

# 1 Statistics or Sadistics? It's Up to You

## CHAPTER OUTLINE

- ◆ Why Statistics?
    - ◇ And Why SPSS?
  - ◆ A 5-Minute History of Statistics
  - ◆ Statistics: What It Is (and Isn't)
    - ◇ What Are Descriptive Statistics?
    - ◇ What Are Inferential Statistics?
    - ◇ In Other Words...
  - ◆ What Am I Doing in a Statistics Class?
  - ◆ Ten Ways to Use This Book (and Learn Statistics at the Same Time!)
  - ◆ About the Book's Features
  - ◆ Key to Difficulty Icons
  - ◆ Glossary
  - ◆ Summary
  - ◆ Time to Practice
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## 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.
  - 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.
  - 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.
  - Michelle Lampl, a pediatrician and anthropologist, has studied the growth of infants, finding that some infants can grow as much as 1 inch overnight.
- 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 education, or 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 sets of data began to be collected, scientists needed to develop specific tools to answer specific questions. This led to the development of statistics.
- In the early 20th century, the simplest test for examining the differences between the averages of two groups was developed and these have evolved into the more refined tests used every day in education settings
- 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.
- 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. This is important for educators who must understand multiple fields of study from psychology to technology and much more.

### ***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.
- 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.
- 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. Samples should always adequately represent the population in terms of age, ethnicity, gender, religion as well as any other relevant characteristic.
- 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.

### ***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 education or other fields as well as what your professors and colleagues study and discuss.
- Research and statistical analyses are the foundation of “evidence based education.” Understanding the statistics behind the evidence will allow you to understand why policy changes or curriculum changes are occurring.
- A basic knowledge of statistics will position you well for further study if you plan to pursue a graduate degree in education or other fields.

### ***Tips for Using This Book***

- Be confident: You are an educator, you can handle this. 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.
- 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