

One Way MANOVA Report

Model:

cbind(G1, G2, G3) ~ studytime

Pillai multivariate test:

source	Df	Pillai	approx F	num Df	den Df	Pr(>F)
studytime	3	0.08464499	6.242352	9	1935	9.861212e-09
Residuals	645	NA	NA	NA	NA	NA

Wilks multivariate test:

source	Df	Wilks	approx F	num Df	den Df	Pr(>F)
studytime	3	0.9160144	6.38227	9	1565.044	6.196767e-09
Residuals	645	NA	NA	NA	NA	NA

Hotelling-Lawley multivariate test:

source	Df	Hotelling-Lawley	approx F	num Df	den Df	Pr(>F)
studytime	3	0.09096733	6.485633	9	1925	3.865519e-09
Residuals	645	NA	NA	NA	NA	NA

Roy multivariate test:

source	Df	Roy	approx F	num Df	den Df	Pr(>F)
studytime	3	0.0824567	17.72819	3	645	4.556784e-11
Residuals	645	NA	NA	NA	NA	NA

Group summary:

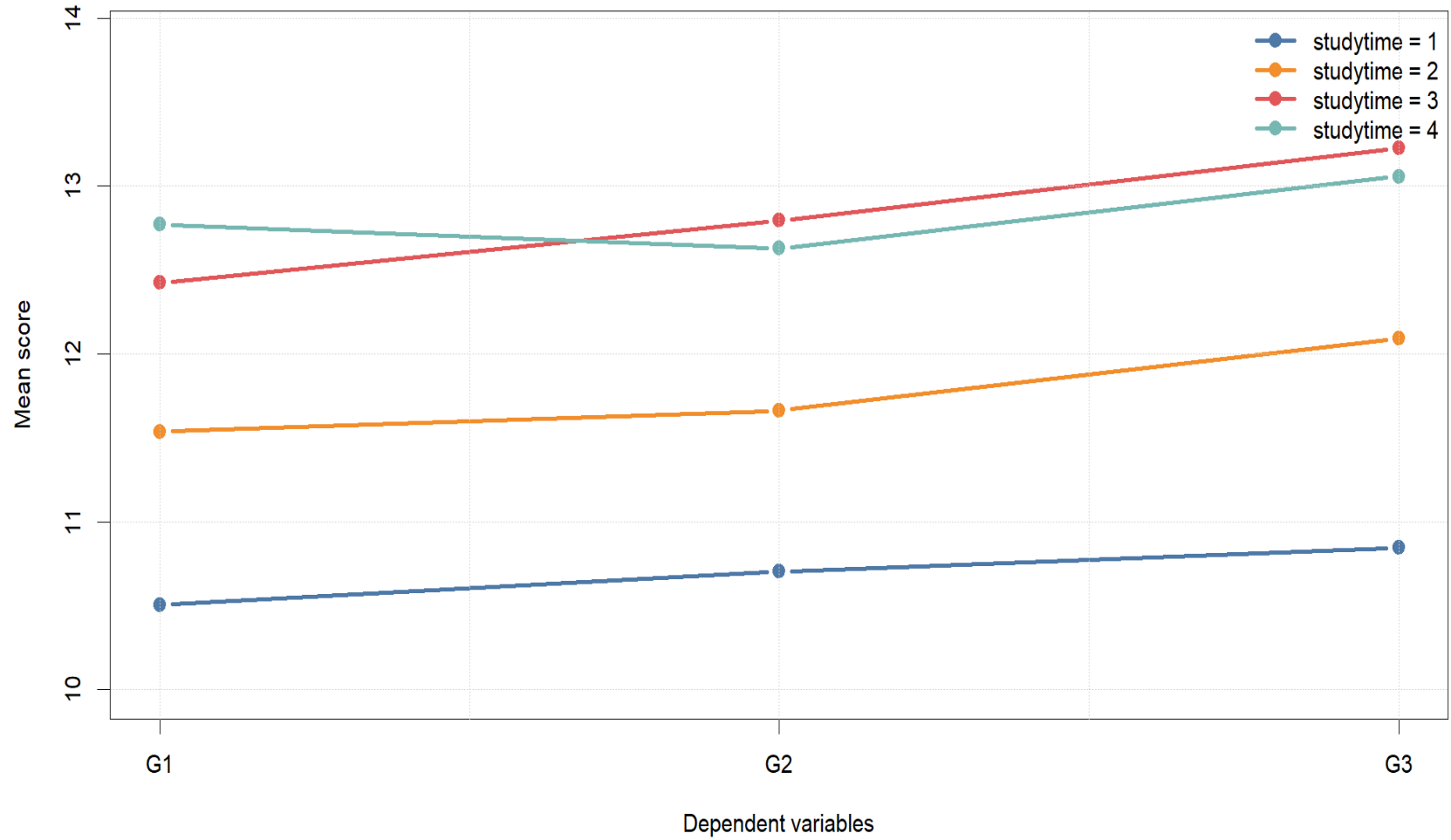
factor	group	outcome	n	mean	median	standard_deviation
studytime	1	G1	212	10.50472	10	2.565719
studytime	1	G2	212	10.70283	11	2.696565
studytime	1	G3	212	10.84434	11	3.218624
studytime	2	G1	305	11.53770	12	2.737301
studytime	2	G2	305	11.66230	12	2.982524
studytime	2	G3	305	12.09180	12	3.243125
studytime	3	G1	97	12.42268	13	2.457281
studytime	3	G2	97	12.79381	13	2.461953
studytime	3	G3	97	13.22680	13	2.502104
studytime	4	G1	35	12.77143	13	2.941445
studytime	4	G2	35	12.62857	12	3.135055
studytime	4	G3	35	13.05714	13	3.038410
variance minimum maximum						
6.582916	4	18				
7.271461	0	18				
10.359541	0	18				
7.492817	0	18				
8.895449	0	18				
10.517860	0	19				
6.038230	7	19				
6.061211	7	18				
6.260524	8	18				
8.652101	5	18				
9.828571	6	19				
9.231933	6	19				

Univariate ANOVA follow-up:

outcome	source	df	sum_sq	mean_sq	f_value	p_value
G1	studytime	3	342.9862	114.328746	16.24040	3.467159e-10
G1	Residuals	645	4540.6532	7.039772	NA	NA
G2	studytime	3	346.5177	115.505893	14.45352	4.016781e-09
G2	Residuals	645	5154.5424	7.991539	NA	NA
G3	studytime	3	465.0778	155.025942	15.87627	5.705728e-10
G3	Residuals	645	6298.1887	9.764634	NA	NA
eta_squared partial_eta_squared omega_squared decision_alpha_0_05						
0.07023169		NA	NA	NA	NA	Reject H0
0.92976831		NA	NA	NA	NA	Fail to reject H0
0.06299107		NA	NA	NA	NA	Reject H0

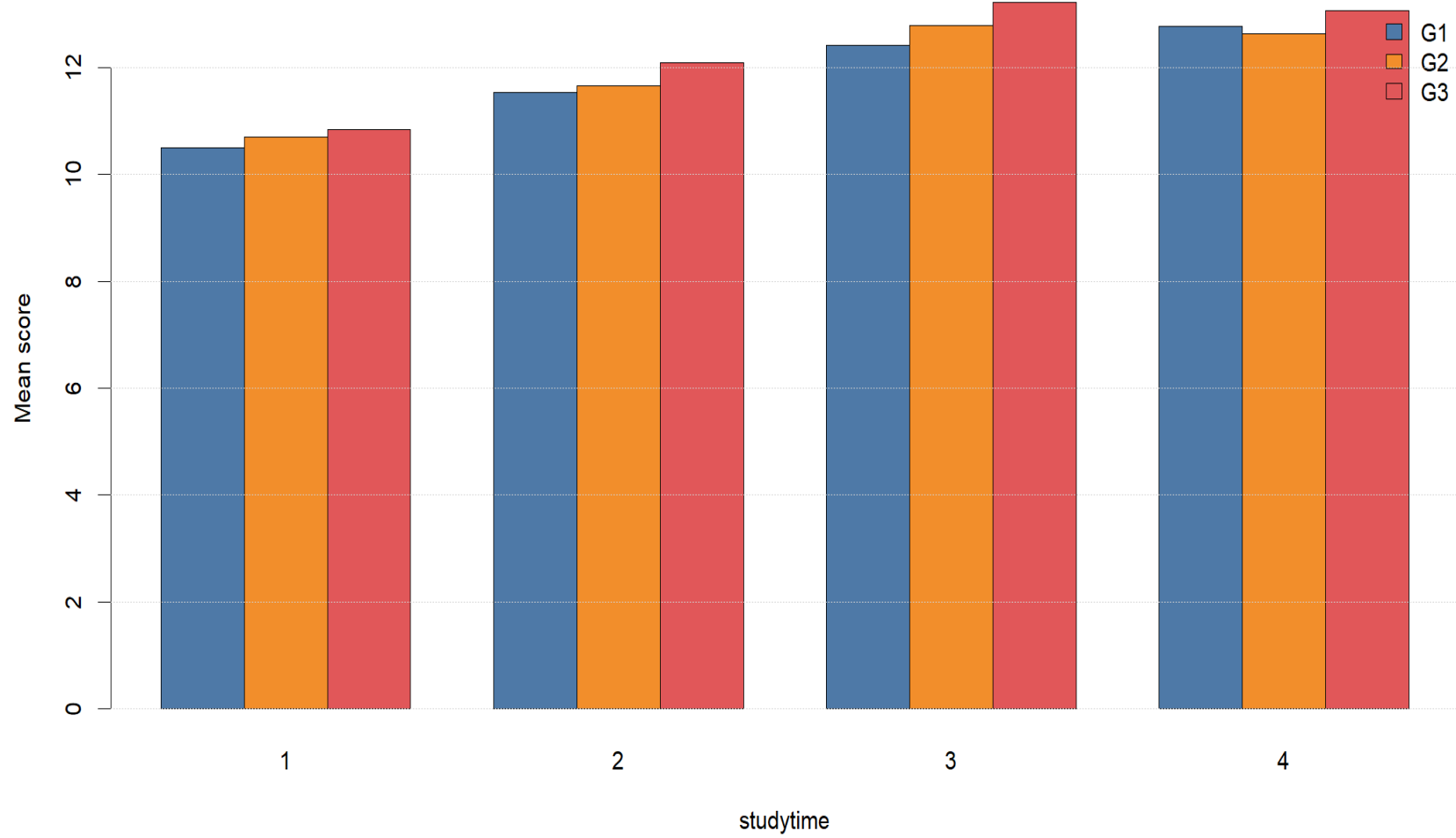
One Way MANOVA: Mean Profile Across Dependent Variables

Raw mean profiles for G1, G2, G3 by studytime.



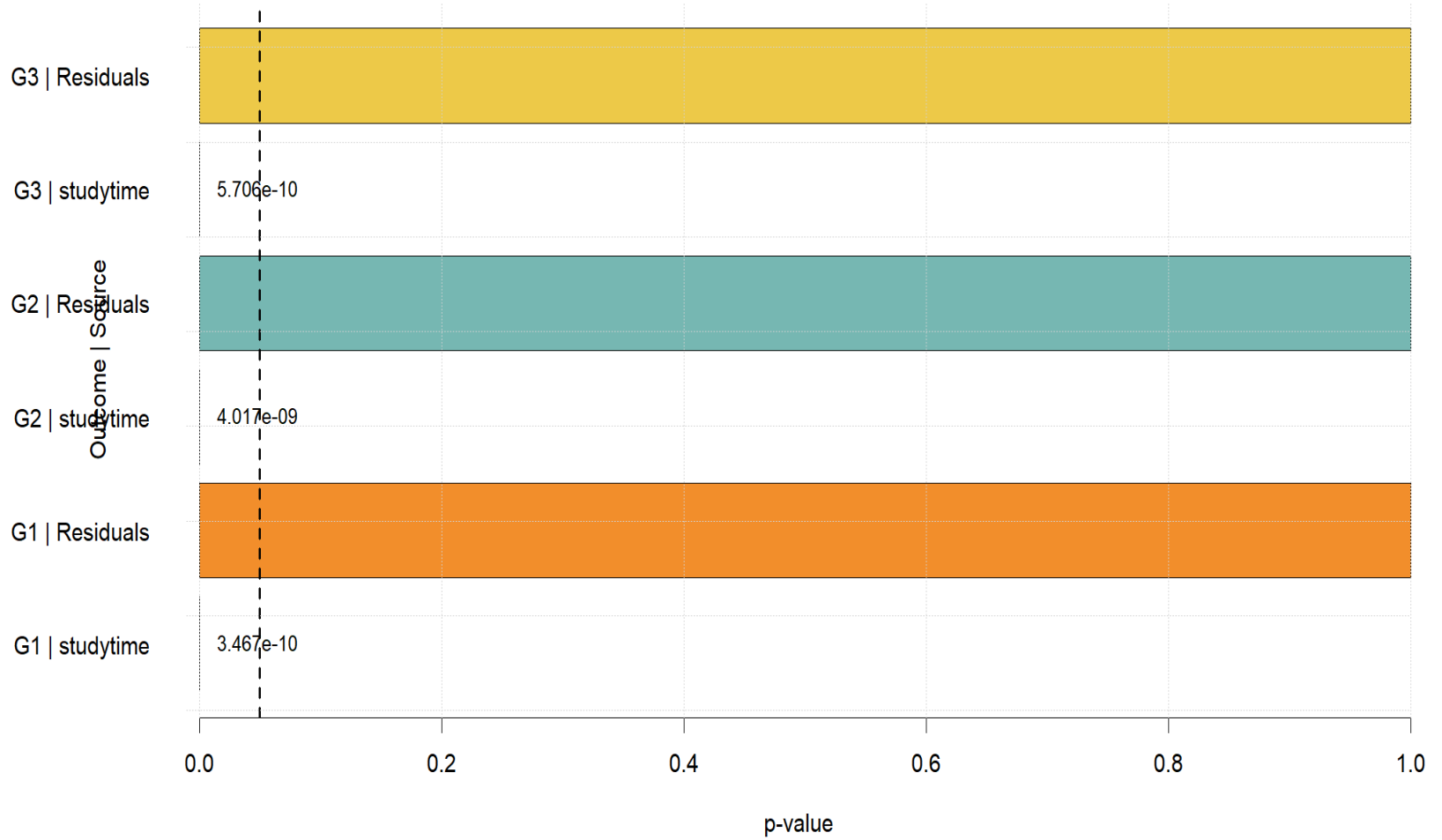
One Way MANOVA: Grouped Mean Comparison

Bars compare mean scores for each dependent variable across groups.



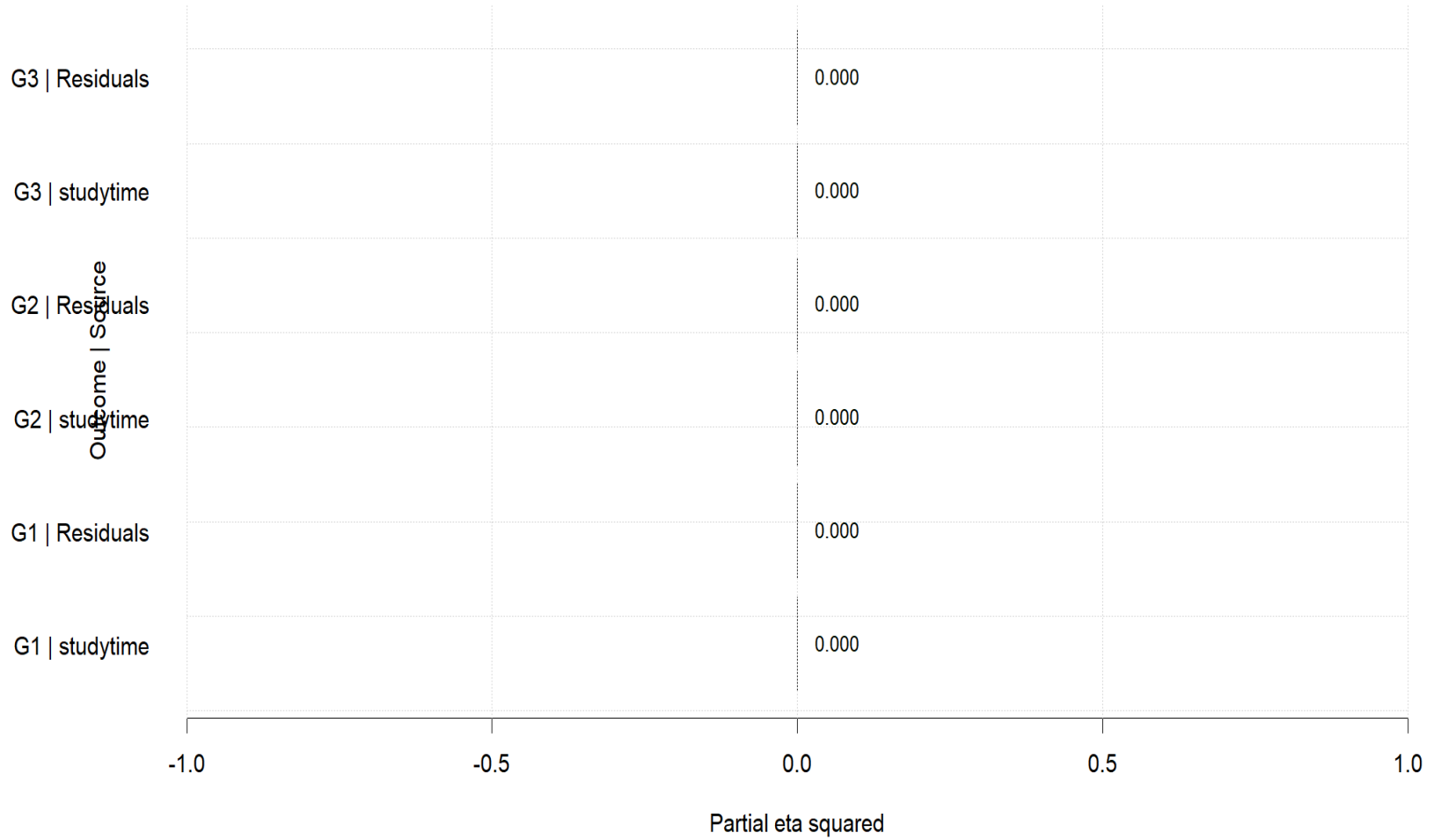
One Way MANOVA Follow-up: Univariate ANOVA p-values

Follow-up tests show which dependent variables contribute to the multivariate result.



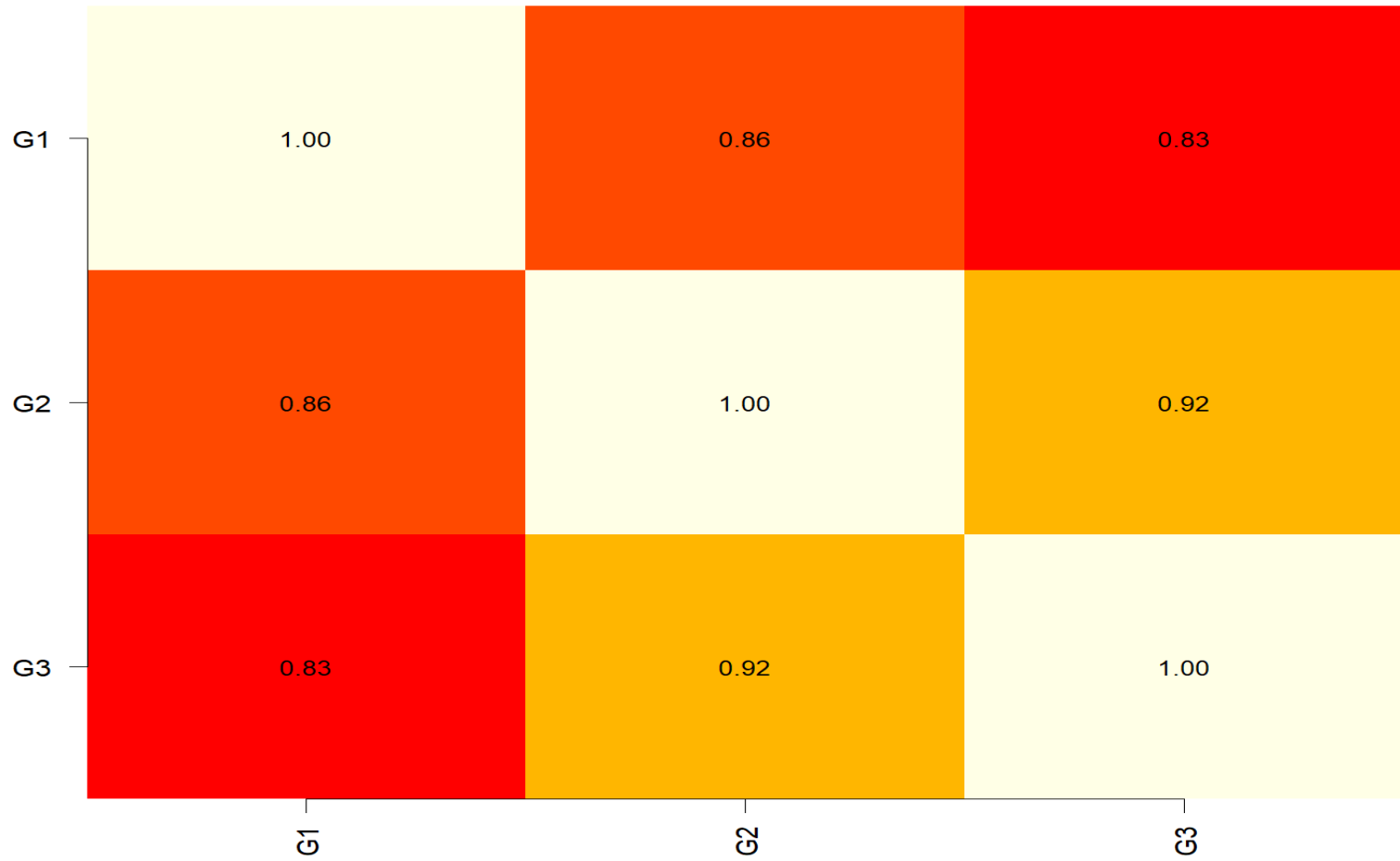
One Way MANOVA Follow-up: Effect Size Summary

Partial eta squared summarizes the size of each univariate group effect.



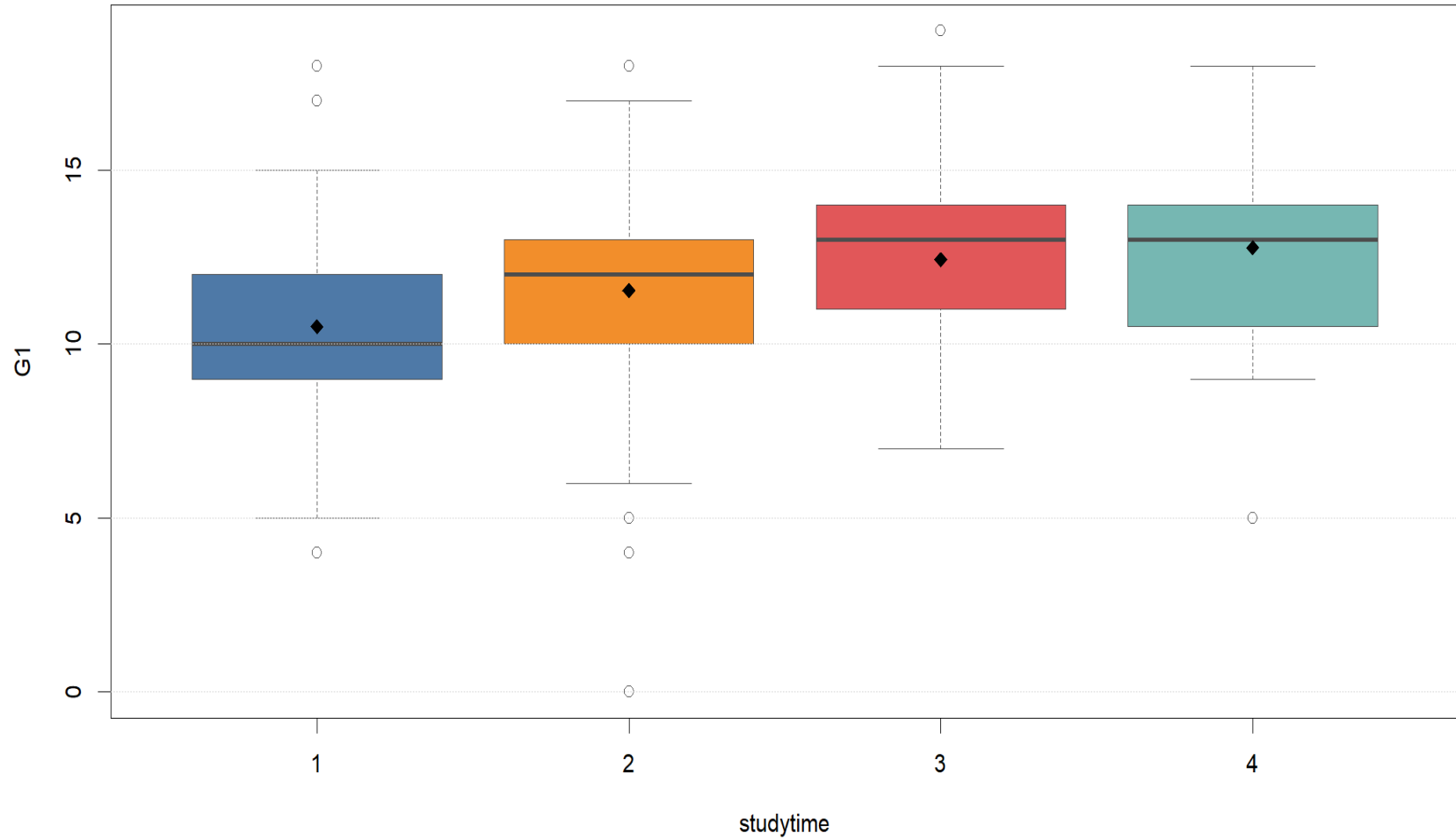
One Way MANOVA: Correlation Matrix of Dependent Variables

MANOVA is useful when dependent variables are conceptually related.



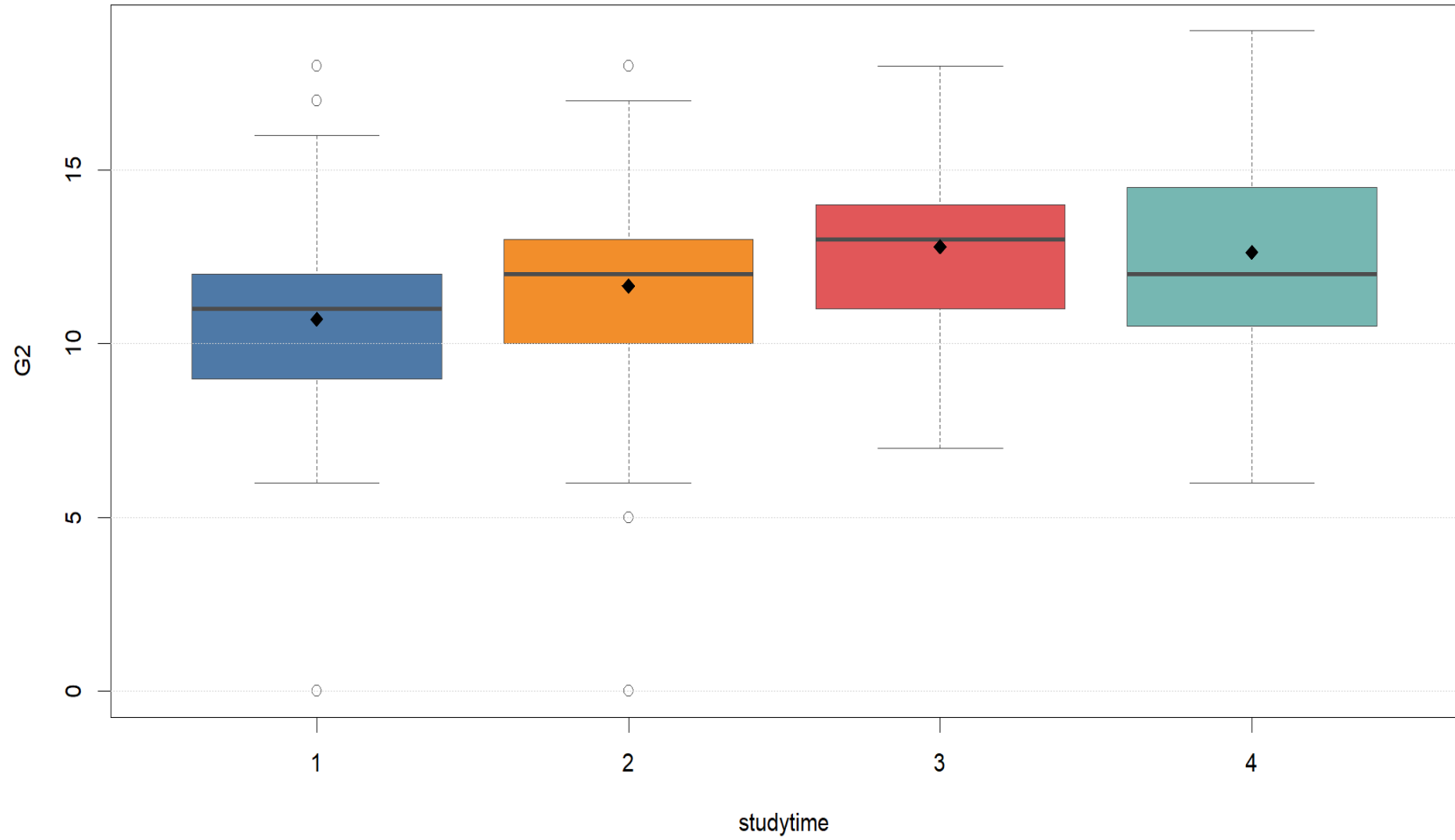
One Way MANOVA: G1 Distribution by studytime

Boxplots show median, spread, mean marker, and possible outliers for each group.



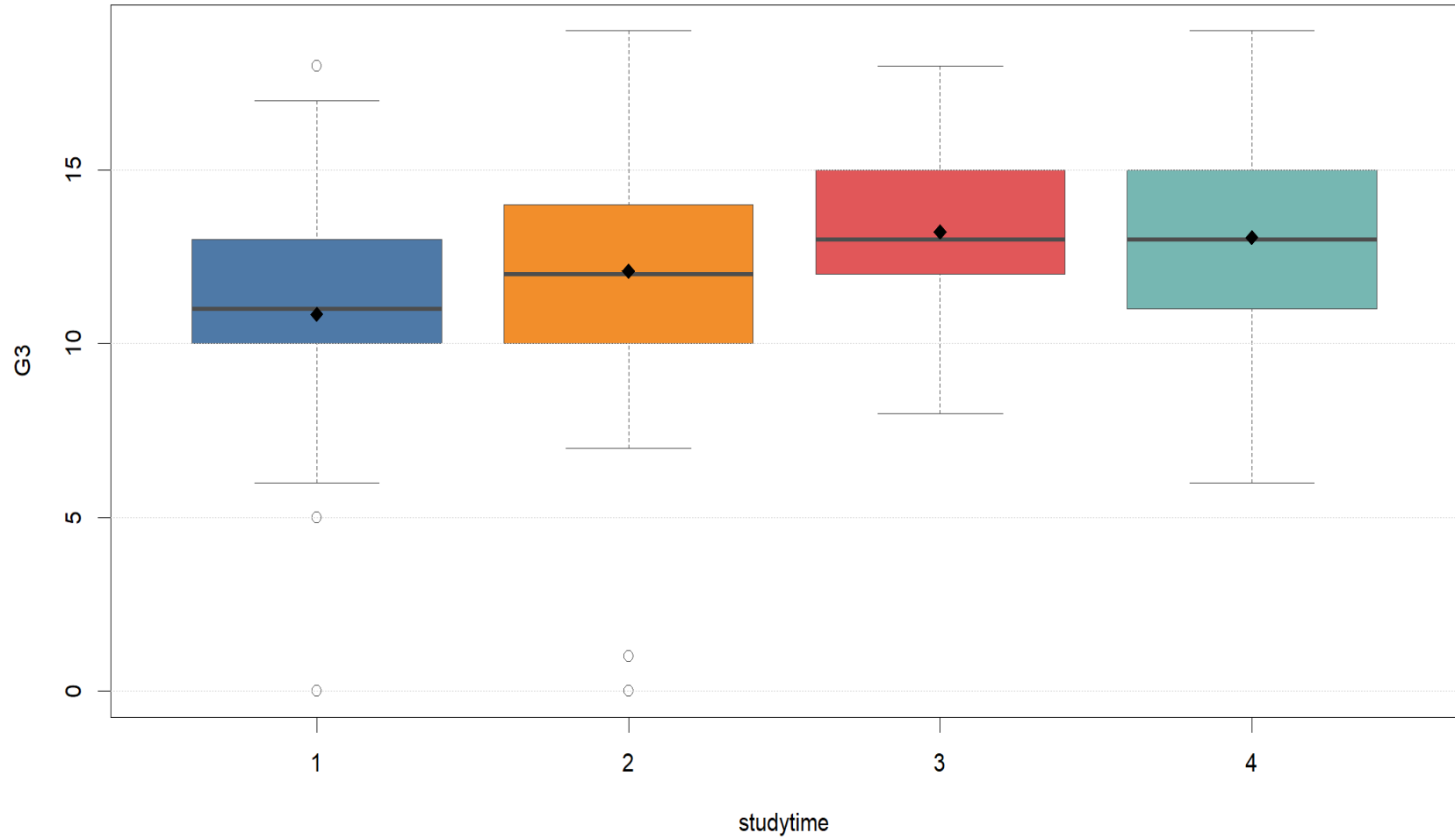
One Way MANOVA: G2 Distribution by studytime

Boxplots show median, spread, mean marker, and possible outliers for each group.



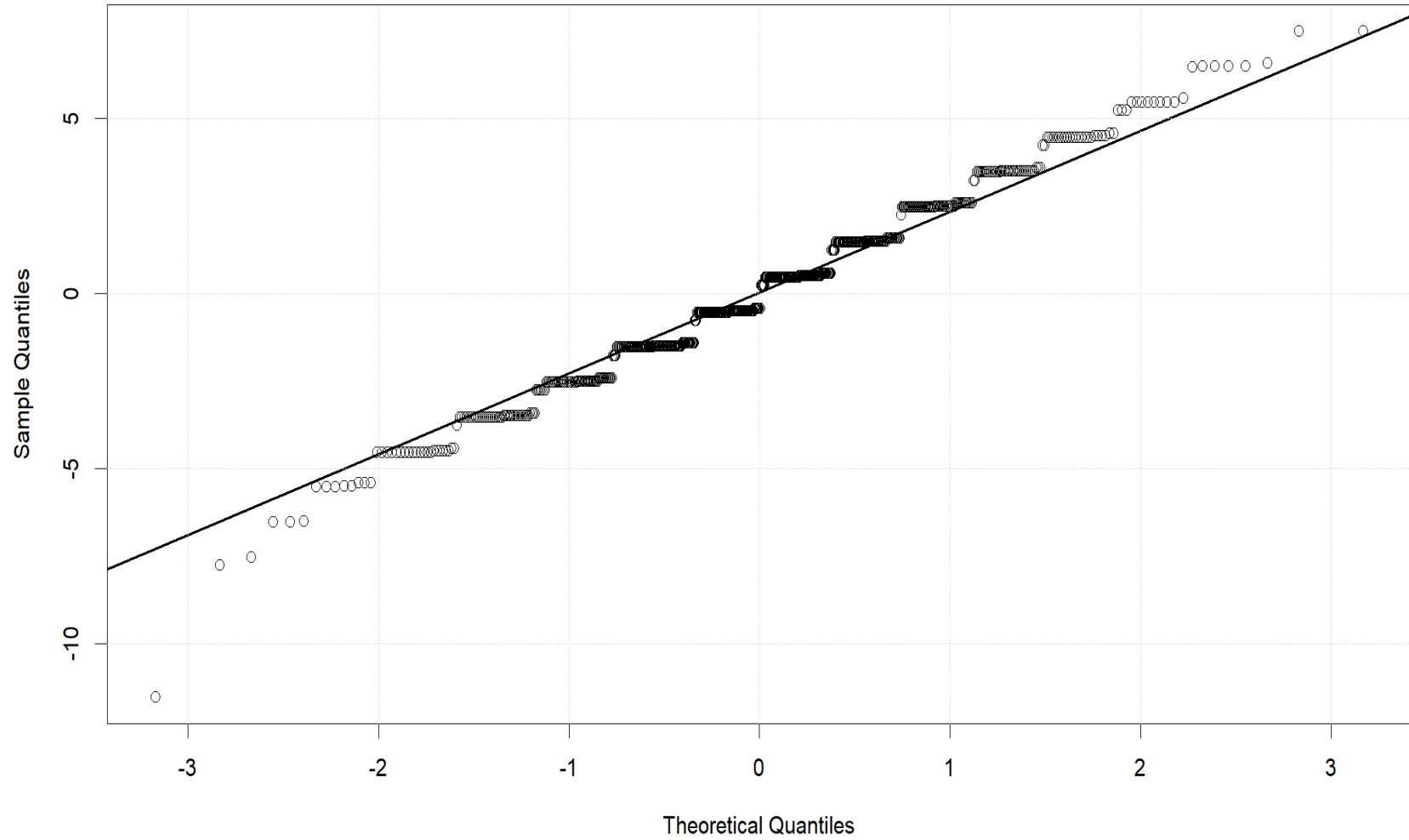
One Way MANOVA: G3 Distribution by studytime

Boxplots show median, spread, mean marker, and possible outliers for each group.



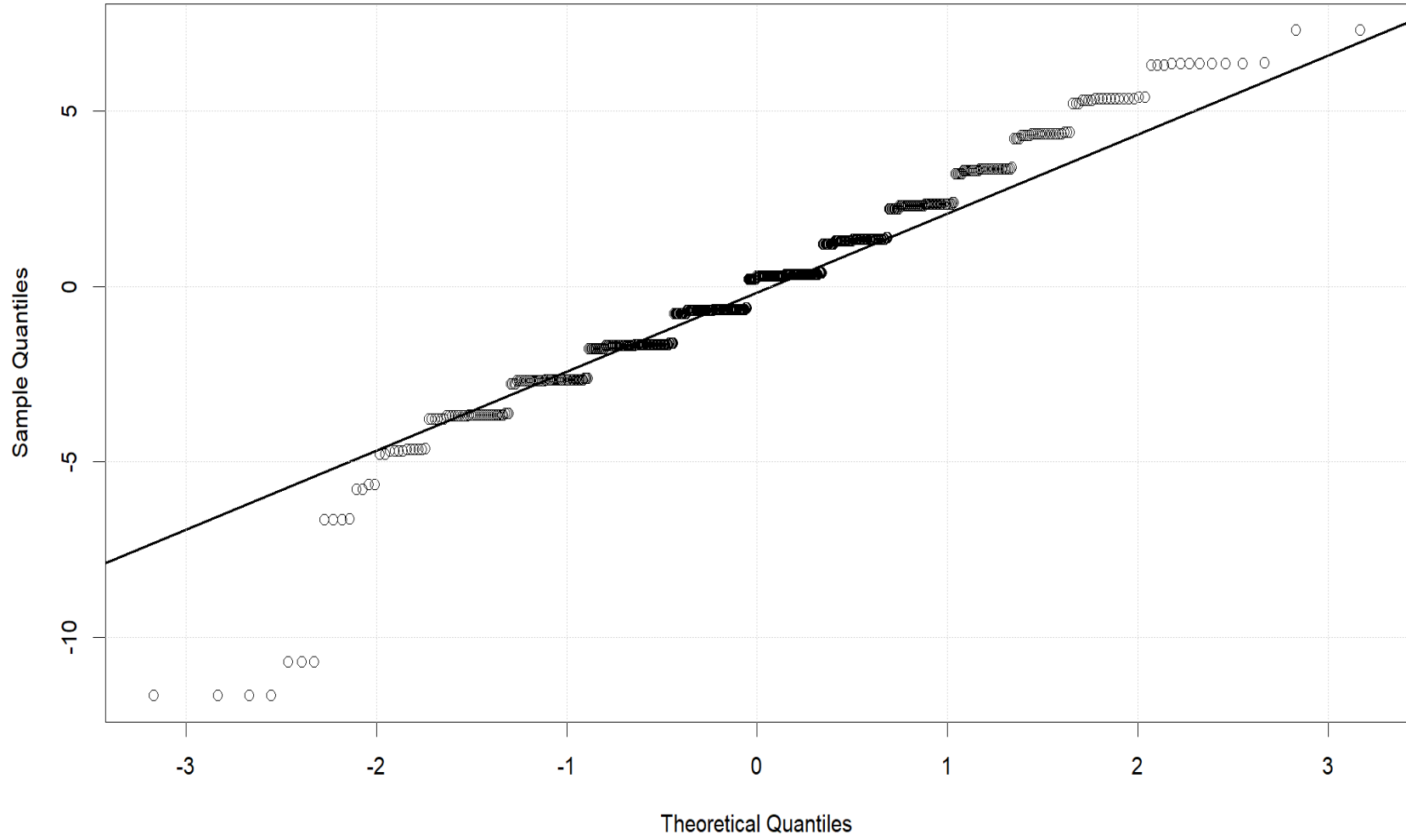
One Way MANOVA Follow-up Residual Q-Q Plot: G1

Points close to the reference line support approximate residual normality.



One Way MANOVA Follow-up Residual Q-Q Plot: G2

Points close to the reference line support approximate residual normality.



One Way MANOVA Follow-up Residual Q-Q Plot: G3

Points close to the reference line support approximate residual normality.

