PSYC 2317: Statistical Methods for Psychology

Tarleton State University | Week 10 Homework | Fall 2019

For each of the hypothesis testing problems below, you need to justify your answer by explicitly defining your null hypothesis $\mathcal{H}_0$ and alternative hypothesis $\mathcal{H}_1$ and reporting an appropriate p-value range for the resulting test statistic.

1. Two separate samples, each with $N = 15$ individuals, receive different treatments. After treatment, the first sample has $SS = 1740$ and the second sample has $SS = 1620$.
   (a) Find the pooled variance for the two samples.
   (b) Compute the estimated standard error for the sample mean difference.
   (c) If the difference in sample means is 8 points, is this enough to conclude that there is a significant difference between the two treatments?

2. A researcher surveys a group of college students to determine the negative life events that they experienced in the past 5 years and their current feeling of well-being. For $N = 18$ participants with 2 or fewer negative experiences, the average well-being score was $\overline{X} = 42$ with $SS = 398$. For the $N = 16$ participants with 5 to 10 negative experiences the average score is $\overline{X} = 48.6$ with $SS = 370$.
   (a) Is there a significant difference between the two populations represented by these two samples?
   (b) Compute Cohen's d to measure the size of the effect.

3. In 1974, Loftus and Palmer conducted a classic study demonstrating how the language used to ask a question can influence eyewitness memory. In the study, college students watched a film of an automobile accident and then they were asked questions about what they saw. One group was asked "About how fast were the cars going when they smashed into each other?" Another group was asked the same question except the verb was changed to "hit" instead of "smashed into". The "smashed into" group reported significantly higher estimates of speed than the "hit" group. Suppose a researcher repeats the study with a sample of today's college students and obtains the following results:

Smashed into	Hit
$n = 15$	$n = 15$
$M = 40.8$	$M = 34.0$
$SS = 510$	$SS = 414$

   (a) Do the results indicate a significantly higher estimated speed for the "smashed into" group?
   (b) Compute Cohen's d to measure the size of the effect.

4. If other factors are held constant, explain how each of the following influences the value of the independent-measures t-statistic, the likelihood of rejecting the null hypothesis, and the magnitude of Cohen's d.
   (a) Increasing the number of scores in each sample
   (b) Increasing the variance for each sample