

## Guide to Inferential Statistics (Hypothesis Testing Statistics)

Statistic	What does it measure?	Null Hypothesis	What you looking for?	What if you find it?
Chi-square ( $X^2$ )	Is there an association (independence) between two categorical (nominal) variables	There is no association between the variables—i.e., the variables are independent	p-value less than .05	If $p < .05$ , there is an association between the variables (reject null) If $p > .05$ , there is no association between the variables (accept null)
Kolmogorov-Smirnov (KS)	Is the variable normally distributed?	The variable is normally distributed	p-value less than .05	If $p < .05$ , the variable is not normally distributed (reject null) If $p > .05$ , the variable is assumed to be normally distributed (accept null)
t-test (independent samples)	Are the mean values of a variable (interval or ratio) measured in two groups actually different?	There is no difference in the mean values of the variable from the 2 groups	p-value less than .05	If $p < .05$ , the mean values are statistically different (reject null) If $p > .05$ , there is no statistical difference in the mean values of groups (accept null)
t-test (paired samples)	Are the mean values of two separate (repeated) measures from the same group actually different?	There is no difference in the mean values of the 2 measures	p-value less than .05	If $p < .05$ , the mean values are statistically different (reject null) If $p > .05$ , the mean values are not statistically different (accept null)
Levene's test (F statistic)	Can we assume that the variances measured from two groups are equal?	The measured variances (think standard deviation) from the 2 groups are equal	p-value less than .05	If $p < .05$ , the variances are not equal (reject null) If $p > .05$ , the variances are assumed equal (accept null)
Phi or Cramers V	What is the relative <u>strength</u> of the association between the 2 nominal variables (value of statistic ranges from 0 to 1)? The higher the value, the stronger the relationship.		High values of Phi or Cramer's V	Look for values above .5 for relatively strong relationships. The p-value is not as important as the value of the statistic itself.
Mann-Whitney U (equivalent to independent t-test but use with non-parametric data)	Are the ranked values of a variable (ordinal, interval, or ratio) measured in two groups actually different?	There is no difference in the ranked values of the variable from the 2 groups	p-value less than .05	If $p < .05$ , the ranked values are statistically different (reject null) If $p > .05$ , the ranked values are not statistically significant (accept null)
Pearson Product Moment Correlation (R value)	The strength and direction of a relationship between 2 variables (interval or ratio). Value of statistic ranges from -1 to +1. Sign indicates direction of relationship, absolute distance from 0 indicates strength of relationship	There is no correlation between the two variables.	p-value less than .05	If $p < .05$ , the correlation/relationship is significant (reject null) If $p > .05$ , the correlation/relationship is not statistically significant (accept null)
ANOVA (F statistic)	Is the systematic between group variance larger than the unsystematic within group variance?	There are no overall differences in group means.	p-value less than .05	If $p < .05$ , the overall mean values are statistically different (reject null)—need to run <u>contrasts</u> or <u>post hoc comparisons</u> to find source of mean differences If $p > .05$ , there is no statistical difference in the mean values of groups (accept null)