

Cox Regression

Test name: Cox Regression

Dataset: D:\DATA ANALYSIS\H Regression Tests and Models\Cox Regression\dataset.csv

Rows in original dataset: 649

Columns in original dataset: 33

Rows used in Cox model: 649

Event count: 151

Censored count: 498

Survival time created: `cox_time = absences + 1`

Event status created: `cox_event = 1` when `G3 < 10` or `failures > 0`; otherwise 0.

Numeric predictors: G1, G2, studytime, age, Medu, Fedu

Categorical predictors: school, sex, address

Formula: `Surv(cox_time, cox_event) ~ G1 + G2 + studytime + age + Medu + Fedu + school + sex + address`

Model: Cox Proportional Hazards using Breslow ties.

Interpretation: coefficients are log-hazard effects; `exp(coefficient)` is the estimated hazard ratio.

Decision guide: $p < 0.05$ and hazard-ratio CI not crossing 1 indicates stronger evidence for a predictor effect.

Assumption guide: inspect proportional hazards visual check; roughly parallel log-minus-log curves support the PH assumption.

Top coefficient checks: G2: HR=0.820, $p=0.0000$; G1: HR=0.822, $p=0.0003$; school_MS: HR=1.986, $p=0.0016$

Charts generated: 9

Reporting guide: state time variable, event definition, sample size, events/censored cases, HRs, 95% CIs, p-values, and PH-assumption context.

Cox regression coefficients

model	term	log_hazard_coef	standard_error	z_value	p_value	ci95_lower_bound	ci95_upper_bound	hazard_ratio	hazard_ratio_lower	hazard_ratio_upper	decision_alpha
Cox Proportional Hazards	G1	-0.1955	0.0535	-3.6540	0.0003	-0.3003	-0.0906	0.8224	0.7406	0.9134	Statistically significant
Cox Proportional Hazards	G2	-0.1979	0.0386	-5.1208	0.0000	-0.2736	-0.1221	0.8205	0.7606	0.8850	Statistically significant
Cox Proportional Hazards	studytime	-0.0539	0.1294	-0.4170	0.6767	-0.3075	0.1996	0.9475	0.7353	1.2209	Not statistically significant
Cox Proportional Hazards	age	0.0226	0.0642	0.3520	0.7248	-0.1032	0.1484	1.0229	0.9019	1.1600	Not statistically significant
Cox Proportional Hazards	Medu	-0.0616	0.0981	-0.6278	0.5301	-0.2538	0.1306	0.9403	0.7759	1.1396	Not statistically significant
Cox Proportional Hazards	Fedu	-0.0654	0.1051	-0.6222	0.5338	-0.2715	0.1407	0.9367	0.7622	1.1510	Not statistically significant
Cox Proportional Hazards	school_MS	0.6859	0.2179	3.1480	0.0016	0.2589	1.1129	1.9855	1.2954	3.0432	Statistically significant
Cox Proportional Hazards	sex_M	0.0972	0.1755	0.5536	0.5798	-0.2468	0.4411	1.1020	0.7813	1.5544	Not statistically significant
Cox Proportional Hazards	address_U	-0.3493	0.1770	-1.9735	0.0484	-0.6963	-0.0024	0.7051	0.4984	0.9976	Statistically significant

Cox regression fit statistics

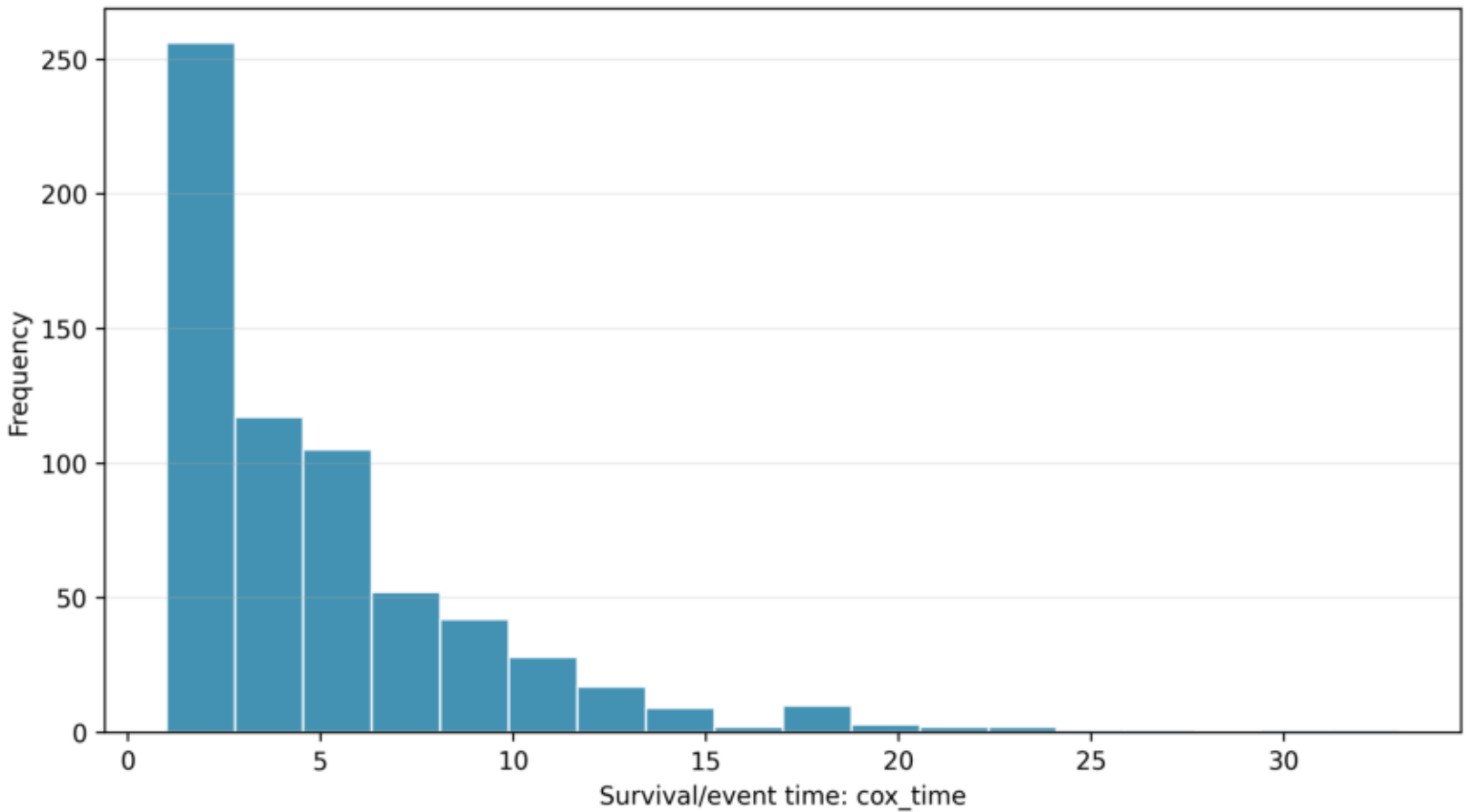
model	n	events	censored	df_model	log_likelihood	aic_partial_like	time_variable	event_variable	ties_method	note
Cox Proportion	649.0000	151.0000	498.0000	9.0000	-707.1453	1432.2906	cox_time	cox_event	breslow	Cox model estimation

Kaplan-Meier survival table

time	at_risk	events	censored_at_time	survival_probability	cumulative_event_probability
1.0000	649.0000	48.0000	196.0000	0.9260	0.0740
2.0000	405.0000	1.0000	11.0000	0.9238	0.0762
3.0000	393.0000	22.0000	88.0000	0.8720	0.1280
4.0000	283.0000	3.0000	4.0000	0.8628	0.1372
5.0000	276.0000	19.0000	74.0000	0.8034	0.1966
6.0000	183.0000	4.0000	8.0000	0.7858	0.2142
7.0000	171.0000	11.0000	38.0000	0.7353	0.2647
8.0000	122.0000	1.0000	2.0000	0.7293	0.2707
9.0000	119.0000	12.0000	30.0000	0.6557	0.3443
10.0000	77.0000	4.0000	3.0000	0.6217	0.3783
11.0000	70.0000	3.0000	18.0000	0.5950	0.4050
13.0000	44.0000	7.0000	5.0000	0.5004	0.4996

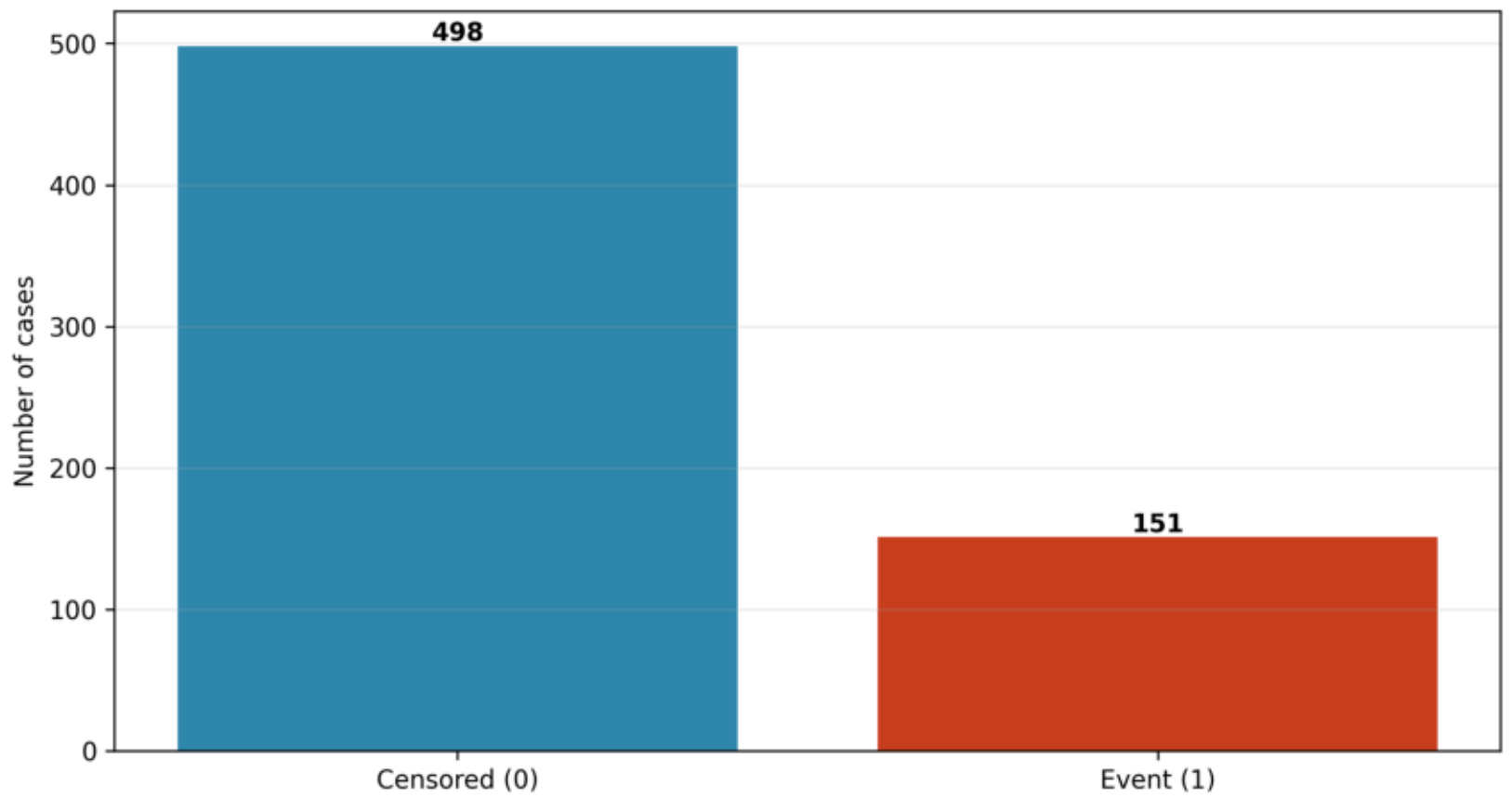
Cox survival time distribution

The Cox model uses positive survival/event times; here time is created as absences + 1 by default.



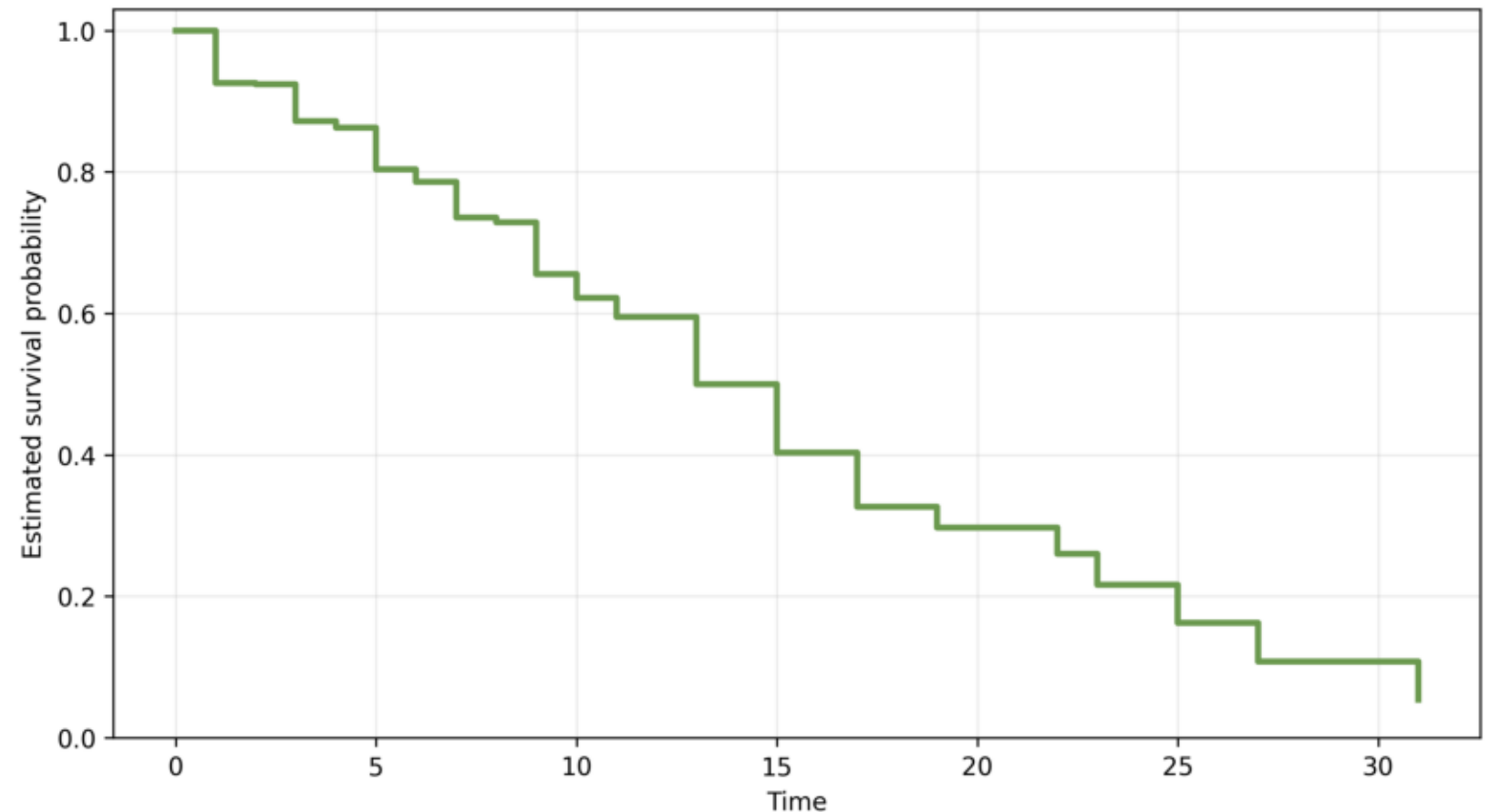
Cox event status counts

The event indicator is 1 when $G3 < 10$ or failures > 0 ; otherwise the case is treated as censored.



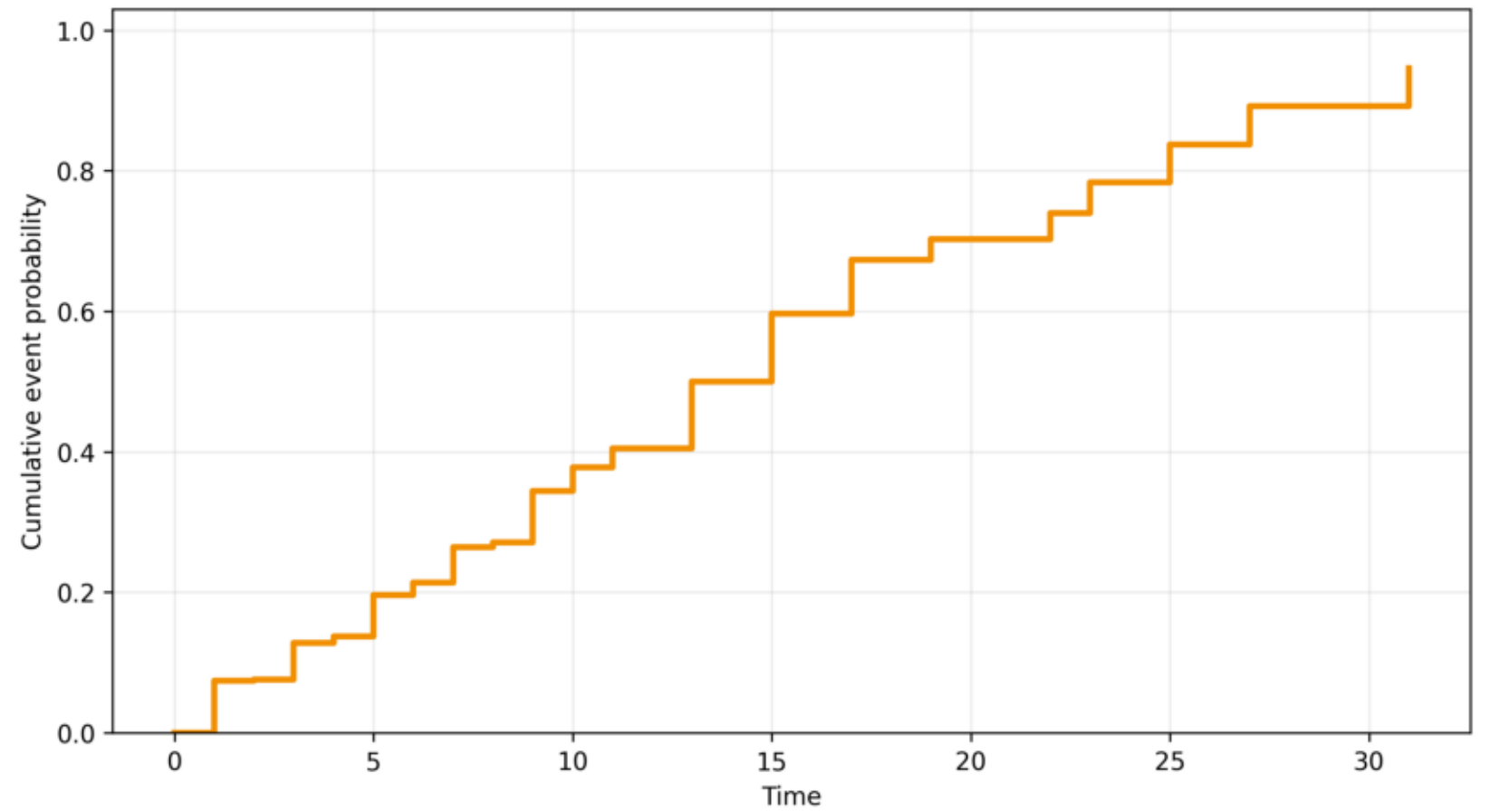
Kaplan-Meier survival curve

This nonparametric curve summarizes survival before adding Cox regression predictors.



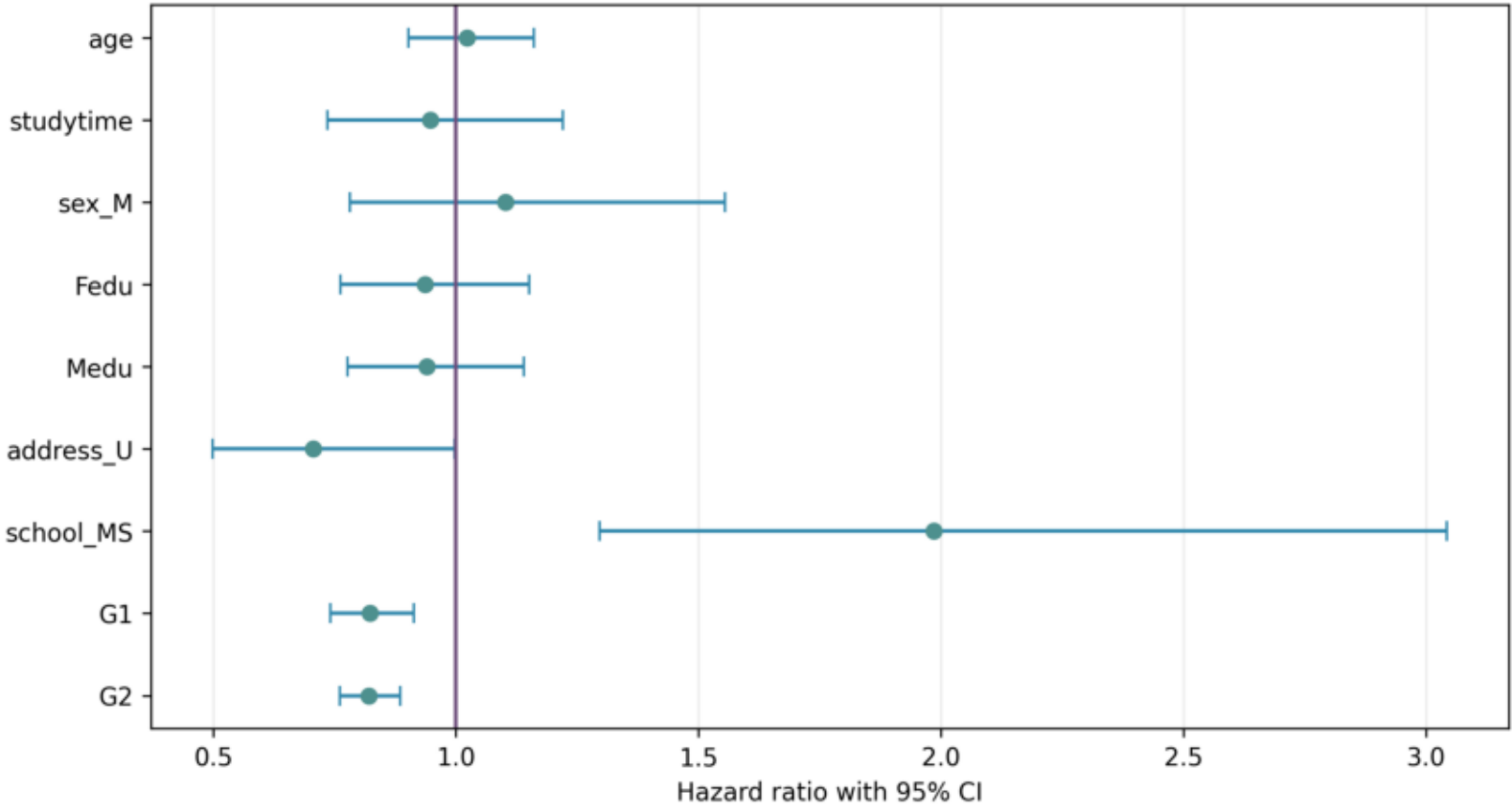
Cumulative event curve

The curve shows the cumulative probability of observing the Cox event across time.



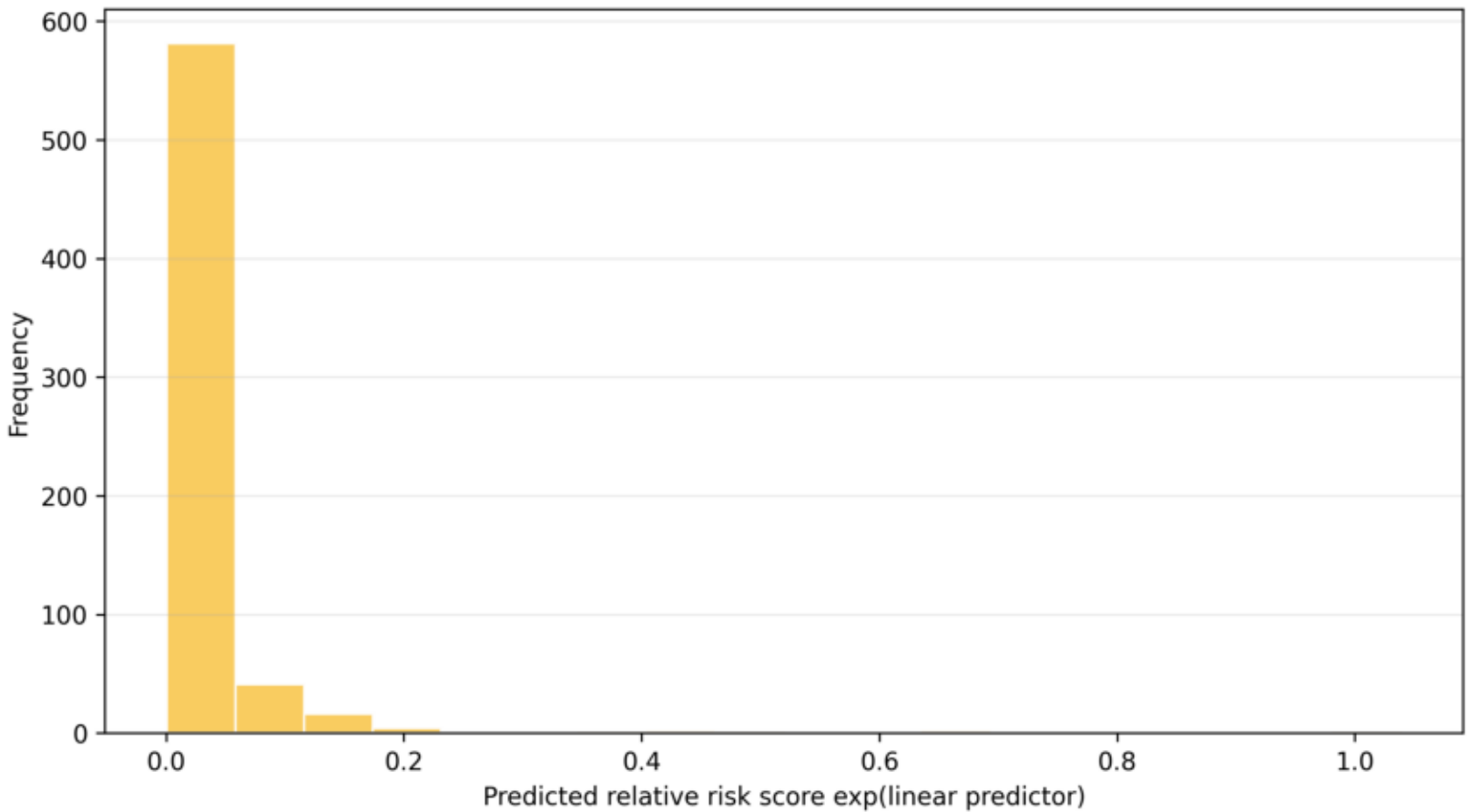
Cox hazard ratio plot

Hazard ratios above 1 indicate higher event hazard; below 1 indicate lower event hazard.



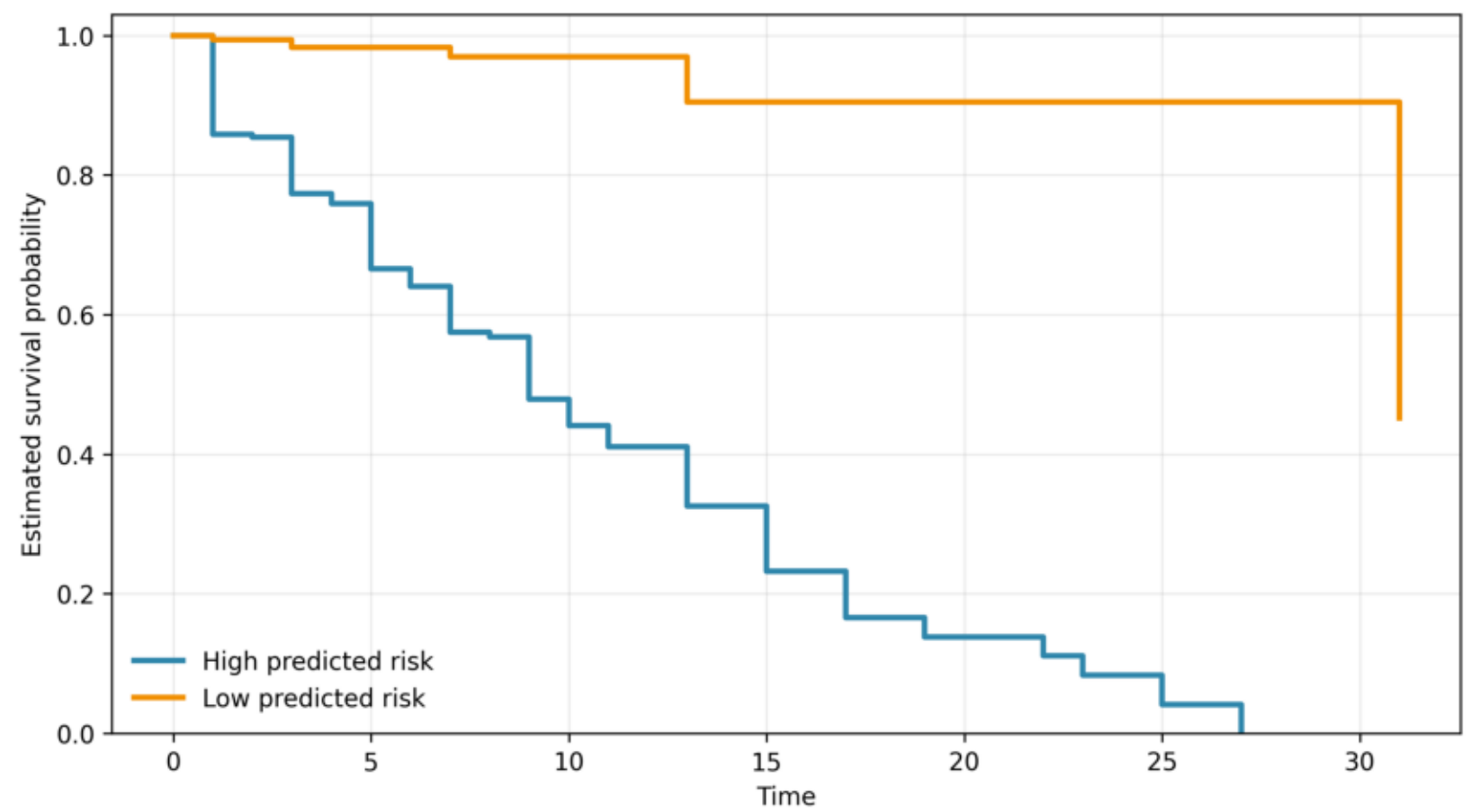
Cox predicted risk score distribution

The risk score ranks observations by their fitted relative event hazard.



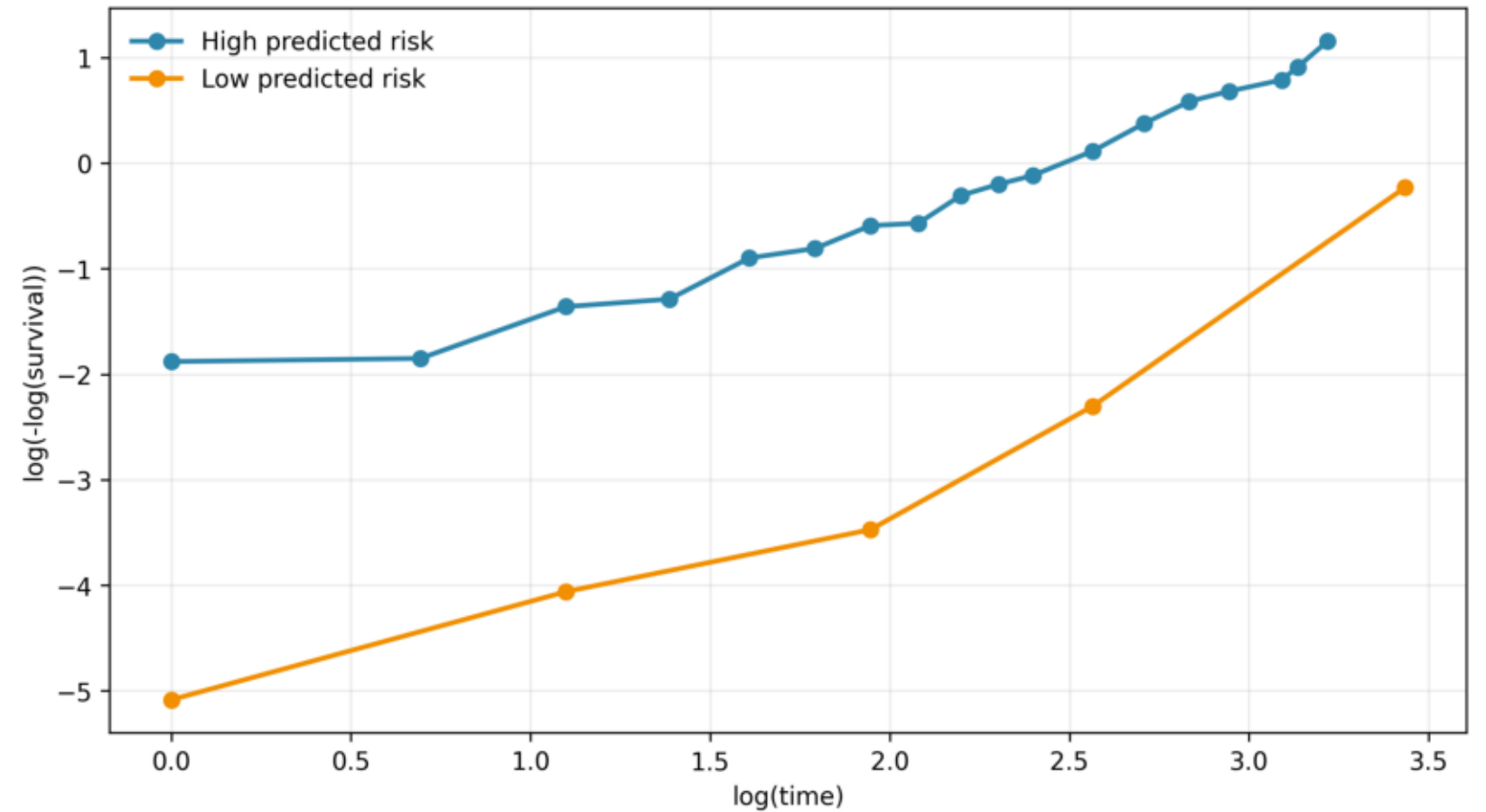
Kaplan-Meier curves by fitted risk group

Groups are split at the median predicted risk score from the Cox model.



Proportional hazards visual check

Roughly parallel log-minus-log curves support the proportional hazards assumption.



Cox baseline survival curve

Baseline survival is estimated from the fitted Cox model using a Breslow-style calculation.

