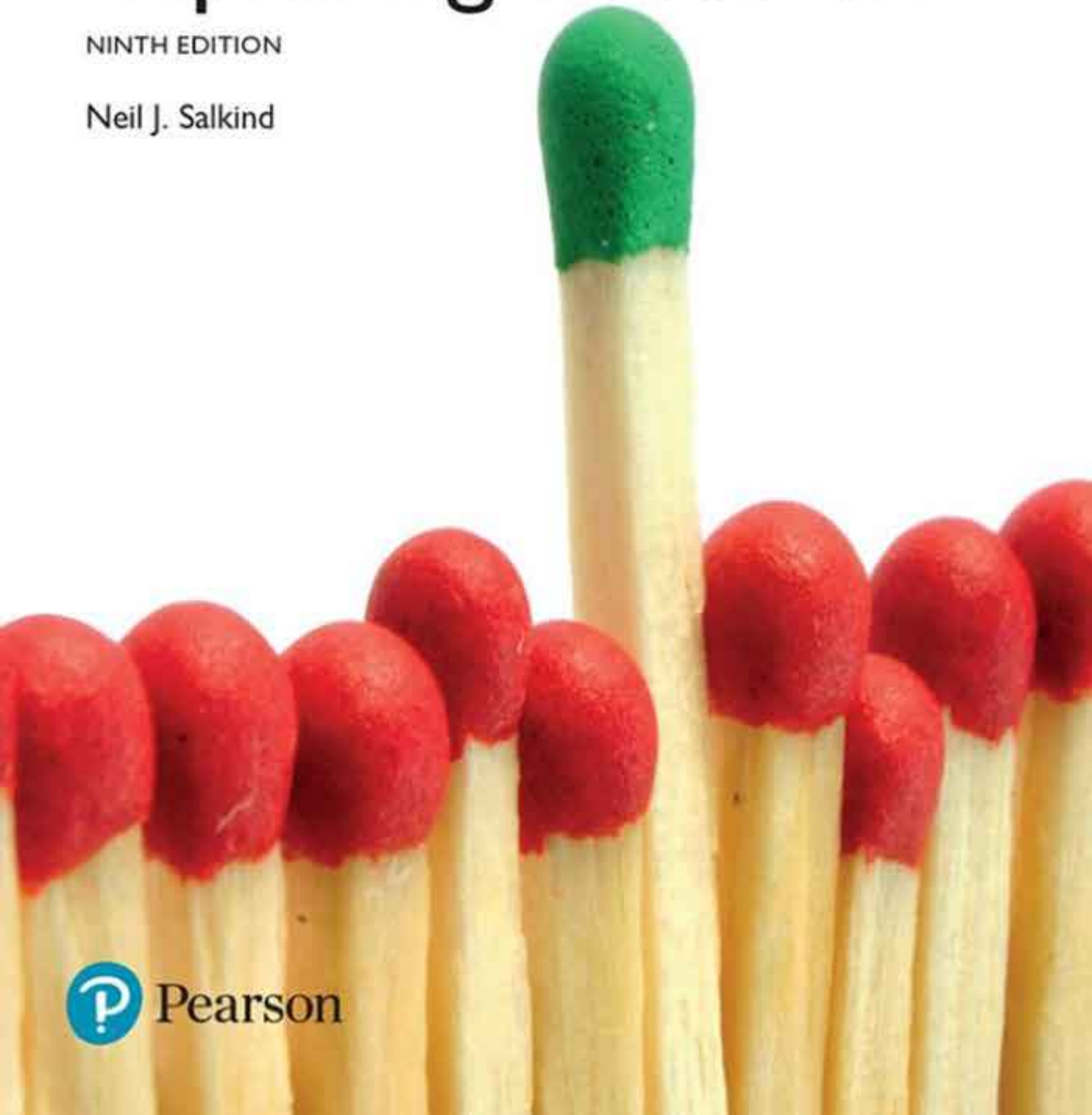
GLOBAL EDITION

Exploring Research

NINTH EDITION

Neil J. Salkind



Pearson

Exploring Research

Ninth Edition

Global Edition

Neil J. Salkind
University of Kansas

Pearson

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For Sara, Micah, and Ted and my fellow
Sharks . . . Happy Laps

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Preface

I've been very lucky. I have had the privilege of teaching introductory research methods and have been able to share all that I know and continue to learn about this fascinating topic. This ninth edition of *Exploring Research* reflects much of what has taken place in my classrooms over those years.

This book is intended for upper-level undergraduate students and graduate students in their first research methods course in the social, behavioral, and health sciences fields. These students are the primary audience. But, lately, other disciplines have been introducing research methods courses to their curriculum, such as public policy, government, journalism, and related fields, and students there have been using *Exploring Research* as well. And, recently, even such fields as American Studies and Ethnomusicology have started incorporating the types of methods we talk about here.

Exploring Research is intended to provide an introduction to the important topics in the general area of research methods and to do so in a nonintimidating and informative way. The existence of a ninth edition of *Exploring Research* means that the audience for a straightforward and unassuming presentation of this material still exists, and I believe that audience is growing. I'm grateful for those who have chosen to use this book.

New to the Edition

Many of the changes are the result of suggestions from students and faculty. Here are the major changes in this ninth edition.

- Rather than SPSS, whatever data analysis discussions take place, Excel is the tool of choice. This is because Excel is available almost everywhere including colleges, universities, and other institutions and many users of this book already have it installed on their own computers. I am assuming that even the beginning research methods students have some rudimentary computer and Excel skills.
- More coverage of ethics because this is becoming increasingly important as a topic that beginning researchers need to know about. There's more on the history of how ethical practices have progressed as well as a brief coverage of some important case studies.
- After lots of discussion with faculty who have adopted this book, it was decided that the answers to the end-of-chapter questions should go at the end of the book in a separate appendix (Appendix C) of its own.
- The online sources for more exploration are increased by about 25% as well.
- Updated and new coverage of software for dealing with qualitative data and the development and refinement of bibliographies.
- Inserted after many sections are questions that will help the reader summarize the content in that part of the chapter and serve, if so desired, as a taking-off point for discussion. These *Test Yourself* questions don't necessarily have a right or a wrong answer—they are there to help facilitate thinking and discussion about the topic at hand.
- The material on the use of the Internet for research is updated with more information about conducting research and literature reviews online and including new information on how social media can be used in a research context. Information on previous topics such as e-mail, that were once new to our research endeavors, but are now *old hat*, has been significantly reduced to allow room for other material such as expanded and updated coverage.
- Appendix A that provides some tips and tricks for using Excel for data analysis.
- The last chapter contains information about the use of the latest, sixth, edition of the *Publication Manual of the American Psychological Association*.

How This Book Is Organized

Exploring Research is organized into 14 chapters (with a big and little Chapters 3A and 3B, respectively) and three appendices. Chapter 1, *The Role and Importance of Research*, covers the basics about the scientific method and includes a brief description of the different types of research that are most commonly used in the social and behavioral sciences.

Chapter 2, *The Research Process: Coming to Terms*, focuses on some of the basic terms and concepts in research methods, including variables, samples, populations, hypotheses, and the concept of significance.

The first step for any researcher is the selection of a problem, which is what Chapter 3A, *Selecting a Problem and Reviewing the Research*, is all about. Here, you will learn how to use the library and its vast resources to help you

focus your interests and actually turn them into something you want to know more about! You will also be introduced to the use of electronic sources of reference material, such as online searches, and how using the Internet can considerably enhance your research skills.

A new Chapter 3B, *The Importance of Practicing Ethics in Research*, talks about the ethical practices and ethical concerns in research.

The content of Chapter 4, *Sampling and Generalizability*, is critical to understanding the research process. How you select the group of participants and how and when the results of an experiment can be generalized from this group to others are a fundamental premise of all scientific research. In this chapter, you will read all about this process.

What is research without measuring outcomes? Not much, I'm afraid. Chapter 5, *Measurement, Reliability, and Validity*, introduces you to the measurement process and the important concepts of reliability and validity. You need to understand not only the principles of measurement but also the methods used to measure behavior. That is what you will learn in Chapter 6, *Methods of Measuring Behavior*, which discusses different types of tests and their importance.

Once you understand what you want to study and the importance of measuring it, the only thing left to do is to go out and collect data! Chapter 7, *Data Collection and Descriptive Statistics*, takes you through the process step by step and includes a summary of important descriptive statistics and how they can be used.

One of the reasons data are collected is to make inferences from a smaller group of people to a larger one. In Chapter 8, *Introducing Inferential Statistics*, you will find an introduction to the discipline of the same name and how results based on small groups are inferred to larger ones.

Chapter 9, *Nonexperimental Research: Descriptive and Correlational Methods*, is the first of four chapters that deal with different types of research methods. In this chapter, you will learn about descriptive and correlational methods.

Chapter 10, *Nonexperimental Research: Qualitative Methods*, provides the reader with an introduction to various qualitative tools, including case studies, ethnographies, and historical methods, and talks a bit about the advantages and disadvantages of each. I hope that you find this new chapter helpful and that it will give you another set of tools to answer important and interesting questions.

Chapter 11, *Pre- and True Experimental Research Methods*, and Chapter 12, *Quasi-Experimental Research: A Close Cousin to Experimental Research*, continue the overview of research methods by introducing you to the different types of research designs that explore the area of cause and effect. Developmental research is discussed in Chapter 12.

Chapter 13, *Writing a Research Proposal*, reviews the steps involved in planning and writing a proposal and includes an extensive set of questions that can be used to evaluate your proposal. If your research methods course does not include the preparation of a proposal as a requirement, this chapter can be used as a stand-alone instructional tool.

Exploring Research ends with Chapter 14, *Writing a Research Manuscript*, a step-by-step discussion of how to prepare a manuscript for submission to a journal for publication using the format prescribed by the sixth edition of *Publication Manual of the American Psychological Association*. Appendix A is a compilation of Excel tips for use in data analysis. Appendix B contains a sample data set that is used in certain examples throughout the book. Appendix C contains the answers to the exercises found at the end of each chapter.

What's Special about This Book?

Several features from previous editions continue to be included in this edition that I hope will help make this book more useful and the learning of the material more interesting. These features have not changed because the feedback from both faculty and students has been so positive.

- Most chapters begin with a Research Maters entry that illustrates how research in the social and behavioral sciences is conducted using the chapter contents as a focus.
- You will find notes that highlight important points contained in the text. These can be used for review purposes and help to emphasize especially important points.
- Those *Test Yourself* questions mentioned earlier.
- Last, but not least, is a glossary of important terms found at the end of the book. The terms that you find in the glossary appear in boldface in the text.

A Note to the Instructor

All teachers tend to use teaching materials in different ways and I tried to complete this edition in such a way that the chapters can be read through in an order different from what is contained in the table of contents. For example, some instructors tell me that they start with Chapter 14 because a central element in their course is writing a research report. Others start with Chapter 4 on sampling and others go right from descriptive statistics to correlational methods. There is, of course, some mention of materials from previous and upcoming chapters throughout, but these are relatively few and will not bear on your students' access to the information they need to understand the ideas under discussion.

Also, if you want to know more about Excel and its application to statistics, you can look at two other books which I have done, published by Sage, including *Excel Statistics*, Third Edition, and the Excel edition of *Statistics for People Who (Think They) Hate Statistics*, Fourth Edition. And, of course, e-mail me at njs@ku.edu should you have any questions.

Finally, you can learn more about supplements that are available for this book by going to www.pearsonglobaleditions.com/salkind.

How to Use This Book

I have tried to write this book so that it is (you guessed it) user friendly. Basically, what I think this means is that you can pick it up, understand what it says, and do what it suggests. One reviewer and user of an earlier edition was put off at first by the easy-going way in which the book is written. My philosophy is that important and interesting ideas and concepts need not be written about in an obtuse and convoluted fashion. Simple is best. You see, your mother was right!

Whether you are using this book as the main resource in a research methods course or as a supplemental text, here are some hints on how to go about using the book to make the most out of the experience.

- Read through the Contents (page vii) so you can get an idea of what is in the book.
- Take your time and do not try to read too much at one sitting. You will probably be assigned one chapter per week. Although it is not an enormous task to read the 20–30 pages that each chapter contains in one sitting, breaking your reading up by main chapter sections might make things a little easier. Too much too soon leads to fatigue, which in turn leads to frustration, and then no one is happy!
- Do the exercises at the end of each chapter. They will give you further insight into the materials that you just read and some direct experience with the techniques and topics that were covered.
- Write down questions you might have in the margins of pages where things seem unclear. When you are able, ask your professor to clarify the information or bring your questions to your study group for discussion.

Available Instructor Resources

The following resources are available for instructors. These can be downloaded at www.pearsonglobaleditions.com/salkind. Login required.

- **PowerPoint**—provides a core template of the content covered throughout the text. Can easily be expanded for customization with your course.
- **Instructor's Manual**—includes an overview, set of objectives, important terms and concepts for in-class discussions for each chapter.
- **Test Bank**—includes additional questions beyond the chapter-end exercises in multiple choice, and open-ended—short and essay response—formats.

A *Big* Thanks

All textbooks have the author's name on the cover, but no book is ever the work of a single person. Such is also the case with *Exploring Research*.

Many people helped make this book what it is, and they deserve the thanks that I am offering here. Chris Cardone, way back at Macmillan, was the inspiration for this book. She remains the best of editors and a close friend. Special thanks to Kristin Teasdale for her assistance on previous editions. Special thanks also to Doug Bell who worked long and hard to make this edition possible.

I take full responsibility for the errors and apologize to those students and faculty who might have used earlier editions of the book and had difficulty because of the mistakes. As many of those screwups (that is exactly the phrase) have been removed as is humanly possible.

Finally, as always, words cannot express my gratitude to Leni for her support and love that see projects like this through to the end. And to Sara, Micah and Ted, my deepest admiration and respect as they continue to build professional and personal lives of their own. These people are making the world a better place.

So, now it is up to you. Use the book well. Enjoy it and I hope that your learning experience is one filled with new discoveries about your area of interest as well as about your own potential. I would love to hear from you about the book, including what you like and do not like, suggestions for changes, or whatever. You can reach me through snail mail or e-mail.

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Chapter 1
The Role and Importance of Research

Say Hello to Research!

Walk down the hall in any building on your campus where social and behavioral science professors have their offices in such departments as psychology, education, nursing, sociology, and human development. Do you see any bearded, disheveled, white-coated men wearing rumpled pants and smoking pipes, hunched over their computers and mumbling to themselves? How about disheveled, white-coated women wearing rumpled skirts, smoking pipes, hunched over their computers, and mumbling to themselves?

Researchers hard at work? No. Stereotypes of what scientists look like and do? Yes. What you are more likely to see in the halls of your classroom building or in your adviser's office are men and women of all ages who are energetic and hard at work. They are committed to finding the answer to just another piece of the great puzzle that helps us understand human behavior a little better than the previous generation of scientists.

Like everyone else, these people go to work in the morning, but unlike many others, these researchers have a passion for understanding what they study and for coming as close as possible to finding the *truth*. Although these truths can be elusive and sometimes even unobtainable, researchers work toward discovering them for the satisfaction of answering important questions and then using this new information to help others. Early intervention programs, treatments of psychopathology, new curricula offerings, conflict resolution techniques, better ways to accurately measure behavior, effective drug treatment programs, and even changes in policy and law have resulted from evidence collected by researchers. Although not always perfect, each little bit of evidence gained from a new study or a new idea for a study contributes to a vast legacy of knowledge for the next generation of researchers such as yourself.

You may already know and appreciate something about the world of research. The purpose of this book is to provide you with the tools you need to do more than just appreciate, such as:

- Develop an understanding of the research process.
- Prepare yourself to conduct research of your own.
- Learn how to judge the quality of research.
- Learn how to read, search through, and summarize other research.
- Learn the value of research activities conducted online.
- Reveal the mysteries of basic statistics and show you how easily they can be used.
- Measure the behaviors, traits, or attributes that interest you.
- Collect the type of data that relate to your area of interest.
- Use a leading software package (Excel) to analyze data.
- Design research studies that answer the question that you want answered.
- Write the type of research proposal (and a research report) that puts you in control—one that shows you have command of the content of the research as well as the way in which the research should be done.

Today, more than ever, decisions are evidence based, and what these researchers do is collect evidence that serves as a basis for informed decisions.

Sound ambitious? A bit terrifying? Exciting? Maybe those and more, but boring is one thing this research endeavor is not. This statement is especially true when you consider that the work you might be doing in this class, as well as the research proposal that you might write, could hold the key to expanding our knowledge and understanding of human behavior and, indirectly, eventually helping others.

So here you are, beginning what is probably your first course in the area of research methods and wondering about everything from what researchers do to what your topic will be for your thesis. Relax. Thousands of students have been here before you and almost all of them have left with a working knowledge of what research is, how it is done, and what distinguishes a good research project from one that is doomed. Hold on and let's go. This trip will be exciting.

What Research Is and What It Isn't

Perhaps it is best to begin by looking at what researchers really do. To do so, why not look at some of the best? Here are some researchers, the awards they have won, and the focus of their work. All of these people started out in a class just like the one you are in, reading a book similar to the one you are reading. Their interest in research and a particular issue continued to grow until it became their life's work.

Research is, among other things, an intensive activity that is based on the work of others and generates new ideas to pursue and questions to answer.

The following awards were given in 2014 by the American Psychological Association in recognition of outstanding work.

Richard N. Aslin from the University of Rochester won a Distinguished Scientific Contribution Award for his work on the relationships among learning, development, and biology. He focused on the study of infant visual perception, infant speech perception, and statistical learning.

G. Terence Wilson from Rutgers University won a 2014 Award for Distinguished Scientific Applications of Psychology for his work on understanding the nature and theory of behavior therapy. Focusing on fear reduction, he sought to understand exposure-based approaches to anxiety disorders as well as work in the area of addiction, obesity, and eating disorders.

Finally, one of several Distinguished Scientific Awards for Early Career Contributions to Psychology went to Laura E. Schulz from the Massachusetts Institute of Technology for her work on children's learning and the role of exploratory.

The American Educational Research Association (AERA) also gives out awards that recognize important contributions.

The 2009 E. F. Lindquist Award was given to Dr. Mark D. Reckase from Michigan State University for his contributions to educational measurement including from computerized testing, work on Multidimensional Item Response Theory (MIRT), and teacher accountability. The award is named after E. F. Lindquist, who was a founder of the American College Testing Program, and is given for outstanding applied or theoretical research in the field of testing and measurement.

And, as with many other organizations, AERA also offers awards for researchers still early in their careers, such as the Early Career Award, one of which was won by Sara Goldrick-Rab from the University of Wisconsin for her work in postsecondary education.

What all these people have in common is that at one time or another during their professional careers, they were active participants in the process of doing research.

So what is a good working definition of the term *research*?

Research is a process through which new knowledge is discovered. A **theory**, such as a theory of motivation, or development, or learning, for example, helps us to organize this new information into a coherent body, a set of related ideas that explain events that have occurred in the past and predict events that may happen in the future. Theories are an important part of science. It is at the ground-floor level, however, that the researcher works to get the ball rolling, adding a bit of new insight here and a new speculation there, until these factors come together to form a corpus of knowledge.

High-quality research is characterized by many different attributes, many of which tend to be related to one another and also tend to overlap. High-quality research

- is based on the work of others,
- can be replicated,
- is generalizable to other settings,
- is based on some logical rationale and tied to theory,
- is doable,
- generates new questions or is cyclical in nature,
- is incremental, and
- is an apolitical activity that should be undertaken for the betterment of society.

Let's take a closer look at each of these.

First, *research is an activity based on the work of others.* No, this does not mean that you copy the work of others (that's plagiarism), but you always look to the work that has already been done to provide a basis for the subject of your research and how you might conduct your own work. For example, if there have been 200 studies on gender differences in aggression, the results of those studies should not be ignored. You may not want to exactly replicate any one of these studies (but note that replication is sometimes called for an appropriate), but you certainly should take methodologies that were used and the results into consideration when you plan your own research in that area.

A good example of this principle is the Manhattan Project, the tremendous intellectual and scientific effort that went into the creation of the atomic bomb. Hundreds of top scientists from all over the world were organized at different locations in an intense and highly charged effort to combine their knowledge to create this horrible weapon. What was unique about this effort is that it was compressed in time; many people who would probably share each other's work in any case did so in days rather than

months because of the military and political urgency of the times. What was discovered 1 day literally became the basis for the next day's experiments (see Richard Rhodes' Pulitzer Prize–winning book, *The Making of the Atomic Bomb*, for the whole story).

Second, while we're talking about other studies, *research is an activity that can be replicated.* If someone conducts a research study that examines the relationship between problem-solving ability and musical talent, then the methods and procedures (and results) of the experiment should be replicable with other groups for two reasons. First, one of the hallmarks of any credible scientific finding is that it can be replicated. If you can spin gold from straw, you should be able to do it every time, right? How about using a new method to teach children to read? Or developing early intervention programs that produce similar results when repeated? Second, if the results of an experiment can be replicated, they can serve as a basis for further research in the same area.

Third, *good research is generalizable to other settings.* This means, for example, that if adolescent boys are found to be particularly susceptible to peer pressure in one setting, then the results would probably stand up (or be generalizable) in a different, but related, setting. Some research has limited generalizability because it is difficult to replicate the exact conditions under which the research was carried out, but the results of most research can lend at least something to another setting.

Fourth, *research is based on some logical rationale and tied to theory.* Research ideas do not stand alone only as interesting questions. Instead, research activity provides answers to questions that help fill in pieces to what can be a large and complicated puzzle. No one could be expected to understand, through one grand research project, the entire process of intellectual development in children, or the reason why adolescents form cliques, or what actually happens during a midlife crisis. All these major areas of research need to be broken into smaller elements, and all these elements need to be tied together with a common theme, which more often than not is some underlying, guiding theory.

Fifth, and by all means, *research is doable!* Too often, especially for the young or inexperienced scientist (such as yourself), the challenge to come up with a feasible idea is so pressing that almost anything will do as a research topic. Professors sometimes see thesis statements from students such as, "The purpose of this research is to see if the use of drugs can be reduced through exposure to television commercials." This level of ambiguity and lack of a conceptual framework makes the statement almost useless and certainly not doable. Good research poses a question that can be answered, and then answers it in a timely fashion.

Sixth, *research generates new questions or is cyclical in nature.* Yes, what goes around comes around. The answers to today's research questions provide the foundation for research questions that will be asked tomorrow. You will learn more about this process later in this chapter when a method of scientific inquiry is described.

Seventh, *research is incremental.* No one scientist stands alone; instead, scientists stand on the shoulders of others. Contributions that are made usually take place in small, easily definable chunks. The first study ever done on the development of language did not answer all the questions about language acquisition, nor did the most recent study put the icing on the cake. Rather, all the studies in a particular area come together to produce a body of knowledge that is shared by different researchers and provides the basis for further research. The whole, or all the knowledge about a particular area, is more than the sum of the parts, because each new research advance not only informs us but it also helps us place other findings in a different, often fruitful perspective.

Finally, at its best, *research is an apolitical activity that should be undertaken for the betterment of society.* I stress *at its best*, because too often various special-interest groups dictate how research funding should be spent. Finding a vaccine for acquired immunodeficiency syndrome (AIDS) should not depend on one's attitudes toward individual lifestyles. Similarly, whether early intervention programs should be supported is independent of one's personal or political views about the importance of early education and such. And should research on cloning be abandoned because of its potential misuse? Of course not. It's how the discovery of new knowledge is used that results in its misuse, not the new knowledge itself.

Although it should be apolitical, research should have as its ultimate goal the betterment of society. Researchers or practitioners do not withhold food from pregnant women to study the effects of malnutrition on children. To examine the stress–nutrition link, researchers do not force adults to eat particular diets that might be unhealthy. These unethical practices would not lead to a greater end, especially because there are other ways to answer such questions without resorting to possibly harmful practices.

If these attributes make for good research, what is bad research? It takes the opposite approach of all the things stated earlier and then some. In sum, bad research is the fishing trip you take looking for something important when it simply is not to be found. It is plagiarizing other people's work, or falsifying data to prove a point, or misrepresenting information and misleading participants. Unfortunately, there are researchers whose work is characterized by these practices, but they are a small minority.

Test Yourself

Note: At the end of every major heading in each chapter of *Exploring Research*, we'll have a few questions for you that we hope will help you understand the content and guide your studying.

1. Think of an instance where research might not lead to the betterment of society.
2. How would you determine whether a research proposal is doable? How would you manage the proposal if it does not seem doable?

A Model of Scientific Inquiry

In the past 20 years, the public has been exposed to the trials and tribulations of the research process as described through hundreds of books by and about the everyday work of scientists around the world.

Doing science means following a model that begins with a question and ends with asking new questions.

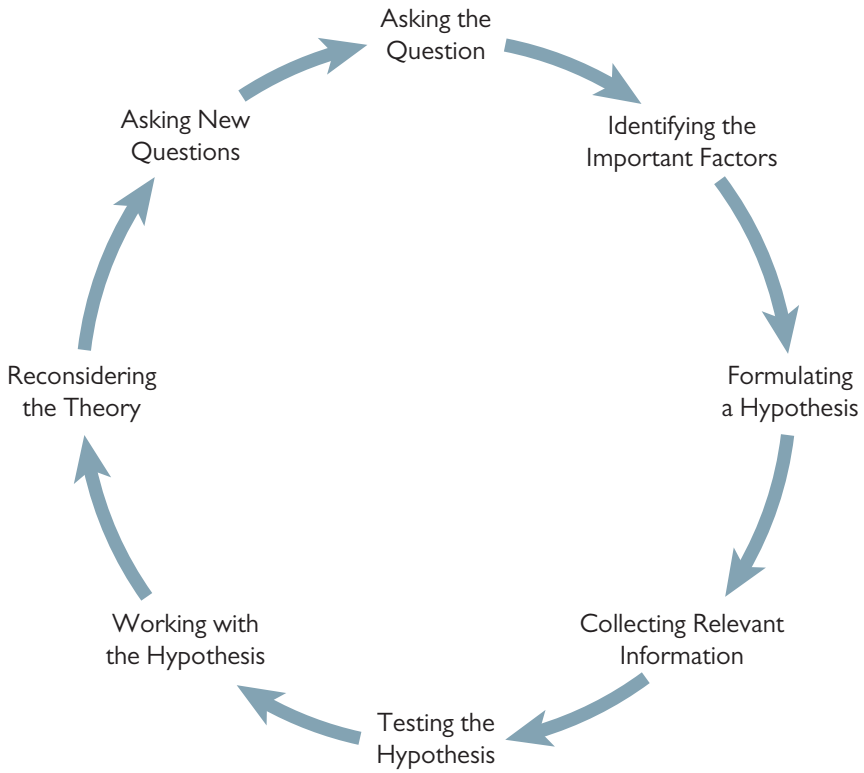
Regardless of the specific content of these books, they all have one thing in common. The work was accomplished through adherence to guidelines that allowed these researchers to progress from point A to point Z while remaining confident that they were on the trail of finding (what they hoped was) an adequate answer to the questions they had posed.

Their methods and their conclusions are not helter-skelter because of one important practice: They share the same general philosophy regarding how questions about human behavior should be answered. In addition, for scientists to be able to trust their colleagues, in the sense of having confidence in the results produced by their studies, these scientists must have something in common besides good intentions. As it turns out, what many of them share is a standard sequence of steps in formulating and answering a question.

When you read in a journal article that Method A is more effective than Method B for improving retention or memory, you can be pretty sure that the steps described next were followed, in one form or another. Because there is agreement about the general method used to answer the question, the results of this comparison of Method A and Method B can be applied to the next study. That study would perhaps investigate variations of Method A and how and why they work. The research efforts of developmental psychologists, gerontologists (specialists in aging), linguists, and experts in higher education all depend on the integrity of the process.

Figure 1.1 shows a set of such steps as part of a model of scientific inquiry.

Figure 1.1 The steps in the research process, wherein each step sets the stage for the next.



The goal of this model is to find the truth (whatever that means) or, in other words, to use a **scientific method** that results in a reasonable and sound answer to important questions that will further our understanding of human behavior.

An interesting and timely topic, *the effects of using social media on adolescents' social skills*, will be used as an example of the different steps followed in this model.

Asking the Question

Remember the story of *The Wizard of Oz*? When Dorothy realized her need to get to the Emerald City, she asked Glinda, the good witch, "But where do I begin?" Glinda's response, "Most people begin at the beginning, my dear," as is also the case in almost any scientific endeavor.

Our first and most important step is asking a question (I wonder what would happen if … ?) or identifying a need (We have to find a way to …) that arises as the result of curiosity, and to which it becomes necessary to find an answer. For example, you might be curious about how the use of social media such as Twitter and Facebook affects relationships between children and their peers. You also might feel an urgency to find out how to use various types of media most effectively for educating children and adults about the dangers of using drugs.

Such questions are informally stated and often are intended as a source of discussion and stimulation about what direction the specific research topic should take. Where do such questions come from? They rarely come from the confines of a classroom or a laboratory. Rather, questions spring (in the fullest sense of the word) from our imagination and our own experiences, enriched by the worlds of science, art, music, and literature. It is no coincidence that many works of fiction (including science fiction) have a basis in fact. The truly creative scientist is always thinking about everything from solutions to existing questions to the next important question to ask. When Louis Pasteur said that "chance favors the prepared mind," he was really saying, "Take advantage of all the experiences you can, both in and out of school." Only then can you be well prepared to recognize the importance of certain events, which will act as a stimulus for more rigorous research activity.

Questions can be as broad as inquiring about the effects of social media on peer groups, or as specific as the relationship between the content of social media transactions and acceptance by peers. Whatever their content or depth of inquiry, questions are the first step in any scientific endeavor.

Identifying the Important Factors

Once the question has been asked, the next step is to identify the factors that have to be examined to answer the question. Such factors might range from the simplest, such as an adolescent's age or socioeconomic status, to more complicated measures, such as the daily number of face-to-face interactions.

For example, the following list of factors have been investigated over the past 10 years by various researchers who have been interested in the effects of social media:

- age and gender of the adolescent,
- ethnicity,
- level of family education,
- access to types of social media,
- number of self-identified close friends,
- parental attitude toward social media,
- family configuration,
- family communication patterns.

And these are only 10 of hundreds of factors and associated topics that could be explored. But of all the factors that could be important and that could help us to understand more about the effects of social media, which ones should be selected as a focus?

In general, you should select factors that

- have not been investigated before,
- will contribute to the understanding of the question you are asking,
- are available to investigate,
- hold some interest for you personally or professionally, and
- are based on an earlier question and lead to another question.

It is hard enough to define the nature of the problem you want to study (see Chapter 3), let alone generate questions that lead to more questions, but once you begin the journey of becoming a scientist, you are a member of an elite group who has the responsibility to contribute to the scientific literature not only by what you do but also by what you see that needs to be done.

Formulating a Hypothesis

When asked what she thought a hypothesis was, a 9-year-old girl said it best: "An educated guess." A **hypothesis** results when the questions are transformed into statements that express the relationships between variables such as an *if … then* statement.

For example, if the question is, "What effects does using Facebook have on the development of friendships?" then the hypothesis could be, adolescents who use Facebook as their primary means of maintaining social contact have fewer close friends. Several characteristics make some hypotheses better than others, and we will talk about those in Chapter 2.

For now, you should realize that a hypothesis is an objective extension of the question that was originally posed. Although all questions might not be answerable because of the way in which they are posed—which is fine for the question stage—a good hypothesis poses a question in a testable form. Good questions lead to good hypotheses, which in turn lead to good studies and useful results.

Collecting Relevant Information

Hypotheses should posit a clear relationship between different factors, such as a correlation between number of followers on Twitter and quality of social skills. That is the purpose of the hypothesis. Once a hypothesis is formulated, the next step is the collection of information or empirical data that will test the hypothesis or confirm or refute it. So, if you are interested in whether or not participating in social media has an impact on adolescent's social skills, the kinds of data that will allow the hypothesis to be tested must be collected.

For example, you might collect two types of data to test such a hypothesis such as the number of friends an adolescent might have. Another variable might be the quality of those relationships.

An important point about testing hypotheses is that you set out to *test* them, not to *prove* them. As a good scientist, you should be intent on collecting data that reveal as much of the truth about the world as is possible and letting the chips fall where they may, whether you agree or disagree with the outcomes.

Setting out to prove a hypothesis can place scientists in the unattractive position of biasing the methods for collecting data or the way in which study results are interpreted. If bias occurs, then the entire sequence of steps can fall apart. Besides, there's really no being *wrong* in science. Not having a hypothesis supported means only that there are additional questions to ask or that those which were asked should be reformulated. That is the beauty of good science—there is always another question to ask on the same topic—one that can shed just a bit more light. And who knows? That bit more light might be the tipping point or just the amount needed to uncover an entirely new and significant finding.

Testing the Hypothesis

Is it enough simply to collect data that relate to the phenomena being studied? Not quite. What if you have finished collecting data and find that adolescents who spend more than 10 hours a week involved in social media have 50% fewer qualitatively *good* relationships with peers than those who spend less than 10 hours? What would your conclusion be?

On one hand, you could say the adolescents who used social media more than 10 hours per week were one-half as sociable as other adolescents or had one-half the quality of relationships of the children who used social media less than 10 hours per week. On the other hand, you might argue that the difference between the two groups of adolescents is not large enough for you to reach any conclusion. You might conclude that in order for a statement about social media use and quality of friendships, you would have to have much greater differences in the quality of relationships.

Say hello to **inferential statistics** (see Chapter 8 for more), a set of tools that allows researchers to separate the effects of an isolated factor (such as time spent on Facebook) from differences between groups that might be owing to some other factor or to nothing other than **chance**. Yes, luck, fate, destiny, the wheels of fortune, or whatever you want to call what you cannot control is, more often than not, responsible for differences between groups.

For example, what if some of the adolescents participating in your study went to some kind of social function where there was a particularly strong emphasis on social media methods of communicating such as texting. Or, what if some of the adolescents were just afraid to truthfully report how much time he or she spent on Facebook during study time?

The job of all the tools that researchers have at their disposal (and the ones you will learn about throughout *Exploring Research*) is to help you separate the effects of the factors being studied (such as amount of time spent on Facebook) from other unrelated factors (such as the number of years a family has lived at its current address). What these tools allow researchers to do is assign a probability level to an outcome so that you can decide whether what you see is really due to what you think it is due to or something else which you leave for the next study.

Working with the Hypothesis

Once you have collected the required data and have tested the hypothesis, as a good scientist you can sit down, put up your feet, look intellectual, and examine the results. The results may confirm or refute the hypothesis. In either case, it is off to the races. If the data confirm your hypothesis, then the importance of the factors that were hypothesized to be related and conceptually important were borne out and you can go on your merry way while the next scientific experiment is being planned. If the hypothesis is not confirmed, it may very well be a time for learning something that was not known previously. In the example used earlier, it may mean that involvement in social media has no impact on social skills or social relationships. Although the researcher might be a bit disappointed that the initial hunch (formally called a hypothesis) was not supported, the results of a well-run study always provide valuable information, regardless of the outcome.

Reconsidering the Theory

Finally, it is time to take stock and relate all these research efforts to what guides our work in the first place: theory. Earlier in this chapter, a theory was defined as a set of statements that predict things that will occur in the future and explain things that have occurred in the past. But the very nature of theories is that they can be modified according to the results of research based on the same assumptions on which the theory is based.

For example, a particular approach to understanding the development of children and adults is known as social learning theory, which places special importance on the role of modeling and vicarious, or indirect, learning. According to this theory, exposure to aggressive behavior would lead to aggressive behavior once the environment contains the same kinds of cues and motivation that were present when the initial aggressive model (such as particularly unkind Facebook postings) was observed.

If the hypothesis that observing such models increases lack of civility is confirmed, then another building block, or piece of evidence, has been added to the house called social learning theory. Good scientists are always trying to see what type of brick (new information) fits where, or if it fits at all. In this way, new knowledge can change or modify the way the theory appears and what it has to say about human behavior. Consequently, new questions might be generated from the theory that will help contribute further to the way in which the house is structured.

Asking New Questions

In any case, the last step in this simple model of scientific inquiry is to ask a new question. It might be a simple variation on a theme (Do males use social media in a different way than females?) or a refinement of the original question (How might the use of social media differentially affect the social relationships of males and females?). Whether or not the hypothesis is supported, good research leaves you farther along the trail to answering the original question. You just might be at a different place than you thought or intended to be.

Test Yourself

Hypothesis plays a very important role in scientific research, with one of them being the objective testing of a particular question that a scientist might want to ask. What are some of the factors that might get in the way of the scientist remaining objective and what impact might that have on a fair test of the hypothesis of interest? What is the danger of not being aware of these biases?

Different Types of Research

By now, you have a good idea what research is and how the research process works. Now it is time to turn your attention to a description and examples of different types of research methods and the type of questions posed by them.

The types of research methods that will be discussed differ primarily on three dimensions: (1) the nature of the question asked, (2) the method used to answer it, and (3) the degree of precision the method brings to answering the question. One way in which these methods do not necessarily differ, however, is in the content or the focus of the research.

In other words, if you are interested in the effects of the use of social media on adolescents' friendships, your research may be experimental, where you artificially restrict access to social media and look at friendship outcomes, or nonexperimental, where you survey a group of adolescents to determine the frequency of use of social media tools.

A summary of the two general categories of research methods (nonexperimental versus experimental), which will be discussed in this book, is shown in Table 1.1.

This table illustrates the purpose of each category, the time frame that each encompasses, the degree of control the different method has over competing factors, *code* words that appear in research articles that can tip you off as to the type of research being conducted, and an example of each. Chapters 9–12 discuss in greater detail each of these research methods.

There is one very important point to keep in mind when discussing different methods used in research. As often as not, as research becomes more sophisticated and researchers (like you in the future) become better trained, there will be increased reliance on mixed methods models, where both experimental and nonexperimental methods are combined. Some researchers feel that this type of approach lacks clarity and precision, but others feel it is the best way to look at a phenomenon of interest from a variety of perspectives and thereby be more informative.

Nonexperimental Research

Nonexperimental research includes a variety of different methods that describe relationships between variables. The important distinction between nonexperimental methods and the others you will learn about later is that nonexperimental research methods do not set out, nor can they test, any causal relationships between variables. For example, if you wanted to survey the social media–using behavior of adolescents, you could do so by having them maintain a diary in which they record what tools they use and for how long.

Nonexperimental research examines the relationship between variables, without any attention to cause-and-effect relationships.

Table 1.1 Summary of research methods covered in exploring research.

	Types of Research					
	Nonexperimental				Experimental	
	Descriptive	**Historical**	**Correlational**	**Qualitative**	**True Experimental**	**Quasi-Experimental**
Purpose	Describe the characteristics of an existing phenomenon	Relate events that have occurred in the past to current events	Examine the relationships between variables	To examine human behavior and the social, cultural, and political contexts within which it occurs	To test for true cause-and-effect relationships	To test for causal relationships without having full control
Time frame	Current	Past	Current or past (correlation) Future (prediction)	Current or past	Current	Current or past
Degree of control over factors or precision	None or low	None or low	Low to medium	Moderate to high	High	Moderate to high
Code words to look for in research articles	Describe Interview Review Literature	Past Describe	Relationship Related to Associated with Predicts	Case study Evaluation Ethnography Historical Research Survey	Function of Cause of Comparison between Effects of	Function of Cause of Comparison between Effects of
Example	A survey of dating practices of adolescent girls	An analysis of Freud's use of hypnosis as it relates to current psychotherapy practices	An investigation that focuses on the relationship between the number of hours of television watching and grade-point average	A case study analysis of the effectiveness of policies for educating all children	The effect of a preschool language program on the language skills of inner-city children	Gender differences in spatial and verbal abilities

This descriptive study provides information about the *content* of their online behaviors but tells you little about *why* they may do what they do. In this type of a research endeavor, you are not trying to understand the motivation for using what online tools are used nor are you trying to manipulate their use or content of the communication or any other outcome. This is nonexperimental in nature because no cause-and-effect relationships of any type are being hypothesized or investigated.

Nonexperimental research methods that will be covered in this volume are descriptive, correlational, and qualitative. Descriptive and correlational methods will be covered in Chapter 9, and qualitative methods will be discussed in Chapter 10. The following is a brief overview of each.

DESCRIPTIVE RESEARCH **Descriptive research** describes the characteristics of an existing phenomenon. The every 10-year U.S. Census is an example of descriptive research as is any survey that assesses the current status of anything from the number of faucets in a house to the number of adults over 60 years of age who have grandchildren.

Descriptive research focuses on events that occur in the present.

What can be done with this information? First, it provides a broad picture of a phenomenon you might be interested in exploring. For example, if you are interested in learning more about the reading process in children, you might want to consult *Reading Assessment* (at http://nces.ed.gov/nationsreportcard/reading). This biennial (every 2 years) publication summarizes information about the reading achievement of children in grades 4, 8, and 12. Or, you might want to consult a publication of the Centers for Disease Control and Prevention, the *Morbidity and Mortality Weekly Report* (at http://www.cdc.gov/mmwr), to determine the current incidence of measles cases in the Midwest, or the Bureau of Labor Statistics (at http://www.bls.gov/) to determine the current unemployment rate and the number of working single parents who have children under age 5 (about 60%). If you want to know it, there is a place to find it. Descriptive research demands this type of information.

Eleanor Hanna, Hsiao-ye Yi, Mary Dufour, and Christine Whitmore (2001) examined the relationship of early smoking to alcohol use, depression, and drug use in adolescence as an example of a study containing nonexperimental elements. They used descriptive statistics and other statistical techniques to find that in comparison with those who never smoked, or those who simply

experimented, early smokers were those most likely to use alcohol and other drugs as well as have school problems and early sexual experiences culminating in pregnancy.

Descriptive research can stand on its own, but it can also serve as a basis for other types of research in that a group's characteristics often need to be described before the meaningfulness of any differences can be addressed. And almost always descriptive data is collected but as the first step of many on the way to a more complex study. Want to describe an outcome? Learn about descriptive techniques.

CORRELATIONAL RESEARCH Descriptive and **historical researches** provide a picture of events that are currently happening or have occurred in the past. Researchers often want to go beyond mere description and begin discussing the relationship that certain events might have to one another. The most likely type of research to answer questions about the relationship among variables or events is called correlational research.

What **correlational research** does, which neither descriptive nor historical research does, is to provide some indication as to how two or more things are related to one another or, in effect, what they share or have in common, or how well a specific outcome might be predicted by one or more pieces of information.

Correlational research examines the relationship between variables.

Correlational research uses a numerical index called the **correlation coefficient** (see Chapter 9 for a complete discussion) as a measure of the strength of this relationship. Most correlational studies report such an index when available.

If you were interested in finding out the relationship between the number of hours that first-year students spend studying and their grade-point averages, then you would be doing correlational research, because you are interested in the relationship between these two variables. If you were interested in finding out the best set of predictors of success in graduate school, you would be doing a type of correlational research that includes prediction.

For example, in a study of culture, obesity stereotypes, self-esteem, and the *thin ideal*, Klaczynski, Goold, and Mudry (2004) examined the relationships among negative stereotypes of obesity, and other variables such as perceptions of the causes of obesity and of control over weight and self-esteem. They found a negative correlation between beliefs in control over one's weight and self-esteem.

One of the most important qualifiers about correlational research is that while it examines relationships between variables, it in no way implies that one variable *causes* changes in the other variable. In other words, correlation and prediction examine associations but not causal relationships, wherein a change in one factor directly influences a change in another.

For example, it is a well-established fact that as the crime rate in a community increases, so does the level of ice cream consumption! What's going on? Certainly, no rational person would conclude that the two are causally related such that if ice cream were banned, no more crimes would occur. Rather, another variable, temperature, better explains the increased ice cream consumption and the increased crime rate (both rise when it gets warm). It might seem ridiculous that people would identify causality just because events are related, but you do not have to read far in the daily newspaper to discover that politicians can reach just such unwise conclusions.

QUALITATIVE RESEARCH **Qualitative research** methods (see Chapter 10) are placed in this general category of nonexperimental methods because they do not directly test for cause and effect and, for the most part, follow an entirely different paradigm than the experimental model.

Qualitative research studies phenomena within the social and cultural context in which they occur.

The general purpose of qualitative research methods is to examine human behavior in the social, cultural, and political contexts in which they occur. This is done through a variety of tools, such as interviews, historical methods, case studies, and ethnography, and it usually results in qualitative (or nonnumerical) primary data. In other words, the qualitative researcher is more (but not only) interested in the contents of an interviewee's speech than in the number of times (frequency) a particular comment is made.

Qualitative research is relatively new to the social and behavioral sciences and, to a large extent, its increasing popularity is due to a degree of dissatisfaction with other available research methods. Some scientists feel that the traditional experimental model is too restrictive and narrow, preventing underlying and important factors and relationships from being revealed. What's so valuable about this set of tools is that it allows you to answer a whole new set of questions in a whole new way.

Experimental Research

You already know that correlational research can help to establish the presence of a relationship among variables, but it does not provide any reason to believe that variables are causally related to one another. How does one find out if characteristics, behaviors, or events are related in such a way that the relationship is a causal one? Two types of research can answer that question: true experimental research and quasi-experimental research.

Experimental research examines the cause-and-effect relationship between variables.

True Experimental Research

In the **true experimental research method**, participants are assigned to groups based on some criterion, often called the treatment variable or treatment condition. For example, let us say that you are interested in comparing the effects of two different techniques for reducing obsessive–compulsive behavior in adults. The first technique includes behavioral therapy, and the second one does not. Once adults are assigned to groups and the programs are completed, you will want to look for any differences between the two groups with regard to the effects of the therapy on the frequency of obsessive–compulsive behaviors. Because the nature of the groups is determined by the researcher, the researcher has complete control over the factors to which the adults are exposed.

True experimental research examines direct cause-and-effect relationships.

This is the ideal model for establishing a cause-and-effect relationship because the researcher has clearly defined the possible cause (if indeed it results in some effect) and can keep very close tabs on what is happening. Most important, however, the researcher has complete control over the treatment.

In a quasi-experimental study, the researcher does not have such a high degree of control because people have already been indirectly assigned to those groups (e.g., social class, type of abuse, gender, and type of injury) for which you are testing the effects.

The distinction between experimental and other methods of research boils down to a matter of control. True experimental research designs (discussed in Chapter 11) isolate and control all the factors that could be responsible for any effects except the one of most interest.

For example, Fleming, Klein, and Corter (1992) examined the effects of participation in a social support group on depression, maternal attitudes, and behavior in new mothers. As part of the experimental design, the researchers divided 142 mothers into three groups. Group 1 received the intervention, Group 2 received the no-intervention condition, and Group 3 received a special group-by-mail intervention. The key point here is the manipulation (the key word in experimental designs) of the condition for each of the three groups. This research is true experimental because the researchers determined the nature of the treatment and who is assigned to each group. As you will learn, in a quasi-experimental study, the researcher has no control over the origin of group membership (male or female, black or white, etc.). The primary difference between quasi-experimental and true experimental research is that in the former, subjects are preassigned to groups. It's that simple.

Quasi-Experimental Research

In **quasi-experimental research**, participants are *preassigned* to groups based on some predetermined characteristic or quality. Differences in gender, race, age, grade in school, neighborhood of residence, type of job, and even experiences are examples. These group assignments have already taken place *before the experiment begins*, and the researcher has no control over who is assigned to which group.

Quasi-experimental studies also focus on cause and effect, but they use preassigned groups.

Let us say that you are interested in examining voting patterns as a function of neighborhood. You cannot change the neighborhood people live in, but you can use the quasi-experimental method to establish a causal link between residence and voting patterns. In other words, if you find that voting pattern and residence are related, then you can say with some degree of confidence (but not as much as with an experimental study) that there is a causal relationship between where one resides and how one votes.

The most important use of the quasi-experimental method occurs where researchers cannot, in good conscience, assign people to groups and test the effects of group membership on some other outcome. For example, researchers who are interested in reducing the impact of child abuse cannot *create* groups of abusers, but rather have to look at already established groups of people who are abusive. That's exactly what Mark Chaffin and his colleagues (2004) did when they assigned already (and that's the key word) physically abusive parents to one of three intervention conditions. They found a reduction in abusive behavior by parents who were assigned to parent–child interaction therapy.

Another phrase for quasi-experimental research is post hoc, or after the fact.

Quasi-experimental research is also called *post hoc*, or after the fact, research because the actual research takes place after the assignment of groups (e.g., abusive versus nonabusive, employed versus unemployed, malnourished versus nonmalnourished, and male versus female). Because assignment has already taken place, the researcher has a high degree, but not the highest degree, of control over the cause of whatever effects are being examined. For the highest degree of control to occur, the true experimental model must be followed.

Test Yourself

We have briefly defined and discussed the different research methods that you will learn about later in *Exploring Research* in much greater detail. For now, answer this question. Which factors determine whether a scientist uses experimental or non-experimental research methods? Think of a research question that can be better answered using experimental methods, and one that can be answered using non-experimental research methods.

What Research Method to Use When?

This is a beginning course and no one would expect you to be able to identify what type of research method was used in a particular study—at least not yet. You may have a very good idea if you understand what you just read about nonexperimental and **experimental research methods**, but it takes some experience to become really good at the identification process.

So, here is a little jump start in the form of a *cheat* sheet (shown in Figure 1.2).

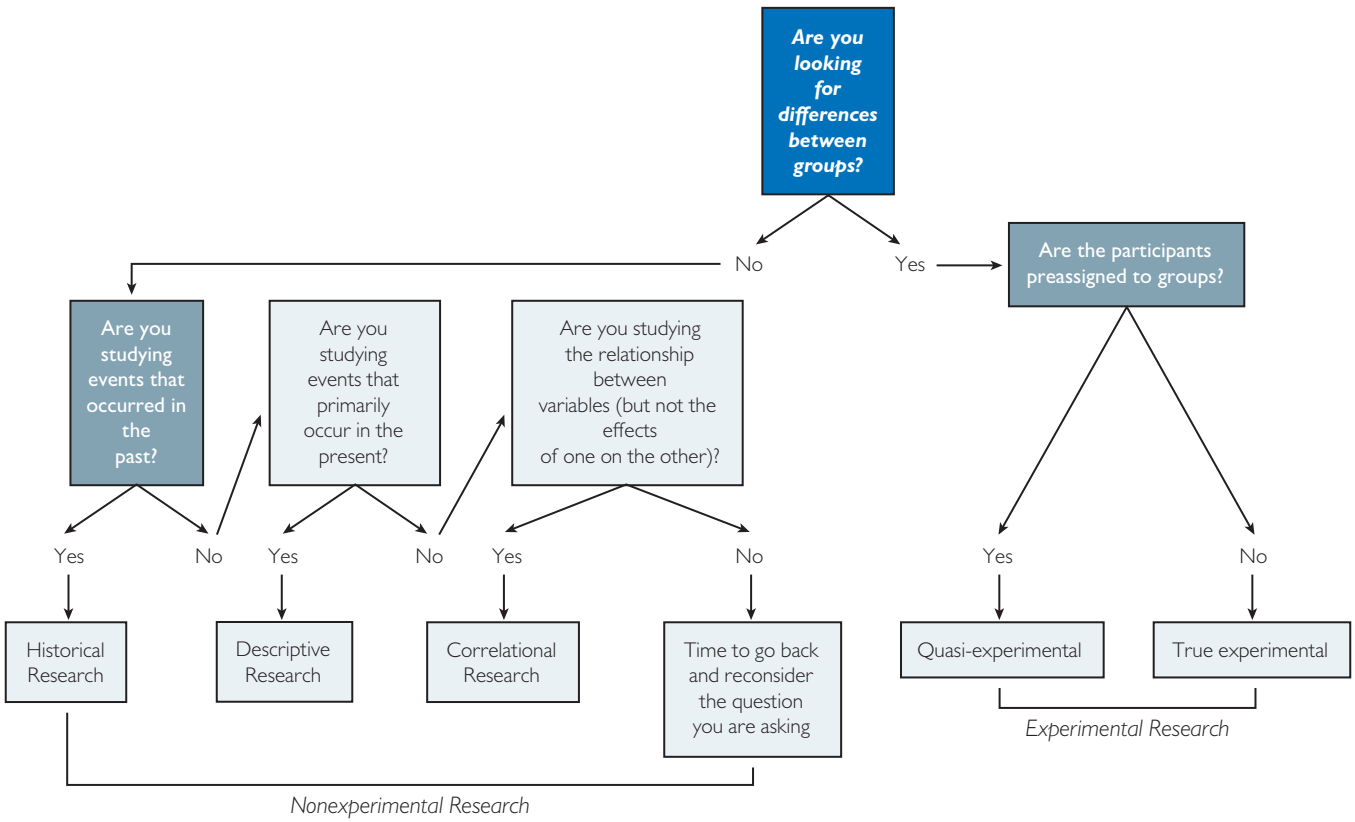
This is not a substitute for learning how to distinguish nonexperimental from experimental **research designs**—it's just a good way to get started and a bit of a help when you need it. Note that an alternative to any nonexperimental method is a qualitative approach (which is not shown in Figure 1.2).

Basic Research versus Applied Research

Sometimes in the research world, distinctions must be made not only about the type of research but also about the most general category into which the implications or utility of the research might fall. This is where the distinction between basic and applied research comes in. But beware! This distinction is sometimes used as a convenient way to classify research activity rather than to shed light on the intent or purpose of the researcher and the importance of the study.

Both basic and applied research are critical parts of studying and understanding a wide range of phenomena.

Figure 1.2 Research design *cheat* sheet.



The most basic distinction between the two types of research is that **basic research** (sometimes called pure research) is research that has no immediate application at the time it is completed, whereas **applied research** does. If this appears to be a somewhat ambiguous distinction, it is, because almost all basic research eventually results in some worthwhile application over the long term. In fact, the once easy distinction between the two is slowly disappearing.

For example, for every dollar spent on the basic research that supported the lunar missions during the 1960s and 1970s, $6 were returned in economic impact. Data from basic research that hypothesizes a relationship between Alzheimer's disease in older people and Down's syndrome (a genetic disorder) in younger people could eventually prove to be the critical finding that leads to a cure for both conditions. Another example: Who cares if some children have a more difficult time than others do in distinguishing between two very similar stimuli? You do, if you want to teach these children how to read. Many different reading programs have grown directly from such basic research efforts.

Never judge the quality of either the finished product or the worth of supporting a research project by branding it as basic or applied research. Rather, look closely at its content and judge it on its merit. This approach obviously has been used, because more and more reports about basic research (at one time beyond the interests of everyday practitioners) appear in such practitioner-oriented professional journals as *Phi Delta Kappan* and the *APA Monitor*, as well as the Sunday *New York Times Magazine*, *Newsweek*, *Science News*, and *American Scientist*. And the results of applied research are those that policy makers look to when formulating position papers.

Test Yourself

Why are both basic and applied research essential to the scientific community as well as to the public community that it serves? What do you think an educated or informed citizen should know about how the research process works? What five questions might he or she be able to answer?

Summary

Great! You have finished the first chapter of *Exploring Research*, and hopefully you now have a good idea about what research is (and isn't), what the purpose of research is, and some of the different ways in which research can be carried out. With this new information under your belt, let's turn to the next chapter, which focuses on some *researchese*, or the language used by researchers, and how these new terms fit together with what you have learned here.

Online…

Professional Organizations

Because someday you'll be a professional, there's no time like the present to get information about some professional societies and join as a student—it will never be cheaper. Here are some of the largest organizations and their Internet addresses:

- American Anthropology Association at http://www.aaanet.org/
- American Educational Research Association at http://www.aera.net/
- American Medical Association at http://www.ama-assn.org/
- American Psychological Association at http://www.apa.org/
- American Public Health Association at http://www.apha.org/
- National Association for the Education of Young Children at http://www.naeyc.org/
- American Nurses Association at http://www.nursingworld.org/
- American Association for the Advancement of Science at http://www.aaas.org/
- American Statistical Association at http://www.amstat.org
- American Psychiatric Association at http://www.psych.org
- American Pharmacists Association at http://www.pharmacist.com
- Council for Exceptional Children at http://www.cec.sped.org

How Science Works

You can't have enough information about the scientific method and why it has served social and behavioral (and other) scientists so well. Search the article "How Science Works" from the good people at University of California Museum of Paleontology (at http://undsci.berkeley.edu) for an interesting and informative overview of the process.

Exercises

1. The process of research never stands independently from the content of the research. As a student new to the field of research, and perhaps even to your own discipline (such as education, psychology, sociology, or nursing), answer the following questions:
   a. What areas within your discipline especially interest you?
   b. Who are some of the outstanding researchers in your field, and what is the focus of their work?
   c. Of the different types of research described and discussed in this chapter, which one do you think best fits the type of research that is done in your discipline?
2. At this point in your studies, what do you find most intimidating about the research process? What is one thing you could do to make this part of the research process a little bit easier or more comfortable? In which part of conducting research are you most confident?
3. How do the terms *hypothesis* and *theory* differ in meaning and application?
4. Visit your college or university library and locate an article from a professional journal that describes a research study. Access it online, or as a hard copy. From the description of how scientific inquiry takes place (which you read about in this chapter), answer the following:
   a. What is the primary question posed by the study?
   b. What important factors are identified?
   c. Is there a hypothesis stated? If so, what is it?
   d. Describe how the information was collected.
   e. How do the results of the study affect the original hypothesis?
5. Interview an active researcher on your campus and ask about this person's research activities, including:
   a. The focus of this person's research interests.
   b. Why this individual is interested in this area.
   c. What the most exciting part of the research is.
   d. What the least exciting part of the research is.
   e. What impact the results of the research might have on this individual's particular discipline.
   f. What studies this individual would like to see as follow-up studies to the research.
6. Select a discipline within the social and behavioral sciences, such as child development, social psychology, higher education, or health psychology. For the discipline you select, find a representative study that is quasi-experimental or experimental in nature. Write a one-paragraph description of the study. Do the same for a historical study.
7. This chapter contains several examples of preassigned groups used in quasi-experimental research (e.g., groups based on preassignment such as gender, race, and grade in school). Name three more examples of preassigned groups appropriate for quasi-experimental research.
8. Research questions come from imagination and can be enriched by science, art, music, and literature. Identify a book you have read or a television show or movie you have watched. What kind of research question can you pull from this work? Here are some examples to get you started:

   Pride and Prejudice (Jane Austen): In what ways do perceptions of social status relate to choices in a relationship partner?

   Clueless (Amy Heckerling): How does an intervention involving vocabulary lessons, a new wardrobe, and instructions on which social groups to befriend affect ratings of popularity from fellow high school students?
9. Think of an aspect of your daily routine and determine how you could study it using true experimental research. For example, you may try two different dishes for breakfast and study their effects on your energy level.
10. In a fictitious correlational study, the results showed that age was related to strength, that is, as children get older, their strength increases. What is the problem with the statements that increased strength is caused by increasing age, or that the stronger you get the older you get?
11. Why do you think physical scientists, such as those working in the fields of physics, chemistry, astronomy, etc., might say that research in the social sciences is unscientific?
12. What are the effects of socio-economic status on academic achievement? Answer the question using two different research methods.

13. Look for a research article that presents correlational evidence and another that presents causal evidence. How do the articles use language differently in describing the methods and the results?

14. What materials can a researcher provide others with in order to help them replicate a study?

15. How can applied research help you understand an issue your university or community is currently facing?

16. Identify three ways in which a study might be classified as bad research.

17. A researcher who hypothesized that 6-year-old children of nonworking mothers have more advanced reading skills than those of 6-year-old children of working mothers found insignificant results. Based on this information and what you have learned about the field of research, answer the following questions:
    a. What is a new research question the researcher could ask?
    b. What is one step in between examining the results and asking the new research question that might point the researcher in the right direction?

18. One characteristic of high-quality research is its ability to contribute toward the betterment of society. In other words, your tutors will always want you to reflect on the contribution of your research to the field of knowledge. Think of a research question you care deeply about and determine how it might contribute toward the betterment of society.

19. Explain the difference between correlational, true experimental, and quasi-experimental research.

20. In your neighborhood, what factors determine the school to which parents will send their children? Use figure 1.2 to decide the research method you would use to answer the question.

Chapter 2
The Research Process
Coming to Terms

Research Matters

Research matters will introduce you to a research project that touches on the content that's discussed in the current chapter. The research that we feature is only one example of many that will help show you how actual researchers approach actual problems in doing their work.

In this first *research work*, we hope you'll pay attention to the introduction of some terms and phrases that may be new to you but you will become more familiar with as you move through the book. You'll also see how researchers focus on real-world problems and issues in their work.

There's no way to talk about the education of children without talking about the importance of reading. And, it's not just *school* books that appear to be important, but reading recreationally as well—you know, those books you really enjoy reading but never seem to be able to find the time?

Margaret Kristin Merga from Edith Cowan University in Australia directed the West Australian Study in Adolescent Book Reading where 520 adolescents discussed the quality and quantity of encouragement of recreational reading by their primary school and high school teachers in the past and at present. The theoretical framework that she followed was that social influences such as teachers' attitudes and practices toward reading have a significant impact on adolescents' attitudes and values toward reading as well. So what works best for influencing adolescents to recreationally read? Among other factors, such qualities by teachers as showing personal enjoyment of recreational book reading, supporting student's discussion of such books, and setting expectations that students will read at school and at home. Here's where a scientist takes her own interest within a theoretical framework and applies that knowledge to a real-world question regarding why adolescents might, and do, read recreationally. A significant question answered in a systematic and comprehensive way.

If you want to know more, you can see the original research at …

Merga, M.K. (2015). "'She knows what I like': Student-generated best-practice statements for encouraging recreational book reading in adolescents." *Australian Journal of Education*, *59*(1): 35–50.

From Problem to Solution

All you need to do is to identify an interesting question, collect some data, and poof!—instant research! Not quite. The model of scientific inquiry (discussed in Chapter 1) does a nice job of specifying the steps in the research process, but there is quite a bit more to the process than that.

At the beginning of this chapter, we will provide a real-life example of how the process actually takes place and how researchers begin with what they see as a problem (to be solved) and end with a solution (or the results) to that problem.

Keep in mind, however, that the meanings of the words *problem* and *solution* go beyond solving a simple problem of the $2 + 2 = 4$ variety. Rather, the questions that researchers ask often reflect a more pressing social concern or economic issue. In addition, the results from a research study often provide the foundation for the next research endeavor.

We will look at an interesting study entitled *Maternal Employment and Young Adolescents' Daily Experiences in Single-Mother Families* (Duckett and Richards, 1989), which examines the impact of maternal employment on adolescent development. Although the study is almost 40 years old, it continues to effectively illustrate many of the ideas and concepts covered in this chapter.

One of the most creative things about this study is the way in which these researchers collected their data. They did not sit down and ask adolescents how they felt about this or that, but instead they tried to get an overall picture of their feelings outside of the laboratory setting. And as you will see, it's an early use of technology that provides some insight into how people were using new tools (no cell phones then, but pagers) to answer interesting questions.

Duckett and Richards studied 436 fifth through ninth graders and their mothers to determine the effects of a combination of issues that continue to receive considerable attention in the media. The general goal of the research (and the problem) was to understand better some of the factors and consequences that surround the large number of working mothers of adolescents.

To narrow their investigation, the researchers set out to learn about the general nature of the adolescents'

experiences as a function of having a mother who works, as well as the quality of time that the adolescents spent with their mothers. Given that so many mothers (more than 50% of those with children under 18 years of age) from both single-parent and dual-parent families work outside the home, answers to questions like those posed by this study are becoming increasingly important in the formation of social and economic policies.

There are many different ways to answer a question, but often the simplest, most clever research plan is the best one.

To obtain their answers, the researchers compared adolescents living with two parents (382, or 88%) with those adolescents who live with only their mother (54, or 12%). However, to reach fully their goal of better understanding the effects of maternal employment, the researchers had to break down the group of children and parents even further into those children whose mothers worked part-time, those children with mothers who worked full-time, and those children with mothers who were unemployed.

When the groups were separated on these two factors (family configuration and employment status), the researchers could make a comparison within and between the six groups (all combinations of single-parent and two-parent families, with part-time employed, full-time employed, and unemployed mothers) and get the information they needed to answer the general questions posed.

Now comes the really creative part of the study. Duckett and Richards used a method called the experience sampling method previously developed by M. Csikszentmihalyi and R. Larson and published in 1987. In accordance with this method, the adolescents participating in the study would carry electronic beepers. On an unpredictable schedule, they would receive a beep from *beep central* and would then stop what they were doing and complete a self-report form. They would do this for 1 week.

Test Yourself

It's really interesting when new technologies have been adopted by social scientists to help them collect and analyze data. For example, almost all adolescents have cell phones, and the capabilities of these cell phones go way beyond sending and receiving calls; cell phones are, in and of themselves, small computers that have GPS and multimedia capabilities. We'll discuss technology and the research process later in *Exploring Research*, but for now, what other new types of technology can you think of that might play a role in completing research? Any ideas as to what the future might bring? What other new technology can you think of that might also play a role in research?

A signal telling the participant to stop and complete the form was sent on an average of every 2 hours between 7:30 A.M. and 9:30 P.M., with a total of 49 signals sent for the week for each participant. In the course of 1 week, 49 separate forms were completed, which provided information about how participants felt at any particular moment. For 436 participants at 49 forms each, a total of 21,364 forms were completed, which is a hefty sample of adolescents' behavior!

What was contained on these self-report forms? The adolescents had to report on what the researchers call *affect* (happy–sad, cheerful–irritable, friendly–angry) and *arousal* (alert–drowsy, strong–weak, excited–bored). Each of these six items was rated on a scale of 1–7. For example, the participants might indicate a 4, meaning they felt "right in the middle of happy and sad at that moment in time." These six items could be completed in a short period of time, and an accurate picture of the adolescents' daily life could then be formed. Adolescents also had to respond to "What were you doing?" and "Whom were you with?" as well as to some questions about their perceptions of their parents' friendliness and their feelings while they were with their parents.

Duckett and Richards had an interesting comparison (single-parent versus dual-parent mothers who are unemployed or employed part-time or full-time) and a good-sized set of reactions from adolescents on which to base their analysis and discussion. To make sense of all this information, the researchers compiled and then applied some statistical tests (you will learn more about these later) to reach their conclusions, including the following:

- Children of working single mothers benefit in ways other than just in the provision of income.
- Maternal employment is related to positive parent–child interactions.
- Children of single mothers employed full-time felt friendliest toward their fathers.

This well-designed, straightforward study examined a question that bears on many issues that everyone from schoolteachers to employers needs to have answered. The study involved a more than adequate number of participants and used methods that directly focused on the type of information the researchers wanted. Although they did not answer every question about the relationship between maternal employment and adolescent development, the researchers did provide an important piece to the puzzle of understanding the effects of employment on growing children and changing families.

The researchers seemed to take a logical approach of going from a question that has some import for many groups in today's society and articulating it in such a way that it can be answered in a reasonable and efficient manner.

The issue of how children are affected by working parents is certainly still an important one, but the results of research, such as that summarized earlier, bring us closer to a solution to some of the questions posed by such work arrangements. To be the kind of researcher you want to be, you need to know the rules of the game (and the lingo) and follow them, as did Duckett and Richards. This knowledge begins with an understanding of some basic vocabulary and ideas.

Test Yourself

More on technology and research. Think about how these two scientists used technology (in this case beepers) to help them collect data. Now, think of the technology that you use every day for a variety of personal communications and to access information, and see if you can think of a way that those tools could be used in a research setting that focuses on your interests as well as a research setting outside of your interests.

The Language of Research

Significance levels. Null hypotheses. Independent variables. Factorial designs. Research hypotheses. Samples. Populations. Yikes!—that's a lot of new terms.

But these and other new words and phrases form the basis for much of the communication that takes place in the research world. As with any endeavor, it is difficult to play the game unless you learn the rules. The rules begin here, with a basic understanding of the terminology used by researchers in their everyday activities. The rest of this chapter offers a language lesson of sorts. Once you become familiar with these terms, everything that follows in *Exploring Research* will be easier to understand and more useful. Each of the terms described and defined here will be used again throughout the book.

All about Variables

The word **variable** has several synonyms, such as *changeable* or *unsteady*. Our set of rules tells us that a variable is a noun, not an adjective, and represents a class of outcomes that can take on more than one value.

For example, hair color is a variable that can take on the values of red, brown, black, blond, blue, magenta, and shockingly bright green and just about any other combination of primary colors as well. Other examples of variables would be height (expressed as short or tall, or 5 feet, 3 inches or 6 feet, 1 inch), weight (expressed as heavy or light, 128 pounds or 150 pounds), age at immunization (expressed as young or old, 6 weeks or 18 months), number of words remembered, time off work, political party affiliation, favorite type of M&Ms™, and so on. The one thing all these traits, characteristics, or preferences have in common is that the variable (such as political party affiliation) can take on any one of several values, such as Republican, Democrat, or Independent.

However, the more precisely that a variable is measured, the more useful the **measurement** is. For example, knowing that Rachael is taller than Gregory is useful, but knowing that Rachael is 5 feet, 11 inches and Gregory is 5 feet, 7 inches is even more useful.

Interestingly, variables that might go by the same name can take on different values. You could measure height in inches (60) or in rank (the tallest), for example—or be defined differently, depending on a host of factors, such as the purpose of the research or the characteristics of the participants. For example, consider the variable called intelligence. For one researcher, the definition might be scores on the Stanford–Binet Intelligence Test, whereas for another it might be scores on the Kaufman Assessment Battery. For Howard Gardner (1983), who believes in the existence of multiple intelligences, the definition might be performance in mathematics, music, or some physical activity. All of these variables represent the same general construct of intelligence, albeit assessed in different ways.

Variables are used for different purposes as well. For example, a variable such as average number of days hospitalized following surgery might be used as a measure of recovery from surgery. But, this same variable might be used to equalize initial differences in patients when the question becomes, "How much post-operative pain did patients experience?" Statistically removing (or controlling for) how long they stayed in the hospital after their surgery is a fancy and very cool technique for taking differences in length of hospital stay out of the equation.

The following paragraphs describe several types of variables, and Table 2.1 summarizes these types and what they do.

Dependent Variables

A **dependent variable** represents the measure that reflects the outcomes of a research study. For example, if you measure the difference between two groups of adults on how well they can remember a set of 10 single digits after a 5-hour period, the number of digits remembered is the dependent variable. Another example: If you are looking at the effect of parental involvement in school on children's grades, the grades that the children received would be considered a dependent variable.

The dependent variable is that which is examined as the outcome of an experiment or a research project.

Table 2.1 Different types of variables.

Type of Variable	Definition	Other Terms You Might See
Dependent	A variable that is measured to see whether the treatment or manipulation of the independent variable had an effect	• Outcome variable • Results variable • Criterion variable
Independent	A variable that is manipulated to examine its impact on a dependent variable	• Treatment variable • Factor • Predictor variable
Control	A variable that is related to the dependent variable, the influence of which needs to be removed	• Restricting variable
Extraneous	A variable that is related to the dependent variable or independent variable that is not part of the experiment	• Threatening variable
Moderator	A variable that is related to the dependent variable or independent variable and has an impact on the dependent variable	• Interacting variable

Think of a dependent variable as the outcome that may depend on the experimental treatment or on what the researcher changes or manipulates.

Independent Variables

An **independent variable** represents the treatments or conditions that the researcher has either *direct* or *indirect* control over to **test** their effects on a particular outcome. An independent variable is also known as a *treatment variable*—it is within this context that the term is most often used. An independent variable is manipulated in the course of an experiment to understand the effects of this manipulation on the dependent variable.

The independent variable is that which is manipulated or changed to examine its effect upon the dependent variable.

For example, you might want to test the effectiveness of three different reading programs on children's reading skills. This design is illustrated in Figure 2.1.

Method A includes tutoring, Method B includes tutoring and rewards, and Method C includes neither tutoring nor rewards (these kids just spend some time with the teacher). In this example, the method of reading instruction is manipulated, and it is the independent variable. The outcome or dependent variable could be reading scores. This experiment includes three levels of one independent variable (method of teaching) and one dependent variable (reading score).

The direct and indirect distinction has to do with whether the researcher actually creates the levels (such as Method A, Method B, or Method C) or the levels are already naturally occurring and cannot be manipulated directly but can only be tested, such as differences in gender (we cannot very well assign that trait to people) or age groupings (we cannot make people younger or older).

So, what if you wanted to investigate whether there is a difference between males and females in their mathematics scores on some standardized test? In this example, the independent variable is gender (male or female), and the outcome or dependent variable is the mathematics score.

Or, you could look at the effects of the number of hours of weekly television-watching time (less than 25 hours for group A or 25 or more hours for group B) on language skills. Here, the amount of time watching television is the independent variable, and the level of language skills is the dependent variable.

The general rule to follow is that when the researcher is manipulating anything or assigning participants to groups based on some characteristic, such as age or ethnicity or treatment, that variable is the independent variable. When researchers look to some outcome to determine whether the grouping had an effect, they look to the dependent variable.

In some cases, when researchers are not interested in looking at the effects of one thing on another, but only in how variables may be related, there are no independent

Figure 2.1 Research designs can take on many different configurations. Here, the researcher is examining the effects of three different methods or levels of teaching reading on reading scores. Note that in the last method neither treatment is implemented, making it the control condition.

Method of Teaching Reading (Independent Variable)			← One independent variable with three levels
Method A (with tutoring)	Method B (with tutoring and rewards)	Method C (no tutoring and no rewards)	
Average Reading Score	Average Reading Score	Average Reading Score	← One dependent variable