1 Statistics or Sadistics?
It's Up to You

LEARNING OBJECTIVES

- Understand the purpose and scope of statistics.

- Review (briefly) the history of statistics.

- Get an introduction to descriptive and inferential statistics.

- Review the benefits of taking a statistics course.

- Learn how to use and apply this book.

SUMMARY/KEY POINTS

Introduction to Part I

- Researchers in a very wide variety of fields use statistics to make sense of the large sets of data they collect in studying a great number of interesting problems.
  - Michelle Lampl, a pediatrician and anthropologist, has studied the growth of infants, finding that some infants can grow as much as 1 inch overnight.
  - Sue Kemper, a professor of psychology, has studied the health of nuns, finding that the complexity of the nuns' writing during their early 20s is related to risk for Alzheimer's disease as many as 70 years later.
  - Aletha Huston, a researcher and teacher, has found that children who watch educational programs on television do better in school than those who don't.

- Statistics can be defined as "the science of organizing and analyzing information," making that information easier to understand.

- Statistics are used to make sense of often large and unwieldy sets of data.

- Statistics can be used in any field to answer a very wide variety of research questions and hypotheses.

A Brief History of Statistics

- Far back in human history, collecting information became an important skill.

- Once numbers became part of human language, they began to be attached to outcomes. In the 17th century, the first set of data relating to populations of people was collected.

- Once scientists began to collect data, they needed to develop specific tools to answer specific questions. This led to the development of statistics, which can look at both the frequency of events (like the number of children born with autism in the United States in a specific decade) as well as differences between groups (like whether people who are under a great deal of stress at work are more likely to yell at their spouses at home compared to people who are more relaxed at work).

- In the early 20th century, the simplest test for examining the differences between the averages of two groups was developed. For example, are people who take "cat naps" during their workday more productive than those who do not take cat naps? Or are couples who are similar happier than couples who are dissimilar (the whole "birds of a feather flock together" versus "opposites attract" debate)?

- The development of powerful and relatively inexpensive computers has revolutionized the field of statistics. While individuals can now conduct complex and computationally intensive statistical analyses with their own computers, they can potentially run analyses incorrectly or arrive at incorrect conclusions regarding their results. A researcher may incorrectly claim that there is a statistically significant difference between a group that sleeps too much and a group that sleeps too little on a cognitive task when there are no actual differences between groups.

- Today, researchers from a wide variety of fields use basically the same techniques, or statistical tests, to answer very different questions. This means that learning statistics enables you to conduct quantitative research in almost any field. It also means that you can understand the methods used in journal articles written by social psychologists, school psychologists, environmental psychologists, clinical psychologists, developmental psychologists, and neuropsychologists, as well as dozens of other specialties within the field of psychology.

Statistics: What It Is (and Isn't)

- Statistics describes a set of tools and techniques that is used for describing, organizing, and interpreting information or data. It helps us understand the world around us.

- Descriptive statistics are used to organize and describe the characteristics of a collection of data. The collection is sometimes called a data set or just data. This might involve finding the average scores on an IQ test or the frequency of times children disobey their parents. The participant section of most journal articles include descriptive statistics related to participant gender, ethnicity, and age.

- Inferential statistics are often (but not always) carried out after descriptive statistics. They are used to make inferences from a smaller group of data to a larger one. An example is using results from one kindergarten classroom to infer, or generalize, about a population of a whole kindergarten grade. Or a researcher might infer whether the skills children with Attention Deficit Hyperactivity Disorder learn in a skills education class can transfer to other populations or other settings.

- A sample is a portion or subset of a larger population. Data from samples may be used for description only, or to generalize something about the larger population.

- A population is a full set from which a sample is taken: all the possible cases of interest. Data from a sample can be used to infer properties of a whole population. Of course, the sample should represent the larger population. If a study finds high ratings of confidence in elected officials, but it only uses community members with a high socio-economic status (SES), the results may not apply to those with lower SES.

Why Study Statistics? What Am I Doing in a Statistics Class?

- Having statistical skills puts you at an advantage when applying to graduate school or for a research or academic position.

- If not a required course for your major, a basic statistics course on your transcript sets you apart from other students.

- A statistics course can be an invigorating intellectual challenge.

- Having a knowledge of statistics makes you a better student, as it will enable you to better understand journal articles and books in your field as well as what your professors and colleagues study and discuss. It will also make you a critical consumer of information outside of an educational setting. When logging onto the Internet, reading a newspaper or magazine, or watching the local news, you are often exposed to research results. But just how valid and reliable are those studies? This course will give you valuable insight into the methods used in those research reports, allowing you to determine whether the studies are dependable.

- A basic knowledge of statistics will position you well for further study if you plan to pursue a graduate degree in the social or behavioral sciences or in many other fields.

Tips for Using This Book

- Be confident: Work hard, and you'll do fine.

- Statistics is not as difficult as it's made out to be.

- Don't skip chapters: Work through them in sequence.

- Form a study group.

- Ask your professor questions.

- Do the exercises at the end of each chapter.

- Practice, practice, practice: Besides the exercises, find other opportunities to use what you've learned.

- Look for applications to make the material more real. If available at your university, try to join a research lab. You can get great exposure to research by actually engaging in research with a faculty member or graduate student.

- Browse: Flip through the future material and review chapters.

- Have fun: Enjoy mastering a new field and acing your course.

KEY TERMS

- **Statistics**: A set of tools and techniques that is used for describing, organizing, and interpreting information or data

- **Descriptive statistics**: A set of statistical techniques and tools that is used to organize and describe data

- **Data, Data set**: A set of data points (where one data point = one observation/measurement)

- **Inferential statistics**: A set of statistical techniques and tools that is used to make inferences from a smaller group of data to a larger one

- **Sample**: A subset of the population. A researcher's goal is often to generalize findings from a sample to a population

- **Population**: All the possible subjects or cases of interest