**Chi-Square Analysis for Contingency Tables EPSY 5245**

Assumption 1: Observations are independent.

 This is generally met when each person in the table is only in the table once – they are not counted twice or more.

Assumption 2: The test statistic is approximately distributed Chi-Square for relatively large samples.

 This is generally met when expected frequencies in each cell of the contingency table are greater than or equal to 5 (there has to be the potential to observe 5 cases in each cell).

**Effect Sizes**

Phi, Φ, is a special case of the Pearson product-moment correlation coefficient for dichotomous items (0/1) – or can be thought of as a correlation in a 2 × 2 table.

Φ is a function of the Pearson chi-square statistic, χ2:

 

This ranges from -1 to 1, like a correlation. If both the rows and columns of the contingency table exceed 2 levels, Φ can exceed 1.0. There is an adjustment made to Φ for contingency tables larger than 2×3 or 3×2 called Cramér’s Phi (SPSS calls this Cramer’s V).

 Cramér’s Φ = 

For tables that are 2×2, 2×3, or 3×2, Phi and Cramér’s Phi are equal.

Consider the following question:

***Do males and females equally support building a new football stadium?***

SPSS OUTPUT:

Female \* Support building a football stadium Crosstabulation

|  |  |  |  |
| --- | --- | --- | --- |
|   |   | Support building a football stadium | Total |
|   |   | No | Yes |   |
| Female | Male | Count | 22 | 58 | 80 |
|   |   | % within Gender | 27.5% | 72.5% | 100.0% |
|   | Female | Count | 71 | 59 | 130 |
|   |   | % within Gender | 54.6% | 45.4% | 100.0% |
| Total | Count | 93 | 117 | 210 |
|   | % within Gender | 44.3% | 55.7% | 100.0% |

Chi-Square Tests

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|   | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
| Pearson Chi-Square | 14.758(b) | 1 | .000 |   |   |
| N of Valid Cases | 210 |   |   |   |   |

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 35.43.

Symmetric Measures

|  |  |  |
| --- | --- | --- |
|   | Value | Approx. Sig. |
| Nominal by Nominal | Phi | -.265 | .000 |
|   | Cramer's V | .265 | .000 |
| N of Valid Cases | 210 |   |

a Not assuming the null hypothesis.

b Using the asymptotic standard error assuming the null hypothesis.

REPORTING IN AN ARTICLE:

Table 1

*Support for the Football Stadium by Gender (% within gender)*

|  |  |  |
| --- | --- | --- |
|   | Support building a football stadium |  |
| Gender | No | Yes | Total |
| Male | 22 (28%) | 58 (73%) | 80 |
| Female | 71 (55%) | 59 (45%) | 130 |
| Total | 93 (44%) | 117 (56%) | 210 |

Based on our results, 73% of males and 45% of females support building a stadium (see Table 1). There is a statistically significant difference in level of support between males and females, where χ2(1, *n*=210)=14.8, *p*<.001. This is a small but statistically significant association where Phi=.265.