1. **Chi-Square Test**

**Frequencies**

|  |  |  |  |
| --- | --- | --- | --- |
| **do you smoke** | | | |
|  | Observed N | Expected N | Residual |
| yes | 34 | 54.0 | -20.0 |
| no | 236 | 216.0 | 20.0 |
| Total | 270 |  |  |

|  |  |
| --- | --- |
| **Test Statistics** | |
|  | do you smoke |
| Chi-Square | 9.259a |
| df | 1 |
| Asymp. Sig. | .002 |
| a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 54.0. | |

1. **Chi-Square for Independence**

**Crosstabs**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Case Processing Summary** | | | | | | |
|  | Cases | | | | | |
| Valid | | Missing | | Total | |
| N | Percent | N | Percent | N | Percent |
| sex \* prob sleep recode 01 | 269 | 99.3% | 2 | 0.7% | 271 | 100.0% |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **sex \* prob sleep recode 01 Crosstabulation** | | | | | |
|  | | | prob sleep recode 01 | | Total |
| no | yes |
| sex | female | Count | 81 | 67 | 148 |
| % within sex | 54.7% | 45.3% | 100.0% |
| % within prob sleep recode 01 | 53.3% | 57.3% | 55.0% |
| % of Total | 30.1% | 24.9% | 55.0% |
| male | Count | 71 | 50 | 121 |
| % within sex | 58.7% | 41.3% | 100.0% |
| % within prob sleep recode 01 | 46.7% | 42.7% | 45.0% |
| % of Total | 26.4% | 18.6% | 45.0% |
| Total | | Count | 152 | 117 | 269 |
| % within sex | 56.5% | 43.5% | 100.0% |
| % within prob sleep recode 01 | 100.0% | 100.0% | 100.0% |
| % of Total | 56.5% | 43.5% | 100.0% |

-

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Chi-Square Tests** | | | | | |
|  | Value | df | Asymptotic Significance (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
| Pearson Chi-Square | .422a | 1 | .516 |  |  |
| Continuity Correctionb | .277 | 1 | .599 |  |  |
| Likelihood Ratio | .423 | 1 | .516 |  |  |
| Fisher's Exact Test |  |  |  | .538 | .300 |
| Linear-by-Linear Association | .421 | 1 | .517 |  |  |
| N of Valid Cases | 269 |  |  |  |  |
| a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 52.63. | | | | | |
| b. Computed only for a 2x2 table | | | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Symmetric Measures** | | | |
|  | | Value | Approximate Significance |
| Nominal by Nominal | Phi | -.040 | .516 |
| Cramer's V | .040 | .516 |
| N of Valid Cases | | 269 |  |

1. **Mann-Whitney U Test**

**NPar Tests**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Ranks** | | | | |
|  | sex | N | Mean Rank | Sum of Ranks |
| sleepy & assoc sensations scale | female | 144 | 138.71 | 19974.00 |
| male | 107 | 108.90 | 11652.00 |
| Total | 251 |  |  |

|  |  |
| --- | --- |
| **Test Statisticsa** | |
|  | sleepy & assoc sensations scale |
| Mann-Whitney U | 5874.000 |
| Wilcoxon W | 11652.000 |
| Z | -3.219 |
| Asymp. Sig. (2-tailed) | .001 |
| a. Grouping Variable: sex | |

1. **Kruskal-Willis Test**

**NPar Tests**

|  |  |  |  |
| --- | --- | --- | --- |
| **Ranks** | | | |
|  | agegp3 | N | Mean Rank |
| sleepy & assoc sensations scale | <= 37 | 79 | 123.52 |
| 38 - 50 | 79 | 114.62 |
| 51+ | 72 | 107.67 |
| Total | 230 |  |

|  |  |
| --- | --- |
| **Test Statisticsa,b** | |
|  | sleepy & assoc sensations scale |
| Kruskal-Wallis H | 2.162 |
| df | 2 |
| Asymp. Sig. | .339 |
| a. Kruskal Wallis Test | |
| b. Grouping Variable: agegp3 | |

**INSTRUCTIONS**

**Chi-Square Test: What to Report and How to Report Finding**

There are a number of Chi-square tests but examples of interpretation are provided for only these four tests:

1. Chi-square test of Goodness of Fit
2. Chi-square of Independence
3. Mann-Whitney *U-T*est
4. Kruskal-Wallis Test

Generally, when reporting a Chi-Square test the following MUST be included in your write-up.

1. Degrees of freedom (*df*)
2. Number of observations (*N*)
3. Observed chi-square value (*Χ2*)
4. Significant level (*p*)
5. Effect size (ES [η], varies with test)

**Syntax:** *χ2* (*df*, *N* = XX) = observed chi-square value, significant level (*p*), ES (*η*)

**Format Example:** A chi-square test indicated that the relationship between gender and promotion was significant, *χ2* (2, *N* = 112) =13.45, *p* < .01, *η* = .29.

1. **Goodness of Fit test**: A chi-square goodness of fit test was calculated comparing the frequency of occurrence of each value of a die. It was hypothesized that each value would occur an equal number of times. The test showed significant deviation from the hypothesized value *χ2* (5, *N*=85) = 12.24, *p* < .0005.
2. **Chi-square for Independence:** A chi-square test for independence was computed comparing the frequency of heart diseases in men and women. A significant interaction was found *χ2* (1, *N* =25) = 23.80, *p* < .05. Men were more likely to get heart disease (67%) than women (38%). **NOTE:**if you have a 2x2 table, i.e. each variable has only two categories such as gender (male/Female) and responses such as "Yes" and "No"-use the "Continuity Correlation" (known as 'Yates' Correlation') instead of "Pearson Chi-Square" because Yates' Correlation compensates for the overestimate of the chi-square value when used with a 2 by 2 table.
3. **Mann-Whitney *U*-Test:** Report- Observed z or U value (*z/U*), Significant level (*p*), Effect size (*ES*, varies with test), Number of observations (*N*), Number of observations per group (*n*), and Mean Rank (*M*). **Syntax example**: group-1 (*n*= XX) was significantly different from Group-2 (*n* = XX), *z* [or *U*] = observed*z* [or *U*] value, significant level, ES.**NOTE:** If one of the sampled groups is lager than 20, use **z**when reporting and use **U**when it is smaller than 20.
   1. **Example:** A Mann-Whitney U-test was calculated examining the place that runners with varying levels of experience took in a long-distance race. Runners with medium experience did significantly worse (*M place* =6.50) than experienced runners (*M place* = 2.50; U = 0.00, *p* < .05). **OR** if the sample group is larger =20 or more  you will say: Mann-Whitney U analysis revealed significant differences between volunteers and direct mail members. The sum average ranks that volunteers assigned to the pollution prevention group was significantly higher (*M Rank*=88.78, n =59) than the sum of the average ranks assigned by direct mail members (*M Rank*=57.18, n=81) *z*(140)=14.67, *p* < .0001.
4. **Kruskal-Wallis Test:** in this test report- Degrees of freedom (*df*), Number of observations (*N*), Observed test value *(H or X*2 ), Significant level (*p*), Effect size (*ES*, varies with test), Number of observations per group (*n*), and Mean Ranks. Syntax: *H* (*df,* *N=XX*)=observed H value, significance level, ES.**Format Example:** The Kruskal-Wallis test indicated a significant effect, *H* (2, *N* =25) =12.47, *p* < .01, *n2* = .07. Be sure to report the **Mean Rank**as well (**See Mann-Whitney example**).