

Ordinal Logistic Regression

Test name: Ordinal Logistic Regression

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

Rows in original dataset: 649

Columns in original dataset: 33

Rows used in ordinal model: 649

Ordinal outcome created: g3_ordinal from G3

Outcome cut points: Low = $G3 < 10$; Medium = $10 \leq G3 < 15$; High = $G3 \geq 15$.

Numeric predictors: G1, G2, studytime, failures, absences, age

Categorical predictors: school, sex, address

Design matrix predictors after dummy coding: 9

Formula: $g3_ordinal \sim G1 + G2 + studytime + failures + absences + age + school_MS + sex_M + address_U$

Link: cumulative logit.

Log likelihood: -158.5859

AIC: 339.1718

BIC: 388.4015

McFadden pseudo R-squared: 0.7268

Classification accuracy: 0.9076

Strongest predictor by absolute z-value: G2 (OR=6.2226, $p=3.399e-23$)

Interpretation: $\exp(\text{coefficient})$ is an odds ratio for being in a higher ordered category.

Decision guide: $p < 0.05$ and an odds-ratio CI not crossing 1 indicate stronger evidence.

Reporting guide: state ordinal outcome coding, link, predictors, odds ratios, 95% CIs, pseudo R-squared and classification context.

Charts generated: 8

Ordinal logistic coefficients

term	coefficient	standard_error	z_value	p_value	ci95_lower	ci95_upper	odds_ratio_exp	odds_ratio_ci95_lower	odds_ratio_ci95_upper	decision_alpha_0.05
G1	0.5988	0.1166	5.1362	0.0000	0.3703	0.8272	1.8198	1.4481	2.2870	Statistically significant
G2	1.8282	0.1843	9.9203	0.0000	1.4670	2.1894	6.2226	4.3361	8.9296	Statistically significant
studytime	-0.0253	0.1879	-0.1345	0.8930	-0.3935	0.3430	0.9751	0.6747	1.4092	Not statistically significant
failures	-0.3228	0.2448	-1.3187	0.1873	-0.8025	0.1570	0.7241	0.4482	1.1699	Not statistically significant
absences	-0.0237	0.0327	-0.7238	0.4692	-0.0879	0.0405	0.9766	0.9159	1.0413	Not statistically significant
age	0.4463	0.1363	3.2736	0.0011	0.1791	0.7136	1.5626	1.1962	2.0413	Statistically significant
school_MS	-0.7942	0.3481	-2.2818	0.0225	-1.4765	-0.1120	0.4519	0.2284	0.8940	Statistically significant
sex_M	-0.4212	0.3126	-1.3476	0.1778	-1.0338	0.1914	0.6563	0.3557	1.2109	Not statistically significant
address_U	-0.0754	0.3282	-0.2298	0.8182	-0.7188	0.5679	0.9273	0.4873	1.7646	Not statistically significant

Thresholds / cutpoints

term	standard_error	z_value	p_value	ci95_lower	ci95_upper	raw_parameter	actual_cumulative	note
Low/Medium	3.1730	8.7811	0.0000	21.6434	34.0812	27.8623	27.8623	SPSS/R-style cutpoint
Medium/High	0.0800	31.8305	0.0000	2.3883	2.7017	2.5450	40.6053	SPSS/R-style cutpoint

Fit statistics

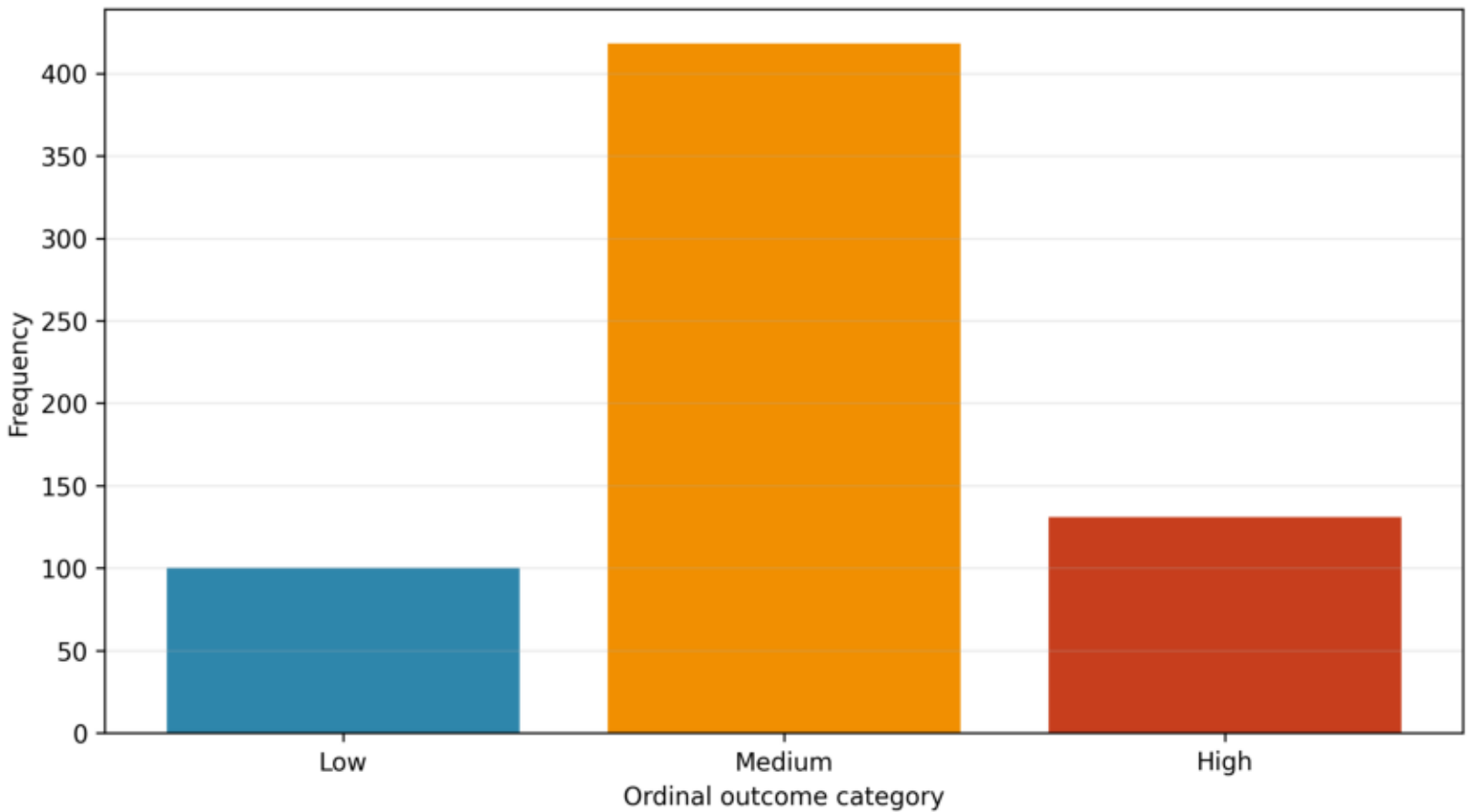
model	n	number_of_	number_of_	log_likelihod	null_log_like	aic	bic	mcfadden_p	classification	outcome_ca	link	note
Ordinal logis	649.0000	9.0000	2.0000	-158.5859	-580.5567	339.1718	388.4015	0.7268	0.9076	Low, Medium	cumulative	Positive coefficients

Classification table

observed_category	Low	Medium	High
Low	77.0000	23.0000	0.0000
Medium	15.0000	396.0000	7.0000
High	0.0000	15.0000	116.0000

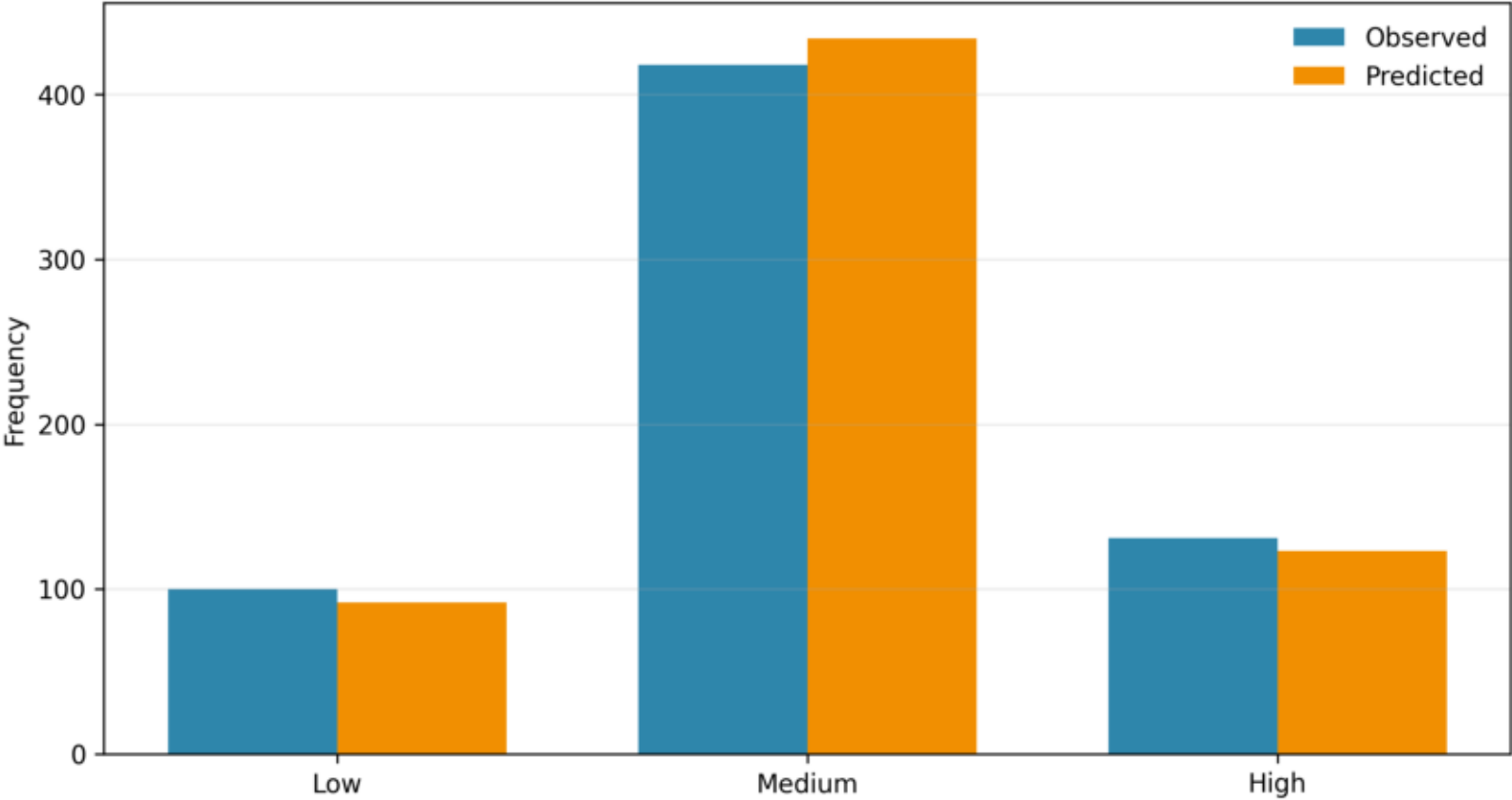
Ordinal outcome distribution

G3 is recoded into ordered Low, Medium, and High achievement categories.



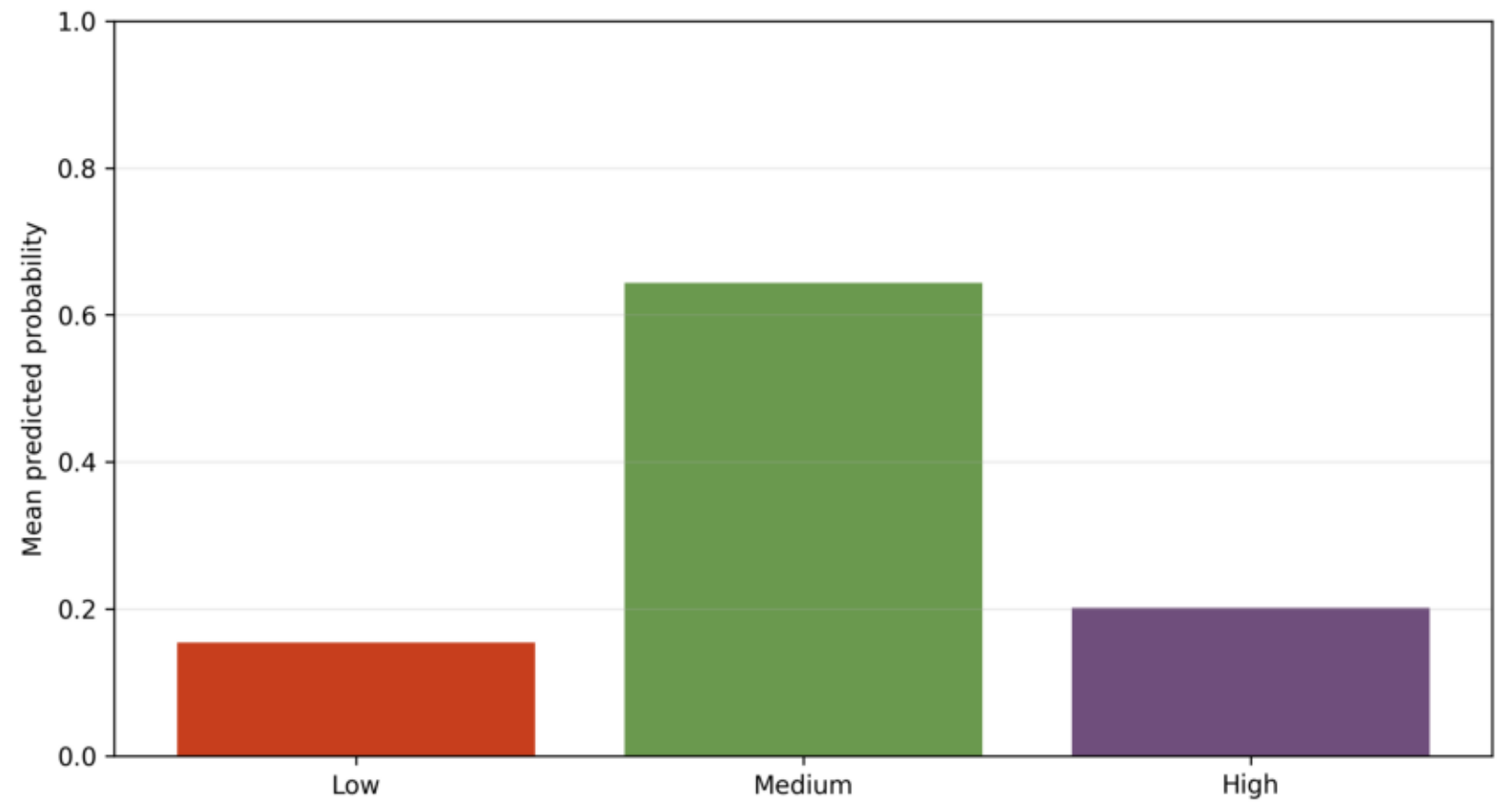
Observed vs predicted category counts

The bars compare actual ordinal categories with the model's most likely predicted categories.



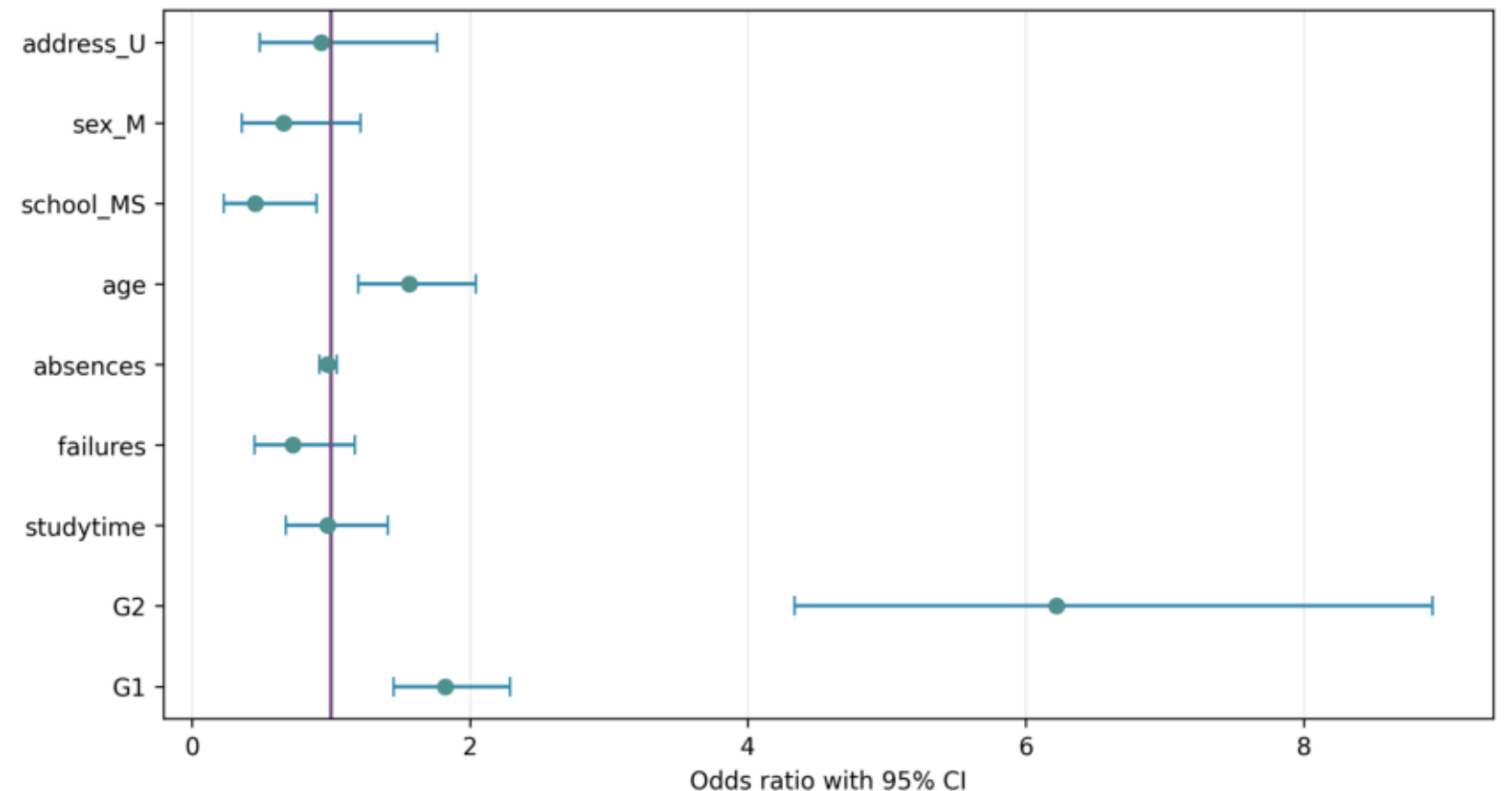
Average predicted probabilities

Each bar is the sample-average model probability for an outcome category.



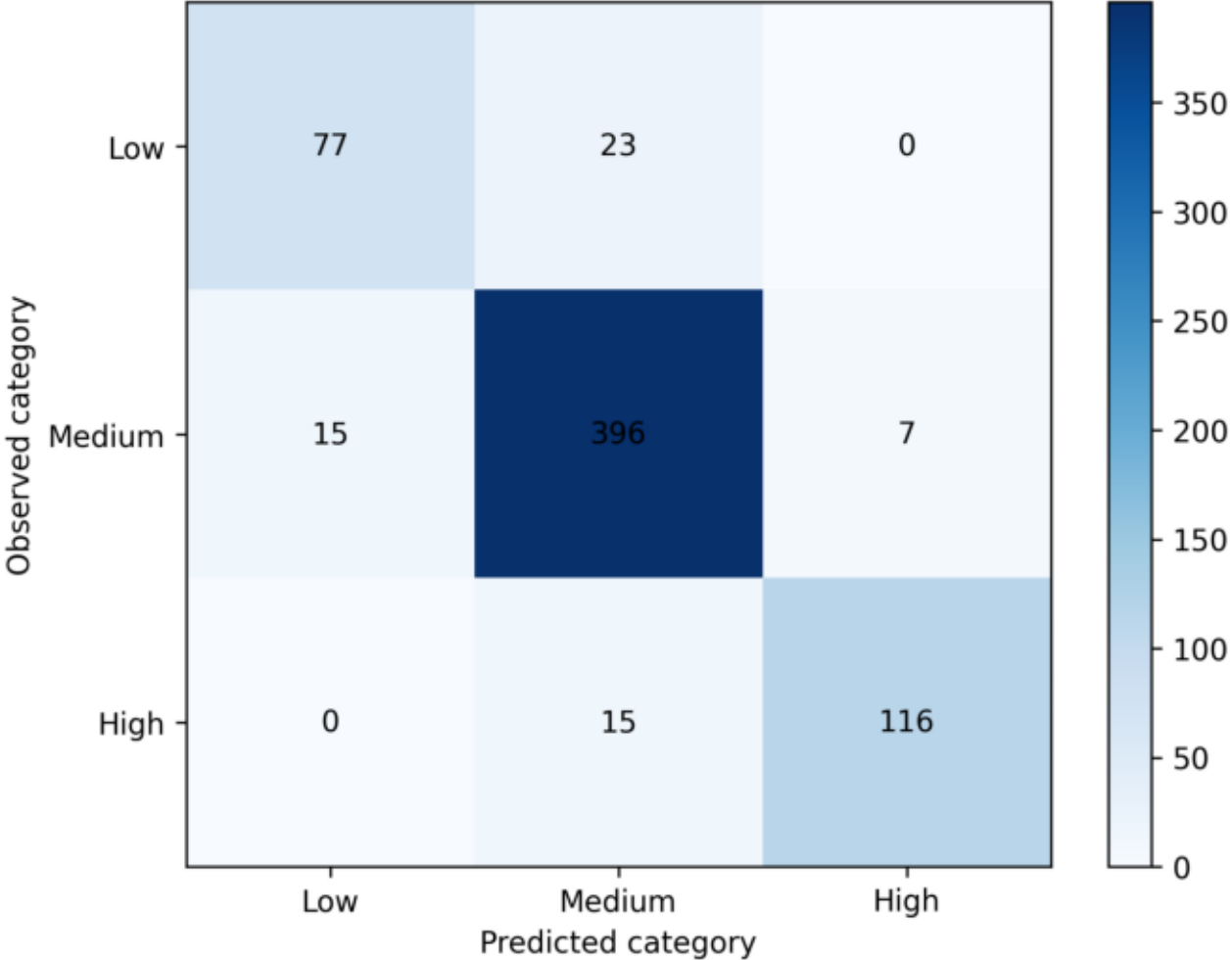
Ordinal logistic odds-ratio plot

Intervals not crossing 1 indicate stronger evidence for a predictor effect.



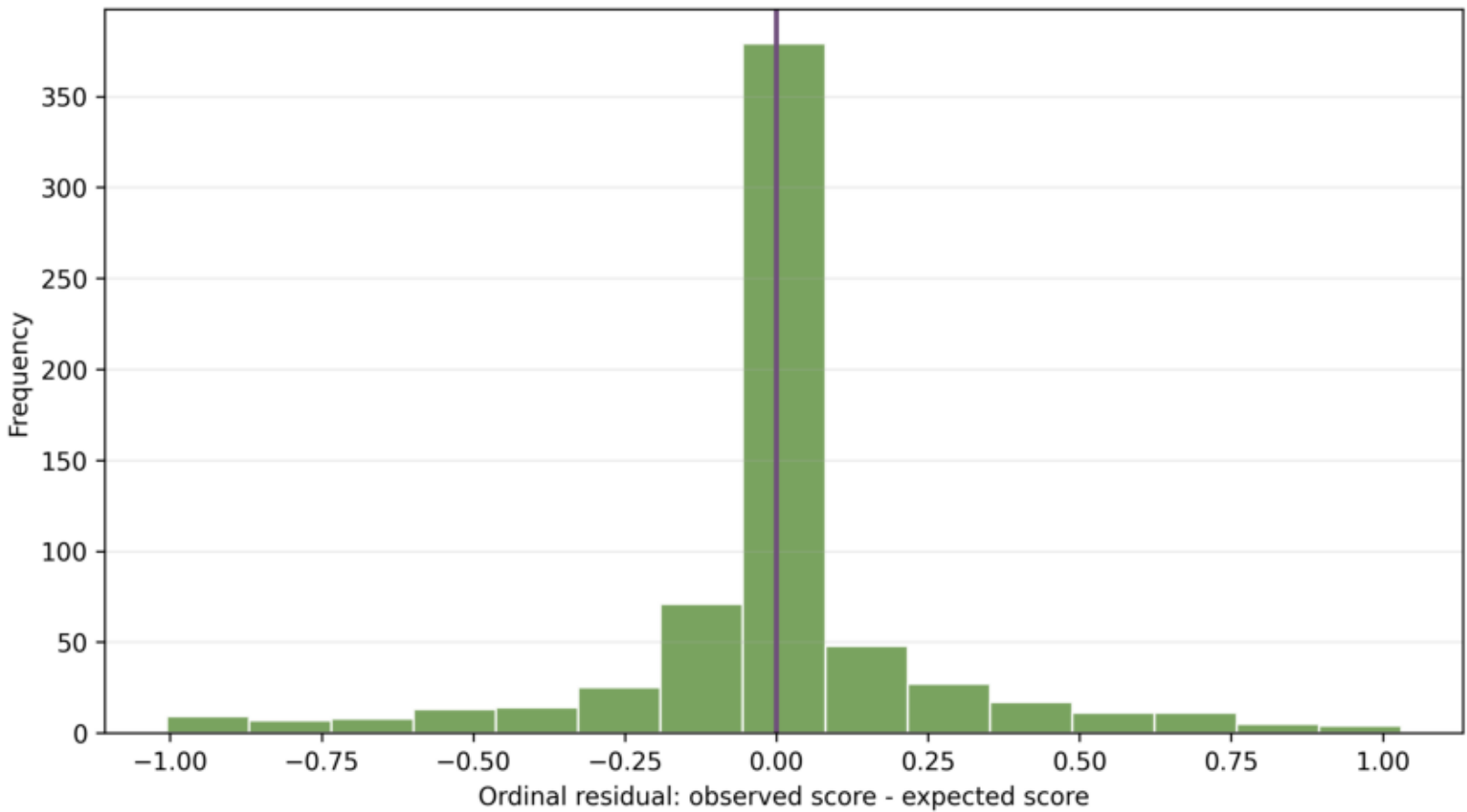
Classification table heatmap

Diagonal cells show cases where predicted and observed ordinal classes match.



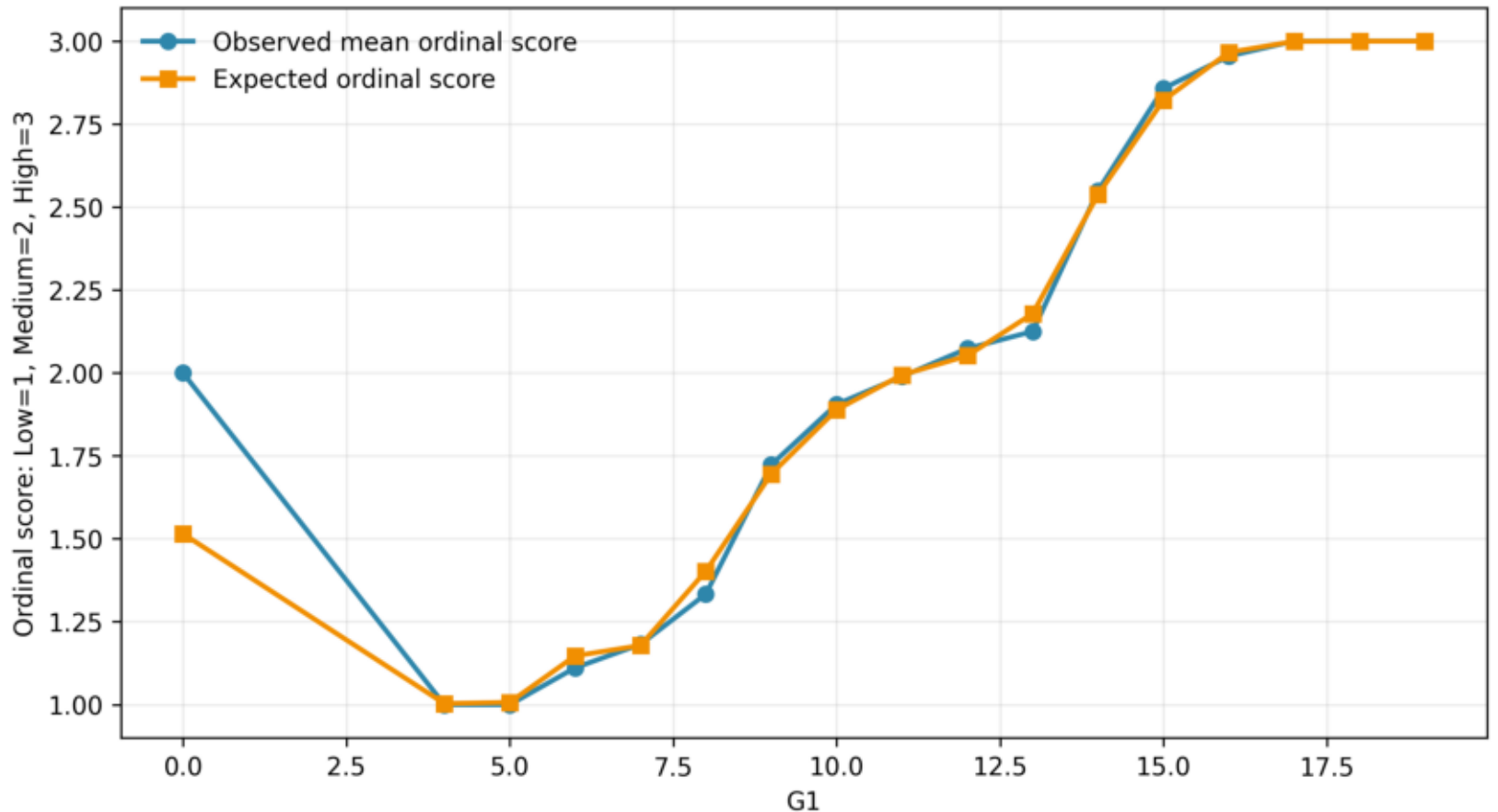
Ordinal residual distribution

Residuals compare observed ordinal scores with probability-weighted expected scores.



Observed and expected ordinal score by G1

This grouped chart checks how well predicted ordinal scores track observed scores.



Predicted category probabilities across G1

Lines show how model-predicted probabilities change along the main numeric predictor.

