

Assignment 6: Independent-Samples t Test



Use the following data to determine if an increase in pay or an increase in vacation time will result in higher job satisfaction.

Increased Pay Participants	Job Satisfaction Score	Increased Vacation Participants	Job Satisfaction Score
1	5	16	5
2	8	17	8
3	6	18	6
4	10	19	1
5	10	20	6
6	8	21	8
7	7	22	2
8	6	23	6
9	5	24	5
10	9	25	4
11	2	26	2
12	8	27	8
13	9	28	6
14	7	29	1
15	7	30	7

SPSS Instructions

- On the bottom left, click Variable View.
- Enter 'Incentive' in the first cell.
- Enter 'Response' in the cell below it.
- On the bottom left, click Data View.
- Under Incentive, enter 1 for the first 15 cells, and 2 for the next 15 cells.
- Under Response, enter the Job Satisfaction scores. (1s correspond to pay; 2s correspond to vacation.)
- Click Analyze, Compare Means, Independent-Samples T Test.
- Move Response into the Test Variable(s) box, and Incentive into the Grouping Variable box.
- Click Define Groups. Enter 1 for Group 1 and 2 for Group 2.
- Click Continue and click OK.
- Save the Data file and Output file separately. Use informative file names.

SPSS Data

	 Incentive	 Response
1	1.00	5.00
2	1.00	8.00
3	1.00	6.00
4	1.00	10.00
5	1.00	10.00
6	1.00	8.00
7	1.00	7.00
8	1.00	6.00
9	1.00	5.00
10	1.00	9.00
11	1.00	2.00
12	1.00	8.00
13	1.00	9.00
14	1.00	7.00
15	1.00	7.00
16	2.00	5.00
17	2.00	8.00
18	2.00	6.00
19	2.00	1.00
20	2.00	6.00
21	2.00	8.00
22	2.00	2.00
23	2.00	6.00
24	2.00	5.00
25	2.00	4.00
26	2.00	2.00
27	2.00	8.00
28	2.00	6.00
29	2.00	1.00
30	2.00	7.00
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SPSS Output

Group Statistics

	Incentive	N	Mean	Std. Deviation	Std. Error Mean
Response	1.00	15	7.1333	2.13363	.55090
	2.00	15	5.0000	2.47848	.63994

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference		Lower	Upper
Response	Equal variances assumed	.631	.434	2.526	28	.017	2.13333	.84440		.40365	3.86301
	Equal variances not assumed			2.526	27.394	.018	2.13333	.84440		.40193	3.86474

Written Answers

Show all work.

- (1) Provide the notation for the null and research hypotheses and a written statement for the former.
- (2) Calculate t by hand, provide the result in APA format, and write a conclusion. Use $\alpha .05$. You may take the means from the SPSS Output.
- (3) Provide the effect size using Cohen's d and write a conclusion statement.
- (4) Calculate the Confidence Interval using $\alpha .05$ and write a conclusion.

1.)

$$H_0: \mu_1 = \mu_2$$

$$H_1: \mu_1 \neq \mu_2$$

Null hypothesis: There is no statistically significant difference in the population means of job satisfaction scores between employees who receive an increase in pay and employees who receive an increase in vacation time.

2.)

$S_p^2 = \frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1+n_2-2}$	$S_p^2 = \frac{(15-1)4.554 + (15-1)6.140}{15+15-2}$	$S_p^2 = 5.35$
$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{(s_p^2/n_1) + (s_p^2/n_2)}}$	$t = \frac{7.133 - 5.000}{\sqrt{(5.35/15) + (5.35/15)}}$	$t = \frac{2.133}{\sqrt{.714}}$
$t = 2.52$		

df = $n_1 + n_2 - 2 = 15 + 15 - 2 = 28$

The critical values for 28 df using $\alpha = .05 = \pm 2.048$. The test statistic of $2.52 > 2.048$, so we reject H_0 .

Result in APA format: $t(28) = 2.52, p = .02$.

Conclusion: The population mean of job satisfaction scores for employees who received a pay increase is a statistically significant higher value than that for employees who received an increase in vacation time.

3.)

$$\hat{d} = \frac{\bar{x}_1 - \bar{x}_2}{s_p} \quad \hat{d} = \frac{7.133 - 5.000}{\sqrt{5.35}} \quad \boxed{\hat{d} = .92}$$

Conclusion: Employees who received a pay increase reported .92 standard deviations higher job satisfaction scores than employees who received an increase in vacation time, indicating a large effect.

4.)

$$CI = (\bar{x}_1 - \bar{x}_2) \pm t_{df} \times S_{\bar{x}_1 - \bar{x}_2} = (7.133 - 5) \pm 2.048 \times .845$$

$$= 2.133 \pm 1.731$$

$$= .40 \leq \mu \leq 3.86$$

$$\boxed{95\% CI [.40, 3.86]}$$

Conclusion: There is a 95% probability that the interval .40 to 3.86 includes the population mean difference in job satisfaction between employees who received a pay increase versus an increase in vacation time.