Using Excel to Perform t Tests and Statistical Significance Calculations

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What is a t-test?

- A t-test comes from inferential statistics.

- It is used to figure out if there is a significant difference between the means of two groups

- Variations of t-tests

An example formula:

Paired t-test formula

$$t = \frac{m}{\frac{s}{\sqrt{n}}}$$

Where

m =   is the average of the difference between pre and post

s =   standard deviation

n =   sample size

Why is this useful?

- Without the tools of statistical inference we'd be left guessing if differences in descriptive statistics were truly differences (or the result of sample size, variance, etc.)

- Especially useful for evaluation

Table 1. Descriptive Statistics

	Four-day week: 5th grade math sample		Traditional schedule: 5th grade math sample		Four-day week: 4th grade reading sample		Traditional schedule: 4th grade reading sample	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Test scores								
Percent scoring proficient or advanced[a]	60.3	16.8	63.2	17.0	66.1	15.6	66.9	15.5
County-level variables								
Percent poverty[a, b]	18.7	9.8	14.4	6.2	18.5	9.7	14.4	6.1
Population density (per sq. mile)[a, b]	51.2	92.1	122	108	50.1	91.6	120	108
School district-level variables								
Percent of male teachers[a, b]	29.7	10.0	26.4	5.20	29.2	9.2	26.4	5.1
Percent of Hispanic teachers[a]	7.6	15.8	6.5	6.5	7.2	15.2	6.4	6.5
Percent of white teachers[b]	91.4	16.1	90.3	10.7	91.9	15.5	90.5	10.7
School-level variables								
Total students[a, b]	228	156	399	150	225	152	399	149
Pupil-teacher ratio[a, b]	14.2	2.9	16.2	10.2	14.1	2.9	16.3	10.7
Percent free lunch	39.9	21.9	37.3	23.9	39.8	21.0	37.2	23.8
Percent of Hispanic students[a, b]	21.2	22.3	24.8	21.1	20.3	21.3	24.8	21.2
Percent of white students[a, b]	75.4	22.2	67.7	22.0	76.4	21.2	67.9	22.0
N	282		3759		326		4304	

Notes: [a] Means are statistically different at 5% level for 5th grade math sample. [b] Means are statistically different at 5% level for 4th grade reading sample. Unweighted means for the 5th grade math sample are based on data from 2001-2010. Unweighted means for the 4th grade reading sample are based on data from 2000-2010.

Anderson, D. M., & Walker, M. B. (2015). Does shortening the school week impact student performance? Evidence from the four-day school week. *Education Finance and Policy, 10*(3), 314-349.

How do I do it?

- Excel has a formula for you!

- Example

- Reference the following steps anytime you need to

"Easy" Steps for performing a t-test in Excel

1. The first, and most important step, is to ensure that your data is ordered (i.e. participant 1 is first in both columns, participant 2 is second, etc.)

2. The formula in Excel is like any other formula, in the cell you wish to see the result in type "=ttest" and the following options will appear:

3. • array1: This is simply the first groups of cells you'd like to analyze. This could be either the pre or the post data. Select the cells (or type their range) then put a ";".

4. • array2: This is the second group of cells you'd like to analyze, follow the same process and put a ";" once the cells are entered

5. • tails: this refers to if the critical area of the distribution is two-sided, meaning a sample could be greater than or less than a certain range of values. Usually we are wanting to measure the potential change (up or down), so two-sided is appropriate. Type 2 and ";"

6. • type: This refers to what type of T-Test you'd like to conduct. With a paired analysis, you would select the first option and you'd type "1)". If you did not have matching pairs you most often would select option number 3, which is a heteroscedastic (unequal variance) analysis. Press enter.

Summary

- T-tests and statistical inference is a useful tool when analyzing descriptive data

- No fancy statistical software needed, Excel can do it!

Thank you!

Questions?

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