Lab Exercise #4 Comparing means using t-test (Independent Samples and Paired)

Tutorial Objectives

1) Learn how to test for differences in mean values for 2 groups (independent samples t-test) and repeated measures (paired t-test).
2) Understand the t statistic and how to interpret SPSS results.

Using the SPSS data file "AlaskaMooseStudy.sav" on the course website, answer the following questions:

1. The research question is to determine whether the measured stress level of moose from areas of high snowmachine use differ from stress levels in moose from areas of no snowmachine use. With location (1=no snowmachine, 2=high snowmachine) as the independent variable and corticosterone level as the dependent variable, test the hypothesis that snowmachines have no effect on measured stress in moose.

a. Are the samples of Denali (no snowmachine) and Petersville (snowmachine) moose normally distributed on the stress variable (corticos)?
b. Are the variances in measures of stress in the two groups of moose similar—in other words, is the assumption of homogeneity of variances satisfied? How do you know?
c. What is the mean corticosterone level for the Denali (no snowmachine) moose?
d. What is the standard deviation for the Denali moose?
e. What is the mean corticosterone level the for Petersville (snowmachine) moose?
f. What is the standard deviation for the Petersville moose?
g. What is the calculated value of the t-statistic?
h. What is the p-value associated with the t-statistic?
i. Based on the t-test, would you accept or reject the null hypothesis of no difference in moose stress levels?

2. Now examine the research question about whether the stress levels between Denali moose (location = 1) are different from urban Kinkade moose (location =3).

a. Are the Kinkade moose stress levels normally distributed?
b. What is the mean corticosterone level for Kinkade moose?
c. What is the standard deviation of corticosterone level for Kinkade moose?
d. Can equal variances be assumed between Denali and Kinkade moose?
e. What is the calculated value of the t-statistic?
f. What is the p-value associated with the t-statistic?
g. Based on the t-test, would you accept or reject the null hypothesis of no difference in moose stress levels between Denali and Kinkade moose?

3. Now examine the research question about whether the stress levels differ in 2 urban moose samples (Kinkade (location=3) and Mid-town (location=5)).

a. Are Mid-town moose (location =5) stress levels normally distributed?

b. What is the mean corticosterone level for Mid-town moose?
c. What is the standard deviation of corticosterone level for Mid-town moose?
d. Can equal variances be assumed for Kinkade and Mid-town moose?
e. What is the calculated value of the t-statistic?
f. What is the p-value associated with the t-statistic?
g. Based on the t-test, would you accept or reject the null hypothesis of no difference in moose stress levels between Kinkade and Mid-town moose?

4. Now examine the research question about whether the stress levels in 2 urban moose samples (Hillside (location=4) and Mid-town (location=5)) are different.

a. Are Hillside moose (location =4) stress levels normally distributed?
b. What is the mean corticosterone level for Hillside moose?
c. What is the standard deviation of corticosterone level for Hillside moose?
d. Can equal variances be assumed between Hillside and Mid-town moose?
e. What is the calculated value of the t-statistic?
f. What is the p-value associated with the t-statistic?
g. Based on the t-test, would you accept or reject the null hypothesis of no difference in moose stress levels between Hillside and Mid-town moose?

5. Now examine the research question about whether corticosterone levels differ by the freshness of the moose poop. (Note: how does the researcher know if the poop is "fresh" or "old"? Hint: taste is an underrated sense ☺).

a. What is the mean coricosterone level for old poop (fresh = 1)?
b. What is the standard deviation for old poop?
c. What is the mean corticosterone level for recent poop (fresh = 2)?
d. What is the standard deviation for recent poop?
d. Can equal variances be assumed between old and recent moose poop?
e. What is the calculated value of the t-statistic?
f. What is the p-value associated with the t-statistic?
g. Based on the t-test, would you accept or reject the null hypothesis of no difference in moose stress levels between old and recent moose poop?

6. Open the "Spider Anxiety Data" file on the course website. This data represents spider anxiety scores from students (the same students) who were shown pictures of spiders and then later shown real spiders. Anxiety scores were measured after each showing.

a. What are the mean and standard deviation of anxiety scores for students seeing <u>pictures</u> of spiders?
b. What are the mean and standard deviation of anxiety scores from students seeing <u>real</u> spiders?
c. What is the calculated value of the t-statistic?
d. What is the p-value associated with the t-statistic?
e. Based on the t-test, would you accept or reject the null hypothesis of no difference in anxiety scores based on pictures versus real spiders?