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THINKING LIKE A RESEARCHER

LEARNING OBJECTIVES

- Explain the connection between thinking critically and thinking like a researcher.
- Describe the scientific approach, including the challenges and benefits of taking a scientific approach.
- Outline and synthesize the steps of the research process.
- Identify and apply ethical principles and standards.
- Formulate a big picture of the nature of science and how science progresses.

Imagine yourself lying on your back in the grass (or in a lawn chair, if you prefer). Stare up into the sky, let your mind wander, and let some of the myriad questions you have about the world come to you. Do not try to answer them—just focus on the kinds of questions that come to mind.

If you are like most students in the social and behavioral sciences, many of your questions are about culture, politics, education, values, or behavior. For example, you might wonder how people develop certain attitudes, why people or animals behave in certain ways, and what interventions might help change behaviors or attitudes. We expect that these questions came pretty easily to you because we have found that curiosity is a key characteristic of students who have opted to focus their studies on the social and behavioral sciences.

Through your studies, you have begun to develop a knowledge base in your discipline. Perhaps this knowledge inspired some of the questions you just generated, and with some

additional thought you might be able to apply your knowledge to help answer some of those questions. Perhaps you know this already, but it is worth pointing out that almost all that knowledge you have gained through your coursework was generated through research.

Now you find yourself taking a Research Methods course within your discipline. Perhaps you signed up out of interest, or maybe the course was required or recommended. You may approach the course with excitement, trepidation, or indifference. Regardless of why you are taking the course or how you feel about it, we bet that this will be one of the most influential courses you ever take.

We would even wager that learning about research methods and statistics will change the way you think about the world. We hope you will continue to nurture your curiosity and occasionally stare up in the sky with a sense of wonder. What will change is that you will come to understand the process by which we know what we know in the social and behavioral sciences, you will learn to generate more in-depth questions that build on this knowledge, and you will develop the tools to systematically investigate those questions you generate. In other words, you will learn to think like a researcher.

CRITICAL THINKING

Critical thinking is essential to all academic pursuits and is therefore an omnipresent term in higher education. We hesitate to use the term here for fear that you have already heard critical thinking defined so many times that the mere mention of it will cause your eyes to glaze over. Bear with us, because although critical thinking is at the heart of what it means to think like a researcher, it is often misunderstood even by those who tout its importance.

One problem is that critical thinking is often equated with criticism. Criticism can be one of the tools used in critical thinking, but simply being critical is not the same as thinking critically. Another problem is that critical thinking is often equated with critical-thinking skills. Critical-thinking skills are used when thinking critically, and are certainly important, but skills alone do not define critical thinking. Moreover, skills are something you have or gain, while critical thinking is something that you do.

Critical thinking is an action that requires dynamic engagement with information or ideas. It involves carefully analyzing that information based on current knowledge, as opposed to relying on personal opinion or beliefs. Additionally, both the knowledge used and the thinking process itself are carefully scrutinized in order to identify and avoid biases. Thinking critically in any academic pursuit and thinking like a researcher are parallel paths. Where they diverge is that researchers think by doing. That is, researchers think critically as they plan, carry out, evaluate, and communicate the results of research studies.

THE SCIENTIFIC APPROACH

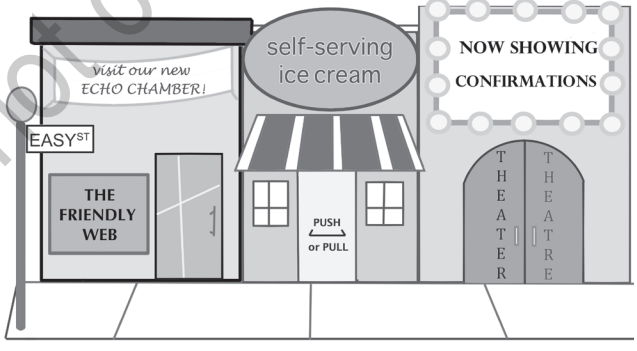
Thinking like a researcher first requires one to take a scientific approach. The scientific approach is a specific type of critical thinking that involves approaching a topic with a genuine desire to understand it, identifying and minimizing biases that interfere with this understanding, avoiding overly simplistic explanations, and following a systematic method to study the topic.

That sounds easy enough, but taking the scientific approach actually requires a fair bit of risk and willingness to critically evaluate results regardless of our personal beliefs. Several questions arise when considering the scientific approach. Are we willing to subject our personal beliefs to science? Are we open-minded enough to pay attention to evidence that contradicts our belief systems? Can we truly be unbiased about a subject we feel passionately about? What might we lose by taking a scientific approach?

It is much easier to avoid the scientific approach and instead rely solely on personal beliefs and experiences. It does not take a lot of effort or thought to fall back on what an authority figure told you, or to base decisions on a significant event in your life, or to follow the advice of someone you trust. We might even say that these tendencies are our default. And let's face it; people can lead full and happy lives without ever challenging this default. See Figure 1.1 for a humorous perspective on this.

Why then would anyone want to take a scientific approach? Not only does the scientific approach necessitate risk—it does not feel good to have our personal beliefs challenged or to be shown that our beliefs are inaccurate—but it also takes more effort. Falling back on

FIGURE 1.1 ⬢ Not Your Scientific Approach



This cartoon depicts "easy street" where no one ever challenges your assumptions. Even though it is not the easy way, the scientific approach requires us to pay attention to information that may contradict our expectations or beliefs.

Source: Eva K. McGuire

our defaults is quite easy. In his book *Predictably Irrational: The Hidden Forces That Shape Our Decisions,* Ariely (2009) argues that we often make irrational decisions based on these defaults. Moreover, in their book *New World, New Mind: Moving Toward Conscious Evolution,* Ornstein and Ehrlich (2000) suggest that our nonscientific default served an evolutionary purpose, but that in today's society this default way of thinking and making decisions is insufficient for dealing with modern problems. In fact, they argue that many modern problems are the direct results of relying on our defaults.

The Scientific Approach and Decision-Making

One reason we might take a scientific approach is that it can help us make better decisions, both individually and as a society. The social sciences were actually formed to improve human welfare and influence social change. Although that connection has never been as seamless as originally envisioned (Scanzoni, 2005), there are many examples of how social science has improved public policy and individual decision-making. Consider the following:

- The statement "I saw it with my own eyes" can be quite convincing. Yet research shows that such eyewitness testimony can be altered by even slight variations in questioning (Loftus, 1975; 1992). In 1998, then U.S. Attorney General Janet Reno responded to this research and compiled a working group to suggest improvements to the criminal justice system. The resulting document was the first uniform set of instructions on how to collect accurate and unbiased eyewitness testimony (U.S. Department of Justice, 1999).
- Hearing conflicting eyewitness reports might lead us to discount those reports or question the honesty of the witnesses. During World War II, when German officers gave locations of where a ship went down that varied by hundreds of miles, the majority opinion was that the eyewitnesses were lying. However, research suggests that memory decay happens in a somewhat predictable way, and two cognitive psychologists applied this research to develop a statistical profile of the contrasting eyewitness accounts. In 2008, the ship was found within three nautical miles of the location pinpointed by the psychologists (Spiegel, 2011).
- Although having lots of choices might seem advantageous, research suggests that choice might actually decrease motivation (Iyenger & Lepper, 2000) and deplete self-control (Vohs et al., 2014). During his presidency, President Obama applied this research by limiting minor choices, such as what to eat and what to wear, so that he could focus his energy on more important decisions (Lewis, 2012).
- Many people believe that an educational intervention is sufficient to change behavior when in actuality it is rarely enough. We can see examples from the COVID-19

crisis when expert advice competed with conspiracy theories and misinformation. To help align public health strategies with social and behavioral science, a global collaboration of social scientists synthesized and communicated empirical evidence relevant to the pandemic, including how people perceive threats and how best to communicate information (Van Bavel et al., 2020; APA Science Directorate, 2020).

Note that in all of these examples, personal beliefs and majority opinion were misleading. Luckily, the scientific approach can be used to overcome the default way of thinking and make better decisions.

The Scientific Approach and Knowledge

Being able to make an informed decision is a good argument for the scientific approach. However, the scientific approach does not always lead directly to a decision. Still, the scientific approach can be used to build our knowledge base, improve or refute theories, and develop new ideas.

Take academic honesty as an example. Academic honesty is of particular importance to anyone involved in education. If a professor discovers that a student plagiarized, the consequences can severely impede that student's college career. It may not matter to the academic system if the student was intentionally dishonest or if the student did not understand the rules of plagiarism, in much the same way that those who speed will get a ticket even if they do not notice a posted speed limit sign.

A professor who discovers plagiarism may take a scientific approach in order to better understand the reasons behind academic dishonesty. That professor might dig a little deeper and try to discover knowledge and beliefs that students have about plagiarism, in what situations students are more or less likely to plagiarize, and what strategies are most effective in preventing plagiarism. In this example, the advantage of using

FIGURE 1.2 ⬢ Plagiarism: A Bad Idea!

Source: Sandi Coon

the scientific approach is gaining knowledge. The end result for the student who plagiarized may be the same, and the policy itself will likely not change. However, the professor's knowledge of plagiarism has increased.

Scientific investigation that leads to increased knowledge, improved theories, or the development of new ideas might not have an immediate effect, but it may serve as a foundation for future research that has real-life applications. For example, earlier research on plagiarism has suggested that plagiarism is more common than anyone would like to believe (Lim & See, 2001; Roig, 1997, 2001). Because of this initial research, other researchers wanted to find out more about why students might plagiarize and found that sometimes students plagiarize due to a lack of knowledge and skill as opposed to actively trying to be deceitful (Culwin, 2006; Landau et al., 2002). Building on that research, there have been several studies examining educational interventions that are effective in improving students' knowledge and skills (Belter & du Pré, 2009; Estow et al., 2011; Owens & White, 2013; Schuetze, 2004; see Figure 1.2).

OVERVIEW OF THE RESEARCH PROCESS (A.K.A. THE SCIENTIFIC METHOD)

In addition to taking a scientific approach, thinking like a researcher requires intimate knowledge of the actual work of scientists. Those without this knowledge may mistakenly believe that science is equivalent to hard facts or that the goal of science is to prove something. These perceptions may be represented and perpetuated by well-intentioned signs, t-shirts, and memes touting that "science is real." But science is not about facts or proof and it does not require belief. Science is about process.

The processes of science are traditionally referred to as the scientific method. Others prefer the term scientific practices to encompass the full range of activities and the uncertainty inherent in science (Ford, 2015; Mody, 2015). Yet *method* is what makes something a science. More specifically, science must include a transparent method that can be evaluated and replicated by others. As such, we use the term scientific method while noting some important refinements.

- First, the goal of the scientific method is not proof, but rather the goal is progress. If you follow steps in the scientific method, you can rule some things out (or disprove them) and you may find some answers, but you will most likely generate more questions than answers.
- Second, the scientific method is not strictly linear, but rather is a cycle. If you complete one step, it may lead you to the next, or it may lead you to

rethink an earlier step. And then when it looks like you are finished, the process takes you back to the beginning for you or another researcher to begin again.

To use a physical analogy, when we talk about steps of the scientific method we are not talking about steps in a staircase that we go up once, never backtracking or revisiting previous steps. Rather the steps are more like the ones we experience when we are using a stair-stepping machine such as those found in health clubs. Some of these machines have steps that cycle around and therefore we are constantly revisiting previous steps, just as we do in the scientific method. In the scientific method we might even skip a step and come back to it later (imagine skipping a step on an exercise machine).

- Third, the scientific method is not isolated, but rather is integrated. The use of the term "steps" signals connection and the singular "method" implies a unified whole. In other words, it is not sufficient to simply memorize individual steps without understanding how they work together. Moreover, it is not sufficient to learn only the technicalities of a scientific discipline. Creativity, reading, writing, presenting, collaborating, and management are essential to science (Mody, 2015) and integrated within the scientific method.

Keep these three refinements in mind as we next outline the steps in the scientific method. The goal here is not that you master every concept but rather for you to develop a basic understanding of the entire research process. We will expound on this process in the rest of this textbook.

Step 1: Identify Your Topic

Your professor may simply assign a research topic, but when you have a chance to choose your own topic it is worthwhile to spend some time thinking carefully about a good topic.

What makes a good topic? First, you want to choose a topic that piques your interest. Perhaps you read something interesting for a class, or heard a news story about an unusual event or behavior, or have some personal observations that you want to test. Personal experiences and observations are a good starting point for selecting a topic, but be careful when you choose a topic that interests you. Interest here means something you are interested in finding out more about—not something that you already have an established belief or opinion about that you are not willing to examine in an unbiased manner.

Although finding an interesting topic is a good first step, you want to avoid a few pitfalls. As a student, you probably have limited time and resources. If you will be responsible

for collecting your own data, do not choose a topic that requires participants who you will need special permission to recruit (e.g., children, individuals with psychological disorders, etc.) or one that requires equipment that you do not already have. If you are doing the research for a class project and the professor is requiring you to use a certain type of research design (such as an experiment—see step 4), then be sure your research topic is one that lends itself to that type of design.

You need to think ahead a little at this point to consider data collection and design; however, you do not want to be too specific with your topic. Have some questions you are interested in examining, but wait until you read past research to develop specific hypotheses or design the specifics of your study.

Throughout this book, we will draw on research from various fields within the social sciences. We will focus on the topic of academic honesty to demonstrate how different research concepts and processes apply within a specific research area. We explain how we choose that research topic in Application 1.1.

Step 2: Find, Read, and Evaluate Past Research

Reading and evaluating past research is one of the most crucial steps in research. You should do it early in the process, but keep in mind that you will likely need to keep going back to the research literature while you design, conduct, and write up your study. In other words, this is not a step you can simply check off and move on. Remember we told

APPLICATION 1.1

Step 1: Identify A Research Topic—Focus On Academic Honesty

As college professors, the authors of this book are keenly aware of and interested in the topic of academic honesty. One situation in particular piqued one of the author's interests in this topic and helped to narrow the topic from academic honesty to plagiarism. A student copied several sentences from the textbook without enclosing those sentences in quotations, but she did cite the book. The professor explained to the student that this was plagiarism and asked the student to redo the assignment. The student reacted with anger and was so sure the professor was wrong that she went to the academic dean, essentially turning herself in for an academic honesty violation.

Although the action clearly constituted plagiarism, the student did not plagiarize intentionally. This raises many questions: What do students believe plagiarism is? How do we raise students' awareness of what plagiarism is and help them avoid it? If a student commits plagiarism, how does that impact our perceptions of the student?

At this point we have a specific topic, but we are just playing around with different research questions. In order to further narrow our topic, we must move on to our second step—to find and read past research on the topic of plagiarism. See Application 1.2 (on p. 27) for more on how we developed a study on this topic.

you these steps were not linear, but rather are steps that you may need to revisit. Reading the research literature on your topic is something you should plan to do throughout the research process. We discuss this in more detail in Chapter 2.

Step 3: Further Refine Your Topic and Develop a Hypothesis or Research Question

The topic you started with might be very different from the one you decide on after you have read past research. Change is a good thing and suggests that you are truly involved in the process of science—process, after all, implies change.

When you have a good handle on what past research has found you will develop a **testable hypothesis** that is based on this research. A common definition of a hypothesis is that it is an educated guess. For our purposes, this means that a hypothesis is a prediction based on past research. A testable hypothesis means that it can be disproven. A belief in true love, angels, or countless other things that cannot be disproven may be very worthwhile on a personal level, but such beliefs are not testable and thus not suitable research questions. On the other hand, we could test the idea that having a belief in true love improves the quality of intimate relationships.

Similarly, as much as we might like the idea that studying research methods will save the world, such a statement is not testable. The only way to disprove a statement such as this would be for the world to end. That is a horrible event on so many levels, and it would be impossible to assess exactly what could have prevented it. With modification, however, we can make this statement testable: Research methods instruction improves decision-making. This is not nearly as exciting as our first statement about research methods saving the world, but it is much more focused and testable. Moreover, it meets our standards for a testable hypothesis because it is a prediction based on past research that demonstrates that decision-making can be improved with instruction in critical thinking (Helsdingen et al., 2010).

Testable hypothesis: An educated prediction that can be disproven.

Step 4: Choose a Research Design

Design a study that tests your hypothesis, is feasible for you to carry out given your time and resource constraints, and is ethical. Keep in mind that there is no perfect study and you cannot examine all the factors that interest you in one study. One of the most basic decisions is the type of research design to use.

There are three basic types of research designs: descriptive, correlational, and experimental. A single study may have multiple hypotheses that are tested with one or more of these designs. The type of design depends largely on the goal of the research. Just like it

sounds, descriptive research simply describes a sample or a population. Correlational and experimental research designs examine relationships among variables, with experimental research testing a causal relationship. There is also something called a quasi-experimental design in which some, but not all, of the requirements for an experiment are met. We will go into depth on each of these designs in later chapters and in the final chapter summarize key decision points for choosing a research design. Here we provide some basic information so that you can begin to familiarize yourself with research design.

All designs will have variables you measure, manipulate, or control. A **variable** is something that varies in that it has at least two possible values. Age is a variable with several possible values, such as age in years starting at a value of zero and increasing by values of one. On the other hand, 29 years is not a variable because it represents just a single value and does not imply any variation. Similarly, the description of having research knowledge does not vary. To make it a variable, we would need to discuss it in terms of the degree of research methods knowledge, which might be defined as number of social and natural science courses completed, grade in a research methods course, or score on a research knowledge exam. You will find more information on measurement of variables in Chapter 3.

Descriptive research examines the who, what, when, where, and how, but does not examine relationships among the who, what, when, where, and how. Descriptive research can be exploratory in nature. It is often used to examine phenomena in more depth or to examine an area of research that is either new or needs updating. For example, a descriptive study could be used to better understand what types of science education, such as natural sciences, social sciences, research methods instruction, statistics, and so on, that people find most important. Such a study might examine opinions about how such education should be administered and funded. Moreover, views on science education may change over time and it could be useful to understand attitudinal trends. See Chapter 5 for more information on descriptive studies.

Correlational research examines the relationship between two or more variables but does not test causality. A correlational study tests the degree to which behaviors, events, and feelings co-occur with or predict other behaviors, events, and feelings. For our science education topic, we might want to better understand factors that correlate with attitudes toward science education such as age, academic major, or political views. We might also want to know if science education predicts certain outcomes, such as the ability to distinguish between relevant and irrelevant information when making a decision.

Variable: A factor in a research study that has two or more possible values.

Descriptive research: Research design in which the primary goal is to describe the variables, but not examine relationships among variables.

Correlational research (or correlational design): Research design in which the relationship among two or more variables is examined, but causality cannot be determined.

We can use correlational research to predict scores, but we cannot use correlations to explain why the scores occurred. A correlational design cannot determine **causation**, in that it cannot show that one variable caused the effect on another variable. If a correlation exists between two variables, it is possible that one variable caused the change in the other but it is also possible that the relationship exists for other reasons. For example, in a study examining the relationship between research methods instruction and decision-making skills, it might be that taking a research methods class improves decision-making skills. See Chapter 9 for more information on Correlational Designs.

Alternatively, it could be that those who already have good decision-making skills seek out a research methods course. Or perhaps there is a third variable that is impacting results, such as academic major or years of education, and there is actually no direct relationship between research instruction and decision-making skills.

Experimental research examines the relationship between two or more variables and, if properly conducted, can demonstrate causation. An experiment goes beyond prediction to an explanation of a relationship between two variables. We provide a deeper explanation of how to examine causality in Chapter 10, but for now try to remember at its most basic, an experiment consists of one **independent variable (IV)** and one **dependent variable (DV)**. An **experiment** tests the effect of the IV on the DV.

Causation: Relationship between cause and effect, in that one variable is shown to be the reason for an observed change in another variable.

Experimental research (or experimental design, or experiment): Research design that attempts to determine a causal relationship by manipulating one variable, randomly assigning participants or subjects to different levels of that manipulated variable, and measuring the effect of that manipulation on another variable.

Independent variable (IV): The variable that is manipulated in an experiment.

Dependent variable (DV): The variable that is measured in an experiment and is expected to vary or change based on the IV manipulation.

An experiment requires that:

a. the experimenter systematically manipulates the independent variable (IV),
b. the experimenter randomly assigns participants to receive different levels of the IV, and
c. the experimenter measures the effect of the IV manipulation on the dependent variable (DV).

For example, the following is a simple experiment to determine if research methods instruction (the independent variable or IV) increases decision-making skills (the dependent variable or DV). We randomly assign participants to one of two IV levels: taking a 1-hour research methods seminar or a 1-hour driver education seminar. To assess our DV, after the seminars we give all the participants scenarios with relevant and irrelevant information and assess their ability to make decisions based only on the relevant information.

PRACTICE 1.1

Identifying Different Types of Research Designs

1. Why would an experiment not be appropriate to investigate the relationship between ethnicity and health? What would be an appropriate research design?
2. The president of a university wants to understand how the beauty of the campus influenced the decision by the incoming student class to enroll in the university. What would be the most appropriate research design?
3. Briefly outline a study to examine the impact of social media on mood. What would be the most appropriate research design?

See Appendix A to check your answers.

In some cases, it is not feasible to conduct an experiment and a quasi-experimental design might be chosen instead. **Quasi-experimental research** includes manipulation of an IV but no random assignment to IV level. For example, we might compare decision-making skills between students in actual driver education and research methods courses. In this case, participants still experience the IV manipulation (research methods vs. driver education) but they were not randomly assigned. Like a correlational study, a quasi-experiment cannot demonstrate causation. In our example, participants who are in a driver education course might already be very different from those who are in the research methods course, and we therefore cannot be sure that any observed differences in decision-making skills were caused by the research methods course.

Test your understanding of descriptive, correlational, and experimental research designs by completing Practice 1.1. By the way, we realize that you might be tempted to skip over these practice exercises in the chapters or ignore the application boxes. We think taking the extra time will be worth your while, however. We base this on research findings that active repetition of material through practice and application is associated with better learning and retention than simply reading and rereading a text (Fritz, 2011).

Quasi-experimental research (or quasi-experimental design, or quasi-experiment): Research design that includes a key characteristic of an experiment, namely, manipulation of a variable. However, it does not have all the requirements for an experiment in that there is no random assignment to the levels of the manipulated variable. Because there is no random assignment, a quasi-experiment cannot demonstrate causation.

Step 5: Plan and Carry Out Your Study

As you plan your study, you will need to decide exactly how you will measure key study variables (see Chapters 3 and 4) and who or what your population of interest is and how you will obtain a sample from that population (see Chapter 5). If you plan to conduct

an experiment, you will need to determine how to manipulate your independent variable and test for causality (see Chapter 10).

Before you carry out your study, you will need to get approval to do so. Your professor is the first person who will need to OK your study to ensure the study has merit based on past research and theory, that you plan to employ appropriate methods and analyses, and that the study is ethical. Broadly speaking, your study should not harm others and should maintain the dignity and respect of those involved in the study.

If your study involves collecting data from human participants, you will likely need to have your study approved by your college or university's **Institutional Review Board (IRB)**. The IRB reviews research conducted by both students and faculty to ensure that the study has merit and therefore the research is justified. The IRB also ensures that the study complies with ethical principles and standards. We will discuss ethics in more depth later in this chapter.

Institutional Review Board (IRB): An established group that evaluates research proposals to ensure that ethical standards are being followed in research that involves human participants.

Step 6: Analyze Your Data

Throughout the course of this book you will learn about different types of analyses to help you test different types of hypotheses and research questions. By the end, you should develop a set of tools that will help you test your hypotheses or provide some answers to your research question. In the final chapter, we provide a summary of all the statistical analyses in this book and when to use them. For now, know that the appropriate analysis depends largely on how you measured your variables. Students sometimes confuse types of research design with types of statistical analyses. It does not help matters that researchers have used "descriptive" and "correlational" to describe both designs and statistics. But try to keep them separate. You may have heard the old adage "correlation does not mean causation," and that refers to correlational design. Causality is a function of research design, not the type of statistics you use to analyze the design.

Ideally, you should choose the best analysis based on your hypothesis or research question. Each analysis is like a tool, and you would not want to use a hammer when a screwdriver is more appropriate for the job. However, beginning researchers will have a limited number of tools, and you might find yourself needing to limit the types of hypotheses you develop in order to run analyses that you know how to do. Even by the end of the course, you will have learned about only a few key analyses. It is appropriate for beginning researchers to modify their hypotheses and questions to those that they can actually test, given the tools they have. Just keep in mind that there is a whole world of analyses out there that can answer much more complex questions than you will be able to ask in this beginning Research Methods course.

Step 7: Share and Communicate Results

Research should be a transparent process and therefore it is important that researchers make their work public. Sharing data and materials promotes verification and replication of results. Communicating what the results mean, how they fit or do not fit with past research, limitations of the study, and suggestions for future research allows others to learn from and build upon the research.

Remember that reviewing past research is an essential and ongoing step in the scientific method. Thus, communicating results feeds back into the process of science. As a student, this does not necessarily mean that you have to publish your results in a research journal. That is a possibility, but it is more likely you will share your results with your professor and your classmates, and perhaps present your study to other students within and outside your college or university.

Writing a research report is one of the basic ways to communicate your results to others, and we go into more detail on how to do that in Appendix B. When you write a report you have to put the study into context, and you will need to explain your study in your own words. The process of writing and revising the report will help you figure out how to effectively communicate your study and its results to others.

Writing in your own words is critical to your own learning and to others' understanding your work. After all, no one will be able to understand your study if you cannot explain it clearly and concisely yourself. Writing in your own words is also an important ethical issue. If someone plagiarizes the work of others, then they essentially steal someone's ideas and hurt the credibility of the entire field.

You may think you know what plagiarism is and how to avoid it, but plagiarism is more than just passing off someone's entire work as your own. Plagiarism also includes incorrect citation of others' work. You are expected to build on past research, which will require you to summarize and paraphrase the work of others. You should do so in your own words; and whenever you describe others' work, you need to cite the appropriate source. Test your understanding of plagiarism by completing Practice 1.2.

PRACTICE 1.2

Identifying and Avoiding Plagiarism

The following was taken directly from Schuetze (2004):

"Increased student confidence in their ability to avoid plagiarism would hypothetically result in an inaccurate perception that they are fully knowledgeable about the complexities involved in proper citations in scientific papers" (p. 259).

Indicate if each of these statements would or would not be considered plagiarism:

a. Increased student confidence in their ability to avoid plagiarism might result in an inaccurate belief that they are fully knowledgeable about the complexities involved in proper citations (Schuetze, 2004).

b. Student confidence in their plagiarism avoidance skills might lead to false perceptions that they understand the intricacies of proper citations.

c. One danger of increasing students' confidence in avoiding plagiarism is that they may overestimate their ability to correctly cite sources (Schuetze, 2004).

d. Increased student confidence in their ability to avoid plagiarism might theoretically result in an incorrect belief that they are completely knowledgeable about the intricacies of proper citations in papers (Schuetze, 2004).

See Appendix A to check your answers.

THINKING CRITICALLY ABOUT ETHICS

When researchers design and carry out their research study, they must carefully consider the ethics of their study. Conducting an ethical research study is more than simply doing the right thing and avoiding doing the wrong thing. Although there are some clear dos and don'ts, ethical decisions are often not that simple. Researchers must consider ethics at every stage of the research process, and consequently we introduce ethics in this chapter as well as discuss ethical issues throughout the book.

Ethics Codes

An ethics code both guides ethical decision-making and delineates the ethical standards that must be followed. Current international and federal ethics codes for human research were created in response to some horrific research conducted in the name of science. Two of the most infamous are the Nazi medical experiments and the Tuskegee syphilis study.

During World War II, the Nazis tortured and murdered an estimated six million Jews along with millions of others who did not fit into the "Aryan race." After the war, a series of military tribunals, called the Nuremberg Trials, were held to try to bring justice to those responsible for carrying out these crimes against humanity. Among those prosecuted were physicians who had conducted medical studies on prisoners of Nazi concentration camps. The prisoners were forced into studies that included amputations, sterilization, and exposure to poison, disease, and hypothermia. In response to such atrocities, the Nuremberg Code was created in 1947 as the first ethical code of conduct

for research (Grodin & Annas, 1996; Karigan, 2001). In 1964, the principles of this code were updated and clarified in the Declaration of Helsinki. This declaration has been updated and revised over time and currently serves as the international code of ethics for biomedical research (Karigan, 2001). It states that the rights of the individual must take precedence and that individuals must give their consent, preferably in written form, to participate in biomedical research (World Medical Association, 2008).

Another prime example of unethical research, conducted by the United States Public Health Service, began in 1932 and continued until 1972, even after the enactment of both the Nuremberg Code and Declaration of Helsinki. The Tuskegee syphilis study examined the long-term effects of syphilis without the consent of the patients suffering from the disease. In fact, the men who participated in the study were led to believe they were receiving free health care when instead the syphilis diagnosis and treatment were intentionally withheld. This study went on for 40 years and stopped due only to public pressure resulting from a newspaper investigation that revealed the true nature of the study (Karigan, 2001). As a result, the Belmont Report was crafted as a guide for the ethical treatment of patients who participate in medical research in the United States. The Belmont Report serves as the basis for the current United States Federal Policy for the Protection of Human Subjects, also known as the "Common Rule" (U.S. Department of Health and Human Services, 2009).

The Nazi and Tuskegee research are extreme examples of what can happen when researchers do not think critically about ethics. Before you assume that all the ethical concerns relate to medical research, consider that some of the most influential social psychology experiments put participants under great emotional duress. Participants in Milgram's (1963) obedience study were told to administer increasingly strong shocks to another person and were ordered to continue if they hesitated. In reality, the other person was part of the study and not shocked at all, but the participants believed they were inflicting pain on another person and consequently demonstrated great discomfort and emotional stress. Participants in Zimbardo's (1972) Stanford prison experiment were randomly assigned to play the role of guards or prisoners in a mock jail. Within a few days, some of the guards exhibited cruel behaviors toward the prisoners and some of the prisoners became docile or depressed. Zimbardo found himself transformed from an unbiased researcher into the role of prison supervisor. It took an outside observer to point out the cruelty of the experiment and convince Zimbardo to stop it (TED, 2008). These social science studies contributed greatly to our understanding of social phenomena, but were the negative impacts on participants worth it? What about studies that ask participants to disclose intimate details of their personal life, give participants false information, observe participants without their consent, or provide a placebo treatment to participants in need of help? And what about studies with animals?

Some of these questions are more relevant to some fields than to others. Because of these differences, researchers in the social and behavioral sciences follow the ethics code of

their specific discipline's professional organization (see Table 1.1 for help finding the ethics code for your discipline). Some disciplines, such as political science, use the Federal Common Rule to guide their research (American Political Science Association, 2008). Psychology, sociology, and anthropology have their own ethics codes for research that are either stricter than the Common Rule or more specific to their discipline. For example, the American Psychological Association (APA; 2017) and the American Anthropological Association (AAA; 2009) have codes of ethics that address animal research, but this type of research does not occur and thus is not addressed in the ethical guidelines for sociology or political science. The AAA guidelines for animal research are much less detailed than the APA's because anthropology researchers do not conduct medical, physiological, or neurobiological research with animals but psychology researchers might.

We summarize key ethical principles and standards for social and behavioral science research in this chapter, but it is worth your while to familiarize yourself with the full ethics code of your discipline. Not only do these codes address research ethics, but they also provide ethical guidelines for the full range of professional activities relevant to the discipline. You can find your discipline's ethics codes by searching on the national or international association website. The associations and web addresses for several social science disciplines appear in Table 1.1.

Ethical Principles

Ethical principles are moral values and ideals. Table 1.2 lists the ethical principles from several different codes of ethics, and you will notice the common principles espoused by the different organizations. These principles do not explain how to behave, but rather serve as guidelines in ethical decision-making. For example, all the organizations listed in Table 1.2 identify respect as a key ethical principle. From a research perspective, this

TABLE 1.1 ⬢ Find Your Discipline's Ethics Code

Discipline	Association	Website
Anthropology	American Anthropological Association (AAA)	americananthro.org
Criminal Justice	Academy of Criminal Justice Sciences (ACJS)	acjs.org
Criminology	American Society of Criminology (ASC)	asc41.com
Education	American Educational Research Association (AERA)	aera.net
Political Science	American Political Science Association (APSA)	apsanet.org
Psychology	American Psychological Association (APA)	apa.org
Social Work	National Association of Social Workers (NASW)	socialworkers.org
Sociology	American Sociological Association (ASA)	asanet.org

TABLE 1.2 ⬢ Comparison of Ethical Principles

Federal Common Rule	Academy of Criminal Justice Sciences (ACJS)	American Psychological Association (APA)	American Sociological Association (ASA)
• Respect • Beneficence • Justice	• Beneficence and nonmaleficence • Respect • Honesty and openness • Competence	• Beneficence and nonmaleficence • Fidelity and responsibility • Integrity • Justice • Respect	• Competence • Integrity • Professional and scientific responsibility • Respect • Social responsibility

means that the researcher should respect the dignity, individual rights, and worth of participants by safeguarding their privacy, treating participants and their data with care, and honoring their autonomy.

Beneficence is an ethical principle of the Federal Common rule, the Academy of Criminal Justice Sciences (ACJS), and the American Psychological Association (APA). Beneficence is promoting the well-being of society or individuals, and ACJS and APA also include nonmaleficence, which is avoiding harm to others. Applied to research, this means that researchers must carefully weigh the potential benefits of the study with the potential risk to human participants or animal subjects. Research does not necessarily have to benefit the participants directly, but the question under study should have broader importance to humans or animals. Moreover, the potential benefits of a study should clearly outweigh the possible harm imposed on human participants or animal subjects.

Based on the principles of beneficence or nonmaleficence, it is clearly not appropriate to study something just because you find it interesting or because the results may benefit you personally. Even completing a brief questionnaire can be harmful to participants if it evokes strong emotions or personal reactions. Unless you are conducting a naturalistic observation in a public space, your study will be intrusive to some degree and will require that the participants take time to help you. This is why one of the first criteria your professor will use in evaluating your study is that it has merit—meaning that the study is clearly grounded in past research and theory. Asking people to participate in a study that is not based on past research and contributes nothing to our knowledge base is unethical because the benefits do not outweigh the potential harm that might be done. See Practice 1.3 to identify risks and benefits of a study, and consider ways to minimize risks.

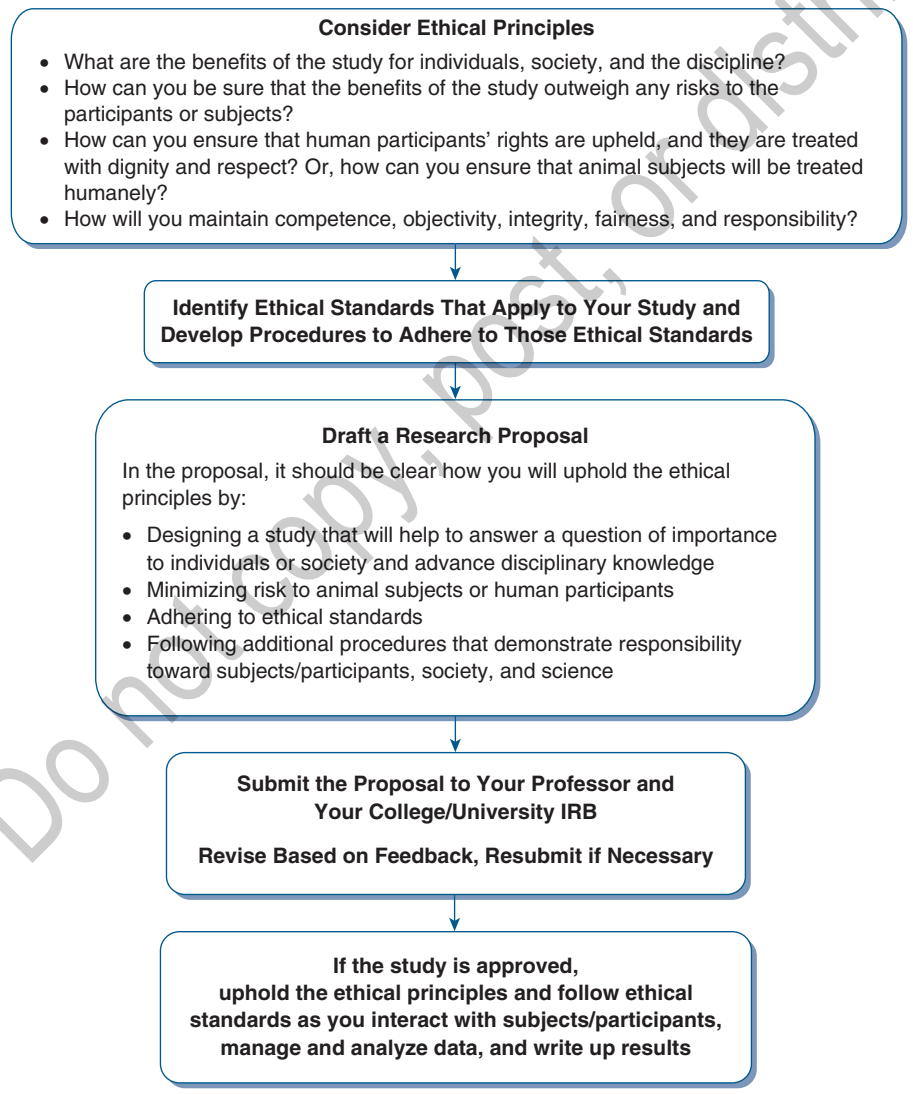
Ethical Standards

Ethical standards are specific rules or obligations that promote the ethical principles. The ethical standards for research with human participants address informed consent

and the right to withdraw that consent, the appropriate use of deception and incentives, and confidentiality.

Your professor and the Institutional Review Board (IRB) will provide oversight for your study to ensure that you are considering ethical principles and follow specific ethical standards. As you focus on the mechanics of your study be sure not to forget to think critically about why these ethical standards are important. Remember that these standards are not simply tasks to check off in order for you to get approval to complete your project. The ethical principles behind the standards should guide every step of your research process (see Figure 1.3).

FIGURE 1.3 ⬢ Ethical Principles Should Guide the Entire Research Process



Informed Consent

If we are to treat people with respect, then we typically should not study them without their **informed consent**. There are a few situations when a researcher may dispense with informed consent, such as when the study involves observations in natural and public situations and the participants cannot later be identified. Once you start manipulating situations, interacting with participants, making audio or visual recordings of participants, or asking them to complete questionnaires, informed consent is almost always necessary.

Informed consent implies that potential participants have a clear understanding of what the study is about, who is conducting the research, what they are being asked to do, how long it will take, and benefits and risks of participation *before* becoming part of a study. If you plan to record the participant, the participant must agree to be recorded and understand how the video or audio recordings will be used. You should also inform your participants that they can decline to participate and also have the **right to withdraw** from the study. The right to withdraw means that they can leave the study at any time and remove any data they provided from the results.

What if you wanted to study participants who cannot legally give their consent to participate? If a study involves anyone under 18 or otherwise under the legal guardianship of someone else, the legal guardian must give consent for that person to participate. The participants should still be informed of the study and asked to participate, and can refuse even if their guardian gave permission. See Practice 1.3 to apply these concepts.

Informed consent: An ethical standard by which potential participants are informed of the topic, procedures, risks, and benefits of participation prior to consenting to participate.

Right to withdraw: An ethical standard by which participants can retract their consent and leave the study.

PRACTICE 1.3

Thinking Critically About Ethics

Consider the following research proposal:

Early initiation of sexual activity is a risk factor for teenage pregnancy and sexually transmitted disease, and is also highly correlated with drug use, delinquency, and school failure. This study seeks to understand the sexual experiences of middle school students. A letter will be sent home to the parents outlining the goals and procedures of the study. Parents who do not want their child to participate in the study can sign and return a form. Children of parents who do not return this form

will be asked to complete an anonymous survey asking them to rate their frequency of specific sexual activities (kissing, petting, oral sex, sexual intercourse), the age at which they first engaged in each of these activities, and the approximate number of partners they have had for each activity.

1. What are the benefits of this study?
2. What are the potential risks to participation? How can the researcher minimize these risks?
3. What is wrong with the informed consent process? How would you change it?

See Appendix A to check your answers.

Informed consent may be given verbally, although it is wise to also obtain written consent. Researchers often craft an informed consent form that potential participants read prior to giving their consent with their signature. The form helps ensure that all participants receive the information necessary for them to make an informed choice to participate or not.

An informed consent form should include the following information:

1. the purpose of the research or topic of study
2. what participants will do and how long it will take
3. possible benefits of participation, including any incentives provided by the researchers
4. any potential risks to participation, including physical or emotional pain or discomfort as well as any risks to confidentiality
5. steps that will be taken to safeguard the participants' confidentiality
6. the right to decline to participate and the right to withdraw from the study after it begins
7. verification that declining or withdrawing will not negatively impact the participants and they will still receive any incentives promised by the researcher
8. the names and contact information of the researchers and supervisors
9. a place for the participant (and legal guardian of the participant, if applicable) to sign and date the form, thus giving their informed consent for participation

An example informed consent form appears in Figure 1.4. Note that this consent form is for a simple and anonymous questionnaire and involves compensating participants with

extra credit. An informed consent form should be tailored to the individual study and may contain more or less of the detail provided in the example. In particular, if a study might cause any emotional or physical distress, or involves asking very personal questions that the participant might deem sensitive or intrusive (such as questions about illegal behavior or their sex lives), then more detail about the nature of the study and procedures should be provided so that the participants can make an informed decision about their participation.

What if you wanted to assess participants' natural responses to situations? In some cases, fully disclosing the purpose of a study may lead the participants to respond quite differently than if they did not know the purpose of the study. Likewise, in some cases explaining exactly what the participant will be asked to do may interfere with the research. Thus, researchers must determine how informed the consent must be in order for the study to both be ethical and yield meaningful results.

FIGURE 1.4 ⬢ Example Informed Consent Form

Informed Consent

The study in which I have been asked to participate is about my views about science education. If I choose to participate, I will be given a brief questionnaire that should take about 10 minutes to complete.

I understand that in order to participate in this study, I must be at least 18 years old.

I understand that I will receive a small number of extra credit points for participating in this study; but beyond that, it is unlikely that I will directly benefit from participation. However, the knowledge gained from the study will help us better understand people's attitudes toward science education.

There are no anticipated risks to participation. I understand that my responses are anonymous in that I will not put my name on the questionnaire. Any results will be reported in aggregate form so that my individual responses will not be identifiable. If I sign this consent form, it will be kept in a secure location that is separate from my completed questionnaire. However, my name will be reported to my professor if I wish to earn extra credit for participation.

I understand that I can withdraw from this study and I can refuse to answer any question in the questionnaire by simply leaving that item blank. If I choose to withdraw completely or not answer certain questions, I will not be penalized and I will still receive the extra credit.

If I have questions about the study or wish to find out the results of the study, I can contact Dr. X in the Department of Psychology at the University of Y: (xxx) xxx–xxxx.

I have read and understood this information, and I agree to participate in the study.

Name (Print) _____

Signature _____

Date _____

Deception

During the informed consent process, you do not need to disclose all the details of the study, such as what you expect to find or that some participants will be exposed to different conditions. Most researchers agree that withholding this type of information is not considered deception (Hertwig & Ortmann, 2008). But what if you intend to mislead or downright lie to your participants? These actions are clearly deceptive, and their use is a very controversial issue in research.

There are two primary arguments against the use of deception. First, deception may harm participants by embarrassing them, making them feel uncomfortable, or leading them to mistrust others (Baumrind, 1985; Fisher & Fryberg, 1994). Second, deception may harm the field by increasing suspicion of research and decreasing the integrity of the individual researcher and the entire research community (Baumrind, 1985; Kelman, 1967). Moreover, deception may invalidate research results even in studies that do not use deception. In a review of empirical research, Hertwig and Ortmann (2008) found evidence that participants who suspected that a study involved deception responded differently than participants who were not suspicious.

Others argue that deception should be allowed under certain circumstances. It may be essential in creating and studying a rare occurrence (e.g., emergencies) and eliciting genuine responses from participants (Hertwig & Ortmann, 2008). Additionally, some claim that deception has only a negligible effect on participants' well-being and the credibility of the field (Kimmel, 1998).

The acceptability of deception varies by discipline. The code of ethics for anthropologists states, "anthropologists should never deceive the people they are studying regarding the sponsorship, goals, methods, products, or expected impacts of their work" (AAA, 2009, p. 3). Likewise, researchers in experimental economics have essentially banned the use of deception. On the other hand, deception remains a relatively common practice in social psychology and marketing research (Hertwig & Ortmann, 2008). Even if your discipline allows for the use of deception, the pros and cons of using deception warrant serious consideration. If you decide to use deception, special care must be taken to minimize potential harm to the participants and to the integrity of the field. You may also want to check to see if some of your participants suspected the deception and consider if that suspicion impacted your results (Hertwig & Ortmann, 2008).

The ethics codes for political science (per the Common Rule, U.S. Department of Health and Human Services, 2009), educational research (AERA, 2011), psychology (APA, 2010a), and sociology (ASA, 1999) allow for the use of deception in some situations.

For example, the APA ethics code (2010) specifies that deception is allowable under the following conditions:

1. The use of deception is necessary and justifiable given the potential benefits of the study.
2. The study is not expected to cause any physical pain or significant emotional distress.
3. The researchers debrief participants as soon as possible regarding the deception.

Debriefing

If the study involves any risk or deception, the researcher should include a **debriefing** in order to reduce or mitigate any longer-term effects on the participants. In most cases, debriefing occurs right after the participant completes the study. This is especially important when participation might result in physical or emotional distress because discussing the study immediately afterwards can help assess and reduce the distress, and the researchers can identify an appropriate follow-up plan for those who may need additional help.

In some situations, debriefing participants on the true nature of the study immediately after their participation may contaminate the study. In cases where the potential participants know each other, those who have completed the study and been debriefed could tell future participants about the deception. In these cases, it is acceptable to wait until all data are collected before debriefing participants (assuming that there was no physical risk and minimal emotional risk. If such risk exists, deception would not be ethical.).

Debriefing: Clearing up any misconceptions that the participant might have and addressing any negative effects of the study.

Incentives for Participation

Researchers sometimes offer an incentive for participation in order to recruit participants. This may sound reasonable; after all, the participants are investing a certain amount of time and effort. The challenge is that an incentive can be coercive. For example, if someone offered you $1,000 to complete a 15-minute interview about your sex life, you might feel like you could not pass up that amount of money even if you felt uncomfortable being asked about your sex life.

Incentives can be particularly problematic if the study requires that participants meet certain criteria (e.g., nonsmoker, HIV positive). What if a participant lies about his or her medical history in order to qualify? Such incidents may invalidate the study results and worse, result in serious health complications for the participant (Ripley, 2006). Even though the participant is the deceptive one in these situations, the researcher still has an ethical responsibility because the participant was influenced by the monetary compensation.

At what point does an incentive become coercive? It depends both on who the target population is and the amount of time and effort involved in the study. Paying people a fair wage for their time seems like a reasonable action, although the potential for coercion will depend on the participants' economic and cultural contexts. Additionally, paying participants for their time might lead them to believe that they must complete the study in order to receive payment. Remember that the participants have the right to withdraw from the study at any time, and withdrawing does not mean forfeiture of any incentive promised to them. The incentive is provided to the participants for showing up for the study, not for completing the study.

There are no hard-and-fast rules for incentives, although there are a few helpful guidelines:

1. Researchers should carefully consider who their potential participants are and not offer incentives that they would have a difficult time refusing.
2. The incentive should not be contingent on the participant completing the study.

Confidentiality

Researchers should respect participants' dignity and right to privacy. As such, data and results from research should always be confidential. **Confidentiality** occurs when responses and results from an individual participant are private. Keep in mind that confidentiality does not imply anonymity. **Anonymity** occurs when it is impossible for anyone, including the researcher, to link a participant to their data. Anonymity is not feasible when a researcher is planning to test participants at several time points or match participants' self-report with other information such as school or court records (with the appropriate consent, of course). Both confidentiality and anonymity require vigilance on the part of the researcher, and we will discuss specific strategies in later chapters.

Confidentiality: A participant's responses are kept private although the researcher may be able to link the participant with their responses.

Anonymity: No one other than the participant can link the participant to their responses.

THE BIG PICTURE: PROOF AND PROGRESS IN SCIENCE

You will sometimes hear people refer to a research study with a statement such as, "This research proves that…"; but "proof" is an inaccurate term to describe results of a research study. A single research study examined only a portion of the population and examined the topic in only one very specific way. There can never be complete certainty that the results will generalize to other participants or methods. Not only will a single study not prove something, but neither will an entire body of research. Proof means that there is 100% accuracy, whereas with research there is always some probability of error. It is

impossible to study everyone in a population; and, even if that were possible, the measures and methods will never be perfectly accurate. The impossibility of proof will make more sense when you learn more about measurement and statistics in later chapters.

If research does not prove something, then how do we ever know anything in the social and behavioral sciences? How do these disciplines progress? When researchers at the graduate and postgraduate level (and even sometimes undergraduate level) complete a study, they typically submit a research report for publication in a scholarly journal or book, submit their work to present at a conference, or both. Other researchers in the field review and critique the work to help ensure that the study is important enough to be shared publicly and that the methods by which the study was conducted are sound. Once the work is made public, it becomes part of the larger body of knowledge in the field. Future research can then build on this knowledge, and those results will support, refute, or refine the findings of the original study.

Although we never prove something, when research findings consistently demonstrate a certain pattern, we feel confident that the pattern is likely one that will generalize to other samples and methods. For example, psychotherapy outcome research has consistently demonstrated that therapy is effective (e.g., Seligman, 1995; Shapiro & Shapiro, 1982; Smith & Glass, 1977). Research cannot prove that therapy has been or will be effective for everyone, but the body of research supporting the efficacy of therapy suggests that if someone is experiencing psychological distress, there is a good chance that therapy can help.

Once there is sufficient evidence that we feel confident of the validity of a pattern, researchers begin to ask deeper and more complex questions. For example, psychotherapy researchers have moved beyond the basic question of "Does therapy work?" to the more sophisticated questions of "What type of therapy works, for whom, under what conditions, and administered by what type of therapist?" These questions were first posed by Kiesler back in 1971, and have been the focus of much of psychotherapy research over the past decades. Now with hundreds of evidence-based psychotherapy treatment models, the field has moved to questions aimed at uncovering the common factors among these models, in essence asking, "What about therapy works?" (e.g., Wampold & Imel, 2015).

You will get a better sense of how knowledge in a field progresses when you dive into a research topic and start finding and reading research on that topic. Some classic theories and research studies will be cited often, as well as more recent studies that have built on those theories and studies and have helped to refine our knowledge of the area. Current research will pose more in-depth questions, and the results of those studies will inspire additional questions, and the cycle will continue. See Application 1.2 for an example of the research process from start to finish.

APPLICATION 1.2

The Scientific Method: Plagiarism Study Example

Step 1:

Identify a Topic

As educators, we are interested in how we might help students understand and avoid plagiarism.

Step 2:

Find, Read, and Evaluate Past Research

We found an article by Schuetze (2004) that demonstrated that a brief homework assignment can help reduce plagiarism. Additionally, Marek et al. (2004) found that a themed-methods course allows for deeper understanding of the material.

Step 3:

Refine Topic and Develop a Hypothesis

Based on the past research, we focused on incorporating assignments focused on plagiarism throughout the course. We hypothesized that students who were in a plagiarism-themed research course would demonstrate better knowledge of plagiarism and would have better paraphrasing skills that would help them avoid plagiarism than students who were in a research course with a different theme.

Step 4:

Design the Study

Ideally, we would do an experiment to show that the plagiarism-themed course caused improvements in students' knowledge and skills. However, this was not practical or ethical because we cannot randomly assign students to class. Instead, we did a quasi-experiment in which we compared students from one semester when we chose plagiarism as our theme to students from another semester when we chose a different theme for the course.

Step 5:

Carry Out the Study

Our participants were students who signed up for the course. All the students received plagiarism homework at the beginning of the semester, and soon afterwards all the students received instruction and one-on-one feedback as needed. Throughout the semester the students in the plagiarism-themed course did a variety of assignments on the topic of plagiarism, including an article analysis, descriptive study, and experiment. Students in the non-plagiarism-themed course did the same assignments but had gender stereotypes as their course theme. All the students did another plagiarism assignment at the end of the semester.

Step 6:

Analyze the Data

We compared the first and second plagiarism homework assignments for those in the plagiarism-themed course with those in the non-plagiarism-themed course. We found that those who were in the plagiarism-themed course showed more improvement on the homework assignment than those in the non-plagiarism-themed course.

Step 7:

Communicate Results

We wrote up a report based on our study and submitted it for publication to the journal *Teaching of Psychology.* Several reviewers and the editor of the journal gave us feedback, and we went through many revisions based on this feedback.

The article was accepted for publication and appeared in print in 2011. It is now part of the larger body of research on the topic of plagiarism. Other researchers can integrate the knowledge gained from the study, critique and improve on the method, and build on the findings in their own research studies.

Both an early version and the final publication version of this paper appear in Appendix B.

CHAPTER RESOURCES

Key Terms

Define the following terms using your own words. You can check your answers by reviewing the chapter or by comparing them with the definitions in the glossary—but try to define them on your own first.

Anonymity 25
Causation 11
Confidentiality 25
Correlational research (or correlational design) 10
Debriefing 24
Dependent variable (DV) 11
Descriptive research 10
Experimental research (or experimental design, or experiment) 11
Independent variable (IV) 11
Informed consent 20
Institutional Review Board (IRB) 13
Quasi-experimental research (or quasi-experimental design, or quasi-experiment) 12
Right to withdraw 20
Testable hypothesis 9
Variable 10

Do You Understand the Chapter?

Answer these questions on your own, and then review the chapter to check your answers.

1. What is critical thinking, and how does it apply to research?
2. What are the risks and benefits of the scientific approach?
3. How does the scientific method relate to the scientific approach?
4. What are factors to consider when choosing a research topic?
5. Why is reading and evaluating past research important in the scientific method?
6. What makes a hypothesis testable?
7. What are the three primary types of research design? What are the similarities and differences among the different designs?
8. What is plagiarism?
9. Why is plagiarism an important issue in research and writing?
10. What are ethical principles and ethical standards?
11. Why is informed consent important from an ethical perspective?
12. What are the arguments for and against deception?
13. What are the problems with using incentives, and how might researchers minimize these problems?
14. Why is confidentiality important from an ethical perspective? How is it different from anonymity?
15. What are the ethical issues to consider when choosing a research design, planning a study, and carrying out a study?