

# Breslow-Day Test

Verified Python analysis transcript

Test: Breslow-Day Test

Design: Independent binary exposure and outcome compared across four study-time strata.

Variables: sex, G3 >= 10, studytime

Null hypothesis: The stratum-specific odds ratios are homogeneous.

Primary formula:  $BD = \frac{\sum_h (a_h - E[a_h | \text{common OR}])^2}{\text{Var}(a_h | \text{common OR})}$

Valid source rows: 649

Verified results:

breslow\_day\_statistic: 3.441983431321326

p\_value: 0.3283649950738907

degrees\_of\_freedom: 3

tarone\_statistic: 3.441858706530288

tarone\_p\_value: 0.32838150935376664

common\_odds\_ratio: 0.7999116499170076

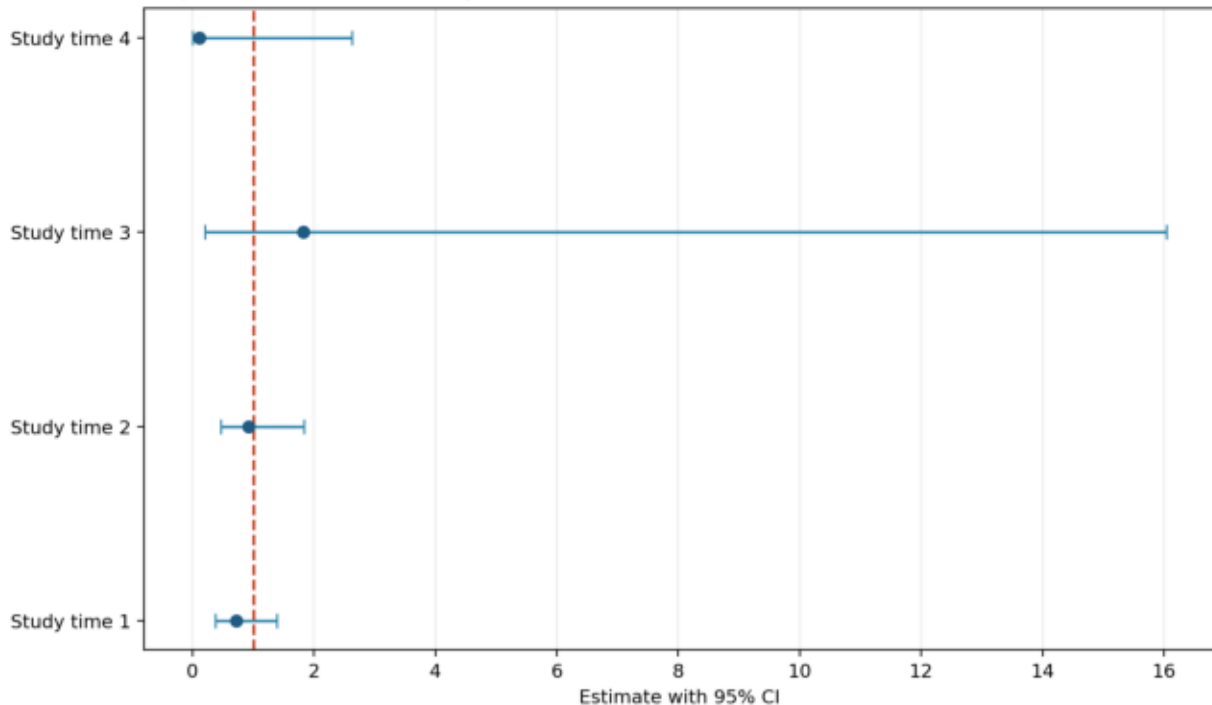
Interpretation:

Breslow-Day chi-square = 3.441983, df = 3, p = 0.328365.

A nonsignificant result supports, but does not prove, a common odds-ratio interpretation across study-time strata.

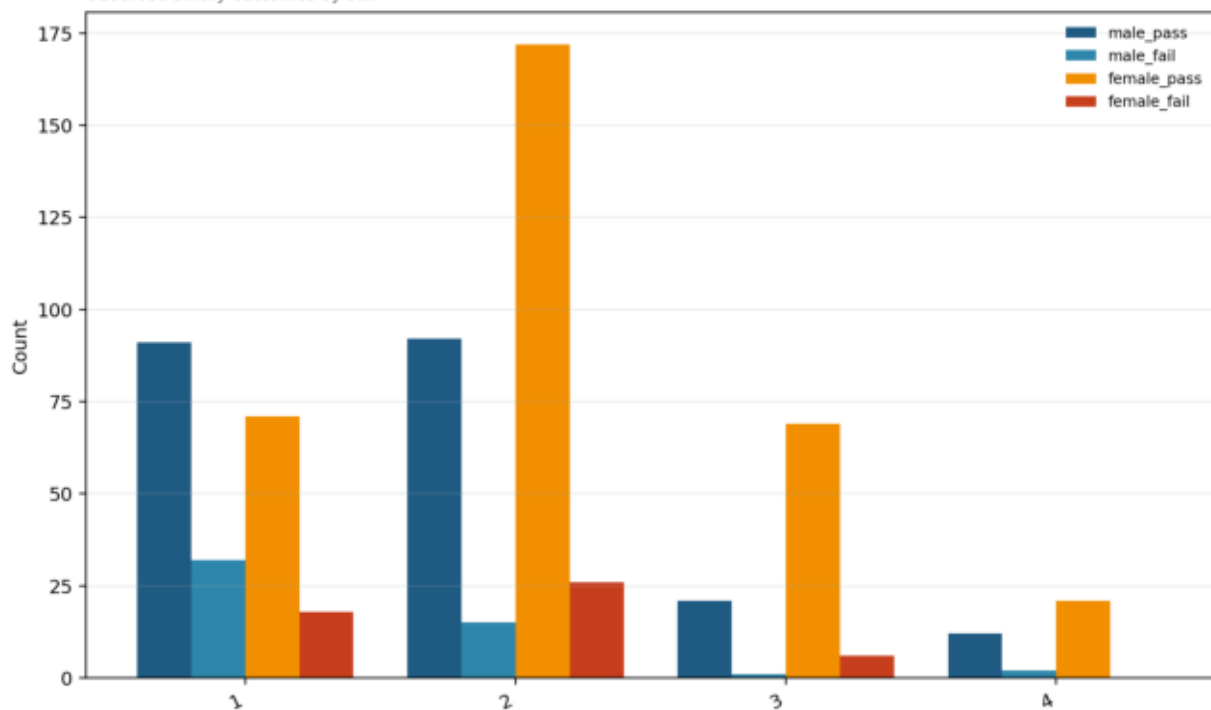
## Stratum-specific odds ratios and homogeneity

Sex-pass association within each study-time stratum



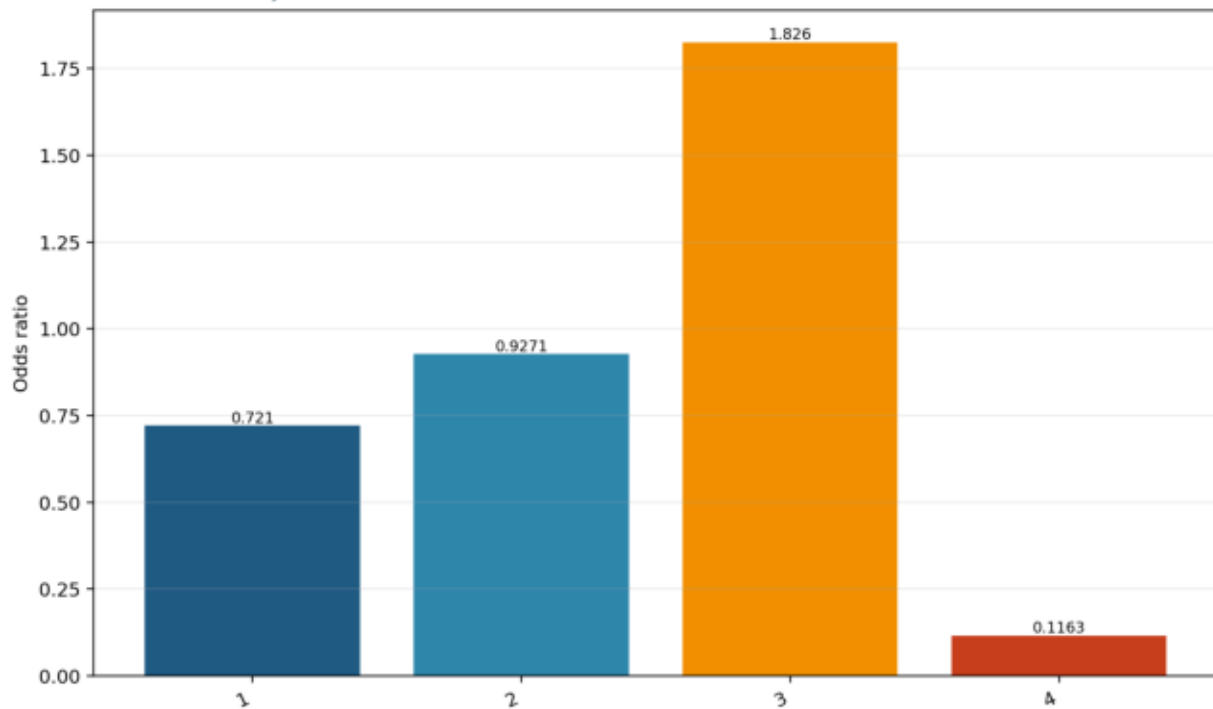
## Stratum-specific 2 x 2 counts

Observed binary outcomes by sex



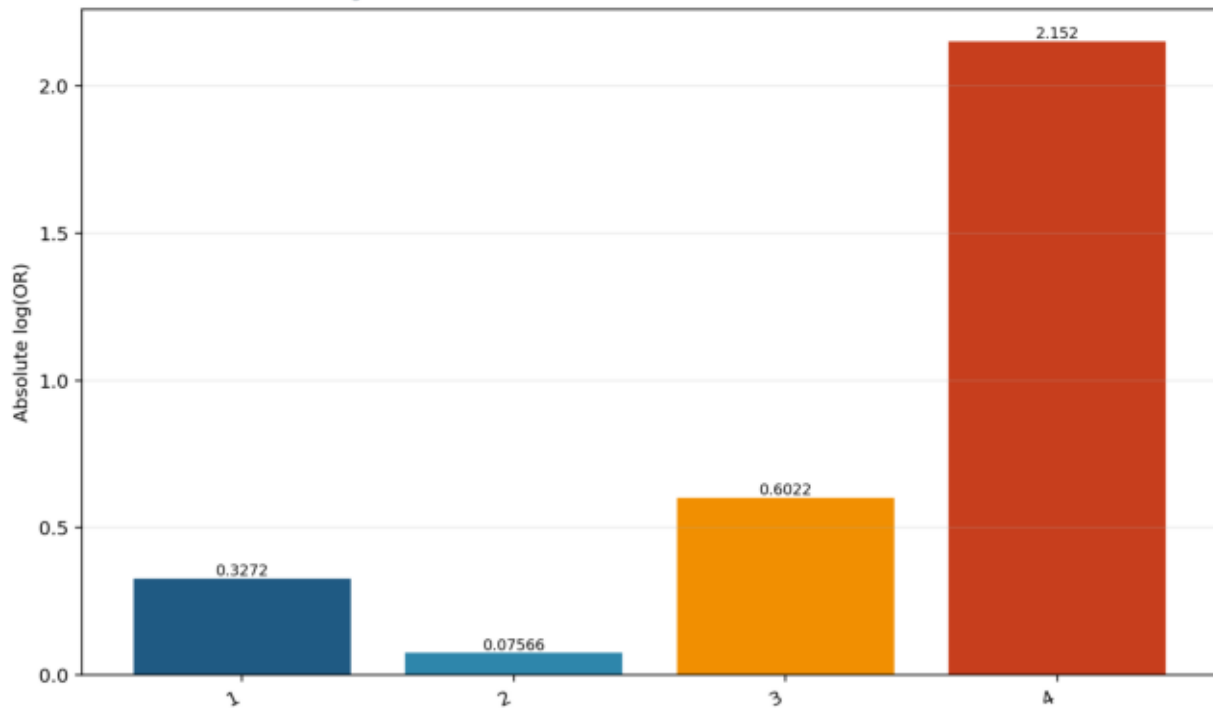
## Odds-ratio heterogeneity profile

Variation across study-time levels



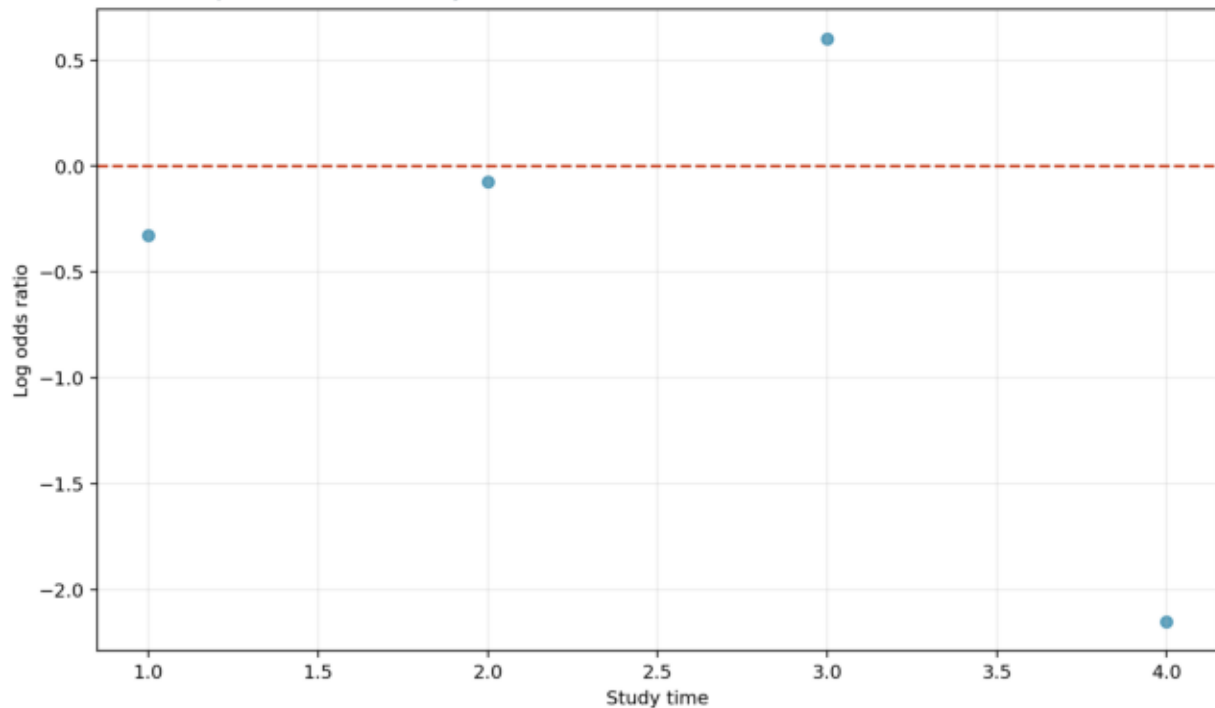
## Absolute stratum log effects

Distance from the null on the log scale



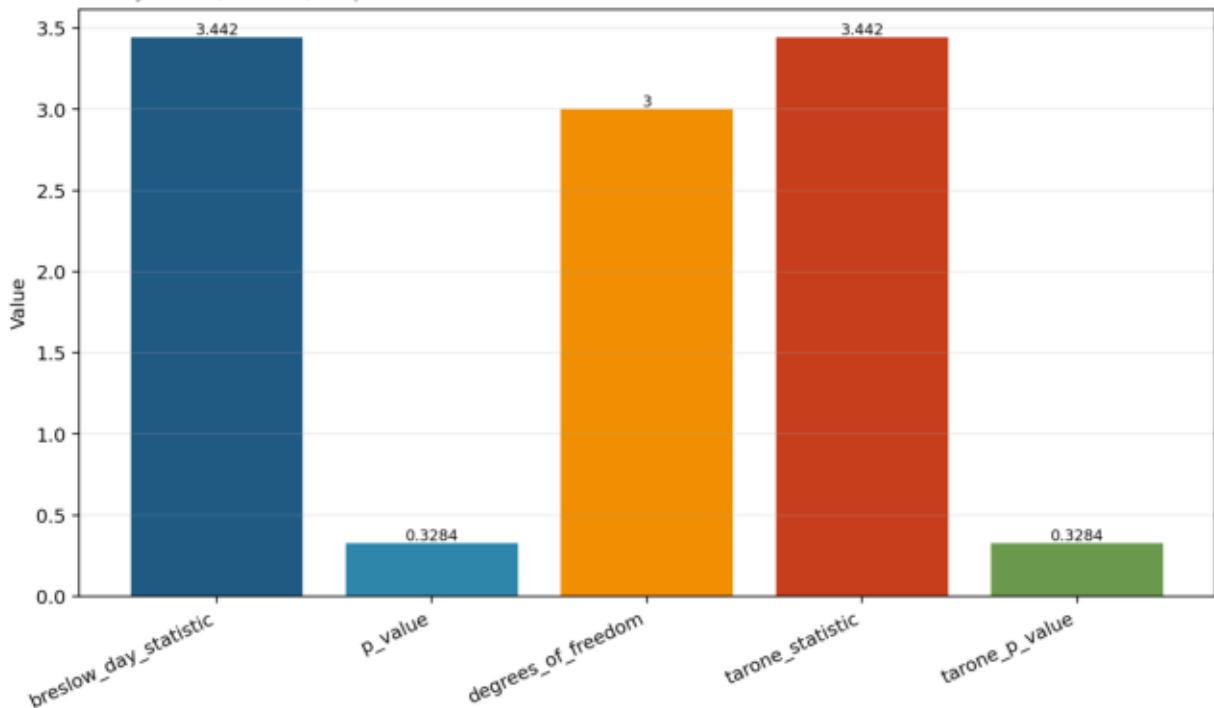
## Log odds ratio by stratum

Direction and pattern across ordered study time



## Stratified-test result summary

Primary statistic, evidence, and pooled effect



# Stratum 2X2 Counts

| male_pass | male_fail | female_pass | female_fail | odds_ratio |
|-----------|-----------|-------------|-------------|------------|
| 91        | 32        | 71          | 18          | 0.720951   |
| 92        | 15        | 172         | 26          | 0.927132   |
| 21        | 1         | 69          | 6           | 1.82609    |
| 12        | 2         | 21          | 0           | 0.116279   |

# Stratum Odds Ratios

| label        | estimate | lower      | upper   |
|--------------|----------|------------|---------|
| Study time 1 | 0.720951 | 0.374272   | 1.38875 |
| Study time 2 | 0.927132 | 0.467793   | 1.83751 |
| Study time 3 | 1.82609  | 0.207943   | 16.0361 |
| Study time 4 | 0.116279 | 0.00515812 | 2.62127 |

# Stratum Log Effects

| Log odds ratio | Absolute log OR |
|----------------|-----------------|
| -0.327185      | 0.327185        |
| -0.0756596     | 0.0756596       |
| 0.602175       | 0.602175        |
| -2.15176       | 2.15176         |