CHAPTER

1

Introduction

How can our intellectual life and institutions be arranged so as to expose our beliefs, conjectures, policies, positions, sources of ideas, traditions, and the like—whether or not they are justifiable—to maximum criticism, in order to counteract and eliminate as much intellectual error as possible?

—W. W. Bartley III (1962, pp. 139–140)

OVERVIEW

This chapter is an introduction to research. Like most introductions, it is a broad overview of what is to come. Admittedly, it is also an attempt to pique your interest. You will learn what research is (and is not) and what the goals of research are. You will also learn about a number of different research projects, projects that illustrate that no single research method is necessarily better than any other. Part of this process is learning about a general framework for understanding and evaluating research conducted by others so that you may inform your own plans and decisions about professional activity, programs, traditions, and the other aspects of life to which Bartley referred in the opening quote. You will learn how the remainder of this book fits into the overall approach toward learning about research and becoming an informed, critical consumer of research. Finally, you will learn how to begin searching for research articles.

INTRODUCTION

You may have a song (or two) to which you have attached so much meaning that you want to stop everything when you hear it and concentrate on listening and conjuring memories associated with the song. For me, that song is "Who'll Stop the Rain?" (Fogerty, 1970)

performed by Credence Clearwater Revival. For those of you who have not heard the tune, the rain is a metaphor for the confusions and mysteries of life. Somewhere behind all those rain clouds is the sun, answers to the mysteries of life. Although everyone has been looking for the sun, the singer continues to wonder who'll stop the rain. As you read this, you may be wondering the same about research, the course you are taking, and this book. What you need now is some sun, but all you see is rain. I'll try to provide some sun, although I don't promise to clarify the mysteries of life.

I need not point out how important getting things right in healthcare has been, is, and will be in our lives. I also need not point out that programs, therapies, treatments, and other things don't always work out the way they should; they often involve unintended consequences, are sometimes more costly than necessary, and occasionally don't do much of anything. In Fogerty's words, they can become "five year plans and new deals, wrapped in golden chains." Like noted methodologist Donald Campbell (1969, 1971), I believe understanding research methods will help you to learn enough to remove some of those golden chains. In our complex and rapidly changing world, we cannot afford to be armchair theorists trying "whatever" in hopes that it works nor can we depend upon others' opinions, however well considered, as we search for understanding and try to make the world a better place. We need to use research to sort what we already have as well as to point the way to more useful treatments and programs. But incorporating research into our everyday, professional behavior must involve more than accepting on faith what "the experts" write. The plethora of dissemination outlets for research reports enables just about anyone to claim to have published a scientific report, often without any review, so we can no longer count on the experts to be, well, experts. We need to become experts ourselves, not in conducting research but in critically evaluating research done by others so that we can determine whether or not that research is good enough to apply to and incorporate into to our professional activities. Without the ability to read research critically, we cannot truly engage in evidence-based practice (APA Presidential Task Force on Evidence-Based Practice, 2006; Sackett, Straus, Richardson, Rosenberg, & Haynes, 2000).

Therefore, this book is about research: what it is, how to evaluate it, how to tell people about it, and how to use it. It is about trying to find an answer to the question posed by Bartley, and it is about stopping Fogerty's rain. As you read further, you will come to realize that research is one of the means by which people avoid making intellectual errors. That is, research is a part of life, a particularly exciting part of life that involves trying to discover the whys and wherefores of the world in which we live. As you learn about research, I hope you will also have some fun and maybe, just maybe, you might even find the sun.

Definitions

It is always best to start at the beginning when attempting to learn a new topic, and for research, that beginning is a definition of research. Unfortunately, it is not easy to arrive at a single definition of research. The online edition of the Oxford English Dictionary

(http://www.OED.com) includes the definition "systematic investigation or inquiry aimed at contributing to knowledge of a theory, topic, etc., by careful consideration, observation, or study of a subject." I have always liked Kerlinger's (1973) definition: "systematic, controlled, empirical, and critical investigation of hypothetical propositions about the presumed relationships among natural phenomena" (p. 11). Both of these definitions, however, are a little too restrictive for me, because research is not always systematic and it is not always careful and controlled. The more systematic and controlled research is, the better it is, but even poor research is still research.

When it comes down to what is important, the definition of research is rather simple. **Research** is *a critical process for asking and attempting to answer questions about the world*. Sometimes asking and attempting to answer questions involves a questionnaire, sometimes an interview, sometimes an experiment, and sometimes an entirely different method. Simple definitions, however, can be misleading. There is more to research than its definition, or this would be the last page of the book.

Research, as a critical process, is one of the tools we use to achieve Bartley's state of maximum criticism. We do so not by pointing out only negative qualities of a particular topic but by examining all of its qualities—good, bad, or indifferent. Regardless of the condition(s) to which our practice is brought to bear, the ultimate subject of our criticism is human behavior, something about which all of us already know a great deal. That knowledge, however, can sometimes get in our way. If, for example, we fail to examine critically some aspect of human behavior because "everyone knows it is true," then we have fallen short of the goal of evidence-based practice. We should, instead, be like a little child who continually asks "Why?" Of course, we are more sophisticated than little children, but we need to return to research to evaluate the answers we obtain to our questions. As critical questioners, we need not believe every answer we obtain. For that matter, research enables us to ascertain whether or not we have even asked the appropriate question.

One of the appropriate questions we must ask is, simply, "Why pay any attention to research?" To answer this, we must make a brief foray into **epistemology**, *the study of the nature of knowledge, of how we know what we know*. In the late 19th century, Charles Peirce (1877) codified the four primary methods we use to decide how we know what we know: (1) a priori method, (2) authority, (3) tradition, and (4) science. As we consider each of the four methods, keep in mind that there are questions that are more amenable to one of these methods than another; no method of knowing is best for all questions.

Also known as logic, intuition, and sometimes faith, the **a priori method** *defines knowledge as anything that appears to make sense, to be reasonable*. There are some advantages to the a priori method, not the least of which is the ease with which we can develop certainty or relieve ourselves of doubt. Thus, Descartes (1637/1993) employed the a priori method to arrive at his famous decision about how he could be certain that he was real, that he (and the rest of us) existed: *cogito ergo sum*. As you might suspect, developing certainty is also the chief disadvantage of the a priori method; it is all too

easy to close enquiry prematurely because we hit upon a reasonable answer. Thus, many people are certain that most medieval people believed the earth was flat (Russell, 1991), some are certain that aliens from outer space have abducted people (Carroll, 2005), and others are certain that the best way to prevent teen pregnancy is by teaching abstinence (O'Donnell et al., 2007). Like all of the other methods of inquiry, the a priori method does not guarantee that the knowledge developed will be useful knowledge. The quality of knowledge derived in this way is a function of the quality of the reasoning employed by the individual producing the knowledge.

In the context of epistemology, **authority** involves *believing something because the source of the knowledge is accepted as inherently truthful*. As children, for example, we believed our parents. Sometimes the belief was correctly placed—stove burners can be hot—and sometimes not—tooth fairies do not exchange our baby teeth for money or prizes. As adults, we rely on authority as an epistemological method when we accept an expert's conclusion simply because the person is an expert. This can lead to positive outcomes, such as a much-needed prescription for hypertension medication, or it can lead to negative outcomes, such as sterilizing people because they are "mentally defective" (Gejman & Weilbaecher, 2002). When we rely on authority for knowledge, the quality of the knowledge rests upon the quality of the authority.

Tradition involves *believing something because of historical precedent or because it has always been believed*. For example, we tend to eat oysters only in months that include an "r" in the name. The reasoning is sound; warmer weather makes safe storage and transportation more difficult, and bacteria are more plentiful in warmer water (Miliotis & Watkins, 2005), but rapid refrigeration at harvest makes the tradition less important now than it was before such techniques were developed. A very different tradition, shaking hands when meeting someone, may have its roots in demonstrating that one is not capable of holding or reaching for a weapon (Morris, 1971). Such concerns are not as relevant as they once were, but the tradition continues with a very different rationale. We now believe we can determine someone's personality from his or her handshake, and we use that belief to project a desired impression of ourselves (Chaplin, Phillips, Brown, Cianton, & Stein, 2000). We continue to engage in the behavior because "we've always done it that way" and to believe knowledge is produced from the tradition, even when the original reasons no longer make sense. Thus, what we know from tradition may be useful but only as long as the reasons for the tradition are valid.

Science, *the process of using systematic, empirical observation to improve theories about phenomena based on a set of rules that defines what is acceptable knowledge*, enables us to develop knowledge by testing our explanations of the world against what we can observe in the world. For example, we know that training nurses in advanced cardiac life support techniques (ACLS) increases the success of in-hospital cardiopulmonary resuscitation about fourfold (Dane, Russell-Lindgren, Parish, Durham, & Brown, 2000). The researchers systematically compared the resuscitation outcomes of people who were discovered to be in distress by an ACLS-trained nurse with the outcomes of people who

Table 1.1 A Summary of Epistemological Methods

Method	Process for Establishing Knowledge, Deciding What Is Truthful
A priori	Accepting information because it makes sense or is reasonable through the application either of intuition or deductive logic
Authority	Accepting information because the source is believed to be inherently truthful or knowledgeable
Tradition	Accepting information because it has always been accepted; historical precedent in one's family, government, society, culture, or other socialization unit
Science	Accepting information because it was obtained through systematic, empirical observation

were discovered by a nurse not yet trained in ACLS. Prior to that study, many people believed ACLS training for nurses would benefit patients who required resuscitation, but that explanation was not tested. Unlike other ways of knowing, however, science includes continual testing of explanations. As you will learn in the next chapter, no theory is ever accepted as true, never again to be examined. Similarly, science continues to develop new questions based on obtained answers. For example, other researchers have demonstrated that nurses trained in ACLS are as capable of leading a resuscitation attempt as are physicians (Gilligan et al., 2005). Thus, while the knowledge we obtain from science is only as good as the data generated from research, the continual generation of data serves to produce an accumulation of knowledge in which misinterpretations of data are corrected instead of perpetuated.

In summary, the four different ways of knowing are equally useful, depending upon the questions being asked and the knowledge desired. (See Table 1.1 for a summary of epistemological methods.) Science cannot, for example, determine how we can know we are real, and a priori reasoning cannot determine whether ACLS training for nurses prolongs lives. Science cannot explain why we began to shake hands, but tradition cannot determine whether or not we can learn something about a person's personality by shaking his or her hand. Science is best used to gain knowledge about empirically testable ideas or explanations. That covers an extremely large number of phenomena but does not cover all phenomena. I hope to convince you that science, through empirical research, is an effective way to make decisions about the utility of what we do as professionals.

GOALS OF RESEARCH

The ultimate goals of research are to formulate questions about testable phenomena and to find answers to those questions. Nestled within these are other goals toward which researchers strive. No one can ask all of the questions and no one can find all of the

answers to even a single question, so researchers need to find some way to organize what we attempt to do. The immediate goals of research—exploration, description, prediction, explanation, and action—provide us with an organization for how to evaluate research.

Exploration

Exploratory research *involves an attempt to determine whether or not a phenomenon exists*. It is used to answer questions of the general form, "Does *X* happen?" Exploratory research may be very simple, such as noting whether men or women (or boys or girls) are more likely to sit toward the front of a classroom. If one or the other gender does sit in front more often, then we may have discovered a social phenomenon that merits further investigation (Okpala, 1996). More recently, Elmer et al. (2015) used a registry of intensive-care patients who had to be reintubated during the course of their treatment to investigate whether or not complications were different and/or more numerous for the first compared to the last intubation. They did find that complications were more frequent with the last intubation. Their discussion section contains some material regarding potential reasons for this difference, but they and other researchers will have to conduct considerably more research as they follow up on this finding.

Exploratory research may also be very complex, and sometimes the object of exploratory research is the research process itself. For example, building upon Durkheim's (1951/1897) and many other researchers' work on suicide, Jacobs (1967) noted that researchers were generally failing to consider an important source of information about suicide—the notes left behind by those who committed the act. His analysis of the content of such notes revealed that many people valued some degree of uncertainty in their lives. Specifically, people who wrote the notes appeared to prefer the uncertainty of death to the certainty that life would continue to become worse.

Regardless of the topic of exploratory research, the basic question addressed by the researchers involves whether or not something exists or is happening. A myriad of questions usually follow the initial finding, but those additional questions do not detract from the finding per se. Even though they, and we, cannot yet explain why last intubations tend to involve more complications than first intubations, Elmer et al.'s (2015) finding, like those of all exploratory research, needs to be somehow incorporated into the understanding and practice of those who may deal with patients who need to be reintubated.

Description

Descriptive research *involves examining a phenomenon to characterize it more fully or to differentiate it from other phenomena*. Munsterberg (1913), for example, began his inquiries into the consistency and accuracy of eyewitness testimony after wondering about his own perceptions following a burglary at his home. He wondered why he thought, and testified, that the burglars had broken through a basement window when they had actually forced open a door. Since he first questioned his own

perceptions and began conducting systematic research on the topic, a number of researchers have been investigating eyewitness accuracy and applying their results to courtrooms and other settings (Strauss & Smith, 2009). Empirical attempts to describe more comprehensively the limits of eyewitness accuracy have been conducted from the time of Munsterberg's first musings to the present (Rounding, Jacobson, & Lindsay, 2014), and they are likely to continue well into the future. Indeed, even the most recent studies on eyewitnesses have some basis in the research Munsterberg conducted at the beginning of the previous century.

Perhaps the most extensive descriptive research is that conducted by the U.S. Bureau of the Census. The goal is to count and describe the characteristics of the entire U.S. population, and the impact of this research is extensive. Billions of dollars in federal, state, and municipal aid shift with the changing population. Congressional districts appear and disappear, and hundreds of researchers rely on these data to assess the representativeness of their own research samples (e.g., DiBennardo & Gates, 2014).

Descriptive research captures the flavor of an object or event at the time the data are collected, but that flavor may change over time. The U.S. Census Bureau, for example, repeats its very costly research every 10 years, engages in interim data collection every year, and updates results regularly (Salvo & Lobo, 2013). Other research results may change even more rapidly. Research on unemployment is conducted monthly, and public opinion polls about certain issues may be conducted as often as every day.

Research results are not timeless, simply because change is one of the complexities inherent in our world. Descriptive research should be evaluated the way one might evaluate a photograph; it captures a moment in time but should not be compared to a video.

Prediction

Sometimes the goal of research is **prediction**, *identifying relationships that enable us to speculate about one thing by knowing about some other thing*. While this may seem complicated, it really is not. We all conduct and use the concept of **predictive research** every day. Predictive research *involves any study in which the purpose is to determine whether a relationship between variables exists such that one can use one of the variables in place of another*. We know, for example, about the relationship between hours on a clock and the probability of a certain business being open. Or we understand the relationship between a thermometer reading and the necessity of a coat when going outside. Or we know about the relationship between the scores on entrance exams and performance in the first year of college (Camara & Kimmel, 2005) or graduate school (Kuncel, Hezlett, & Ones, 2001).

Predictive research also gives clues about whether or not one variable is the cause of another. We can learn from the research of Angela Lee Duckworth and her colleagues, for example, that the personality variable known as *grit* may be an important component of success. There are studies in which grit is related to success in spelling

bees (Duckworth, Kirby, Tsukayama, Berstein, & Ericsson, 2010), to performance in elite colleges (Duckworth, Peterson, Matthews, & Kelly, 2007), to performance as a teacher (Duckworth, Quinn, & Seligman, 2009), and even to success in Army Special Operations Forces training (Eskreis-Winkler, Shulman, Beal, & Duckworth, 2014). Note the careful wording of the first sentence in this paragraph—"clues about" causes. Because Duckworth and her colleagues were not able to create different levels of grit among their participants—they could not control grit—they were not able to test grit directly as a cause of success.

Explanation

Explanatory research *involves examining a cause–effect relationship between two or more phenomena*. It is used to determine whether or not an explanation (cause–effect relationship) is valid or to determine which of two or more competing explanations is more valid. Explanatory research usually involves creating two or more groups of participants by manipulating some aspect of the situation and assigning participants to the groups that were created.

Oermann, Kardong-Edgren, and Odom-Maryon (2011), for example, conducted an experiment to test whether or not brief periods of practice were sufficient to maintain nursing students' cardiopulmonary resuscitation (CPR) skills for a year. To do this, they assigned some of the students to complete six minutes of practice per month, while the other students were not assigned any practice time. Every three months, some students from both groups were tested on hand placement, compression rate, compression depth, ventilation rate, and ventilation volume. While both groups were able to maintain proper rates, students in the brief-practice group were better able to maintain proper compression depth (push hard enough to get enough blood flowing) and proper ventilation volume (get enough air into the lungs). From this study, we learn that practice is a cause of performance for some CPR skills. Oermann et al. did not test specific explanations for the practice effect, however, so we don't know why practice helps to maintain skills, but we do know that practice causes better performance of CPR skills.

Action

Research can also be used to attempt to do something about a particular phenomenon. **Action research** *refers to research conducted to solve a social problem* (Lewin, 1946). Action research can involve any of the previously mentioned goals but adds the requirement of finding a solution, of doing something to improve conditions, of generally making the world a better place beyond adding new knowledge. For example, Becker and Seligman (1978) noted that many people continue to run their air conditioners even though the outside temperature is lower than the temperature inside their house. To address this problem, Becker and Seligman conducted an experiment to test potential solutions to this instance of wasted energy. They created four different groups

by providing some people with a chart showing them how much energy they were using, other people with a light that flashed whenever the outside temperature was lower than the inside temperature, still other people with both chart and light, and still others with neither chart nor light. They measured the amount of electricity used by each of the four groups and discovered that the charts did not alter people's energy efficiency. The signaling device, however, decreased electricity consumptions by about 16%. Through their action research, they provided a solution to the problem of wasted electricity: a simple signaling device.

Action research, in general, is an extremely important aspect of science, for it is through action research that we are able to test applications of other research results. We might all want to make the world a better place, but the complexity of the world requires that we test proposed solutions to problems before applying them on a large scale.

Research goals affect the ways in which we attempt to evaluate and eventually apply research. It would not be appropriate to reject research because it did not meet goals it was not designed to meet. We should not, for example, devalue Becker and Seligman's research because they did not explain why flashing lights created more efficient use of energy. Explaining why was not part of their project. We do need to understand the initial goals of every research project, but understanding the goals is only the beginning of evaluating research. The five goals of research are described in Table 1.2.

EVALUATION OF RESEARCH

Before we apply research results, we have to accept them as reasonable, which means we need to be able to know the extent to which they are worthwhile. Evidence-based practice involves much more than simply paying attention to the latest research. We need

Table 1.2 The Five Goals of Research Expressed as Abstract and as Concrete Questions

Abstract Questions	Concrete Questions
Exploration: Does it exist?	Do suicide notes contain any information about people's motivations concerning suicide?
Description: What are its characteristics?	How accurate are eyewitnesses?
Prediction: To what is it related?	Is grit related to success in life?
Explanation: What causes it?	Does practice maintain CPR skills?
Action: Can this be used to solve a problem?	Can feedback about outside temperature be used to help people to conserve energy?

to evaluate research results and the methods used to produce them, and we need to do so critically. Critical evaluation involves noting both positive and negative aspects, the good and the bad. Critical evaluation also involves noting the indifferent and irrelevant, the things to which research is not related. As consumers of research, we need to be able to determine which research project is relevant and which is not. To construct a systematic framework for evaluating research, I have borrowed some familiar questions from journalism: who, what, where, when, why, and how. These questions will be used throughout the remainder of the text, which also allows me to provide a preview of what is to come in subsequent chapters.

Who

The *who* of a research project involves three different questions: Who are the researchers? Who are the participants? Who are the consumers? The answers, of course, vary from project to project, and all have something to do with how one evaluates the project.

We learn from the first page of a research article the names of the authors, but asking about the researchers involves more than simply discovering their names. What we really want to know is something about the characteristics of the researchers, their competence, and their biases. We presume researchers are competent until we learn otherwise, but once we learn otherwise, we should be unwilling to consider their research seriously. For example, I know of no one willing to place a great deal of faith in research conducted by Sir Cyril Burt in light of his fraudulent research on intelligence (Hearnshaw, 1979). It may sound cruel, but my recommendation is to discount all research by someone for whom a research article is retracted on the grounds of misrepresentation.

Beyond outright fraud, one rarely has specific information about a researcher's reputation at the outset of a career in evaluating research. As you read critically, however, you will develop opinions about specific researchers as you read their work. Some write better than others, some include more detail than others, and some make you think more than others. As an evaluator of research, it is important to avoid letting judgments about the researcher weigh too heavily in our judgments about their research. Science is about the data, not about who collected them. When we allow ourselves to become over- or under-impressed by someone's writing or institution, then we are no longer engaged in science, we are engaging in authority or another of Peirce's (1877) ways of knowing.

In the abstract and method sections of an article, we learn about the participants in a research project. They, too, are an important consideration in the evaluation of research. Should you read Oermann et al. (2011), for example, you would learn that their participants included nursing students from 10 different programs throughout the United States and included different types of nursing programs: diploma, associate degree, and baccalaureate. The comprehensive source of their participants means that their results should be given different weight than results obtained from students in a single institution or a particular type of nursing program.

The intended consumers of research also play a role in one's ability to evaluate a project. Researchers tend to write their reports for other researchers as opposed to the general public. They often use jargon that they expect readers to understand. At this point, the phrase *a 2 × 2 factorial design* probably doesn't mean much to you, but it denotes a specific research design. The design carries with it a variety of assumptions, implications, and techniques, all of which would be very time consuming, not to mention boring, to describe every time someone wrote about it. Inability to understand jargon makes it difficult to evaluate research, which is one of the reasons for the glossary in this text. At the completion of this course, you will be evaluating research quite differently from the way you evaluate it now.

What

We learn about the *what* of research primarily from the introduction, in which researchers explain the topic as well as the theory on which the research is based. It should be obvious that different research topics require different methods. Attempting to interview people who have committed suicide is ridiculous, not to mention macabre. On the other hand, an interview or survey is entirely appropriate for a project dealing with energy use. What may not be so obvious is that different questions about the same research topic may require different methods. If researchers are interested in perceptions about electricity use, interviews may be just what they need to use. But if they are interested in actual electricity use, then they might do as Becker and Seligman (1978) did and read meters instead of asking people how much electricity they used.

Through the theory they use as they derive their research questions, researchers also affect the manner in which they conduct the research. Sales (1972), for example, specifically tested Marxist theory, so he included economic conditions (one of the major components of Marxist theory) as one of his research measures. If instead he was interested in theories about psychological depression, he probably would have used some sort of depression scale and ignored economic indicators. Both economics and depression may be related to membership in a religious organization (Jenkins, 2003), but which variable gets included in a single research project is determined by the theory from which the research question is derived. The evaluation of research involves assessing whether or not what is included in research is appropriate to the theory on which it is based.

Beyond the level of theory, **worldview**, *the basic set of untestable assumptions underlying all theory and research*, also plays an important role in research. Kamin (1974), for example, pointed out that researchers were willing to accept the notion that men and women did not differ in intelligence, and so those developing intelligence tests generally excluded from intelligence tests items that produced gender differences. They were not, however, so willing to accept the notion that racial and ethnic minorities were as intelligent as themselves. Thus, early measures of intelligence did not exhibit a gender bias but did exhibit a number of racial and ethnic biases. Political beliefs may also affect

the topic one selects for research (Frank, 1981). Understanding a particular researcher's worldview is generally not something obtains from a single article, however. Worldview is something we come to know from a collection of someone's articles, including responses to commentary about the research.

Where

Also from the method section, we learn about the *where* of research, which includes the physical and social environment in which the research was conducted. Certain conditions are possible in one setting but not in another, and some settings do not allow certain types of research to be conducted at all. We cannot, for example, legally study jury deliberations in any systematic fashion by recording what occurs in the deliberation room, although some researchers have been able to do so under extraordinary circumstances (Devine, Clayton, Dunford, Seying, & Pryce, 2001; Ellison & Buckhout, 1981; Simon, 1975). Similarly, we cannot ethically examine reactions to an emergency by shouting "Fire!" in a theater. On the other hand, we can study simulations of juries (Cox, Clark, Edens, Smith, & Magyar, 2013) as well as simulations of emergencies (Helton, Funke, & Knott, 2014; Kaplan, Connor, Ferranti, Holmes, & Spencer, 2012). Bringing trials or emergencies into a research laboratory may introduce an element of artificiality, but artificiality alone is not grounds for devaluing a research project. Just as it is with other evaluation questions, it is necessary to engage in critical assessment of the relationship between the physical setting and the research goals.

The influence of the social environment may include very general aspects of the society as well as cultural biases. Someone doing research in a country without a jury system—Japan, for example—might never decide to use a jury simulation to study group decision making. Similarly, the belief in the United States and Canada that beauty was in the eye of the beholder kept social scientists from systematically studying the effects of physical attractiveness until the 1960s. The first few studies about physical attractiveness, however, blew that belief right out of the water. After decades of research and its attendant publicity, few of us have any trouble responding to a question that begins with "On a scale from 1 to 10, how attractive is . . . ?" and even fewer of us doubt our rating will agree with those of many others (Adams, 1977; Rhodes, Halberstadt, Jeffery, & Palermo, 2005).

When

From the year of publication, we learn the time frame of a particular study. Time frame may, of course, alter its utility, but it can also be the major purpose of the study. Science operates on the basis of cumulative knowledge most of the time (see, e.g., Fleck, 1979). Each bit of information adds to what is already known. In 1990, for example, it was concluded that a daily, low-dose aspirin was useful for preventing cardiovascular disease (Ewy, 2014). As daily use became prevalent, the relationship between daily aspirin and other diseases could be studied (Illingworth & Parmet, 2015), including cancer

(Orenstein & Yang, 2015), and eventually to very specific genotypes (Rupp, 2011). During that same time period, there were occasional reports of complications concerning aspirin (e.g., Patel et al., 2015), but such reports did not negate the earlier research. Someone paying attention only to the latest research might well have felt as though they were the ball in a ping-pong match—take it, don't take it, take it, don't take it, take it—but research should not be consumed one study at a time in a vacuum, so to speak. Knowing when research was conducted allows us to place it in the context of existing information about the research topic.

Changes in conditions over time may themselves be the focus of research, and such information comes from the method section of the research article. Oermann et al. (2011), for example, found no differences between the brief-practice and no-practice groups in terms of adequacy of CPR compression depth in the first 3–9 months of their study. By 12 months, however, the differences were considerable, and those differences remained even after a refresher course.

Why

We have already dealt with the general reasons why research is done: exploration, description, prediction, explanation, and action. From the introduction of the article, we also learn more specific reasons. We learn, for example, what the authors think about how the research results fit into the existing knowledge about the topic.

Our critical consumption of the introduction gives us contextual information about the research. Because we want to know about all of the research relevant to a specific topic, we use the introduction to learn of the existence of additional research to include in the evidence relevant to our professional practice. Oermann et al. (2011), for example, cited 12 different studies about the decline in CPR skills that occur over time and another eight studies about the utility of practice to reduce or prevent such declines. If we are reading Oermann et al. to learn about preventing the decline of CPR skills and did not already know about all 20 studies, then we have additional information to incorporate into our body of evidence. Reading critically about research, however, means that we have to get and read the additional articles. We should not merely accept what Oermann et al. wrote about the other research; that would be using Oermann et al. as authority (Peirce, 1877) instead of engaging in science.

How

The goals of research affect how it is done (its methods), and so we turn to some of those methods as a way to preview the remainder of this text. The design and procedures are likely to be the most critically evaluated aspects of research and so deserve the greatest amount of attention.

The *how*s of research range from the manner in which one obtains an idea to the ways in which one writes about the research results, and understanding each of these is useful

in our attempts to consume research conducted by others. Nestled between these two activities are issues concerning measurement, design, data analyses, and interpretations. In addition, there are many aspects of research that may or may not be relevant to a particular research project. Scale construction and obtaining large, representative samples are just two examples of such aspects.

Like most of life, research can be extremely boring if you only read about it with no particular purpose in mind. Although you may not be able to apply everything discussed in this text, you can think about the relevancy of various topics to your professional interests throughout the text. As you continue to read, think about how you might use the information you are reading in your current or your intended profession. Imagination cannot replace activity, but imagination is better than nothing. At some point, and I hope it is soon, you may be in a position to prepare a research-based manuscript, even if it's only a memo suggesting a change in process in your workplace. If you have thought about it ahead of time, you'll be able to take advantage of the opportunity.

INITIATING A RESEARCH REVIEW

Research results are always placed in context, and our professional interests provide a framework for new ideas about what to research. There is no official starting point in this relationship, but I have chosen to begin the discussion of how to review research with choosing a topic.

Choosing a Topic

The first step in conducting a research review is to choose a topic. There are no rules for this step, but there are some general guidelines. Topics for literature reviews are infinite, for anything may stimulate an interest in empirical research. Indeed, anyone can come up with any number of questions that could be answered empirically, but the trick to conducting a research review is to develop a good question, one that is likely to have been addressed by researchers. Recognizing and formulating a researchable, empirical question takes a little practice and requires some understanding of research methods, but one does not have to be an expert in research methodology to begin the process. Perhaps the most important suggestion that can be made about deciding upon a question upon which to base your review is to limit your questions to topics that are particularly interesting to you. I can think of no more boring task than reviewing research on a topic in which I have no interest.

You may be assigned a topic for review by a supervisor who wants empirical information on a specific policy, process, or program. Barring such an assignment, however, you need to consider various sources for information about potential review topics. Perhaps the most important source is your involvement in your profession. What do you want to know more about? Is there a particular procedure or process that comes to mind? Is there

a particular type of client about which you'd like to learn more? Another good source for review topics is a research journal. Choose a journal relevant to your discipline or scope of activities and scan the table of contents until you find a topic of particular interest. Read the article to find out what issues and questions are being addressed. Think about questions you would like to ask the author if you had the opportunity. Also, take the time to ask coworkers or supervisors about their own questions. They may be interested in aspects of the profession that didn't occur to you but sound interesting once you learn of them.

Once you have developed a question, regardless of its source, you have begun the research review process. The next step is to become familiar with your topic. This point may seem too obvious to bother making, but more than a few reviewers have begun amassing sources only to discover that they were woefully unprepared to interpret those sources. If your interests involve a formal theory, read about the theory and its related research. If your interests involve a specific process or procedure, read about that. Remember, for critical consumption of research, you need a context into which you can place the research.

Operationalization

As you read about your topic of interest, pay attention to the range of **operational definitions**—*concrete representations of abstract theoretical concepts*—that could be related to your interests. Heat is a theoretical concept, for example, and the number of units on a thermometer is one operational definition of it. How researchers operationally define the concepts they include in their research has an impact on the results they obtain. Oermann et al. (2011), for example, included five different operational definition of "follow-up time": three months, six months, nine months, and 12 months as well as 12 months with the refresher basic life support course. Their definitions included two different versions of 12 months, which means that they could (and did) change as a function of which measure of *12 months* was being used. One of the ways in which Duckworth, Weir, Tsukayama, and Kwok (2012, p. 3) measured *success* was in terms of lifetime income, which was operationalized "using the average indexed monthly earnings in Social Security-linked records and adjusted to constant dollars of 2006 using the same wage index." Clearly, this is a different operational definition than asking people to report their lifetime income, but both definitions would be reported as *lifetime income* in a research article.

It is important to keep in mind that the operational definition of a concept is not the same as the concept itself, but it does represent the concept. A score on an intelligence test, for example, is not the same thing as intelligence, nor is lifetime income the same as success. Campbell (1969) coined the term **definitional operationism** to refer to the *failure to recognize the difference between a theoretical concept and its operational definition*. Years later, Leahey (1980) used the phrase *myth of operationism* to label the same problem. Theoretical concepts must have operational definitions before anyone can do research related to the concepts, and as consumers, we need to maintain the

distinction between a concept and its operationalization. You will need to consider the variety of different ways in which the concepts of interest to you can be operationalized, or made concrete, through research. You do not have to know all of the possible operational definitions of concepts in which you are interested, but it helps to consider some of them before beginning your research review. Operational definitions can be extremely useful as key words in a search.

An operational definition of a concept is also called a **variable**—*a measurable entity that exhibits more than one level or value*. A thermometer reading is a variable, for it is measurable and it exhibits more than one level. Similarly, we are all too familiar with how variable lifetime income is. Other examples of variables include a score on an intelligence test, a rating of 1 to 10 on a scale of physical attractiveness, and survival (yes or no) after cardiopulmonary resuscitation. Variables need not be numeric, but they must vary; there must be more than one level (at least the presence or absence) of some quality.

Once you have some operational definitions for the theoretical concepts of interest, you also need to understand how those variables are used to form **hypotheses**—*statements that describe a relationship between variables*. A hypothesis is a concrete statement analogous to an abstract relationship described in a theory. Dane et al. (2000) tested the hypothesis that ACLS training (yes or no) for nurses was related to survival after CPR in a hospital. They measured the variables—ACLS training and survival—and applied statistical analyses to examine the relations. There was no formal theory in their research, but the suspected link between ACLS training and survival was a hypothesis.

For any particular theory, the number of ways in which a concept may be operationalized is limited only by the imagination of the researcher. We cannot, however, evaluate variables solely on the basis of creativity. You probably would not want your instructor to be creative when operationalizing your knowledge of research methods in terms of your body temperature and award the highest grades to the most feverish students. This may be a creative approach, but it is not valid. **Validity**, in general, refers to *the extent to which a claim or conclusion is based on sound logic*. There are many specific kinds of validity in research and we will eventually discuss all of them, but the relevant validity here is **construct validity,** *the extent to which a measure represents concepts it should represent and does not represent concepts it should not represent*. Validity, including construct validity, is assessed through consensus.

If you agree with Dane et al. (2000) that being discharged alive from a hospital is survival and dying while in the hospital is not survival, then you consider their measure of survival to be valid. Similarly, if you agree with Oermann et al. (2011) that 12 months without a refresher course is different from 12 months with a refresher course, then you consider their measurement of follow-up time to be valid. The consensus of science, however, is not merely popularity—it is based on logic derived from the theory—but it is agreement. Sometimes, however, the popularity of a particular variable leads to its misuse as an operational definition. The mere existence of a valid operational definition is not sufficient reason to use it in a review of research; whatever research variables you include

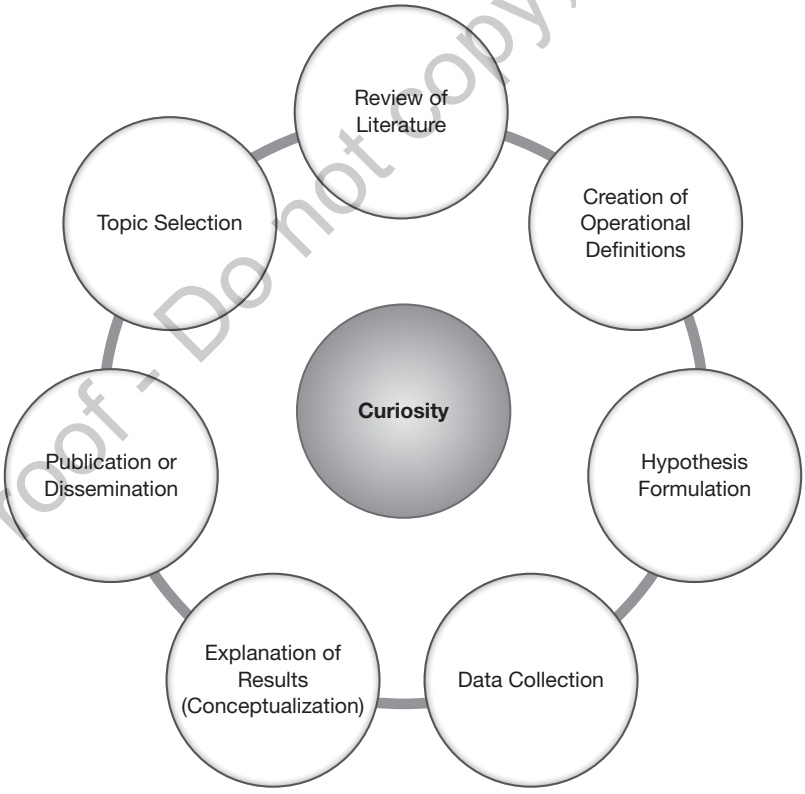
in your review should be based on a logical analysis of the concept(s) or issue(s) to be addressed in your research question.

By the time you have an interesting research question; have found an applicable theory, policy, or program for your question; and have (at least temporarily) decided upon some operational definitions, you have become intimately involved in the cyclical practice of science (see Figure 1.1).

FINDING RESEARCH

Before one can use research as part of evidence-based practice, one has to be able to find research reports, what researchers refer to as *the literature*. Despite use of the definite article, there is no one, single literature; instead **literature** is *the generic term used to refer to the collection of articles, chapters, and books that contain research results relevant to a particular topic*. Knowing that *the literature* is out there, somewhere,

Figure 1.1 The Cyclical Nature of the Practice of Science



is a beginning, but is not much help if one doesn't know where to look to find it. In this section, we will examine how to find sources.

Published Sources

Some of the best, as well as some of the most overlooked, sources for literature are textbooks. They contain a great deal of information, some of which you may have forgotten since you took the course, and the good ones have many pages of references. Granted, the information is usually discussed at a superficial level (reading the textbook will not be sufficient), but there is usually enough information to decide whether or not the research is related to your interests. Once you have identified relevant information, you can use the reference section to determine where to find the original article, chapter, or book.

Other good sources for published material are research journals in your interest area. These journals include material on a variety of research topics, so not every article will be relevant to your interests, but if you scan their tables of contents online, then you are likely to find a fair amount of information related to your interests. You can also peruse journals in other disciplines are aligned with your interests. Your library maintains a list of the periodicals it holds, and it can usually be searched online by subject or title. The list will provide the call numbers that enable you to locate current and back issues of the journal in the library or URLs for online access.

Journals are not the only sources for relevant literature, although they are likely to be the major sources. Every year, Annual Review, Inc. publishes a series of volumes titled *Annual Review of . . .* for most of the major disciplines dealing with human behavior. Other review series, often titled *Advances in . . .* , can be found by perusing the library's electronic card catalog by title.

Skimming through textbooks, issues of journals, or annual series is one way to develop your research idea and to find information related to it. Indeed, you have probably taken enough courses to have a good idea about which journals or series are likely prospects for perusal. Let us move on, then, to some very specific tactics for tracking down information you have decided you need.

Key Topics

One of the best tactics for locating relevant literature is searching for specific topics. When you know some of the key topics relevant to your research idea, there are even faster methods for locating related literature. You are probably familiar with a few indexing or abstracting services available through your library's search databases, such as ProQuest, MedLine, EBSCO, Google Scholar, OVID, PsychNet, and others. Each of these resources contains a compilation of empirical journals and other publications, all of which can be searched via one or more keywords.

Which databases are available through your library will depend upon the extent of the subscription services. It is not possible for me to describe or even list all of the available

indexes nor would it do much good for me to try to guess which, in print or in digital format, your library might have. The easiest way to find out what is available to you is to talk to one of the reference librarians.

I have not provided very many details about how to use any of the indexes or abstracts because it is much better to find out from a person rather than a textbook. Local options vary so much on most computerized indexes, even if it is officially the same index, that my telling you about how my library's index works could be a waste of time. It is worth your effort to get the information from your local reference librarian. I have been assured that most reference librarians really do enjoy showing people how to use the services they offer. One reference librarian likened it to showing off one's favorite toys. Another said that reference librarians enjoy talking about their reference services almost as much as professors enjoy talking about their research—now that's enjoyment.

Key Authors

In almost all but the newest areas of research, there are likely to be key researchers—people whose names are known and who have written much on a particular topic. If you have exhausted your key topics, cannot think of any key topics, or just want to expand your search opportunities, then one way to continue your literature search is by examining the work of key authors. You may discover key authors from perusing textbooks or general journals or by reading whatever material you were able to discover through a key topic search.

Chances are, however, that the research of key authors will be dated, but that is not a problem. There is nothing inherently wrong with old research. Indeed, older articles will provide the background you need to understand more recent research. Most database resources enable you to search for articles in which a particular, older article has been cited, so you can use the old research as a key study.

Key Studies

Sooner or later in your search, you will find an article that seems perfectly related to your interests—a key article. Once you have found them, key articles are one of the most effective bases for a comprehensive literature search. The reference section of the key study will list relevant research reports that were published before the key study was published. Consulting those references provides the means for discovering related research in the relative past.

Key articles are a great find, but I can imagine you asking "What if my key article is ten years old?" No matter hold old your key article may be, you can use the key terms listed for that article to discover additional articles related to the same key terms. This helps you to overcome the problem associated with any differences between the specific key terms used by the database organizers and the key terms you think they should have used when organizing the database. As noted earlier, you can also search for more recent articles in which the authors included the key article among the references.

Unpublished Studies

Not all of the empirical and theoretical work related to your policy issue idea can be found in published sources. Some of the references you obtain in your search will be found in either *Dissertation Abstracts International* or *Masters Abstracts International*. These publications contain abstracts of doctoral dissertations and master's theses, respectively, and have indexes through which you can find dissertations and theses related to various topics. In both publications, however, the abstracts are very short, about 300 words, and you will have to access ProQuest, usually through your library, to get a copy of the entire research report. Finally, let me add a caution about using general, online search engines (e.g., Google, Bing, etc.). Using these will certainly produce many hits for almost all key words, and some of these may actually be research articles, but the majority of the material is likely to be more opinion than research. You might be able to find good background information, but you are likely to find more information than you are able to peruse efficiently. Critical consumption of all sources is important, but it is particularly important when the material has not been peer reviewed.

Enough reading for now; go develop a topic of interest and search for some research articles.

SUMMARY

- Research can be defined in many ways, the most general of which is a process through which questions are asked and answered systematically. As a form of criticism, research can include the question of whether or not we are asking the right question.
- The ultimate goal of research is to be able to answer the questions asked. However, exploration, description, prediction, explanation, and action are different ways to ask the same question.
- Exploration involves attempting to determine whether or not a particular phenomenon exists.
- Description involves attempting to define a phenomenon more carefully, including distinguishing between it and other phenomena.
- Prediction involves examining the relationship between two things so as to be able to make educated guesses about one by knowing something about the other.
- Explanation also involves examining the relationship between two things but specifically involves trying to determine whether or not one causes the other.
- Action involves using research to attempt to solve a social problem. Action research may involve any of the other goals of research, but it includes a specific application.

- Evaluating research involves the questions *who*, *what*, *where*, *when*, *how*, and *why*. Researchers, participants, and consumers of research may all affect the outcome of the research as well as the manner in which the outcome is interpreted.
- The topic, theory, and worldview on which research is based are also involved in evaluating research critically, as are the physical location of the research and the social climate in which it is conducted.
- Research results are not timeless, mainly because the world itself is dynamic. Changes in research results, however, can themselves become the focus of research.
- Searching for research reports is best done through search engines designed for scholarly publications. Using key terms, key authors, and key articles, as well as textbooks, should provide you with a comprehensive set of reports, the literature related to the policy or program in which you are interested.

EXERCISES

1. Obtain a popular-press report (newspaper, magazine, blog, etc.) about an issue of interest and determine whether the information in the report is based on a priori reasoning, appeal to authority, tradition, or scientific content. (Note: There may be a mixture of types of epistemological methods represented in any given report.)
2. Obtain a popular-press report containing reference to scientific research. Decide what kind of purpose is attributed to the research. (Ideally, choose a report that contains enough information about the research so that you can later track down the article[s] on which the report is based.)
3. Using a new popular-press report or one you used in the other exercises, answer as many of the who/what/where/when/how/why questions as possible.
4. Identify an issue or concept in which you are interested and use the resources in your library to track down at least two empirical (research) articles that are relevant to that concept or issue.