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 µ= 50 and a σ= 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: The State of New Jersey

2. Name the sample: 16 participants.

3. What is the independent variable? Zylex a new antidepressant

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4. What is the dependent variable? Will affect Concentration.

5. What is the appropriate hypothesis test? Z- test non-directional

6. What two means are you comparing in this test? Population and Sample means.

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

Step 1: Ho: Zylex, a new antidepressant will not affect concentration.

   H¹: Zylex, a new antidepressant will influence concentration.

Ho: u = 50 , H¹u≠50 Since Ho is ≠ 50 is a two directional test.

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Step 2: Since the level of significance α = .05, then the critical region value is 1.96.

Step 3: The test statistic is given as Z= $X - U \dfrac{\square}{\square} \sigma \sqrt{n}$ Z= (56-50)/12/1$\sqrt{16}$ Z=2

Step 4: Since the calculated test statistic is Z=2 is > than the critical value 1.96, then we reject the Ho

Write the statistical statement for your results: Since Ho is rejected then there is sufficient evidence to conclude that the Zylex drug does influence concentration.

Interpret your results (relating back to the hypothesis): Zylex the new antidepressant drug does affect concentration.

Is there a probability of Type I error? Yes X   No

If yes, what is the probability of a Type I error? The probability of Type I error is the significance level of .05 which rejects the Ho.

Is yes, how could you have decreased that probability? There is evidence to conclude that Zylex improves score by decreasing Alpha to make it the test more accurate.

Is there a probability of Type II error? Yes_____ No   X

If it is appropriate, please calculate effect size: Answer: Because we have already rejected the Ho then we cannot have a Type II error because the Ho would be true.

Research Scenario #2:

A researcher wanted to study the effect of alcohol on reaction time. She hypothesized that sample of n= 36 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 μ = 400 msec reaction time with a σ = 48. The reaction time mean for the sample was M= 412 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: Rutgers University

2. Name the sample: 36 participants from Rutgers University

3. What is the independent variable? Alcohol

4. What is the dependent variable? Inaccurate reaction time (participants will take longer to react)

5. What is the appropriate hypothesis test? Z-test One directional for one population mean.

6. What two means are you comparing in this test? U= population 400

U0= hypoyhrsixed population Mean =412

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

Step 1: Ho: Null Hypothesized $u400$ $(the\ alcohol\ did\ not\ significanlty\ increase\ reaction\ time)$

H1:Alternative hypothesis = u > 400 (the alcohol significantly increased reaction time)

Step 2: Take .05 one directional Z- test from critical value of z= 1.64 Rejection region Ho: .1,64

Step 3: Test is given by Z= 412-400 / $40\sqrt{36}$ =1.50

Step 4: Since calculated value of z= 1.50 it is less than the critical value of Z= 1.64, the difference is not significant, failed to reject the Null hypothesis.

Write the statistical statement for the results: The data does not support the claim that the Alcohol significantly increased the reaction time.

Interpret your results (relating back to the hypothesis): The effect of alcohol does not increase the reaction time.

 Is there a probability of Type I error? Yes _____ No X

Is there a probability of Type II error? Yes, X No_____

If appropriate, please compute effect size: Answer: Cohen's d = 400-400 / 48=0.25

 d = 0.2 small effect mean difference is o.2 standard deviation

d = 0.5 Medium effect mean difference is 0.5 standard deviation

d = 0.8 Large effect mean difference is 0.8 standard deviation/.