



Overview on selection of test statistics for bivariate analysis

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Choice of test statistics

1. What type of RQ are you asking
2. How many number of variables do you want to analyze?
3. What type of data do you have and what characteristic they have

Statistics for assessing an association between two variables, unpaired data

Risk factor (independent variable, exposure, group assignment)	Outcome (dependent variable)					
	Dichotomous	Nominal	Interval, normal distribution	Interval non-normal	Ordinal	Time to event, censored data
Dichotomous	Chi-squared, Fisher’s exact test, risk ratio, odds ratio	Chi-squared	<i>t</i> -test	Mann-Whitney test	Chi-squared for trend, Mann- Whitney test	Log-rank, Wilcoxon, rate ratio
Nominal	Chi-squared, exact test	Chi-squared	ANOVA	Kruskal–Wallis test	Kruskal–Wallis test	Log-rank, Wilcoxon
Interval, normal distribution	<i>t</i> -test	ANOVA	Linear regression, Pearson’s correlation coefficient	Spearman’s rank correlation coefficient	Spearman’s rank correlation coefficient	–
Interval, non-normal	Mann-Whitney test	Kruskal–Wallis test	Spearman’s rank correlation coefficient	Spearman’s rank correlation coefficient	Spearman’s rank correlation coefficient	–
Ordinal	Chi-squared for trend, Mann- Whitney test	Kruskal–Wallis test	Spearman’s rank correlation coefficient	Spearman’s rank correlation coefficient	Spearman’s rank correlation coefficient	–

Comparison of bivariate tests for independent observations and repeated observations of the same subjects

	Independent observations (2 groups)	Paired observations (2 observations)	Independent observations (≥ 3 groups)	Repeated observations (≥ 3 observations)
Dichotomous variable	Chi-squared Fisher's exact	McNemar's test	Chi-squared	Cochran's Q
Normally distributed interval variable	<i>t</i> -test	Paired <i>t</i> -test	ANOVA	Repeated-measures ANOVA
Non-normally distributed interval variable	Mann-Whitney test	Wilcoxon signed rank test	Kruskal–Wallis test	Friedman statistic
Ordinal variable	Mann-Whitney test	Wilcoxon signed rank test	Kruskal–Wallis test	Friedman statistic

Comparison of bivariate tests for unmatched and matched data

	Unmatched data	Matched data
Dichotomous variable	Chi-squared Odds ratio	McNemar's test Matched odds ratio
Normally distributed interval variable	<i>t</i> -test	Paired <i>t</i> -test
Non-normally distributed variable	Mann-Whitney test	Wilcoxon signed rank test
Ordinal variable	Mann-Whitney test	Wilcoxon signed rank test
Survival time	Log-rank	No readily available test

References

- Mitchell H. Katz (2009). Study Design and Statistical Analysis: A Practical Guide for Clinicians (2nd Edition), the United States of America by Cambridge University Press, New York

Thank you.