

Chapter Summary

- A **two-way table** displays the outcomes of a categorical variable in two or more contexts.
- The **null hypothesis**, denoted H_0 , describes an initial belief that there has been no change in *ABILITY* or that there is no difference in *ABILITY* in two different contexts. The **alternative hypothesis**, denoted H_a , describes what we want to establish or what we suspect is true. In this chapter, the alternative hypothesis states that an athlete's or team's *ABILITY* to be successful is higher in one context than in another.
- A **hypothesis test** is a procedure for deciding whether the data provide convincing evidence to support the alternative hypothesis.
- A **test statistic** is a measure calculated from an athlete's *PERFORMANCES* and used as evidence in a hypothesis test. In this chapter, the test statistic was the difference in the percentage of successes in two different contexts.
- A **p -value** measures how likely it is to get a test statistic at least as extreme as the observed test statistic by *RANDOM CHANCE*, assuming that the null hypothesis is true.
- To estimate the p -value, we conduct a **simulation** to determine what values of the test statistic are likely to happen by *RANDOM CHANCE* alone, assuming that the null hypothesis is true.
- When the p -value is small (less than 0.05), we **reject the null hypothesis** and say that there is convincing evidence that the alternative hypothesis is true.
- When the p -value is large (greater than or equal to 0.05), we **fail to reject the null hypothesis** and say that there is *not* convincing evidence that the alternative hypothesis is true.
- The **sample size** is the number of observations in a particular context. When the alternative hypothesis is really true, we are more likely to find convincing evidence that it is true when we use larger sample sizes.
- When it is impossible to determine which of two or more variables is causing a change in the response variable, these variables are **confounded**.
- When studies use available data, they are called **observational studies**. It is difficult to establish cause-and-effect relationships with observational studies, even when there is convincing evidence that an athlete or team has a greater *ABILITY* in one context.
- In an **experiment**, researchers deliberately impose **treatments** to see if changes in the **explanatory variable** cause changes in the **response variable**.
- In an experiment using one athlete, it is important to **randomly assign** the order in which the treatments are applied so that one treatment isn't favored by going first or last.
- In an experiment, **control** means keeping all variables the same except for the explanatory variable.