

Ordinal Logistic Regression for Likert Data

Standalone verified Python analysis

Method: Ordinal Logistic Regression for Likert Data

Method type: regression_model

Design: Cumulative-logit proportional-odds model for the five-level family-relationship response.

Variables: famrel, studytime, age, failures, sex

Inference scope: The applicable omnibus likelihood-ratio test compares the fitted predictor model with the intercept-only ordinal model.

Formula: $\text{logit}[P(Y \leq j)] = \theta_j - X * \beta$; $LR = 2 * (LL_model - LL_null)$.

Source rows: 649

Calculated metrics:

log_likelihood: -806.7073488321118

null_log_likelihood: -810.4700524171607

likelihood_ratio: 7.525407170097651

lr_df: 4

lr_p_value: 0.11059414851905408

mcfadden_r_squared: 0.004642618902236828

studytime_coefficient: 0.051229466550601156

n_cases: 649

Independent reference values:

log_likelihood: -806.7073488321118

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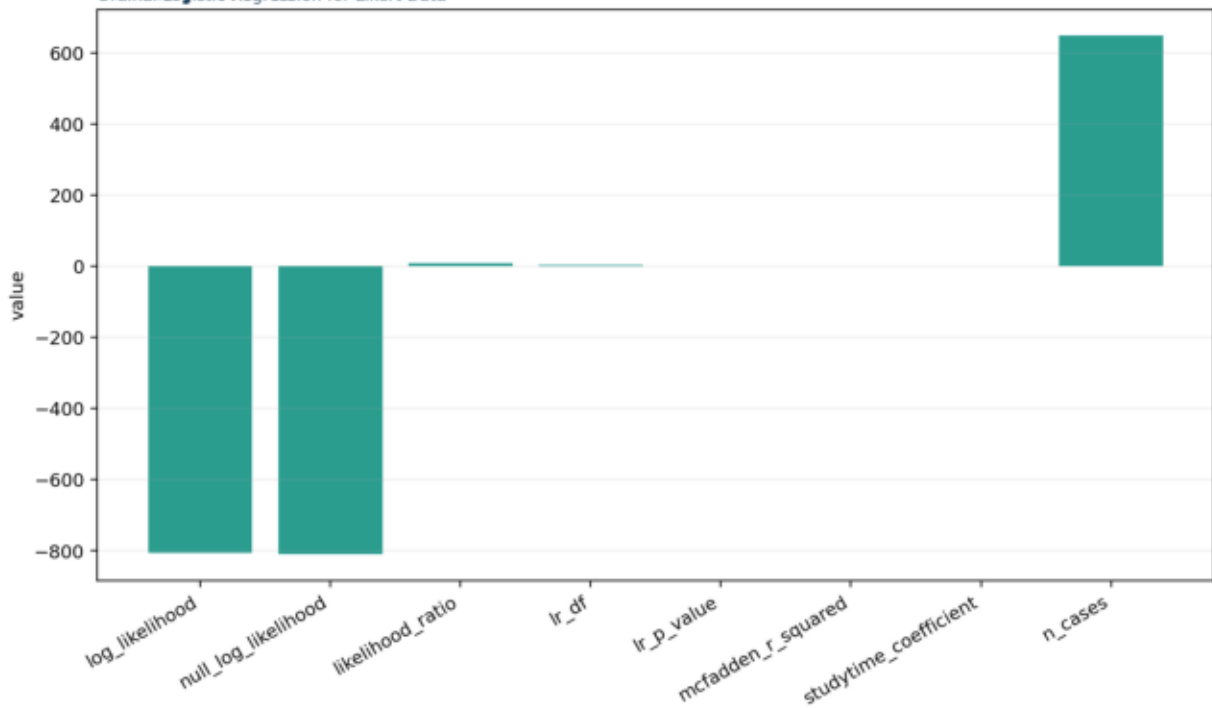
Interpretation:

The cumulative-logit model estimates common slopes across four response thresholds.

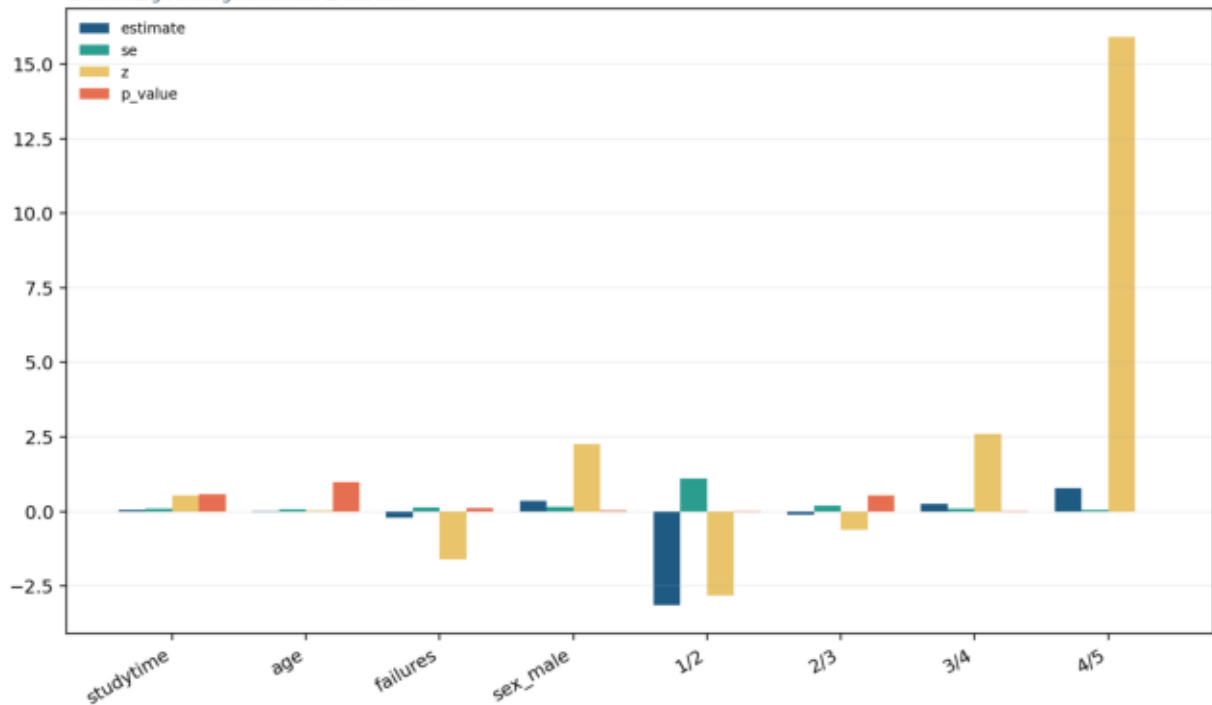
Likelihood-ratio=7.525407, p=0.110594; McFadden R-squared=0.004643.

Primary Metrics

Overview of Statistical Regression for Likert Data

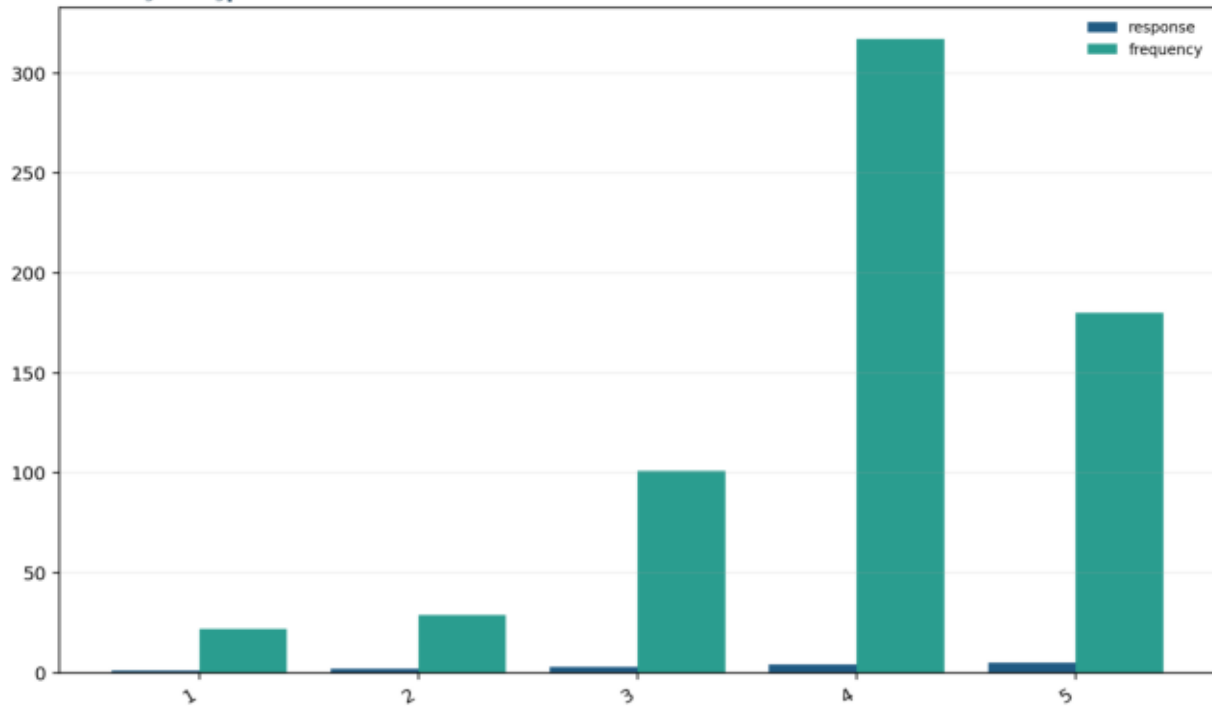


Ordinal Model Parameters

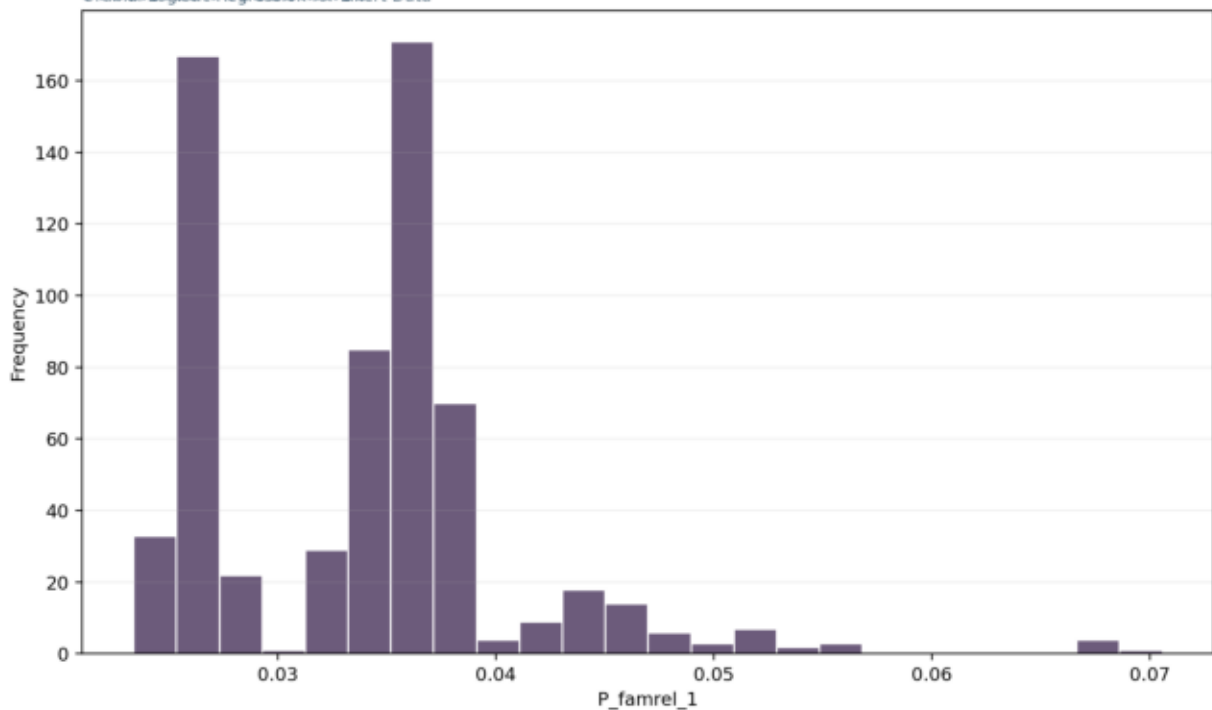


Outcome Frequencies

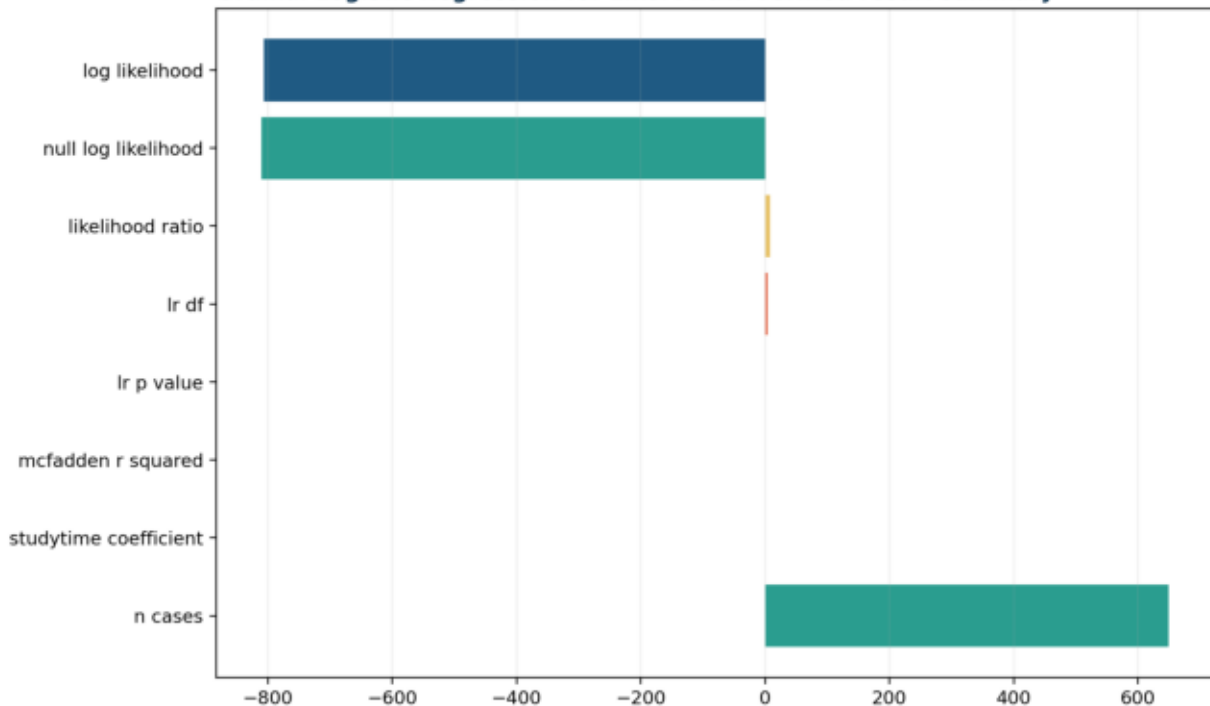
Skert Data



Predicted Probabilities Pert Data



Ordinal Logistic Regression for Likert Data verified result summary



Primary Metrics

metric	value
log_likelihood	-806.707
null_log_likelihood	-810.47
likelihood_ratio	7.52541
lr_df	4
lr_p_value	0.110594
mcfadden_r_squared	0.00464262
studytime_coefficient	0.0512295
n_cases	649

Ordinal Model Parameters

term	estimate	se	z	p_value
studytime	0.0512295	0.094295	0.543289	0.586931
age	0.0022178	0.064971	0.0341353	0.972769
failures	-0.217425	0.13587	-1.60025	0.109544
sex_male	0.348635	0.154666	2.25411	0.0241891
1/2	-3.13926	1.11061	-2.82662	0.00470424
2/3	-0.115969	0.18736	-0.618961	0.535942
3/4	0.252866	0.0975814	2.59133	0.00956048
4/5	0.771313	0.0484654	15.9147	5.01e-57

Outcome Frequencies

response	frequency
1	22
2	29
3	101
4	317
5	180

Predicted Probabilities

P_famrel_1	P_famrel_2	P_famrel_3	P_famrel_4	P_famrel_5
0.0362065	0.0476446	0.165247	0.493435	0.257467
0.0362839	0.0477377	0.165492	0.493443	0.257043
0.0364394	0.0479243	0.165981	0.493458	0.256197
0.0346827	0.045807	0.160365	0.493065	0.26608
0.0363616	0.0478309	0.165737	0.493451	0.25662
0.0259362	0.034984	0.129447	0.481133	0.3285
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0.0362839	0.0477377	0.165492	0.493443	0.257043
0.0259923	0.035055	0.129662	0.48128	0.328011
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0.0364394	0.0479243	0.165981	0.493458	0.256197
0.0346827	0.045807	0.160365	0.493065	0.26608
0.0273212	0.0367294	0.134691	0.484439	0.31682
0.0259923	0.035055	0.129662	0.48128	0.328011
0.0247263	0.0334496	0.124752	0.477672	0.339401
0.0381999	0.0500277	0.171428	0.493375	0.246969
0.0346085	0.0457171	0.160123	0.493037	0.266514
0.0363616	0.0478309	0.165737	0.493451	0.25662
0.0509532	0.064721	0.205946	0.483132	0.195248
0.0272623	0.0366554	0.134471	0.484311	0.3173
0.0259923	0.035055	0.129662	0.48128	0.328011
0.0273212	0.0367294	0.134691	0.484439	0.31682
0.0259362	0.034984	0.129447	0.481133	0.3285
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0.0346827	0.045807	0.160365	0.493065	0.26608
0.0381999	0.0500277	0.171428	0.493375	0.246969