

Semi Partial Correlation Analysis

Outcome variable: G3
Focal predictor: G2
Control variables: G1, studytime, failures, absences

Definition:
Semi-partial correlation is the correlation between the outcome and the part of the focal predictor not explained by controls.
sr^2 is the R-squared change when the focal predictor is added after the controls.

Main result:

outcome_variable	focal_predictor	control_variables	n_complete_cases	zero_order_correlation	partial_correlation	semi_partial_correlation_sr	semi_partial_correlation_from_delta_r2	semi_partial_r_squared_unique_variance	reduced_model_r_squared_controls_only	full_model_r_squared_controls_plus_focal	r_squared_change_added_focal_predictor	f_change	df1	df2	t_for_focal_predictor	p_value	alpha	decision_alpha_0_05	method_note
G3	G2	G1, studytime, failures, absences	649	0.918548	0.717325	0.397992	0.397992	0.158397	0.692166	0.850563	0.158397	681.556962	1	643	26.106646	5.437936e-103	0.05	Significant	unique contribution Semi-partial correlation = correlation between outcome and focal predictor residualized on controls. sr^2 equals R-squared change when the focal predictor is added last.

Model comparison:

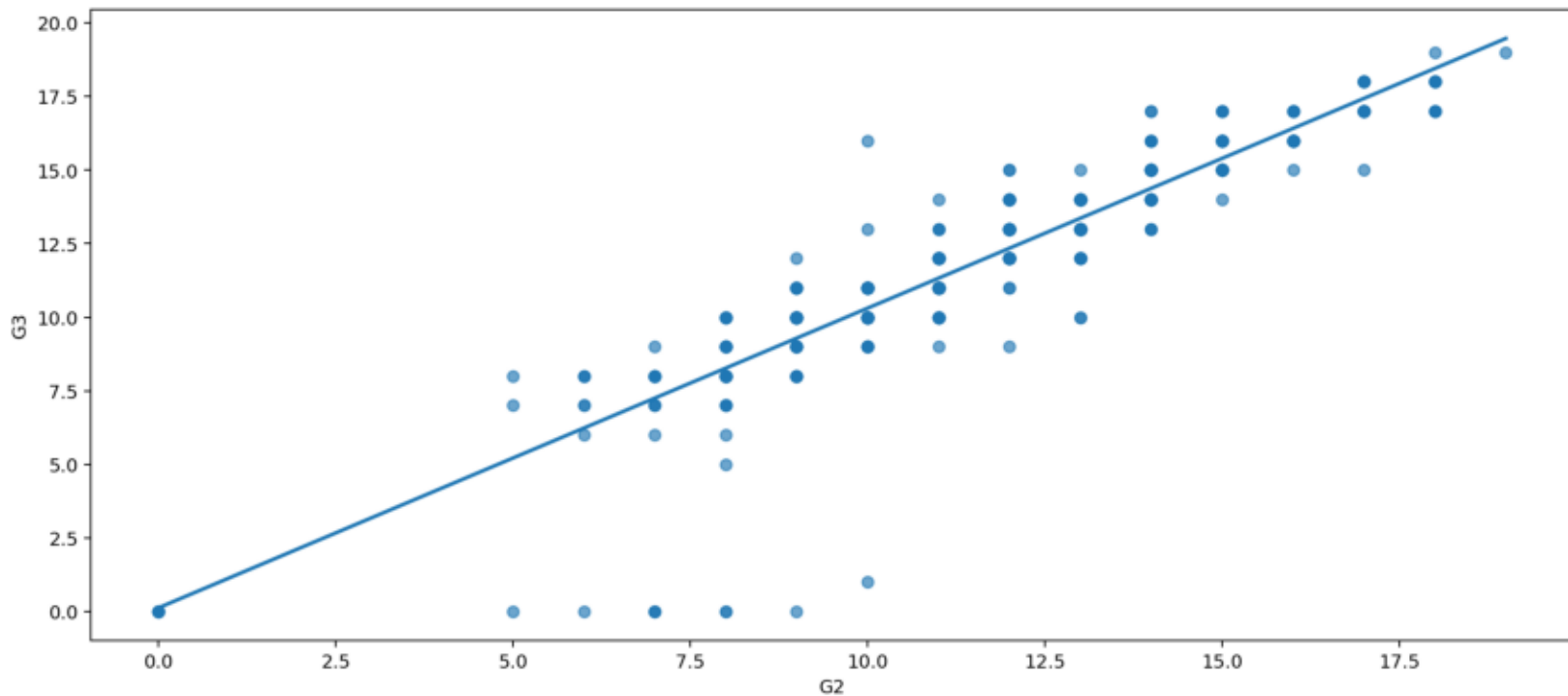
model	predictors	r_squared	adjusted_r_squared	sse	df_residual
Reduced: controls only	G1, studytime, failures, absences	0.692166	0.690254	2081.963098	644
Full: controls + focal predictor	G1, studytime, failures, absences, G2	0.850563	0.849401	1010.679276	643
Change after adding focal predictor	G2	0.158397	NaN	1071.283822	643

Full model coefficients:

term	coefficient_b	standard_error	t_value	p_value	ci95_lower	ci95_upper	standardized_beta
Intercept	-0.155190	0.258626	-0.600057	5.486796e-01	-0.663043	0.352663	NaN
G1	0.139457	0.036227	3.849494	1.301880e-04	0.068319	0.210596	0.118505
studytime	0.096699	0.061810	1.564470	1.181993e-01	-0.024674	0.218073	0.024829
failures	-0.218290	0.090861	-2.402463	1.656754e-02	-0.396711	-0.039870	-0.040084
absences	0.023367	0.010794	2.164781	3.077169e-02	0.002171	0.044562	0.033565
G2	0.885709	0.033927	26.106646	5.437936e-103	0.819088	0.952329	0.798796

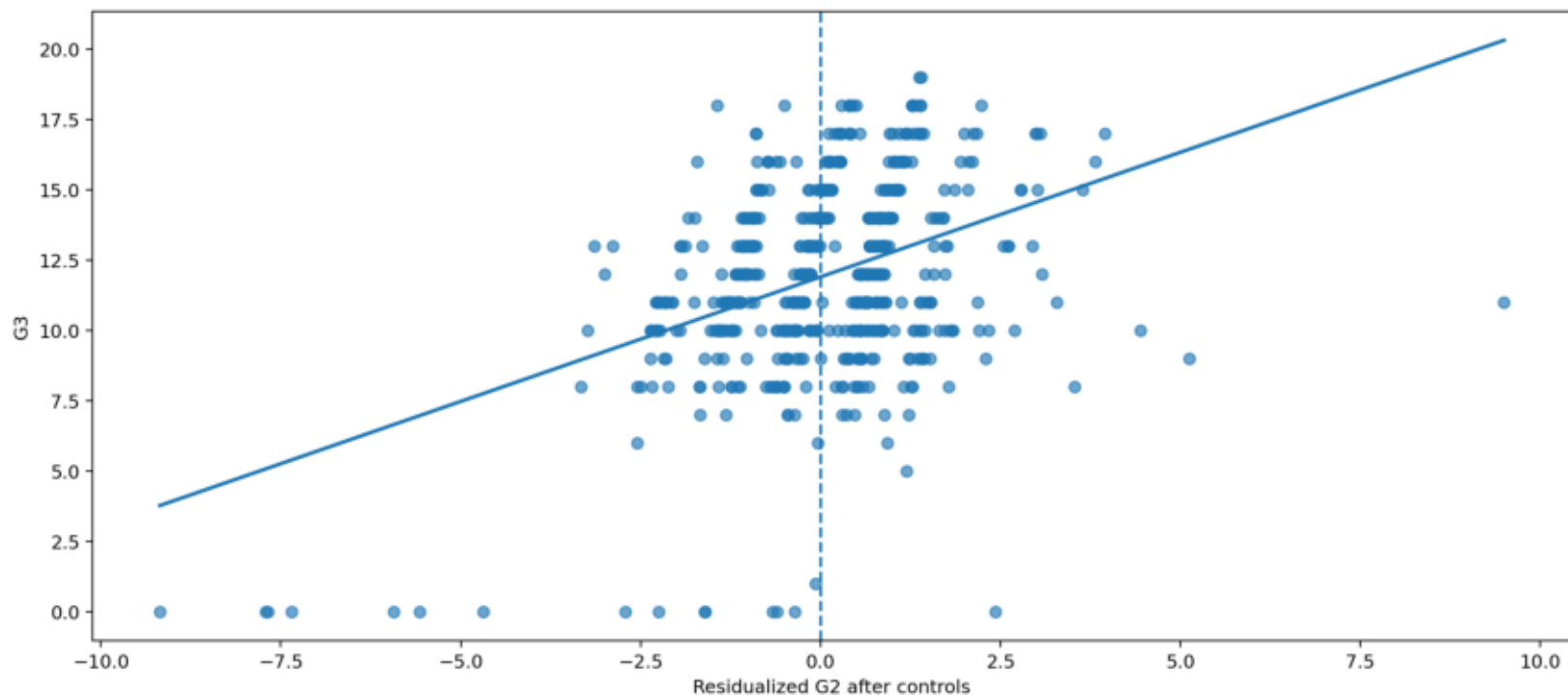
Semi Partial Correlation: Zero-order Relationship

This chart shows the raw association before removing control-variable overlap from the focal predictor.



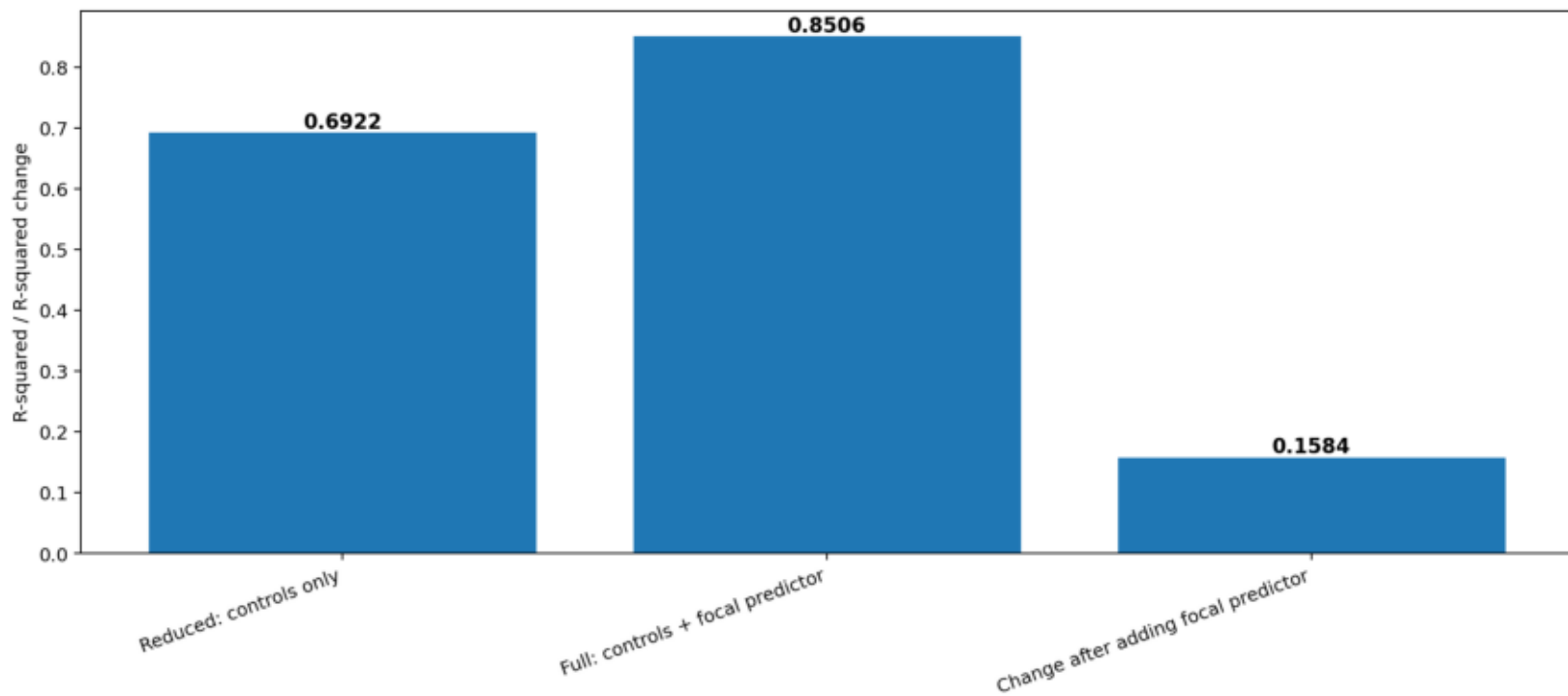
Semi Partial Correlation: Unique Predictor Component

The slope reflects the association between the outcome and the predictor part not explained by controls.



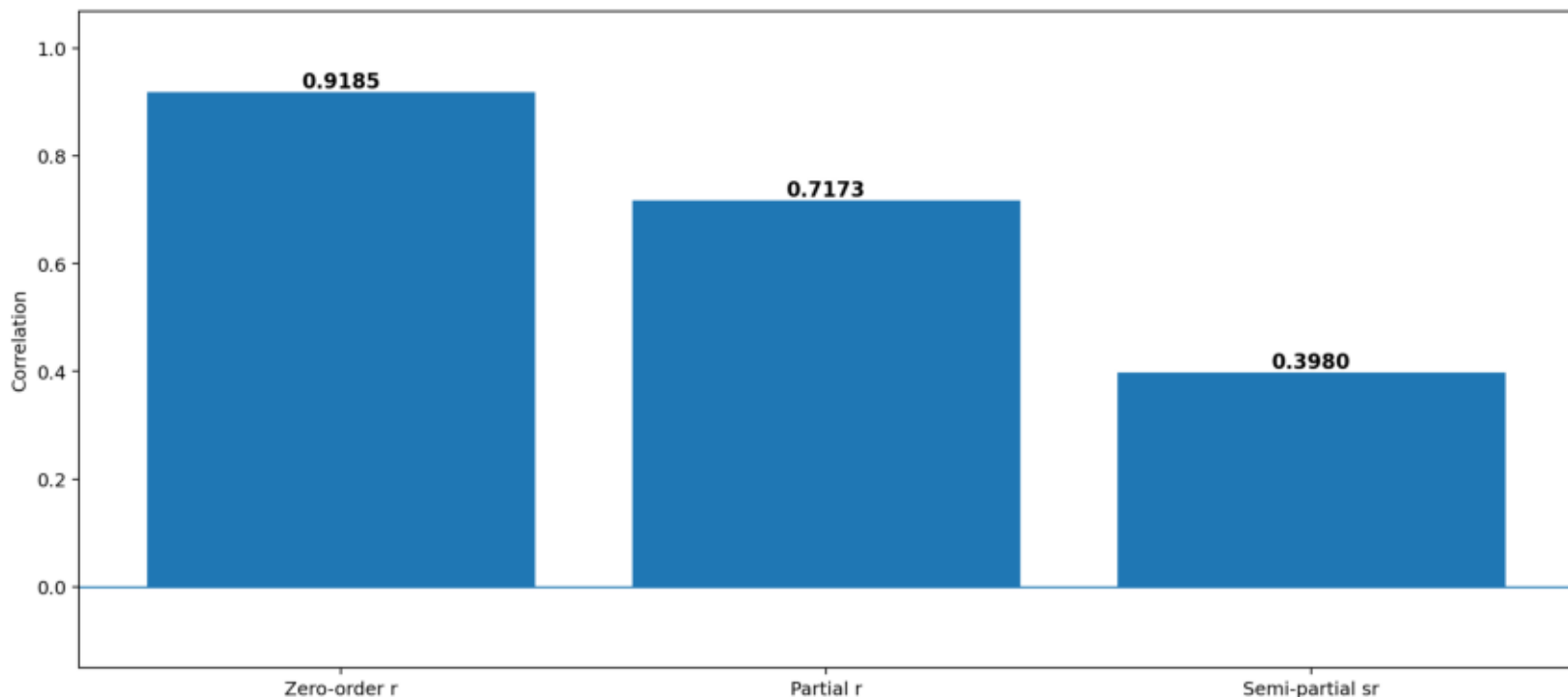
Semi Partial Correlation: R-squared Change

The added R-squared is sr^2 , the unique outcome variance explained by the focal predictor.



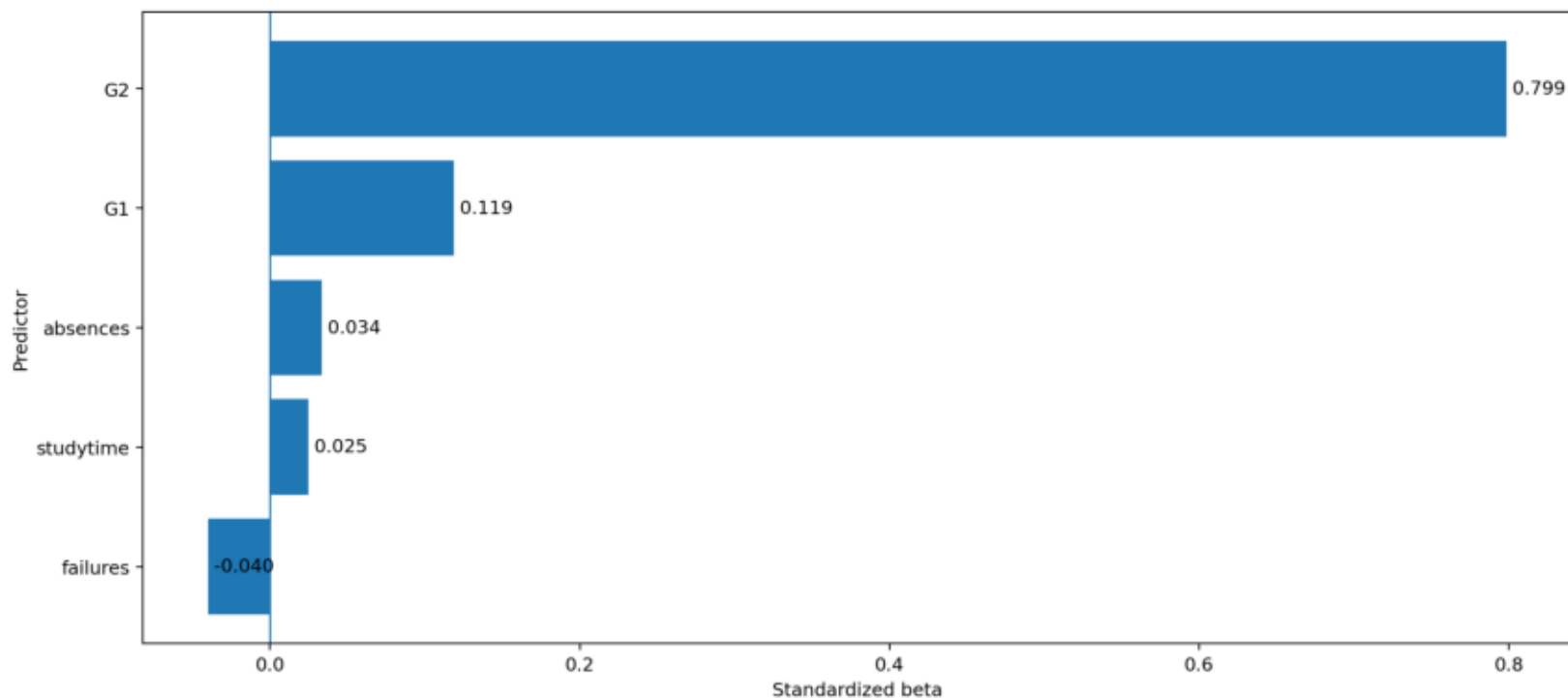
Semi Partial Correlation Compared with Other Correlations

Semi-partial correlation is usually smaller than the zero-order association when controls explain shared variance.



Semi Partial Correlation Context: Full Regression Coefficients

The focal predictor's coefficient is interpreted after the control variables are already in the model.



Semi Partial Correlation: Regression Residual Check

A random residual cloud around zero supports the regression context used to compute sr^2 .

