11.5: Case-Control Studies

Independent samples

	D+	D−	Total
E+	A_1	B_1	N_1
E−	A_0	B_0	N_2
Total	M_1	M_0	N

- The **odds ratio** $\hat{O}R = \frac{A_1 B_0}{A_0 B_1}$. (The second edition of the text uses this symbol $\hat{\psi}$ to represent the odds ratio estimate.
- The odds ratio in the population is stochastically equivalent to its rate ratio. When risks in the population are low (less than 5%), the odds ratio may be interpreted as a risk ratio.
- The standard error of natural log (ln) of the odds ratio is $SE = \sqrt{\frac{1}{A_1} + \frac{1}{B_1} + \frac{1}{A_0} + \frac{1}{B_0}}$. A 95% confidence interval for the *OR* parameter is given by $e^{\ln \hat{O}R \pm (1.96)(SE)}$.
- A *P* value can be derived with this test statistic: $z = \frac{A_1 - \frac{N_1 M_1}{N}}{\sqrt{\frac{N_1 N_0 M_1 M_0}{N^2 (N-1)}}}$

Match-pairs

With matched-pairs, each case-control pair represents an observation. Matched pairs are then cross-tabulated like this:

	Control E+	Control E−
Case E+	*t*	*u*
Case E−	*v*	*w*

- The **odds ratio** is $\hat{O}R = \frac{u}{v}$
- The standard error of natural log (ln) of the odds ratio is $SE = \sqrt{\frac{1}{u} + \frac{1}{v}}$, and the the 95% confidence interval for the *OR* parameter is given by $e^{\ln \hat{O}R \pm (1.96)(SE)}$
- A *P* value can be derived with this test statistic $z = \sqrt{\frac{(u-v)^2}{u+v}}$