

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

Rows used: 649

Outcome: G3

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

Formula: $G3 \sim G1 + G2 + \text{studytime} + \text{failures} + \text{absences} + \text{age}$

R-squared: 0.850632

Adjusted R-squared: 0.849236

F statistic: 609.352742

Model p-value: $3.254128 \times 10^{-261}$

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% 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.

Individual prediction intervals include residual variation and are therefore wider.

Charts generated: 8

Model summary

test_name		outcome	predictors		n_complete_cases
Regression Confidence Interval		G3 G1, G2, studytime, failures, absences, age	649		
number_of_predictors	r_squared	adjusted_r_squared	f_statistic	f_p_value	rmse residual_standard_error
6	0.8506322	0.8492363	609.3527	3.254128e-261	1.254409
df_model	df_residual	t_critical_95	aic	bic	decision
6	642	1.963666	2144.955	2180.758	Overall regression model is statistically significant

95% coefficient confidence intervals

confidence_level	term	coefficient	standard_error	t_value	p_value	ci_lower	ci_upper
0.95	(Intercept)	-0.54531480	0.76263548	-0.7150399	4.748443e-01	-2.042876127	0.95224653
0.95	G1	0.14216855	0.03658857	3.8856004	1.126739e-04	0.070320825	0.21401627
0.95	G2	0.88339876	0.03420986	25.8229266	2.206497e-101	0.816222016	0.95057550
0.95	studytime	0.09457944	0.06196635	1.5263031	1.274269e-01	-0.027101783	0.21626066
0.95	failures	-0.23315622	0.09493193	-2.4560358	1.431172e-02	-0.419570816	-0.04674162
0.95	absences	0.02267927	0.01087356	2.0857261	3.739772e-02	0.001327229	0.04403132
0.95	age	0.02364114	0.04347324	0.5438091	5.867616e-01	-0.061725777	0.10900806
interval_width	excludes_zero	decision_alpha_0_05					
2.99512266	FALSE	Not statistically significant					
0.14369544	TRUE	Statistically significant					
0.13435348	TRUE	Statistically significant					
0.24336244	FALSE	Not statistically significant					
0.37282920	TRUE	Statistically significant					
0.04270409	TRUE	Statistically significant					
0.17073384	FALSE	Not statistically significant					

Interval summary

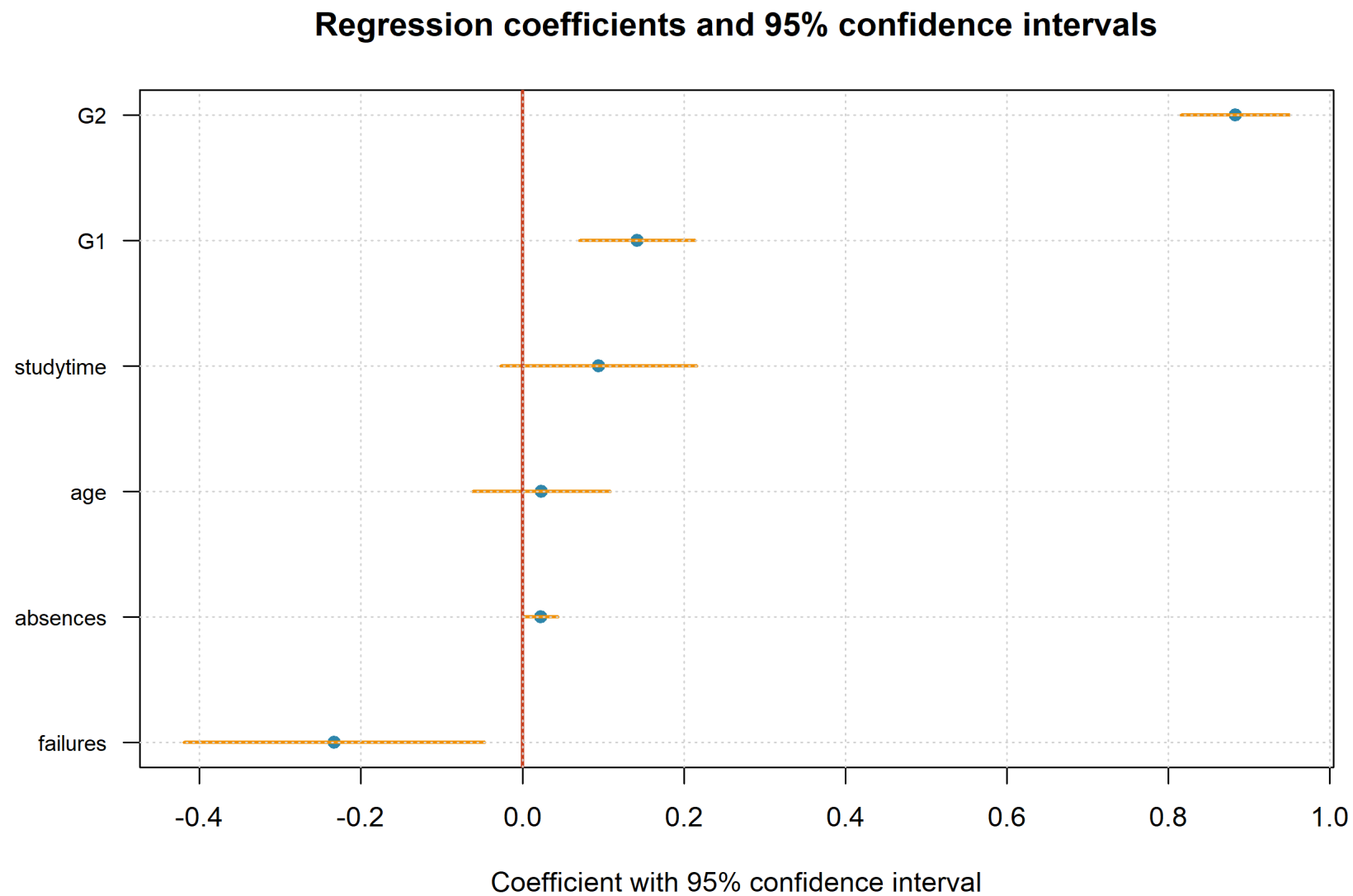
confidence_level	n	mean_ci_average_width	mean_ci_median_width	prediction_interval_average_width
0.95	649	0.4805829	0.4371368	4.952918
prediction_interval_median_width	observed_coverage_mean_ci	observed_coverage_prediction_interval		
4.945837		0.146379		0.972265

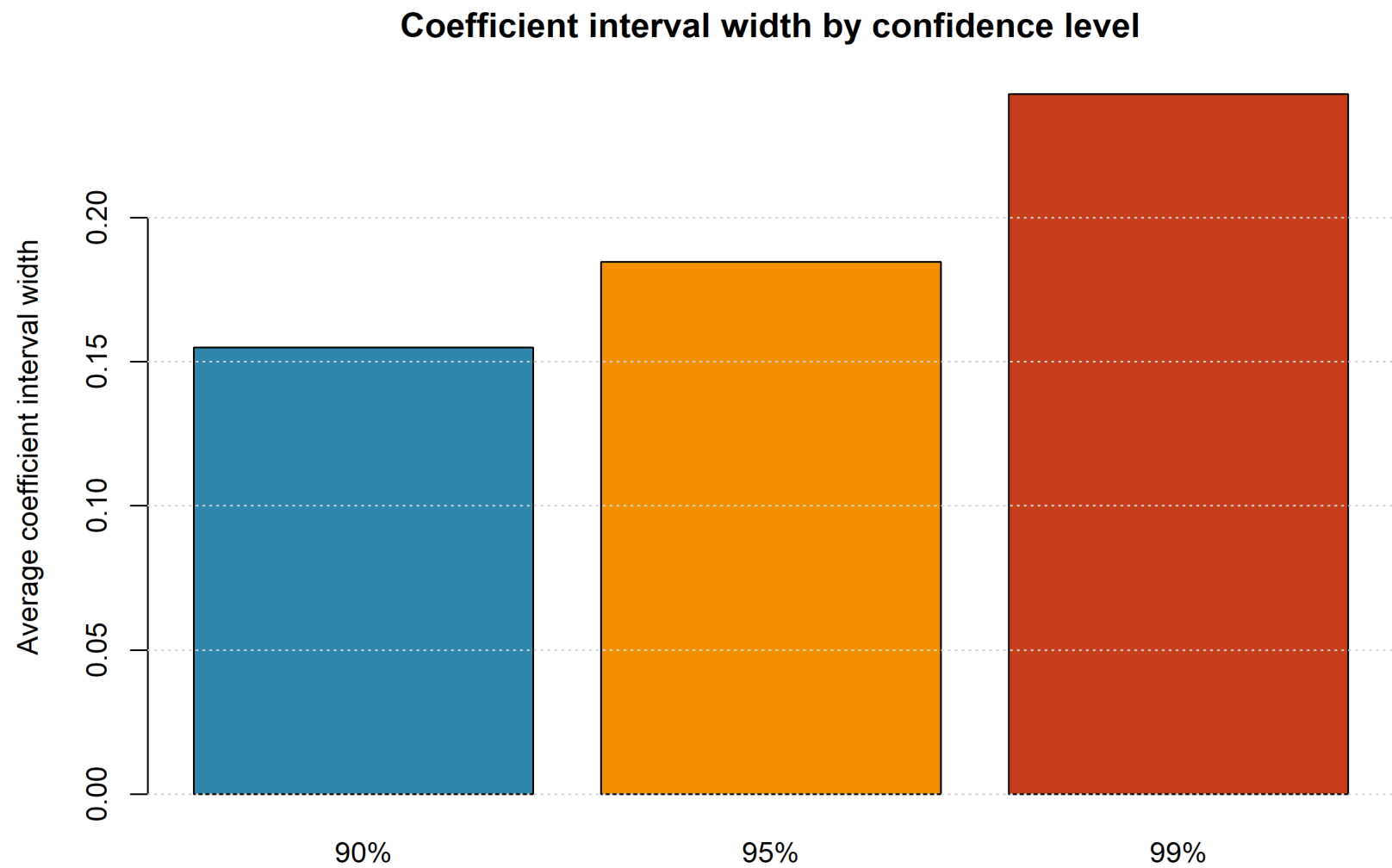
note

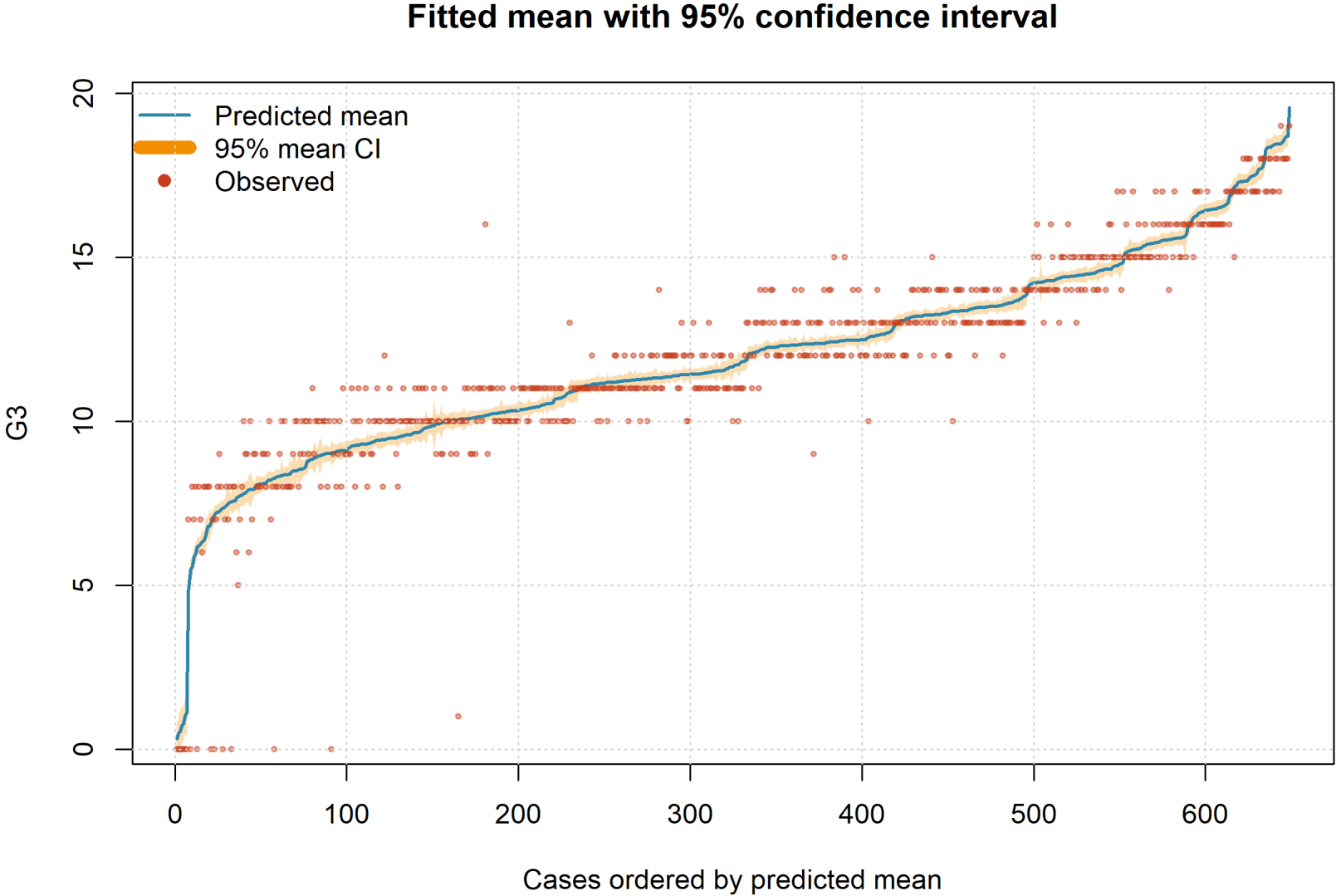
Mean-response confidence intervals are narrower than individual prediction intervals.

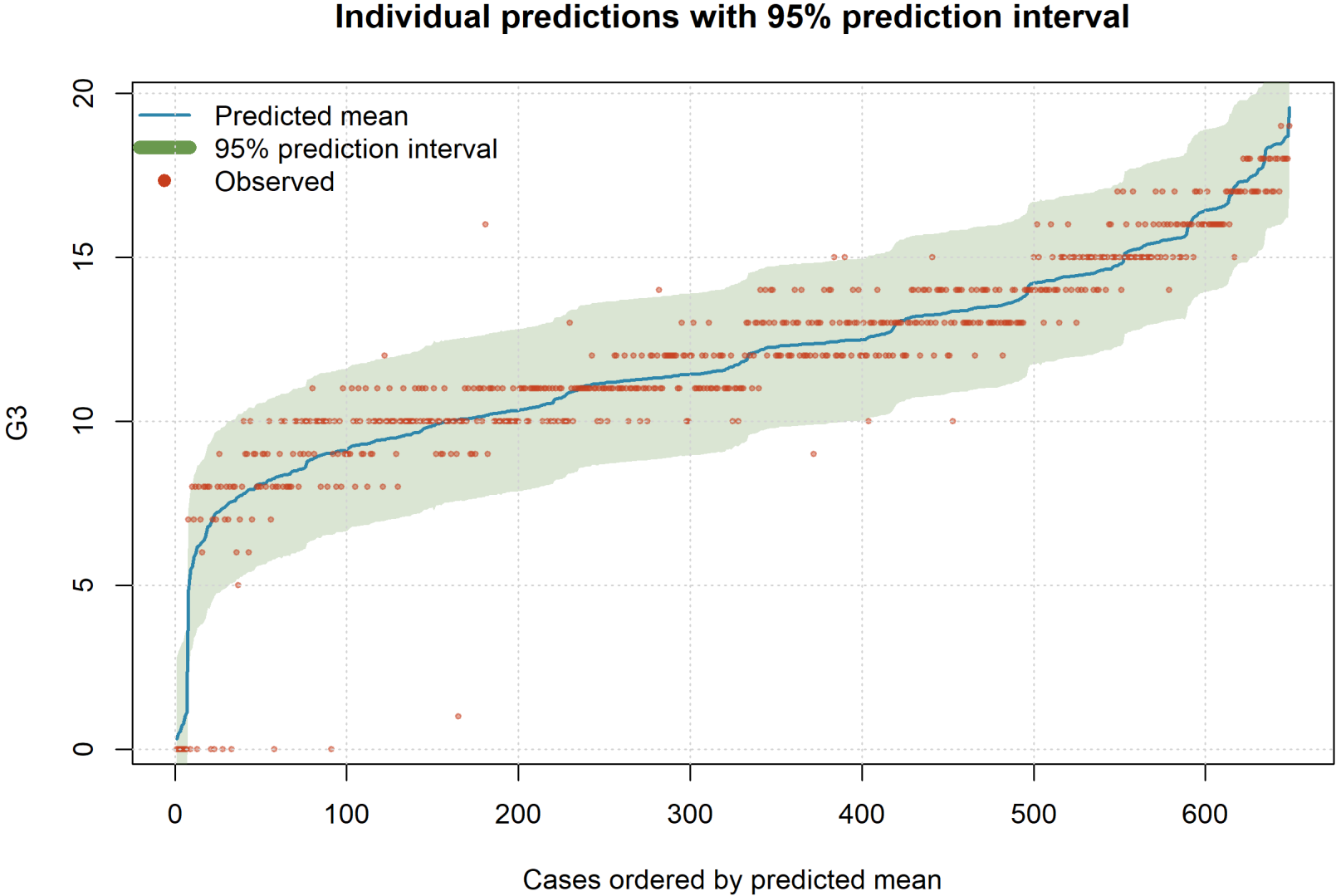
Predictions and intervals

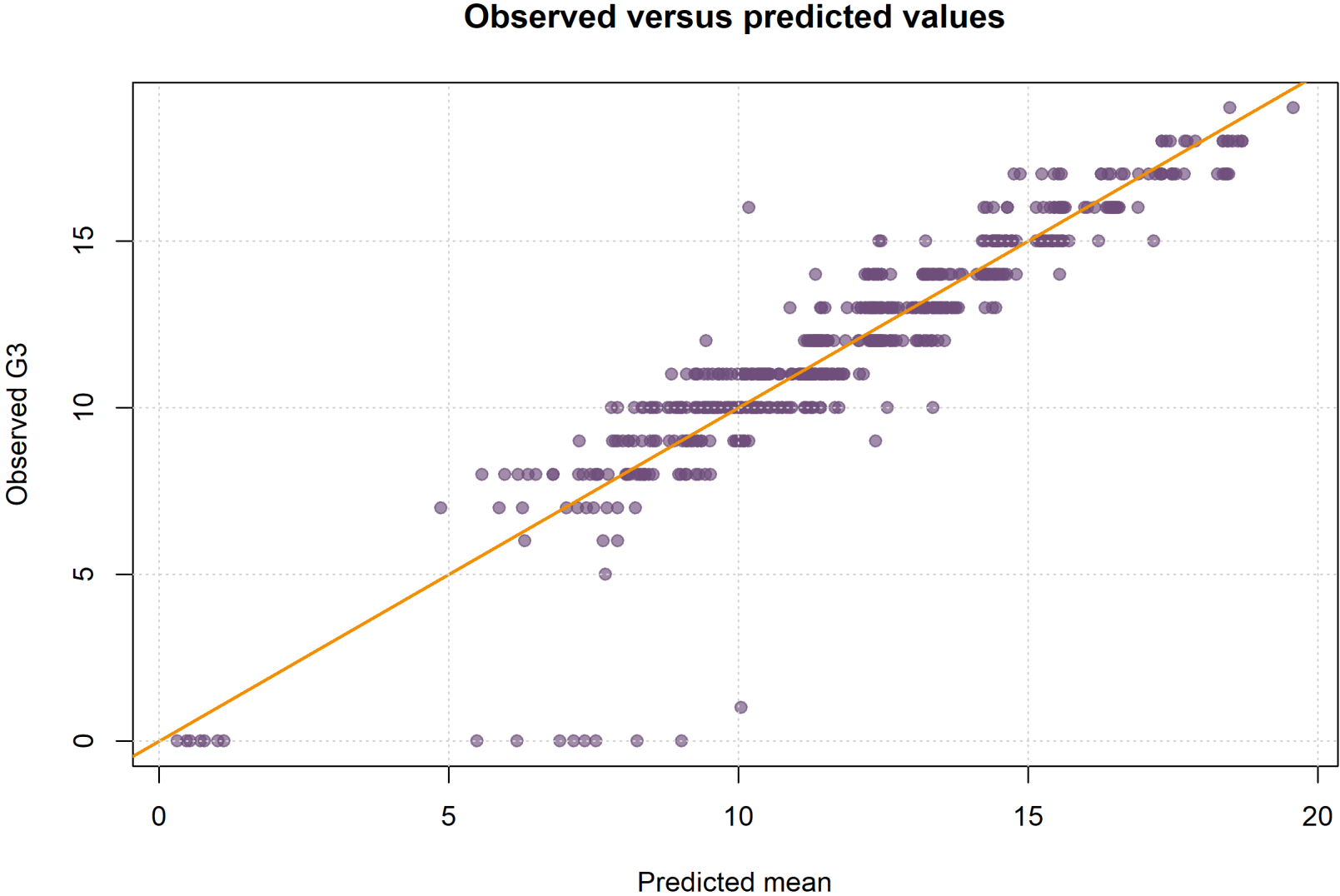
G3	G1	G2	studytime	failures	absences	age	predicted_mean	mean_ci95_lower	mean_ci95_upper	
11	0	11	2	0	4	18	9.877488	9.085762	10.66921	
11	9	11	2	0	2	17	11.088005	10.901546	11.27446	
12	12	13	2	0	6	15	13.324743	13.127261	13.52223	
14	14	14	3	0	0	15	14.450983	14.229884	14.67208	
13	11	13	2	0	0	16	13.070140	12.885240	13.25504	
13	12	12	2	0	6	16	12.464986	12.334548	12.59542	
13	13	12	2	0	0	16	12.471079	12.318135	12.62402	
13	10	13	2	0	2	17	12.996971	12.779051	13.21489	
17	15	16	2	0	0	15	16.265370	16.034903	16.49584	
13	12	12	2	0	0	15	12.305269	12.126532	12.48401	
14	14	14	2	0	2	15	14.401762	14.214703	14.58882	
13	10	12	3	0	0	15	12.115511	11.843145	12.38788	
12	12	13	1	0	0	15	13.094088	12.867348	13.32083	
13	12	12	2	0	0	15	12.305269	12.126532	12.48401	
prediction_interval95_lower			prediction_interval95_upper			mean_ci95_width		prediction_interval95_width		raw_residual
7.290138			12.46484			1.5834517		5.174701		1.122511911
8.617718			13.55829			0.3729190		4.940575		-0.088005322
10.853599			15.79589			0.3949638		4.942288		-1.324743287
11.977840			16.92413			0.4421984		4.946286		-0.450982938
10.599970			15.54031			0.3698004		4.940340		-0.070140243
9.998294			14.93168			0.2608744		4.933383		0.535014328
10.003095			14.93906			0.3058877		4.935968		0.528921421
10.524110			15.46983			0.4358408		4.945722		0.003028614
13.791371			18.73937			0.4609324		4.947996		0.734630437
9.835552			14.77499			0.3574746		4.939433		0.694731111
11.931429			16.87209			0.3741188		4.940665		-0.401762046
9.637259			14.59376			0.5447334		4.956505		0.884488767
10.620434			15.56774			0.4534797		4.947308		-1.094088209
9.835552			14.77499			0.3574746		4.939433		0.694731111
inside_mean_ci95			inside_prediction_interval95							
FALSE			TRUE							

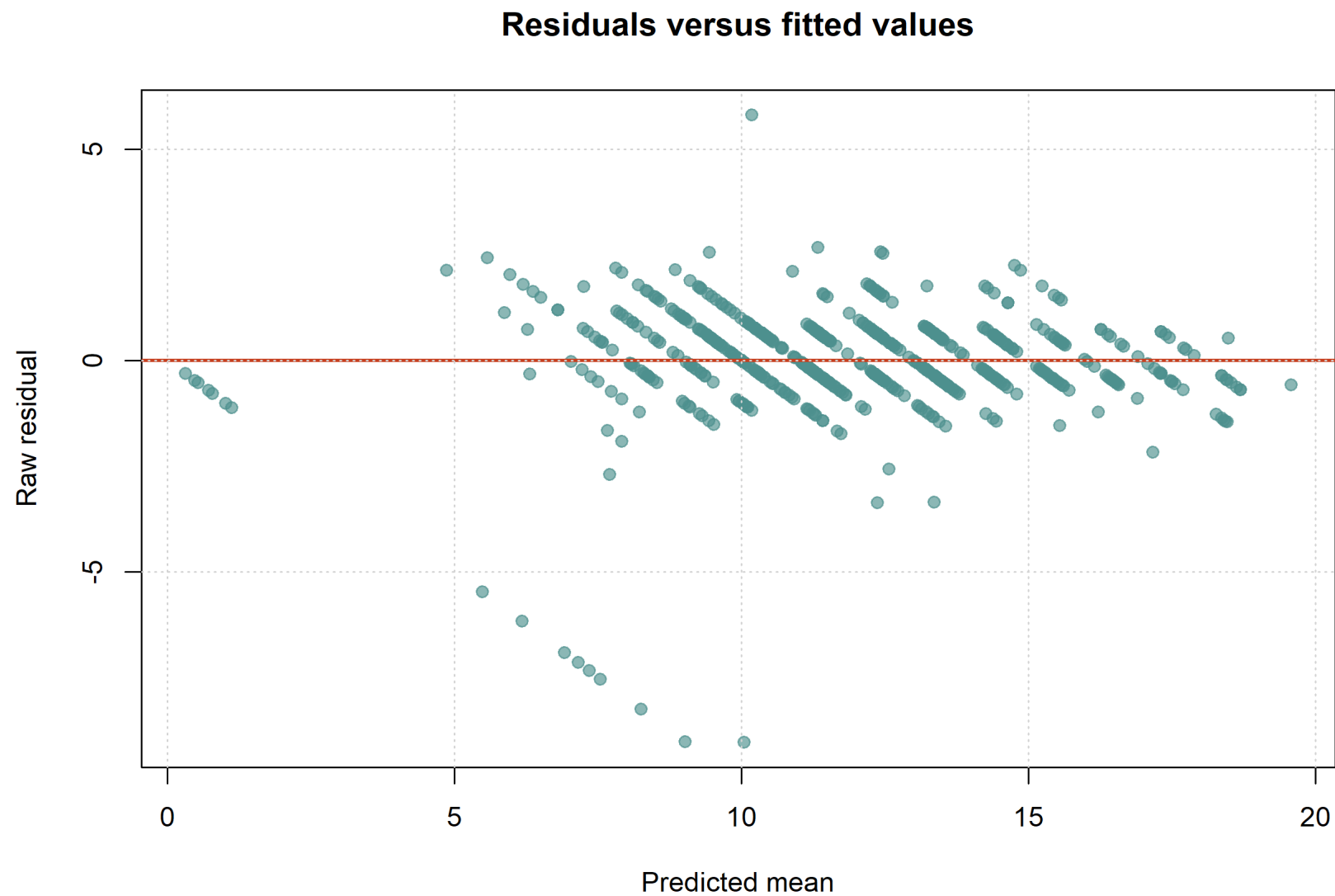












Confidence and prediction interval widths

