

## AS1(Assignment 1, Unit 5) Independent Measures t-test

Please write your responses in red ☺

A researcher wants to know if the rate that a professor smiles at a student has an effect on the number of times that students raise their hands in class. The researcher randomly selects a sample of  $n=24$  students and randomly assigns the sample to two conditions: one with smiles from the professor and one without smiles from the professor. Here are the data:

Smiles	No Smiles
3, 0, 5, 6	2, 1, 4, 5
4, 3, 2, 1	3, 2, 1, 0
3, 5, 4, 6	6, 4, 3, 5

1. What is the researcher's hypothesis?

*The rate that a professor smiles has an effect on the number of times that students raise their hands in class.*

2. What is the null hypothesis?

*The rate that a professor smiles does NOT have an effect on the number of times that students raise their hands in class.*

3. What is the independent variable?

*Smiles from the professor*

4. What is the dependent variable?

*Number of times that students raise their hands in class*

5. What is the name of the research design in this study?

*Experimental Between Subjects Design*

6. What is the appropriate hypothesis test to analyze the data from this study?

*Independent t test*

7. What are the two mean "differences" you are analyzing in these data?

*A mean from the Control Group and the mean from the Experimental Group is the numerator, it is the difference between the means that the researcher can attribute to the independent Variable. The denominator is the difference between the means "just be chance".*

8. What is the definition of a random assignment?

*The researcher has to randomly assign the participants in the sample to either a control or experimental group. The definition of random assignment is that everyone in the sample has an equal chance of being put into the control group or the experimental group.*

9. Why is using a random sample important in this study?

*It is important that researchers use random samples based on the fact that researchers want to study populations but cannot study the population directly. The point of studying samples is to be able to generalize the results of the study based on the sample back to the population they are interested in studying. In random samples, it allows the researcher to assume that the sample represents or looks like the population. This assumptions says that what was true of the sample findings is also true of the population.*

10. If a researcher failed to use a random sample, how would this affect the research conclusion?

*If a researcher failed to use a random sample, they would not be able to make a generalization of the effects of the research for a population because the sample does not adequately represent the population they are trying to observe or understand.*

11. If a researcher failed to use random assignment, how would this affect the research results?

*If the researcher did NOT use random assignment then the research her could not assume that the only difference between the groups is the independent variable. The limitation is that the researcher cannot attribute the cause to the Independent Variable, which is the whole point of running an experiment: to establish a cause and effect relationship between the independent variable and the dependent variable.*

12. Run the appropriate SPSS analysis on the data and cut and paste your SPSS results here:

**Group Statistics**

	VAR00002	N	Mean	Std. Deviation	Std. Error Mean
VAR00001	1.00	12	3.5000	1.88294	.54356
	2.00	12	3.0000	1.85864	.53654

**Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
VAR00001	Equal variances assumed	.000	1.000	.655	22	.519	.50000	.76376	-1.08395	2.08395
	Equal variances not assumed			.655	21.996	.519	.50000	.76376	-1.08396	2.08396

13. Based on your SPSS results, please answer the following questions:

(a) What is the appropriate decision, reject the null or fail to reject the null?

Fail to reject the null hypothesis

(b) Write the “statistical statement” of your SPSS analysis:  $t(22) = .655, p > .05$

(c) Please write your results as they might be written in a research study:

The mean for the number times a student raised their hands with smiles is  $M = 3.5$  with a  $SD = 1.88294$ .  
The mean for the number of times a student raised their hand with no smiles is  $M = 3.0$  with a  $SD = 1.85864$ . The data failed to reach significance,  $t(22) = .655, p > .05$

(d) Is there a probability of Type I error? Yes \_\_\_\_\_ No

(e) Is there a probability of Type II error? Yes  No \_\_\_\_\_