

Reading Inferential Statistics

LLE – Mathematics and Statistics Skills

1. A new treatment for loose feet has been designed. The foot loose index (FLI) is a measure of the performance of the foot, with higher values demonstrating better performance. A group of individuals are recruited to test the new treatment. The FLI is recorded before treatment and then again after 3 months of treatment.
 - (a) Is this an example of a between-groups analysis (that is individuals are divided into distinct groups) or a within-groups analysis (that is the same individuals having multiple recordings)?

A related-samples t-test is carried out to test whether there is evidence that the treatment works. The summary results and t-test are given:

	Before	After
N	35	35
Mean	11.1	13.1
SD	5.54	6.51
Mean difference (after – before)	1.91	
95% confidence interval for difference	(0.734, 3.09)	
t	3.30	
p	0.002	

- (b) Did any participants drop-out during the trials? Explain your answer.
- (c) Interpret the 95% confidence interval for the mean of the difference between before and after treatment.
- (d) Use the confidence interval and p-value given to determine whether there is any evidence that the treatment makes a difference to FLI.

2. Treatments for excessive snoring are going to be tested. A good sleep index (gsi) is to be used, with higher values representing better sleep. Two drugs, codenamed Drug A and Drug B, are going to be tested. Three groups of participants are going to be given either a placebo or one of the two drugs. The trial will be double-blinded.
- (a) Is this an example of a between-groups analysis (that is individuals are divided into distinct groups) or a within-groups analysis (that is the same individuals having multiple recordings)?
 - (b) What is meant by ‘double-blinded’ and what are the advantages of this?

The summary statistics are given below. Mean gsi was adjusted for age and sex of participants.

Treatment	Placebo	Drug A	Drug B
N	25	25	22
Mean	47.7	50.7	51.8
Adjusted mean	47.7	51.1	51.4
95% CI for adjusted mean	43.7, 51.7	47.0, 55.2	47.0, 55.7

- (c) Is there any evidence in the table above that either of the drugs are significantly effective in improving a person’s gsi?
- (d) An analysis of covariance was carried out (with age and sex taken as confounding variables) and the results for treatment type were:

$$F(2, 67) = 1.020, p = 0.366$$

How would you interpret this result in determining the effectiveness of either of the drugs?

3. A medical researcher is concerned about whether wearing a red top causes premature death. To test this, they watch episodes of

the original series of Star Trek and record deaths based on whether the crew member wore a red shirt.

Shirt - Status	Dead	Alive	Total
Red	24	215	239
Not red	16	175	191
Total	40	390	430

- (a) Find the percentage (correct to 1 decimal place) of crew members who died whilst in red.
- (b) Find the percentage (correct to 1 decimal place) of crew members who died whilst not in red.
- (c) Which group, wear red v did not wear red, had the higher proportion of deaths?
- (d) A chi-square test of association gives the result

$$\chi^2 = 0.349, p = 0.555$$

Is there evidence that wearing red is anymore dangerous than not wearing red?