

Correlation Matrix Analysis

Number of numeric variables: 16

Target variable for focused interpretation: G3

Variable summary:

variable	valid_n	missing_n	mean	standard_deviation	minimum	q1	median	q3	maximum
age	649	0	16.7442219	1.2181376	15	16	17	18	22
Medu	649	0	2.5146379	1.1345520	0	2	2	4	4
Fedu	649	0	2.3066256	1.0999309	0	1	2	3	4
traveltime	649	0	1.5685670	0.7486601	1	1	1	2	4
studytime	649	0	1.9306626	0.8295096	1	1	2	2	4
failures	649	0	0.2218798	0.5932351	0	0	0	0	3
famrel	649	0	3.9306626	0.9557169	1	4	4	5	5
freetime	649	0	3.1802773	1.0510926	1	3	3	4	5
goout	649	0	3.1848998	1.1757661	1	2	3	4	5
Dalc	649	0	1.5023112	0.9248344	1	1	1	2	5
Walc	649	0	2.2804314	1.2843800	1	1	2	3	5
health	649	0	3.5362096	1.4462591	1	2	4	5	5
absences	649	0	3.6594761	4.6407588	0	0	2	6	32
G1	649	0	11.3990755	2.7452651	0	10	11	13	19
G2	649	0	11.5701079	2.9136387	0	10	11	13	19
G3	649	0	11.9060092	3.2306562	0	10	12	14	19

Top strongest correlations:

variable_1	variable_2	n_pairwise	pearson_r	absolute_r	direction	strength	p_value
G2	G3	649	0.9185480	0.9185480	Positive	Very strong	5.642401e-263
G1	G2	649	0.8649816	0.8649816	Positive	Strong	6.373795e-196
G1	G3	649	0.8263871	0.8263871	Positive	Strong	1.617571e-163
Medu	Fedu	649	0.6474766	0.6474766	Positive	Moderate	2.190291e-78
Dalc	Walc	649	0.6165614	0.6165614	Positive	Moderate	3.239244e-69
failures	G3	649	-0.3933155	0.3933155	Negative	Weak to moderate	1.934153e-25
goout	Walc	649	0.3886798	0.3886798	Positive	Weak to moderate	7.812237e-25
failures	G2	649	-0.3857822	0.3857822	Negative	Weak to moderate	1.848633e-24
failures	G1	649	-0.3842105	0.3842105	Negative	Weak to moderate	2.939047e-24
freetime	goout	649	0.3463518	0.3463518	Positive	Weak to moderate	9.968392e-20
age	failures	649	0.3199679	0.3199679	Positive	Weak to moderate	6.472062e-17
Medu	traveltime	649	-0.2650790	0.2650790	Negative	Weak	6.736153e-12

decision\_alpha\_0\_05

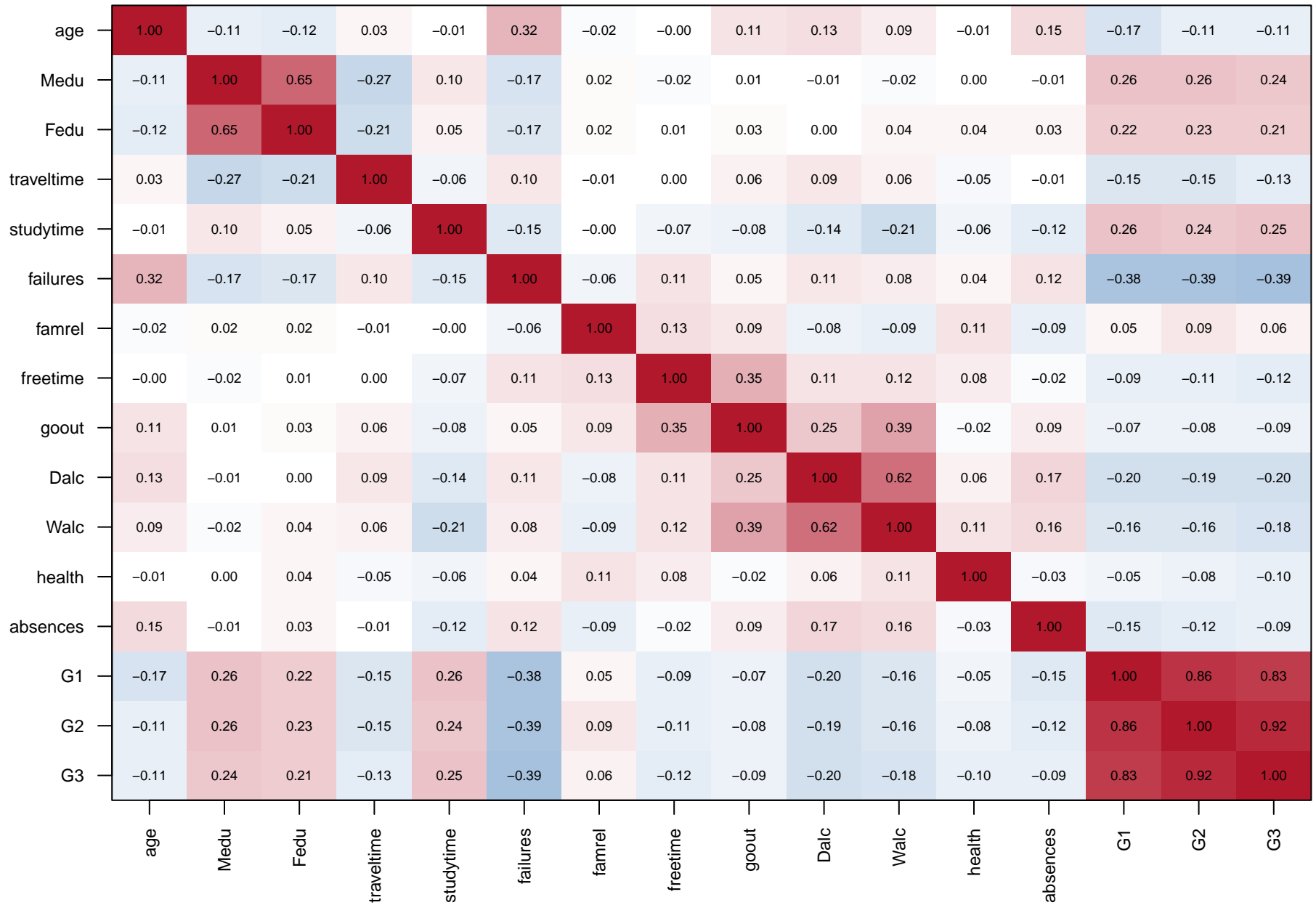
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Correlations with G3 :

target_variable	comparison_variable	n_pairwise	pearson_r	absolute_r	direction	strength	p_value
G3	G2	649	0.91854800	0.91854800	Positive	Very strong	5.642401e-263
G3	G1	649	0.82638712	0.82638712	Positive	Strong	1.617571e-163
G3	failures	649	-0.39331555	0.39331555	Negative	Weak to moderate	1.934153e-25
G3	studytime	649	0.24078860	0.24078860	Positive	Weak	1.000000e-10

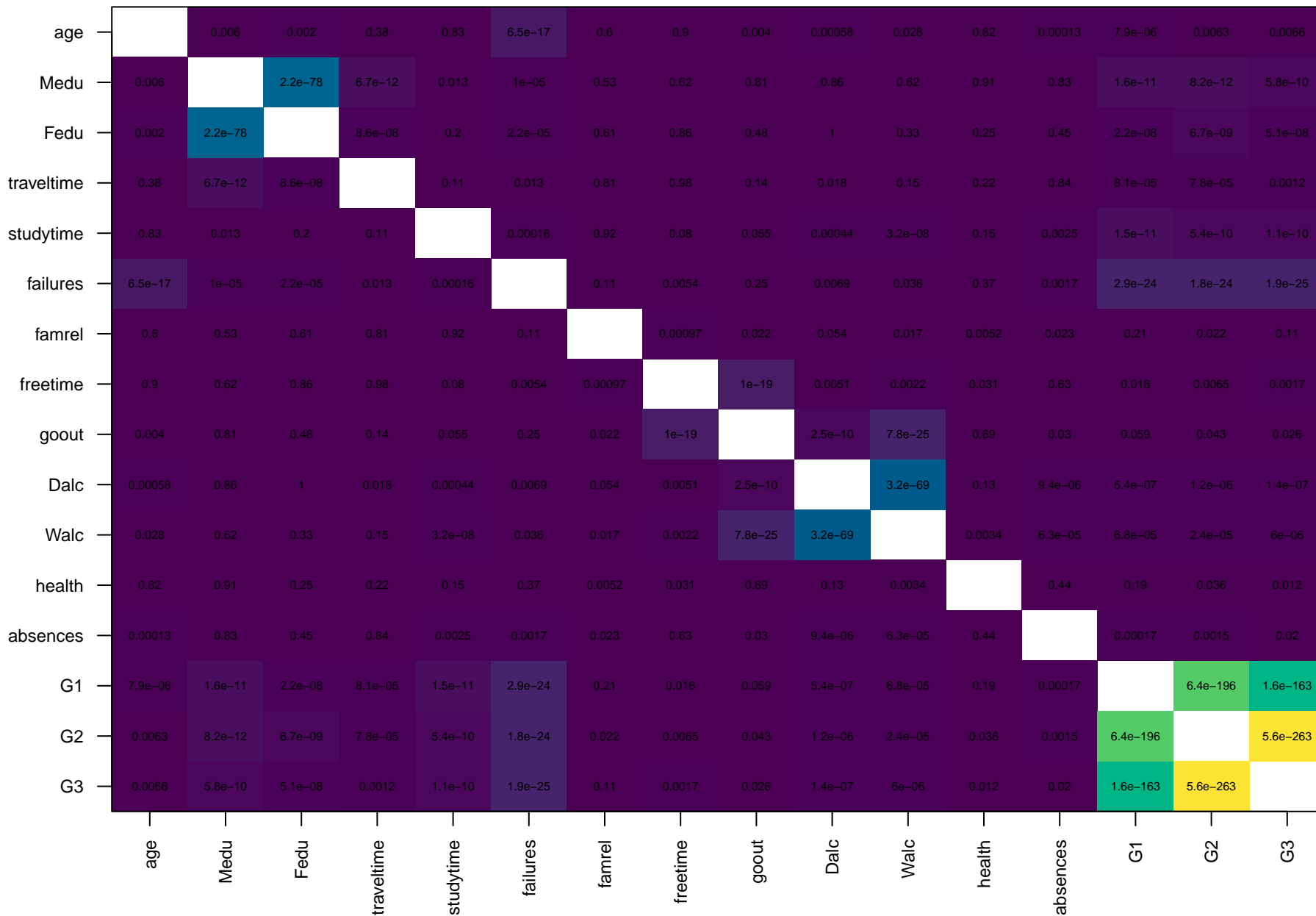
# Correlation Matrix: Colorful Pearson r Heatmap

Blue indicates negative association; red indicates positive association.



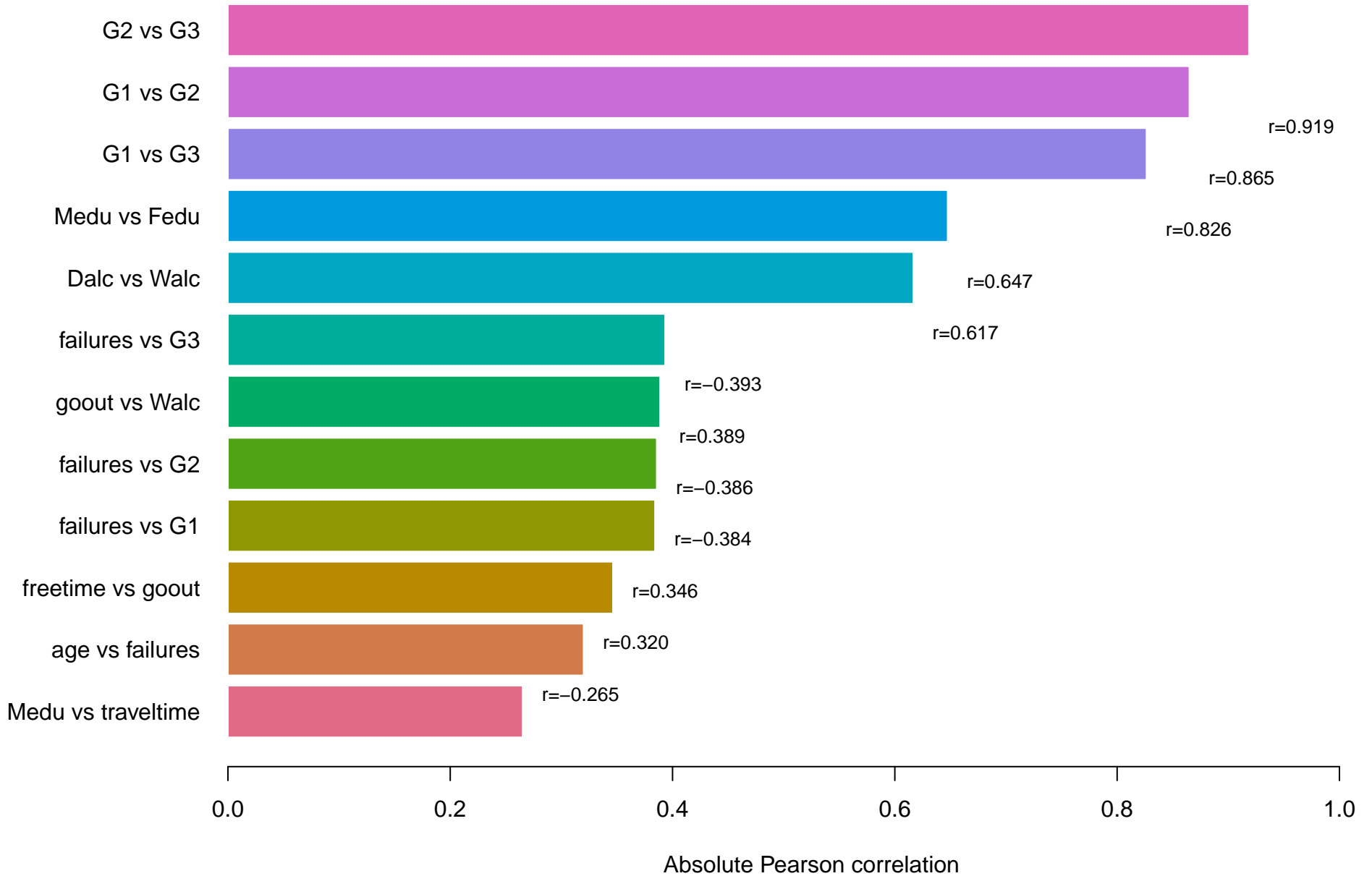
# Correlation Matrix: Colorful p-value Heatmap

Cell labels show p-values; color intensity uses  $-\log_{10}(\text{p-value})$ .



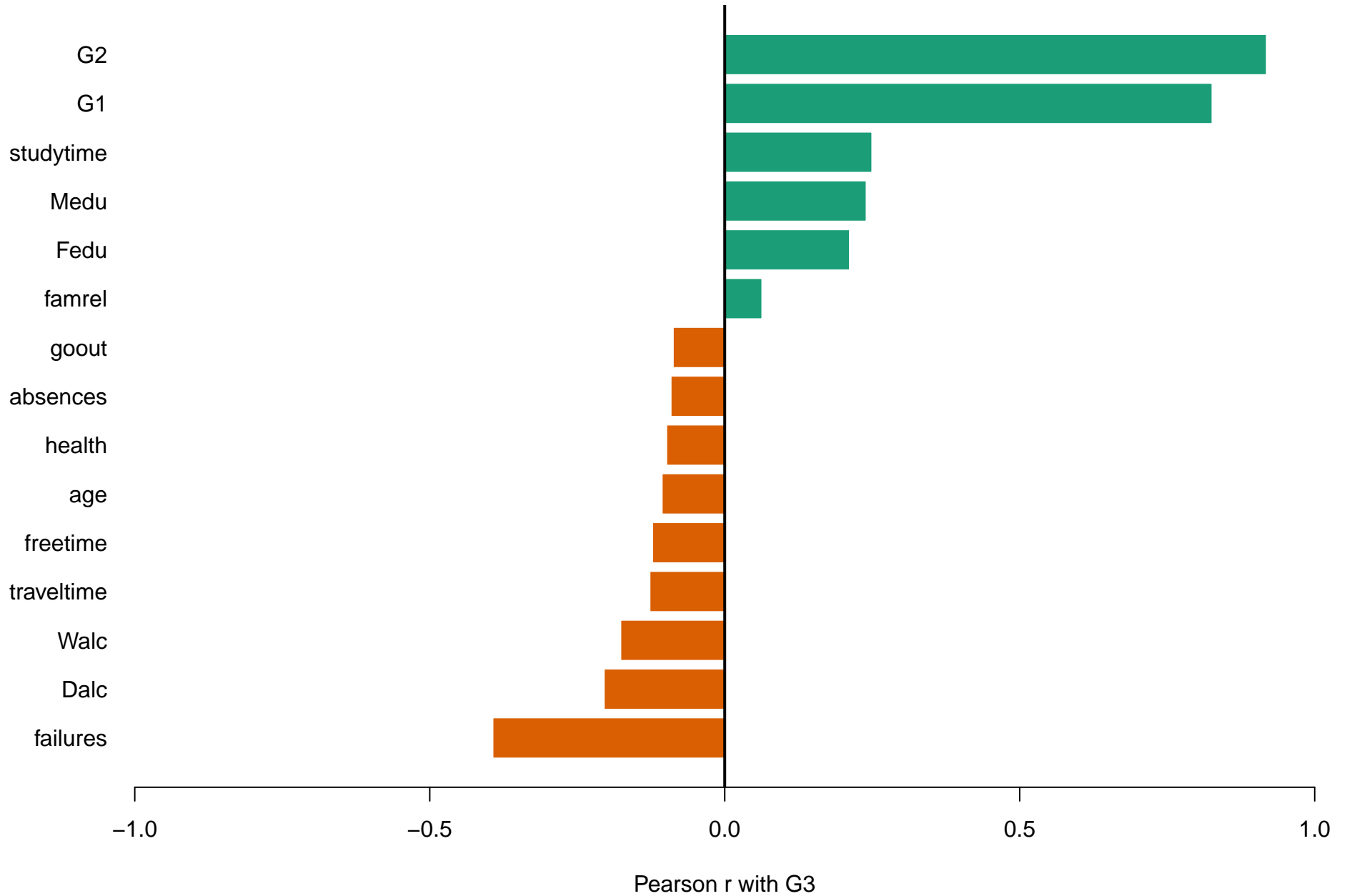
# Correlation Matrix: Colorful Strongest Variable Pairs

The ranking uses absolute r, so strong positive and negative relationships are retained.



## Correlation Matrix: Colorful Correlations with G3

Variables are ordered by their signed Pearson correlation with G3 .



# Correlation Matrix: Colorful Pairwise Sample Size Matrix

Each cell shows the valid paired observations used for the corresponding correlation.

age	649	649	649	649	649	649	649	649	649	649	649	649	649	649	649	
Medu	649	649	649	649	649	649	649	649	649	649	649	649	649	649	649	
Fedu	649	649	649	649	649	649	649	649	649	649	649	649	649	649	649	
traveltime	649	649	649	649	649	649	649	649	649	649	649	649	649	649	649	
studytime	649	649	649	649	649	649	649	649	649	649	649	649	649	649	649	
failures	649	649	649	649	649	649	649	649	649	649	649	649	649	649	649	
famrel	649	649	649	649	649	649	649	649	649	649	649	649	649	649	649	
freetime	649	649	649	649	649	649	649	649	649	649	649	649	649	649	649	
goout	649	649	649	649	649	649	649	649	649	649	649	649	649	649	649	
Dalc	649	649	649	649	649	649	649	649	649	649	649	649	649	649	649	
Walc	649	649	649	649	649	649	649	649	649	649	649	649	649	649	649	
health	649	649	649	649	649	649	649	649	649	649	649	649	649	649	649	
absences	649	649	649	649	649	649	649	649	649	649	649	649	649	649	649	
G1	649	649	649	649	649	649	649	649	649	649	649	649	649	649	649	
G2	649	649	649	649	649	649	649	649	649	649	649	649	649	649	649	
G3	649	649	649	649	649	649	649	649	649	649	649	649	649	649	649	
	age	Medu	Fedu	traveltime	studytime	failures	famrel	freetime	goout	Dalc	Walc	health	absences	G1	G2	G3

# Correlation Matrix: Colorful Strongest Pair Scatterplot

G2 vs G3 : Pearson r = 0.919

