Test Bank for Statistics for the Behavioral Sciences 5th Nolan

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Name:_____ Class:_____ Date:_____

Chapter 1 - Fill-in-the-Blank

1. A statistic that summarizes a group of numbers is a(n) _____ statistic.
ANSWER: descriptive

2. A statistic that uses sample data to make general estimates about the larger population is a(n) _____ statistic.
ANSWER: inferential

3. A five-star rating system for hotels is a(n) _____ variable.
ANSWER: ordinal

4. A person's religious affiliation is a(n) _____ variable.
ANSWER: nominal

5. Continuous observations can typically take on _____ values than discrete observations.
ANSWER: more

6. A(n) _____ is a variable that meets the criteria for an interval and ratio variable.
ANSWER: scale variable

7. Discrete values that the independent variable can take on are called the _____ of the independent variable.
ANSWER: levels

8. A variable that is manipulated to determine its effects on another variable is a(n) _____ variable.
ANSWER: independent

9. A(n) _____ variable makes it impossible to determine whether the independent variable is the cause of changes in the dependent variable.
ANSWER: confounding

10. A(n) _____ measure sets out to evaluate something and does that accurately.
ANSWER: valid

11. A(n) _____ variable gets consistent results; that is, it produces the same assessment over time for an unchanging variable.
ANSWER: reliable

12. _____ is the process of drawing conclusions about whether or not a particular relation between variables is supported by the data.
ANSWER: Hypothesis testing

13. When two or more variables vary together, they are said to be _____.
ANSWER: correlated

14. Each participant experiences all levels of the independent variable in a(n) _____ design.
ANSWER: within-groups

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Chapter 1 - Fill-in-the-Blank

15. Participants experience only one level of the independent variable in a(n) _____ design.
ANSWER: between-groups

16. When an investigator changes their research hypotheses to fit the data they have collected it is known as _____.
ANSWER: HARKing

17. The process of _____ involves a researcher specifying their data collection plans, methods, and analyses before beginning their research study.
ANSWER: preregistration

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Name:_____ Class:_____ Date:_____

Chapter 1 - Multiple Choice

1. A behavioral psychologist wanted to determine whether eating sugary cereal for breakfast increased the aggression of first graders during their morning play period. After feeding a group of 20 students sugary cereal for breakfast she observed that, on average, the students committed 5.1 aggressive behaviors during their morning play period. In this example, the descriptive statistic is:

a. the 5.1 aggressive behaviors.
b. the 20 students the researcher observed.
c. all first graders.
d. all first graders who ate sugary cereal for breakfast.

ANSWER: a

2. Stacey is a weight-loss group instructor. To get a better idea of how to help those she will be working with to achieve their weight-loss goals, she wishes to know the average weight-loss goal of the individuals in her group. What kind of statistic should Stacey use?

a. reliability
b. population
c. inferential
d. descriptive

ANSWER: d

3. A behavioral economist wanted to explore the connection between the number of bathrooms in a house and the sale price of the house. She studied 1384 home sales in an economically diverse, medium-sized city and found that the average sale price went up by $63,000 for each full bath. What is the descriptive statistic in this study?

a. 1384 home sales
b. houses in economically diverse, medium-sized cities
c. number of bathrooms
d. average increase in sale price of $63,000 per bathroom

ANSWER: d

4. A descriptive statistic is generally defined as:

a. the entire group of interest about which we want to make conclusions.
b. a single number or group of numbers that organize, summarize, and communicate a group of numerical observations.
c. a subset, or smaller collection, of observations from the overall group of interest.
d. using data to make general estimates about the overall group of interest.

ANSWER: b

5. A team of researchers interested in asthma symptoms wanted to know how symptoms were affected in dry versus humid conditions. The researchers recruited 18 asthma patients to spend four weeks under two conditions: sleeping with a dehumidifier for two weeks to create a "dry" environment and sleeping with a humidifier for the remaining two weeks to create a "humid" environment. Patients were asked to rate their symptoms at regular intervals using a scale from "0 – no symptoms" to "20 – maximum asthma symptoms." The change in asthma symptoms from dry to humid conditions was 5.82, showing a reduction of symptoms in

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Chapter 1 - Multiple Choice

humid conditions. What was the descriptive statistic in this study?

a. change in responses on the scale of 5.82 on average
b. four weeks, with two weeks under each condition
c. 18 asthma patients
d. two sleeping conditions, dry and humid

ANSWER: a

6. A behavioral psychologist wanted to determine whether eating sugary cereal for breakfast increased the aggression of first graders during their morning play period. After feeding a group of 20 students sugary cereal for breakfast she observed that, on average, the students committed 5.1 aggressive behaviors during their morning play period. In this example, the sample is:

a. the 5.1 aggressive behaviors.
b. the 20 students the researcher observed.
c. all first graders.
d. all first graders who ate sugary cereal for breakfast.

ANSWER: b

7. Research published by Hsee and Tang (2007) described the results of a study in which 195 college students completed a happiness scale (from 1 to 7) just before taking a midterm exam. On this scale, 1 corresponded to *very unhappy* and 7 to *very happy*. On average, the students rated their happiness as 6.18. In this study, which of these would require an inferential statistic?

a. the average rating of happiness at 6.18
b. the conclusion that college students, on average, are rather happy prior to taking midterm exams
c. the conclusion that these 195 college students are rather happy prior to taking this midterm exam
d. the 195 college students who completed the happiness scale

ANSWER: b

8. Inferential statistics allow a researcher to:

a. summarize numerical observations for a population.
b. make inferences about a sample of interest given observations taken on a larger population.
c. make inferences about a population of interest given observations taken on a smaller sample.
d. summarize numerical observations for a sample.

ANSWER: c

9. Dietz and Henrich (2014) were interested in the impact of texting on student learning. A group of 99 college students were randomly assigned to text ($N = 50$) or not text ($N = 49$) during a pre-recorded psychology lecture. At the end of the 20 minute lecture, students answered a 17 question quiz about the material that had just been presented. On average, the researchers found that students who texted during the lecture answered fewer quiz questions correctly as compared to students who hadn't texted during the lecture. What is the sample in this study?

a. the 99 college students who participated in the study
b. all college students, those who text in class and those who don't text in class

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c. the number of questions answered correctly on the post-lecture quiz
d. the 20-minute duration of the pre-recorded lecture

ANSWER: a

10. Dietz and Henrich (2014) were interested in the impact of texting on student learning. A group of 99 college students were randomly assigned to text ($N = 50$) or not text ($N = 49$) during a pre-recorded psychology lecture. At the end of the 20 minute lecture, students answered a 17 question quiz about the material that had just been presented. On average, the researchers found that students who texted during the lecture answered fewer quiz questions correctly as compared to students who hadn't texted during the lecture. Which of these requires an inferential statistic?

a. the random assignment of students into texting and non-texting groups
b. recruiting the sample of 99 college students
c. the average performance on the post-lecture quiz
d. the conclusion that texting interferes with student learning

ANSWER: d

11. A behavioral psychologist wanted to determine whether eating sugary cereal for breakfast increased the aggression of first graders during their morning play period. After feeding a group of 20 students sugary cereal for breakfast she observed that, on average, the students committed 5.1 aggressive behaviors during their morning play period. In this example, the population is:

a. the 5.1 aggressive behaviors.
b. the 20 students the researcher observed.
c. all first graders.
d. all first graders who eat sugary cereal for breakfast.

ANSWER: d

12. Dietz and Henrich (2014) were interested in the impact of texting on student learning. A group of 99 college students were randomly assigned to text ($N = 50$) or not text ($N = 49$) during a pre-recorded psychology lecture. At the end of the 20 minute lecture, students answered a 17 question quiz about the material that had just been presented. On average, the researchers found that students who texted during the lecture answered fewer quiz questions correctly as compared to students who hadn't texted during the lecture. What is the population in this study?

a. the 99 college students who participated in the study
b. all college students, those who text in class and those who don't text in class
c. the number of questions answered correctly on the post-lecture quiz
d. the 20-minute duration of the pre-recorded lecture

ANSWER: b

13. Why do researchers typically study samples rather than populations?

a. Entire populations can be too costly to study or impossible to access.
b. Entire populations are too variable to study.
c. Samples are more representative than their respective populations.
d. Studying a sample is more difficult than studying a population.

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Chapter 1 - Multiple Choice

ANSWER: a

14. The statement "12405 college-aged students participated in a study examining the relationship between gender and depression" is an example of a(n) _____ in research and statistics.
    a. population
    b. sample
    c. descriptive statistic
    d. inferential statistic

ANSWER: b

15. A behavioral economist wanted to explore the connection between the number of bathrooms in a house and the sale price of the house. She studied 1384 home sales in an economically diverse, medium-sized city and found that the average sale price went up by $63,000 for each full bath. What is the sample in this study?
    a. 1384 home sales
    b. houses in economically diverse, medium-sized cities
    c. number of bathrooms
    d. average increase in sale price of $63,000 per bathroom

ANSWER: a

16. A behavioral economist wanted to explore the connection between the number of bathrooms in a house and the sale price of the house. She studied 1384 home sales in an economically diverse, medium-sized city and found that the average sale price went up by $63,000 for each full bath. Which statement involves a logical inferential statistic based on this research?
    a. Adding a bathroom to your house will cost $63,000.
    b. On average, adding a bathroom to your house can increase the sale price.
    c. Houses sell for $63,000 on average.
    d. Bathrooms are highly desirable features of houses in medium-sized cities.

ANSWER: b

17. A behavioral economist wanted to explore the connection between the number of bathrooms in a house and the sale price of the house. She studied 1384 home sales in an economically diverse, medium-sized city and found that the average sale price went up by $63,000 for each full bath. What is a logical population to which the researcher would want to extend this finding?
    a. the 1384 homes involved in the research
    b. home sales across the country in which the research was conducted
    c. all home sales in diverse, medium-sized cities
    d. home sales throughout the last decade

ANSWER: c

18. A sample is generally defined as:
    a. the entire group of interest about which we want to make conclusions.
    b. a single number or group of numbers that organize, summarize, and communicate a group of

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numerical observations.

c. a subset, or smaller collection, of observations from the overall group of interest.

d. using data to make general estimates about the overall group of interest.

ANSWER: c

19. A population is generally defined as:

a. the entire group of interest about which we want to make conclusions.

b. a single number or group of numbers that organize, summarize, and communicate a group of numerical observations.

c. a subset, or smaller collection, of observations from the overall group of interest.

d. using data to make general estimates about the overall group of interest.

ANSWER: a

20. An inferential statistic is generally defined as:

a. the entire group of interest about which we want to make conclusions.

b. a single number or group of numbers that organize, summarize, and communicate a group of numerical observations.

c. a subset, or smaller collection, of observations from the overall group of interest.

d. using data to make general estimates about the overall group of interest.

ANSWER: d

21. A team of researchers interested in asthma symptoms wanted to know how symptoms were affected in dry versus humid conditions. The researchers recruited 18 asthma patients to spend four weeks under two conditions: sleeping with a dehumidifier for two weeks to create a "dry" environment and sleeping with a humidifier for the remaining two weeks to create a "humid" environment. Patients were asked to rate their symptoms at regular intervals using a scale from "0 – no symptoms" to "20 – maximum asthma symptoms." The change in asthma symptoms from dry to humid conditions was 5.82, showing a reduction of symptoms in humid conditions. What was the sample in this study?

a. change in responses on the scale of 5.82 on average

b. four weeks, with two weeks under each condition

c. 18 asthma patients

d. two sleeping conditions, dry and humid

ANSWER: c

22. A team of researchers interested in asthma symptoms wanted to know how symptoms were affected in dry versus humid conditions. The researchers recruited 18 asthma patients to spend four weeks under two conditions: sleeping with a dehumidifier for two weeks to create a "dry" environment and sleeping with a humidifier for the remaining two weeks to create a "humid" environment. Patients were asked to rate their symptoms at regular intervals using a scale from "0 – no symptoms" to "20 – maximum asthma symptoms." The change in asthma symptoms from dry to humid conditions was 5.82, showing a reduction of symptoms in humid conditions. What is MOST likely the population of interest for these researchers?

a. the patients who participated in the study

b. all asthma sufferers

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c. everyone who sleeps
d. patients during the four weeks of the study

ANSWER: b

23. A team of researchers interested in asthma symptoms wanted to know how symptoms were affected in dry versus humid conditions. The researchers recruited 18 asthma patients to spend four weeks under two conditions: sleeping with a dehumidifier for two weeks to create a "dry" environment and sleeping with a humidifier for the remaining two weeks to create a "humid" environment. Patients were asked to rate their symptoms at regular intervals using a scale from "0 – no symptoms" to "20 – maximum asthma symptoms." The change in asthma symptoms from dry to humid conditions was 5.82, showing a reduction of symptoms in humid conditions. Which statement involves an inferential statistic related to this research finding?

a. Asthma symptoms may be lowered, on average, with humid sleeping conditions.
b. You can expect your asthma symptoms to diminish if you move to a drier climate.
c. Varying your sleeping conditions can affect your health.
d. Asthma symptoms increase when patients sleep with humidifiers.

ANSWER: a

24. A preschool school teacher is interested in the association between sugar consumption and activity level in preschool children. The teacher gives 30 preschool children from Preppy Preschool Playland 0 milligrams, 25 milligrams, or 50 milligrams of sucrose (sugar) in a breakfast drink. He then observes their behavior for 30 minutes during their morning outdoor play period and codes their activity level. In this example, the population is:

a. 30 preschool children.
b. the amount of sucrose.
c. all preschool children.
d. activity level.

ANSWER: c

25. A preschool school teacher is interested in the association between sugar consumption and activity level in preschool children. The teacher gives 30 preschool children from Preppy Preschool Playland 0 milligrams, 25 milligrams, or 50 milligrams of sucrose (sugar) in a breakfast drink. He then observes their behavior for 30 minutes during their morning outdoor play period and codes their activity level. In this example, the sample is:

a. 30 preschool children.
b. the amount of sucrose.
c. all preschool children.
d. activity level.

ANSWER: a

26. Variables are:

a. specific values (in whole numbers) that represent an individual's category membership.
b. the value of physical, attitudinal, or behavioral characteristics for a given individual.
c. hypothetical ideas that have been developed to describe and explain human behavior.
d. observations of physical, attitudinal, or behavioral characteristics that can take on different values.

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ANSWER: d

27. A variable that consists of separate specific categories for which there are no values between categories is:
    a. discrete.
    b. ratio.
    c. continuous.
    d. confounding.

ANSWER: a

28. Which of the following is NOT a variable?
    a. students' heights
    b. students' scores on a statistic exam
    c. maximum number of points possible on a 100-point exam
    d. students' scores on an empathy scale

ANSWER: c

29. A variable for which there is an infinite number of values between any two points on the scale is:
    a. discrete.
    b. ratio.
    c. continuous.
    d. confounding.

ANSWER: c

30. Variables on which measurement scale are always discrete?
    a. ratio and ordinal
    b. ratio and interval
    c. nominal and ordinal
    d. nominal and interval

ANSWER: c

31. Melina is a student at a large university. When visiting professors during their office hours, she has noticed that many have refrigerators in their offices. She decides to survey 60 faculty and count the total number of refrigerators they have. What is the variable in this study?
    a. the university where the data are collected
    b. number of faculty, 60
    c. total number of refrigerators
    d. location of refrigerators

ANSWER: c

32. Melina is a student at a large university. When visiting professors during their office hours, she has noticed that many have refrigerators in their offices. She decides to survey 60 faculty and count the total number of refrigerators they have. What type of observation is she making?

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a. discrete
b. continuous
c. discrete and ordinal
d. continuous and interval

ANSWER: a

33. When reading your college textbooks, you may sometimes find errors in them. If you track the number of errors based on the edition of the textbook, you might find that 1st editions have more errors than 3rd, 5th, and 10th editions. What type of variable is the edition of the text you are assessing?

a. nominal
b. ordinal
c. scale
d. dependent

ANSWER: b

34. A five-star rating system for restaurants is a(n) _____ variable.

a. nominal
b. ordinal
c. interval
d. ratio

ANSWER: b

35. A person's religious affiliation is a(n) _____ variable.

a. nominal
b. ordinal
c. interval
d. ratio

ANSWER: a

36. The United States Forest Service Wildland Fire Assessment System measures fire danger as extreme, very high, high, moderate, or low. In this system, fire danger is:

a. continuous and ratio.
b. continuous and interval.
c. discrete and interval.
d. discrete and ordinal.

ANSWER: d

37. Hair color, assessed as blonde, black, red, brown, and other, as a variable is measured on a(n) _____ scale.

a. nominal
b. ordinal
c. interval

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d. ratio

ANSWER: a

38. Five people run in an election for student body president. The votes are tallied to create a list of candidates from most to least popular. The number of votes is then removed so that a list of candidates from most to least popular is presented. This is a(n) _____ variable.

a. nominal
b. ordinal
c. interval
d. ratio

ANSWER: b

39. The number of times a person eats fast food each week is:

a. discrete and ratio.
b. continuous and interval.
c. discrete and interval.
d. continuous and ordinal.

ANSWER: a

40. A student's grade point average on a scale from 0 to 4.0 is a(n) _____ variable.

a. nominal
b. ordinal
c. interval
d. ratio

ANSWER: d

41. The amount of food a person eats each week (as measured in calories) is:

a. continuous and ratio.
b. continuous and interval.
c. discrete and interval.
d. continuous and ordinal.

ANSWER: a

42. The measurement of the performance of bicyclists in a race based on their finishing places is a(n) _____ variable. The measurement of the performance of bicyclists in a race based on their times to complete the race is a(n) _____ variable.

a. ratio; interval
b. ordinal; ratio
c. ordinal; nominal
d. nominal; ordinal

ANSWER: b

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43. Five people run in an election for student body president. The votes are tallied to create a list of candidates from most to least popular. When the number of votes are actually presented, this is a(n) _____ variable.

a. nominal
b. ordinal
c. interval
d. ratio

ANSWER: d

44. Imagine that a variable "sensitivity to others" is measured from 0 (low) to 80 (high). Although it is possible to have low sensitivity to others, it is not conceptually possible to have no sensitivity at all. What type of variable is this MOST likely to be?

a. nominal
b. ordinal
c. interval
d. ratio

ANSWER: c

45. The number of top ten songs is calculated for 30 multi-platinum recording artists. What type of variable is number of top ten songs?

a. nominal
b. ordinal
c. interval
d. ratio

ANSWER: d

46. The difference between an interval and a ratio variable is that:

a. ratio scales indicate only difference, but interval scales indicate difference and order.
b. interval scales indicate only difference, but ratio scales indicate difference and order.
c. on a ratio scale, the number 0 corresponds to an absence of the quality, but this is not true for an interval scale.
d. there are equal intervals between points on an interval scale, but this is not true for a ratio scale.

ANSWER: c

47. Which types of variables are considered scale variables by statistical computing packages such as SPSS?

a. continuous and ratio
b. continuous and interval
c. discrete and interval
d. ratio and interval

ANSWER: d

48. _____ variables are almost always continuous.

a. Ordinal

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b. Interval
c. Nominal
d. Ratio

ANSWER: d

49. In 2010, there was an interesting lawsuit about bagels. A company claimed to have created a new way to recreate "Brooklyn style" bagels and then reported that another bagel producer stole its recipe. A researcher wonders if bagel sales might have been affected simply by the story making the national news, so she tracks total bagel sales in dollars for one year before and after the news story hits. What type of variable is total bagel sales?

a. nominal
b. ordinal
c. scale
d. independent

ANSWER: c

50. When reading your college textbooks, you may sometimes find errors in them. If you track the number of errors based on the edition of the textbook, you might find that 1st editions have more errors than 3rd, 5th, and 10th editions. What type of variable is the number of errors found?

a. nominal
b. ordinal
c. scale
d. independent

ANSWER: c

51. An article from the *New York Times,* published on April 24, 2007, summarized research conducted by of Dr. Vallortigara, a neuroscientist at the University of Trieste, Italy. In this study, Dr. Vallortigara assessed whether a dog's tail wags in a preferred direction in response to positive as opposed to negative stimuli. First, Dr. Vallortigara recruited 30 dogs that were family pets. While filming a dog's tail from above, he allowed the dog to view (through a slot in its cage) its owner, an unfamiliar human, a cat, and an unfamiliar dominant dog. The study found that dogs' tails wagged to the right for the owner and to the left for the unfamiliar dominant dog. What type of measure was the independent variable in this study?

a. nominal
b. ordinal
c. interval
d. ratio

ANSWER: a

52. An article from the *New York Times,* published on April 24, 2007, summarized research conducted by Dr. Vallortigara, a neuroscientist at the University of Trieste, Italy. In this study, Dr. Vallortigara assessed whether a dog's tail wags in a preferred direction in response to positive as opposed to negative stimuli. First, Dr. Vallortigara recruited 30 dogs that were family pets. While filming a dog's tail from above, he allowed the dog to view (through a slot in its cage) its owner, an unfamiliar human, a cat, and an unfamiliar dominant dog. The

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study found that dogs' tails wagged to the right for the owner and to the left for the unfamiliar dominant dog. What type of measure was the dependent variable in this study?

a. nominal
b. ordinal
c. interval
d. ratio

ANSWER: a

53. The term *level* refers to:

a. a variable that is manipulated to determine its effects on another variable.
b. the discrete values that a variable can take on.
c. a situation in which two variables have the same value.
d. a situation in which there are no confounding variables.

ANSWER: b

54. The variable that is manipulated or observed in order to determine its effects on another variable is the _____ variable.

a. scale
b. independent
c. dependent
d. confounding

ANSWER: b

55. A social psychologist was interested in the effects of gender on attitudes toward women in leadership positions. The researcher surveyed a group of individuals, 12 of whom were men and 12 of whom were women. In this example, *men* is a(n) _____ variable.

a. level of the independent
b. independent
c. dependent
d. confounding

ANSWER: a

56. A social psychologist was interested in the effects of gender on attitudes toward women in leadership positions. The researcher surveyed a group of individuals, 12 of whom were men and 12 of whom were women. In this example, *gender* is the _____ variable.

a. level of the independent
b. independent
c. dependent
d. confounding

ANSWER: b

57. An article from the *New York Times,* published on April 24, 2007, summarized research conducted by Dr.

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Vallortigara, a neuroscientist at the University of Trieste, Italy. In this study, Dr. Vallortigara assessed whether a dog's tail wags in a preferred direction in response to positive as opposed to negative stimuli. First, Dr. Vallortigara recruited 30 dogs that were family pets. While filming a dog's tail from above, he allowed the dog to view (through a slot in its cage) its owner, an unfamiliar human, a cat, and an unfamiliar dominant dog. The study found that dogs' tails wagged to the right for the owner and to the left for the unfamiliar dominant dog. What is the independent variable in this study?

a. finding that dogs' tails went rightward for the owner and leftward for an unfamiliar dog
b. the 30 dogs recruited for the study
c. how far each dog wagged its tail to the right or left
d. the type of visual stimulus provided to the dog

ANSWER: d

58. The outcome variable that we expect to change with changes in the independent variable is the _____ variable.

a. confounding
b. noise
c. dependent
d. scale

ANSWER: c

59. A social psychologist was interested in the effects of gender on attitudes toward women in leadership positions. The researcher surveyed a group of individuals, 12 of whom were men and 12 of whom were women. In this example, what is the dependent variable?

a. the 12 men in the study
b. the 12 women in the study
c. gender of the participants
d. participants' attitudes toward women in leadership positions

ANSWER: d

60. Dr. Hanstad was interested in the effect of Valium on motor performance. He injected 25 rats in the experimental group with a small amount of Valium and 25 rats in the control group with saline solution. Following injection, he measured the rate of bar pressing by both groups of rats. On average, rats in the control group had 800 presses per hour and rats in the experimental group had 615 presses per hour. The same testing box was used for both groups of rats, but different student assistants tested the control and experimental groups. In this example, having two different student assistants test the two groups is a(n) _____ variable.

a. confounding
b. nominal
c. independent
d. dependent

ANSWER: a

61. An article from the *New York Times,* published on April 24, 2007, summarized research conducted by Dr. Vallortigara, a neuroscientist at the University of Trieste, Italy. In this study, Dr. Vallortigara assessed whether

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a dog's tail wags in a preferred direction in response to positive as opposed to negative stimuli. First Dr. Vallortigara recruited 30 dogs that were family pets. While filming a dog's tail from above he allowed the dog to view (through a slot in its cage) its owner, an unfamiliar human, a cat, and an unfamiliar dominant dog. The study found that dogs' tails wagged to the right for the owner and to the left for the unfamiliar dominant dog. What is the dependent variable in this study?

a. finding that dogs' tails went rightward for the owner and leftward for an unfamiliar dog
b. the 30 dogs that were recruited for the study
c. whether the dog wagged its tail to the right or left
d. the type of visual stimulus provided to the dog

ANSWER: c

62. An education researcher studies length of time in college, first through fourth year, and its relation to academic motivation. To get the most detail out of her measures, she assesses each student in both the fall and spring semesters of each of their four years in school. She finds that students have increasingly higher motivation from their first semester to their seventh semester (the start of their fourth year), with a trailing off in the last semester. What is the independent variable in this study?

a. year in school
b. semester in school
c. academic motivation
d. time of year in which the assessment was completed

ANSWER: b

63. An education researcher studies year in college, first through fourth year, and its relation to academic motivation. To get the most detail out of her measures, she assesses each student in both the fall and spring semesters of each their four years in school. She finds that students have increasingly higher motivation from their first to fourth year, with a trailing off in the last semester. What is the dependent variable in this study?

a. year in school
b. semester in school
c. academic motivation
d. time of year in which the assessment was completed

ANSWER: c

64. In a variant of the Coke/Pepsi Challenge, tasters try to identify regular and diet versions of these popular beverages under "blind" conditions, where they can't see the two products. How many levels are there to the independent variable?

a. 1
b. 2
c. 4
d. 8

ANSWER: b

65. In 2010, there was an interesting lawsuit about bagels. A company claimed to have created a new way to recreate "Brooklyn style" bagels and then reported that another bagel producer stole its recipe. A researcher

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Chapter 1 - Multiple Choice

wonders if bagel sales might have been affected simply by the story making the national news, so she tracks total bagel sales in dollars for one year before and after the news story hits. What is the independent variable in this study?

a. the types of bagels sold
b. total sales
c. the news story
d. the lawsuit

ANSWER: c

66. In 2010, there was an interesting lawsuit about bagels. A company claimed to have created a new way to recreate "Brooklyn style" bagels and then reported that another bagel producer stole its recipe. A researcher wonders if bagel sales might have been affected simply by the story making the national news, so she tracks total bagel sales in dollars for one year before and after the news story hits. What is the dependent variable in this study?

a. the types of bagels sold
b. total sales
c. the news story
d. the lawsuit

ANSWER: b

67. A nutritional researcher was interested in whether the size of breakfast could decrease overall food consumption throughout the rest of the day. He creates two breakfast groups, a 350-calorie breakfast and a 700-calorie breakfast, assigns eight participants to each group, and tracks their total calories eaten in one day. Because of the detailed attention needed to accurately interview participants about their eating, he works with the high-calorie group and has his assistant interview the low-calorie group. What is the independent variable in this study?

a. total calories consumed
b. the breakfasts
c. weight loss experienced in the day
d. the researcher conducting the interviews

ANSWER: b

68. A nutritional researcher was interested in whether the size of breakfast could decrease overall food consumption throughout the rest of the day. He creates two breakfast groups, a 350-calorie breakfast and a 700-calorie breakfast, assigns eight participants to each group, and tracks their total calories eaten in one day. Because of the detailed attention needed to accurately interview participants about their eating, he works with the high-calorie group and has his assistant interview the low-calorie group. What is the dependent variable in this study?

a. total calories consumed
b. the breakfasts
c. weight loss experienced in the day
d. the researcher conducting the interviews

ANSWER: a

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Chapter 1 - Multiple Choice

69. A nutritional researcher was interested in whether the size of breakfast could decrease overall food consumption throughout the rest of the day. He creates two breakfast groups, a 350-calorie breakfast and a 700-calorie breakfast, assigns eight participants to each group, and tracks their total calories eaten in one day. Because of the detailed attention needed to accurately interview participants about their eating, he works with the high-calorie group and has his assistant interview the low-calorie group. What is the confounding variable in this study?

a. total calories consumed
b. the low- and high-calorie breakfasts
c. weight loss experienced in the day
d. the individual conducting the interviews

ANSWER: d

70. A nutritional researcher was interested in whether the size of breakfast could decrease overall food consumption throughout the rest of the day. He creates two breakfast groups, a 350-calorie breakfast and a 700-calorie breakfast, assigns eight participants to each group, and tracks their total calories eaten in one day. Because of the detailed attention needed to accurately interview participants about their eating, he works with the high-calorie group and has his assistant interview the low-calorie group. How many levels does the independent variable have in this study?

a. 1
b. 2
c. 8
d. 16

ANSWER: b

71. A preschool school teacher is interested in the association between sugar consumption and activity level in preschool children. The teacher gives 30 preschool children from Preppy Preschool Playland 0 milligrams, 25 milligrams, or 50 milligrams of sucrose (sugar) in a breakfast drink. He then observes their behavior for 30 minutes during their morning outdoor play period and codes their activity level. In this example, the independent variable is:

a. 30 preschool children.
b. the amount of sucrose.
c. all preschool children.
d. activity level.

ANSWER: b

72. A preschool school teacher is interested in the association between sugar consumption and activity level in preschool children. The teacher gives 30 preschool children from Preppy Preschool Playland 0 milligrams, 25 milligrams, or 50 milligrams of sucrose (sugar) in a breakfast drink. He then observes their behavior for 30 minutes during their morning outdoor play period and codes their activity level. In this example, the dependent variable is:

a. 30 preschool children.
b. the amount of sucrose.

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Chapter 1 - Multiple Choice

c. all preschool children.
d. activity level.

ANSWER: d

73. Prof. Acosta was interested in which of two popular statistics textbooks (*Statistics: It Will Change Your Life* and *Statistics: Bigger, Better, Stronger*) was better for students. Prof. Acosta compared the two texts by assigning one text to a section of statistics taught by Prof. Agnew from 10 to 11 a.m. on Monday, Wednesday, and Friday, and the other text to a section of statistics taught by Prof. Alvarez from 7 to 10 p.m. on Wednesday evenings. At the end of the term, all students took the same comprehensive test. Students to whom *Statistics: Bigger, Better, Stronger* was assigned performed better on the test than did students to whom *Statistics: It Will Change Your Life* was assigned. Therefore, Prof. Acosta concluded that the former textbook was the better one. What was the independent variable in this study?

a. statistics textbooks
b. professors
c. comprehensive test
d. students

ANSWER: a

74. Prof. Acosta was interested in which of two popular statistics textbooks (*Statistics: It Will Change Your Life* and *Statistics: Bigger, Better, Stronger*) was better for students. Prof. Acosta compared the two texts by assigning one text to a section of statistics taught by Prof. Agnew from 10 to 11 a.m. on Monday, Wednesday, and Friday, and the other text to a section of statistics taught by Prof. Alvarez from 7 to 10 p.m. on Wednesday evenings. At the end of the term, all students took the same comprehensive test. Students to whom *Statistics: Bigger, Better, Stronger* was assigned performed better on the test than did students to whom *Statistics: It Will Change Your Life* was assigned. Therefore, Prof. Acosta concluded that the former textbook was the better one. What was the dependent variable in this study?

a. statistics textbooks
b. professors
c. comprehensive test scores
d. students

ANSWER: c

75. Prof. Acosta was interested in which of two popular statistics textbooks (*Statistics: It Will Change Your Life* and *Statistics: Bigger, Better, Stronger*) was better for students. Prof. Acosta compared the two texts by assigning one text to a section of statistics taught by Prof. Agnew from 10 to 11 a.m. on Monday, Wednesday, and Friday, and the other text to a section of statistics taught by Prof. Alvarez from 7 to 10 p.m. on Wednesday evenings. At the end of the term, all students took the same comprehensive test. Students to whom *Statistics: Bigger, Better, Stronger* was assigned performed better on the test than did students to whom *Statistics: It Will Change Your Life* was assigned. Therefore, Prof. Acosta concluded that the former textbook was the better one. Which of the following is NOT a potential confounding variable in this study?

a. number of classes per week
b. professors teaching course
c. comprehensive test scores
d. time of day course is taught

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Chapter 1 - Multiple Choice

ANSWER: c

76. When a test or inventory measures what it is intended to measure, the test is said to be:
a. a scale variable.
b. continuous.
c. reliable.
d. valid.

ANSWER: d

77. Lewis has taken the GRE three times. Every time he takes the test he gets a 500 on the math section. This implies that:
a. the GRE is a valid test.
b. the GRE is a reliable test.
c. the GRE is neither a valid nor a reliable test.
d. Lewis is not motivated to improve his score on the math section.

ANSWER: b

78. The Hamilton Depression Rating Scale (HDRS) is a scale intended to measure depression levels, with higher scores indicating higher levels of depression. If the HDRS is a valid measure of depression, we would expect that:
a. the results of the HDRS could not be consistently replicated.
b. a person's score on the HDRS would not be related to his or her level of depression.
c. people who get higher scores on the HDRS would be more depressed than people who get lower scores.
d. people who get lower scores on the HDRS would be more depressed than people who get higher scores.

ANSWER: c

79. The Consideration of Future Consequences scale is intended to measure the extent to which an individual considers the future when making immediate choices. If the scale is a reliable measure, we would expect that:
a. a person's score on the scale might change from day to day.
b. a person's score on the scale would be relatively stable from day to day.
c. people with higher scores on the scale would have a greater tendency to consider future consequences.
d. people with lower scores on the scale would have a lower tendency to consider future consequences.

ANSWER: b

80. Teachers and administrators debate whether standardized tests, such as the ACT and SAT, are predictors of college performance. This is essentially a debate about:
a. validity.
b. reliability.
c. confounding variables.

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Chapter 1 - Multiple Choice

d. hypothesis testing.

ANSWER: a

81. Francisco has a history of depression. As part of his self-care, he takes a depression assessment every six months. His results tend to be very consistent, except when he is in a serious depression and his results show elevated levels of depression. The tendency for his results to be consistent supports the _____ of the assessment.

a. validity
b. reliability
c. continuous nature
d. confounding nature

ANSWER: b

82. Francisco has a history of depression. As part of his self-care, he takes a depression assessment every six months. His results tend to be very consistent, except when he is in a serious depression and his results show elevated levels of depression. The fact that Francisco's results vary with his changes in mood, mirroring his depression levels, supports the _____ of the assessment.

a. validity
b. reliability
c. continuous nature
d. confounding nature

ANSWER: a

83. Hypothesis testing refers to:

a. drawing conclusions about whether a particular relation between variables is supported by the evidence.
b. the direct manipulation of an independent variable in an attempt to assess its effects on a dependent variable.
c. summarizing data using descriptive statistics.
d. measuring a variable of interest using an operational definition.

ANSWER: a

84. A psychological study designed to assess the effects of disclosure of ingredients on the experience of taste, Lee, Frederick, and Ariely (2006) approached patrons at a local pub and asked them to taste and rate a new beer: the MIT Brew. Some participants were told about the secret ingredient in the beer (a few drops of balsamic vinegar) either before tasting (*before* condition) or after tasting but before rating (*after* condition). Other participants were not told anything regarding the secret ingredient (*not told* condition). Which aspect of this study is an operational definition of the dependent variable?

a. sample of patrons at the local pub
b. disclosure of the ingredients
c. experience of taste
d. participants' responses on the taste rating scale

ANSWER: d

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Chapter 1 - Multiple Choice

85. An operational definition is one that:
a. can be flexibly implemented by any researcher.
b. defines a variable in terms of observable and measurable behaviors.
c. defines a variable in terms of a hypothetical construct.
d. is used to determine the independent variable of an experiment.

ANSWER: b

86. In 2000, Bartels and Zeki conducted a study in which they hypothesized that there may be special pathways in the brain that support the feeling of romantic love. To test their hypothesis they recruited volunteers who reported themselves to be "truly, deeply, and madly in love." They then used brain imaging methods to determine which areas of the volunteers' brains were active when looking at pictures of their loved one. How did these researchers operationally define romantic love?
a. They asked volunteers if they were in a romantic relationship.
b. They gave volunteers a Depth of Love scale.
c. They used self-reports of volunteers who claimed to be "truly, deeply, and madly in love."
d. These researchers did not operationally define romantic love.

ANSWER: c

87. A correlation measures the relationship among _____ or more variables.
a. two
b. three
c. four
d. five

ANSWER: a

88. Controlling for _____ variables permits researchers to make statements about cause–effect relationships between variables.
a. discrete
b. reliable
c. scale
d. confounding

ANSWER: d

89. A medical researcher is interested in the effectiveness of natural remedies for allergies. The researcher randomly assigns to 36 allergy sufferers a treatment of herbal tea, homeopathic doses of the allergens, or a traditional antihistamine. What type of research design has the researcher employed?
a. within-groups
b. experimental
c. correlational
d. operational research

ANSWER: b

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Chapter 1 - Multiple Choice

90. Random assignment refers to a situation in which:
   a. participants self-select into a particular condition in the study.
   b. the experimenter randomly determines whether to use a single-blind or double-blind research design.
   c. every person in the population has an equal chance of being selected for participation in the study.
   d. every participant in the study has an equal chance of being assigned to any condition or level of the independent variable.

ANSWER: d

91. The purpose of random assignment to groups is to:
   a. control confounding variables.
   b. ensure that you have a representative sample.
   c. control extraneous variables.
   d. reduce the noise in your study.

ANSWER: a

92. What research technique is crucial to drawing the conclusion that the independent variable caused the change in the dependent variable?
   a. random selection
   b. random assignment to groups
   c. double-blind experiment
   d. quasi-experiment

ANSWER: b

93. Why does random assignment help control for confounding variables?
   a. Random assignment ensures that participants in a study are properly motivated to perform the experimental task that will be required of them.
   b. Random assignment eliminates individual differences by removing individuals with the same characteristics from the study and only using individuals who have different characteristics.
   c. By randomly assigning people to groups, individual differences that may influence the dependent variable are randomly distributed throughout the conditions, rather than being systematically related to the independent variable.
   d. By randomly assigning people to groups, all individuals with similar characteristics are grouped together in the same condition.

ANSWER: c

94. An article from the *New York Times,* published on April 24, 2007, summarized research conducted by Dr. Vallortigara, a neuroscientist at the University of Trieste, Italy. In this study, Dr. Vallortigara assessed whether a dog's tail wags in a preferred direction in response to positive as opposed to negative stimuli. First Dr. Vallortigara recruited 30 dogs that were family pets. While filming a dog's tail from above, he allowed the dog to view (through a slot in its cage) its owner, an unfamiliar human, a cat, and an unfamiliar dominant dog. The study found that dogs' tails wagged to the right for the owner and to the left for the unfamiliar dominant dog. What type of research design did Dr. Vallortigara employ?
   a. between-groups

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Chapter 1 - Multiple Choice

b. within-groups
c. non-experimental
d. quasi-experimental

ANSWER: b

95. A psychological researcher wants to assess well-being among dog and cat owners. She administers a well-being assessment to 125 dog owners and 163 cat owners. What type of research design is being used?
a. experimental research
b. random assignment design
c. between-groups
d. within-groups

ANSWER: c

96. Reading times are collected for bilingual participants, comparing their reading speed across their two languages. What type of research design would MOST likely be used in this study?
a. experimental research
b. random assignment design
c. between-groups
d. within-groups

ANSWER: d

97. A research approach that encourages scientists to collaborate with each other and share their data, methodology and analyses is known as:
a. data transparency.
b. open science.
c. data ethics.
d. HARKing.

ANSWER: b

98. When researchers push for a "severe test" of a hypothesis, they are referring to approaches that:
a. utilize rigorous analyses aimed at identifying flaws in the hypothesis.
b. analyze data repeatedly and in different ways so as to support the research hypothesis.
c. reject any collected data that do not match the stated hypothesis.
d. only report statistically significant results.

ANSWER: a

99. The purpose of preregistering a study is to enable the researcher to:
a. obtain research funding before they have collected any data.
b. receive scientific recognition before other researchers can claim credit for the ideas.
c. demonstrate that they conducted their research study as they originally intended.
d. obtain permission to conduct the proposed research study.

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Chapter 1 - Multiple Choice

ANSWER: c

100. When a researcher reformulates a hypothesis after the data has been collected and analyzed, the researchers has engaged in:

a. data transparency.

b. open science.

c. a severe test of the hypothesis.

d. HARKing.

ANSWER: d

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Name:_____ Class:_____ Date:_____

Chapter 1 - True/False

1. Inferential statistics summarize a group, while descriptive statistics help us make estimates about a larger population.
   a. True
   b. False

ANSWER: False

2. Descriptive statistics summarize a group, while inferential statistics help us make estimates about a larger population.
   a. True
   b. False

ANSWER: True

3. A major electronics store calculates holiday spending for both its store-based sales (2.3 million) and online sales (1.4 million). These are both descriptive statistics.
   a. True
   b. False

ANSWER: True

4. By definition a population is smaller than its respective sample.
   a. True
   b. False

ANSWER: False

5. By definition a sample is smaller than its respective population.
   a. True
   b. False

ANSWER: True

6. Discrete observations can typically take on more values than continuous observations.
   a. True
   b. False

ANSWER: False

7. Continuous observations can typically take on more values than discrete observations.
   a. True
   b. False

ANSWER: True

8. Mattress size, including twin, full, queen, king, and California king, is a nominal variable.
   a. True
   b. False

ANSWER: False

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Chapter 1 - True/False

9. Mattress size, including twin, full, queen, king, and California king, is an ordinal variable.
   a. True
   b. False

ANSWER: True

10. Square footage, such as that used to describe home size, is a ratio variable.
   a. True
   b. False

ANSWER: True

11. Square footage, such as that used to describe home size, is an interval variable.
   a. True
   b. False

ANSWER: False

12. Confounding variables are connected to the dependent variable such that we cannot know which variable causes the effect we observe.
   a. True
   b. False

ANSWER: False

13. Confounding variables are connected to the independent variable such that we cannot know which variable causes the effect we observe.
   a. True
   b. False

ANSWER: True

14. A test that has poor validity cannot have good reliability.
   a. True
   b. False

ANSWER: False

15. A test that has low reliability cannot have good validity.
   a. True
   b. False

ANSWER: True

16. If a test is valid, then we know that it is reliable.
   a. True
   b. False

ANSWER: True

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Chapter 1 - True/False

17. In a between-groups research design, a participant experiences one and only one of the levels of the independent variable.

a. True

b. False

ANSWER: True

18. In a between-groups research design, a participant experiences more than one of the levels of the independent variable.

a. True

b. False

ANSWER: False

19. In a within-groups research design, a participant experiences more than one of the levels of the independent variable.

a. True

b. False

ANSWER: True

20. In a within-groups research design, a participant experiences only one of the levels of the independent variable.

a. True

b. False

ANSWER: False

21. In a between-groups research design, a participant experiences more than one of the levels of the dependent variable.

a. True

b. False

ANSWER: False

22. In a between-groups research design, a participant experiences one and only one of the levels of the dependent variable.

a. True

b. False

ANSWER: False

23. In a within-groups research design, a participant experiences more than one of the levels of the dependent variable.

a. True

b. False

ANSWER: False

24. In a within-groups research design, a participant experiences only one of the levels of the dependent

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Chapter 1 - True/False

variable.

a. True

b. False

ANSWER: False

25. Open science is an approach to research that encourages researchers to work together and share methodology, data, and statistical analyses in order to allow for replication of their findings.

a. True

b. False

ANSWER: True

26. Preregistration is a technique that is now discouraged by proponents of open science.

a. True

b. False

ANSWER: False

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Name:_____ Class:_____ Date:_____

Chapter 1 - Critical-Thinking and Problem-Solving

1. Schacter and Gross (1968) gathered data from a group of 60 male students for about one hour in the afternoon. At the end of this period of time, a clock on the wall was correct (5:30 p.m.) for 20 participants, slow (5:00 p.m.) for 20 others, and fast (6:00 p.m.) for 20 more. The actual time for all groups was 5:30 p.m., the usual dinnertime for these students. While participants filled out a final questionnaire, the experimenters provided crackers for the students to eat. The weight of the crackers each student consumed was measured. The arithmetic means were 5:00 p.m. group, 20 grams; 5:30 p.m. group, 30 grams; 6:00 p.m. group, 40 grams. Identify for this study the (a) population, (b) sample, (c) independent variable, (d) levels of the independent variable, (e) dependent variable, (f) descriptive statistic, and (g) any inferences warranted by this study.

ANSWER: (a) The population is male students; (b) the sample is the 60 male students who participated in the study; (c) the independent variable is the time that appeared on the clock; (d) the levels of the independent variable were correct, slow, and fast; (e) the dependent variable was the amount of crackers eaten by each student in grams; (f) there are three descriptive statistics provided: the means of each group: 20 grams for the slow group, 30 grams for the correct group, and 40 grams for the fast group; (g) one could infer that male students in general eat more when they believe it to be past their dinner hour.

2. Research published by Hsee and Tang (2007) described the results of a study in which 195 college students completed a happiness scale (from 1 to 7) just prior to taking their midterm exam. On this scale, 1 corresponded to *very unhappy* and 7 to *very happy*. On average, the students rated their happiness as 6.18. Identify for this study the (a) population, (b) sample, (c) dependent variable, and (d) descriptive statistic.

ANSWER: (a) The population is all college students just about to take a midterm exam; (b) the sample is the 195 college students selected for this study; (c) the dependent variable is the student's rating on the happiness scale; and (d) the descriptive statistic is the average of the happiness ratings, which is 6.18.

3. An article from the *New York Times,* published on April 24, 2007, summarized research conducted by Dr. Vallortigara, a neuroscientist at the University of Trieste, Italy. In this study, Dr. Vallortigara assessed whether a dog's tail wags in a preferred direction in response to positive as opposed to negative stimuli. First, Dr. Vallortigara recruited 30 dogs that were family pets. While filming a dog's tail from above, he allowed the dog to view (through a slot in its cage) its owner, an unfamiliar human, a cat, and an unfamiliar dominant dog. The study found that dogs' tails wagged to the right for the owner and to the left for the unfamiliar dominant dog. Identify for this study the (a) population, (b) sample, (c) independent variable, (d) levels of the independent variable, and (e) dependent variable.

ANSWER: (a) The population is all dogs that are family pets; (b) the sample is 30 dogs selected for this study; (c) the independent variable is the type of visual stimulus the dog was allowed to see; (d) the levels of the independent variable are owner, unfamiliar human, a cat, and an unfamiliar dominant dog; (e) the dependent variable is the direction in which the dog wagged its tail.

4. A preschool school teacher is interested in the relation between sugar consumption and activity level in preschool children. The teacher gives 30 preschool children from Preppy Preschool Playland 0 milligrams, 25 milligrams, or 50 milligrams of sucrose (sugar) in a breakfast drink. He then observes their behavior for 30 minutes during their morning outdoor play period and codes their activity level. Identify for this study the (a) population, (b) sample, (c) independent variable, (d) levels of the independent variable, and (e) dependent variable.

ANSWER: (a) The population is all preschool children; (b) the sample is the 30 preschool children who the teacher studied; (c) the independent variable is the amount of sucrose given to the children; (d) the

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levels of the independent variable are 0 milligrams, 20 milligrams, and 50 milligrams; (e) the dependent variable is each child's activity level.

5. In a psychological study designed to assess the effects of disclosure of ingredients on the experience of taste, Lee, Frederick, and Ariely (2006) approached patrons at a local pub and asked them to taste and rate a new beer: the MIT Brew. Some participants were told about the secret ingredient in the beer (a few drops of balsamic vinegar) either before tasting (*before* condition) or after tasting but before rating (*after* condition). Other participants were not told anything regarding the secret ingredient (*not told* condition). Identify for this study the (a) population, (b) sample, (c) independent variable, (d) levels of the independent variable, and (e) dependent variable.

ANSWER: (a) The population is people who are patrons of pubs; (b) the sample is patrons approached in this study; (c) the independent variable is whether the patron was told about the secret ingredient in the MIT Brew; (d) the levels of the independent variable are told before, told after, or not told; (e) the dependent variable is the patron's taste rating for the beer.

6. Identify at least one confounding variable that undermines the conclusion drawn in the following fictional study: Prof. Acosta was interested in which of two popular statistics textbooks (*Statistics: It Will Change Your Life* and *Statistics: Bigger, Better, Stronger*) was better for students. Prof. Acosta compared the two texts by assigning one text to a section of statistics taught by Prof. Agnew from 10 to 11 a.m. on Monday, Wednesday, and Friday, and the other text to a section of statistics taught by Prof. Alvarez from 7 to 10 p.m. on Wednesday evenings. At the end of the term, all students took the same comprehensive test. Students to whom *Statistics: Bigger, Better, Stronger* was assigned performed better on the test than did students to whom *Statistics: It Will Change Your Life* was assigned. Therefore, Prof. Acosta concluded that the former textbook was the better one.

ANSWER: There are several possible confounding variables that students may identify. One confound is the time at which the sections of the class are taught: one in the evening and the other in the morning. A second confound is the distribution of the class sections: one meets once a week, the other three times a week. A third confound is that different instructors taught each of the courses. A fourth confound is the time of day and length of time which the class is taught at one time: mornings for one hour, evenings for three hours.

7. An operational definition specifies the operations or procedures used to measure or manipulate variables. A researcher is interested in investigating the relationship between thinking ability and educational success. What are some operational definitions that could be used in this study?

ANSWER: Operational definitions are needed for the terms *thinking ability* and *educational success.* This is because the variables do not have specific definitions. An example of operational definitions that could be used in this study can be seen in the following research question: What is the relationship between IQ scores on an intelligence scale (operational definition for thinking ability) and GPA (operational definition for educational success)? Another example: It is hypothesized that problem-solving scores on a standardized test (operational definition for thinking ability) will impact grades in an engineering course (operational definition for educational success).

8. What is the difference between a within-groups and a between-groups design? What are the relative advantages and disadvantages of each type of design?

ANSWER: In a within-groups design all participants are exposed to all levels of the independent variable, but in a between-groups design each participant experiences only one level of the independent variable. One advantage to the within-groups design is that it requires fewer participants. If all the

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participants can participate in all conditions of the study, fewer individuals need to be recruited. Another advantage to the within-groups design is that it allows each participant to serve as their own baseline or control, against which we can measure any change across the various levels. One disadvantage to the within-groups study is order effects. By virtue of having participated in one condition of the study, participants may change their response in subsequent conditions. Another disadvantage to the within-groups study is carryover effects. Because the participants are in more than condition, the impact of one condition may carry over into the next condition, either compounding the effect or creating a unique effect. The between-groups design does not have these problems because each participant experiences only one of the conditions.

9. What are some advantages in using a correlational design over an experimental design?

ANSWER: There are situations where random assignment to groups may not be available, which makes the use of a correlational design more practical because it has fewer restrictions. In correlational research, we do not have to manipulate any variables but only measure them and look for relations (correlations) between them. Also, sometimes we cannot conduct experiments because of ethical safeguards.

10. Gabriel is interested in examining the effect of classical music on problem solving. Explain what is involved in preregistering his study and how this approach would be beneficial.

ANSWER: Preregistration is one recommended open-science practice, and involves the researcher laying out their methods and analysis plans before conducting their research. Gabriel would specify what variables would be measured, how his data would be collected, and the particular statistical tests that he intended to use to evaluate his hypotheses. Preregistration is helpful because Gabriel can show that he did everything he intended and that his results are not the consequence of unethical data practices. This approach also allows other researchers to have more confidence in the results of Gabriel's findings.

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