Field Sport Science CHAPTER 2 – The SPINE of statistics

Multiple choice

1. Which of the following descriptions best describes a population?

a. A generally large, distinctive group of individuals or cases

b. A selection of individuals or cases

c. A value that reflects an individual variable present in each case of a large group of individuals

d. A value that reflects an individual variable present in a selection of individuals or cases

Ans: A

2. If a researcher was interested in the average VO2 max of athletes who have run 1500 m in under 4 minutes, which of the following would be the most appropriate for a sample group?

a. All athletes who have run 1500 m in under 4 minutes during the 2012 season

b. All athletes who have run 1500 m in under 4 minutes

c. All athletes who compete in middle-distance track events

d. All athletes who competed in middle-distance track events during the 2012 season

Ans: A

3. Deviance is also known as the error in a statistical model. Suppose the mean height (standard deviation) jumped by a group high jumpers was 1.89(0.05) m. One of the individuals jumped 1.95 m. Calculate the deviance score.

a. +0.06

b. –0.06

c. +0.6

d. –0.6.

Ans: A

4. Which of the following best reflects the study statistical model (Q2)?

a. The average VO2 max of all runners who have run 1500 m in under 4 minutes

b. The average VO2 max of runners who have run 1500 m in under 4 minutes during the 2012 season

c. The average VO2 max of runners who compete in middle-distance track events

d. The average VO2 max of runners who competed in middle-distance track events during the 2012 season

Ans: B

5. What does the standard error of the mean represent?

a. The standard deviation of the sample means

b. The standard deviation of the population mean

c. The confidence intervals of the sample means

d. The confidence intervals of the population mean

Ans: A

6. Theoretically, suppose we knew the average VO2 max value of every runner who has run 1500 m in under 4 minutes (e.g. 73(4) ml/kg/min). The reality is that we will never know, but if we were to sample a series of runners who had run 1500 m in under 4 minutes (see below) which samples would have 95% confidence intervals that do *not* contain the true value?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Sample 1 | Sample 2 | Sample 3 | Sample 4 | Sample 5 |
| 1 | 68.4 | 75.4 | 78.1 | 69.7 | 73.7 |
| 2 | 78.2 | 79.3 | 77.7 | 69.0 | 70.0 |
| 3 | 78.6 | 74.4 | 78.9 | 80.1 | 76.9 |
| 4 | 77.9 | 69.9 | 76.8 | 68.7 | 74.2 |
| 5 | 75.0 | 78.2 | 76.6 | 70.0 | 75.5 |
| Mean | 75.6 | 75.4 | 77.6 | 71.5 | 74.1 |
| SD | 4.3 | 3.7 | 0.9 | 4.8 | 2.6 |

a. Sample 1

b. Sample 2

c. Sample 3

d. Sample 4

Ans: C

7. 95% of data under a normal distribution curve fall between which *z*-scores?

a. –1 and +1

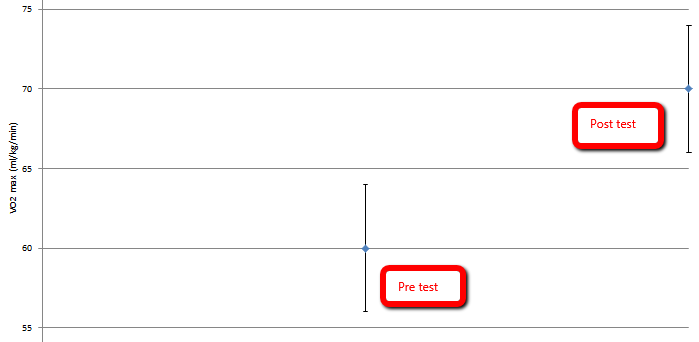
b. –2 and +2

c. –2.5 and +2.5

d. –3 and +3

Ans: B

8. To improve the aerobic capacity (VO2 max) of a group of athletes, a six-week training intervention was administered. Examine the confidence intervals shown below, and choose the statement that best reflects the outcome.



a. Intervention did significantly improve VO2 max.

b. Intervention did not significantly improve VO2 max.

c. Intervention improved VO2 max but not significantly.

d. No inference can be made from these results.

Ans: A

9. If the confidence intervals of one sample fell within the range of a second sample, what would this suggest?

a. Samples are likely to have been drawn from the same population.

b. Samples are unlikely to have been drawn from the same population.

c. This is proof that the samples came from the sample population.

d. This is proof that the samples did not come from the sample population.

Ans: A

10. A two-tailed test is considered a

a. Non-directional test

b. Directional test

c. Uni-directional test

d. Bi-directional test

Ans: A

11. Which of the following would be classed as a two-tailed hypothesis?

a. The training intervention will evoke a change in aerobic capacity.

b. The training intervention will result in a decrease in aerobic capacity.

c. The training intervention will result in an increase in aerobic capacity.

d. The training intervention will result in a significant increase in aerobic capacity.

Ans: A

12. A researcher interested in the effects of interval training on VO2 max reported an increase following the intervention when in reality there was no improvement. What type of error has occurred?

a. Type I

b. Type II

c. Type IIA

d. Type IIB

Ans: A

13. A researcher interested in the effects of interval training on VO2 max reported no significant increase following the intervention when in reality there was an improvement. What type of error has occurred?

a. Type I

b. Type II\*

c. Type IIA

d. Type IIB

Ans: B

14. To recruit sufficient participants for a study (i.e. sample size), what factors need to be considered?

a. Effect size

b. Probability

c. Power

d. All of the above

Ans: D

15. If a researcher sets a level of significance at .05 (i.e. 5%), what does this mean?

a. Five times out of 100, a significant result will be found that is due to chance alone and not the intervention.

b. Ninety-five times out of 100, a significant result will be found that is due to chance alone and not the intervention.

c. Five times out of 100, a significant result will be found that is not due to chance, but the intervention.

d. None of the above.

Ans: A

16. Suppose a researcher wanted to examine the different levels of intrinsic motivation in four groups of students (each group representing a different course) on the issue of gaining work or vocational experience whilst studying for a degree. How many paired tests would need to be conducted to compare the differences between the four groups?

a. 4

b. 5

c. 6

d. 7

Ans: B

17. Based on the answer provided in Q16 and given that a confidence level of 95% is set for each test, what would be the revised level of confidence (i.e. probability of *no* Type I errors?)

a. 74%

b. 94%

c. 84%

d. 64%

Ans: A

18. If the significance level is set at .05, which of the following best reflects the probability of a chance finding?

a. 1 in 20

b. 1 in 5

c. 1 in 10

d. 1 in 15

Ans: A

19. Which of the following descriptions best describes the statistical power?

a. Reject the null hypothesis, when the null hypothesis is false.

b. Reject the null hypothesis when the null hypothesis is true.

c. Accept the null hypothesis when the null hypothesis is false.

d. Accept the null hypothesis when the null hypothesis is true.

Ans: A

20. What effect would increasing the sample size have on the confidence intervals of the group?

a. Confidence intervals would decrease in size.

b. Confidence intervals would increase in size.

c. Confidence intervals are unaffected by sample size.

d. Confidence intervals could either increase or decrease in size.

Ans: A

21. If you were researching a medical procedure that could potentially diagnose pancreatic cancer earlier than the procedures we have at the moment, what type of error might you consider protecting against?

a. Type I

b. Type II

c. Type IIA

d. Type IIB

Ans: B

22. If a six-week training intervention (equal to 70% VO2 max) was to be administered to a group of sedentary individuals and individuals who train regularly, which group would be more likely to have a greater effect size?

a. Sedentary group\*

b. Trained group

c. Both groups would be similar

d. Impossible to tell

Ans: A

23. Which of the following is not a measure of effect size?

a. Cohen’s *d*

b. Pearson’s correlation coefficient (*r*)

c. Odds ratio

d. Shapiro–Wilk test

Ans: D

24. What is a typical effect size for the majority of sport and exercise based studies?

a. Very small effect sizes

b. Small to medium effect sizes

c. Medium to large effect sizes

d. a and b

Ans: D

25. To help reduce the effects of hypertension (high blood pressure), researchers were interested in the effects of an acute 30 min bout of exercise over a two-week period. Resting blood pressure was measured before and after the two weeks of exercise and statistical significance was determined to be *p* = .001. Which of the following descriptions best describes its meaning?

a. A difference was found between the pre and post measurements and there *may be* an important effect.

b. A difference was found between the pre and post measurements and there *is* an important effect.

c. A difference was not found between the pre and post measurements but there *may* *be* an important effect.

d. A difference was not found between the pre and post measurements and neither was there an important effect.

Ans: A

26. Suppose the same test was conducted but the statistical significance value was determined at *p* = .08. Which of the following descriptions best describes its meaning?

a. A difference was not found between the pre and post measurements but there *may* *be* an effect.

b. A difference was found between the pre and post measurements and there *may be* an important effect.

c. A difference was found between the pre and post measurements and there *is* an effect.

d. A difference was not found between the pre and post measurements and no effect was found.

Ans: A