AS2 (Assignment 2, Unit 4): Computing the Z-test Statistic

Research Scenario #1

A researcher hypothesizes that zylex, a new antidepressant, will affect concentration. It is known that scores on a standardized concentration test is normally distributed with a $\mu= 50$ and a $\sigma= 12$. A random sample of n=16 participants, aged 19-35, are chosen from the State of New Jersey. The sample is put on a six month dosage plan of zylex. After six months, all the participants are given a standardized concentration test. The researcher records the data and calculates a sample mean of M=56. Are the data sufficient to conclude that the drug, zylex, does have an effect on concentration?

Based on the above research scenario, please answer the following questions:

1. Name the population: <u>50</u>

2. Name the sample: <u>16</u>

3. What is the independent variable? <u>Zylex (new antidepressant)</u>

4. What is the dependent variable? <u>The DV participants are ages 19-35 from the state of New Jersey.</u>

5. What is the appropriate hypothesis test? <u>Z-test (Non-Directional)</u>

6. What two means are you comparing in this test? <u>M= 56 and $\mu= 50$</u>

7. Please calculate the appropriate hypothesis test using all four steps:

Step 1: H0= Zylex does not have an effect on concentration.

       H1= Zylex does have an effect on concentration.

Step 2: Critical region is non-directional with an alpha level (a) of .05, p>.05

-1.65   p>.05   +1.65

Step 3: $Z = M - \mu / \sigma m$; $M - \mu = 56-50=2$,

σm = $12/ \sqrt{16}=12/4= 3$

$Z=2/3= 0.66$

Step 4: <u>Fail to reject H0</u>

<u>Write the statistical statement for your results</u>: The p that H0 is true is high, therefore we fail to reject and conclude there was no effect. Z= 0.66, p>.05

<u>Interpret your results (relating back to the hypothesis):</u> Our study supports that Zylex does not have an effect on concentration. The data were NOT significant. Z= 0.66, p>.05

Is there a probability of Type I error? Yes _____   No <u>X</u>

If yes, what is the probability of a Type I error? N/A

Is yes, how could you have decreased that probability? N/A

Is there a probability of Type II error? Yes <u>X</u> No_____

If it is appropriate, please calculate effect size: Answer: <u>N/A</u>

Research Scenario #2:

A researcher wanted to study the effect of alcohol on reaction time. <mark>She hypothesized that alcohol will INCREASE reaction time (participants will take longer to react</mark>). She selected a sample of <mark>n= 36</mark> participants from Rutgers University. The 36 participants each consumed a 6-ounce glass of wine. Thirty minutes later, the researcher measured each participant's reaction time, using a standardized driving simulation task for which the regular population has a <mark>$\mu = 400$</mark> msec reaction time with a <mark>$\sigma = 48$</mark>. The reaction time mean for the sample was <mark>M= 412</mark> msec. Are the data sufficient to conclude that the alcohol significantly increased reaction time?

Based on the above research scenario, please answer the following questions:

1. Name the population: <u>$\mu = 400$</u>

2. Name the sample: <u>n= 36</u>

3. What is the independent variable? <u>Alcohol</u>

4. What is the dependent variable? <u>Reaction time</u>

5. What is the appropriate hypothesis test? <u>Directional test</u>

6. What two means are you comparing in this test? <u>M=412 and μ = 400</u>

7. Please calculate the appropriate hypothesis test using all four steps:

Step 1:

H0: Alcohol will NOT increase reaction time.

H1: Alcohol WILL increase reaction time.

Step 2: +1.65

Step 3: Z= 412-400 = 12

σm = 48/√36= 48/6 = 8

Z= 12/8 = 1.50

Step 4: Fail to reject H0

Write the statistical statement for the results: <u>The p that H0 is true is high, therefore we fail to reject and conclude there was no effect. Z= 1.50, p>.05</u>

Interpret your results (relating back to the hypothesis): <u>Our study supports that alcohol does NOT increase reaction time. The data were NOT significant. Z= 1.50 p>.05</u>

 Is there a probability of Type I error? Yes _____ No <u>X</u>

Is there a probability of Type II error? Yes <u>X</u>   No____

If appropriate, please compute effect size: Answer: _<u>N/A</u>