress, and the stress reduction in turn increases the chances of conception (see Gilovich, 1991).

This example illustrates the use of intuition and anecdotal evidence to draw general conclusions about the world around us. When you rely on intuition, you accept unquestioningly what your own personal judgment or a single story (anecdote) about one person's experience tells you. The intuitive approach takes many forms. Often it involves finding an explanation for our own behaviors or the behaviors of others. For example, you might develop an explanation for why you keep having conflicts with your roommate, such as "He hates me" or "Having to share a bathroom creates conflict." Other times, intuition is used to explain events that you observe, as in the case of concluding that adoption increases the chances of conception among couples having difficulty conceiving a child.

A problem with intuition is that numerous cognitive and motivational biases affect our perceptions, and so we may draw erroneous conclusions about cause and effect (cf. Fiske & Taylor, 1984; Gilovich, 1991; Nisbett & Ross, 1980; Nisbett & Wilson, 1977). Gilovich points out that there is in fact no relationship page 5 between adoption and subsequent pregnancy, according to scientific research investigations. So why do we hold this belief? Most likely it is because of a cognitive bias called *illusory correlation* that occurs when we focus on two events that stand out and occur together. When an adoption is closely followed by a pregnancy, our attention is drawn to the situation, and we are biased to conclude that there must be a causal connection. Such illusory correlations are also likely to occur when we are highly motivated to believe in the causal relationship. Although this is a natural thing for us to do, it is not scientific. A scientific approach requires much more evidence before conclusions can be drawn.

## *Authority*

The philosopher Aristotle said: “Persuasion is achieved by the speaker’s personal character when the speech is so spoken as to make us think him credible. We believe good men more fully and readily than others.” Aristotle would argue that we are more likely to be persuaded by a speaker who seems prestigious, trustworthy, and respectable than by one who appears to lack such qualities.

Many of us might accept Aristotle’s arguments simply because he is considered a prestigious authority—a convincing and influential source—and his writings remain important. Similarly, many people are all too ready to accept anything they learn from the Internet, news media, books, government officials, celebrities, religious figures, or even a professor! They believe that the statements of such authorities must be true. The problem, of course, is that the statements may not be true. The scientific approach rejects the notion that one can accept *on faith* the statements of any authority; again, more evidence is needed before we can draw scientific conclusions.

## *Empiricism*

The scientific approach to acquiring knowledge recognizes that intuition, anecdote, and authority can be sources of ideas about behavior. However, scientists do not unquestioningly accept anyone's intuitions—including their own. Scientists recognize that *their* ideas are just as likely to be wrong as anyone else's. Also, scientists do not accept on faith the pronouncements of anyone, regardless of that person's prestige or authority. Thus, scientists are very skeptical about what they see and hear. Scientific **skepticism** means that ideas must be evaluated on the basis of careful logic and results from scientific investigations.

If scientists reject intuition and blind acceptance of authority as ways of knowing about the world, how do they go about gaining knowledge? The fundamental characteristic of the scientific method is **empiricism**—the idea that knowledge comes from observations. Data are collected that form the basis of conclusions about the nature of the world. The scientific method embodies a number of rules for collecting and evaluating data; these rules will be explored throughout this book.