

FOUNDATIONS OF STATISTICS: – ASSIGNMENT – 2

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Question 1:

An Organisational psychologist at an institution hypothesised that the average score for “team engagement” of Australian public service employees has decreased due to changes made by the current government when the average score was 14.5 (as per the previous research).

For a random sample of 1500 Australian public service employees, the average score for “team engagement” was 11.71 ($s = 6.06$ [rounded to two]). This is lower than the mean score of 14.5 which was recorded in the previous research and a one-sample t-test shows this difference in mean score for “team management” is significant, $t_{(1499)} = 17.82$, $p < 0.001$.

The 95% confidence interval shows that average score for “team management” of Australian public service employees is between 2.48 and 3.09 less than the score of 14.5.

As expected, the average score for “team management” of Australian public service employees has decreased when compared with the previous research.

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Level of Engagement with your Team [scale of 0 - 20]	1500	11.71	6.055	.156

One-Sample Test						
Test Value = 14.5						
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Level of Engagement with your Team [scale of 0 - 20]	-17.821	1499	.000	-2.786	-3.09	-2.48

Additional Output:

One-Sample Effect Sizes					
		Standardizer ^a	Point Estimate	95% Confidence Interval	
				Lower	Upper
Level of Engagement with your Team [scale of 0 - 20]	Cohen's d	6.055	-.460	-.513	-.407
	Hedges' correction	6.058	-.460	-.513	-.407

a. The denominator used in estimating the effect sizes.
Cohen's d uses the sample standard deviation.
Hedges' correction uses the sample standard deviation, plus a correction factor.


Question 2:

Researches hypothesised that Australian public service employees who have less than 5 years tenure in their job are more engaged with their supervisor than Australian public service employees who have 5 years or more tenure.

For a random sample of 1493 Australian public service employees, the average level of engagement with their supervisor for the employees who have less than 5 years tenure in their job ($M = 14.11$, $s = 5.06$, $n = 450$) was higher than the average level of engagement with their supervisor for the employees who have 5 years or more tenure ($M = 13.47$, $s = 5.22$, $n = 1043$), however an independent sample t-test shows this difference in mean level of engagement of Australian public service employees with their supervisor is significant, $t_{(1491)} = 2.18$, $p = 0.029$.

The 95% confidence interval shows that the average level of engagement of employees with their supervisor who have less than 5 years tenure in their job is between 0.07 and 1.21 higher than for those who have 5 years or more tenure.

As expected, the average level of engagement of Australian public service employees with their supervisor who have less than 5 years tenure is higher than that of employees who have 5 years or more tenure.



Group Statistics					
	Length of time with company	N	Mean	Std. Deviation	Std. Error Mean
Level of Engagement with your Supervisor [scale of 0 - 20]	Less than 5 years	450	14.11	5.059	.238
	5 years or more	1043	13.47	5.216	.162

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
Level of Engagement with your Supervisor [scale of 0 - 20]	Equal variances assumed	.937	.333	2.184	1491	.029	.637	.292	.065 1.209
	Equal variances not assumed			2.211	875.872	.027	.637	.288	.072 1.202

Additional Output:

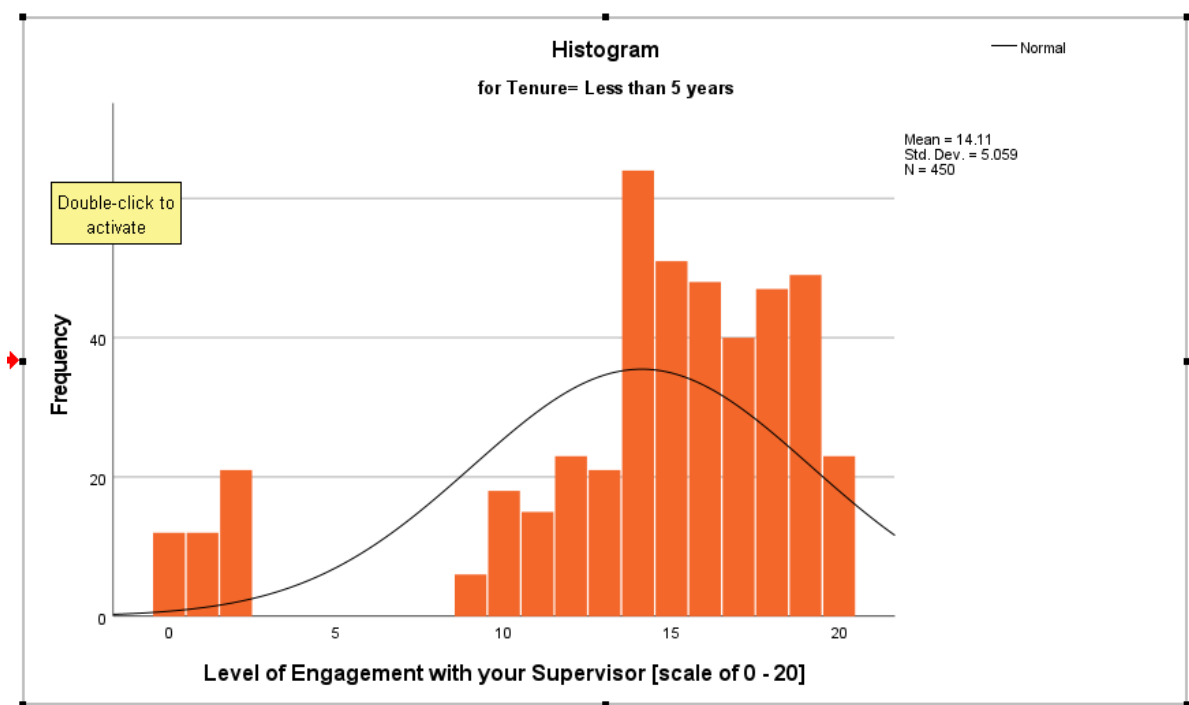
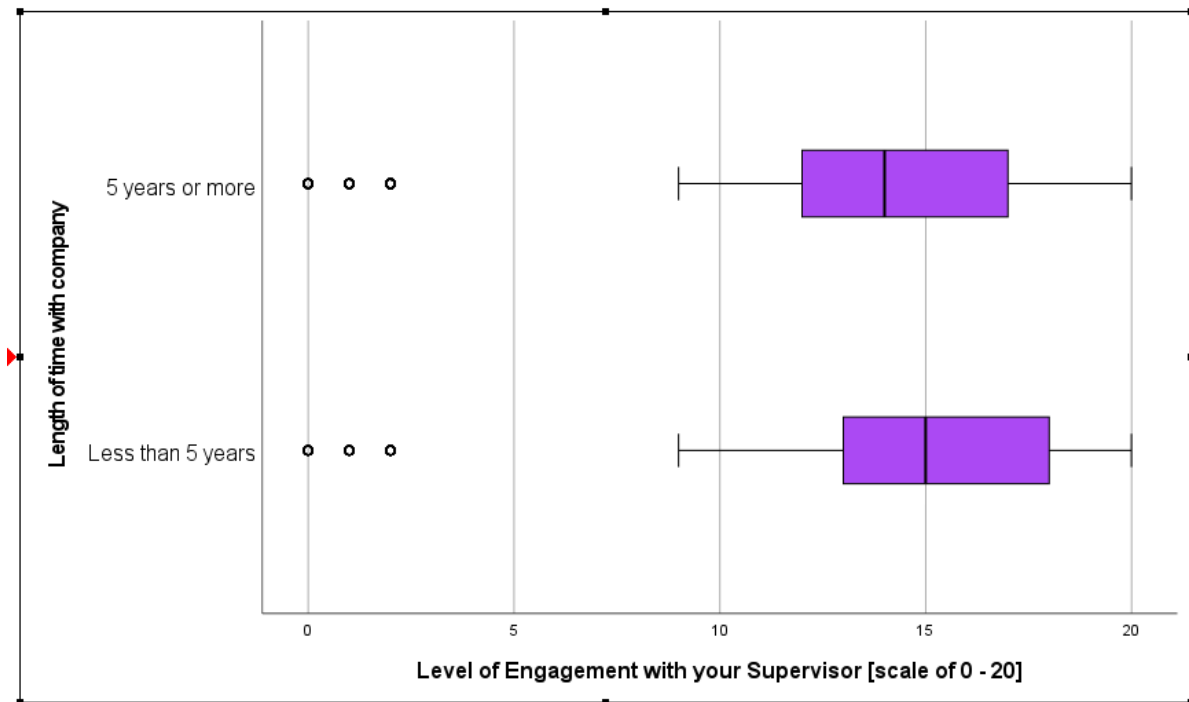
Independent Samples Effect Sizes					
		Standardizer ^a	Point Estimate	95% Confidence Interval	
				Lower	Upper
Level of Engagement with your Supervisor [scale of 0 - 20]	Cohen's d	5.169	.123	.013	.234
	Hedges' correction	5.172	.123	.013	.234
	Glass's delta	5.216	.122	.011	.233

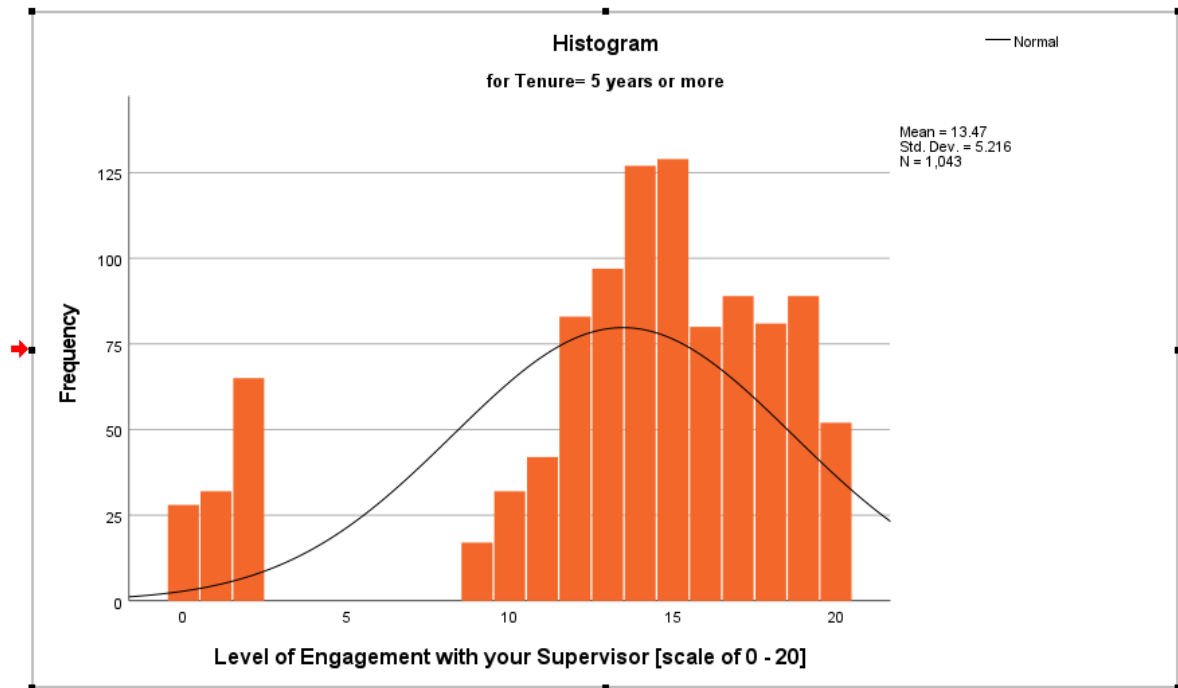
a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation.
Hedges' correction uses the pooled standard deviation, plus a correction factor.
Glass's delta uses the sample standard deviation of the control group.

Assumptions:

The assumption of independence of observations has been met. The sample was a random sample of Australian public service employees. The assumption of normality has not been met. The distribution of level of engagement of employees with their supervisor was negatively skewed for those who have less than 5 years tenure. The distribution of level of engagement of employees with their supervisor was negatively skewed for those who have 5 years or more tenure. The assumptions of homogeneity of variances has been met. The Levene's test was not significant (Sig. > 0.05). The independent samples t-test is robust to the violation of either the assumption of normality, or the assumption of homogeneity of variances, so the results of the independent samples t-test can be used.

Additional output to check assumptions:





Question 3:

Researchers hypothesised that Australian public service employees are more engaged, on average, with the team of colleagues they regularly work in than with their supervisor.

For a random sample of 1493 Australian public service employees, on average, the level of engagement with their supervisor ($M = 13.66$, $s = 5.18$) was higher than the level of engagement with their team ($M = 11.71$, $s = 6.05$). A paired samples t-test shows that this difference in the mean of level of engagement of employees ($M_D = 1.95$, $s_D = 5.97$) is significant, $t_{(1492)} = 12.62$, $p < 0.001$. The 95% confidence interval indicates that, on average, the level of engagement of employees with their supervisor is between 1.65 and 2.25 scores higher than the level of engagement of employees with their team.

Contrary to the expectations of the researches, the level of engagement of the Australian public service employees with their team is less when compared with the level of engagement with their supervisor. They have higher level of engagement with their supervisor than that of with their team.

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
→ Pair 1	Level of Engagement with your Supervisor [scale of 0 - 20]	13.66	1493	5.176	.134
	Level of Engagement with your Team [scale of 0 - 20]	11.71	1493	6.054	.157

Paired Samples Test									
		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Level of Engagement with your Supervisor [scale of 0 - 20] - Level of Engagement with your Team [scale of 0 - 20]	1.950	5.969	.154	1.647	2.253	12.621	1492	.000

Additional Output:

Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	Level of Engagement with your Supervisor [scale of 0 - 20] & Level of Engagement with your Team [scale of 0 - 20]	1493	.444	.000

Paired Samples Effect Sizes						
			Standardizer ^a	Point Estimate	95% Confidence Interval	
					Lower	Upper
Pair 1	Level of Engagement with your Supervisor [scale of 0 - 20] - Level of Engagement with your Team [scale of 0 - 20]	Cohen's d	5.969	.327	.275	.379
		Hedges' correction	5.971	.327	.274	.379

a. The denominator used in estimating the effect sizes.
Cohen's d uses the sample standard deviation of the mean difference.
Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

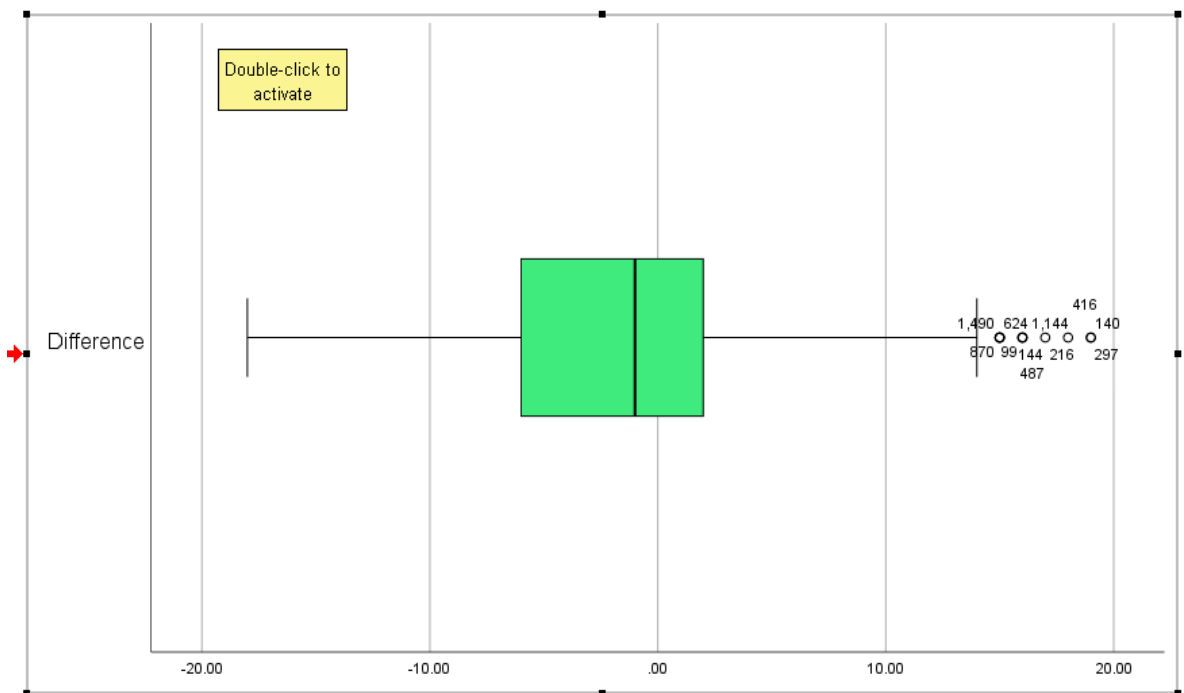
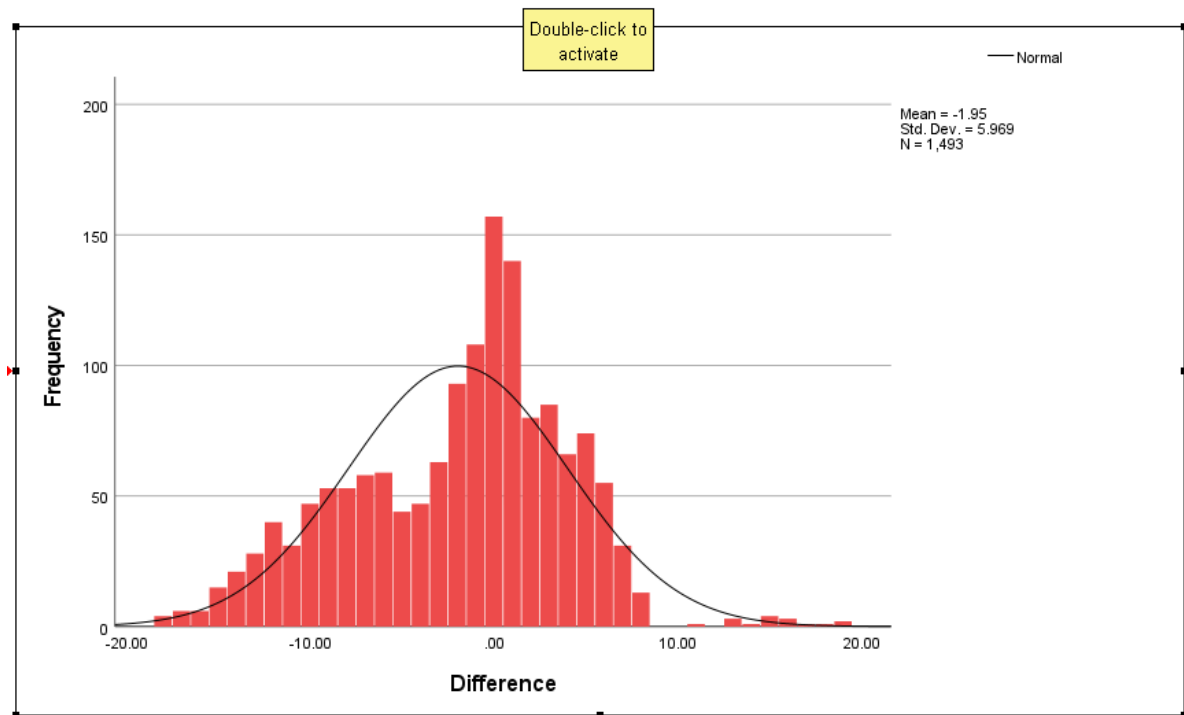
Assumptions:

The assumption of independence of observations has been met. The sample was a random sample of Australian public service employees. The assumption of normality has been met. The distribution of the difference scores was approximately normal.

[or]

The distribution of the difference scores in the sample appear to be normally distributed which suggests that in the population the difference scores are normally distributed.

Additional output to check assumptions:



Question 4:

A. To investigate the pharmaceutical company's prediction, we conduct a Binomial test (Comparing our sample proportion to a population proportion known) for a single proportion using z-standard normal distribution. Where the H_0 and H_1 are:

H_0 = There is no difference in the proportion of Australian adults who prefer to take a generic brand prescription drug

H_1 = There is a difference in the proportion of Australian adults who prefer to take a generic brand prescription drug

B. The population contains all the **Australian adults**. All Australian adults is the population we can draw conclusions about in this study.

C. Given $p = 0.110$, when we compare the p value with the α (0.05) value, p value is greater than the value of α ($0.11 > 0.05$). We assume 5% level of significance that is $\alpha = 0.05$. So, it is not significant. We do not reject the null hypothesis [H_0].

The conclusion of the pharmaceutical company is correct. The percentage of Australian adults willing to take a cheaper generic brand prescription drug has remained the same, exactly 48%.