1 Introduction to Research Methodology

LEARNING OBJECTIVES

- Explain why an understanding of research methods is important.
- Describe the four goals of science.
- Describe the steps of the research process.
- Identify four characteristics of science.

Consider the following questions:

- Is a relationship more exciting when you keep it a secret?
- What is your prospective employer likely to think of your new tattoo?
- Does drinking alcohol affect the extent of our self-disclosure?
- Are people more likely to lie for a friend or a stranger?
- Does the amount of sleep you get affect your test performance the next day?

FIGURE 1.1 Would this person's body modifications affect his chance of being hired?

Research can answer questions like these. In fact, each of the above questions is addressed somewhere in this textbook, which is designed to teach you how to understand research. I'll use this chapter to give you a brief introduction to research and an introduction to many of the topics you'll encounter in this book.

Why Do I Need to Know about Research Methods?

Early in my college career, I read a newspaper headline that said, "Peanut butter causes cancer." This really worried me because I ate peanut butter multiple times a week. Was this report true, I wondered? Now that I know how to be a critical consumer of research, I realize I didn't have much to worry about. The statement that peanut butter *caused* cancer was very much an overstatement. In fact, the investigation of peanut butter and cancer relied on what we call correlational research, and you cannot determine causation from correlational research. (We'll talk more about correlational research in Chapter 6.)

Why is it important to understand research? Well, for one thing, without that understanding, I would have missed out on an additional 30 years of peanut butter. But there are other reasons. For one, the media often provide us with research results, and it's important that we understand how to evaluate them. For example, as I was writing this, I took a look at the Yahoo website and found the following headlines:

1. "This ground-breaking high fat diet could combat diabetes and promote weight loss" (Lewis, March 4, 2016)
2. "Chimpanzees believe in God, research suggests" (Dicker, March 4, 2016)
3. "Dogs have a very special way of seeing human faces" (Freeman, March 4, 2016).

Do I just accept these findings? Should I start eating a lot of fat and rethink any interactions I have with chimps and dogs? Not necessarily. If I had just accepted that media report about peanut butter, I would have missed eating a lot of it. If you learn how to critically evaluate the way the researchers did their research, you will be able to decide

whether the conclusions they put forth and/or the media reports of the research are warranted.

Understanding research methods can also help you in your work as a college student. Throughout your college career, you'll learn a lot about what scholars have discovered in your field. How do they know all they know? Research! It's important to distinguish a well-executed study from one that is severely flawed so you will know when to accept and when to question the research findings you learn about.

You may also have opportunities to conduct some research yourself. Then, of course, it is important that you know what you are doing so you can understand which methods are appropriate for your particular investigation and so you can arrive at the appropriate conclusions.

Understanding research methods can also help you as a consumer. For example, I am currently in the market for a new car. How should I choose my new car? I could just talk with my friend who has the type of car I want and see what she thinks of her car. However, someone who is familiar with research methods would know that, under typical circumstances, getting the view of just one person is not likely to provide you with the information you need. You might want to know, for example, how reliable the car is. What if your friend is particularly hard on her car, careening around corners and jumping curbs? She might need more service on her car than those who treat their cars more gently. What likely is more helpful is to know how reliable this vehicle *typically* is. To know this, you need to go to a source (such as *Consumer Reports*) that has collected data from a larger sample, ideally a representative sample. A **representative sample** is one that has the same characteristics as the population of interest. A **population** consists of the members of an identifiable group – in this case the population is defined as all the people who drive the car you are interested in. You'll learn more about **sampling**, or choosing a portion of the population as study participants for research, in Chapter 7.

FIGURE 1.2 Teachers use research too!

Finally, understanding research methods can help you in your future career. Many careers require using research methods and/or evaluating research findings in some way. For example, you could be a market researcher, determining what people think of a particular toothpaste, politician, or radio station. You could be a teacher, evaluating which teaching techniques to use and assessing how well your students are doing. You could work in the mental health industry, selecting the best treatment method given your client's particular needs. You could be a human resources executive, evaluating and implementing ways to enhance employee performance and morale as well as increase employees' participation in healthy activities. There are so many ways a knowledge of research methodology can become a part of your life.

The Goals of Science

Scientific research has four general goals: (1) to **describe** the phenomenon of interest, (2) to **explain** the phenomenon of interest, (3) to **predict** when the observed phenomenon will occur again, and (4) to

The Four Goals of Science

- **Describe**
- **Explain**
- **Predict**
- **Control**

FIGURE 1.3 The four goals of science.

control the phenomenon of interest. I'll talk about each of these goals below. (See Figure 1.3.)

Description

One of the main goals of scientists is to describe phenomena. For scientists who study psychology, this often means describing observable behavior. **Observable behaviors** are behaviors that can be seen, such as the amount of time students spend texting while walking between two buildings on campus, the number of alcoholic beverages people drink on the day they turn 21, or the number of M&Ms eaten while watching a movie with friends. We can observe activities like these in a systematic manner and document the results of our observations. To be systematic means to develop a plan for what exactly we are going to look for, striving to make these observations as objective as possible so we can generate accurate descriptions of the phenomena of interest.

For example, McCormick and Jones (1989) conducted an observation study to investigate differences in nonverbal flirtation in men and women. They were interested in the following behaviors: "gaze, movement, posture, facial expression, grooming, and touch" (p. 273). According to McCormick and Jones, each of these behaviors could be used to bring about two possible outcomes when you are interacting with someone – you could be trying to increase closeness ("escalation") or to reduce it ("deescalation"). Thus the researchers used a checklist with 12 options (Table 1.1), and they checked these options off as they saw them while observing couples in a bar. At the end of their observation study, McCormick and Jones were able to describe the frequency of the nonverbal flirtation behaviors they observed.

Psychologists also can describe factors that are less readily observable, such as how many times a week people remember their dreams, how anxious people feel when speaking in front of an audience, or how people feel after working out. We typically can't get the answers to these questions by observing people, but we *can* get them by asking. Basow and Kobrynowicz (1993) found that women were seen as more appealing by a sample of college students when they were shown eating fewer rather than more calories. How did Basow and Kobrynowicz know this? They asked. (By the way, I'm not happy about this finding, but it doesn't matter whether I am happy or even whether Basow and Kobrynowicz are happy. These are the results that were obtained; the way a researcher feels about them does not matter.) You'll learn more about how to observe behavior in Chapter 5 and how to describe thoughts and attitudes in Chapter 7.

FIGURE 1.4 In order to learn how people feel after working out, we can ask them.

Table 1.1 McCormick and Jones' (1989) twelve categories of nonverbal flirtation behavior.

Behavior	Purpose*	Definition
Gaze toward	Escalation	Establishing or holding eye contact; mutual gaze
Gaze away	Deescalation	Looking away; avoiding partner's eyes
Move closer	Escalation	Positioning body closer to partner
Move away	Deescalation	Increasing distance between self and partner
Open posture	Escalation	Relaxed stance, e.g., open legs, open arms, trunk easily visible; pivoting toward or facing partner
Closed posture	Deescalation	Arms and/or legs crossed and held tightly against body, closing off body; pivoting away from partner; shifting to shoulder-to-shoulder position
Positive facial expression	Escalation	Smiling, laughing, and grinning
Negative facial expression	Deescalation	Frowning, yawning, and grimacing
Grooming	Escalation	Enhancing appearance: smoothing hair, tightening abdomen, most self-touching; arched back, chest thrusting, stretching; lip licking
Brief touching	Escalation	Placing fingertips on or making fleeting physical contact with partner's shoulder, hair, arm, leg, face, or hand for a few seconds
Continuous touching	Escalation	Ongoing touching; holding hands, placing arm around partner, leaning against partner, touching legs; one partner rests against the other's head or shoulder
Intimate touching	Escalation	Touching two or more parts of partner's body or sexual areas; kissing, hugging, placing hand on partner's buttocks, breast, or genitals; rubbing against partner

* Escalation behaviors attempt to increase intimacy or attract another person; deescalation behaviors attempt to decrease intimacy or reject another person.
Source: McCormick, N. B. & Jones, A. J. (1989). Gender differences in nonverbal flirtation. *Journal of Sex Education & Therapy, 15*, 271–282.

Explanation

Scientists also want to explain the phenomena of interest. Often this means that we wish to determine *why* something happens. In other words, we want to find out what causes the phenomena of interest.

Scientists will often look at the pattern of data from research on a particular topic and propose a theory to account for why the data appear as they do. More formally: a **theory** is a statement that organizes, summarizes, and explains available information about a phenomenon and serves as a basis

for formulating testable predictions about the phenomenon. Let's look at an example.

Have you ever glanced through a magazine at a store, decided to buy it, but then put it back and chosen a "fresh" one from the back of the display? Argo, Dahl, and Morales (2006) were interested in investigating how consumers react to products they think were touched by others. In this case, the products of interest were t-shirts, and Argo et al. tested what people thought about three possible contamination cues: how close the item was to the location where it was presumably touched by someone (proximity to contact), how long it has been since someone presumably touched the item, and how many people were believed to have touched the item. With regard to proximity, they found that evaluations of the t-shirts were less favorable when, for example, the t-shirt was reported as discarded in a dressing room as opposed to hanging on a rack; however, this lowered evaluation occurred only when participants thought others had more recently touched the item. Contamination effects seemed to wear off with time. Participants also rated the t-shirt less favorably when they believed many people had touched it as opposed to only one.

Thus Argo et al. found that if consumers thought a product had recently come into contact with one or more other customers, they saw it as less appealing. When Argo et al. asked their study participants a series of questions to determine why they felt the way they did about the t-shirt, they found that the responses were driven by disgust. Argo et al. then proposed a *theory of consumer contamination* motivated by disgust to explain why people feel as they do about products that have been touched. Consumers are believed to contaminate products simply by having contact with them. Think about this the next time you're in a fitting room.

Once a scientific phenomenon has been described and a theory has been put forth to explain the phenomenon, we can attempt the next goal of science: prediction.

Prediction

Forming hypotheses is the third purpose of scientific research. **Hypotheses** are predictions, our expectations for our results, and they often are developed from theories. To illustrate, let's look at a specific theory and a specific hypothesis derived from that theory. Duval and Wicklund's (1972) theory of objective self-awareness claims that when people are self-aware, they tend to focus on what behavior is expected in a particular setting and evaluate how well their behavior matches that standard. Now let's look at how a team of researchers used this theory to generate a hypothesis.

Diener and Wallbom (1976) gave their study participants an "intelligence test" requiring them to solve a series of anagrams in the allotted time (p. 109). Some participants were first made self-aware by the experience of seeing themselves in a mirror and hearing a recording of their voice, while others were not made self-aware. Diener and Wallbom hypothesized that if being self-aware leads us

FIGURE 1.5 A mirror is often used in research to make someone self-aware.

to think about standards of behavior appropriate to the setting, then those who are self-aware will be less likely to act in a deviant manner, in this case by cheating on a test. Consistent with this hypothesis, they found that college students were less likely to cheat on a test if they were self-aware as opposed to not self-aware.

Once we have formed our hypotheses, we can test them to find out how accurately they predict events. If the results are as we predicted, we need to relay that information to our audience. There are specific ways to say this. Each of the following is appropriate:

- the data support the hypothesis
- the data are consistent with the hypothesis.

If the results are not as we predicted, we say:

- the data did not support the hypothesis, or
- the data are not consistent with the hypothesis.

If the data were not consistent with the hypotheses, and the hypotheses were derived from a theory, then the theory likely needs to be modified. We could then modify the theory, generate new hypotheses, and test again. That's how science works. Each time our hypotheses are supported (the results come out as we expected), we gain confidence in the theory. We'll talk more about hypotheses in Chapter 2.

Notice, however, that we never use any version of the word "prove" when talking about theories or hypotheses (do not say "my hypothesis was proven!"). The reason for this is that, as scientists continue to explore a particular topic, they may find disconfirming evidence, a case in which the theory does not fully account for the observed pattern of results or a case in which a hypothesis is not supported. It is always possible that new information may require researchers to modify current ideas.

Control

After we have described and explained a scientific phenomenon and made predictions about what we expect to occur, it's time to talk about control, the fourth purpose of scientific research. For many psychologists, learning how to influence or even control attitudes and behavior is the goal. For example, many researchers are trying to determine how to curb racism, discrimination, and aggression, to name a few. Let's look at a more specific example.

Emile Bruneau is a cognitive neuroscientist who has spent years investigating groups around the world that have historically been in conflict (such as Democrats and Republicans, Israelis and Palestinians). How can we stop or at least lessen the likelihood of these conflicts? Many have suggested solutions, each designed to increase people's positive attitudes toward those who oppose them. Bruneau's approach is to use brain scans in an effort to see how our brains react when we empathize or fail to empathize with someone outside our group (empathy is thought to play a role in conflict resolution). The hope is that we'll be able to identify the parts of the brain responsible for empathy and then learn how to increase empathy for those outside the group (see Interlandi, 2015). Again, learning how to minimize conflict is an example of the kind of influence or control a psychological researcher might have as an overall goal.

The Goals of Science in Action

Let's take a look at a research example to illustrate the goals of description, explanation, prediction, and control. First, picture the following. You're a star of the track team preparing for a big meet. Under which conditions are you likely to run your fastest: alone or with other runners? Those with experience running on a track team are likely to say: I run faster when other runners are present. Now picture another situation. You are about to perform your first monologue

FIGURE 1.6 Members of a track team tend to run faster when they are running with others as opposed to alone.

in acting class. You practice in front of the mirror repeatedly until you feel you are pretty good. Then it's finally time to perform in front of the class. You slowly walk up to the front of the class and prepare to speak. But you start to shake and stutter. And you realize you are not giving nearly the same level of performance you gave in the mirror.

These two scenarios both describe a performance in front of others. In one case the performer is better in front of others, while in the other the performer is worse. Early researchers were often perplexed by similar outcomes, sometimes seeing better performance with an audience (for example Weston & English, 1926) and sometimes worse (see Pessin, 1933). Why the difference? Researchers wanted to create a theory that accounted for both outcomes, and Robert Zajonc (rhymes with "science") did just that. In 1965, Zajonc used the theory of social facilitation to explain why the presence of others sometimes improves performance and sometimes inhibits it. He explained that when someone is just learning a task, that person's responses are likely the wrong responses (wrong responses are dominant). However, when the task is well learned, the dominant responses are likely correct responses. Zajonc postulated that the presence of others increases physiological arousal, and that arousal enhances the presence of dominant responses. In other words, according to Zajonc's depiction of social facilitation, when others are present, people will tend to do better on simple or well-learned tasks and worse on complex or poorly learned tasks. (See Figure 1.7.)

So Zajonc's theory of social facilitation did a good job of explaining the data. This theory then could be used to generate hypotheses. For example, Kotzer (2007) used Zajonc's theory to predict what will happen when expert and novice basketball players attempt free throws in front of an audience and alone. As hypothesized, Kotzer found that those who were relatively experienced at playing basketball made more free throws when being watched by an audience than when alone. On the other hand, those who were relatively inexperienced made more free throws when alone than with an audience. This is consistent with what Zajonc's theory of social facilitation would predict.

Now that the phenomenon of performance differences has been described and explained through

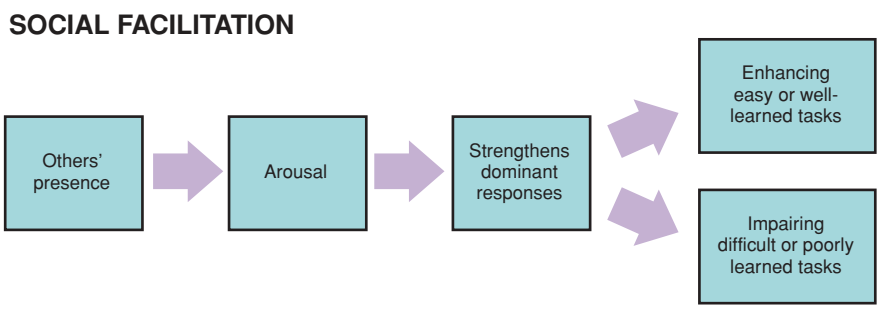

FIGURE 1.7 Zajonc's (1965) social facilitation hypothesis.

theory and predictions have been made, let's take a look at how researchers could use social facilitation research to influence or control attitudes and/or behavior. Yu and Wu (2015) considered how the presence of observers would affect those performing baggage x-ray screening tasks. Would the presence of an audience enhance simple x-ray screening tasks and impair difficult x-ray screening tasks, as the theory of social facilitation predicts? The researchers brought the screening task into the laboratory and trained college students to look for knives in x-ray images of baggage. After the training, these students were tested on an additional 400 images, 200 of which had a knife. For half the images an observer watched the student complete the screening; for the other half, the students performed the screening task while alone. What happened? The presence of an observer did have an influence; when the screening task was relatively easy, those being watched performed it faster. When it was relatively difficult, those being watched slowed down. The presence of an audience did not affect response accuracy, however.

How did Yu and Wu use this research to influence or control the phenomenon of interest? After seeing their results, they made recommendations for the security industry. They suggested that if the task is simple, such as detecting threats in small bags (what you likely would find people carrying on the subway), the security screeners should be performing their tasks while being watched. On the other hand, if the task is complex, such as detecting threats in large bags (what you likely would find people carrying in the airport), they should be performing their tasks while alone. The researchers also suggested that small bags and large bags be screened separately, with an observer present only for those screening small bags. According to Yu and Wu, these policies would optimize the performance of those detecting threats to security. With these recommendations, Yu and Wu are seeking to influence the way x-rays of baggage are screened.

Note that even though the theory of social facilitation could explain many research findings by focusing on the complexity of the task, science didn't stop there. Researchers have continued to conduct research to determine *why* people have such reactions to the presence of others. There are currently three major categories of explanations for the social facilitation effects researchers have found. As Aiello and Douthitt (2001) noted in their review of social facilitation, researchers have continued to investigate Zajonc's assertion that the presence of others increases arousal levels. Researchers have also considered the possibility that people are affected by the presence of others because they are worried about being evaluated, or because they are distracted. So, as you can see, while Zajonc's theory of social facilitation was an important development in explaining why performance sometimes improves and sometimes falters when people are watched, researchers have continued to refine the theory with additional research.

The Steps in the Research Process

How do scientists accomplish their four goals of description, explanation, prediction, and control? In this section we'll go over the general steps you take when you conduct research. We'll discuss all these steps in more detail later in the textbook.

(Step 1) Develop a Research Idea

The first thing you need to do is come up with a research idea. There are lots of ways to do this. This textbook was designed to provide you with research examples that are generally pertinent to students' lives, and one of the things you can do is to look at the experiences in your own life to come up with ideas.

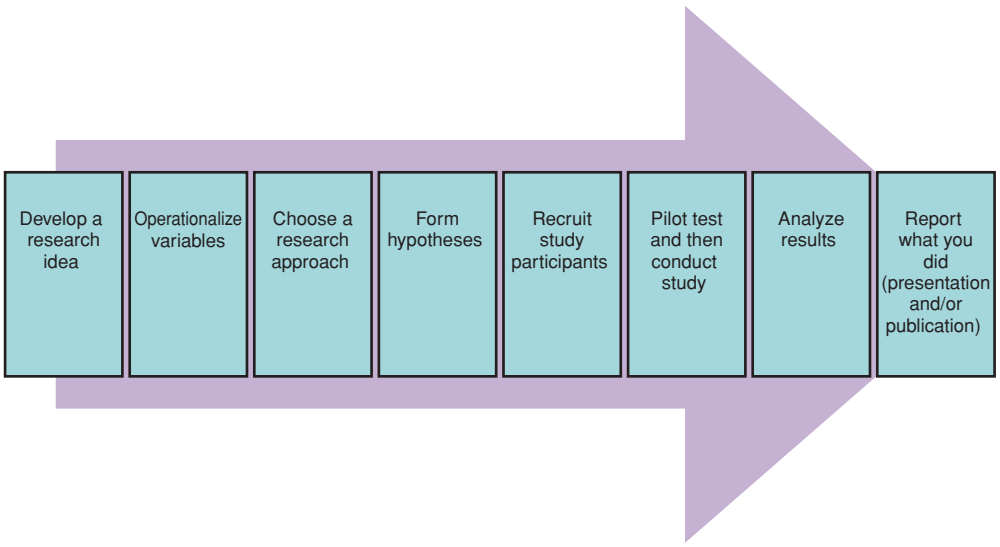

FIGURE 1.8 The steps in the research process.

Let's take an example. Let's say you find yourself completely obsessed with texting on your cell phone, even in very odd places like the shower and at very odd times such as during intimate moments. You wonder, "Am I the only one doing this?" You now have an idea for research. You can develop a survey and ask your respondents to indicate under what conditions they text.

As you'll see in Chapter 13, Harrison and Gilmore (2012) did this. They were interested in why and when college students text. So they created an online survey presenting 29 social situations and asked a sample of students at their university to indicate whether they texted in such situations. They found that almost 30% of the respondents had texted while in the shower, and 13% while having sex! In Chapter 7, you will learn how to create a survey to address your own research questions, and in Chapter 13 you'll learn how to create and administer a survey online.

Thinking about your own life is just one of many ways to come up with an idea for your research. You can also get ideas from the need to solve practical problems, from previous research, and from theories. Chapter 2 will elaborate on each of these ways to generate research ideas.

FIGURE 1.9 Where do you do your texting?

There is another way to think about research ideas. Psychological research can generally be considered as either basic or applied. **Basic research** attempts to answer fundamental questions about a