

Barnard's Exact Test

Test name: Barnard's Exact Test

Dataset: D:\DATA ANALYSIS\I Chi Square and Categorical Data Tests\Barnards Exact Test\dataset.csv

Rows in original dataset: 649

Columns in original dataset: 33

Rows used in the 2 x 2 analysis: 649

Independent grouping variable: sex

Group 0: F

Group 1: M

Binary outcome source: G3

Outcome category 1: G3 >= 10

Outcome category 0: G3 < 10

Observed 2 x 2 table: [[333, 50], [216, 50]]

Primary method: Barnard's unconditional exact test with pooled score statistic.

Alternative hypothesis: two-sided.

Barnard statistic: 1.992745

Barnard exact p-value: 0.06716011

Decision at alpha = 0.05: Fail to reject H0

Group 0 outcome proportion: 0.86945

Group 1 outcome proportion: 0.81203

Risk difference (Group 1 - Group 0): -0.05742

Risk ratio: 0.93396

Odds ratio: 0.64865

Cramer's V: 0.07822

Haldane-Anscombe correction used for ratios: False

Fisher's exact and chi-square results are included only for comparison.

Assumption note: observations should be independent and the table must be 2 x 2.

Barnard's test is unconditional and does not require both margins to be fixed.

Observed contingency table

sex	G3 >= 10	G3 < 10
F	333.00000	50.00000
M	216.00000	50.00000

Barnard and comparison tests

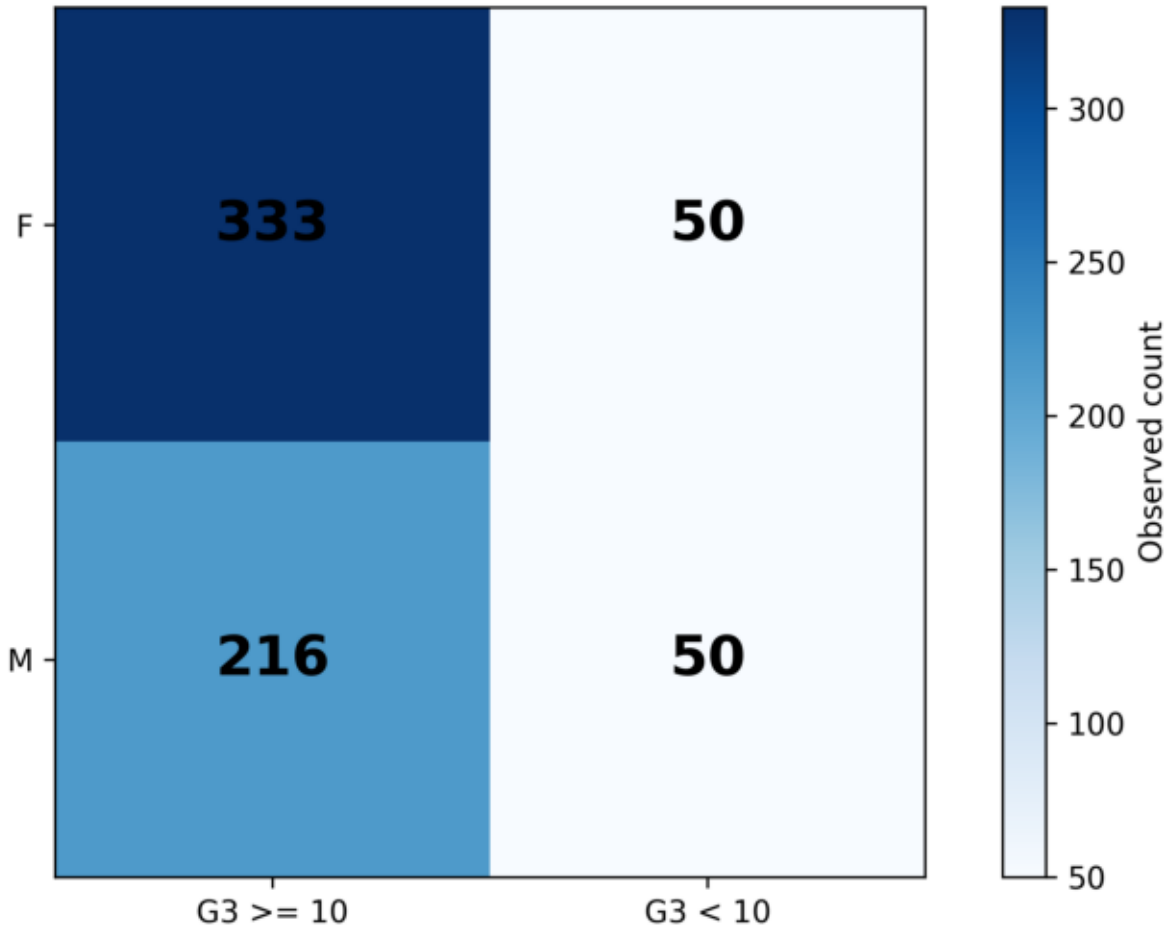
test	statistic	df	p_value	primary_test	decision_alpha_0_05
Barnard exact test	1.99275		0.06716	Yes	Fail to reject H0
Fisher exact test	1.54167		0.05980	No - comparison	Fail to reject H0
Pearson chi-square	3.97103	1.00000	0.04629	No - comparison	Reject H0
Yates corrected chi-square	3.54271	1.00000	0.05981	No - comparison	Fail to reject H0

Effect sizes

effect	estimate	ci95_lower	ci95_upper	interpretation
Group 0 outcome proportion	0.86945	0.83201	0.89956	F
Group 1 outcome proportion	0.81203	0.76076	0.85441	M
Risk difference (Group 1 - Group 0)	-0.05742	-0.11524	0.00040	Absolute difference in outcome probability
Risk ratio (Group 1 / Group 0)	0.93396	0.87113	1.00131	Relative outcome probability
Odds ratio (Group 1 / Group 0)	0.64865	0.42290	0.99491	Relative outcome odds
Cramer's V	0.07822			Strength of 2 x 2 association
Number needed for one additional	17.41504			1 / absolute risk difference

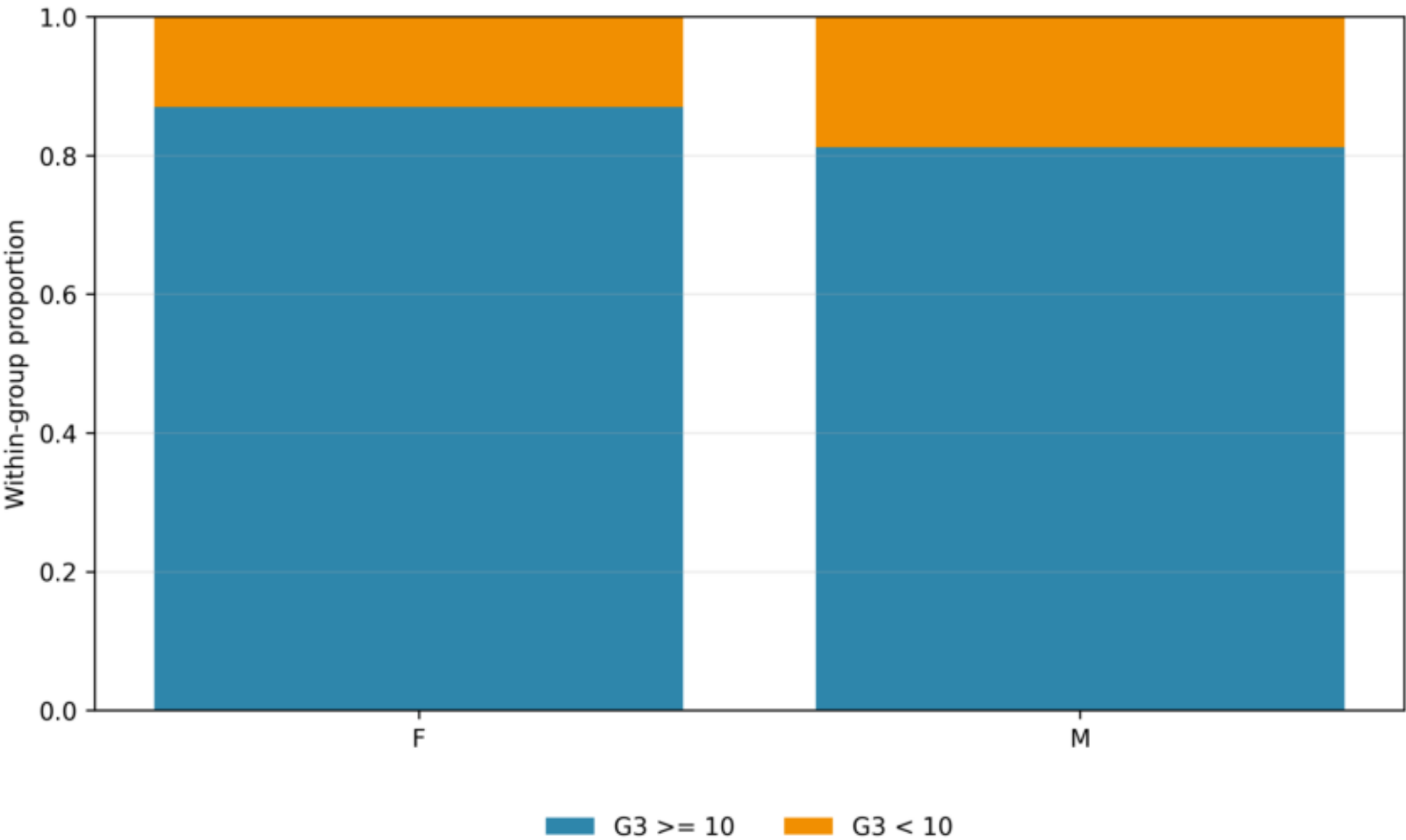
Barnard 2 x 2 contingency table

Observed counts for the two independent groups and the binary outcome.



Binary outcome composition by group

Each bar sums to 100% within its independent group.



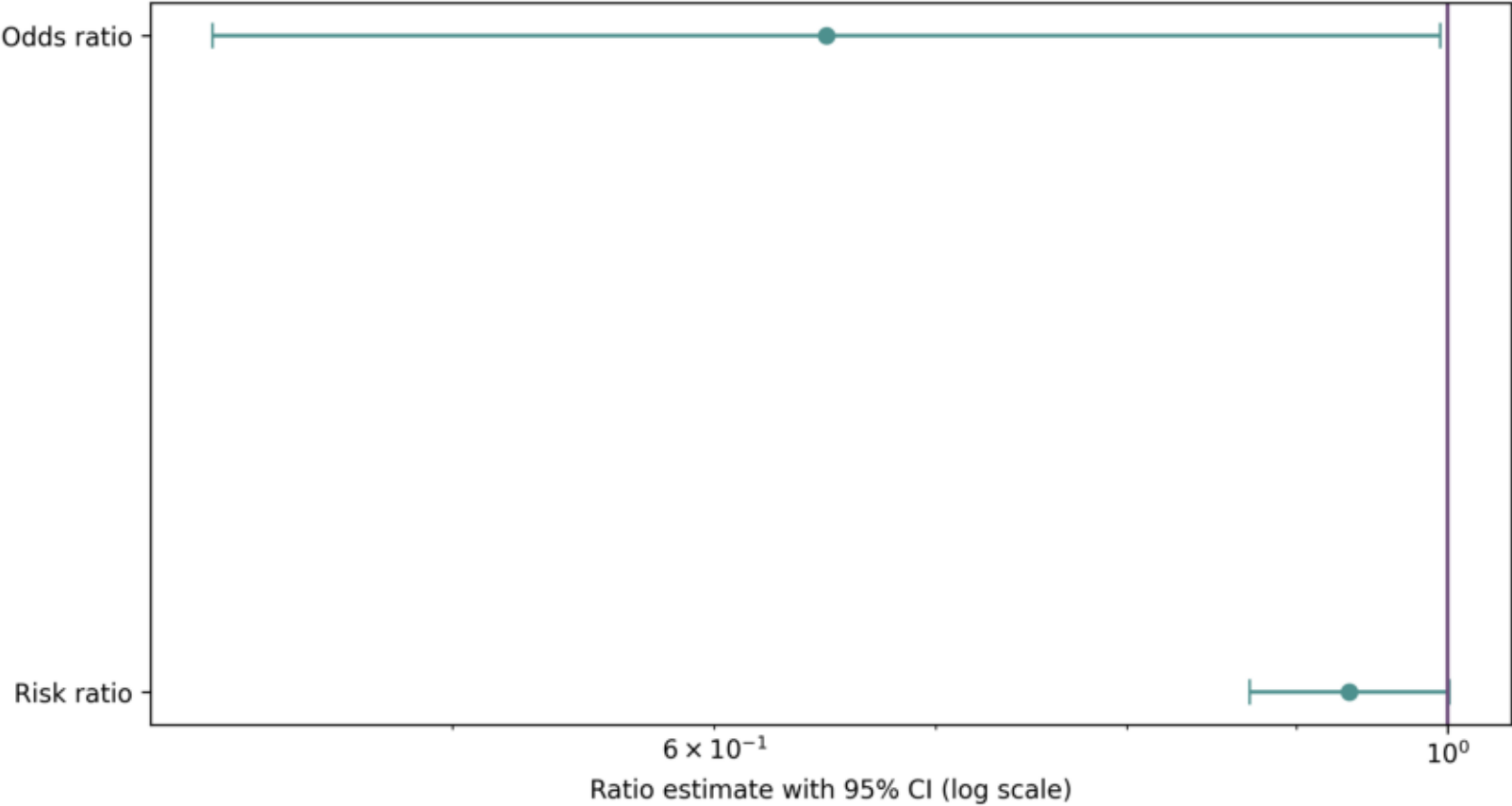
Outcome proportions with confidence intervals

Non-overlap is not the formal decision rule; Barnard's exact p-value is primary.



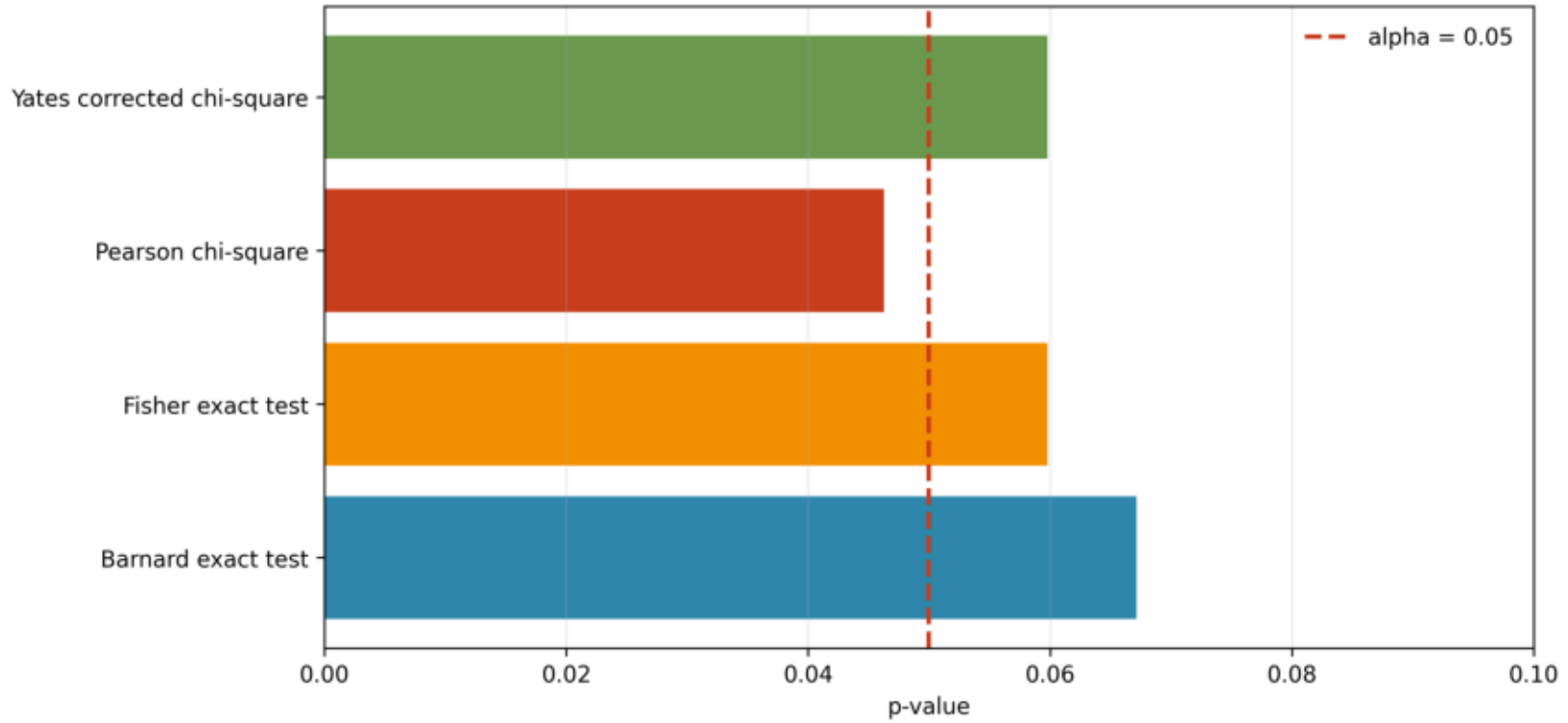
Relative effect estimates

A confidence interval crossing 1 indicates limited evidence for a relative effect.



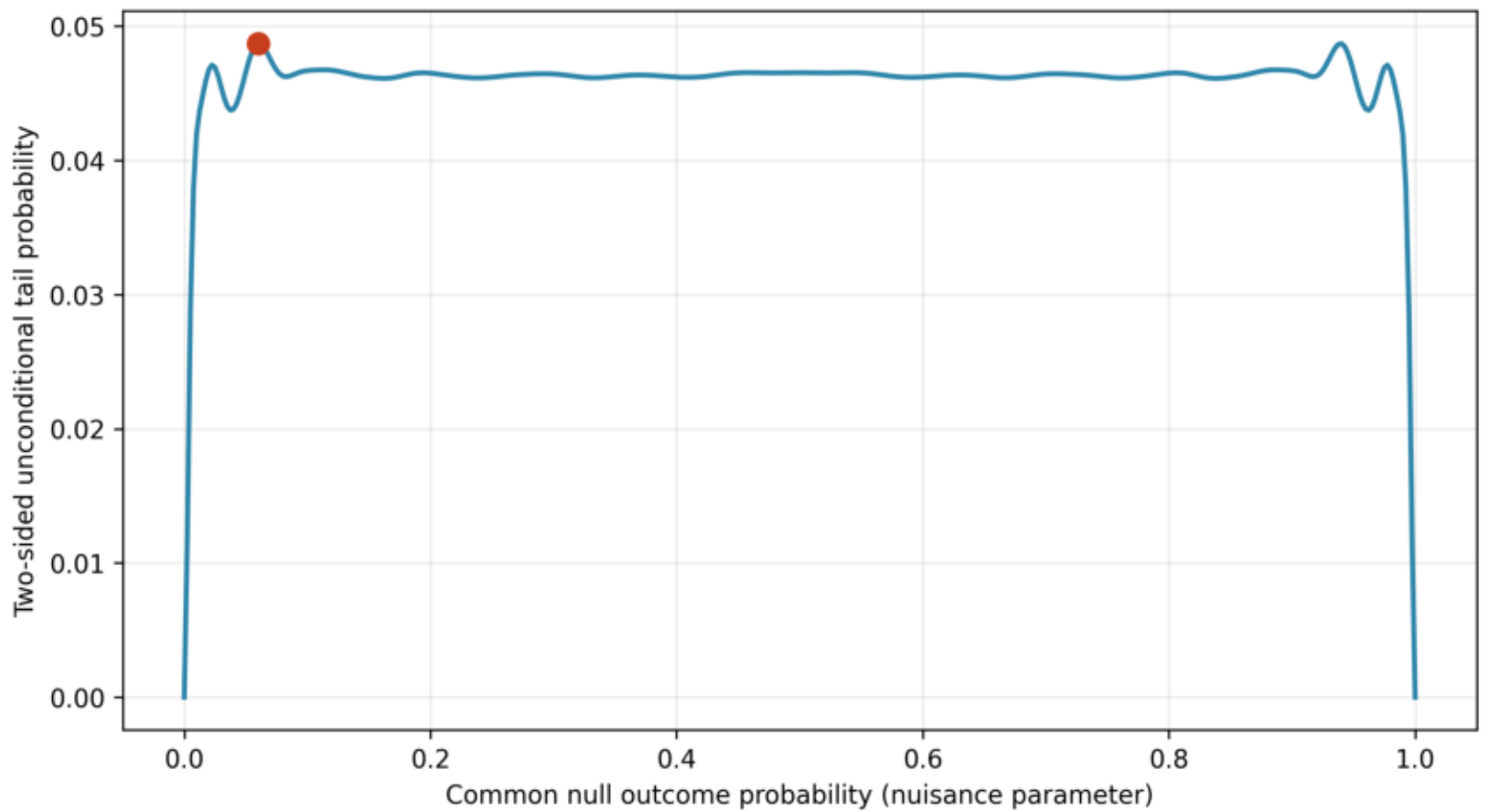
Barnard and comparison-test p-values

Barnard's unconditional exact test is the primary inferential result.



Barnard nuisance-parameter profile

The unconditional p-value is the maximum tail probability over the common null probability.



Observed and independence-expected counts

This comparison gives chi-square context; Barnard's test does not rely on large-sample expected-count rules.

