CHAPTER OUTLINE

1. Psychology's Scientific Method
2. Research Settings and Types of Research
3. Analyzing and Interpreting Data
4. The Challenges of Conducting and Evaluating Psychological Research
5. The Scientific Method and Health and Wellness
PSYCHOLOGY’S SCIENTIFIC METHOD

Experiencing Psychology

IN PURSUIT OF HAPPINESS

In 1981, Ed Diener, a professor of psychology at University of Illinois, Urbana-Champaign, was already an established researcher in the area of social influence. This subfield of psychology studies how the influence of others can make us engage in negative behavior that we otherwise would normally avoid—for example, participating in riots, mob behavior, and acts of aggression. Diener and his family were living in the Virgin Islands, where his wife, Carol (an accomplished clinical psychologist and attorney), was teaching. Perhaps inspired by the setting, Diener decided he would change his research focus to something more positive. Surveying the current psychological research, he noticed that the psychology of happiness was being all but ignored, and so he chose the experience of happiness, or what psychologists call “subjective well-being,” as his new focus.

When he shared his plan with a former graduate school advisor, the response was less than enthusiastic: Who would be interested in knowing about such a thing? But, in fact, who (besides most psychologists prior to 1981) wouldn’t be! Indeed, most of us are interested in what makes us happy and how we can be happier. In the 1980s alone, some 8,000 studies were published on the topic of happiness (a number of them by Diener himself). Diener’s work provides one of the cornerstones of the exciting
new field known as positive psychology. Indeed, he is one of the creators of the Satisfaction with Life Scale you completed in Chapter 1 (his car license plate is SWLS).

Is there a danger in studying the sometimes mysterious experience of happiness? If we study it and try to put this complex emotion into words, will it lose its magic? A positive psychologist who was giving a talk on happiness was asked by a chemistry professor in the audience, “How can you study happiness? Isn’t it ineffable?” By that the professor meant that he believed happiness cannot be put into words—that happiness goes beyond the reach of scientific inquiry. And if we cannot even describe it, how can we study it? In fact, now that so much research has focused on happiness, we have come to understand that happiness is quite effable. People know when they are happy and when they are unhappy, and we can use their expression of that knowledge to find out what causes enduring happiness and what the experience of happiness might lead to in people’s lives. So, rather than spoiling the experience of happiness, a positive psychologist such as Diener would say that understanding this vital human experience provides a much better chance of increasing its occurrence in people’s lives.

The striking popularity of self-help books—a half-trillion-dollar industry (Marketdata Enterprises, 2006)—attests to the fact that many people are struggling to experience happiness and other of life’s elusive human rewards: enduring love, peace of mind, a sense of life’s meaning, and more. Without psychologists’ scientific research and the strong scientific evidence on which it rests, we would be left with only the shelves upon shelves of books in the self-help section of the bookstore, offering often contradictory suggestions. Should we follow the advice to “not sweat the small stuff” or “focus on the little things”? If Dr. Phil tells us something, is it so? The problem with relying on the authors of popular books, media figures, and even wise friends and family members to advise us on important questions about our psychological health and well-being is that we have no way of knowing whether what sounds like a good idea really is a good idea, one that will work reliably for us and for large numbers of people. The scientific method can lead us to the elusive answer. The scientific method allows researchers to test promising ideas not only about human happiness but also concerning many other questions, using objective methods to reach reliable findings. Accordingly, in recent years, the science of psychology has begun to examine the many aspects of the well-lived life, to enrich our understanding of life’s sometimes mysterious pleasures without robbing them of their inherent value (Csikszentmihalyi & Csikszentmihalyi, 2006; Emmons, 2007; Tov & Diener, 2007).

PREVIEW

Being a psychologist means being a scientist who studies psychology. In this chapter, we review the scientific method. You will read about the ways that psychologists have applied this general method to a variety of important topics and about the steps that are involved in recognizing research questions, developing methods to test them, and using statistical techniques to understand the results. Later in the chapter we consider some of the ethical issues that are involved in scientific inquiry. Psychology shares a great deal with other sciences, but as you will see, topics that psychologists study sometimes require special methodological and ethical consideration.
1 Psychology's Scientific Method

**Explain what makes psychology a science.**

Science is not defined by what it investigates but by how it investigates. Whether you study photosynthesis, butterflies, Saturn's moons, or happiness, the way you study the question is what determines whether your approach is scientific. You can gain a clear understanding of science by knowing what it means to take a scientific approach, by realizing the importance of collaboration, and by learning about the scientific method.

**A Scientific Approach**

Central to the scientific approach are four attitudes: curiosity, skepticism, objectivity, and a willingness to think critically. A scientist is first and foremost curious. Why are some people happy and others not? What are the ingredients of a happy life? The scientist notices things in the world (a star in the sky, an insect, a happy person) and wants to know what it is and why it is that way. Science is about asking questions, even very big questions such as, Where did the earth come from? and How does love between two people endure for 50 years?

Scientists are also skeptical. Skeptical people question things that other people take for granted. They wonder whether a supposed fact is really true. There was a time when "everybody knew" that women were morally inferior to men, that race could influence a person's IQ, and that the earth was flat. A scientist looks at assumptions in a new and questioning way.

Science also means being objective. Scientists believe that one of the best ways to be objective is to conduct research studies (Martin, 2008; McBurney & White, 2007). Scientists use empirical methods to learn about the world. The empirical method means that for scientists knowledge comes from observation of events and logical reasoning. Being objective means trying to see things as they really are, not just as we would like them to be. It also means using methods of decision making that keep us in touch with the real world (Smith & Davis, 2007).

Last, science involves thinking critically. In Chapter 1, we saw that thinking critically consists of thinking reflectively, thinking productively, and evaluating the evidence. Critical thinkers question and test what some people say are facts. They examine research to see how sound its support of an idea really is (Stanovich, 2007).

These four attitudes are ideals. No scientist possesses them all at every moment. But the closer we embrace these attitudes, the better we are able to use the basic tools of scientific theory and objective observation. They reduce the likelihood that information will be based on unreliable personal beliefs, opinions, and emotions. As you go through this book, practice using these scientific attitudes. You also would do well to call on these attitudes whenever you hear people discussing "facts" and arguing about issues.

**Collaboration**

Science is a collaborative effort. Even when different groups of scientists seem to be competing to be the first to answer a particular question, they are part of a collective effort to increase an overall body of knowledge. More than that, no scientific finding has much impact until a community of scientists agrees, through the process of peer review, that the finding is true and important. Research psychologists share their work by publishing it in scientific and academic journals. In contrast to other types of periodicals, these journals publish mainly scholarly research and information—usually in a specific field such as the psychology of the workplace or human development. The peer review process means that nearly all scientific publications are reviewed by anonymous experts in the field who evaluate the methodological soundness, conceptual clarity, and importance of the work. Journals gather and preserve the core information of the discipline of psychology. Many journals are very selective about what they publish. The best journals maintain high standards, and some accept only 10 to 20 percent of the articles that are submitted to them. That is why evidence that appears in a
research journal is more likely to reflect valid processes than something that appears in a self-help book that is written, ultimately, to make a profit.

Within colleges and universities, psychologists share their findings with their colleagues and open their research to evaluation. Conferences conducted by national and international societies allow psychologists, and students of psychology as well, to share and discuss their findings.

One area in which the collaborative aspect of psychological research comes to the fore is in meta-analysis (Hyde, 2005, 2007). **Meta-analysis** is a method by which researchers can combine results across a variety of different studies to establish the strength of an effect. For instance, one meta-analysis of research revealed that frequently being in a positive mood often relates to success in life (Lyubomirsky, King, & Diener, 2005). The results of this analysis suggest that happiness not only comes from being successful in life but also predicts those successes. Examining hundreds of studies by a wide array of researchers, these researchers demonstrated that happy people may be more likely to get married, be promoted at work, and live long, healthy lives.

### The Five Steps in the Scientific Method

One of the hallmarks of taking a scientific approach to psychology involves adopting the scientific method in studying topics in the field (Neuman, 2007). Indeed, most of the studies psychologists publish in research journals follow the scientific method, which is summarized in these five steps:

1. Observing some phenomenon.
2. Formulating hypotheses and predictions.
3. Testing through empirical research.
4. Drawing conclusions.
5. Evaluating conclusions.

The scientific method usually begins with one key idea: a theory. A **theory** is a broad idea or set of closely related ideas that attempts to explain certain observations. Theories try to explain why certain things have happened, and they can be used to make predictions about future observations.

In psychology, theories help to organize and connect observations and research. The overall meaning of the large numbers of research studies that are always being conducted in psychology would be difficult to grasp if theories did not provide a structure for summarizing and understanding them and putting them in a context with other research studies. In addition, good, testable theories generate interesting research questions and allow researchers to make observations that might answer those questions. Research may or may not support the theory in question, and theories may be revised in response to research findings. Scientists do not regard theories as being exactly, entirely, and permanently correct. A theory is judged by its ability to generate ideas about how the world works and to predict important events and behaviors. Depending on how well it predicts, a theory gains or loses support.

### 1. Observing Some Phenomenon

The first step in conducting a scientific inquiry comes from observing some phenomenon in the world. The phenomena scientists study are called variables. A **variable** is anything that can change. The variable that interested Ed Diener was happiness. He noticed that some people seemed to be generally happier than others. What might account for these differences?

An important aspect of conceptualizing a research problem is coming up with a concrete way to measure the variables of interest. An **operational definition** is an objective description of how a research variable is going to be measured and observed. Operational definitions eliminate some of the fuzziness and loose ends that might creep into thinking about a problem.
To measure how happy a person is, Diener and his students (Diener & others, 1985) devised a self-report questionnaire that measures how satisfied a person is with his or her life. The scale includes items such as “The conditions of my life are excellent” and “On the whole I am satisfied with my life.” Scores on the questionnaire are then used as measures of happiness.

Research using this scale and others like it has shown certain specific factors that are strongly related to being happy: marriage, religious faith, purpose in life, and good health (Diener, 1999). Interestingly, financial success is only weakly related to happiness. After a person has enough money to live comfortably, additional money does not seem to buy more happiness (Myers, 2000).

Importantly, there is not just one operational definition for something. For example, in a study that examined happiness as a predictor of important life outcomes, Lee Anne Harker and Dacher Keltner looked at the yearbook pictures of college women who had graduated 3 decades earlier. The researchers coded the pictures for the appearance of “Duchenne smiling.” This type of smiling refers to genuine smiling—the kind that creates crow’s feet, those little wrinkles around the outer corner of the eyes. Duchenne smiling has been shown to be a sign of genuine happiness. (If you want to see whether someone in a photograph is smiling genuinely, cover the bottom of the person’s face. Can you still tell that he or she is smiling? A genuine smile can be seen in the eyes, not just the mouth.) So, while Diener and colleagues used the operationally defined (or “operationalized”) happiness as a score on a questionnaire, Harker and Keltner operationalized happiness as Duchenne smiling. Harker and Keltner (2001) found that happiness, as displayed in these yearbook pictures, predicted positive life outcomes, such as successful marriages and satisfying lives, some 30 years later.

2. Formulating Hypotheses and Predictions

The second step in the scientific method is stating a hypothesis. A hypothesis is an idea that is arrived at logically from a theory. It is a prediction that can be tested. A hypothesis can be thought of as an educated guess, given existing theory and the application of logic.

For example, one theory of well-being is self-determination theory (Deci & Ryan, 2000). According to this theory, people are likely to feel fulfilled when their lives meet three important needs: relatedness (warm relations with others), autonomy (independence), and competence (mastering new skills). One hypothesis that follows logically from this theory is that people who value money, material possessions, prestige, and physical appearance (that is, extrinsic rewards) over the needs of relatedness, autonomy, and competence should be less fulfilled, less happy, and less well adjusted. In a series of studies entitled “The Dark Side of the American Dream,” researchers Timothy Kasser and Richard Ryan have found that individuals who value materialistic rewards over more intrinsic rewards do indeed tend to suffer as predicted (Kasser & Ryan, 1993, 1996; Kasser & others, 2004).

The relationship between theories and hypotheses is not necessarily as straightforward as this simple example indicates. A theory can generate many hypotheses. If more and more hypotheses related to a theory turn out to be true, the theory gains in credibility. One reason that so many scientists hold the theory of evolution in high esteem is that it has been able to predict many observations.

3. Testing Through Empirical Research

The next step involved in the scientific method is the need to test the hypotheses by conducting empirical research, that is, collecting and analyzing data. Among the important decisions to be made about collecting data are whom to choose as the participants and which research methods to use. We will explore a number of research methods in some detail shortly here, let’s focus on the research participants.

Will the participants be people or animals? Will they be children, adults, or both? Will they be females, males, or both? Will they be of a single ethnicity, such as Anglo-American, or will they come from a diversity of ethnic groups?

When psychologists conduct a study, they usually want to be able to draw conclusions that will apply to a larger group of people (or animals) than the participants they actually study. Recall that research has shown that money does not buy happiness and in fact that
placing money above other values is quite bad for a person. A related question is, Do people think that money does buy happiness?

Christie Napa, an undergraduate researcher, was interested in finding out if people in general believe that it might be better to be rich and unhappy than poor and happy. With her advisor Laura King, she devised a research project in which undergraduate college students rated how good or desirable a life was when that life was described as happy or unhappy, meaningful or not meaningful, or wealthy or poor. Research on these undergraduates showed that the desirable life—the one that was rated as most like "the good life"—was the life that was happy and meaningful, with money having little impact on these desirability ratings (King & Napa, 1998).

The entire group about which the investigator wants to draw conclusions is the population. In this particular study of the good life, the population is all people in the United States. The subset of the population chosen by the investigator for study is a sample. In Napa's undergraduate thesis, the sample was a group of students. Now you might be thinking, "Some college students are naive—they don't realize how important money can be." With these concerns in mind, Napa collected more data, this time from adults who were waiting for jury duty. Even among these adults, similar results were found: the relative unimportance of money to the desirability of a life (King & Napa, 1998).

The target population to which the investigator wants to generalize varies with the study. The researcher might be interested only in a particular group, such as all children who are gifted and talented, all young women who embark on science and math careers, or all gay men. The key is that the sample studied must be representative of the population to which the investigator wants to generalize.

To mirror the population more closely, a researcher would use a random sample, a sample that gives every member of the population an equal chance of being selected. In the study of the good life, a representative sample would reflect the U.S. population's age, socioeconomic status, ethnic origins, marital status, geographic location, religion, and so forth. A random sample provides much better grounds for generalizing the results to a population than a nonrandom sample.

Investigators do not always use appropriate sampling methods (Jackson, 2008). Surveys by newspapers and magazines often ask people to mail or call in their opinions. However, the people who respond probably feel more strongly about the issue than do those who do not respond. In addition, the readers may feel differently about an issue than the population as a whole. Keep in mind that random sampling is important in some types of research but much less important in other kinds. If a researcher wants to know how often people donate money to charity in the United States, obtaining a random sample is important. However, in many research studies, psychologists are interested in studying specific aspects of behavior under specific conditions, in which case they deliberately do not obtain a random sample. In these studies, they might want people with certain characteristics to be well represented.

It is also noteworthy that, in many areas of psychology, generalization comes from similar findings across a number of studies rather than from random sampling within a single study. Imagine five or six studies conducted with varied samples and in different geographic locations, all examining views of the role of money judgments of the good life. Indeed, Christie Napa (who now goes by her married name, Scollon) eventually collected data on the topic of the good life from a variety of participants who were waiting for flights in airports all over the world (Scollon & King, 2004).

A key aspect of the process of testing hypotheses is data analysis. Data refers to all of the information researchers collect in a study. Data analysis involves the application of mathematical (or statistical) procedures to understand what the data mean (Aron, Aron, & Coops, 2008: Vogt, 2007). Later in this chapter, we examine two types of statistical procedures in some detail. Many students of psychology are surprised to hear that very much of the work that is done in psychological sciences relies heavily on sophisticated quantitative techniques.

4. Drawing Conclusions Based on the data analyses, scientists then draw conclusions from their research. It is important to keep in mind that a revision of theory usually occurs only after a number of studies produce similar results. Before we change a theory, we want
to be sure that the research can be replicated. Reliability is the extent to which scientific research yields a consistent, reproducible result. If a research finding is shown again and again across different researchers and different specific methods, it is considered reliable.

5. Evaluating Conclusions  The final step in the scientific method is one that never really ends. Researchers submit their work for publication, and it undergoes rigorous review. Afterward, the published studies are there for all to see, read, and evaluate continuously. The research community maintains an active conversation about what we know, and conclusions are always questioned. A scholar may come up with a new idea based on published studies that will eventually change the way we think. Steps 3, 4, and 5 in the scientific method are understood as part of an iterative process. That is, researchers go back and do more research and continually revise theory, hone methods, and so on.

REVIEW, ASSESS, AND SHARPEN YOUR THINKING

Review

1. Explain what makes psychology a science.
   - Discuss the four attributes of a scientific attitude.
   - Explain the need for collaboration in science.
   - Name and describe the five steps in the scientific method.

Assess

1. Which of the following attitudes is not at the heart of the scientific approach?
   A. skepticism  
   B. critical thinking
   C. prejudging  
   D. curiosity

2. The statement “I predict this study will demonstrate that students who study in groups will get better grades than those who study alone” is an example of
   A. a theory.  
   B. an observation.
   C. a conclusion.  
   D. a hypothesis.

3. A group of 100 students is randomly chosen from Wilmington High School. Which of the following would be considered the population?
   A. the 100 students
   B. all the students at the Wilmington High School

Sharpen Your Thinking

Create an operational definition of love. List several measurements that you might use to assess love.

2 Research Settings and Types of Research

Discuss common research settings and the three types of research that are used in psychology.

The collection of data is the fundamental means of testing hypotheses. In this section we investigate the major ways of gathering data about behavior and mental processes. We will find that three basic types of research are used in psychology: descriptive, correlational, and experimental.
One concept that is central to all of these research approaches is that of a variable, a term referring to anything that varies. In a person, variables might include height, weight, IQ, religious faith, and the extent to which the individual feels happy or unhappy, for example. We can consider anything that differs among people or changes within a person to be a variable. In general, all forms of scientific inquiry in psychology are interested in how variables relate to one another. The type of methods researchers use is typically guided by their conceptual understanding of the variables of interest.

Another fundamental element of any research is the setting where such research may take place. We begin our look at common approaches to psychological research by considering the settings available to researchers.

**Research Settings**

All three types of research that we will discuss shortly—descriptive, correlational, and experimental—can be carried out in different settings. In other words, the setting of the research does not determine the type of research it is. Common settings include the research laboratory and natural settings.

Because psychological researchers often need to control certain factors that determine behavior but are not the focus of inquiry, much of their research is conducted in a laboratory, a controlled setting with many of the complex factors of the real world removed (Mitchell & Jolley, 2007).

Although laboratory research allows a great deal of control, doing research in the laboratory has some drawbacks. First, it is almost impossible to conduct research in the lab without the participants' knowing they are being studied. Second, the laboratory setting is unnatural and therefore can cause the participants to behave unnaturally. A third drawback of laboratory research is that people who are willing to go to a university laboratory may not fairly represent groups from diverse cultural backgrounds. Those who are unfamiliar with university settings and with the idea of “helping science” may be intimidated by the setting. Fourth, some aspects of the mind and behavior are difficult if not impossible to examine in the laboratory. Laboratory studies of certain types of stress may even be unethical.

Research can also take place in a natural setting. Naturalistic observation provides insight that researchers sometimes cannot achieve in the laboratory (Bronfenbrenner & Morris, 2006). **Naturalistic observation** is observing behavior in real-world settings. Psychologists conduct naturalistic observations at sporting events, day-care centers, work settings, shopping malls, and other places that people frequent. Suppose that you wanted to study the level of civility on your campus. Most likely, you would include some naturalistic observation of how people treat one another in such gathering places as the cafeteria and the library reading room.

Naturalistic observation was used in one study that focused on conversations in a children's science museum (Crowley & others, 2001). The researchers’ finding that parents were three times as likely to engage boys than girls in explanatory talk while visiting different exhibits suggests a
gender bias that encourages boys more than girls in science (Figure 2.1). In another study, Mexican American parents who had completed high school used more explanations with their children when visiting a science museum than Mexican American parents who had not completed high school (Tenenbaum & others, 2002). Naturalistic observation allows the researcher access to a person’s spontaneous behaviors; however, a key weakness of this method is the lack of control over the setting. For instance, imagine setting up one’s research in a museum and having no one come by that day.

**Descriptive Research**

Some important psychological theories have grown out of descriptive research, which serves the purpose of observing and recording behavior. For example, a psychologist might observe the extent to which people are altruistic toward one another. By itself, descriptive research cannot prove what causes some phenomenon, but it can reveal important information about people’s behaviors and attitudes. Descriptive research methods include observation, surveys and interviews, standardized tests, and case studies.

**Observation** Imagine that you are interested in studying how children who are playing a game resolve conflicts that come up during the game. Thus, the data you are interested in concern conflict resolution. As a first step, you might go to a playground and simply observe what the children do—how often you see conflict resolution occur and how it unfolds. You would likely keep careful notes of what you observe.

This type of scientific observation requires an important set of skills. Unless we are trained observers and practice our skills regularly, we might not know what to look for, we might not remember what we saw, we might not realize that what we are looking for is changing from one moment to the next, and we might not communicate our observations effectively. Furthermore, it might be important to have more than one person do the observations as well, to develop a sense of how accurate your observations are. For observations to be effective, they must be systematic. We must have some idea of what we are looking for. We must know whom we are observing, when and where we will observe, and how we will make the observations. And we need to know in what form they will be recorded: in writing, by sound recording, or by video.

**Surveys and Interviews** Sometimes the best and quickest way to get information about people is to ask them for it. One technique is to interview them directly. A related method that is especially useful when information from many people is needed is the survey, or questionnaire. A standard set of questions is used to obtain people’s self-reported attitudes or beliefs about a particular topic. In a good survey, the questions are clear and unbiased, allowing respondents to answer unambiguously.

Surveys and interviews can probe into a wide range of topics, from religious beliefs to sexual habits to attitudes about gun control (Rosnow & Rosenthal, 2008). Surveys and interviews are conducted in person, by telephone, or (increasingly) over the Internet.

Some survey and interview questions are unstructured and open-ended, such as “Could you elaborate on your optimistic tendencies?” and “How fulfilling would you say your marriage is?” They allow for unique responses from each person surveyed. Other survey and interview questions are more structured and ask about quite specific things. For example, a structured survey or interview question might ask, “How many times have you talked with your partner about a personal problem in the past month: 0, 1–2, 3–5, 6–10, 11–30, every day?”

One problem with surveys and interviews is the tendency of participants to answer questions in a way that they think is socially acceptable or desirable rather than in a way that communicates what they truly think or feel (Nardi, 2006). For example, a person might exaggerate the amount of communication that goes on in a relationship in order to impress the interviewer.

One example of a survey conducted by the Gallup organization (1999) asked parents their beliefs about the most important problems facing schools. Forty-three percent cited drugs, 40 percent sex, 39 percent discipline in the classroom, 28 percent violence, and 25 percent social pressure among students to be popular. The survey was based on telephone interviews.
PSYCHOLOGY AND LIFE

Who Is the Healthiest Person You Know?

One way to study psychological variables is through case studies, or case histories. Researchers often use case studies to understand individuals who suffer from psychological disorders. But they might similarly use the case history approach to plumb the reasons why people are psychologically healthy.

Imagine that you have been asked to do a case study of psychological wellness. Think of the psychologically healthiest and happiest person you know. Consider the following questions about your hypothetical study:

- What makes this person a good example for a study of psychological health?
- How would you gather data for your case study?
- If you interviewed this person, what sorts of questions would you ask?
- What might we learn about psychological health, broadly speaking, from such a study?

with a randomly selected sample of 338 U.S. parents. Recall the discussion of random sampling earlier in the chapter. When surveys are conducted on a national basis, as Gallup polls are, random sampling is considered to be an important aspect of the survey process.

Standardized Tests  A standardized test requires people to answer a series of written or oral questions or sometimes both (Gregory, 2007). A standardized test has two distinct features: An individual’s answers are tallied to yield a single score, or set of scores, that reflects something about that individual; and the individual’s score is compared with the scores of a large group of similar people to determine how the individual responded relative to others (Gronlund, 2006). One widely used standardized test in psychology is the Stanford-Binet intelligence test, which we consider in Chapter 9.

Scores on standardized tests are often stated in percentiles. Suppose you scored in the 92nd percentile on the Scholastic Assessment Test (SAT). This score would mean that 92 percent of a large group of individuals who previously took the test received scores lower than yours.

The main advantage of standardized tests is that they provide information about individual differences among people. But one problem with standardized tests is that they do not always predict behavior in non-test situations. Another problem is that standardized tests are based on the belief that a person’s behavior is consistent and stable, yet personality and intelligence—two primary targets of standardized testing—can vary with the situation. For example, a woman may perform poorly on a standardized intelligence test in an office setting but score much higher at home, where she is less anxious.

This criticism is especially relevant for members of minority groups, some of whom have been inaccurately classified as mentally retarded on the basis of their scores on intelligence tests (Hodapp & Dykens, 2006). In addition, cross-cultural psychologists caution that many psychological tests developed in Western cultures might not be appropriate in other cultures (Shiraev & Levy, 2007). People in other cultures may have had experiences that cause them to interpret and respond to questions much differently than the people on whom the test was standardized.

Case Studies  A case study, or case history, is an in-depth look at a single individual. Case studies are performed mainly by clinical psychologists when, for either practical or ethical reasons, the unique aspects of an individual’s life cannot be duplicated and tested in other individuals.
(Dattilio, 2001). A case study provides information about one person’s goals, hopes, fantasies, fears, traumatic experiences, family relationships, health, or anything else that helps the psychologist understand the person’s mind and behavior. Sigmund Freud developed his theory of psychoanalysis based entirely on case studies of individuals suffering from psychological problems.

Another example of a case study is the analysis of India’s spiritual leader Mahatma Gandhi by psychodynamic theorist Erik Erikson (1969). Erikson studied Gandhi’s life in great depth to discover insights into how his positive spiritual identity developed, especially during his youth. In putting together the pieces of Gandhi’s identity development, Erikson described the contributions of culture, history, family, and various other factors that might affect the way other people develop an identity.

Case histories provide dramatic, detailed portrayals of people’s lives, but we must be cautious when generalizing from this information. The subject of a case study is unique, with a genetic makeup and personal history that no one else shares. In addition, case studies involve judgments of unknown reliability. However, case studies may be useful in generating ideas that could then be tested in empirical investigations using larger samples and correlational or experimental designs. To get a taste of how researchers approach a case study, see Psychology and Life.

**Correlational Research**

Some psychological research relies on the systematic observation of variables within a sample of individuals. These studies are concerned with identifying the relationships between two or more variables in order to describe how these variables change together. This work is often called correlational research because of the statistical technique, referred to as correlation, that is typically used to analyze this type of data. The more strongly the two events are correlated (or related or associated), the more effectively we can predict one event from the other. The distinguishing feature of a correlational study is that the variables of interest are measured, not manipulated, by the researcher. That is, the researcher simply measures the variables of interest to see how they relate. No attempt is made to change the value of any of the variables.

The degree of relationship between two variables is expressed as a numerical value called a correlational coefficient. Let’s assume that we have data on the relationship between how many hours individuals spend volunteering for a variety of charities (the X variable) as well as the level of life satisfaction these people experience (the Y variable). For the sake of this example, let’s assume these data produce a correlation coefficient (represented by the letter r) of +.70. Remember this number, as we will soon use it to illustrate what a correlation coefficient tells you about the relationship between two events or characteristics.

For the moment, however, you need to know only that the number tells you the strength of the relationship between the two variables. The rule is simple: The closer the number is to 1.00, the stronger the correlation; conversely, the closer the number is to .00, the weaker the correlation. Figure 2.2 offers guidelines for interpreting correlational numbers. But perhaps you are wondering about the significance of the plus sign in the correlation coefficient of +.70 that we have calculated in our classroom study.

**Positive and Negative Correlations** The numerical value of a correlation coefficient always falls within the range from -1.00 to +1.00. The number of the correlation tells us about the strength of the relations, but the sign (+ or −) tells us about the direction of the relationship between the variables. So, negative numbers do not indicate a lower value than positive numbers. A correlation of −.65 is just as strong as a correlation of +.65. The plus or minus sign tells you nothing about the strength of the correlation. A correlation coefficient of −.87 is closer to −1.00 and thus indicates a stronger correlation than the coefficient of +.45 is to +1.00.

What the plus or minus sign does tell you is the direction of the relationship between the two variables. A positive correlation is a relationship in which the two factors vary in the same direction. Both factors tend to increase together, or both factors tend to decrease together. So, in the example above, the more time spent volunteering, the more satisfied
people were with their lives. In addition, the positive correlation means that people who spent little time volunteering also showed lower life satisfaction. Either relationship represents a positive correlation. A negative correlation, in contrast, is a relationship in which increases in one variable are associated with decreases in the other. For instance, we might find that the number of hours spent watching TV is negatively correlated with life satisfaction. That means that the more TV a person watches, the lower his or her life satisfaction might be expected to be. Examples of scatter plots showing positive and negative correlations appear in Figure 2.3.

An example of a correlational research on happiness is a set of studies conducted by psychologists Sonja Lyubomirsky and Lee Ross. These researchers were interested in how happy and unhappy people feel about decisions they have made in their lives. Imagine, for example, that you are going to buy a new computer. You browse through plenty of stores, talk to friends, and read product reviews in Consumer Reports magazine. Finally, you make your choice. How are you likely to feel about it, and how will you feel about the computers you almost bought?

Lyubomirsky and Ross (1999) conducted a series of studies investigating the relationship between being happy and evaluations of one's choices as well one's feelings about what he or she did not get. In one study, Lyubomirsky and Ross studied high school students who were applying to colleges. These students completed a measure of how generally happy they were and provided information about the colleges to which they were applying. They also rated how positively they felt about each school. Three months later, after acceptance and rejection letters had been sent out (and students' decisions about which school to attend had been made), the students once again rated the schools to which they had applied. How did knowing that they were accepted, rejected, going to a particular school, or not going influence their feelings?

With regard to the college they had chosen to attend, happy students tended to be very excited about their chosen school—their assessment of the school had become even more

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**FIGURE 2.3**

**Scatter Plots Showing Positive and Negative Correlations** A positive correlation is a relationship in which two factors vary in the same direction, as shown in the two scatter plots on the left. A negative correlation is a relationship in which two factors vary in opposite directions, as shown in the two scatter plots on the right.
positive. In contrast, unhappy students did not show an increase in their feelings about the school they would be attending. Indeed, unhappy students tended to react somewhat negatively toward the school. With regard to schools that had accepted them but that they had declined to attend, happy students remained very positive about them. These schools, after all, had shown very good taste and judgment—the students’ attendance there just was not meant to be.

In contrast, unhappy students tended to denigrate schools that had accepted them but that they had chosen not to attend. The comedian Groucho Marx once quipped that he would never want to join a club that would have him as a member, and the unhappy students tended to reflect this outlook: Any school that would take them could not be that great.

In a second study, conducted in the laboratory, happy and unhappy participants were presented with 10 fancy desserts to evaluate before and after they were told which one they would get to eat (Lyubomirsky & Ross, 1999). Participants were read descriptions of 10 different delicious desserts—cheesecake, lemon poppy seed cake, chocolate-on-chocolate cake, carrot cake, and so on. They were asked to rank the desserts in terms of how much they would want to try them. Participants were always told that they would be receiving their second choice. Before getting their dessert, however, participants were asked to rate the choices one more time—at this point they were presented with pictures of the desserts.

Once again, happy people showed a tendency to increase their liking of the dessert they were told they would be receiving, while unhappy people actually slightly decreased their liking for the dessert when they realized they would be getting it. In addition, when rating a dessert they would not be receiving, the unhappy people tended to derogate (that is, to belittle) the dessert; that slice of chocolate-on-chocolate cake suddenly looked much less appetizing when they knew it was not going to be theirs. These findings provide insight into the different thinking styles of happy and unhappy people. Compared to happy people, unhappy individuals appear to feel compelled to derogate alternatives they did not choose or could not have. Happy people, in contrast, appear to live in a world full of good things, and they tend to celebrate what they have received without feeling the need to boost its value by devaluing alternatives.

These studies are correlational in nature because in both studies happiness was measured, not manipulated—it was a variable that the participants brought with them into the studies. Lyubomirsky and Ross measured two variables: happiness (operationalized here by ratings on a happiness scale) and postdecisional judgments of alternatives that were either available or not (the ratings made of colleges and desserts before and after choices were made). They found that, compared to unhappy people, happy people were more likely to celebrate what they were getting (whether it was a college to attend or a dessert to eat). We might state this research result as, “Happiness was positively correlated with positivity about one’s choices.” As happiness increased, so did positive ratings of chosen schools and desserts. In addition, happiness was negatively correlated with derogating alternatives that were not chosen. As happiness increased, the tendency to view unchosen alternatives negatively decreased.

This example clarifies some key points about systematic observation. First, the setting of a study does not determine its methodology. Correlational studies can take place in a classroom, out in the world, or in a laboratory. Also, the methods for data analyses do not determine the design of a study. Lyubomirsky and Ross did not use correlation coefficients to analyze their data. Even though they are typically referred to as correlational studies, such investigations need not rely on correlation coefficients. Once again, the key defining feature of this type of research is that the variables are simply measured.

**Correlation and Causation** In trying to make sense of the world, people often make a big mistake about correlation. Look at the terms in bold type in the following newspaper headlines:

- Researchers **Link** Coffee Consumption to Cancer of Pancreas
- Scientists Find **Connection** Between Ear Hair and Heart Attacks
- Psychologists Discover **Relationship** Between Marital Status and Health
Reading these headlines, the general public would tend to jump to the conclusion that coffee causes cancer, car hair causes heart attacks, and so on. But all of the words in bold type are synonymous only with correlation, not with causality. Correlation does not equal causation. Remember, correlation means only that two variables change together. Being able to predict one event based on the occurrence of another event does not necessarily tell us anything about the cause of either event (Howell, 2008). Sometimes an extraneous variable that has not been measured accounts for the relationship between two others. This circumstance is referred to as the third variable problem.

To understand the third variable problem, consider the following example. A researcher measures two variables: the number of ice cream cones sold in a town and the number of violent crimes that occur in that town throughout the year. She finds that ice cream cone sales and violent crimes are positively correlated, to the magnitude of +.50. This high positive correlation would indicate that as ice cream sales increase, so do violent crimes. Would it be reasonable for the local paper to run the headline “Ice Cream Consumption Leads to Violence”? Should protesters set themselves up outside the local Frosty Freeze to stop the madness? Probably not. Perhaps you have already thought of the third variable that might explain this correlation—heat. Indeed, when it is hot outside, people are more likely both to purchase ice cream and to engage in aggressive acts (Anderson & Bushman, 2002). These “third variables” are also called confounds.

Given the potential problems with extraneous third variables, why do researchers conduct correlational studies? There are several very good reasons. One reason is that some important questions can be investigated only by using correlational designs. Such questions may involve variables that cannot be manipulated, such as biological sex, personality traits, genetic factors, and ethnic background. Another reason why researchers conduct correlational studies is that sometimes the variables of interest are real-world events that influence people’s lives, such as the effects of the September 11 attack of the World Trade Center on New York City residents. Correlational research is also valuable in cases where it would not be ethical to carry out an experiment because of the dangers it poses, such as in which expectant mothers are directed to smoke varying numbers of cigarettes so that the researcher can see how cigarette smoke affects birth weight and the fetal activity level.

Correlational studies are useful, too, when the issue under investigation is post hoc (after the fact) or historical, such as research into the childhood backgrounds of people who are particularly successful. And correlational research is used when researchers are interested in everyday experience, which is difficult to study by bringing people into the artificial setting of a laboratory. For example, correlational researchers have begun to use daily diary methodologies, known as the experience sampling method (ESM), to study people in their natural settings. These studies involve having people document their daily experiences in a diary a few times a day, or complete measures of their mood and behavior whenever they are beeped by an electronic organizer. One recent daily diary study examined the experience of the meaning in life on a daily basis. In this study, student volunteers rated their mood, activities, thoughts, and their sense of meaning in their life twice daily for a week. The data showed that the strongest predictor of a day being felt to be meaningful was the amount of positive mood the person experienced that day (King & others, 2006).

One way that correlational researchers can confront the problem of third variables is to include these variables in designs that adopt a multivariate approach—a method that involves more than just the two main variables of interest. If a variable is measured, it can be controlled for, if not experimentally then statistically. In this way, for example, we can show that the number of cigarettes a person smokes does predict the likelihood of developing lung cancer, controlling for such factors as alcohol consumption, diet, body weight, family background, exercise, and so on. Thus, although correlation cannot be assumed to imply a causal relationship, correlational studies can prove very useful in pinning down potentially causal relationships by employing multivariate approaches to problems that are difficult to study through experiments.

An interesting research question that has been addressed in this way is, Do happy people live longer? In one study, 2,000 older Mexican Americans were interviewed twice over the
course of 2 years (Ostir & others, 2000). In the first assessment, participants completed measures of happiness but also reported about potential third variables such as diet, physical health, smoking, marital status, and distress. Two years later, the researchers contacted the participants again to see who was still alive. Results showed that, controlling for these many potential third variables, happiness predicted who was alive 2 years later.

Another way that correlational researchers can approach the issue of causation is to employ a special kind of systematic observation called a **longitudinal design**. Longitudinal research involves obtaining measures of the variables of interest in multiple waves over time. Longitudinal research can address the issue of causation because we can assume that if variable X causes changes in variable Y, X ought to, at least, precede Y over time.

One intriguing longitudinal study is the Nun Study, conducted by David Snowdon and his colleagues (Riley & others, 2005; Snowdon, 2003; Tyas & others, 2007). The study began in 1986 and has followed a sample of 678 School Sisters of Notre Dame ever since. The nuns ranged in age from 75 to 103 when the study began. These women complete a variety of psychological and physical measures annually. This sample is, of course, unique in many respects. However, some characteristics render the participants an excellent group for correlational research. For one thing, many potential extraneous third variables are relatively identical for all the women in the group. Their gender, living conditions, diet, activity levels, marital status, and religious participation are essentially held constant, providing little chance that differences in these variables can explain results. (If a variable does not change, it cannot change with or correlate with anything else.)

Researchers recently examined the question of the relation between happiness and longevity using this rich dataset. All of the nuns had been asked to write a spiritual autobiography when they entered the convent (for some, as many as 80 years before). Deborah Danner and her colleagues were given access to these documents and used them as indicators of happiness earlier in life, by counting the number of positive emotions expressed in the autobiographies (Danner, Snowdon, & Friesen, 2001). (Note that here we have yet another operational definition of happiness.) Higher levels of positive emotion expressed in autobiographies written at an average age of 22 were associated with a 2.5-fold difference in risk of mortality when the nuns were in their 80s and 90s. That is, women who included positive emotion in these autobiographies when they were in their early 20s were two-and-a-half times more likely to survive some 60 years later.

The use of multivariate approaches and longitudinal designs are ways that correlational researchers may attempt to indicate causal relations among variables. These are the kinds of studies that, along with experimental research using animal models, have allowed researchers to conclude that cigarette smoking *causes* cancer. Still, it is important to keep in mind that even the brightest scientist may not think of all of the potential third variables that might explain her results. Throughout this book you will read about numerous correlational research studies. Keep in mind how easy it is to assume causality when two events or characteristics are merely correlated. Think about those innocent ice cream cones, and critically evaluate conclusions that may be drawn from simple observation.

**Experimental Research**

If two variables are correlated, there might be a causal relationship between them; but if there is, we cannot be sure which way the causal arrow ought to point. Does X cause Y, or does Y cause X? Recent research on meaning in life provides a case in point.

Experiencing one’s life as meaningful has long been assumed to be an important aspect of psychological well-being (Frankl, 1984; Steger & Frazier, 2005). Because measures of meaning in life and well-being have been shown to correlate positively (that is, the more meaning in life you have, the happier you are), the assumption has been that meaning in life caused the greater happiness. But because the studies involved in exploring this relationship have been correlational in nature, the causal pathway might well run in the other direction: Happiness might make people feel that their lives are more meaningful. A series of laboratory experiments has shown this very outcome. Laura King and colleagues (2006) have demonstrated that putting people in a good mood—by having them imagine themselves
being recognized as a hero for helping a lost child find his parents—caused them to rate their lives as more meaningful than individuals who were told to imagine a neutral experience.

To clarify the direction of causality, then, psychologists who are interested in determining the causal relationships that might exist between variables must turn to experimental methods (McBurney & White, 2007). An experiment is a carefully regulated procedure in which one or more variables believed to influence the behavior being studied are manipulated while all other variables are held constant.

If the behavior under study changes when a variable is manipulated, we say that the manipulated variable has caused the behavior to change. In other words, the experiment has demonstrated cause and effect. In the example above, positive mood was the cause, and meaning in life was the effect. This notion that experiments can demonstrate causation is based on the idea that if participants are randomly assigned to groups, the only systematic difference between them must be the manipulated variable. Random assignment means that researchers assign participants to groups by chance. This technique reduces the likelihood that the experiment’s results will be due to any preexisting differences between groups (Martin, 2004). In the case of the study of meaning in life by King and others, because of random assignment we can assume that the groups (positive versus neutral mood) did not differ in meaning in life from the outset.

**Independent and Dependent Variables**  
Experiments have two types of variables: independent and dependent. An **independent variable** is a manipulated experimental factor. It is a potential cause. The label “independent” is used because this variable can be manipulated independently of other factors to determine its effect. Researchers have a vast array of options open to them in selecting independent variables, and one experiment may include several independent variables. In the study of positive mood and meaning in life, the independent variable is mood (positive versus neutral).

A **dependent variable** is a factor that can change in an experiment in response to changes in the independent variable. As researchers manipulate the independent variable, they measure the dependent variable for any resulting effect. In the study of mood and meaning in life, meaning in life is the dependent variable.

**Experimental and Control Groups**  
Experiments can involve one or more experimental groups and one or more control groups. An **experimental group** is a group whose experience is manipulated. A **control group** is as much like the experimental group as possible and is treated in every way like the experimental group except for the manipulated factor. The control group thus serves as a baseline against which the effects of the manipulated condition can be compared.

**Some Cautions About Experimental Research**  
Validity refers to the soundness of the conclusions we draw from an experiment. Two types of validity matter to experimental designs. The first is **ecological validity**, which refers to the extent to which an experimental design is representative of the real-world issues it is supposed to address. That is, do the experimental methods and the results generalize to the real world?

Imagine that a researcher is interested in the influence of mood on creative problem solving. She randomly assigns individuals to listen to happy music (a positive mood induction) or sad music (a negative mood induction). She then gives all participants a chance to be creative by listing all of the uses they can think of for a cardboard box. Counting up the number of uses that people list, she finds that those in the happy-mood condition had generated more uses for the box. This finding might indicate that happiness is related to creativity. Considering the ecological validity of this study, we might ask the questions, How similar is the happy mood of participants in this study to the kinds of happy moods people experience in real life? And how much is listing the uses of a cardboard box really a sign of creativity? In other words, we ask, Do these methods do a good job of reflecting the real-world processes they are supposed to represent?

The second type of validity is **internal validity**, which refers to the extent to which changes in the dependent variable are due to the manipulation of the independent variable.
In this case, we want to know if the experimental methods are free from biases and logical errors that may render the results suspect. Although experimental research is a powerful tool, it requires safeguards (Leary, 2008). Expectations and biases can, and sometimes do, tarnish results (Rosnow & Rosenthal, 2008).

**Experimenter Bias**  Experimenter bias may subtly (and often unknowingly) influence their research participants. **Experimenter bias** occurs when the experimenter's expectations influence the outcome of the research.

In a classic study, Robert Rosenthal (1966) turned college students into experimenters. He randomly assigned the participants rats from the same litter. However, half of the students were told that their rats were “maze bright,” whereas the other half were told that their rats were “maze dull.” The students then conducted experiments to test their rats’ ability to navigate mazes. The results were stunning. The so-called maze-bright rats were more successful than the maze-dull rats at running the mazes. The only explanation for the results is that the college students’ expectations affected the performance of the rats. In subsequent studies, researchers have demonstrated that experimenters’ expectations influence not only rodent behavior but human behavior as well (Rosenthal, 1994).

**Research Participant Bias and the Placebo Effect** Like the experimenters, research participants may have expectations about what they are supposed to do and how they should behave, and these expectations may affect the results of experiments (L. Christensen, 2007). **Research participant bias** occurs when the behavior of research participants during the experiment is influenced by how they think they are supposed to behave.

For example, in one study, the researchers first assessed participants’ sensitivity to pain (Levine, Gordon, & Fields, 1979). Then they gave the participants an injection of a pain-killing, or so the participants thought. Actually, they received a placebo—a harmless, inert substance that has no specific physiological effect. (A placebo can be given to participants instead of the presumed active agent, such as a drug, to determine if the placebo produces the effects thought to characterize the active agent.) Subsequently, when the experimenter administered painful stimuli, the participants perceived less pain than they had in the earlier assessment of their sensitivity to pain. This experiment demonstrated a placebo effect, which occurs when participants’ expectations, rather than the experimental treatment, produce an experimental outcome.

U.S. television viewers are often exposed to advertisements for prescription drugs. These ads typically include a voice-over that describes the potential side effects. You may have heard the statement “Some individuals taking this drug complain of headaches or stomach discomfort, but these effects were no different from those experienced by people receiving the placebo or sugar pill.” Experimenters use placebos to ensure that the effects of a medication are not simply due to expectations. Placebo effects can be surprisingly strong. Research has shown that a substantial part of the treatment effects for antidepressants, for example, may come out of the beliefs of the doctors and patients who use them (Kirsch & Sapirstein, 1999).

Another way to ensure that neither the experimenter’s nor the participants’ expectations affect the outcome is to design a **double-blind experiment**. In this design, neither the experimenter nor the participants are aware of which participants are in the experimental group and which are in the control group until the results are calculated.
Anthropological Theory and Social Psychology: Can Reminders of Death Influence Political Allegiance?

At the beginning of this chapter, we considered a variety of life experiences that seem difficult to study through empirical research. We have found that even for something as potentially inexpressible as happiness, psychologists can propose new theories, conduct studies, and describe results (with potential benefits to countless people) by employing the scientific method. Sometimes theories that are proposed to explain human behavior are quite abstract and even strange. Observing the world around them, scientists use their critical thinking and skepticism to devise explanations for a wide range of human behavior. These theories are sometimes counterintuitive, meaning that they run counter to common expectations or previously held notions. An example may help to illustrate how even abstract theory can be explored through empirical research.

In the 1970s anthropologist Ernest Becker (1972) drew together theory and research from a broad array of social sciences to devise a grand theory of human life and culture. According to Becker, an important human characteristic that has evolved over the centuries is our amazing intellectual capacity. One result of this capacity is that unlike other animals, we humans are aware of our own vulnerability, notably the reality of our own deaths. This awareness of our mortality creates the potential for overwhelming terror. Yet somehow we manage to go about our daily lives without being preoccupied by the terrifying reality of death. Why is this so?

According to Becker, as our intellectual capacity evolved, so did our capacity to create and invest in culture. Culture provides the customary beliefs, practices, religious rules, and social order for humans living together. People in the same culture often share attitudes, values, and goals. Our culture gives us the framework to understand what behavior is appropriate and what is not. Culture provides answers to questions such as, How many wives should a man have? and Should children work to support their family?

Becker asserted that being part of a larger culture shields us from the terror of our own mortality. He maintained that by investing in our cultural worldview (our beliefs, routine practices, and standards for conduct), we are able to enjoy real and symbolic immortality. Real immortality is provided by religious ideas about life after death. Symbolic immortality derives from our ability to contribute to a culture that will outlive us. As long as we feel that we are valued members of a culture, this status will buffer us against our fears of personal death. Becker’s theory is known as terror management theory (TMT) (Solomon, Greenberg, & Pyszczynski, 1991).

TMT theory is abstract and not very intuitive. It might strike you as “out there.” You might conclude that it is a theory that could not possibly be studied scientifically. How could one actually develop operational definitions for the variables in Becker’s model? In fact, TMT has led to a number of provocative laboratory investigations that support Becker’s views. Using the scientific method, social psychologists Jeff Greenberg, Sheldon Solomon, and Tom Pyszczynski (1997) derived some specific hypotheses from Becker’s broad theory. One such hypothesis is that when people are reminded of their own death, we would expect them to show a tendency to champion their cultural worldview. That is, when our own death is made salient (real) to us, we should be more likely to defend ourselves against mortality by investing strongly in our cultural worldview. Thus, the awareness of death ought to lead to worldview defense.

Becker asserted that being part of a larger culture shields us from the terror of our own mortality.

How might we study this prediction empirically using an experimental design? First the variables must be operationalized. In this case, the independent variable (the cause) is death awareness. To make people more aware of their own deaths, these researchers asked participants to take a few minutes and to write a description of their own deaths—to describe what would happen to them physically and emotionally when they die (Arndt & others, 2005). This “mortality salience” condition is the experimental condition. The dependent variable in our prediction is the defense of one’s worldview (the effect). How might this dependent variable be operationalized? One way that worldview defense might show itself is in attitudes about people who behave in ways that contradict the cultural worldview of what is appropriate—for example, criminals. In an early study, researchers asked a sample of 22 municipal court judges either to write about their own deaths or not to do this assignment, and then presented all of them with the same hypothetical case report of a woman arrested for prostitution (Rosenblatt & others, 1989). The judges were asked to set bail for the woman. Judges who had written about their own deaths gave the woman a much higher bond ($455 versus $50). In subsequent studies, these researchers and others have shown that reminding people of their own death tends to increase the tendency to judge harshly individuals who defy our cultural worldview and also to increase our own self-esteem.

Still, this research might seem artificial. How often do you sit down and write about your own death, and in this way get a reminder of your own mortality? Is this work ecologically valid—that is, does it represent how things work in the real world? Although you may not write such descriptions, reminders of death are in fact quite common: the violence we view on TV and in movies, news reports on war and acts of terrorism, the deaths of acquaintances, and even the cemetery or funeral home we drive by on our way home. These common experiences might serve as natural sources of mortality concern.

The terrorist attacks of September 11 might be thought of as a strong mortality salience manipulation. That is, thinking about 9/11 might cause individuals to feel a great deal of death anxiety. And from Becker’s theory we would predict that thinking
In a final study, participants who wrote about their own mortality showed increases in their favorable ratings of George W. Bush and less favorable ratings of John Kerry, and they judged themselves as more likely to vote for Bush than Kerry (Landau & others, 2004). These provocative findings suggest that unconscious concerns about death heightened the appeal of a charismatic leader. It is interesting to note that on October 29, just prior to the 2004 presidential election, Osama bin Laden (certainly a powerful reminder of the events of 9/11) appeared in a video criticizing George W. Bush. Bush later noted that he felt bin Laden's speech only helped him win the election (Reuters, 2006). Indeed, he may have been correct if bin Laden's appearance heightened death concerns for U.S. viewers.

Terror management theory and research provide a powerful example of how broad theory can be translated into strong empirical research. This theory has also yielded surprising findings with regard to more positive human characteristics. Concerns about death can lead either to our becoming narrow and defensive or, conversely, to our becoming more creative and more concerned about leaving a good legacy for the future (Routledge, Arndt, & Sheldon, 2004). Relationships, religious faith, creativity, and sharing our values with others all have been shown to diminish the need to engage in worldview defense when individuals are reminded of their mortality (Jonas & Fischer, 2006; Mikulincer, Florian, & Hirschberger, 2004; Routledge, Arndt, & Sheldon, 2004). In this way, concern over mortality can be a strong motivator to contribute positively to the world.

A study of drug treatment for social phobia was conducted in a double-blind manner (Van Ameringen & others, 2001). Both the experimenter who administered the drug and the participants were kept in the dark about which individuals were receiving the drug and which were receiving a placebo that looked like the drug. This setup ensured that the experimenter could not, for example, make subtle gestures signaling who was receiving the drug and who was not. A double-blind study allows researchers to tease apart the actual effects of the independent variable from the possible effects of the experimenter’s and the participants’ expectations about it.

A final caution is worth noting in interpreting the results of an experiment. Even if the design was solid and free of obvious confounds or biases, some uncertainty may remain about precisely what aspect of the experimental manipulation caused the results in the dependent measure. An example is provided by the fascinating body of research on expressive writing begun by James Pennebaker. He and his colleagues (Pennebaker & Chung, 2007) conducted a number of studies that converge on the same conclusion: Writing about your deepest thoughts and feelings concerning your most traumatic life event leads to a number of health and well-being benefits.

In these studies, each participant is randomly assigned to write about one of two topics—either the individual’s most traumatic life event or a relatively uninteresting topic (for example, his or her plans for the day). Assignment of the specific topic is meant to control for the act of writing itself (Pennebaker & Graybeal, 2001). The participants write about the same topic for 3 or 4 consecutive days for about 20 minutes each day. Weeks or months after writing, participants in the trauma writing group have better physical health than those in the control group. Since the first traumatic writing study, a host of researchers have replicated these effects, showing that writing about trauma is associated with superior immune function, better response to a vaccine, higher psychological well-being, better adjustment to coming to college, and more quickly finding employment after being laid off from work (Lepore & Smyth, 2002). Thus,
we might conclude that documenting one's deepest thoughts and feelings about traumatic life events is necessary to attain what has been termed the "healing power" of writing.

Note, however, that the participants in the trauma group were not only writing about a trauma. They were also documenting an important personal experience. Is it necessary to focus on a trauma to benefit from writing? Might there not be other, less negative aspects of life that are equally meaningful and that might bring health benefits when they are the subject of personal writing? Indeed, researchers recently have begun to examine the impact of writing about a variety of topics for health and well-being. For example, research has shown that writing only about the benefits of a traumatic life event—how a person has grown or become a better person because of the event—also leads to health benefits (King & Miner, 2000; Low, Stanton, & Danoff-Burg, 2006).

In addition, writing about one's life dreams not only produced health benefits equal to writing about a traumatic life event but did so while also boosting positive mood (King, 2001). In one study, writing about one's most intensely positive experience also led to health benefits (Burton & King, 2004). These findings and others have prompted researchers to rethink what the mechanisms underlying writing benefits might be (King, 2002). It may be that writing about meaningful and important life experiences is what is needed to benefit from writing, regardless of whether these experiences are negative or positive. We will return to the power of writing for health and wellness in Chapter 12.

At this point, you have read about several different types of research in psychology. For another look at how these research methods differ, see Figure 2.4. And to read about how psychologists have used the experimental research method to translate a broad theory into testable findings about terrorism, death anxiety, and political allegiance, see the Intersection.

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**FIGURE 2.4**

*Psychology's Research Methods Applied to Dreaming* Psychologists can apply very different methods to study the same phenomenon. Notice how the object of study, dreams, can influence the usefulness of various methods.

<table>
<thead>
<tr>
<th>Observation</th>
<th>Survey and Interview</th>
<th>Standardized Test</th>
<th>Case Study</th>
<th>Correlational Research</th>
<th>Experimental Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not an easy task, but researchers have observed that an individual's eyes move back and forth behind closed eyelids periodically during the night when dreams are occurring.</td>
<td>Individuals have been asked on surveys and in interviews to report what they dream about.</td>
<td>Psychologists have been ingenious at constructing psychological tests for many phenomena, but dreaming has not been one of them.</td>
<td>Analysis of all that was said by one individual during an hour in which a dream was related. Assessment might take place periodically during the individual's life.</td>
<td>There have been many correlational studies of dreams. For example, researchers have studied whether dreams are related to age, gender, and a person's cultural experiences.</td>
<td>Fewer experimental than correlational studies of dreaming have been conducted. However, in experimental research, individuals in drug-induced states often report a different profile of dreaming than those not under the influence of drugs.</td>
</tr>
</tbody>
</table>
Review

2. Discuss common research settings and the three types of research that are used in psychology.
   - Name and describe two common settings in which psychological research takes place.
   - Name and describe four kinds of descriptive research and identify at least one advantage of each kind of study.
   - State the goal of correlational research and explain the significance of the correlation coefficient.
   - Discuss the experimental method, including its components. Include in your discussion the potential pitfalls of the experimental method and how to avoid them.

Assess

1. A correlation of -0.67 indicates
   A. a strong positive relationship.
   B. a strong negative relationship.
   C. a weak positive relationship.
   D. a weak negative relationship.

2. A study on obesity had four groups: one group of participants was assigned to read a brochure about diet and nutrition; another group was assigned to a 30-minute counseling session with a nutritionist; a third group was assigned to read the newspaper; and a fourth group was assigned to watch a video about exercise and fitness. Which group is the control group?
   A. the group that had a counseling session
   B. the group that read the newspaper
   C. the group that read the brochure
   D. the group that watched the video

3. A researcher gives one group of participants an injection of epinephrine and another group an injection of a saline solution. The researcher then measures all participants' responses to completing a series of word puzzles. What is the dependent variable?
   A. the epinephrine
   B. the saline solution

C. the ages of the subjects
D. the word puzzles themselves

4. A study employed a double-blind methodology with random assignment to groups. All participants were first-year college students enrolled in an introductory psychology class. Which of the following could be a concern with this study?
   A. experimenter bias
   B. internal validity
   C. research participant bias
   D. ecological validity

5. Which of the following statements is correct?
   A. Only correlational research allows researchers to determine causality.
   B. Only experimental research allows researchers to determine causality.
   C. Both correlational and experimental research allow researchers to determine causality.
   D. Neither correlational nor experimental research allow researchers to determine causality.

Sharpen Your Thinking

Earlier, you were asked to give an operational definition for love. How would you use this definition to conduct research on the important construct of love? Would you use correlational or experimental methods? How would your study of this construct help us to better understand the experience of love?

3 Analyzing and Interpreting Data

Distinguish between descriptive statistics and inferential statistics.

As we have seen in the preceding discussion of the scientific method, after psychologists collect data, they analyze and interpret them. To do so, psychologists use statistics, which are mathematical methods for reporting data (Aron, Aron, & Coups, 2008). There
are two basic categories of statistics: descriptive statistics, which are used to describe and summarize data, and inferential statistics, which are used to draw conclusions about those data.

Statistical analyses are vitally important to psychological research, and there is even a specific field of psychology, quantitative psychology, that is devoted to developing quantitative techniques to handle the most complex datasets (Jackson, 2006; Vogt, 2007). Psychology students are sometimes surprised to learn that a course in statistics is often a requirement for the major. In this section, as we look at how psychologists analyze and interpret research data, you will get a flavor of the ways in which math plays an important role in the science of psychology.

Descriptive Statistics

Most psychological studies generate considerable numerical data. Simply listing all of the scores generated by a study—for each individual in the study—is not very meaningful. Descriptive statistics are the mathematical procedures researchers have developed to describe and summarize sets of data in a meaningful way. Descriptive statistics show us the "big picture"—that is, the overall characteristics of the data and the significant variations among them (Neuman, 2007).

Measures of Central Tendency

A measure of central tendency is a single number that tells you the overall characteristics of a set of data. The three measures of central tendency are the mean, the median, and the mode.

Most quantitative techniques in psychological science begin with the average, or the mean. The mean is what people often think of as the average. The mean is calculated by adding, for example, all the scores in a set of scores and then dividing by the number of scores. As a good indicator of the central tendency for a group of scores, the mean is the measure that is used most often. When your instructor provides students with their exam grades, he or she might mention the test mean, because this average gives the class a general idea of how the group performed.

The mean is not so helpful, however, when a group of scores contains a few extreme scores, especially if the number of such cases is small. Consider the annual earnings for the two groups of five people shown in the table below. Group 1 lists the earnings of five ordinary people. Group 2 is composed of the earnings of four ordinary people plus the approximate earnings of movie director Steven Spielberg. Now look at the means that have been calculated for the two groups. The vast difference between them is due to the one extreme score. In such a situation, one of the other two measures of central tendency, the median or the mode, would give a more accurate picture of the data overall.

The median is the score that falls exactly in the middle of the distribution of scores after they have been arranged (or ranked) from highest to lowest. When you have an odd number of scores (say, 5 or 7 scores), the median is the score with the same number of scores above it as below it. In the table below, each group has a median income of $23,000. Notice that, unlike the mean, the median is unaffected by extreme scores. The medians are the

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
</tr>
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<tbody>
<tr>
<td>$19,000</td>
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<tr>
<td>19,000</td>
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<td>24,000</td>
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<tr>
<td>25,000</td>
<td>45,000,000</td>
</tr>
</tbody>
</table>

Mean  $22,000 | Mean  $9,017,000 |
Median $23,000 | Median $23,000 |
Mode   $19,000 | Mode   $19,000 |
both groups ($23,000), but their means are extremely different ($22,000 versus $9,017,000). Of course, if there is an even number of scores, there is no "middle" score. This problem is dealt with by averaging the scores that share the middle location.

The **mode** is the score that occurs most often in a set of data. In our present example, the mode is $19,000, which occurs twice in each group. All of the other annual incomes occur only once. The mode is the least used measure of central tendency. But the mode can be particularly useful, for example, in cases in which information is desired about preference or popularity. Consider a teacher who wants to know the most popular or least popular child in her classroom. She might create a questionnaire and ask students which of their classmates they like the most or the least. The most frequently nominated child would be the mode in these instances.

**Measures of Dispersion** In addition to revealing the central characteristics of a sample, descriptive statistics can also give us measures of dispersion, which describe how much the scores in a sample vary from one another. That is, these measures give us a sense of the spread of scores. Let's look at some common ways that researchers measure dispersion.

Imagine that four students rate their positive mood on a scale from 1 (not at all) to 7 (extremely much), as follows:

<table>
<thead>
<tr>
<th>Positive mood</th>
<th></th>
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<tbody>
<tr>
<td>Sara</td>
<td>5</td>
</tr>
<tr>
<td>Sun Mee</td>
<td>4</td>
</tr>
<tr>
<td>Josh</td>
<td>1</td>
</tr>
<tr>
<td>Rodney</td>
<td>6</td>
</tr>
</tbody>
</table>

One common measure of dispersion is the **range**, which is the distance between the highest and the lowest scores. In the example above, the range in positive mood is 5 (6 - 1). Generally speaking, the range is a rather simplistic estimate of variability for a group of scores. More important, because the range takes into account only the lowest and highest scores, it can produce a misleading picture of the variability in a set of data. Note that for positive mood, most people in the example have fairly similar high scores, but using the range alone gives the impression that scores are very widely dispersed.

A more informative measure of dispersion, and the one most commonly used in psychological research, is the standard deviation. **Standard deviation** measures how much the scores vary, on the average, around the mean (which in our example of positive mood is 4) of the sample. There is a little hitch, however. One of the mathematical properties of the mean is that if you add up each person's difference from the mean, the sum will always be 0.

So, we cannot calculate the average deviation from the mean and get a meaningful answer. Instead, we calculate the average **squared** deviation from the mean and take the square root of that. The smaller the standard deviation, the less variability from the mean. To calculate the standard deviation in our positive mood example, we would do the following:

1. Subtract 4 (the mean) from all scores and in this way obtain a list of deviation scores: 1, 0, -3, and 2. (Notice that if you add these up, they equal 0.)
2. Square these deviation scores, thus getting 1, 0, 9, and 4.
3. Take the average of these scores by summing them (to get 14) and then dividing by 4 (to get 3.5).
4. Finally, take the square root of the average squared deviation from the mean (a mouthful, but essentially this is the definition of standard deviation) and get approximately 1.87. This is the standard deviation of our sample, which, compared to the range of 6, tells us that the group is actually fairly closely arranged around the mean.

Why do psychologists use the standard deviation so frequently? The reason is that the standard deviation tells them how far away a measured score is from the mean (Aron &
Aron, 2003). The mean and standard deviation together yield a lot of information about a sample. Indeed, given the raw scores and the mean and standard deviations of two variables, we can calculate the correlation coefficient in no time.

**Inferential Statistics**

Imagine that you have conducted a study of the relation between expressions of positive emotion and interpersonal success. You have videotaped job candidates being interviewed, coded the tapes for Duchenne smiling by the candidates, and recorded who was called back for a second interview. Let’s say you calculate that the mean number of smiles for candidates who were not called back was 3.5, and the mean number of smiles for candidates who were called back was 6.5. So, those who were called back generated, on average, 3 more smiles than those who were not called back. Does that difference matter? It seems pretty big, but is it big enough—should we believe that it represents a difference that is very unlikely to have happened by chance? Inferential statistics are the tools that can answer this question. More specifically, **inferential statistics** are the mathematical methods used to indicate whether data sufficiently support or confirm a research hypothesis (Sprinthall, 2007).

The logic behind inferential statistics is relatively simple. Inferential statistics yield a statement of probability about the differences observed between two or more groups; this probability statement gives the odds that the observed differences were due simply to chance.

If a probability statement tells you that the odds are 5 out of 100 (or .05) or less that the differences are due to chance, the results are considered statistically significant. In statistical language, this is referred to as the **.05 level of statistical significance**, or the **.05 confidence level**. Put another way, **statistical significance** means that the differences observed between two groups are so large that it is highly unlikely that those differences are merely due to chance.

The .05 level of statistical significance is considered the minimum level of probability that scientists will accept for concluding that the differences observed are real, thereby supporting a hypothesis. Some researchers prefer to use more rigorous levels of statistical significance, such as the .01 level of statistical significance (1 out of 100 odds or less that the differences are due to chance) or the .001 level of statistical significance (1 out of 1,000 odds or less). Note that the correlation coefficient that we have already discussed is an inferential statistic.

There are a few things to keep in mind with regard to interpreting statistical significance. First, significance tests are based in part on the number of cases in the sample. The higher the number of cases, the easier it is to get statistical significance. As a result, with a very large sample, even very small effects may be significant. Similarly, statistical significance is not the same thing as real-world significance. Even if a difference is found to be statistically significant, its “real-world value” remains to be evaluated by thinking scientists.

**REVIEW, ASSESS, AND SHARPEN YOUR THINKING**

**Review**

3. Distinguish between descriptive statistics and inferential statistics.
   - Define descriptive statistics and identify three measures of central tendency and two measures of dispersion, stating the purpose of each.
   - Define inferential statistics and discuss statistical significance and its importance in data interpretation.

**Assess**

1. Which of the following is not a measure of central tendency?
   A. standard deviation  
   B. mean  
   C. median  
   D. mode

2. Which of the following statements is true?
   A. Inferential statistics describe a sample, while descriptive statistics describe a population.
B. Inferential statistics test hypotheses, while descriptive statistics summarize data.
C. Inferential statistics are based on measures of central tendency, while descriptive statistics are based on measures of dispersion.
D. Inferential statistics are based on a significance level of .01, while descriptive statistics are based on a significance level of .05.

3. You have obtained scores from five participants of 2, 2, 3, 3, and 10. What is the median?
   A. 2  B. 3  C. 4  D. 10

4. There are 10 participants in a study. Nine of the participants scored between 1–5. The tenth participant has a score of 20.

**Sharpen Your Thinking**

Why is it important for you to develop a basic understanding of statistics?

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**4 The Challenges of Conducting and Evaluating Psychological Research**

*Discuss some research challenges that involve ethics, bias, and information.*

The scientific and statistical foundation of psychological research helps to minimize the effect of individual researchers’ biases and to maximize the objectivity of the results. Still, some subtle challenges remain to be fully resolved. One is to ensure that research is conducted in an ethical way; another is to recognize and try to overcome researchers’ deeply buried personal biases. Researchers are not the only ones who face these challenges, however. So do you. Every time you encounter information about psychology, whether in the popular media or in academic journals, you face the challenge of evaluating the information objectively and making sure that you are not jumping to the wrong conclusions.

**Conducting Ethical Research**

Ethics is an important consideration for all science. This fact was brought to the fore in the aftermath of World War II, for example, when it became apparent that Nazi doctors had used concentration camp victims as guinea pigs in experiments. These atrocities spurred scientists to develop a code of appropriate behavior—a set of principles about the treatment that participants in research have a right to expect. In general, ethical principles of research focus on balancing the rights of the participants with the rights of the scientists to ask important research questions (Leary, 2008).

The issue of ethics in psychological research may affect you personally if at some point you serve as a participant in a study. In that event, you need to know your rights as a participant and the researchers’ responsibilities in ensuring that these rights are safeguarded. Participants’ experiences can have life-altering consequences if researchers fail to consider their well-being.

For example, one investigation of young dating couples asked them to complete a questionnaire that coincidentally stimulated some of the participants to think about potentially troublesome issues (Rubin & Mitchell, 1976). One year later, when the
researchers followed up with the original sample, 9 of 10 participants said they had discussed their answers with their dating partners. In most instances, the discussions helped to strengthen the relationships. But in some cases, the participants used the questionnaire as a springboard to discuss problems or concerns previously hidden. One participant said, "The study definitely played a role in ending my relationship with Larry." In this case, the couple had different views about how long they expected to be together. She was thinking of a short-term dating relationship, whereas he was thinking in terms of a lifetime. Their answers to the questions brought the disparity in their views to the surface and led to the end of their relationship. Researchers have a responsibility to anticipate the personal problems their study might cause and, at least, to inform the participants of the possible fallout.

If you ever become a researcher in psychology, you need a deep understanding of ethics. Whether or not you become a researcher in the field, you may carry out one or more experimental projects in the psychology courses you take. Even smart, conscientious students frequently do not consider the rights of the participants who serve in their experiments. Psychology students might think that members of their church, athletes in the Special Olympics, or residents of the local nursing home where they volunteer present great samples for psychological research. But without proper permission, the most well-meaning, kind, and considerate studies still violate the rights of the participants.

Ethics Guidelines Safeguarding the rights of research participants is a challenge because the potential harm is not always obvious. At first glance, you might not imagine that a questionnaire on dating relationships among college students would have any substantial impact or that an experiment involving the treatment of memory loss would be anything but beneficial.

Today colleges and universities have a review board (typically called the institutional review board, or IRB) that evaluates the ethical nature of research conducted at their institutions. Proposed research plans must pass the scrutiny of a research ethics committee before the research can be initiated.

In addition, the American Psychological Association (APA) has developed ethics guidelines for its members. The code of ethics instructs psychologists to protect their participants from mental and physical harm. The participants' best interests need to be kept foremost in the researcher's mind (L. Christensen, 2007). APA's guidelines address four important issues:

- **Informed consent:** All participants must know what their participation will involve and what risks might develop. For example, participants in a study on dating should be told beforehand that a questionnaire might stimulate thoughts about issues in their relationships that they have not considered. Participants also should be informed that in some instances a discussion of the issues might improve their relationships but that in others it might worsen the relationships and even end them. Even after informed consent is given, participants must retain the right to withdraw from the study at any time and for any reason.

- **Confidentiality:** Researchers are responsible for keeping all of the data they gather on individuals completely confidential and, when possible, completely anonymous.

- **Debriefing:** After the study has been completed, participants should be informed of its purpose and the methods that were used. In most cases, the experimenter also can inform participants in a general manner beforehand about the purpose of the research without leading participants to behave in a way that they think that the experimenter is expecting. When preliminary information about the study is likely to affect the results, participants can at least be debriefed after the study has been completed.

- **Deception:** This is an ethical issue that psychologists debate extensively. In some circumstances, telling the participants beforehand what the research study is about substantially alters the participants' behavior and invalidates the researcher's data. For example, suppose a psychologist wants to know whether bystanders will report a
theft. A mock theft is staged, and the psychologist observes which bystanders report it. Had the psychologist informed the participants beforehand that the study intended to discover the percentage of bystanders who will report a theft, the whole study would have been undermined. Thus, the researcher deceives participants about the purpose of the study, perhaps leading them to believe that it has some other purpose. In all cases of deception, however, the psychologist must ensure that the deception will not harm the participants and that the participants will be told the true nature of the study (will be debriefed) as soon as possible after the study is completed.

The federal government also takes a role in ensuring that research involving human participants is conducted ethically. The Federal Office for Protection from Research Risks is devoted to ensuring the well-being of participants in research studies. Over the years, the office has dealt with many challenging and controversial issues—among them, informed consent rules for research on mental disorders, regulations governing research on pregnant women and fetuses, and ethical issues regarding AIDS vaccine research.

Some people think of reality TV shows as natural social experiments. To read further about how psychologists view the ethical aspects of these shows, see the Critical Controversy.

**The Ethics of Research with Animals** For generations psychologists have used animals in some research. Animal studies have provided a better understanding of and solutions for many human problems (Kalat, 2007; Wickens, 2005). Neal Miller, who has made important discoveries about the effects of biofeedback on health, listed the following areas in which animal research has benefited humans (Miller, 1985):

- Psychotherapy techniques and behavioral medicine
- Rehabilitation of neuromuscular disorders
- Alleviation of the effects of stress and pain
- Drugs to treat anxiety and severe mental illness
- Methods for avoiding drug addiction and relapse
- Treatments to help premature infants gain weight so they can leave the hospital sooner
- Methods used to alleviate memory deficits in old age

Only about 5 percent of APA members use animals in their research. Rats and mice account for 90 percent of all psychological research with animals. How widespread is abuse to animals in psychological research? Animal welfare and rights activists would have you believe that such abuse is extensive. It is true that researchers sometimes use procedures with animals that would be unethical with humans, but they are guided by a set of standards for housing, feeding, and maintaining the psychological and physical well-being of their animal subjects. Researchers are required to weigh potential benefits of the research against possible harm to the animal and to avoid inflicting unnecessary pain. Animal abuse simply is not as common as animal activist groups charge. Stringent ethical guidelines must be followed, whether animals or humans are the subjects in psychological research (Herzog, 1995).

**Values** Questions are asked not only about the ethics of psychology but also about its values, its standards for judging what is worthwhile and desirable. Some psychologists argue that psychology should be value-free and morally neutral. From their perspective, the psychologist’s role as a scientist is to present facts as objectively as possible.

Others believe that, because psychologists are human, they cannot possibly be value-free, even if they try. Indeed, some people even argue that psychologists *should* take stands on value-laden issues. For example, psychological research shows that children reared by gay and lesbian parents are no more likely to be gay than other
Would Reality TV Pass the Institutional Review Board?

Survivor, Fear Factor, American Idol, The Bachelor, The Apprentice—these are just a few of the many extraordinarily popular reality shows that fill the U.S. television airwaves. The more pessimistic commentators view these shows as portents of the end of Western civilization; as a Newsweek article bemoaned, "Another Reality Show, Another IQ Point Disappears" (Peyser, 2001). More optimistically, some people see the programs as interesting social experiments. Indeed, reality TV watchers may think that they are learning a lot about human nature by tuning in to see who will get voted off, who will willingly eat ground-up rats, or who will be ridiculed by Simon Cowell.

For you as a student of psychology, an appropriate question might be, Would these reality TV shows ever gain the approval of the institutional review board (IRB) of an institution of higher learning? This issue was of interest to Barbara Spellman, a founding member of the American Psychological Society Committee on Human Subject Protection, who recently undertook a study of reality TV programming with an eye toward the ethical issues these shows present. If we were to consider reality TV from the perspective of the APA ethical guidelines we have considered in this chapter, at least five issues that Spellman identified would come to the fore.

First, how do reality shows achieve informed consent? The principle of informed consent means that all participants must know what their participation will involve and what risks might develop. Yet the very thing that makes reality shows exciting is the element of the unknown—the potential for surprise. Clearly the producers of Fear Factor are not going to inform contestants upfront that for their particular episode they will be asked to shave their heads, because the element of shock and the dramatic moment of the decision would diminish greatly if it occurred off camera while the person perused the consent form. On the other hand, we might note that it is highly unlikely that anyone who participates on such a show has not watched a few episodes, and therefore most participants will have a pretty good idea that they must expect the unexpected. On American Idol, as yet another contestant expresses dismay at the harsh treatment he or she has experienced courtesy of judge Simon Cowell, you may find yourself yelling at the TV, "What did you expect? Haven't you ever watched this show?"

A second, related problem with at least some reality shows is the use of deception. Fooling a group of women into believing that a semi-employed construction worker is actually a millionaire is probably not likely to satisfy APA ethical considerations.

A third issue that might arise is that of risk. As Spellman (2005) points out, many reality shows pose a great deal of psychological and/or physical risk. Some reality shows include children (for example, Trading Spouses), and it is very unlikely that an IRB would consider that posing any kind of risk to children could ever be justified. The most recent addition to reality TV, Kid Nation, would be particularly problematic, as it includes only children, with minimal adult supervision. The considerable physical risk common to reality TV, such as the extreme weight loss endured by Survivor contestants and the daunting physical challenges faced on Fear Factor, also would be likely to raise IRB eyebrows—and disapproval.

A fourth issue that Spellman identifies as a major stumbling block for reality TV is the potential for exorbitant award money. Participants in such "research" may feel persuaded to do things they would never "really" do because of the enormous financial incentives involved. Is it "really" lying if you are doing it in order to win a million dollars? If a person does something to "play the game" that he or she would never do outside of the game, haven't we shown that money has compelled the individual to act in ways he or she might later regret or be judged for? Indeed, Spellman suggests that one way to make the shows more likely to secure IRB approval would be to rework the payment structure so that financial gain is less likely to compel behavior.

Remember that ethical considerations involve balancing the rights of participants with the scientist's right to know. Thus, a fifth question pertinent to a study of reality TV is, What is the value of what we can learn from these "experiments"? This brings up the issue of how "natural" reality shows are. Are people truly themselves when the cameras are rolling? Can we learn much of value about human beings in these highly unusual circumstances?

Although we may not be able to discover much about the people who appear on the shows, perhaps we can learn something about the viewers. After all, the finale of Survivor attracted an audience of some 51 million. And even as the novelty of reality TV has worn off, the shows still remain unusually popular. Indeed, American Idol routinely trumped the Winter Olympics of 2006 in viewership. So, the question of why do people watch this stuff is one that researchers have begun to address. Steven Reiss and James Wilt (2004) surveyed more than 10,000 individuals online and identified some of the motivations behind watching reality TV. Disturbingly, they found that what seemed to interest viewers was the enjoyment of watching other people being humiliated. Viewers tended to be high in motivations for status and vengeance (Reiss & Wiltz, 2004). Some psychologists are particularly concerned about the potential of reality shows to change our perceptions about what sort of behavior is appropriate or normal. As many of us complain about the loss of politeness and a growing coarseness in human behavior, we might all need to be more mindful of how the things we watch on TV may influence our own behavior.

What Do You Think?

• Do reality TV shows represent natural human behavior? Explain.
• How could we possibly use reality TV in a way that might allow us to understand important psychological processes?
• Do you think that reality TV has affected the standards for behavior in your daily life? Why or why not?
children and tend to show levels of psychological functioning that are equal to or higher than those of children reared by heterosexual parents. To the extent that some have argued against the rights of gay individuals to adopt children or to retain custody of their biological children, psychologists may have a role to play in the debate about these issues. The underlying question is psychologists’ scientific responsibilities versus their responsibilities to society as a whole.

**Minimizing Bias**

The debate over the place of values in psychology continues. But psychologists have generally come to agree that another type of personal objectivity is desirable when doing research. Specifically, psychological studies are most useful when they are conducted without bias or prejudice toward any particular group of people—especially biases based on sex or gender and on culture or ethnicity.

**Gender Bias** For centuries, society has had a strong gender bias, a preconceived notion about varying abilities between women and men that prevented countless individuals from pursuing their own interests and achieving their potential. Many women have faced barriers in the academic world and in their careers. Within the field of psychology, gender bias also has had a less obvious effect (Hyde, 2007; Smith, 2007). Think about it: Psychology is the science of all human behavior. But historically, theory and research in psychology often started with just the male experience—not only because the researchers themselves were often male, but also because the research participants too were typically all men, since only men were available as participants when psychologists began to study undergraduates. Thus, too often psychological research has had a gender bias (Hyde, 2007; Kimmel & Crawford, 2002). For too long, the female experience has been subsumed under the male experience (Tetreault, 1997).

Florence Denzmark and her colleagues (1988) argue as well that when gender differences are found, they are too often unduly magnified. For example, a researcher might report in a study that 74 percent of the men had high achievement expectations versus only 67 percent of the women, and might describe the difference in some detail. In reality, this might be a rather small difference. It also might disappear if the study were repeated or found to have methodological problems that do not allow such strong interpretations.

Researchers giving females equal rights in research have raised some new questions (Tetreault, 1997):

- How might gender bias influence the choice of hypotheses, participants, and research design? For example, the most widely known theory of moral development was proposed by a male (Lawrence Kohlberg) in a male-dominant society (the United States), and males were the main participants in research used to support the theory for many years.

- How might research on topics of primary interest to females—such as relationships, feelings, and empathy—challenge existing theory? For example, in the study of moral development, the highest level has often been portrayed as based on a principle of "justice for the individual" (Kohlberg, 1976). However, more recent theorizing notes that individuality and autonomy tend to be male concerns and suggests that a principle based on relationships and connections with others be added to our thinking about high-level moral development (Gilligan, 1982, 1996).

- How has research that has exaggerated gender differences between females and males influenced the way that people think about females? For example, some researchers believe that gender differences in mathematics have often been exaggerated and have been fueled by societal bias (Hyde, 2005, 2007). Such exaggeration of differences can lead to negative expectations for females’ math performance.

**Cultural and Ethnic Bias** The realization that psychological research needs to include more people from diverse ethnic groups has also been building (Berry & others, 2006; McLoyd, Aikens, & Burton, 2006). Historically, people from ethnic minority groups
(African American, Latino, Asian American, and Native American) have been discounted from most research in the United States and simply thought of as variations from the norm, or average. Because their scores do not always fit neatly into measures of central tendency, minority individuals have been viewed as simply adding “noise” to the data. Consequently researchers have deliberately excluded them from the samples they have selected. Given the fact that individuals from diverse ethnic groups have been excluded from psychological research for so long, we might reasonably conclude that people’s real lives are perhaps more varied than research data have indicated in the past.

Researchers also have tended to overgeneralize about ethnic groups (Banks, 2008). **Ethnic gloss** is using an ethnic label, such as “African American” or “Latino,” in a superficial way that portrays an ethnic group as being more homogeneous than it really is. For example, a researcher might describe a research sample like this: “The participants were 20 Latinos and 20 Anglo-Americans.” A more complete description of the Latino group might be something like this: “The 20 Latino participants were Mexican Americans from low-income neighborhoods in the southwestern area of Los Angeles. Twelve were from homes in which Spanish is the dominant language spoken, 8 from homes in which English is the main language spoken. Ten were born in the United States, 10 in Mexico. Ten described themselves as Mexican American, 5 as Mexican, 3 as American, 2 as Chicano, and 1 as Latino.” Ethnic gloss can cause researchers to obtain samples of ethnic groups that are not representative of the group’s diversity. Overgeneralization and stereotyping can result.

One psychologist interested in obtaining better research information about gender and ethnicity is Pam Reid (Reid, 2002; Reid & Zalk, 2001). Reid’s research focuses on the ways in which gender, socioeconomic status, and ethnicity are involved in the development of social skills. Reid and her students study why middle school girls from various ethnic backgrounds stop taking classes in mathematics. Reid points out that many psychological findings have been based on research with middle socioeconomic status Euro-Americans. Taking into account the expectations, attitudes, and behaviors of diverse ethnic groups can only enrich psychological theory and practice.
Being a Wise Consumer of Information About Psychology

Television, radio, newspapers, magazines, and the Internet all report on psychological research that is likely to be of interest to the general public. Much of the information has been published in professional journals or presented at national meetings, and most major colleges and universities have a media relations department that contacts the press about current research by their faculty.

You should be aware, however, that not all psychological information that is presented for public consumption comes from professionals with excellent credentials and reputations at colleges or universities or in applied mental health settings (Stanovich, 2007). Because journalists, television reporters, and other media personnel are not usually trained in psychological research, they often have trouble sorting through the widely varying material they find and making sound decisions about the best information to present to the public. In addition, the media often focus on sensationalistic and dramatic psychological findings to capture your attention. They tend to go beyond what actual research articles and clinical findings really say.

Even when the media present the results of excellent research, they have trouble adequately informing people about what has been found and the implications for people’s lives. For example, this entire book is designed to carry out the task of carefully introducing, defining, and elaborating on key concepts and issues, research, and clinical findings. The media, however, do not have the luxury of so much time and space to detail and specify the limitations and qualifications of research. They often have only a few minutes or a few lines to summarize as best they can the complex findings of a study or a psychological concept.

In the end, you have to take responsibility for evaluating the reports on psychological research that you encounter in the media. To put it another way, you have to consume psychological information wisely. Five guidelines follow.

**Distinguish Between Group Results and Individual Needs** People who learn about psychological research through the media are likely to apply the results to their individual circumstances, yet most research focuses on groups, and individual variations in participants’ responses are seldom emphasized. As a result, the ill-informed consumer of psychological research may get the wrong idea about the “normality” of his or her circumstances. For example, researchers interested in the effects of divorce on an adult’s ability to cope with stress might conduct a study of 50 divorced women and 50 married women. They might conclude that the divorced women, as a group, cope more poorly with stress than the married women. In this particular study, however, some of the divorced women were likely to be coping better than some of the married women. Indeed, of the 100 women in the study, the 2 or 3 women who are best coping with stress may be the divorced women. It would be accurate to report the findings as showing that divorced women (as a group) coped less effectively with stress than married women (as a group) did. But it would not be sensible to conclude, after reading a summary of the results of the study, that your divorced sister may not be coping with stress as well as she thinks and to recommend that she see a therapist.

The failure of the media to distinguish adequately between research on groups and the individual needs of consumers is not entirely their fault. Researchers have not made the difference clear, either. They often fail to examine the overlap in the data on the groups they are comparing and focus only on the differences. And then, too often they highlight only these differences in their reports.

Remember, if you read a report in a research journal or the media that states that the divorced women coped more poorly with stress than the married women, you cannot conclude that all divorced women coped more poorly with stress. The only conclusion that you can reasonably draw is that more married women coped better than divorced women did.

**Avoid Overgeneralizing from a Small Sample** Media presentations of psychological information often do not have the space or time to go into details about the nature of the sample used in the study. Sometimes you will get basic information about the sample’s size—whether it is based on 10 participants, 50 participants, or 200 participants. If you cannot learn anything else about the sample, at least pay attention to its number.
Small or very small samples require caution in generalizing to a larger population of individuals. For example, a sample of only 10 or 20 divorced women may have some unique characteristics that would make the study's finding inapplicable to many women. The women in the sample might all have high incomes, be White, be childless, live in a small southern town, and be undergoing psychotherapy. Divorced women who have moderate to low incomes, are from other ethnic backgrounds, have children, are living in different contexts, and are not undergoing psychotherapy might have given very different responses.

**Look for Answers Beyond a Single Study** The media might identify an interesting piece of research or a clinical finding and claim that it is something phenomenal with far-reaching implications. Although such pivotal studies do occur, they are rare. It is safer to assume that no single study will provide conclusive answers to an important question, especially answers that apply to all people. In fact, in most psychological domains that prompt many investigations, conflicting results are common. Answers to questions in research usually emerge after many scientists have conducted similar investigations that yield similar conclusions.

If one study reports that a particular therapy conducted by a particular therapist has been especially effective with divorced adults, you should not conclude that the therapy will work as effectively with all divorced adults and with other therapists until more studies are conducted. Remember that you should not take a report of one research study as the absolute, final answer to a problem.

**Avoid Attributing Causes Where None Have Been Found** Drawing causal conclusions from correlational studies is one of the most common mistakes made by the media. When a true experiment has not been conducted—that is, when participants have not been randomly assigned to treatments or experiences—two variables or factors might have only a noncausal relationship to each other (Leavitt, 2000). Remember from the discussion of correlation earlier in the chapter interpretations cannot be made when two or more factors are simply correlated. We cannot say that one causes the other.

In the case of divorce, imagine that you read this headline: “Low Income Causes Divorced Women to Have a High Degree of Stress.” You should instantly be able to conclude that the story is about a correlational study, not an experimental study. The word causes is used in error. Why? For ethical and practical reasons, women participants cannot be randomly assigned to become divorced or stay married, and divorced women cannot be randomly assigned to be poor or rich. A more accurate heading might be “Low-Income Divorced Women Have a High Degree of Stress,” meaning that the researchers found a correlation among being divorced, having a low income, and experiencing a lot of stress. Be skeptical of words indicating causation until you know more about the research they are describing.

**Consider the Source of Psychological Information** Remember that studies conducted by psychologists are not automatically accepted by the rest of the research community. The researchers usually must submit their findings to a journal for review by their colleagues, who make a decision about whether to publish the paper, depending on the care taken in conducting the research. Although the quality of research and findings is not uniform among all psychology journals, in most cases journals submit the findings to far greater scrutiny than the popular media do (Stanovich, 2007).

Within the media, though, you can usually draw a distinction. The reports of psychological research in respected newspapers such as the New York Times and Washington Post, as well as in credible magazines such as Time and Newsweek, are far more trustworthy than reports in tabloids such as the National Inquirer and Star. But regardless of the source—serious publication, tabloid, or even academic journal—you are responsible for reading the details of the research behind the findings that are presented and analyzing the study's credibility.

In the next few days, look through several newspapers and magazines for reports about psychological research. Also notice what you see and hear on television about psychology. Try applying the guidelines for being a wise consumer of information about psychology to these media reports.
**REVIEW, ASSESS, AND SHARPEN YOUR THINKING**

**Review**

4. Discuss some research challenges that involve ethics, bias, and information.
   - Describe researchers' ethical responsibilities to the humans and animals they study.
   - Explain how gender, cultural, and ethnic bias can affect the outcome of a research study.
   - List five key things to keep in mind when you come across information pertaining to psychological research.

**Assess**

1. Providing research participants with information about the purpose of a study at the study's conclusion is called
   A. informed consent.  
   B. deception. 
   C. debriefing. 
   D. confidentiality.

2. Which organization provides ethical guidelines for psychologists?
   A. The American Psychiatric Association
   B. The Institutional Review Board
   C. The American Medical Association
   D. The American Psychological Association

3. Overgeneralizing about a racial or ethnic group is referred to as
   A. gender bias. 
   B. ethnic bias. 
   C. ethnic gloss. 
   D. cultural bias.

4. What is the problem with small sample sizes?
   A. Their results may be unrepresentative of the larger population.
   B. They can only be studied with survey questions.
   C. They are made up of unreliable sources.
   D. They give only correlational information.

5. A study could possibly put participants at risk of harm but the participants are not told about the potential for harm. What ethical standard has been violated?
   A. debriefing 
   B. informed consent 
   C. deception 
   D. confidentiality

**Sharpen Your Thinking**

What should society do with knowledge that is gained from research that is deemed unethical (for instance, research conducted on concentration camp victims)? Do you think the information should still be used to benefit society? Why or why not?

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**5 The Scientific Method and Health and Wellness**

**Discuss scientific studies on human happiness and the nature of their findings.**

**The Science of Increasing Happiness**

The role of science in human health is obvious. Daily, we read or hear about important scientific discoveries that promise to help us prevent and cure disease. Research shows the benefits of exercising, eating right, and not smoking in enhancing our chances of living long, healthy lives. If science can be relied upon to help us be healthier, can scientific inquiry also help us to be happier?

The scientific study of happiness typically focuses on a variable called *subjective well-being*. Subjective well-being is an individual's personal assessment of how well things are going in his or her life: how much positive affect (that is, feeling) and negative affect the person experiences and how he or she feels about life in general. You can quickly assess your subjective well-being by answering the question, How satisfied are you with your life as a whole?
As we have considered throughout this chapter, happiness is best seen not only as an outcome of positive life events but also as a predictor of those events. Recall the description of the meta-analysis toward the beginning of the chapter that surveyed a broad array of studies in support of the notion that happiness is a correlate, predictor, and possible cause of life success (Lyubomirsky, King, & Diener, 2005). This meta-analysis presents compelling evidence from longitudinal research that demonstrates a link between positive affect and altruism, sociability, activity, self-esteem, other esteem, conflict resolution, physical health, and immune function. It seems likely that if we were to write a prescription for happiness, we might do well to include a good marriage, satisfying work, warm friendships, and a long, healthy life. Importantly, the results of the meta-analysis suggest not only that happiness is an outcome of these experiences but also that happiness may in fact foster them. Happiness is a precursor to a broad array of positive outcomes, including satisfying relationships (Lucas & others, 2003), career success (Staw, Sutton, & Pelled, 1994), superior coping (Aspinwall, 1998; Carver & others, 1993), physical health (Kubzansky & others, 2001), and even survival (Danner, Snowdon, & Friesen, 2001). Thus, happiness is a potential cause of life success.

In light of the significant benefits of happiness, what might we do to become happier? There are two important problems associated with attempts to enhance happiness: the so-called hedonic treadmill and the problem of pursuing happiness as a goal in and of itself.

The first key dilemma in increasing happiness is the hedonic (meaning "related to pleasure") treadmill (Brickman & Campbell, 1971; Fredrick & Loewenstein, 1999). The concept of the hedonic treadmill is that any aspect of life that enhances our positive feelings is likely to do so for only a short period of time. That is, we are likely to adapt quite rapidly to any change that might occur in our life that would presumably influence our happiness. So winning the lottery, moving to a dream home in California, or falling in love may lead to temporary gains in our experience of joy, but eventually we go back to our baseline (Sehkae & Kahneman, 1998). Whether it is the switch from CDs to iTunes or from dial-up to wireless, what we first experience as a life-changing improvement eventually fades to a routine (but still necessary) aspect of life, all too soon to be taken for granted. So, how can we increase happiness if such happiness enhancers quickly lose their power?

A second challenge to the goal of enhancing happiness is that pursuing happiness for its own sake is rarely a good way to do it. When happiness is the goal, the pursuit is likely to backfire (Schooler, Ariely, & Loewenstein, 2003). Explicitly focusing on trying to be happier is not a good way to actually be happier. Indeed, those who explicitly link the pursuit of their everyday goals to happiness fare quite poorly (McIntosh, Harlow, & Martin, 1995).

How can the many among us who are interested in being happier navigate this difficult path? In other words, how can we enhance our happiness without having this new capacity for joy become ho-hum, and how might we pursue happiness without really pursuing it? One potentially useful approach is to commit ourselves to the pursuit of other personally meaningful goals.

Stop for a minute and write down the things you are typically trying to accomplish in your everyday behavior. You might identify a goal such as “to get better grades,” “to be a good friend (or wife or mother),” or “to fight injustice when I see it happening.” Such everyday goals and our pursuit of them have been shown to relate strongly to our subjective well-being (Brunstein, 1993; King, 2007; Sheldon, 2002). Research demonstrates that simply having important, valued goals is associated with subjective well-being, as is making progress on those goals. Personal goals have been shown to organize daily experience and influence the relationship between events and daily emotional life (Cantor & Sanderson, 1999; Diener & Fujita, 1995). Events matter to us to the extent that they affect our goals. Goal pursuit provides the glue that meaningfully relates a chain of life events, endowing life with beginnings, middles, and ends. To the extent that goals direct attention, draw our thoughts to them, and drive the extraction of meaning from life events, they are a kind of psychic hub in our mental lives (King, 2007).
The considerable scholarly literature on goal investment offers a variety of ideas about the types of goals that are likely to enhance our subjective well-being. To optimize the happiness payoffs of goal processes, one ought to pursue goals that are important and personally valuable (Sheldon, 2002). These goals should be moderately challenging and should share an instrumental relationship with each other—so that the pursuit of one goal facilitates the accomplishment of another (Emmons & King, 1988). Having daily goals that serve the function of leading us to our broader life dreams is related to enhanced subjective well-being, and progress on those goals is particularly rewarding (King, Richards, & Stemmerich, 1998). Now pause and write down your daily goals and your life goals, and consider how these relate to each other. Are you pursuing the kinds of daily goals that will get you to the larger life dream you desire?

With regard to the hedonic treadmill, goal pursuit has a tremendous advantage over other ways of trying to enhance happiness. Goals change and are changed by life experience. As a result, goal pursuit may be less susceptible to adaptation over time. One reason why goals may allow us to maintain traction on the hedonic treadmill is that goals accentuate the positive but do not necessarily eliminate the negative. Goals may relate to either positive or negative emotional experiences, depending on how we are progressing in goal pursuit. Goals may increase not only subjective well-being, but also momentary unhappiness—the latter effect perhaps being a very good thing. Sometimes achieving a particular goal just does not work out, no matter how well we articulate it or how doggedly we pursue it. Indeed, setting a goal includes not only the promise of fulfillment but also the potential for failure, humiliation, and regret. Emotionally investing in one’s daily life may mean experiencing worry over whether one will succeed (Pomerantz, Saxon, & Oishi, 2000) and experiencing disappointment when things do not go well (Kernis & others, 2000; Marsh, 1995).

So, overall, goal pursuit may lead to a happier life. But goals also keep life affectively interesting. By fostering a rich emotional life that is also coherent and comprehensible, goals keep the positive possible and interesting. The conclusion, for those who want to enhance happiness, is to strive mightily for the goals that you value. You may get lucky and fail now and then, but missing the mark will only make your successes all the sweeter. Another advantage of goals as an entryway to enhanced happiness is that goals allow you to enjoy happiness without necessarily pursuing it. Goals pave the way for you to pursue happiness while you are pursuing other things.

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**REVIEW, ASSESS, AND SHARPEN YOUR THINKING**

**Review**

5. Discuss scientific studies on human happiness and the nature of their findings.

- Describe researchers’ findings about how people can enhance their happiness, and discuss two challenges associated with attempts to become happier.

**Assess**

1. Which of the following is an example of the hedonic treadmill?
   A. a person continuing to seek out pleasure at the expense of his or her responsibilities
   B. a person feeling very happy when he or she buys a luxury car, but the feeling quickly fades
   C. a person pursuing a promotion in order to obtain more financial rewards
   D. a person working toward valued goals
2. Which of the following is least related to subjective well-being?
   A. positive affect  B. negative affect
   C. satisfaction with life  D. anxiety

3. To optimize your happiness, your goals should be
   A. easy, attainable, and interesting.
   B. moderately challenging, difficult to attain, and related to income.
   C. easy, related to other goals, and personally meaningful.
   D. moderately challenging, important, and personally valuable.

Sharpen Your Thinking
*Do you think that increasing happiness is a worthwhile goal? Why or why not?*

4. What is the relationship between positive life events and happiness?
   A. Positive life events can predict happiness.
   B. Happiness is a poor prediction of positive life events.
   C. Happiness both predicts and is a positive outcome of positive life events.
   D. There is very little relationship between positive life events and happiness.
1 PSYCHOLOGY'S SCIENTIFIC METHOD

Explain what makes psychology a science.

A Scientific Approach
A scientist's attitude is distinguished by four characteristics: being curious, being skeptical, being objective (by using empirical methods), and thinking critically.

Collaboration
Science takes place among a community of thinkers. Psychologists share their findings with others by making presentations at conferences and publishing their work in peer-reviewed journals. Through peer review, findings are evaluated critically by others, ensuring that the research published in academic journals represents the highest-quality knowledge.

The Five Steps in the Scientific Method
The scientific method involves five steps: (1) observing a phenomenon, (2) formulating hypotheses and predictions, (3) testing these hypotheses through empirical research, (4) drawing conclusions based on that research, and (5) evaluating conclusions.

2 RESEARCH SETTINGS AND TYPES OF RESEARCH

Discuss common research settings and the three types of research that are used in psychology.

Research Settings
Two common research settings are laboratories and natural settings. The research laboratory is a controlled setting where the complex factors of the real world can be closely controlled or eliminated. Natural settings are places in which behavior occurs naturally and without artificial control of outside factors.

Descriptive Research
Four types of descriptive research are observation, surveys and interviews, standardized tests, and case studies. Each type has certain strengths. Observation allows scientists to gain an understanding of behavior as it occurs naturally. Surveys and interviews allow researchers directly to ask people the questions they wish to know. Standardized tests provide a basis for comparing individuals. Case studies provide dramatic, in-depth portrayals of single individuals.

Correlational Research
The goal of correlational research is to determine whether two variables change together. The correlation coefficient is a statistic that conveys the direction of this covariation. In a positive correlation, the variables change in the same direction—if one increases, so does the other. In a negative correlation, as one variable increases, the other systematically decreases. Correlational studies are limited in that they cannot be used to determine causal relationships between variables.

Experimental Research
The experimental method involves a carefully regulated procedure that allows researchers to determine whether one variable causes changes in another. Experiments typically rely on random assignment to ensure that two groups do not differ systematically prior to the study. In an experiment, the independent variable is the one that is manipulated, allowing the researcher to examine its effects on the dependent variable. The independent variable is the "cause," and the dependent variable is the "effect." Generally, the experimental group is the group for whom the independent variable is manipulated. The control group is identical to the experimental group except for the manipulation of the independent variable.

Problems that can influence the validity of an experiment include experimenter bias, participant bias, and the placebo effect. Experimenter bias occurs when the experimenter's expectations influence the outcome of a study. Participant bias refers to the effects of a participant's expectations about a study. The placebo effect refers to the fact that sometimes a person's belief in a treatment can cause changes, even for individuals in the control condition. These biases can be avoided through the use of double-blind procedures, in which neither the experimenter nor the participant knows which treatment condition a person has been assigned to receive.

3 ANALYZING AND INTERPRETING DATA

Distinguish between descriptive statistics and inferential statistics.

Descriptive Statistics
Descriptive statistics are used to describe and summarize samples of data in a meaningful way. Two types of descriptive statistics are measures of central tendency and measures of variability. Measures of central tendency are the mean (or mathematical average), the median (the middle score), and the mode (the most common score). Measures of variability include the range (the difference between the highest and lowest scores) and the standard deviation (the square root of the average squared deviation from the mean).

Inferential Statistics
Inferential statistics are used to draw conclusions about data. Inferential statistics aim to uncover statistical significance, which means that the differences observed between groups (or the correlation between variables) are unlikely to be the result of chance.

4 THE CHALLENGES OF CONDUCTING AND EVALUATING PSYCHOLOGICAL RESEARCH

Discuss some research challenges that involve ethics, bias, and information.

Conducting Ethical Research
To conduct research ethically, the researcher's responsibilities include obtaining informed consent, ensuring confidentiality, debriefing participants about the purpose of the study and any consequences of participation, and avoiding the unnecessary use of deception. In animal research, ethical considerations include protecting animal subjects from unnecessary pain and discomfort, while weighing the potential benefits of research against the possible harm to animals.

Minimizing Bias
Psychologists must guard against gender, cultural, and ethnic biases in research. Research that relies on limited (for example, all male or all Euro-American) samples cannot be generalized to the entire population. Gender, cultural, and ethnic biases can lead to inaccurate conclusions in psychological research.

Being a Wise Consumer of Information About Psychology
When you read or hear about psychological research in the popular media, you should approach the information with a critical mind. This means distinguishing between group results and individual needs, not overgeneralizing based on a small sample or single study, and not drawing causal conclusions from correlational data. It is also important to evaluate the source of the information and its credibility.