

## LEARNING CHECK

1. What is a Type I error? Why is the Type I error an issue when we are comparing three or more group means?

A: Researchers commit a Type I error when they find a statistically significant result in their sample data that does not exist in the population from which that sample was drawn. The Type I error is problematic when comparing three or more group means because the more statistical comparisons we make, the more likely we are to commit this type of error.

2. Why is Eskine's (2012) experiment considered a "one-way" design? Why is Eskine's (2012) experiment considered a "between-subjects" design?

A: It was a "one-way" experimental design because it contained one independent variable. It was a "between-subjects" experimental design because participants were randomly assigned to one and only one experimental group created by the manipulation of the independent variable.

3. What are the two components of between-groups variability?

A: The effects of the independent variable (systematic variance) and error variability

4. Suppose an ANOVA has a systematic variance of 5 and an error of variance of 10. What will the  $F$  ratio be?

$$\begin{aligned} \text{A:} \quad F &= \frac{5 + 10}{10} \\ F &= \frac{15}{10} \\ F &= 1.5 \end{aligned}$$

5. Suppose an ANOVA has a systematic variance of 20 and an error variance of 20. What will the  $F$  ratio be?

$$\begin{aligned} \text{A:} \quad F &= \frac{20 + 20}{20} \\ F &= \frac{40}{20} \\ F &= 2 \end{aligned}$$

6. What is the "grand mean" in an ANOVA? Why might the grand mean not simply be the average of all group means?

A: The grand mean is the mean obtained from averaging scores across all groups in an experiment. The grand mean may not be the average of the group means because there may not be an equal number of participants in each experimental group. A group with 20 participants will have a stronger influence on the grand mean than will a group with, say, 16 participants.