Supplement G: Report Writing for Hypothesis Tests

A report on a hypothesis test (e.g., Binomial test, one-sample t-test) should include:

- Introduction, including the alternative hypothesis for the study
- Sample description, together with quoting the sample size and any other appropriate sample statistics
- Comparison of values (if looking at a difference in means or proportions)
- Comment on whether the observed difference (or relationship) is significant or not significant, quoting appropriate statistics
- 95% confidence interval interpretation, quoting relevant values
- Conclusion which relates back to the alternative hypothesis

Note: sometimes the *p*-value will appear in SPSS output as .000. If that occurs, in a report it should be written as $p < .001$

We will look in more specific detail at report writing for one-sample t-tests and Binomial tests below. But, in the later modules you will also see a similar general format as described above, when writing reports for other types of hypothesis tests.

1. Report writing for one-sample *t*-tests

A report on a one-sample t-test should include:

- Introduction, including the alternative hypothesis for the study
- Sample description, including nature of the sample and mean, standard deviation and size of the sample
- Comparison of sample mean with reference mean
- Difference significant or not significant, quoting *t*, *df* and *p*
- 95% confidence interval interpretation, quoting relevant values
- Conclusion which relates back to the alternative hypothesis

Example 1

A university lecturer believes that the average amount of sleep per night for students taking her unit differs from 8 hours per night. She took a random sample of her students and asked each student how much sleep they typically have per night. Use the SPSS output below to help write a report on the results of her study (testing at an alpha level of .05)

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Hours sleep per night	15	7.2000	.86189	.22254

One-Sample Test

Test Value = 8

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Hours sleep per night	-3.595	14	.003	-.80000	-1.2773	-.3227

Report

A university lecturer hypothesised that the average amount of sleep per night for students taking her unit differs from 8 hours per night.

For a random sample of 15 university students taking her unit, the average amount of sleep per night was 7.20 hours (*s* = 0.86 hours). This is lower than 8 hours per night and a one-sample t-test shows this difference in mean hours sleep per night is significant, $t(14) = 3.60$, $p = .003$

The 95% confidence interval shows that average hours sleep per night for university students taking the instructor's unit is between 0.32 and 1.28 hours less than 8 hours.

As expected, the average amount of sleep per night for students taking the instructor's unit differs from 8 hours, with her students on average sleeping less than 8 hours per night.

Example 2

In 2016, a report indicated that the average BMI of Australian adults was 27.44 kg per m^2. Some health researchers believe the BMI of Australian adults has decreased since that time. The following SPSS output was recently obtained for a random sample of Australian adults.

Is this data sufficient evidence to conclude that the BMI of Australian adults is lower than in 2016? Write a report on the results of this study.

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Body Mass Index	**1716**	**27.1809**	**5.17325**	**.12488**

One-Sample Test

Test Value = 27.44

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Body Mass Index	-2.075	1715	.038	-.25913	-.5041	-.0142

Report

Health researchers hypothesised that the average BMI of Australian adults has decreased since 2016, when it was 27.44 kg per m^2.

For a random sample of 1716 Australian adults, the average BMI was 27.18 kg per m^2 (s = 5.17 kg per m^2). This is lower than the mean BMI of 27.44 recorded in 2016 and a one-sample t-test shows this difference in mean BMI is significant, $t(1715) = 2.08$, $p = .038$

The 95% confidence interval shows that average BMI of Australian adults is between 0.01 and 0.50 kg per m^2 lower than in 2016.

As expected, the average BMI of Australian adults has decreased since 2016.

2. Report writing for Binomial tests

A report on a Binomial test should include:

- Introduction, including the alternative hypothesis for the study
- Sample description, including nature of the sample, the sample proportion and the sample size
- Comparison of the sample proportion (or percentage) with the reference value
- Difference significant or not significant, quoting *n* and *p*
- 95% confidence interval interpretation, quoting relevant values
- Conclusion which relates back to the alternative hypothesis

Example 1

A newly established food company manufactures a cereal called Brekky Blockz. The company claims that 30% of packets of Brekky Blockz contain a bonus novelty token. However, some consumers suspect this claim is false - they believe that a lower percentage of the Brekky Blockz packets contain the novelty token. The following SPSS output was produced to investigate this (note that 'packet contains a novelty token?' was coded 1 = yes, 2 = no).

Write a report on the results of this study.

Binomial Test

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (1-tailed)
Packet contains novelty token?	Group 1	<= 1	6	.2	.3	.024[a]
	Group 2	> 1	34	.9		
	Total		40	1.0		

a. Alternative hypothesis states that the proportion of cases in the first group < .3.

Enter the sample proportion	0.150	
Enter the sample size	40	
	Lower Bound	Upper Bound
95% Confidence Interval	0.04	0.26

Report

Consumers hypothesised that less than 30% of Brekky Blockz cereal packets contain a novelty token.

For a random sample of 40 Brekky Blockz cereal packets, 15% of the packets contained a novelty token. This is lower than the 30% claimed by the food company, and a Binomial test shows this difference is significant, $n = 40$, $p = .024$

The 95% confidence interval indicates that between 4% and 26% of Brekky Blockz cereal packets contain a novelty token.

As expected, less than 30% of Brekky Blockz cereal packets contain a novelty token.

(*Note: Because the sample proportion in the SPSS output was rounded off to one decimal place, obtained the value to 2 decimal places by working out 6 / 40 = 0.15*)

Example 2

In 2012, 22% of first-year students studying Engineering at a particular university were enrolled in their degree as part-time students. A student advisor believes the proportion of first-year students currently studying Engineering at the university who are enrolled in their degree part-time is now higher than this. She takes a random sample of 100 current first-year Engineering students and records the enrolment status of each student (note that enrolment status was coded 1 = part-time, 2 = full-time). She produces the following output.
Write a report on the results of this study.

Binomial Test

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (1-tailed)
Enrolment Status	Group 1	<= 1	25	.25	.22	.268
	Group 2	> 1	75	.75		
	Total		100	1.00		

95% Confidence Interval Calculator for Proportions

(for use with the Binomial Test)

Enter the **Sample's Proportion** (0 to 1)	0.250	
Enter the **Sample's Size** (*n*)	100	
	Lower Bound	Upper Bound
95% Confidence Interval	0.1651	0.3349

Report

A student advisor hypothesised that the percentage of current first-year students studying Engineering at a particular university who are enrolled in their degree part time is higher than it was in 2012, when 22% of first-year Engineering students at the university were studying part-time.

For a random sample of 100 current first-year Engineering students at the university, 25% of them were enrolled in their degree part-time. This is lower than the 22% of first-year Engineering students at the university who were studying part-time in 2012, however a Binomial test shows this difference is not significant, $n = 100$, $p = .268$
The 95% confidence interval indicates that between 17% and 33% of current first-year Engineering students at the university are enrolled in their degree part-time.

There is no evidence to suggest the percentage of current first-year Engineering students at the university who are studying part-time is higher than in 2012.