

CHAPTER 10— ANSWERS TO EXERCISES

1.

- a. Degrees of freedom = $(2 - 1)(2 - 1) = 1$
- b. Chi-square = 29.01 (with Yates's correction is 28.18). The probability of our obtained chi-square is less than our alpha (and less than 0.001). We can reject the null hypothesis and conclude that gender and fear of walking alone at night are dependent. A higher percentage of women (40%) than men (22%) report being afraid.

Sex and FEAR	f_o	f_e	$f_o - f_e$	$(f_o - f_e)^2$	$\frac{(f_o - f_e)^2}{f_e}$
Men/yes	77	111.96	-34.96	1222.20	10.92
Men/no	270	235.04	34.96	1222.20	5.20
Women/yes	175	140.04	34.96	1222.20	8.73
Women/no	259	293.96	-34.96	1222.20	4.16
$\chi^2 = 29.01$					

With the Yates correction:				
Sex and FEAR	$ f_o - f_e $	$(f_o - f_e - .50)^2$	f_e	$\frac{(f_o - f_e - .50)^2}{f_e}$
Men/yes	34.96	$(34.46)^2 = 1187.49$	111.96	10.61
Men/no	34.96	$(34.46)^2 = 1187.49$	235.04	5.05
Women/yes	34.96	$(34.46)^2 = 1187.49$	140.04	8.48
Women/no	34.96	$(34.46)^2 = 1187.49$	293.96	4.04
Total				28.18

- c. If α were changed to .01, we would still reject the null hypothesis. The probability of our obtained chi-square is still less than alpha.
- d. The lambda is 0. There is no proportional reduction of error using sex to predict fear of walking alone at night.

2.

- a. Democrats: 21.3% (69/324), Republicans: 6% (15/245)
- b. We reject the null hypothesis of no relationship and conclude that there is a relationship between party identification and HELPPoor. The relationship is significant at the .01 level. Democrats and Independents are more likely to indicate that the government should support the poor, while Republicans are more likely to report that people should help themselves.

3.

- a. A slightly higher percentage of blacks, 34.2% (38/111), report being afraid to walk alone at night. Among whites, the percentage is 31.6% (190/601).
- b. Regardless of race, women are more likely than men to report being afraid to walk alone at night. The percentage of white women indicating that they are afraid is slightly higher than black women, 40.4% (129/319) versus 39% (30/77).

c.

Whites, $\chi^2 = 23.62$; we reject the null hypothesis.

Blacks, $\chi^2 = 1.85$; we fail to reject the null hypothesis.

For whites					
Sex and FEAR	f_o	f_e	$f_o - f_e$	$(f_o - f_e)^2$	$\frac{(f_o - f_e)^2}{f_e}$
Men/yes	61	89.15	-28.15	792.42	8.89
Men/no	221	192.85	28.15	792.42	4.12
Women/yes	129	100.85	28.15	792.42	7.86
Women/no	190	218.15	-28.15	792.42	3.63
$\chi^2 = 24.50$					

With the Yates's correction, the chi-square is 23.62, as it is shown below:				
Sex and FEAR	$ f_o - f_e $	$(f_o - f_e - .50)^2$	f_e	$\frac{(f_o - f_e - .50)^2}{f_e}$
Men/yes	28.15	764.52	89.15	8.58
Men/no	28.15	764.52	192.85	3.96
Women/yes	28.15	764.52	100.85	7.58
Women/no	28.15	764.52	218.15	3.50

For blacks					
Sex and FEAR	f_o	f_e	$f_o - f_e$	$(f_o - f_e)^2$	$\frac{(f_o - f_e)^2}{f_e}$
Men/yes	8	11.64	-3.64	13.25	1.14
Men/no	26	22.36	3.64	13.25	.59
Women/yes	30	26.36	3.64	13.25	.50
Women/no	47	50.64	-3.64	13.25	.26
$\chi^2 = 2.49$					

With the Yates's correction, the chi-square is 1.85:				
Sex and FEAR	$ f_o - f_e $	$(f_o - f_e - .50)^2$	f_e	$\frac{(f_o - f_e - .50)^2}{f_e}$
Men/yes	3.64	9.86	11.64	0.85
Men/no	3.64	9.86	22.36	0.44
Women/yes	3.64	9.86	26.36	0.37
Women/no	3.64	9.86	50.64	0.19

4.

We reject the null hypothesis. The obtained chi-square of 40.43 is significant at the .05 level. As educational attainment increases, respondents are likely to agree with both government action and that people should help themselves. This indicates a positive relationship between educational attainment and HELPPoor.

5.

- We will make 2,973 errors, because we predict that all victims fall in the modal category (white). $E_1 = 6,084 - 3,111 = 2,973$.
- For white offenders, we could make 373 errors; for black offenders, 493 errors; and for other offenders, we would make 42 errors. $E_2 = 908$.
- The proportional reduction in error is then $(2,973 - 908)/2,973 = .6946$. This indicates a very strong relationship between the two variables. We can reduce the error in predicting victim's race based on race of offender by 69.46%.

6.

- Ignoring sex of the offender, we would make 1,730 errors. $E_1 = 5,940 - 4,210 = 1,730$
- Considering the sex of the offender to predict sex of the victim, we would make 1,730 errors. For male offenders, we would make 1,590 errors and for the female offenders, we would make 140 errors.

- c. $\text{Lambda} = (1,730 - 1,730)/1,730 = 0$. Information about sex of the offender reduces our error in predicting the sex of the victim by 0%.
- d. The lambda for Exercise 5 is stronger than the lambda for Exercise 6. Race of offender is more strongly associated with race of victim.

7.

Race/First- Generation College Status	f_o	f_e	$f_o - f_e$	$(f_o - f_e)^2$	$\frac{(f_o - f_e)^2}{f_e}$
White/first	1,742	1,749.6	-7.6	57.76	0.03
White/nonfirst	2,392	2,384.4	7.6	57.76	0.02
Black/first	102	93.5	8.5	72.25	0.77
Black/nonfirst	119	127.5	-8.5	72.25	0.57
Native American/first	41	36.4	4.6	21.16	0.58
Native American/ nonfirst	45	49.6	-4.6	21.16	0.43
Hispanic/first	19	18.6	0.4	0.16	0.01
Hispanic/nonfirst	25	25.4	-0.4	0.16	0.01
Asian American/first	6	11.9	-5.9	34.81	2.93
Asian American/ nonfirst	22	16.1	5.9	34.81	2.16
$\chi^2 = 7.51$					

Chi-square = 7.51, with 4 degrees of freedom $[(2 - 1)(5 - 1) = 4]$.

We would fail to reject the null hypothesis. The probability of our obtained chi-square lies somewhere between 0.20 and 0.10, above our alpha level.

8.

- a. $(31 + 41)/80 = .90$ or 90%
 - b. The gamma of $-.276$ indicates a weak negative relationship between the two variables. As education increases, respondents are likely to agree that scientific research is necessary and should be supported by the government. Knowing respondent's education reduces the error in predicting agreement by 27.6%.
 - c. The chi-square obtained of 30.520 is significant at .002 ($< .05$). We can reject the null hypothesis and conclude that the variables are statistically dependent.
9. We would reject the null hypothesis. The chi-square obtained of 52.047 is significant at the .032 level ($< .05$ alpha). There is a relationship between degree and church attendance for these French respondents. Overall, as educational attainment increases, church attendance decreases.
 10. We would fail to reject the null hypothesis. The chi-square obtained of 42.866 is significant at the .095 level ($> .05$ alpha).

11. The lambda of .051 for PRES12 and HLTHALL indicates a weak relationship. Only 5.1% of the error in predicting HLTHALL responses is based on PRES12. Notice from the SPSS output that when PRES12 is defined as the dependent variable (HLTHALL is the independent variable), the lambda increases to .467.

The gamma of $-.198$ indicates a weak negative relationship between CLASS and HLTHALL. If we rely on CLASS as an independent variable to predict HLTHALL, we would reduce our errors by 19.8%.

12. The gamma of $-.206$ indicates a weak negative relationship between RAGE and DISCPOL. Based on information about respondent's age, we reduce the error in predicting DISCPOL by 20.6%.

The lambda of .034 indicates a weak relationship between respondent's sex and frequency of discussing politics. Only 3.4% of the error in predicting DISCPOL would be reduced by knowing respondent's sex.

13. Gender: The model is significant at the .01 level, indicating a significant relationship between the variables. Though males contribute to more violent onset, in proportional terms, females exhibit a higher prevalence rate—18.32% of females exhibit violent onset compared with 11.71% of males.

Age at first offense. The model is significant at the .01 level, indicating a significant relationship between age at first offense and violent onset. Violent onset is more likely among the group 14 years and older (14.74%) than those less than 14 years of age at first onset (9.67%).

SPSS SOLUTIONS

1.
 - a. Zero cells have an expected count less than 5. The majority of male and female respondents indicate that they are "very happy" in their marriage.
 - b. Chi-square is 3.255, significant at .196.
 - c. Based on the obtained chi-square, we fail to reject the null hypothesis.
 - d. The output for HAPMAR and DEGREE is presented.

hapmar HAPPINESS OF MARRIAGE * degree RS HIGHEST DEGREE Crosstabulation

Count		degree RS HIGHEST DEGREE					Total
		0 LT HIGH SCHOOL	1 HIGH SCHOOL	2 JUNIOR COLLEGE	3 BACHELOR	4 GRADUATE	
hapmar	1 VERY HAPPY	38	172	21	106	65	402
HAPPINESS OF MARRIAGE	2 PRETTY HAPPY	30	118	18	46	44	256
	3 NOT TOO HAPPY	1	11	2	2	3	19
Total		69	301	41	154	112	677

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.160 ^a	8	.254
Likelihood Ratio	10.460	8	.234
Linear-by-Linear Association	2.134	1	.144
N of Valid Cases	677		

a. 4 cells (26.7%) have expected count less than 5. The minimum expected count is 1.15.

2. The obtained chi-square is 45.780, $p = .000$. We would reject the null hypothesis and conclude that social class and general happiness is related.

A higher proportion of upper-class respondents ($38.5\% = 15/39$) were very happy compared with lower-class respondents ($18.2\% = 27/148$).

class SUBJECTIVE CLASS IDENTIFICATION * happy GENERAL HAPPINESS Crosstabulation

Count		happy GENERAL HAPPINESS			Total
		1 VERY HAPPY	2 PRETTY HAPPY	3 NOT TOO HAPPY	
class SUBJECTIVE CLASS IDENTIFICATION	1 LOWER CLASS	27	83	38	148
	2 WORKING CLASS	197	389	102	688
	3 MIDDLE CLASS	209	358	48	615
	4 UPPER CLASS	15	21	3	39
Total		448	851	191	1490

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	45.780 ^a	6	.000
Likelihood Ratio	44.382	6	.000
Linear-by-Linear Association	36.196	1	.000
N of Valid Cases	1490		

a. 1 cells (8.3%) have expected count less than 5. The minimum expected count is 5.00.

3.

- a. The appropriate measure of association is gamma as both variables are ordinal. The gamma of $-.354$ indicates a moderate negative relationship between DEGREE and HEALTH. The proportional reduction of error is 35.4%.
- b. The obtained chi-square is 99.412, significant at the .000 level. We reject the null hypothesis and conclude that DEGREE and HEALTH are related. Based on the gamma and chi-square information, we know that there is a negative relationship between the variables—as education increases respondents are more likely to indicate “excellent” or “good” health.

health CONDITION OF HEALTH * degree RS HIGHEST DEGREE Crosstabulation

Count		degree RS HIGHEST DEGREE					Total
		0 LT HIGH SCHOOL	1 HIGH SCHOOL	2 JUNIOR COLLEGE	3 BACHELOR	4 GRADUATE	
health CONDITION OF HEALTH	1 EXCELLENT	15	85	19	61	41	221
	2 GOOD	36	243	38	95	65	477
	3 FAIR	48	117	18	28	12	223
	4 POOR	23	34	3	7	2	69
Total		122	479	78	191	120	990

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	99.412 ^a	12	.000
Likelihood Ratio	95.404	12	.000
Linear-by-Linear Association	74.295	1	.000
N of Valid Cases	990		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.44.

Symmetric Measures

		Value	Asymptotic Standardized Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal	Gamma	$-.354$.037	-9.139	.000
N of Valid Cases		990			

a. Not assuming the null hypothesis

4.

- a. For our calculations, we'll define HOMOSEX as the dependent variable.
- b. Both variables are ordinal-level measures. The appropriate measure of association is gamma. The obtained gamma is .657, indicating a positive strong association between the two variables.

Symmetric Measures

	Value	Asymptotic Standardized Error ^a	Approximate T ^b	Approximate Significance
Ordinal by Ordinal Gamma	.657	.047	12.279	.000
N of Valid Cases	339			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

- c. Gamma results are presented for each sex. There is a stronger relationship between HOMOSEX and AMCHRSTN for females than males. Both gammas indicate a strong positive relationship between the variables.

Symmetric Measures

RESPONDENTS SEX		Value	Asymptotic Standard Error ^a	Approximate T ^b	Approximate Significance
MALE	Ordinal by Ordinal Gamma Zero-Order	.678	.063	9.694	.000
	N of Valid Cases	164			
FEMALE	Ordinal by Ordinal Gamma Zero-Order	.701	.064	8.958	.000
	N of Valid Cases	175			
Total	Ordinal by Ordinal Gamma Zero-Order	.657	.047	12.279	.000
	First-Order Partial	.689			
	N of Valid Cases	339			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

5. Students are encouraged to select a variety of demographic variables—*sex, marital status, number of children, degree*—to examine abortion attitudes as measured by the General Social Survey.