**Effect Size, Confidence Intervals, & Power**

Statistics for the Behavioral Sciences

•Effect size

•Confidence intervals

•Statistical power

**•Statistical significance may not be meaningful**

α’s are set by researcher

z-statistics are influenced by sample size

**•To compute standard error for the population we need:**

•Population σ

•Sample size (N)

**•Calculate a z-statistic you need:**

•Population mean (μM)

•Population standard error (σM)

•Sample mean (M)

**•Sample size (N = 1000)**

**•Population mean (μM = 72)**

•Population standard error (σM = .38)

•Sample mean (M = 76)

•Statistical significance may not be meaningful

α’s are set by researcher

**z-statistics are influenced by sample size**

We need another measure

**•Effect size**

Is not affected by α’s nor sample sizes

Based on the pop. distributions of scores

• Means and standard deviations (note)

•We can expect on average that any individual Applebee employee’s performance will

increase with the new training by 0.33 of a standard deviation over the old training program.

This is a small effect.

**•When explaining an effect size:**

•Specify that it is at the individual level

•Identify who/what is being measured

•Identify the measurement being used

•Briefly (not full descriptions) identify the populations (groups)

•Difference in terms of standard deviations

•Include the size of the effect

**•Effect sizes**

d = 0.20 is small

d = 0.50 is medium

d = 0.80 is large

• Depends on context

• But now can make meaningful predictions

**Provides additional information to help make decisions**

They don’t replace hypothesis test results

Need both the hypothesis test and the effect size to make an informed decision

**•Confidence intervals**

**•The sample mean is an estimate (or proxy) for the population mean**

•The sample and population means are not likely the same

•Estimate the range of the pop. mean

What would be the range of our estimate?

• Give a confidence estimate

**•The pop. performance with the new training is estimated to be 76 based on our sample**

•However, the sample mean is not the true pop. mean of all employees

•Estimate the range of the pop. mean

Within some level of confidence (chance)

**•To calculate a confidence intervals:**

•Alpha (α/2) and z-critical (note)

•Sample mean (M) (note)

•Standard error (σM)

•Calculate the test statistic (N =30)

The performance appraisals for all employees who received the old training had a mean of

72 with a standard deviation of 12.

The performance appraisals for employees who received the new training had a mean of

76 with a standard deviation of 10.

**•To calculate a confidence intervals:**

•Alpha (α = .05) and z-crit (+/- 1.96)

•Sample mean (M = 76)

•Standard error (σM = 2.19)

•There is a 95% chance that the true population mean for Applebee’s employees performance

for the new training falls between 71.71 and 80.29 performance appraisal scores:

95% CI [71.71, 80.29]

**•Statistical power**

•Probability of correctly rejecting the null

•Proportion of comparison distribution in the critical region

•Increasing α

•Using a one-tailed test

•Increasing the sample size

**•When making a practical decision:**

Provide a decision (e.g., do we implement the new training program at Applebees?)

Support your answer with at least 2 statistical evidences (e.g., hypothesis test, effect size,

reliability/validity of variables)

Support your answer with additional insight (e.g., other variables that may matter to the

decision such as cost vs. savings)