**Introduction to Effect Size**

**Effect size (*d*):** refers to the *magnitude* (i.e., size) of a difference when it is expressed on a standardized scale.

*-d* is one of the most popular statistics for describing the effect size of the difference between two means

-the *d* is calculated independent of the sample size

-accordingly, you do not use the SEM, but instead just use the standard deviation (S)

$$d= \frac{\overbar{x}D- µD }{S} $$

**Example**

A scientist developed a new drug, called SMILE, to treat depression. Experimenter 1 administered SMILE to an experimental group (n = 50) and a placebo pill to a control group (n = 50). To assess changes in depression, the experimenter used a 20 item true/false depression scale (with possible raw scores from 0 to 20). The experimenter collected data for the experimental group (mean = 12; standard deviation = 4) and the control group (mean = 7; standard deviation = 4). Note that the difference between the two means ($\overbar{x}D$) is 5 raw score points.

Now, suppose Experimenter 2 wanted to test a different drug, called HAPPY, to treat depression. Similarly, the experimental group (n = 50) received HAPPY, while the control group (n = 50) received a placebo pill. However, to assess changes in depression, Experimenter 2 used a different survey. Experimenter 2 used a 30-item scale with choices from “strongly agree” to “strongly disagree” (with possible scores from 0 to 120). The experimenter collected data for the experimental group (mean = 80; standard deviation = 14) and the control group (mean = 70; standard deviation = 14). Note that the difference between the two means ($\overbar{x}D$) is 10 raw score points.

You are a psychiatrist and want to know which drug will be more effective in treating depression, SMILE or HAPPY. How do you decide which treatment is superior?

What we know:

🡪 Drug SMILE resulted in a 5-point raw score difference between the two means

🡪 Drug HAPPY resulted in a 10-point raw score difference between the two means

However, the answer is not clear because the 2 experimenters used different measurement scales to assess the effectiveness of the treatment for depression (0 to 20 versus 0 to 120)

**Solution**: Calculate the effect size (d) for each drug.

*Note:* $\overbar{x}D$ *is the mean between the two conditions (Experimental – Control).* $µD$ *is the null hypothesis, which is that there is no difference between the two conditions (Experimental – Control = 0)*

$$HAPPY: d = \frac{\overbar{x}D- µD }{S} : \frac{5 - 0}{4} = 1.25 $$

$$SMILE: d = \frac{\overbar{x}D- µD }{S} : \frac{10 - 0}{14} = .71 $$

Now that you have standardized the effects, you can make a decision as to which drug (HAPPY or SMILE) is more effective in treating depression.

*Note: larger effect sizes mean bigger magnitude of effect; d scores range from 0 to 3.*

**Decision**: You should choose Drug HAPPY.