

WS #17 - Cox PH: interaction

Math 150, Jo Hardin

Wednesday, April 9, 2025

Your Name: _____

Names of people you worked with: _____

What magical power would you like to have?

Task: Consider the [handout on hazard ratios for CHD](#) (from the Framingham Study, Mahmood et al 2014, tables from Dupont 2009). Note that Dupont (throughout the text) refers to HR as instantaneous relative risk (which is why the tables say RR).

1. Table 7.3: does it seem like interaction is needed? Justify your response numerically.
2. Table 7.4: what does it mean to “adjust” for age, BMI, and serum cholesterol?

Solution:

1. Table 7.3: does it seem like interaction is needed? Justify your response numerically.

The answer is that there is some amount of interaction. You can address the question in either direction.

- HR for two blood pressure groups, compare men vs women.

For women, the HR for 81-90mm HG vs 71-80 mm HG is $3.52 / 2.43 = 1.45$

For men, the HR for 81-90mm HG vs 71-80 mm HG is $5.28 / 5.55 = 0.95$

There is interaction because gender changes the relationship between blood pressure and hazard of CHD.

- HR for men vs women, compare two different blood pressure groups.

For people with dbp 71-90 mm HG, the HR for men vs women is $5.55/2.43 = 3.04$

For people with dbp > 110 mm HG, the HR for men vs women is $13/13.6 = 0.956$

There is interaction because the level of dbp changes the relationship between sex and hazard of CHD.

Note that some of the groups do not seem to indicate interaction. But in order to assess whether there is interaction overall, it is necessary to look at all the groups. Said differently, if there is some interaction across some comparisons, then interaction is needed. We can do without interaction if there are no interactions seen across any of the comparisons.

2. When we “adjust” for variables, that means the variables are included in the model. That is, coefficients are estimated for all of the additional variables (see equation (7.11)) on the handout. Note that when interpreting the HR, it is important to remember that you are **keeping all other variables constant**.