Polyserial Correlation Analysis

Continuous variable: G3
Ordinal variable: studytime
Valid n: 649

Polyserial rho (MLE): 0.285080
Approximate standard error: 0.039445
Wald z statistic: 7.227193
Two-tailed p-value: 4.93079e-13
95% CI: [0.212785, 0.354269]
Interpretation: weak positive association.

Results table:

continuous_variable	ordinal_variable	n	number_of_ordinal_categories	polyserial_correlation_mle	standard_error_observed_information	z_statistic	p_value_two_tailed_wald	ci95_lower_fisher_approx	ci95_upper_fisher_approx	log_likelihood_rho_hat	log_likelihood_null_rho_0	lr_chi_square_vs_zero	lr_p_value_vs_zero	normal_score_pearson_approximation	ordinary_pearson_with_category_codes	spearman_rank_correlation	decision_alpha_0_05	method_note
continuous_x	ordinal_y	649	4	0.28508	0.039445	7.227193	4.930790e-13	0.212785	0.354269	-731.870177	-754.080304	44.420253	2.649321e-11	0.255121	0.249789	0.274712	Reject H0: evidence of association	Polyserial MLE using ordinal thresholds from marginal proportions and a latent-normal ordinal response model.

Ordinal thresholds:

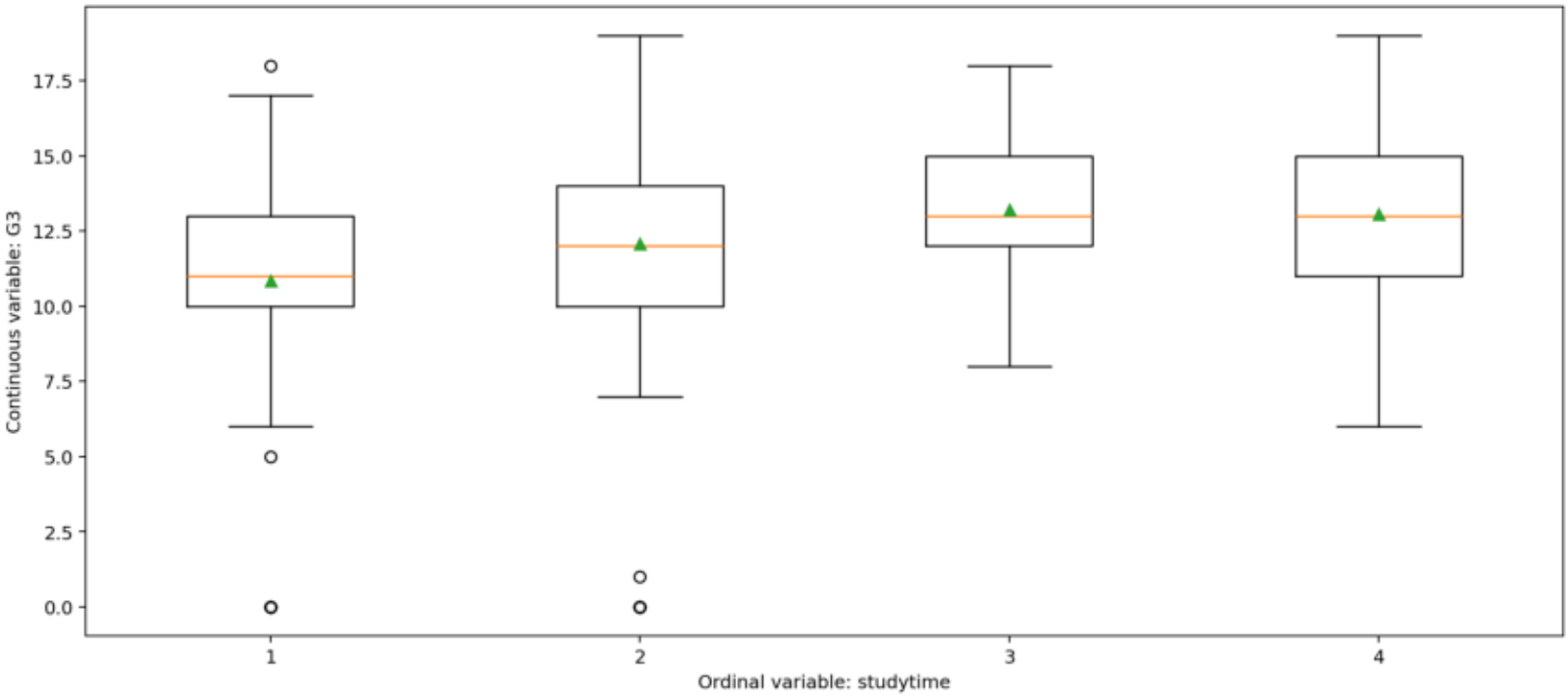
ordinal_category	count	proportion	cumulative_count	cumulative_proportion_lower	cumulative_proportion_upper	threshold_lower	threshold_upper	expected_latent_score
1	212	0.326656	212	0.000000	0.326656	-inf	-0.449165	-1.104103
2	305	0.469954	517	0.326656	0.796610	-0.449165	0.829574	0.165693
3	97	0.149461	614	0.796610	0.946071	0.829574	1.607895	1.159297
4	35	0.053929	649	0.946071	1.000000	1.607895	inf	2.030909

Descriptive statistics by ordinal category:

ordinal_category	n	mean_continuous	standard_deviation	standard_error	minimum	maximum	mean_ci95_lower	mean_ci95_upper
1	212	10.844340	3.218624	0.221056	0.0	18.0	10.411070	11.277609
2	305	12.091803	3.243125	0.185701	0.0	19.0	11.727830	12.455777
3	97	13.226804	2.502104	0.254050	8.0	18.0	12.728866	13.724742
4	35	13.057143	3.038410	0.513585	6.0	19.0	12.050516	14.063769

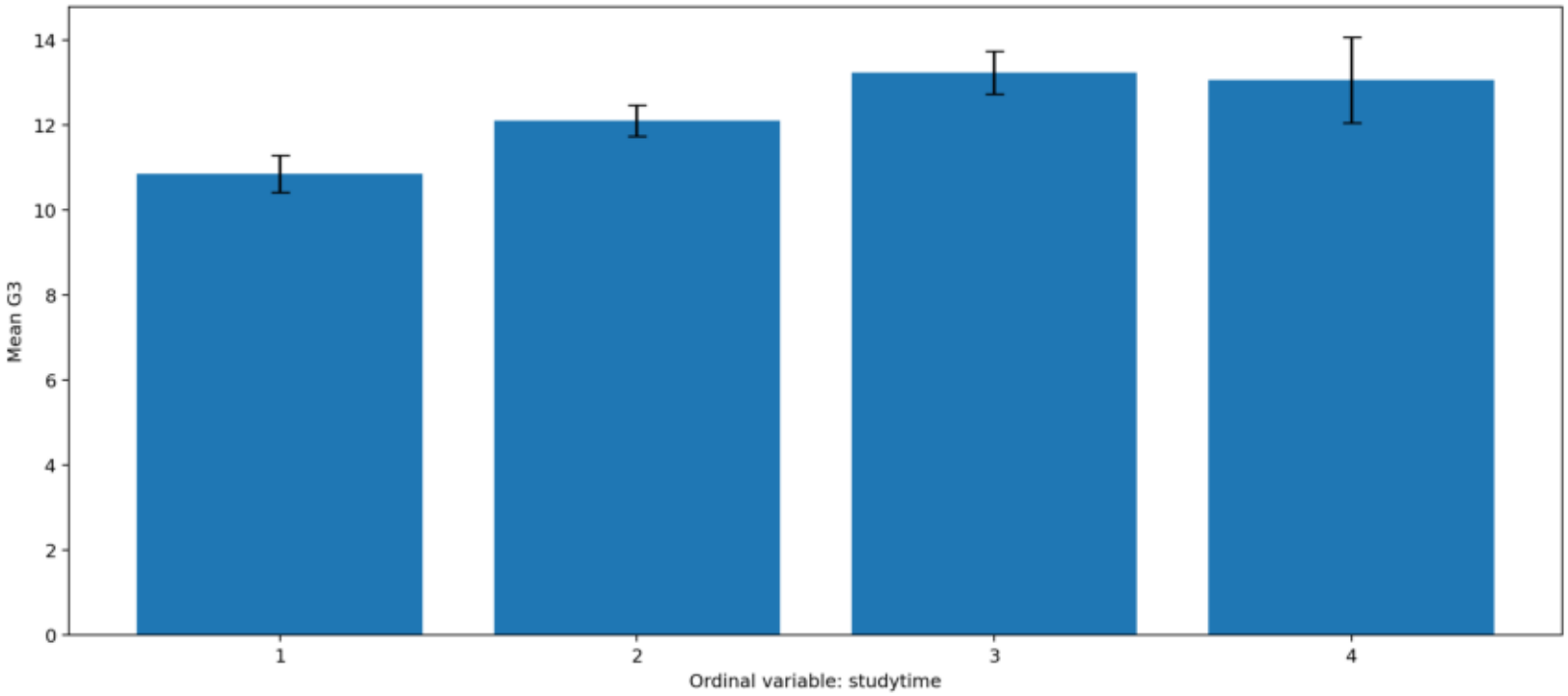
Polyserial Correlation: Continuous Distribution by Ordinal Category

The boxplots show whether the continuous score tends to rise or fall across ordered categories.



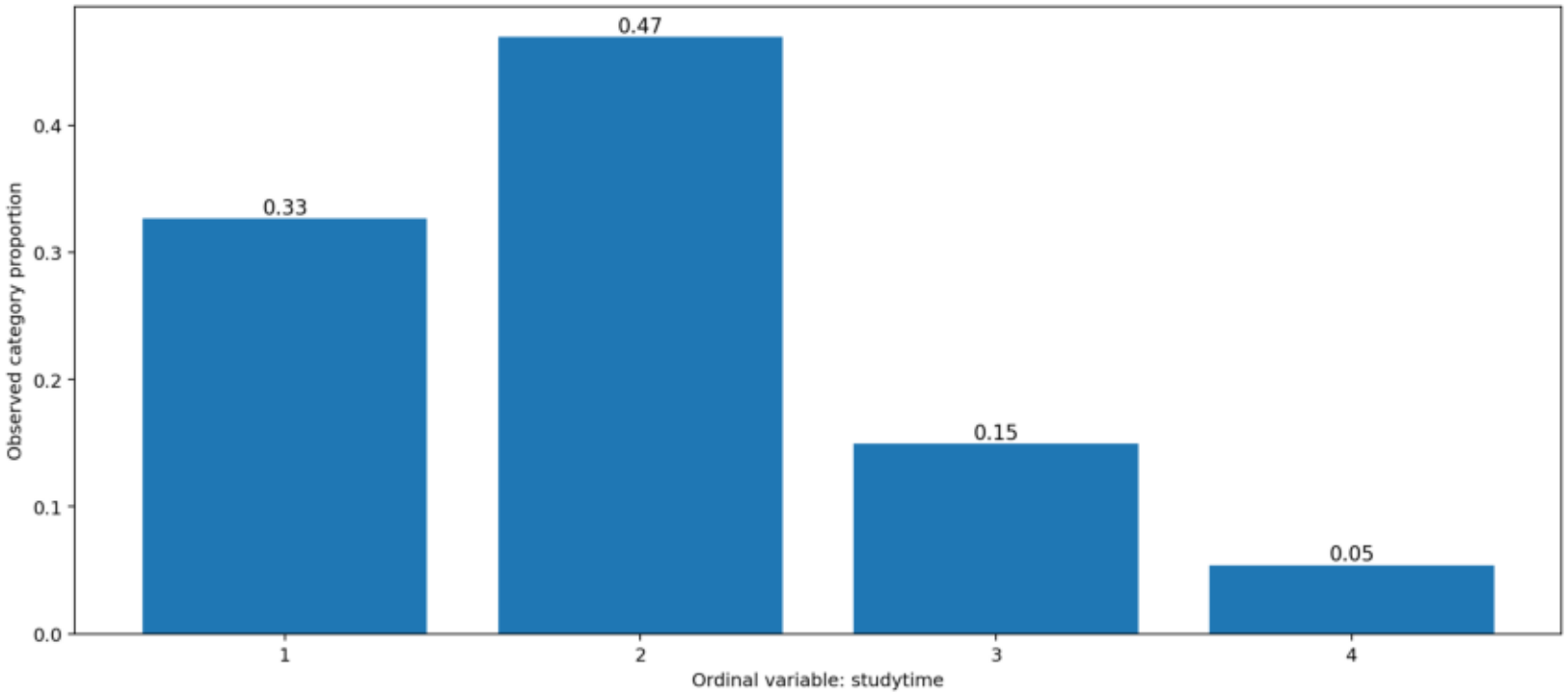
Polyserial Correlation: Mean Continuous Score by Ordinal Category

A monotonic pattern supports the direction of the estimated polyserial correlation.



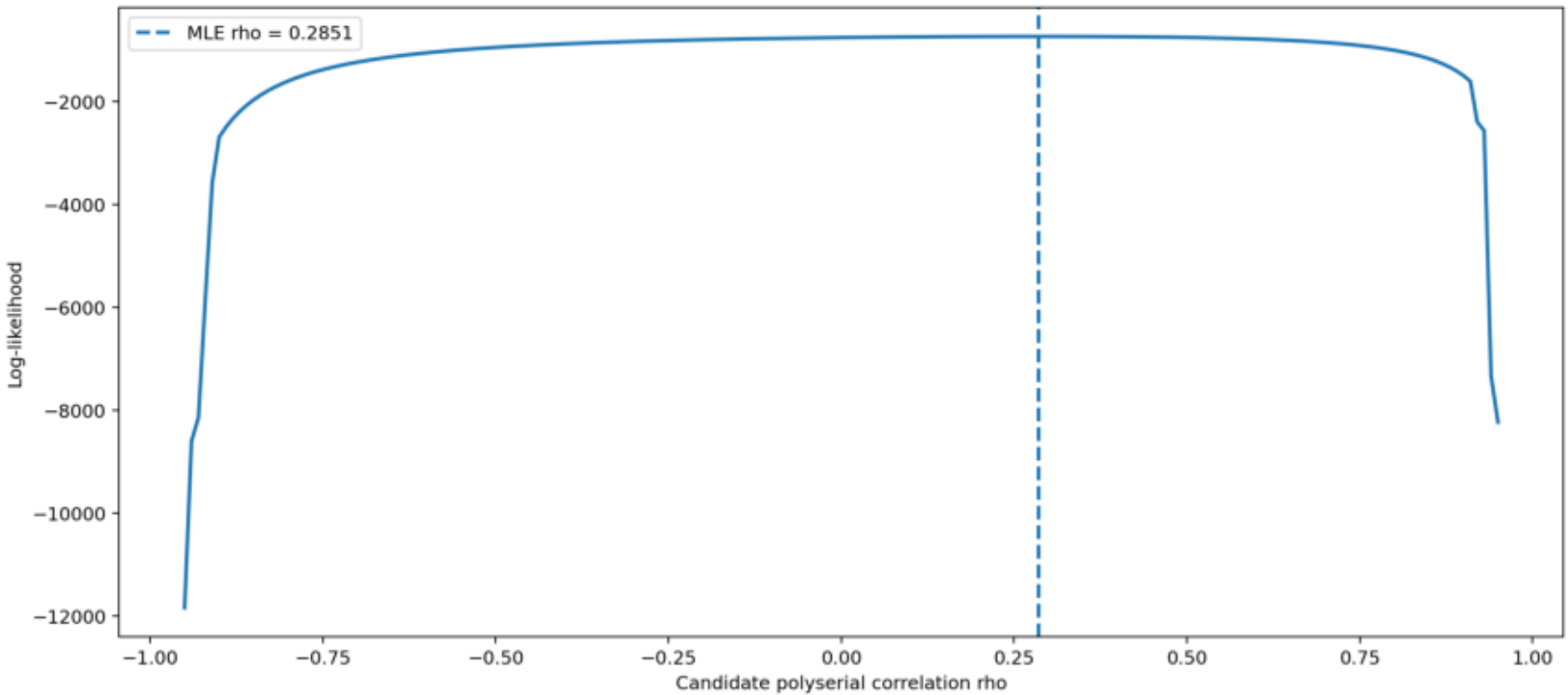
Polyserial Correlation: Ordinal Category Proportions

Category proportions determine the latent normal thresholds used in the polyserial model.



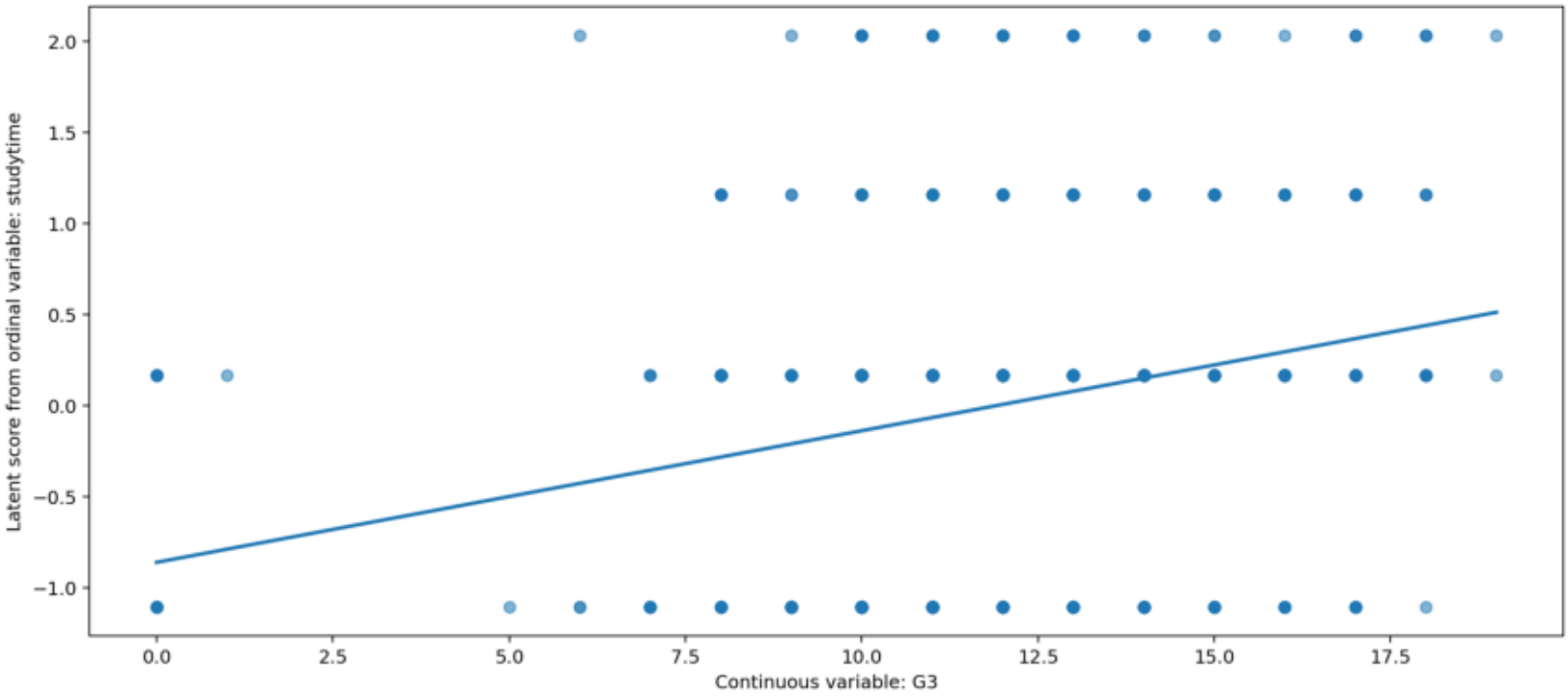
Polyserial Correlation: Log-likelihood Curve

The maximum of the curve is the maximum-likelihood estimate of the polyserial correlation.



Polyserial Correlation: Continuous Score vs Latent Ordinal Score

The fitted line summarizes the positive/negative direction implied by rho = 0.2851.



Polyserial Correlation Compared with Simpler Correlations

Polyserial correlation treats the ordinal variable as a categorized latent continuous variable.