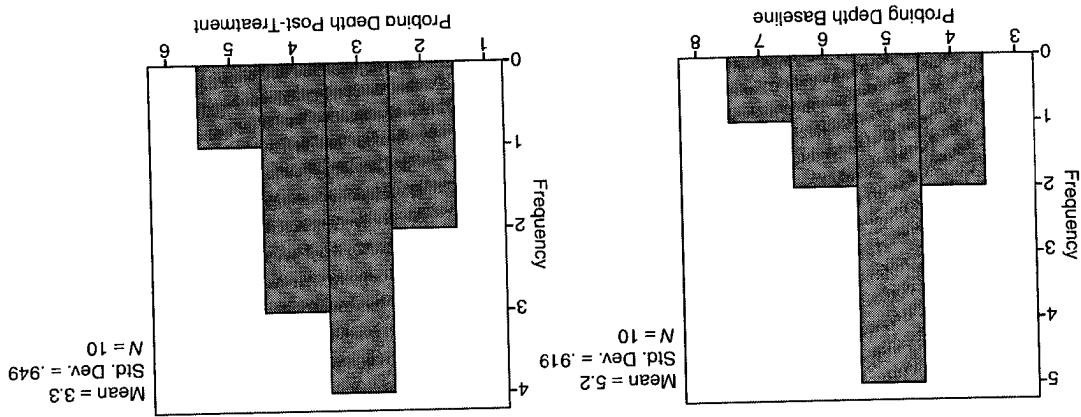


Answers to Study Questions

1. Yes, the data are approximately normally distributed as noted by the two SPSS frequency distributions below.



2. The Shapiro-Wilk p values for baseline and post-treatment probing depths were 0.15 and 0.29, respectively, indicating that the two frequency distributions did not significantly deviate from normality. Moreover, visual inspection of the frequency distributions indicates that the variables are approximately normally distributed.

3. Yes, the data meet criteria for "paired samples" because the two variables were collected from the same single group of study participants before and after the treatment.

4. The null hypothesis is: "There is no reduction in probing depth from baseline to post-treatment for patients with periodontitis."

5. The exact likelihood of obtaining a t -test value at least as extreme as or as close to the one that was actually observed, assuming that the null hypothesis is true, was less than 0.001%.

6. The baseline and post-treatment variables were correlated because the sample of patients was assessed twice, and therefore it is logical that a person's post-treatment value is affected by his or her baseline value in a repeated measures design.

7. The numerator represents the mean difference between the two variables (see formula for the paired samples t -test).

8. The denominator represents the extent to which there is dispersion among the entire dataset's values.

9. A one-sample crossover design also would be suitable for a paired samples t -test because one group of participants is exposed to one level of an intervention and then those scores are

DATA FOR ADDITIONAL COMPUTATIONAL PRACTICE FOR QUESTIONS TO BE GRADED

Using an example from a study examining the level of functional impairment among 10 adults receiving rehabilitation for a painful injury, changes over time were investigated (Cipher, Kurian, Fulda, Snider, & Van Beest, 2007). The dependent variable is emotional distress, which was represented by patients' scores on the Affective Distress subscale of the Multidimensional Pain Inventory (MPI; Kerns, Turk, & Rudy, 1985), with higher scores representing more emotional distress due to pain. The null hypothesis is: "There is no significant reduction in emotional distress from baseline to post-treatment for patients in a rehabilitation program."

Compute the paired samples t-test on the data in Table 2 below.

TABLE 2 AFFECTIVE (EMOTIONAL) DISTRESS LEVELS AT BASELINE AND POST-TREATMENT			
Participant #	Baseline Affective Distress Scores	Post-treatment Affective Distress	Difference Scores
1	.8	.7	.1
2	3.6	1.7	1.9
3	.3	1.3	-1.0
4	4.3	3.0	1.3
5	2.0	1.3	.7
6	2.3	2.7	-.4
7	3.0	1.3	1.7
8	3.9	1.7	2.2
9	4.9	3.0	1.9
10	5.2	3.7	1.5

Questions to be Graded

EXERCISE 32

Name: _____
Date: _____
Class: _____

Follow your instructor's directions to submit your answers to the following questions for grading. Your instructor may ask you to write your answers below and submit them as a hard copy for grading. Alternatively, your instructor may ask you to use the space below for notes and submit your answers online at <http://evolve.elsevier.com/Grove/statistics/> under "Questions to Be Graded."

1. Do the example data meet the assumptions for the paired samples *t*-test? Provide a rationale for your answer.

2. If calculating by hand, draw the frequency distributions of the two variables. What are the shapes of the distributions? If using SPSS, what are the results of the Shapiro-Wilk tests of normality for the two variables?

3. What are the means for the baseline and posttreatment affective distress scores, respectively?

4. What is the paired samples *t*-test value?

5. Is the *t*-test significant at $\alpha = 0.05$? Specify how you arrived at your answer.

6. If using SPSS, what is the exact likelihood of obtaining a *t*-test value at least as extreme as or as close to the one that was actually observed, assuming that the null hypothesis is true?

7. On average, did the affective distress scores improve or deteriorate over time? Provide a rationale for your answer.

8. Write your interpretation of the results as you would in an APA-formatted journal.

9. What do the results indicate regarding the impact of the rehabilitation on emotional distress levels?

10. What are the weaknesses of the design in this example?