

## 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: The State of New Jersey
2. Name the sample: Participants from the ages 19-35
3. What is the independent variable? Zylex
4. What is the dependent variable? Concentration
5. What is the appropriate hypothesis test? Non-Directional Z Test
6. What two means are you comparing in this test? Sample mean to population mean
7. Please calculate the appropriate hypothesis test using all four steps:

Step 1:

Ho: Zylex will Not have an effect on concentration

H1: Zylex Will have an effect on concentration

Step 2: Z test Non directional

Step 3:  $Z=2$

Step 4: Fail to Reject  $H_0$  \_\_\_\_\_

Write the statistical statement for your results:  $Z=2, p>.05$

Interpret your results (relating back to the hypothesis): The study supports that Zylex did not have an effect on concentration

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

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 X No \_\_\_\_\_

If it is appropriate, please calculate effect size: Answer: d=0.5 Medium effect

**Research Scenario #2:**

A researcher wanted to study the effect of alcohol on reaction time. She hypothesized that alcohol will INCREASE reaction time (participants will take longer to react). She selected a 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  $\mu = 400$  msec reaction time with a  $\sigma = 48$ . 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: Selected students
3. What is the independent variable? Alcohol
4. What is the dependent variable? Reaction Time
5. What is the appropriate hypothesis test? Directional Z-Test
6. What two means are you comparing in this test? Sample mean to population mean
7. Please calculate the appropriate hypothesis test using all four steps:

Step 1:  $H_0$ : Alcohol will not increase reaction time

$H_1$ : Alcohol will increase reaction time.

Step 2: Directional Z-Test

Step 3:  $Z=1.5$

Step 4: Fail to Reject  $H_0$

Write the statistical statement for the results:  $Z=1.5, p>.05$

Interpret your results (relating back to the hypothesis): The study supports that alcohol did not decrease reaction time. The data were not significant.

Is there a probability of Type I error? Yes  No

Is there a probability of Type II error? Yes  No

If appropriate, please compute effect size: Answer: 0.25