Robin Dunbar a famous anthropologist argued that humans only have the capacity to keep track of so many people at a time. He argued that the maximum number of people humans could keep track of is 150. This number is called Dunbar's number (Links to an external site.). Some have interpreted this to mean that any individual person has on average about 150 friends.

Some technologists have argued that social media and modern information technology allow individuals to keep track of more people. For example, Facebook algorithmically organizes and presents information about our Facebook friends in a centralized feed lowering the costs associated with keeping in contact with all these people.

Fortunately we can evaluate this claim because our colleague Prof. Vitak has collected data on Facebook usage among college students at a large university. Here is a cleaned up version of the data. Using the theoretical population mean of 150 and the sample provided conduct a one-sample t-test to determine whether individuals have more friends than would be expected by Dunbar's number. Interpret the results and draw a conclusion, considering the significance test, effect size, and limitations.

Students who have more than 150 friends may be using Facebook in fundamentally different ways from those that have fewer than 150 friends. In particular, those with more Facebook friends may be using Facebook to meet new people. Use a two sample t-test to compare Facebook users who have 150 Facebook friends of more to those who have fewer to see if they responded to the question "I use Facebook to meet new people" differently. Interpret the results and draw a conclusion, considering the significance test, effect size, and limitations. Provide a bar graph to show difference in mean response for the two groups.

Explanation of the data:

numfriends - this is the number of friends participants reported

meetnewpeople - this is the participants the response to the item "I use Facebook to meet new people" 1 corresponds to "Very Unlikely", 2 corresponds to "Unlikely", 3 corresponds to "Neither Likely Nor Unlikely", 4 corresponds to "Likely", and 5 corresponds to "Very Likely".

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Project #1

When figuring out if people on Facebook have more friends than Dunbar's number of 150, I needed to conduct a one-sample t-test. The first step in doing this is by stating the null and alternative hypothesis:

1. Step 1:
    a) Null Hypothesis $\mu = 150$
    b) Alternative Hypothesis $\mu > 150$

Next, I had to figure out the basic descriptive statistics about the data and perform a test with the following data and equations:

2. Step 2:
    a) $\bar{x} = 435.73$
    b) $\mu = 150$
    c) $s = 275.65$
    d) $N = 383$
    e) $t = (\bar{x} - \mu)/(s/\sqrt{N}) = (435.73-150)/(275.65/\sqrt{383}) = 20.286$
    f) Degrees of freedom = 383 - 1 = 382
    g) Probability of sample size: p = pt(t,df) = pt(20.286,382) = 1
    h) Effect size = .7703
    i) Cohen's d = 2.416

Finally, I can use the previous information in order to summarize my results and provide feedback:

3. Step 3:
    a) We reject the null hypothesis and say that it would be expected that people have more friends who use facebook than those characterized by Dunbar's number of 150. We can conclude this because we found a 100% probability from the t-test that those who use facebook have more than 150 friends.
    b) With an effect size of .7703, an average person who uses facebook has .7703 standard deviations above of the amount of friends a person from Dunbar's number would have.
    c) Limitation for this problem can include that professor Vitak only researched college students for her work, whereas, Dunbar's number could have represented everyone in society.

For the next problem, I needed to perform a Two-sample t-test from the data given. My first step for that was to state the null and alternative hypothesis:

- Null hyp: There is no difference in the responses for why people use facebook
- Alternative hyp: There is a difference in the responses for why people use facebook.

Next, I had to conduce a two-sample t-test and figure out the necessary variables used:

II. Two sample t-test
   A. μ_1= users who have less than 150 friends average meetnewpeople rating = 2
   B. μ_2 = users who have 150 or more friends average meetnewpeople rating = 1.5
   C. s_1 = 1.4142
   D. s_2 = .7071
   E. n_1= 38
   F. n_2 = 345
   G. $t= (\mu_1-\mu_2)/(sqrt((s_1^2/n_1+s_2^2/n_2)) = (2-1.5)/sqrt((1.4142^2/38 + .7071^2/345)) = 2.52326$
   H. df_{total} = (38-1)+(345-1) = 37 + 344 = 381

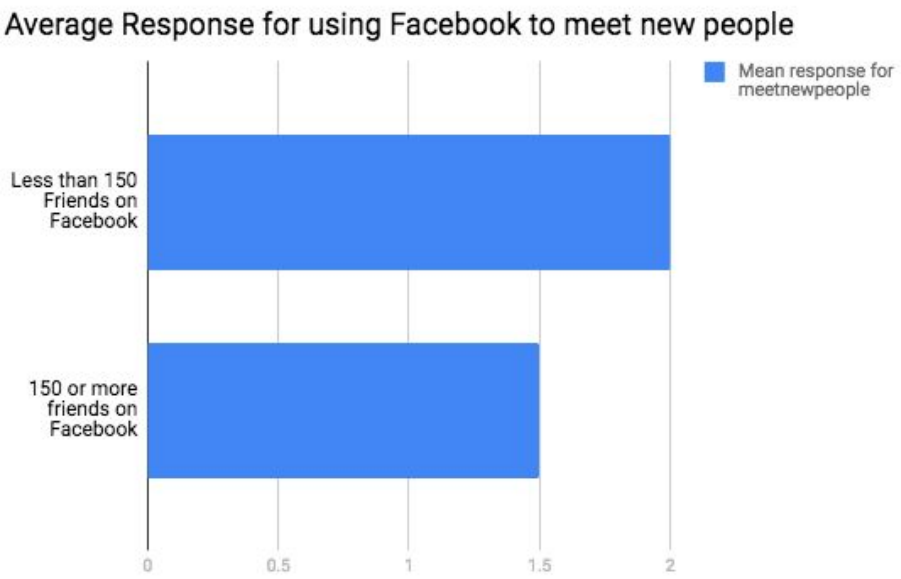
Finally, I found the probability of the chance that the null hypothesis is true and summarized the info:

I. pt(t,df) = pt(2.52326, 381) = .99398
   1. This probability of 99.39% shows that there is a 99.39% that those with 150 or more facebook friends are no more likely to use facebook to meet new people than those with less than 150 friends. Instead, there is a 99.39% chance that the two groups are using facebook for the same reasons. Therefore, we fail to reject the null null.

J. Effect size = .1282
   1. With an effect size of .1282 an average person who uses facebook and has less than 150 friends has .1282 standard deviations above more likely to use facebook to meet new people than those with over 150 friends.

K. Cohen's d = .2585

L. A limitation for this problem is that again Professor Vitak only researched college students, who are all more likely to have the same reason as to why they use Facebook compared to others.



III. This bar graph shows that there is only a .5 difference of the average response for using Facebook to meet new people. The small difference helps in part for the conclusion that those with less friends are no more likely to use facebook to meet new people than those with 150 or more friends.