***Udacity Data Analyst Track***

**I. Into to Inferential Stats**

5. T-tests Part 2

* **Effect size** 🡪 size of the effect of our treatment
* In non-experimental studies, this may refer to the strength of the relationship between variables
* In z and t tests, simplest measure of effect size **= mean difference**
* Z or 1-tail t-test mean difference **= x – mu**
* Good for variables w/ easy-to-understand meanings (no specialized training)
* If we don’t know what a variable is telling us/it doesn’t have an everyday meaning, the mean difference may not be the best informative measure, so statisticians developed other effect size measures
* 2 main groups
* Difference measures
* **mean difference**
* **Standardized difference** 🡪 **Cohen’s D** (mean difference but in standardize units)
* Correlation measures
* **R2** 🡪 proportion/% of variation in a variable that is related to/explained by another variable
* Can explain a variation in 1 variable by knowing the value of the explanatory variable
* **Statistical Significance** 🡪 rejected the null + results not likely due to chance or sampling error
* *DOESN’T mean it’s important, large in size, or meaningful*
* How to tell if results were meaningful
* 1) What was measured?/What were the variables?
* 2) Did the variables have practical application, social issue, or theoretical (theory) importance?
* If not, the results are clearly not important, no matter what they are
* 3) Effect size = how large were the results?
* Small does not = unimportant and large does not = important
* Small effect sizes can be very important
* 3) Can we rule out random chance/sampling error as an explanation?
* Does not guarantee meaningful results, but goes a long way in helping us asses meaningfulness
* 4) Can we rule out alternative explanations (**lurking/confounding variables**) for our results?
* Jacob Cohen 🡪 **Cohen’s D** 🡪 difference measure giving the *standardize mean difference (x – mu)*
* When standardized, we take x – mu / sample SD to get the mean difference in SD units
* Tells us how far the means are in SD units
* **R2/Coefficient of Determination** 🡪 strength of the relationship between 2 variables
* Goes from 0 (not related at all) to 1 (perfectly related)
* R2 can be derived from t-test values 🡪 **t^2 / (t^2 + dF)**
* Ex: Pizza company A wants to know if they deliver faster than Company B

|  |  |
| --- | --- |
| A | B |
| 20.4 | 20.2 |
| 24.2 | 16.9 |
| 15.4 | 18.5 |
| 21.4 | 17.3 |
| 20.2 | 20.5 |
| 18.5 |  |
| 21.5 |  |

* Use Cohen’s d to measure the effect size between the two times.