**Interpret output for paired t-test**

Let’s have a look at the results of our paired examples t-test. Now our first table shows us some descriptive statistics and we can see that the mean competency before starting the job was about 42.47 and after one year on the job it increased to 54.269. Now the purpose of the t-test is asking Did this difference happen just by chance in our sample, or is there enough evidence to suggest that in the population, employees will be significantly more confident after one year on the job. Now the table we’re really interested in for the results of our t-test is this paired sample t-test table. If you look at the heading here, it says paired differences and it extends all the way from the end of the confidence intervals to this mean, and that means that all of these values relate to paired differences. So this first one is the mean of the paired differences and we can get this value by taking the first mean and subtracting the second mean, so 42.47 – 54.269. That will give us -11.79762. The standard deviation score is a standard deviation of paired differences so if you imagine taking the difference for each participant of their competency before minus the competency after so by having a new column of paired differences and finding the standard deviation of those differences. That’s what this value represents.

Next, I want to look at the t-statistics. So our t-stat is minus 26.062, with 69 degrees of freedom and it’s a very, very small value and this value is what gives us our p-value here in our sig column, and our p-value is very, very small for this test: .000. Now we never ever say that our p-value equals 0, even when we have a value that looks like this. All it says that p is zero to at least three decimal places so it’s very small. So we report it as p less than 0.001. So basically, what we’re saying is the most the p value could possibly be is .001. If we have a look down at this table here that I’ve entered into SPSS, it tells us how we can interpret this significance value, and we’re always comparing our p-value to our alpha value. Now my alpha value is .05, but you should use your alpha value. If our p-value is less than .05, that means there’s enough evidence to reject each zero and accept each one. Now if you remember in a t-test, our null hypothesis always says there’s no difference and our alternate hypothesis is saying there is a difference. If our p-value is bigger that.05, that means we cannot reject H0. There’s not enough evidence to so we have to accept it and conclude that the means are not significantly different. So in our case, p is .000, so it’s much less than .05, so we’re going to reject the null and accept our alternate hypothesis, concluding that the means are significantly different, so in other words, these two competency scores here are significantly different, it didn’t just happen by chance. Now if we have a look here, what do we do when we have a one-tailed test? Well a two-tailed test just says there’s a difference so in our case, employees competency before and after are different from each other. A one-tailed test makes a specific claim about a difference. So we would say something like employees’ competency score for one year on the job are significantly greater than their score before they started the job. So if we had a one-tailed test in our output, we would need to take our p-value and we would divide it by two. Now in this case, because p is already .000, if we divide that by two, we’re going to get the same result. It’s not really going to make a difference here, but if you have any numbers in your p-value, you need to make sure that you divide it by two, if you’re doing a one-tailed test. Lastly, if we have a look at this competence interval it’s for our main difference, so this number’s right in the middle between these two, and its saying that 95% of the time, we expect the difference between the before and after scores to be between -12 and -10. In other words, we’re 95% confident that the before competency score will be lower than the after competency score.

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