

Polyserial Correlation Analysis

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

Polyserial rho (MLE): 0.28508
 Approximate standard error: 0.039445
 Wald z statistic: 7.227194
 Two-tailed p-value: 4.93076e-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
continuous_x	ordinal_y	649	4	0.2850795
standard_error_observed_information	z_statistic	p_value_two_tailed_wald	ci95_lower_fisher_approx	
0.0394454	7.227194	4.93076e-13	0.2127855	
ci95_upper_fisher_approx	log_likelihood_rho_hat	log_likelihood_null_rho_0	lr_chi_square_vs_zero	
0.3542694	-731.8702	-754.0803	44.42025	
lr_p_value_vs_zero	normal_score_pearson_approximation	ordinary_pearson_with_category_codes		
2.649321e-11	0.2551205	0.2497887		
spearman_rank_correlation	decision_alpha_0_05			
0.2747118	Reject H0: evidence of association			

method_note

Polyserial MLE using ordinal thresholds from marginal proportions and a latent-normal ordinal response model.

Ordinal thresholds:

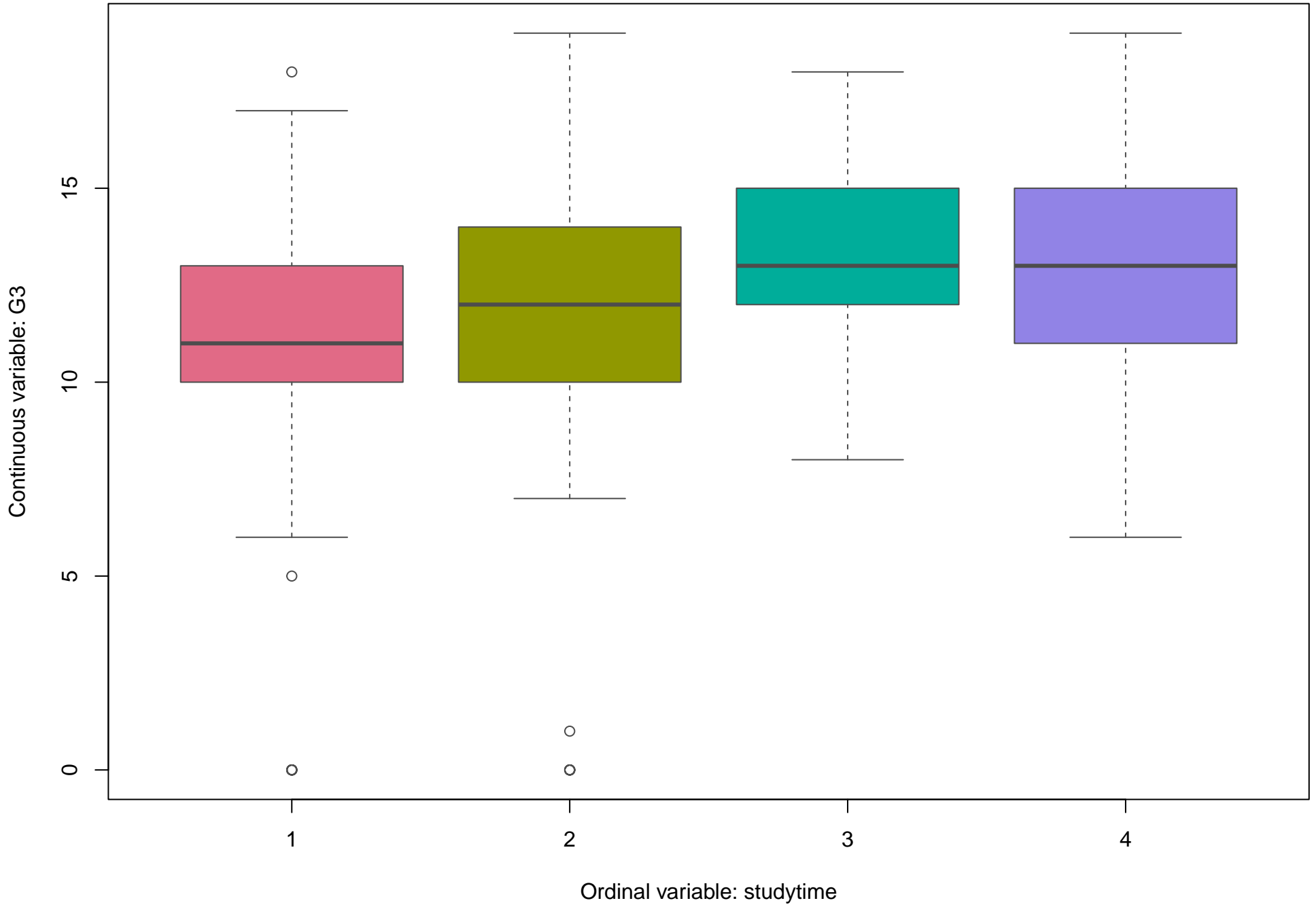
ordinal_category	count	proportion	cumulative_count	cumulative_proportion_lower	cumulative_proportion_upper
1	212	0.32665639	212	0.0000000	0.3266564
2	305	0.46995378	517	0.3266564	0.7966102
3	97	0.14946071	614	0.7966102	0.9460709
4	35	0.05392912	649	0.9460709	1.0000000
threshold_lower	threshold_upper	expected_latent_score			
-Inf	-0.4491648	-1.1041032			
-0.4491648	0.8295740	0.1656928			
0.8295740	1.6078947	1.1592966			
1.6078947	Inf	2.0309089			

Descriptive statistics by ordinal category:

ordinal_category	n	mean_continuous	standard_deviation	standard_error	minimum	maximum	mean_ci95_lower
1	212	10.84434	3.218624	0.2210560	0	18	10.41107
2	305	12.09180	3.243125	0.1857008	0	19	11.72783
3	97	13.22680	2.502104	0.2540502	8	18	12.72887
4	35	13.05714	3.038410	0.5135850	6	19	12.05052
mean_ci95_upper							
		11.27761					
		12.45578					
		13.72474					
		14.06377					

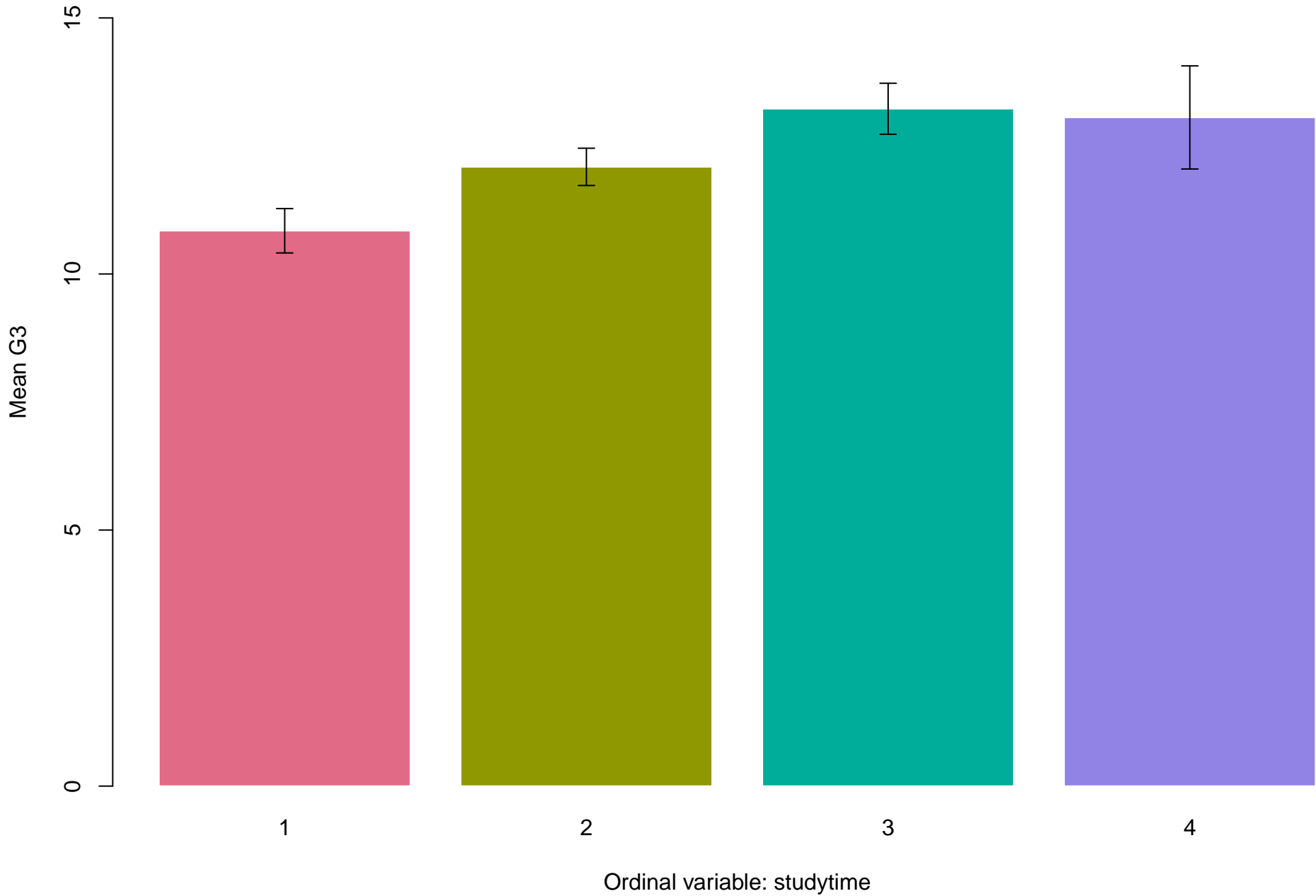
Polyserial Correlation: Colorful Continuous Distribution by Category

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



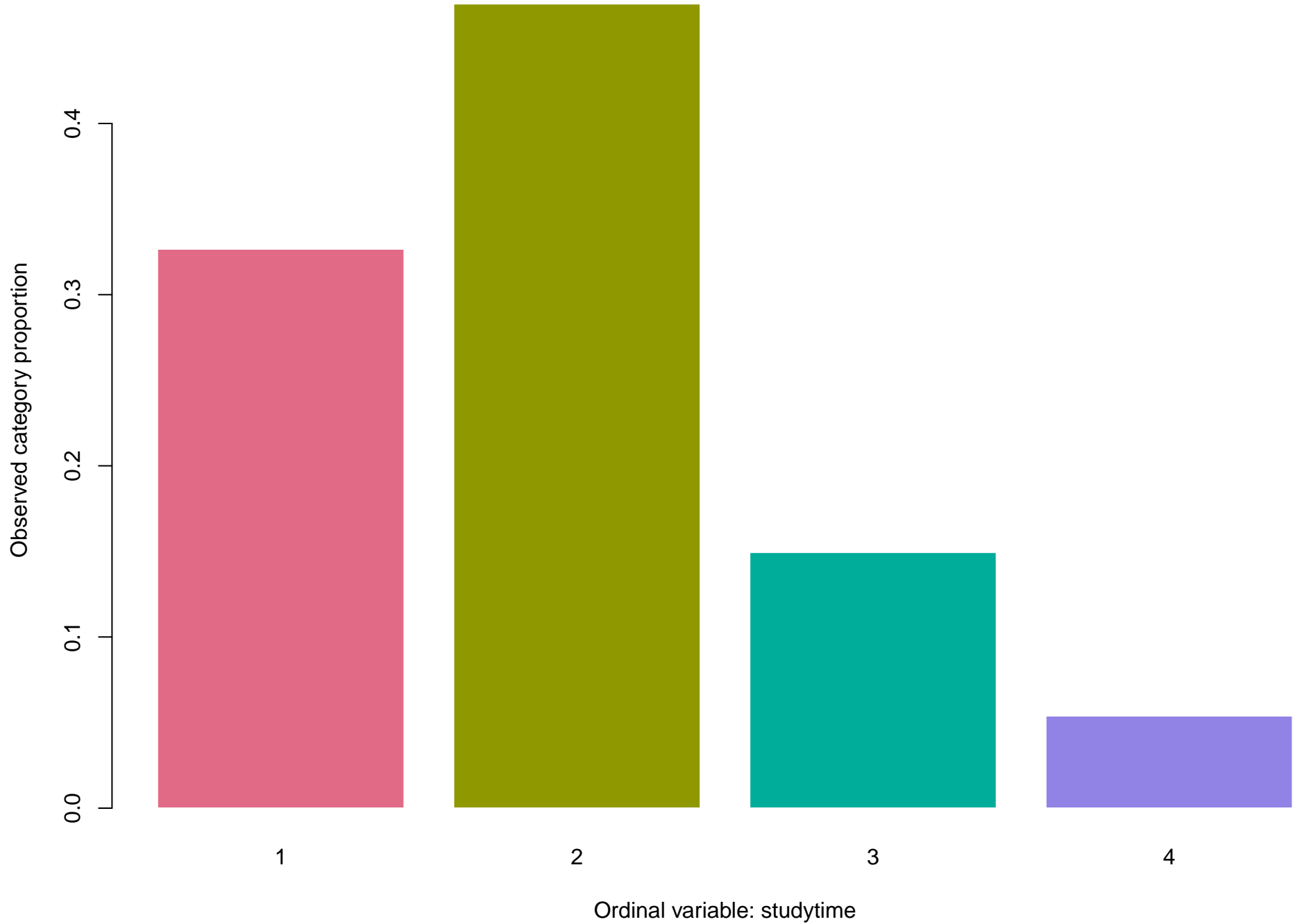
Polyserial Correlation: Colorful Mean Score by Ordinal Category

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



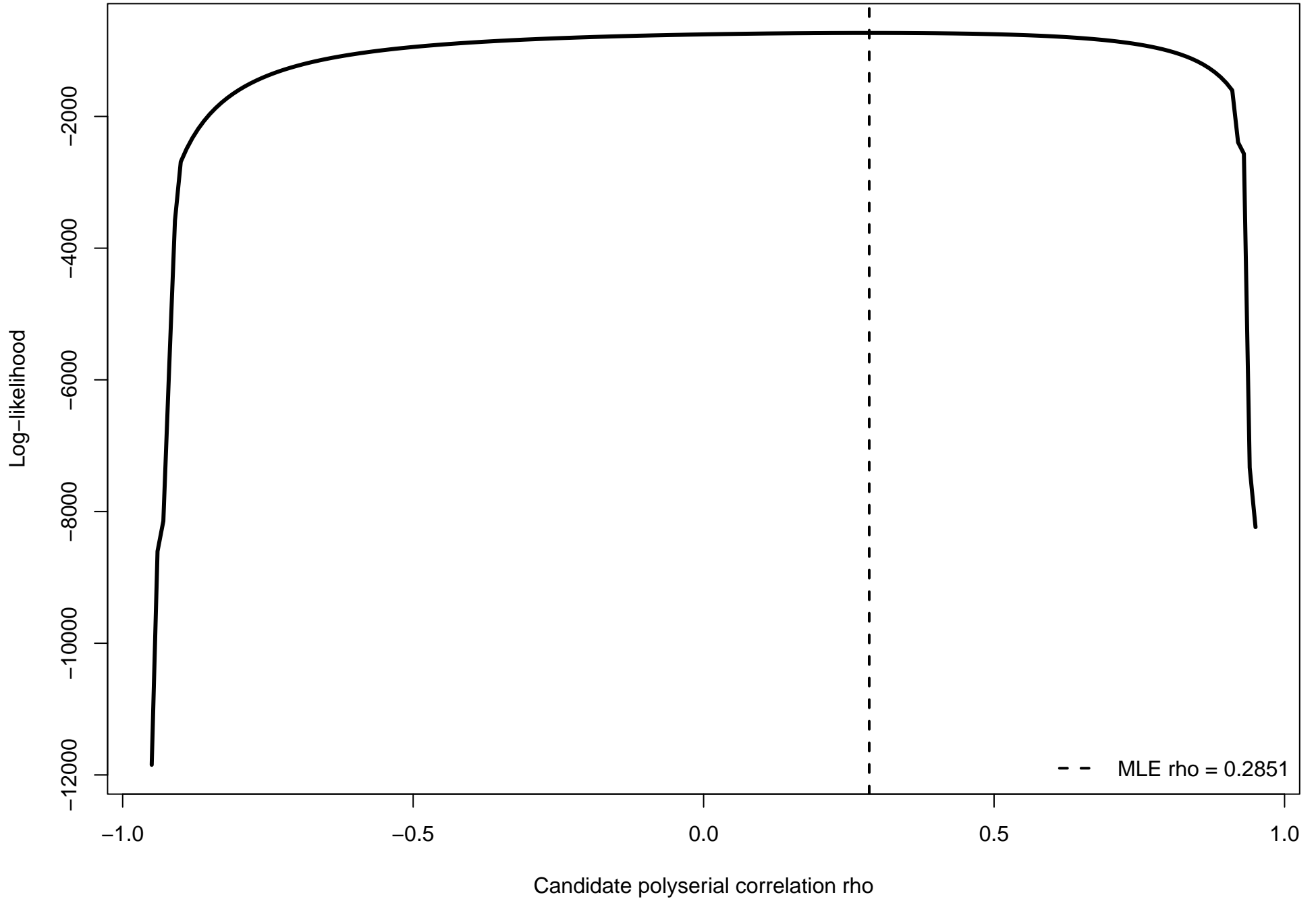
Polyserial Correlation: Colorful Category Proportions

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



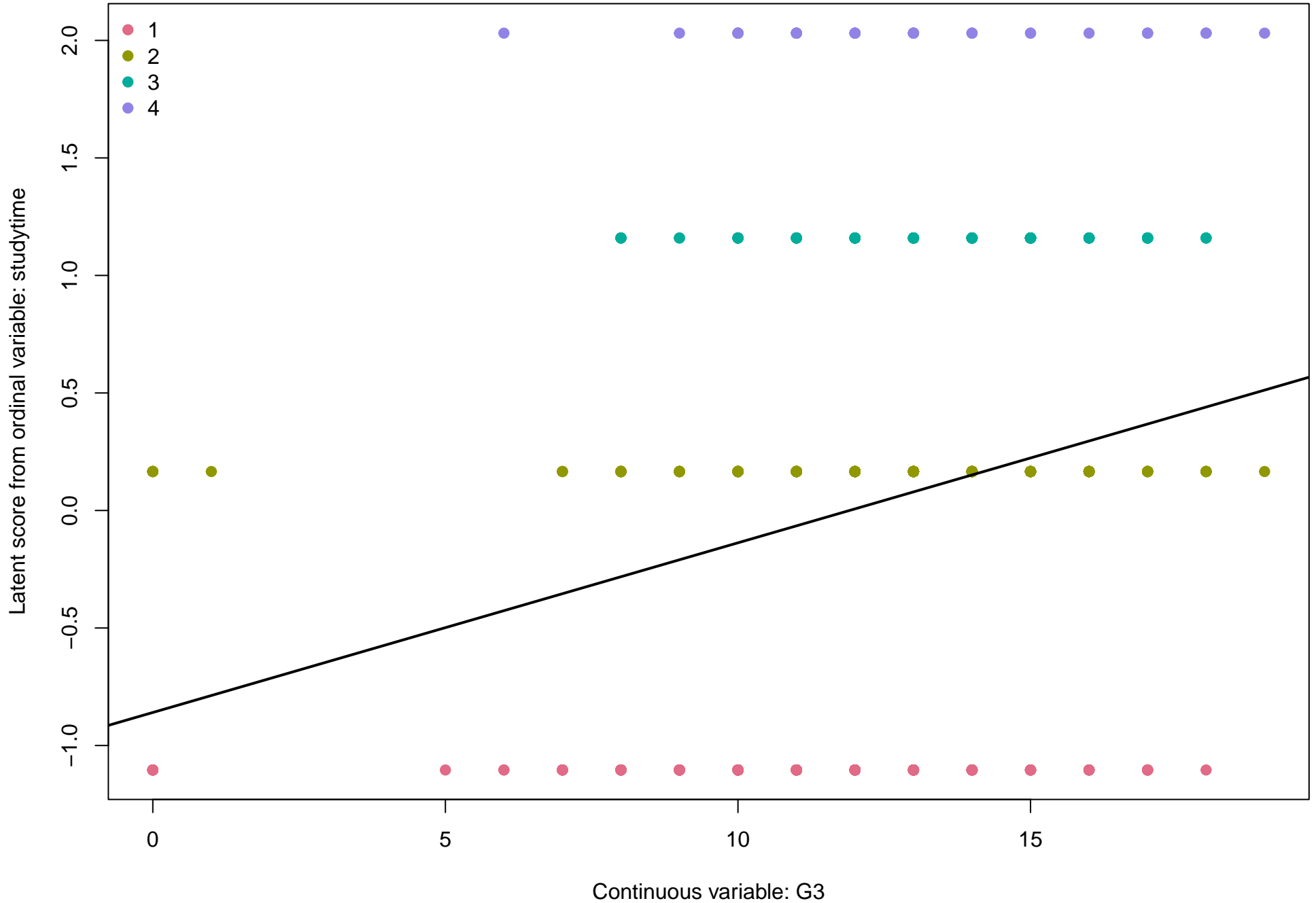
Polyserial Correlation: Colorful Log-likelihood Curve

The curve reaches its maximum at the maximum-likelihood polyserial estimate.



Polyserial Correlation: Colorful Continuous Score vs Latent Ordinal Score

The fitted line summarizes the direction implied by $\rho = 0.2851$



Polyserial Correlation Compared with Simpler Correlations

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

