

3.5: Quantitative Analysis with SPSS- Multivariate Crosstabs

Producing a multivariate crosstabulation is exactly the same as producing a bivariate crosstabulation, except that an additional variable is added. Note that, due to the limitations of the crosstabulation approach, you are not actually looking at the relationships between all three variables simultaneously (and this approach is limited to three variables). Rather, you are looking at how controlling for a third variable—your “Layer” or control variable—changes the relationship between the independent and dependent variable in your analysis. What SPSS produces, then, is basically a stack of crosstabulation tables with your independent and dependent variables, one for each category of your control variable, along with statistical significance and association values for each category of your control variable. This chapter will review how to produce and interpret a multivariate crosstabulation. It uses variables with fairly few categories for ease of interpretation. Do note that when using variables with many categories, results can become quite complex and lengthy, and due to small numbers of cases left in each cell of the very lengthy tables, statistical significance is likely to be reduced. Thus, analysts should take care to consider whether the relationship(s) they are interested in are suitable for this type of analysis, and may want to consider recoding variables (see the chapter on data management) with many categories into somewhat fewer categories to facilitate analysis.

To produce a multivariate crosstabulation, follow the same steps as you

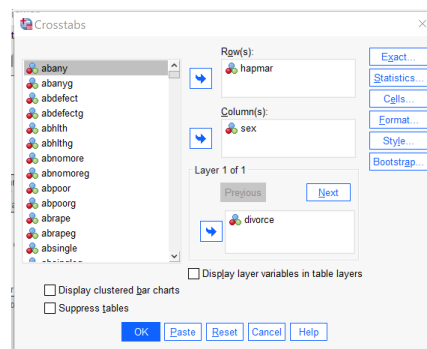


Figure 1. Crosstabs Dialog for an Analysis for SEX as Independent Variable, HAPMAR as Dependent Variable, and DIVORCE as Control Variable

would follow to produce a bivariate crosstabulation—put the independent variable in the columns box, the dependent variable in the rows box, select column percentages under cells, and select chi square and an appropriate measure of association under statistics. Note that the measure of association you choose should be the same one that you would choose for a bivariate analysis with the same independent and dependent variables, as the third variable is a control variable and does not alter the criteria upon which the decision about measures of association is made. The one thing you need to add in order to produce a multivariate crosstabulation is that you add your third variable, the control variable, to the Layer box in the crosstabs dialog. Figure 1 shows what this would look like for a crosstabulation with the independent variable SEX, the dependent variable HAPMAR, and the control variable DIVORCE. In other words, this analysis is exploring whether being male or female influences respondents’ feelings of happiness in their marriages, controlling for whether or not they have ever been divorced.

Below are the tables SPSS produces for this analysis. After the tables, the text will continue, with an explanation of how one would go about interpreting these results.

Happiness of R’s marriage * Respondent’s sex * Ever been divorced or separated Crosstabulation

Ever been divorced or separated				Respondent’s sex		Total
				male	female	
yes	Happiness of R’s marriage	very happy	Count	136	133	269
			% within Respondent’s sex	57.1%	52.8%	54.9%
	pretty happy		Count	96	107	203
			% within Respondent’s sex	40.3%	42.5%	41.4%
	not too happy		Count	6	12	18
			% within Respondent’s sex			

Ever been divorced or separated			Respondent's sex		Total		
			male	female			
no	Total	% within Respondent's sex	2.5%	4.8%	3.7%		
		Count	238	252	490		
		% within Respondent's sex	100.0%	100.0%	100.0%		
	Happiness of R's marriage	very happy	Count	467	439	906	
			% within Respondent's sex	65.6%	59.8%	62.7%	
		pretty happy	Count	224	260	484	
			% within Respondent's sex	31.5%	35.4%	33.5%	
		not too happy	Count	21	35	56	
			% within Respondent's sex	2.9%	4.8%	3.9%	
	Total	Count	712	734	1446		
		% within Respondent's sex	100.0%	100.0%	100.0%		
	Total	Happiness of R's marriage	very happy	Count	603	572	1175
				% within Respondent's sex	63.5%	58.0%	60.7%
			pretty happy	Count	320	367	687
				% within Respondent's sex	33.7%	37.2%	35.5%
not too happy			Count	27	47	74	
			% within Respondent's sex	2.8%	4.8%	3.8%	
Total		Count	950	986	1936		
		% within Respondent's sex	100.0%	100.0%	100.0%		

Chi-Square Tests

Ever been divorced or separated		Value	df	Asymptotic Significance (2-sided)
yes	Pearson Chi-Square	2.231 ^b	2	.328
	Likelihood Ratio	2.269	2	.322

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 36.31.

b. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.74.

c. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 27.57.

Ever been divorced or separated		Value	df	Asymptotic Significance (2-sided)
no	Linear-by-Linear Association	1.649	1	.199
	N of Valid Cases	490		
	Pearson Chi-Square	6.710 ^c	2	.035
	Likelihood Ratio	6.748	2	.034
Total	Linear-by-Linear Association	6.524	1	.011
	N of Valid Cases	1446		
	Pearson Chi-Square	8.772 ^a	2	.012
	Likelihood Ratio	8.840	2	.012
	Linear-by-Linear Association	8.200	1	.004
	N of Valid Cases	1936		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 36.31.				
b. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.74.				
c. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 27.57.				

Symmetric Measures

Ever been divorced or separated			Value	Approximate Significance
yes	Nominal by Nominal	Phi	.067	.328
		Cramer's V	.067	.328
	N of Valid Cases		490	
no	Nominal by Nominal	Phi	.068	.035
		Cramer's V	.068	.035
	N of Valid Cases		1446	
Total	Nominal by Nominal	Phi	.067	.012
		Cramer's V	.067	.012
	N of Valid Cases		1936	

First, consider the crosstabulation table. As you can see, this table really consists of three tables stacked on top of each other. Each of these three tables considers the relationship between sex and the happiness of the respondent's marriage, but there is one table for those who have ever been divorced, one table for those who have never been divorced, and one table for everyone. Comparing the percentages across the rows, we can make the following observations:

- Among those who *have* ever been divorced, males are slightly more likely to be very happy in their marriage, while females are somewhat more likely to be not too happy.
- Among those who *have not* ever been divorced, males are more likely to be very happy in their marriage, while females are more likely to be pretty happy and are somewhat more likely to be not too happy.
- Among the entire sample, males are more likely to be very happy in their marriages, while females are more likely to be pretty happy and somewhat more likely to be not too happy.

- Overall, then, the results suggest men are happier in their marriages than women.

Next, we turn to statistical significance. At the $p < 0.05$ level, we can observe that this analysis produces significant results for those who have never been divorced and for the entire sample, but *not* for those who *have* been divorced. Turning to the association, we find a weak association—the figures for those who have been divorced, those who have not been divorced, and the entire population are quite similar.

Thus, we can conclude that women who have never been divorced are, on average, less happy in their marriages than men who have never been divorced, but that among those who *have been* divorced, the relationship between sex and marital happiness is not statistically significant.

Exercises

Select three variables of interest. Answer the following questions:

- Which is the independent variable, which is the dependent variable, and which is the control variable?
- What is the research hypothesis for this analysis? What do you predict will be the relationship between the independent variable and the dependent variable, and how will the control variable impact this relationship?
- What is the null hypothesis for this analysis?
- What confidence level (p value) have you chosen?
- Which measure of association is most appropriate for this relationship?

Next, use SPSS to produce a multivariate crosstabulation according to the instructions in this chapter. Interpret the crosstabulation. First, answer the following questions for each of the stacked crosstabulations of your independent and dependent variable (one for each category of the control variable, plus one for everyone):

- Is the relationship between the independent and dependent variables statistically significant?
- Can the null hypothesis be rejected?
- How strong is the association between the two variables?
- Looking at that pattern of percentages across the rows, what can you determine about the nature of the relationship between the two variables?

Then, compare your results across the different categories of the control variable.

- What does this tell you about how the control variable impacts the relationship between the independent and dependent variables?
- Is there support for your research hypothesis?

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