

Regression Confidence Interval

Test name: Regression Confidence Interval

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

Rows in original dataset: 649

Outcome: G3

Predictors: G1, G2, studytime, failures, absences, age

N used: 649

R-squared: 0.850632

Adjusted R-squared: 0.849236

F statistic: 609.352742

Model p-value: 3.25413e-261

Residual standard error: 1.254409

Residual degrees of freedom: 642

95% t critical value: 1.963666

Significant predictors at alpha 0.05: G1, G2, failures, absences

Average 95% mean-response CI width: 0.480583

Average 95% individual prediction-interval width: 4.952918

Observed mean-CI coverage: 0.1464

Observed prediction-interval coverage: 0.9723

Interpretation: coefficient confidence intervals quantify uncertainty in slope estimates.

Mean-response confidence intervals quantify uncertainty in the expected outcome at given predictor values.

Individual prediction intervals are wider because they include both mean-estimation uncertainty and individual residual variation.

Charts generated: 8

Model summary

test_name		outcome	predictors	n_complete_cases	number_of_predictors	r_squared	adjusted_r_squared	f_statistic	f_p_value	rmse	residual_standard_error	df_model	df_residual	t_critical_95	aic	bic	decision	
Regression Confidence Interval		G3	G1, G2, studytime, failures, absences, age	649	6	0.850632	0.849236	609.352742	3.254128e-261	1.254409	1.254409	6.0	642.0	1.963666	2142.954778	2174.282808	Overall regression model is statistically significant	

95% coefficient confidence intervals

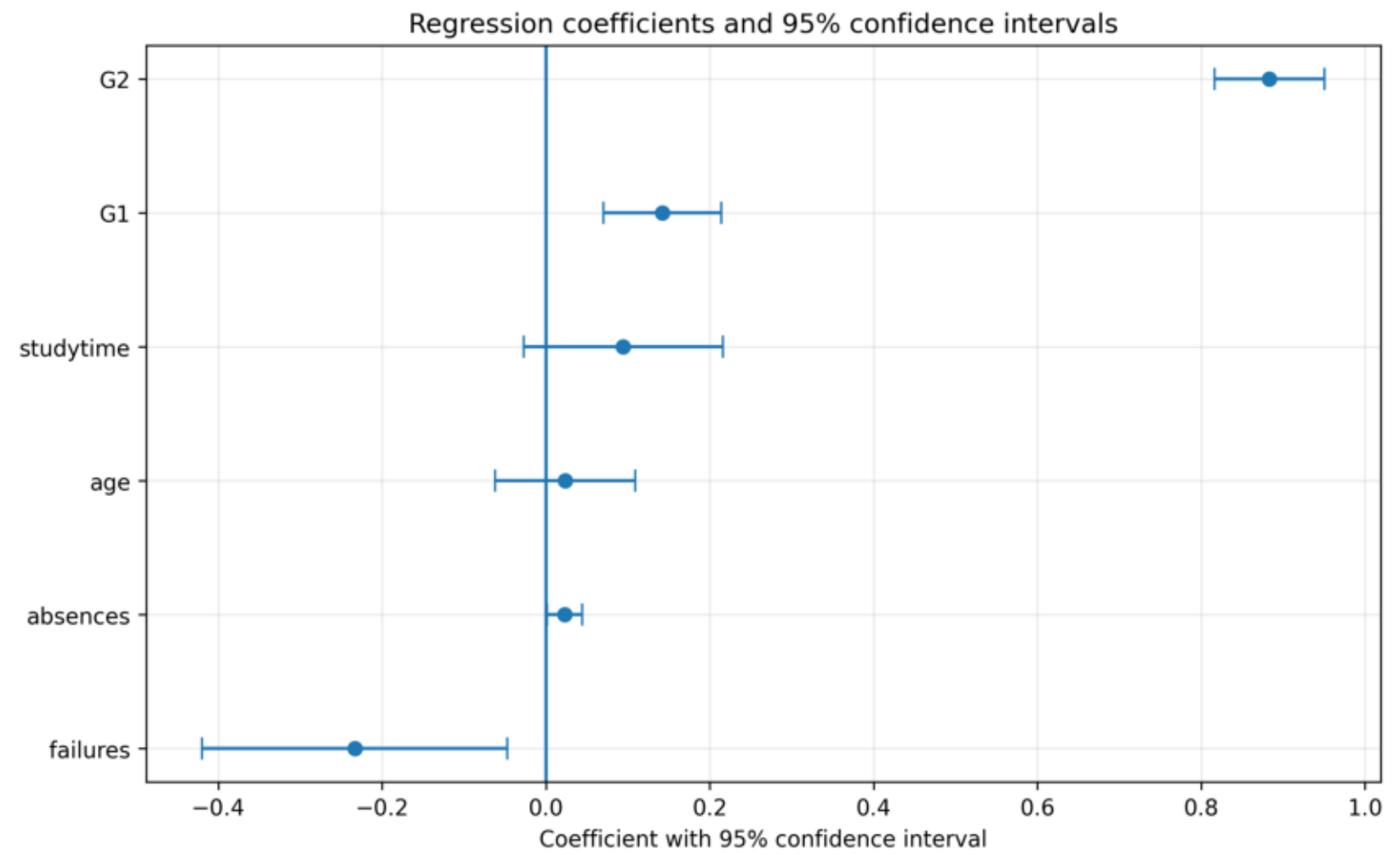
confidence_level	term	coefficient	standard_error	t_value	p_value	ci_lower	ci_upper	interval_width	excludes_zero	decision_alpha_0_05	
0.95	const	-0.545315	0.762635	-0.715040	4.748443e-01	-2.042876	0.952247	2.995123	False	Not	statistically significant
0.95	G1	0.142169	0.036589	3.885600	1.126739e-04	0.070321	0.214016	0.143695	True		Statistically significant
0.95	G2	0.883399	0.034210	25.822927	2.206497e-101	0.816222	0.950576	0.134353	True		Statistically significant
0.95	studytime	0.094579	0.061966	1.526303	1.274269e-01	-0.027102	0.216261	0.243362	False	Not	statistically significant
0.95	failures	-0.233156	0.094932	-2.456036	1.431172e-02	-0.419571	-0.046742	0.372829	True		Statistically significant
0.95	absences	0.022679	0.010874	2.085726	3.739772e-02	0.001327	0.044031	0.042704	True		Statistically significant
0.95	age	0.023641	0.043473	0.543809	5.867616e-01	-0.061726	0.109008	0.170734	False	Not	statistically significant

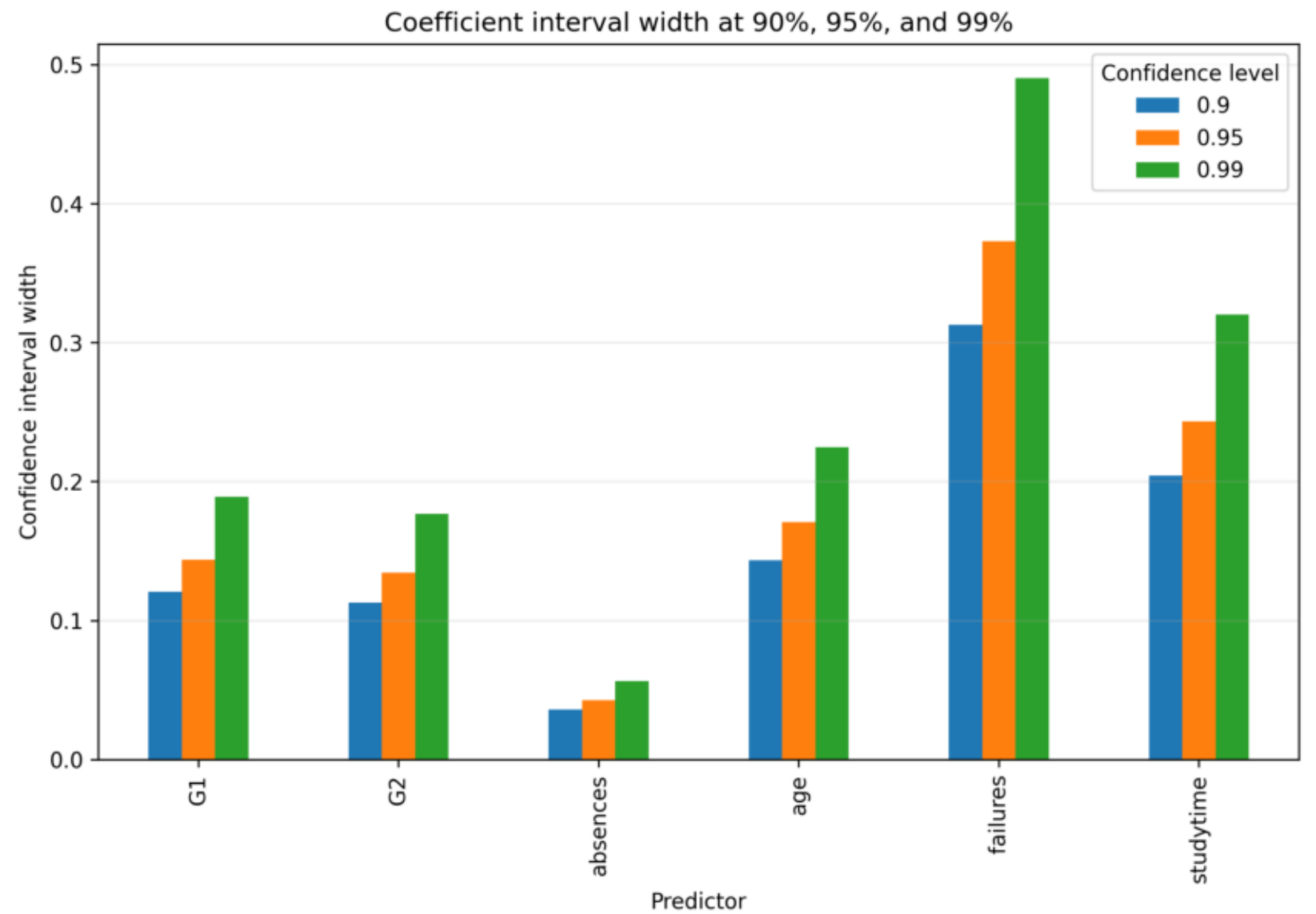
Interval summary

confidence_level	n	mean_ci_average_width	mean_ci_median_width	prediction_interval_average_width	prediction_interval_median_width	observed_coverage_mean_ci	observed_coverage_prediction_interval	note
0.95	649	0.480583	0.437137	4.952918	4.945837	0.146379	0.972265	Mean-response confidence intervals are narrower than individual prediction intervals.

Predictions and intervals

G3	G1	G2	studytime	failures	absences	age	predicted_mean	mean_ci95_lower	mean_ci95_upper	prediction_interval95_lower	prediction_interval95_upper	mean_ci95_width	prediction_interval95_width	raw_residual	inside_mean_ci95	inside_prediction_interval95
11	0	11	2	0	4	18	9.877488	9.085762	10.669214	7.290138	12.464839	1.583452	5.174701	1.122512	False	True
11	9	11	2	0	2	17	11.088005	10.901546	11.274465	8.617718	13.558293	0.372919	4.940575	-0.088005	True	True
12	12	13	2	0	6	15	13.324743	13.127261	13.522225	10.853599	15.795887	0.394964	4.942288	-1.324743	False	True
14	14	14	3	0	0	15	14.450983	14.229884	14.672082	11.977840	16.924126	0.442198	4.946286	-0.450983	False	True
13	11	13	2	0	0	16	13.070140	12.885240	13.255040	10.599970	15.540310	0.369800	4.940340	-0.070140	True	True
13	12	12	2	0	6	16	12.464986	12.334548	12.595423	9.998294	14.931677	0.260874	4.933383	0.535014	False	True
13	13	12	2	0	0	16	12.471079	12.318135	12.624022	10.003095	14.939062	0.305888	4.935968	0.528921	False	True
13	10	13	2	0	2	17	12.996971	12.779051	13.214892	10.524110	15.469832	0.435841	4.945722	0.003029	True	True
17	15	16	2	0	0	15	16.265370	16.034903	16.495836	13.791371	18.739368	0.460932	4.947996	0.734630	False	True
13	12	12	2	0	0	15	12.305269	12.126532	12.484006	9.835552	14.774985	0.357475	4.939433	0.694731	False	True
14	14	14	2	0	2	15	14.401762	14.214703	14.588821	11.931429	16.872095	0.374119	4.940665	-0.401762	False	True
13	10	12	3	0	0	15	12.115511	11.843145	12.387878	9.637259	14.593764	0.544733	4.956505	0.884489	False	True
12	12	13	1	0	0	15	13.094088	12.867348	13.320828	10.620434	15.567742	0.453480	4.947308	-1.094088	False	True
13	12	12	2	0	0	15	12.305269	12.126532	12.484006	9.835552	14.774985	0.357475	4.939433	0.694731	False	True
15	14	14	3	0	0	15	14.450983	14.229884	14.672082	11.977840	16.924126	0.442198	4.946286	0.549017	False	True
17	17	17	1	0	6	16	17.498243	17.209550	17.786935	15.018143	19.978343	0.577385	4.960200	-0.498243	False	True
14	13	13	3	0	10	16	13.675850	13.442776	13.908923	11.201607	16.150092	0.466147	4.948485	0.324150	False	True
14	13	14	2	0	2	16	14.283235	14.140974	14.425496	11.815890	16.750580	0.284522	4.934690	-0.283235	False	True





03_fitted_mean_with_95_confidence_interval.png

