Assignment 10: Chi-Square

Researchers predicted that rats receiving inescapable electrical shocks would be less likely to reject a tumor than rats receiving escapable electrical shocks. This seems like a cruel hypothesis to test but the implications would be important by revealing if our perception to escape stress like tumors can itself influence the ability to fight stress. The following reference may be of interest but reading the article is optional.

Visintainer, M. A., Volpicelli, J. R., & Seligman, M. E. (1982). Tumor rejection in rats after inescapable
or escapable shock. *Science, 216*(4544), 437–439.
https://doi.org/10.1126/science.7200261

Use the following data to determine if there is a relationship between the ability to escape shocks and the likelihood of rejecting a tumor.

	Inescapable Shock	Escapable Shock	Totals
Tumor Rejected	8	19	27
Tumor Not Rejected	22	11	33
Totals	30	30	60

SPSS Instructions

- On the bottom left, click Variable View.
- Enter 'Row' in the first cell, 'Column' in the cell below, and 'Frequency' in the next cell below.
- On the bottom left, click Data View. In the first column, enter the following in the first four cells: 1, 1, 2, 2. (1 = Tumor Rejected; 2 = Tumor Not Rejected.)
- In the second column, enter: 1, 2, 1, 2. (1 = Inescapable Shock; 2 = Escapable Shock.)
- In the third column, enter: 8, 19, 22, 11.
- Click Data, Weight Cases, and select 'Weight cases by'.
- Move Frequency to the Frequency Variable box. Click OK.
- Click Analyze, Descriptive Statistics, Crosstabs.
- Move Row to the Row(s) box on the right and move Column to the Column(s) box.
- Click Statistics, select Chi-square, click Continue, Click OK.
- Save the Data file and Output file separately. Use informative file names.

PSYC 60 Assign 10 Data.sav [DataSet4] - IBM SPSS Statistics Data Editor

File   Edit   View   Data   Transform   Analyze   Graphs   Utiliti

4 :

	Row	Column	Frequency	var
1	1.00	1.00	8.00	
2	1.00	2.00	19.00	
3	2.00	1.00	22.00	
4	2.00	2.00	11.00	
5				
6				

SPSS Output

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.148[a]	1	.004		
Continuity Correction[b]	6.734	1	.009		
Likelihood Ratio	8.352	1	.004		
Fisher's Exact Test				.009	.004
Linear-by-Linear Association	8.012	1	.005		
N of Valid Cases	60				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 13.50.
b. Computed only for a 2x2 table

Written Calculations

Show all work.

(1) Is this a one- or two-classification variable design? What is)are the classification variables?
(2) Use chi-square to test if there is a statistically significant difference between rats that receive escapable shocks versus inescapable shocks in terms of how many reject a tumor. Provide the result in APA format and write a conclusion. Use α .01.
(3) What is the risk of not rejecting a tumor when there is inescapable shock?
(4) What is the risk of not rejecting a tumor when there is escapable shock?
(5) What is the risk ratio of not rejecting a tumor? Write a conclusion.
(6) What are the odds of not rejecting a tumor when there is inescapable shock?
(7) What are the odds of not rejecting a tumor when there is escapable shock?
(8) What is the odds ratio of not rejecting a tumor? Write a conclusion.
1.) This is a two-classification variable design. The classification variables are tumor rejection and shock escapability.

2) $E_{11} = 13.5$

$E_{12} = 13.5$

$E_{21} = 16.5$

$E_{n2} = 16.5$

$$\chi^2 = \sum \frac{(O-E)^2}{E} = \frac{(8-13.5)^2}{13.5} + \frac{(19-13.5)^2}{13.5} + \frac{(22-16.5)^2}{16.5}$$

$$+ \frac{(11-16.5)^2}{16.5}$$

$$\chi^2 = 8.148$$

$$\chi^2(1, N=60) = 8.15, \ p = .004$$

Significantly more rats that received inescapable shock rejected a tumor than rats that received inescapable shock.

3. $\frac{22}{30} = 0.7\overline{3}$

4. $\frac{11}{30} = .3\overline{6}$

5. Ans. $.73/.36 = 2$ The risk of not rejecting a tumor is 2 times as high when experiencing inescapable shock when compared to escapable shock.

6. $22/8 = 2.75$

7. $11/19 = .58$

8. $2.75/.58 = 4.75$

The odds of not rejecting a tumor are 4.75 times higher when experiencing inescapable shock compared to escapable shock.