

TABLE 6.1
High School Grades for Students from High-
and Low-Income Families

High Income		Low Income
72		83
86		89
81		94
78		90
85		97
80		89
91		95
Mean = 81.9	Compare the two groups	Mean = 91.0

There are three different research strategies that examine relationships between variables using the kind of data shown in Table 6.1. The differences among the three strategies are based on the questions that they address and their ability to produce unambiguous answers.

The Experimental Research Strategy

The experimental research strategy is intended to answer cause-and-effect questions about the relationship between two variables. For example, are increases in exercise responsible for causing decreases in cholesterol level? To answer the question, a researcher could create two treatment conditions by changing the amount of exercise from low in one condition to high in the other. Then, one group of individuals is assigned to the low-exercise condition, and a similar group is assigned to the high-exercise condition. Cholesterol is measured for each group, and the scores in the low-exercise condition are compared with the scores in the high-exercise condition to determine whether changes in the level of exercise cause changes in cholesterol (Table 6.2a). Note that the purpose of the experimental research strategy is to explain the relationship by determining the underlying cause. An experimental study is conducted with rigorous control to help ensure an unambiguous demonstration of a cause-and-effect relationship. In Chapter 7, we discuss the details of the experimental research strategy.

The Quasi-Experimental Research Strategy

Although this strategy usually attempts to answer cause-and-effect questions about the relationship between two variables, it can never produce an unambiguous explanation. For example, a researcher would like to determine whether a specific treatment causes a reduction in cigarette smoking. Attempting to answer this question, a researcher identifies a large company with several offices across the country. Two of the offices are selected to participate in the study, and a group of people who smoke is identified in each office. The

TABLE 6.2
Examples of Data for Experimental, Quasi-Experimental,
and Nonexperimental Research Studies

a. Experimental		b. Quasi-Experimental		c. Nonexperimental	
Low Exercise	High Exercise	Without Treatment	With Treatment	Girls	Boys
168	122	still smoking	quit	27	14
196	210	still smoking	still smoking	30	16
175	130	quit	quit	19	18
210	124	still smoking	quit	27	15
226	146	still smoking	quit	24	21
183	133	still smoking	quit	23	23
142	158	quit	still smoking	18	18
198	122	quit	quit	15	14
207	140	still smoking	still smoking	29	21
195	135	still smoking	quit	28	20
Compare cholesterol scores		Compare smoking behaviors		Compare verbal scores	

researcher then begins the smoking cessation treatment for one of the two groups. After two months, the smoking behavior for the individuals in both groups is recorded again, and the scores for the individuals in the smoking cessation treatment are compared with those obtained for the individuals who did not receive the treatment (see Table 6.2b). The quasi-experimental research strategy uses some of the rigor and control that exist in experiments; however, quasi-experimental studies always contain a flaw that prevents the research from obtaining an absolute cause-and-effect answer. For this example, the researcher used preexisting groups and did not control the assignment of individuals to groups. Therefore, there is no way to know whether the people in the treatment program are similar to those in the no-treatment program. The two groups could be very different in terms of age, income, motivation, or a variety of other variables. Although people who received the treatment may be more successful at quitting, you cannot conclude that the treatment *caused* greater success. It may be that the treatment has no effect and the smokers in the treatment condition were simply more motivated. As the name implies, quasi-experimental studies are almost, but not quite, experiments. In Chapter 10, we discuss the details of the quasi-experimental research strategy.

The Nonexperimental Research Strategy

The nonexperimental research strategy is intended to demonstrate a relationship between variables, but it does not attempt to explain the relationship. In particular, this strategy does not try to produce cause-and-effect explanations. For example, a researcher would like to determine whether the verbal skills for

6-year-old girls are different from those for 6-year-old boys. (Is there a relationship between verbal skills and gender?) To answer this question, a researcher could measure verbal skills for each individual in a group of boys and in a group of girls, then compare the two sets of scores (see Table 6.2c). Non-experimental studies do not use the rigor and control that exist in experiments and in quasi-experimental studies, and do not produce cause-and-effect explanations. For example, a study may demonstrate that girls have higher verbal skills than boys, but it does not explain *why* the girls' scores are higher. In Chapter 10, we discuss the details of the nonexperimental research strategy.

Nonexperimental and Correlational Research

You may have noticed that nonexperimental and correlational research have exactly the same goal. Specifically, both are designed to demonstrate that a relationship exists between two variables but do not try to explain the relationship. The difference between the two research strategies is the kind of data used to accomplish this goal. The correlational strategy uses one group of participants and measures two variables for each individual, producing data structured like the scores shown in Figure 6.2. The nonexperimental strategy compares two or more groups of scores, measuring only one variable for each individual and produces data like the scores in Table 6.2c. Although these two research strategies take different approaches for collecting data, they reach the same conclusions and have exactly the same limitations.

Research Strategy Summary

The five research strategies are summarized in Table 6.3. For organizational purposes, we group the five research strategies into three broad categories:

1. Strategies that examine individual variables instead of relationships between variables.
2. Strategies that examine relationships between variables by measuring two (or more) variables for each participant.
3. Strategies that examine relationships between variables by comparing two (or more) groups of scores.

Note that the three research strategies in Category 3 form a hierarchy in terms of explaining relationships between variables. Experiments are designed to demonstrate cause-and-effect relationships. That is, experimental studies produce unambiguous explanations by demonstrating that changes in one variable are responsible for causing changes to occur in a second variable. Quasi-experimental studies aim to demonstrate cause-and-effect relationships but fall short of achieving this goal. Finally, nonexperimental research simply attempts to demonstrate that a relationship exists and makes no attempt to explain why the two variables are related. Also notice that although the correlational and nonexperimental strategies use different data, they have the same purpose and produce the same kind of conclusion.

Research Strategies, Research Designs, and Research Procedures

We introduced the term *research strategy* to refer to the general approach to a research study that is intended to address a specific question. We should note,

TABLE 6.3
Five Research Strategies Organized by the Data Structures They Use

<p>Category 1: Strategies that examine individual variables.</p>	<p>Data: Create two treatment conditions by changing the level of one variable. Then measure a second variable for the participants in each condition (see Table 6.2a).</p>
<p>Descriptive Purpose: Produce a description of individual variables as they exist within a specific group. Data: A list of scores obtained by measuring each individual in the group being studied. Example: On average, students at the local college spend 12.5 hours studying outside of class each week and get 7.2 hours of sleep each night.</p>	<p>Example: Increasing the amount of exercise causes a decrease in cholesterol levels.</p>
<p>Category 2: Strategies that examine relationships between variables by measuring two (or more) variables for each participant.</p>	<p>Quasi-Experimental Purpose: Attempt to produce a cause-and-effect explanation, but fall short.</p>
<p>Correlational Purpose: Produce a description of the relationship between two variables but do not attempt to explain the relationship. Data: Measure two variables (two scores) for each individual in the group being studied (see Figure 6.2). Example: There is a relationship between wake-up times and grade point averages for college students, but we don't know why.</p>	<p>Data: Measure before/after scores for one group that receives a treatment and for a different group that does not receive the treatment (see Table 6.2b). Example: The treatment may cause a reduction in smoking behavior, but the reduced smoking may be caused by something else.</p>
<p>Category 3: Strategies that examine relationships between variables by comparing two (or more) groups of scores.</p>	<p>Nonexperimental Purpose: Produce a description of the relationship between two variables but do not attempt to explain the relationship.</p>
<p>Experimental Purpose: Produce a cause-and-effect explanation for the relationship between two variables.</p>	<p>Data: Measure scores for two different groups of participants or for one group at two different times (see Table 6.2c). Example: There is a relationship between gender and verbal ability. Girls tend to have higher verbal skills than boys, but we don't know why.</p>

however, that the terms *research design* and *research procedures* are often used to refer to the same concept. We prefer that these three terms be defined individually to refer to three distinct stages of research development and the choices and decisions that comprise each stage. The following paragraphs discuss and define the three terms as they will be used throughout this book.

Research Strategies

The term *research strategy* refers to the general approach and goals of a research study (see p. 155). Research strategy is usually determined by the kind of question you plan to address and the kind of answer you hope to obtain. In general terms, a research strategy is concerned with what you hope to accomplish in a

research study. Chapters 7, 10, 12, and 13 provide more details about these different approaches.

Research Designs

The next step, the research design, addresses how to implement the strategy. Determining a research design requires decisions about three basic aspects of the research study:

1. *Group versus individual.* Will the study examine a group of individuals, producing an overall description for the entire group, or should the study focus on a single individual? Although results from a large group can be generalized more confidently than results from a single individual, the careful examination of a single individual often can provide detail that is lost in averaging a large group.
2. *Same individuals versus different individuals.* Some research examines changes within the same group of individuals as they move from one treatment to the next. Other research uses a different group of individuals for each separate treatment and then examines differences between groups. Each design has advantages and disadvantages that must be weighed in the planning phase.
3. *The number of variables to be included.* The simplest study involves examining the relationship between two variables. However, some research involves three or more variables. For example, a researcher may be interested in multiple relationships, or a study may focus on two variables but ask how their relationship is affected by other variables. Thus, one factor in determining a research design is deciding how many variables will be observed, manipulated, or regulated.

A research design is a general framework for conducting a study. We discuss different designs and their individual strengths and weaknesses in Chapters 8, 9, 10, 11, 13, and 14.

DEFINITION

A research design is a general plan for implementing a research strategy. A research design specifies whether the study will involve groups or individual participants, will make comparisons within a group or between groups, and how many variables will be included in the study.

Research Procedures

The next stage in developing a research study involves filling in the details that precisely define how the study is to be done. This final, detailed stage is called the research procedure. It includes a precise determination of:

- exactly how the variables will be manipulated, regulated, and measured.
- exactly how many individuals will be involved.
- exactly how the individual participants or subjects will proceed through the course of the study.

The procedure contains the final decisions about all choices still open after the general design is determined and each study typically has its own unique

procedures. The task of defining and measuring variables is discussed in Chapter 3; different ways of selecting individuals to participate in a study are discussed in Chapter 5. For each completed study, a description of the research procedure is typically presented in the method section of the research report, which is discussed briefly in Table 2.2 (p. 55) and in Chapter 16.

DEFINITION

A research procedure is an exact, step-by-step description of a specific research study.

Data Structures and Statistical Analysis

Experimental, quasi-experimental, and nonexperimental studies all involve comparing groups of scores (see Table 6.2). Usually, the comparison involves looking for mean differences or differences in proportions. For example:

- The average cholesterol score is 142 for people in the high-exercise group compared to an average of 190 for people in the low-exercise group.
- Of the individuals who were in the treatment program, 70% quit smoking compared with only 30% of those who did not receive the treatment.
- The average verbal score for the girls is 24, compared with an average score of 18 for the boys.

Statistical techniques are discussed in Chapter 15.

Because these three strategies produce similar data, they also tend to use similar statistical techniques. For example, *t* tests and analysis of variance are used to evaluate mean differences, and chi-square tests are used to compare proportions.

Correlational studies do not involve comparing different groups of scores. Instead, a correlational study measures two different variables (two different scores) for each individual in a single group and then looks for patterns within the set of scores (see Figure 6.2). If a correlational study produces numerical scores, the data are usually evaluated by computing a correlation (such as the Pearson correlation). If the data consist of nonnumerical classifications, the statistical evaluation is usually a chi-square test.

Descriptive studies are intended to summarize single variables for a specific group of individuals. For numerical data, the statistical summary usually consists of a mean, or average, score. If the data are nonnumerical classifications, the summary is typically a report of the proportion (or percentage) associated with each category. For example, the average student sleeps 7 hours a day and eats two pizzas a week. Or, 58% of the students report having failed at least one course.

Summary

Different research strategies are available to address the variety of questions with which research can begin. Each strategy is directed toward different types of questions, and each strategy has its own strengths and limitations. Although we have identified five research strategies, another common method differentiates only two: experimental research and nonexperimental, or nonmanipulative, research. The rationale for this two-way classification is that only the experimental strategy can establish the existence of cause-and-effect relationships; other strategies cannot.