Applied Regression II Final - Part Two

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Model summaries for both model one and model two are found in the summary section.

Model One

Model one uses a Cox model to model the time until a child experiences depression as a function of parental history of depression:

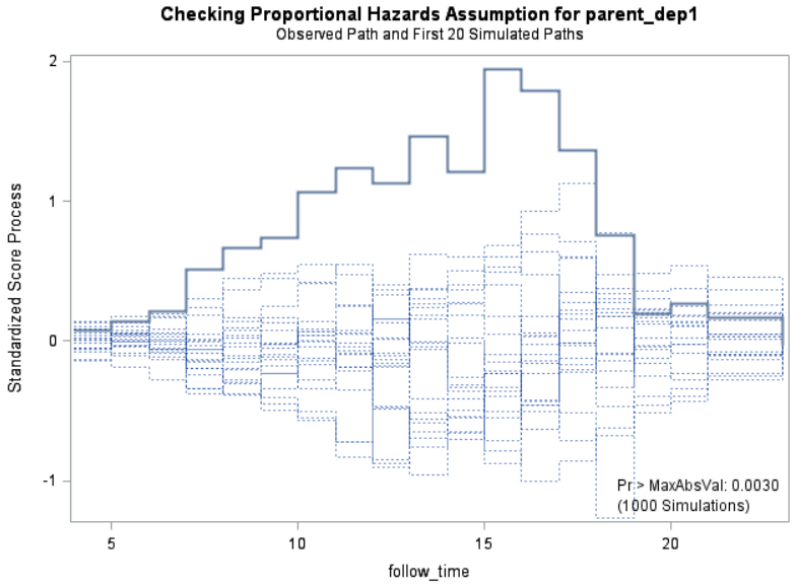
$$h(t, x) = h_0(t)h(\beta_1 x_{1i})$$

$$\text{where, } x_1 = \begin{cases} 0 \text{ if no history of parental depression} \\ 1 \text{ if history of parental depression} \end{cases}$$

SAS code for the model is as follows:

```
proc phreg data = depression;
    class parent_dep (ref = '0') / param = ref;
    model follow_time * child_dep(0) = parent_dep / ties = efron risklimits;
    assess ph / resample;
run;
```

I tested the proportional hazards assumption for parental depression and found that it was violated (p = 0.003). Because the proportional hazards assumption is violated, parental depression is a time-dependent and this needs to be controlled for.



Model Two

A check of the proportional hazards assumption in model one showed that the effect of parental history on the time until a child experiences depression is not constant over time. As such, in model 2 I have introduced a time-dependent covariate ("early_onset") that indicates if the age that depression started or the age at which censoring occured were pre-pubertal (< 13 years old) or not (13 years or older):

$$h(t,x) = h_0(t)h(\beta_1 x_{1i} + \beta_2 x_{2i} + \beta_3 x_{1i} x_{2i})$$

$$\text{where, } x_1 = \begin{cases} 0 \text{ if no history of parental depression} \\ 1 \text{ if history of parental depression} \end{cases}$$

$$x_2 = \begin{cases} 0 \text{ if follow time is} \geq 13 \text{ years} \\ 1 \text{ if follow time is} < 13 \text{ years} \end{cases}$$

SAS code for model two is as follows:

```
data depression;
    set depression;
    if follow_time >= 13 then early_onset = 0;
        else early_onset = 1;
run;

proc phreg data = depression;
    class parent_dep (ref = '0') / param = ref;
    class early_onset (ref = '0') / param = ref;
    model follow_time * child_dep(0) = parent_dep early_onset parent_dep*early_onset / ties = efron;
    hazardratio parent_dep / diff = ref;
run;
```

Summary

Table 1 provides hazard ratios and corresponding 95% confidence intervals for model one and model two.

Table 1: Hazard ratios comparing risk of depression according to parental depression history

Covariate	HR (95% CI)	p-Value
Model 1: Parental depression status only		
Parental Depression	2.01 (1.21, 3.33)	0.007
No Parental Depression	1.00 (reference)	
Model 2: Pre-pubertal onset interaction		
No parental depression, pre-pubertal onset	1.00 (reference)	
Parental depression, pre-pubertal onset	5.16 (1.53, 17.42)	
No parental depression, not pre-pubertal onset	1.00 (reference)	
Parental depression, not pre-pubertal onset	1.32 (0.73, 2.38)	