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Weighted Least Squares Regression

Weighted Least Squares Regression
Import data

WLS Variable Preparation

WLS Variable Preparation

Create dummy predictors for categorical variables

WLS Prepared Data Summary

WLS Prepared Data Summary
Outcome, numeric predictors, and dummy predictors

Frequencies

[WLSData] D:\DATA ANALYSIS\H Regression Tests and Models\Weighted Least Squares Regression\SPSS_Output\sav\Weighted-Least-Squares-Regression-data.sav

Statistics

		School dummy: 1 = MS, 0 = GP	Sex dummy: 1 = male, 0 = female	Address dummy: 1 = urban, 0 = rural	Higher education intention dummy: yes	Internet access dummy: yes
N	Valid	649	649	649	649	649
	Missing	0	0	0	0	0

Statistics

		School support dummy: yes	Family support dummy: yes	Activities dummy: yes
N	Valid	649	649	649
	Missing	0	0	0

Frequency Table

School dummy: 1 = MS, 0 = GP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No / reference	423	65.2	65.2	65.2
	Yes / target	226	34.8	34.8	100.0
	Total	649	100.0	100.0	

Sex dummy: 1 = male, 0 = female

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No / reference	383	59.0	59.0	59.0
	Yes / target	266	41.0	41.0	100.0
	Total	649	100.0	100.0	

WLS Prepared Data Summary
Outcome, numeric predictors, and dummy predictors

Address dummy: 1 = urban, 0 = rural

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No / reference	197	30.4	30.4	30.4
	Yes / target	452	69.6	69.6	100.0
	Total	649	100.0	100.0	

Higher education intention dummy: yes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No / reference	69	10.6	10.6	10.6
	Yes / target	580	89.4	89.4	100.0
	Total	649	100.0	100.0	

Internet access dummy: yes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No / reference	151	23.3	23.3	23.3
	Yes / target	498	76.7	76.7	100.0
	Total	649	100.0	100.0	

School support dummy: yes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No / reference	581	89.5	89.5	89.5
	Yes / target	68	10.5	10.5	100.0
	Total	649	100.0	100.0	

Family support dummy: yes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No / reference	251	38.7	38.7	38.7
	Yes / target	398	61.3	61.3	100.0
	Total	649	100.0	100.0	

WLS Prepared Data Summary
Outcome, numeric predictors, and dummy predictors

Activities dummy: yes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No / reference	334	51.5	51.5	51.5
	Yes / target	315	48.5	48.5	100.0
	Total	649	100.0	100.0	

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Final grade / default continuous outcome for WLS regression	649	0	19	11.91	3.231
First period grade	649	0	19	11.40	2.745
Second period grade	649	0	19	11.57	2.914
Weekly study time group	649	1	4	1.93	.830
Number of past class failures	649	0	3	.22	.593
Student age	649	15	22	16.74	1.218
Medu	649	0	4	2.51	1.135
Fedu	649	0	4	2.31	1.100
traveltime	649	1	4	1.57	.749
health	649	1	5	3.54	1.446
School absences	649	0	32	3.66	4.641
Valid N (listwise)	649				

OLS Baseline Model

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>Warning # 2004. Command name: SUBTITLE  
>The subtitle given exceeds 60 characters in length. The first 60 characters  
>will be used.
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OLS Baseline Model
Save fitted values and residuals for residual variance weigh

Regression

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	Internet access dummy: yes, Student age, health, Weekly study time group, Address dummy: 1 = urban, 0 = rural, School absences, Fedu, Sex dummy: 1 = male, 0 = female, Higher education intention dummy: yes, traveltime, Number of past class failures, School dummy: 1 = MS, 0 = GP, Second period grade, Medu, First period grade ^b	.	Enter

a. Dependent Variable: Final grade / default continuous outcome for WLS regression

b. All requested variables entered.

OLS Baseline Model
Save fitted values and residuals for residual variance weigh

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.924 ^a	.854	.851	1.248

a. Predictors: (Constant), Internet access dummy: yes, Student age, health, Weekly study time group, Address dummy: 1 = urban, 0 = rural, School absences, Fedu, Sex dummy: 1 = male, 0 = female, Higher education intention dummy: yes, traveltime, Number of past class failures, School dummy: 1 = MS, 0 = GP, Second period grade, Medu, First period grade

b. Dependent Variable: Final grade / default continuous outcome for WLS regression

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5776.701	15	385.113	247.096	.000 ^b
	Residual	986.565	633	1.559		
	Total	6763.267	648			

a. Dependent Variable: Final grade / default continuous outcome for WLS regression

b. Predictors: (Constant), Internet access dummy: yes, Student age, health, Weekly study time group, Address dummy: 1 = urban, 0 = rural, School absences, Fedu, Sex dummy: 1 = male, 0 = female, Higher education intention dummy: yes, traveltime, Number of past class failures, School dummy: 1 = MS, 0 = GP, Second period grade, Medu, First period grade

OLS Baseline Model
Save fitted values and residuals for residual variance weigh

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.566	.843		-.671	.502
	First period grade	.133	.037	.113	3.608	.000
	Second period grade	.876	.034	.790	25.489	.000
	Weekly study time group	.055	.064	.014	.858	.391
	Number of past class failures	-.219	.096	-.040	-2.284	.023
	School absences	.016	.011	.023	1.454	.146
	Student age	.031	.044	.012	.709	.479
	Medu	-.047	.060	-.017	-.786	.432
	Fedu	.027	.059	.009	.448	.654
	traveltime	.143	.073	.033	1.973	.049
	health	-.049	.035	-.022	-1.399	.162
	School dummy: 1 = MS, 0 = GP	-.206	.121	-.030	-1.704	.089
	Sex dummy: 1 = male, 0 = female	-.191	.106	-.029	-1.809	.071
	Address dummy: 1 = urban, 0 = rural	.164	.119	.023	1.374	.170
	Higher education intention dummy: yes	.189	.179	.018	1.055	.292
	Internet access dummy: yes	.070	.124	.009	.565	.573

OLS Baseline Model
Save fitted values and residuals for residual variance weigh

Coefficients^a

Model		95.0% Confidence Interval for B	
		Lower Bound	Upper Bound
1	(Constant)	-2.220	1.089
	First period grade	.061	.205
	Second period grade	.808	.943
	Weekly study time group	-.070	.179
	Number of past class failures	-.407	-.031
	School absences	-.006	.038
	Student age	-.056	.118
	Medu	-.165	.071
	Fedu	-.090	.143
	traveltime	.001	.286
	health	-.117	.020
	School dummy: 1 = MS, 0 = GP	-.443	.031
	Sex dummy: 1 = male, 0 = female	-.398	.016
	Address dummy: 1 = urban, 0 = rural	-.070	.398
	Higher education intention dummy: yes	-.163	.541
	Internet access dummy: yes	-.173	.313

a. Dependent Variable: Final grade / default continuous outcome for WLS regression

OLS Baseline Model
Save fitted values and residuals for residual variance weigh

Collinearity Diagnostics^a

Model	Dimension	Eigenvalue	Condition Index	(Constant)	Variance Proportions	
					First period grade	Second period grade
1	1	11.844	1.000	.00	.00	.00
	2	1.024	3.400	.00	.00	.00
	3	.809	3.827	.00	.00	.00
	4	.590	4.482	.00	.00	.00
	5	.508	4.827	.00	.00	.00
	6	.259	6.756	.00	.00	.00
	7	.231	7.159	.00	.00	.00
	8	.193	7.842	.00	.00	.00
	9	.146	8.993	.00	.00	.00
	10	.133	9.425	.00	.00	.00
	11	.096	11.082	.00	.01	.02
	12	.071	12.945	.00	.03	.04
	13	.060	14.098	.00	.00	.00
	14	.025	21.605	.04	.03	.04
	15	.008	39.284	.00	.87	.88
	16	.002	76.944	.95	.04	.02

OLS Baseline Model
Save fitted values and residuals for residual variance weigh

Collinearity Diagnostics^a

Model	Dimension	Variance Proportions				
		Weekly study time group	Number of past class failures	School absences	Student age	Medu
1	1	.00	.00	.00	.00	.00
	2	.00	.44	.01	.00	.00
	3	.00	.08	.17	.00	.00
	4	.00	.00	.23	.00	.00
	5	.01	.24	.47	.00	.00
	6	.02	.00	.00	.00	.01
	7	.01	.02	.00	.00	.08
	8	.00	.00	.01	.00	.03
	9	.07	.01	.00	.00	.01
	10	.48	.01	.03	.00	.00
	11	.32	.05	.00	.00	.01
	12	.03	.00	.00	.00	.00
	13	.00	.00	.00	.00	.86
	14	.04	.13	.07	.08	.00
	15	.00	.00	.00	.00	.00
	16	.00	.03	.00	.92	.00

OLS Baseline Model
Save fitted values and residuals for residual variance weigh

Collinearity Diagnostics^a

Model	Dimension	Variance Proportions				
		Fedu	traveltime	health	School dummy: 1 = MS, 0 = GP	Sex dummy: 1 = male, 0 = female
1	1	.00	.00	.00	.00	.00
	2	.00	.00	.00	.07	.00
	3	.00	.01	.00	.29	.03
	4	.00	.00	.00	.00	.64
	5	.00	.00	.00	.10	.15
	6	.01	.15	.01	.33	.00
	7	.11	.03	.01	.00	.01
	8	.08	.01	.01	.00	.00
	9	.00	.07	.75	.00	.04
	10	.03	.42	.00	.03	.09
	11	.04	.13	.06	.00	.00
	12	.00	.02	.00	.00	.00
	13	.71	.01	.01	.00	.01
	14	.00	.14	.14	.16	.01
	15	.00	.00	.01	.00	.00
	16	.00	.01	.01	.00	.01

OLS Baseline Model
Save fitted values and residuals for residual variance weigh

Collinearity Diagnostics^a

Model	Dimension	Variance Proportions		
		Address dummy: 1 = urban, 0 = rural	Higher education intention dummy: yes	Internet access dummy: yes
1	1	.00	.00	.00
	2	.01	.00	.00
	3	.01	.00	.00
	4	.00	.00	.00
	5	.02	.00	.00
	6	.36	.00	.02
	7	.35	.00	.09
	8	.00	.00	.80
	9	.02	.00	.01
	10	.09	.00	.00
	11	.05	.29	.01
	12	.02	.64	.02
	13	.00	.00	.01
	14	.05	.01	.03
	15	.00	.00	.00
	16	.00	.05	.00

a. Dependent Variable: Final grade / default continuous outcome for WLS regression

Residuals Statistics^a

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-.15	19.43	11.91	2.986	649
Residual	-8.984	5.189	.000	1.234	649
Std. Predicted Value	-4.037	2.520	.000	1.000	649
Std. Residual	-7.196	4.157	.000	.988	649

a. Dependent Variable: Final grade / default continuous outcome for WLS regression

WLS Weight Construction

WLS Weight Construction
Inverse residual variance weights based on OLS residual size

WLS Weight and Residual Diagnostics

WLS Weight and Residual Diagnostics
Weight distribution and OLS residual pattern

Descriptives

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
OLS predicted value used for WLS weight diagnostics	649	-.1469	19.4314	11.906009	2.9857432
OLS residual used for WLS weight diagnostics	649	-8.9840	5.1895	.000000	1.2338870
Absolute OLS residual	649	.0010	8.9840	.774759	.9598434
Squared OLS residual	649	.0000	80.7115	1.520131	6.8176746
Residual variance proxy = squared OLS residual + small constant	649	.0000	80.7115	1.520132	6.8176746
WLS inverse variance weight	649	.0124	492054.2875	965.335486	19401.25690
Valid N (listwise)	649				

Explore

Case Processing Summary						
	Valid		Cases Missing		Total	
	N	Percent	N	Percent	N	Percent
Final grade / default continuous outcome for WLS regression	649	100.0%	0	0.0%	649	100.0%
OLS residual used for WLS weight diagnostics	649	100.0%	0	0.0%	649	100.0%
Absolute OLS residual	649	100.0%	0	0.0%	649	100.0%
WLS inverse variance weight	649	100.0%	0	0.0%	649	100.0%

WLS Weight and Residual Diagnostics
Weight distribution and OLS residual pattern

Descriptives

			Statistic	Std. Error
Final grade / default continuous outcome for WLS regression	Mean		11.91	.127
	95% Confidence Interval for Mean	Lower Bound	11.66	
		Upper Bound	12.16	
	5% Trimmed Mean		12.06	
	Median		12.00	
	Variance		10.437	
	Std. Deviation		3.231	
	Minimum		0	
	Maximum		19	
	Range		19	
	Interquartile Range		4	
	Skewness		-.913	.096
	Kurtosis		2.712	.192
OLS residual used for WLS weight diagnostics	Mean		.000000	.0484343
	95% Confidence Interval for Mean	Lower Bound	-.095107	
		Upper Bound	.095107	
	5% Trimmed Mean		.070488	
	Median		-.012498	
	Variance		1.522	
	Std. Deviation		1.2338870	
	Minimum		-8.9840	
	Maximum		5.1895	
	Range		14.1734	
	Interquartile Range		1.1137	
	Skewness		-2.880	.096
	Kurtosis		18.233	.192
Absolute OLS residual	Mean		.774759	.0376771
	95% Confidence Interval for Mean	Lower Bound	.700775	
		Upper Bound	.848743	
	5% Trimmed Mean		.649598	
	Median		.559315	
	Variance		.921	

WLS Weight and Residual Diagnostics
Weight distribution and OLS residual pattern

Descriptives

		Statistic	Std. Error
	Std. Deviation	.9598434	
	Minimum	.0010	
	Maximum	8.9840	
	Range	8.9829	
	Interquartile Range	.5602	
	Skewness	5.123	.096
	Kurtosis	33.989	.192
WLS inverse variance weight	Mean	965.335486	761.5659495
	95% Confidence Interval for Mean	Lower Bound	-530.099499
		Upper Bound	2460.770471
	5% Trimmed Mean	11.386217	
	Median	3.196580	
	Variance	376408769.3	
	Std. Deviation	19401.25690	
	Minimum	.0124	
	Maximum	492054.2875	
	Range	492054.2751	
	Interquartile Range	8.0658	
	Skewness	25.116	.096
	Kurtosis	636.393	.192

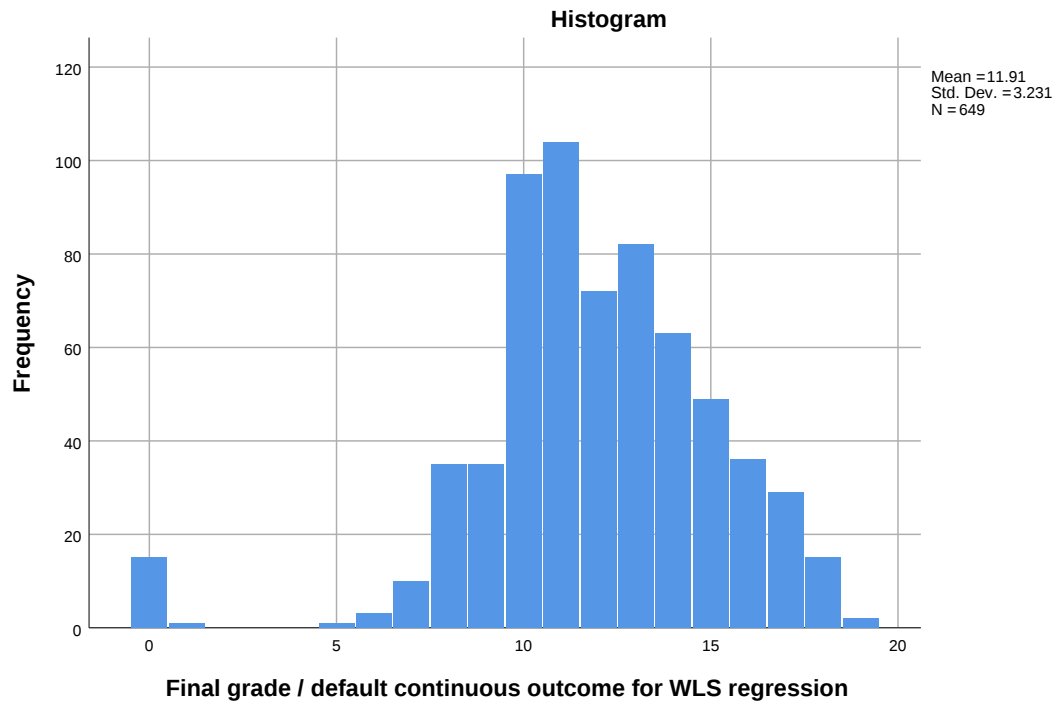
Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Final grade / default continuous outcome for WLS regression	.124	649	.000	.926	649	.000
OLS residual used for WLS weight diagnostics	.141	649	.000	.765	649	.000
Absolute OLS residual	.210	649	.000	.541	649	.000
WLS inverse variance weight	.483	649	.000	.024	649	.000

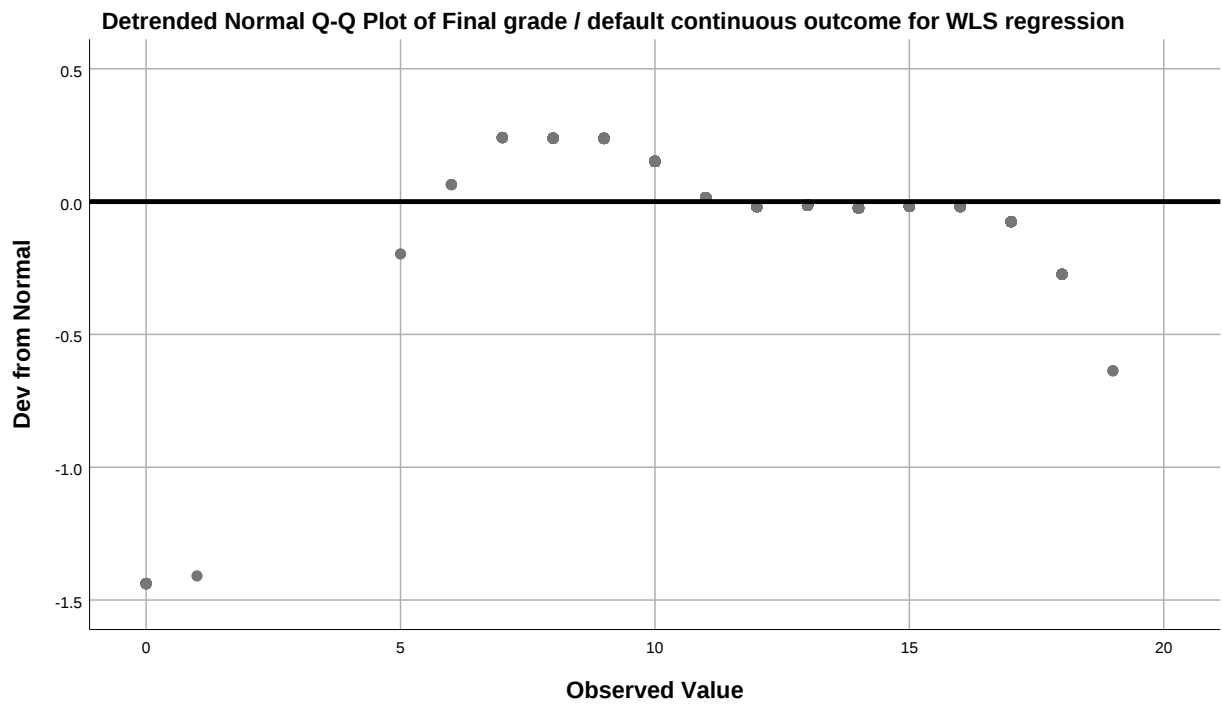
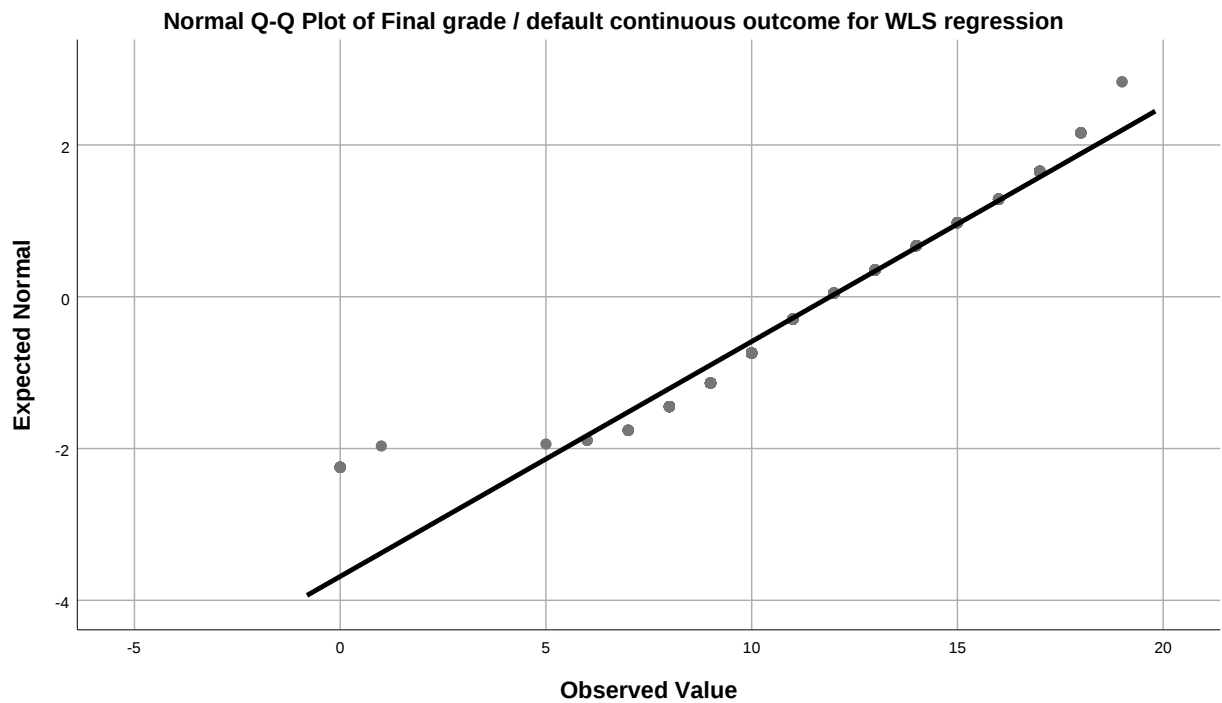
a. Lilliefors Significance Correction

WLS Weight and Residual Diagnostics
Weight distribution and OLS residual pattern

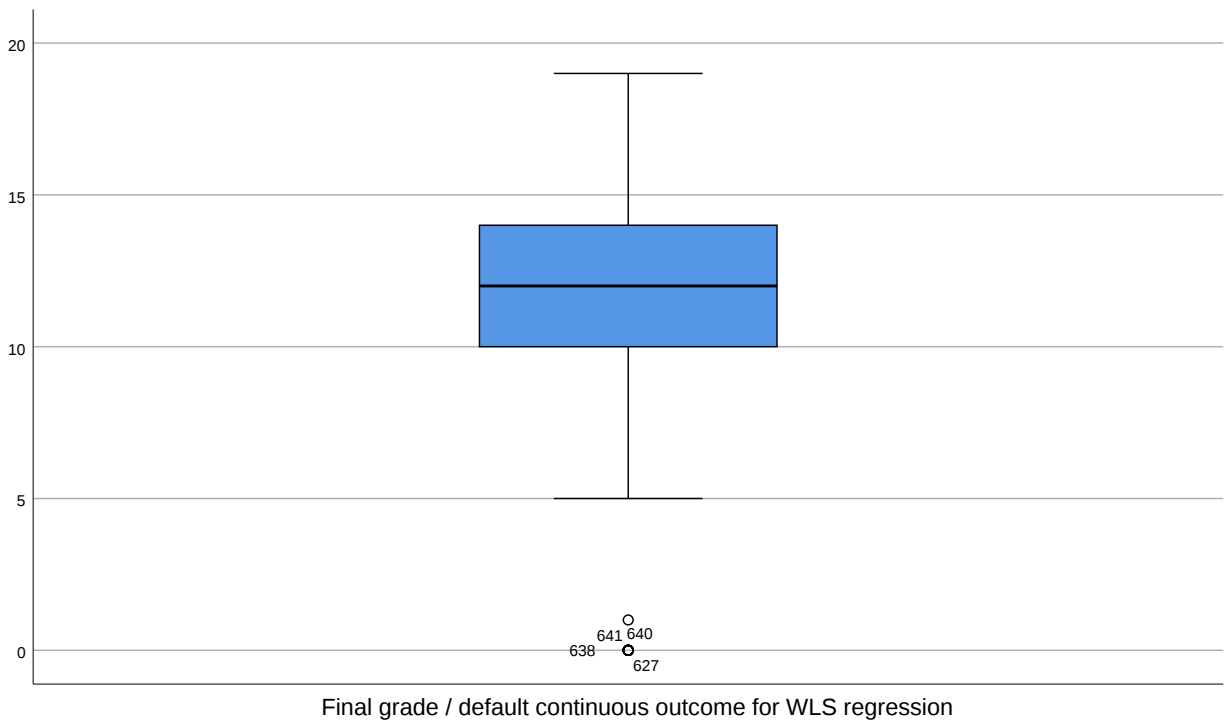
Final grade / default continuous outcome for WLS regression



WLS Weight and Residual Diagnostics
Weight distribution and OLS residual pattern

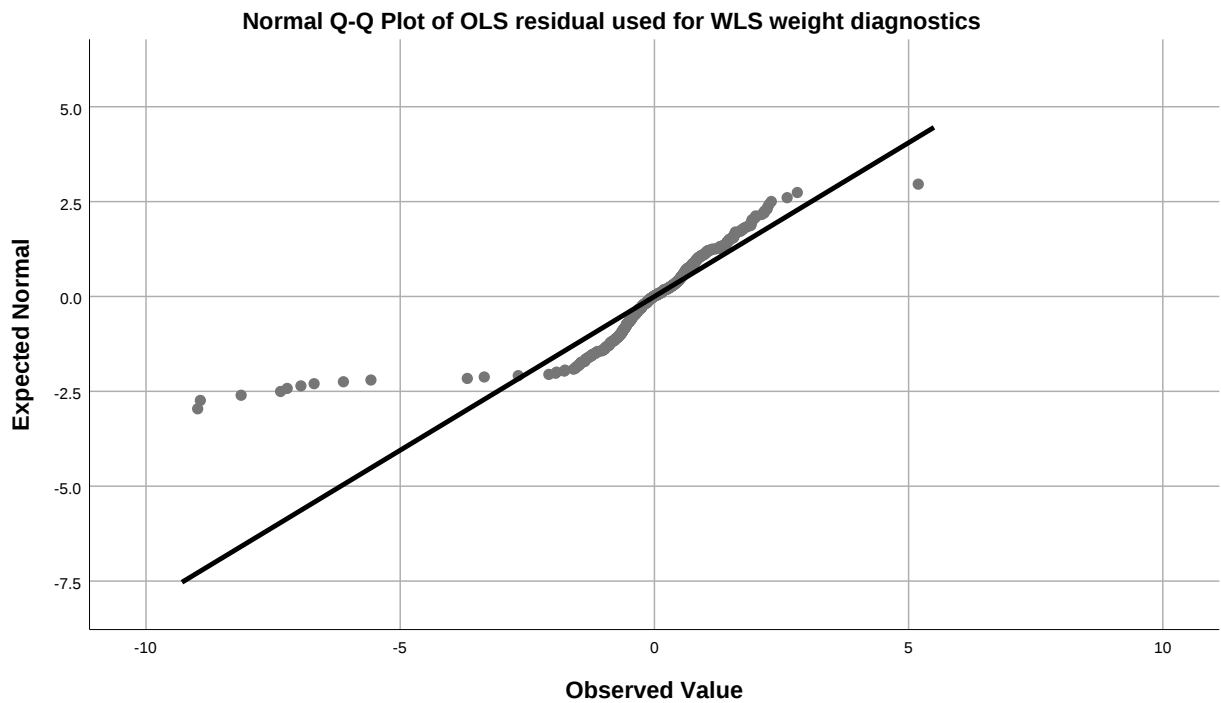
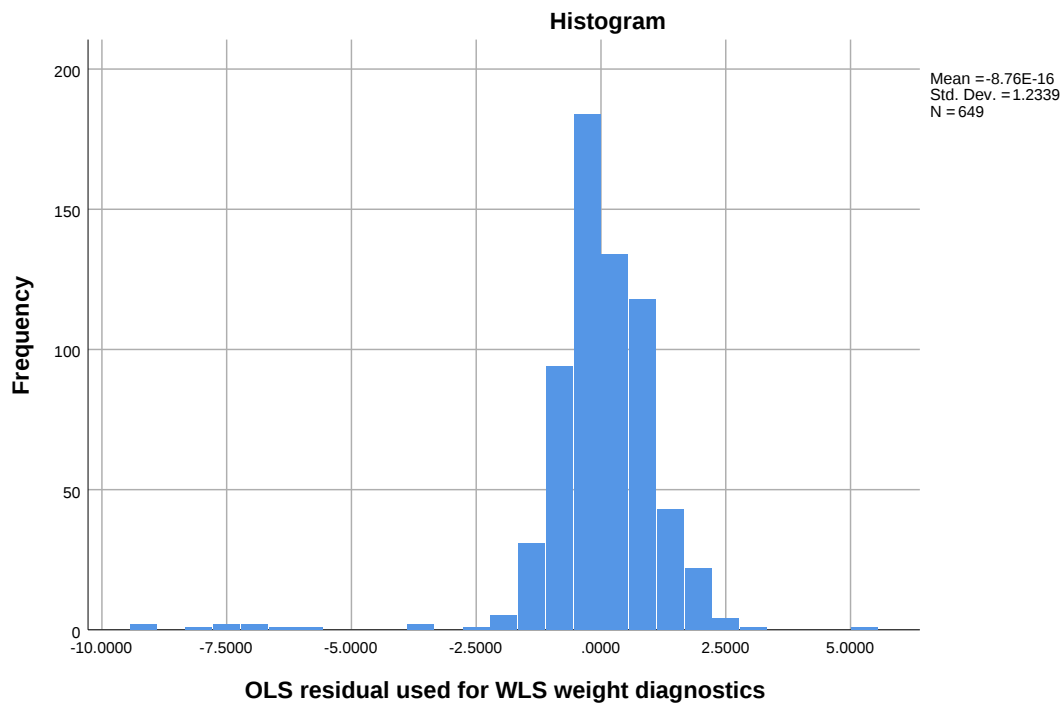


WLS Weight and Residual Diagnostics
Weight distribution and OLS residual pattern



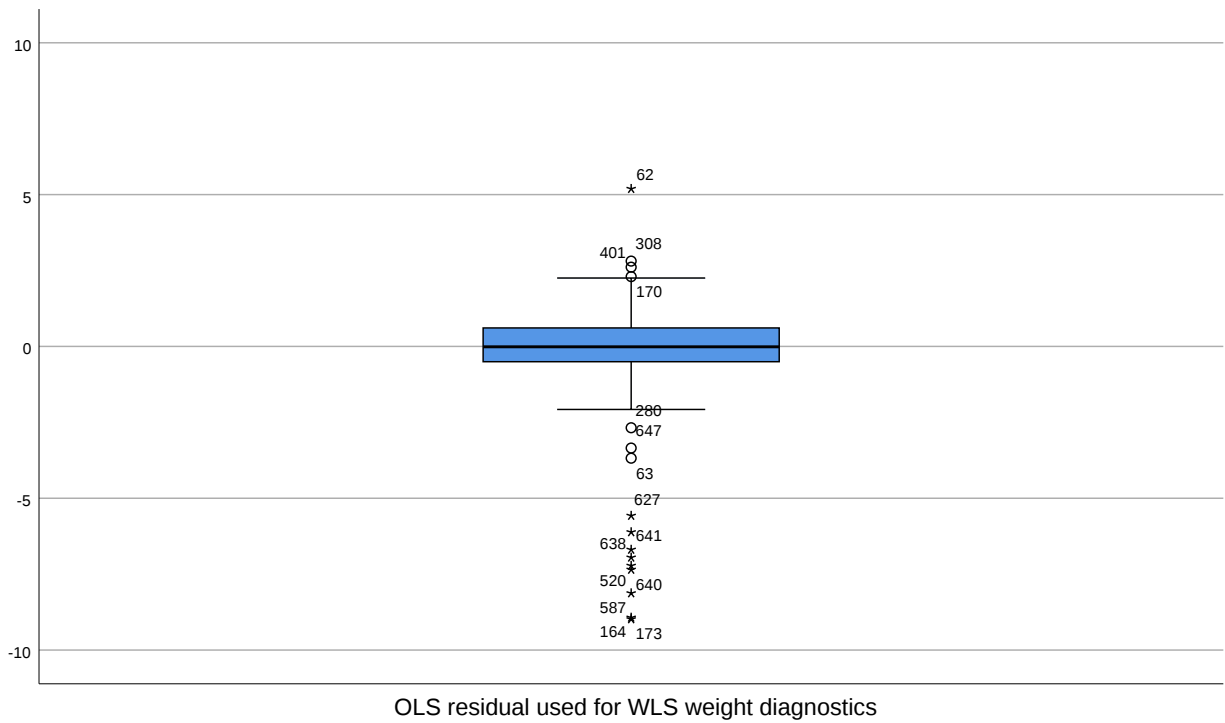
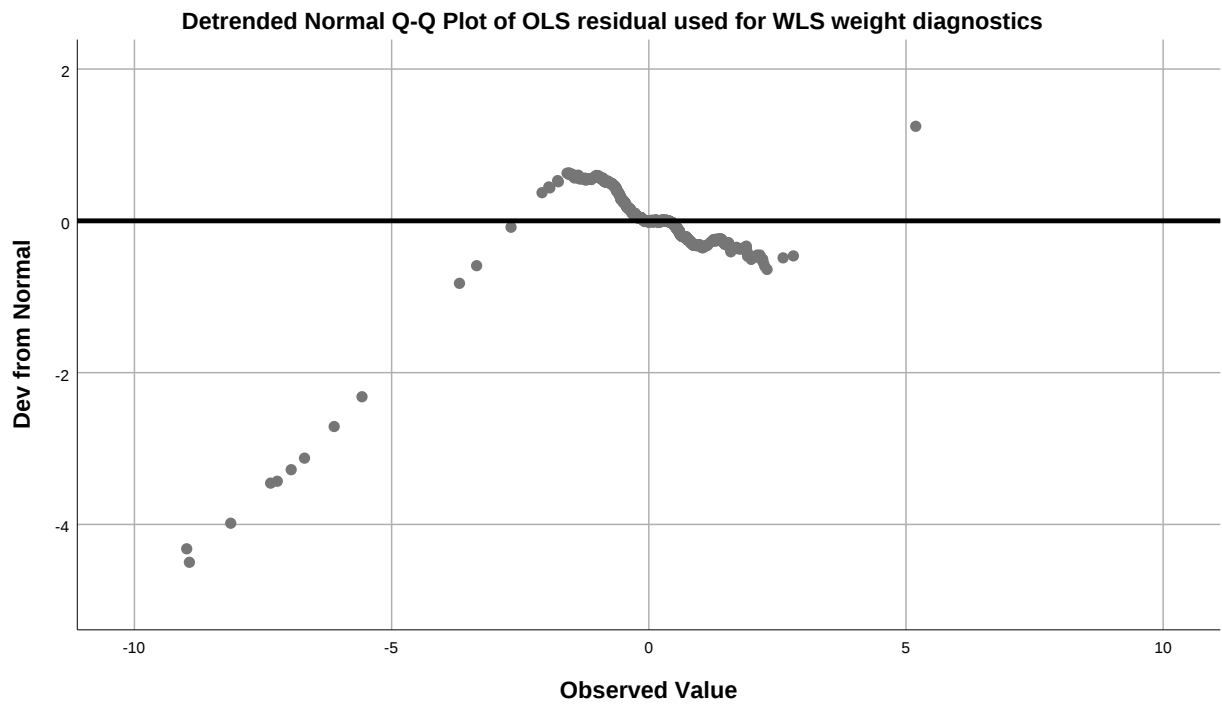
OLS residual used for WLS weight diagnostics

WLS Weight and Residual Diagnostics
Weight distribution and OLS residual pattern

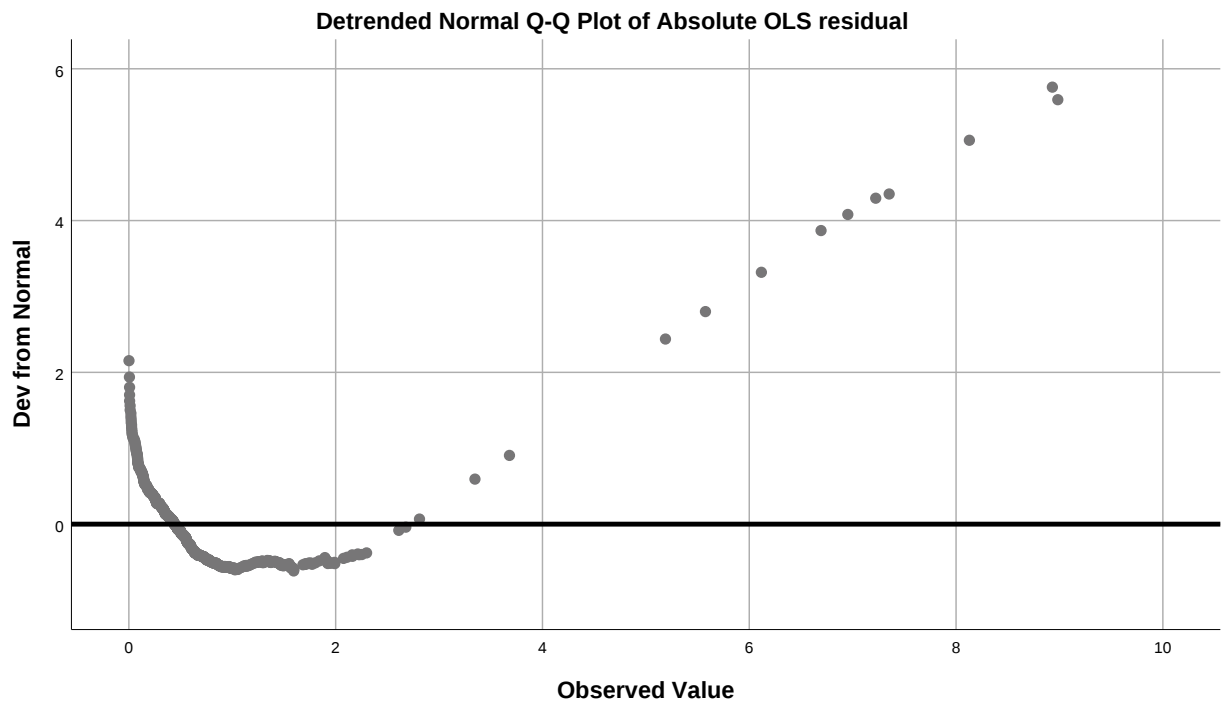
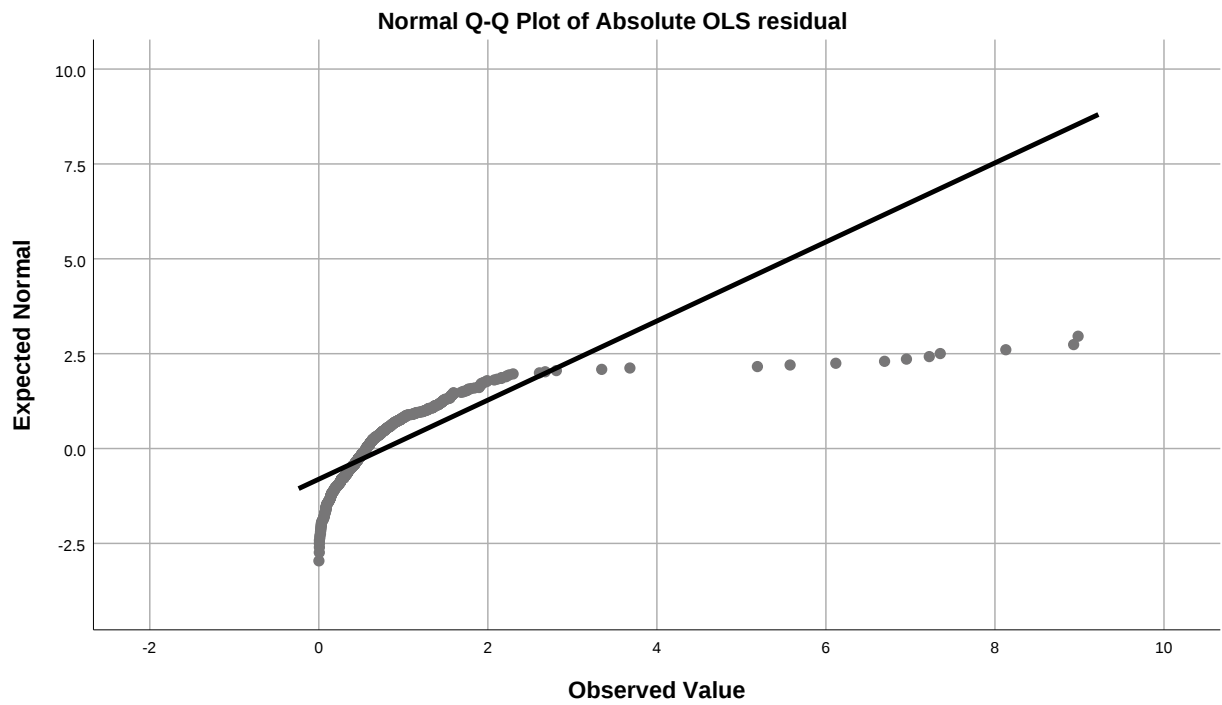


WLS Weight and Residual Diagnostics

Weight distribution and OLS residual pattern

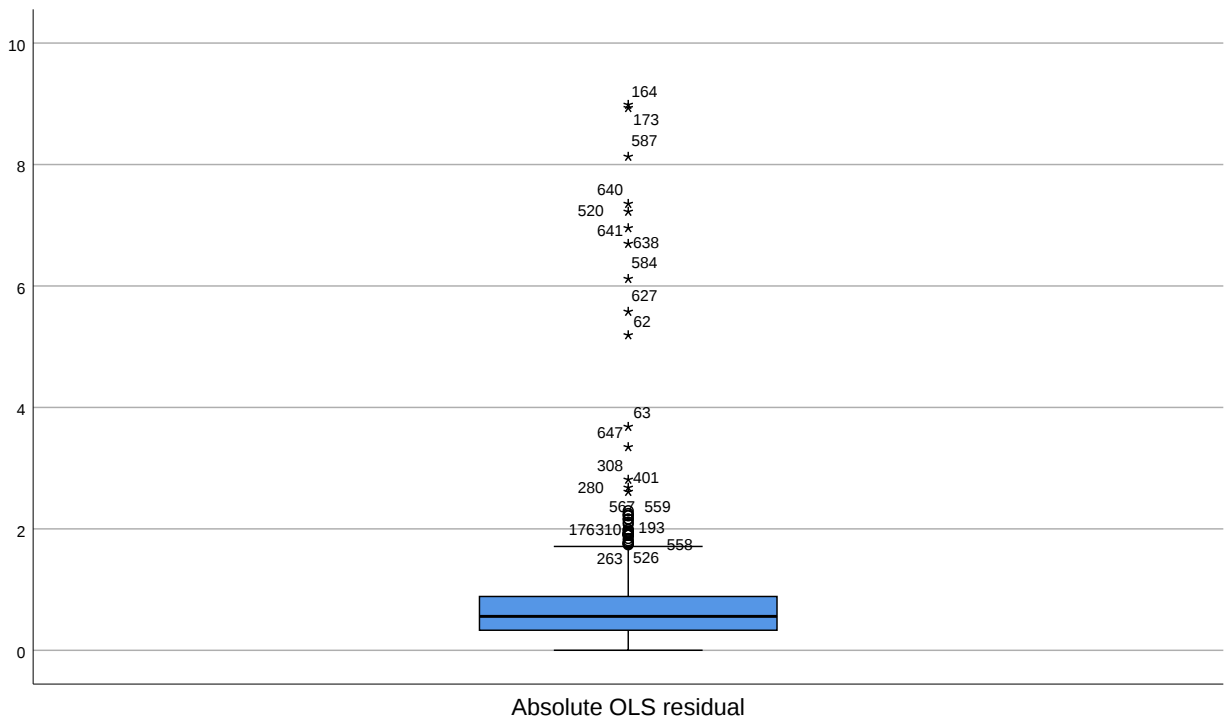


WLS Weight and Residual Diagnostics
Weight distribution and OLS residual pattern



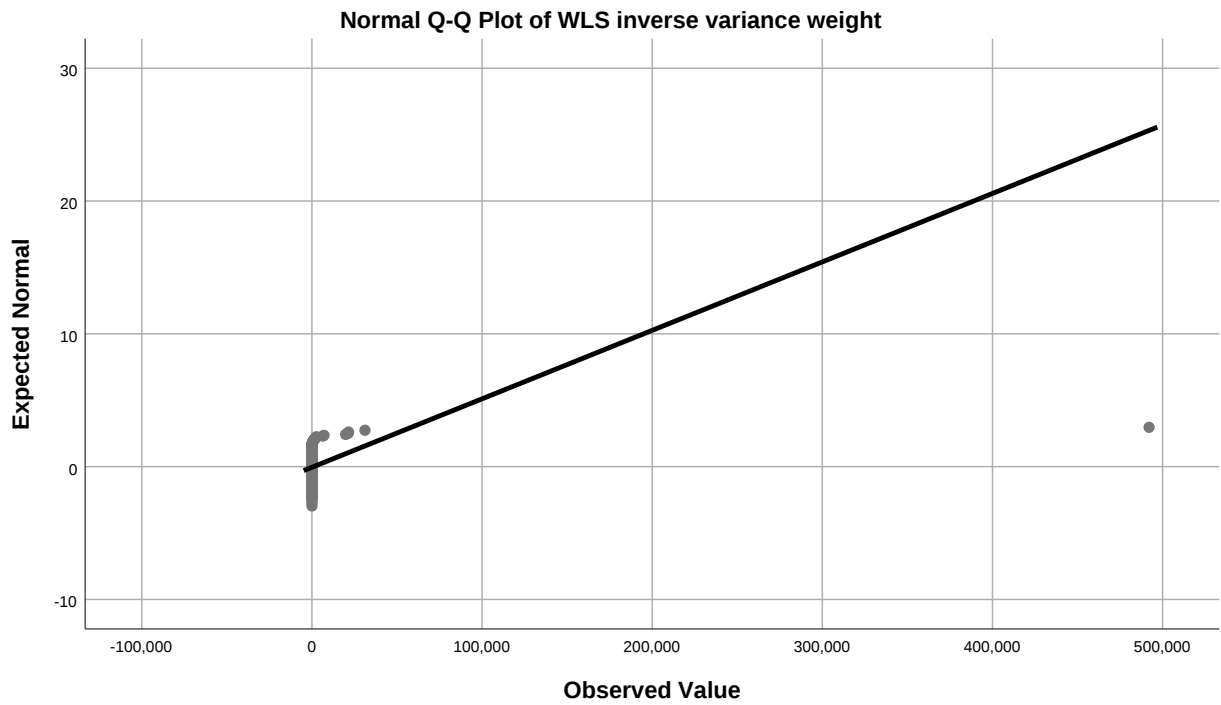
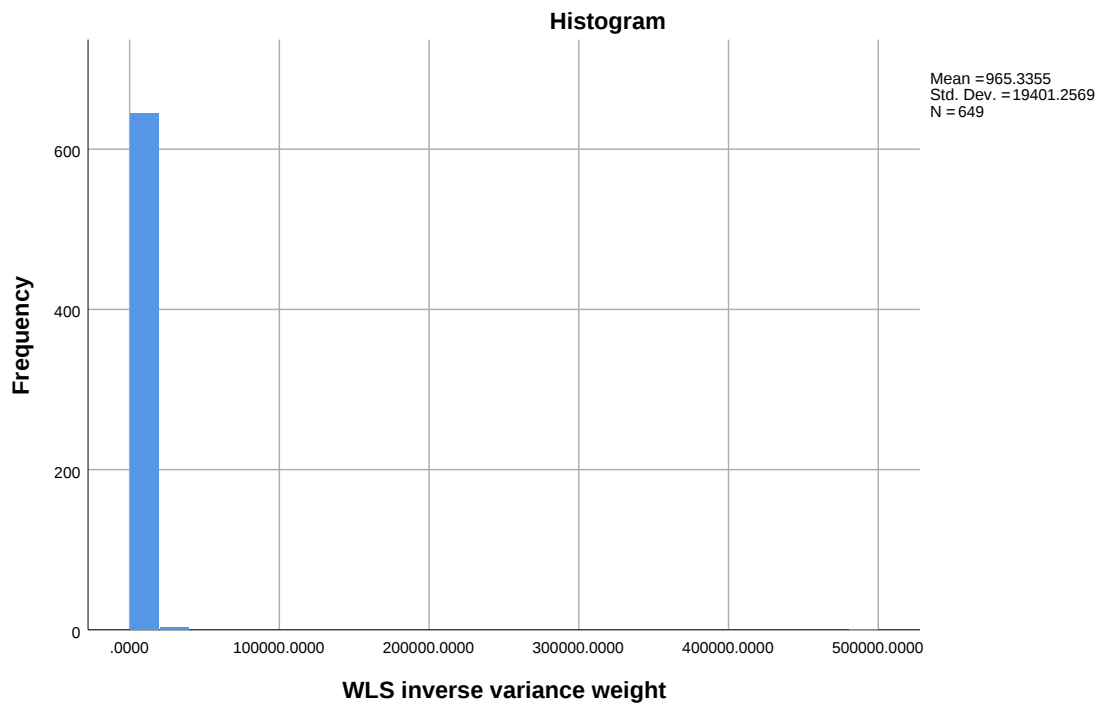
WLS Weight and Residual Diagnostics

Weight distribution and OLS residual pattern



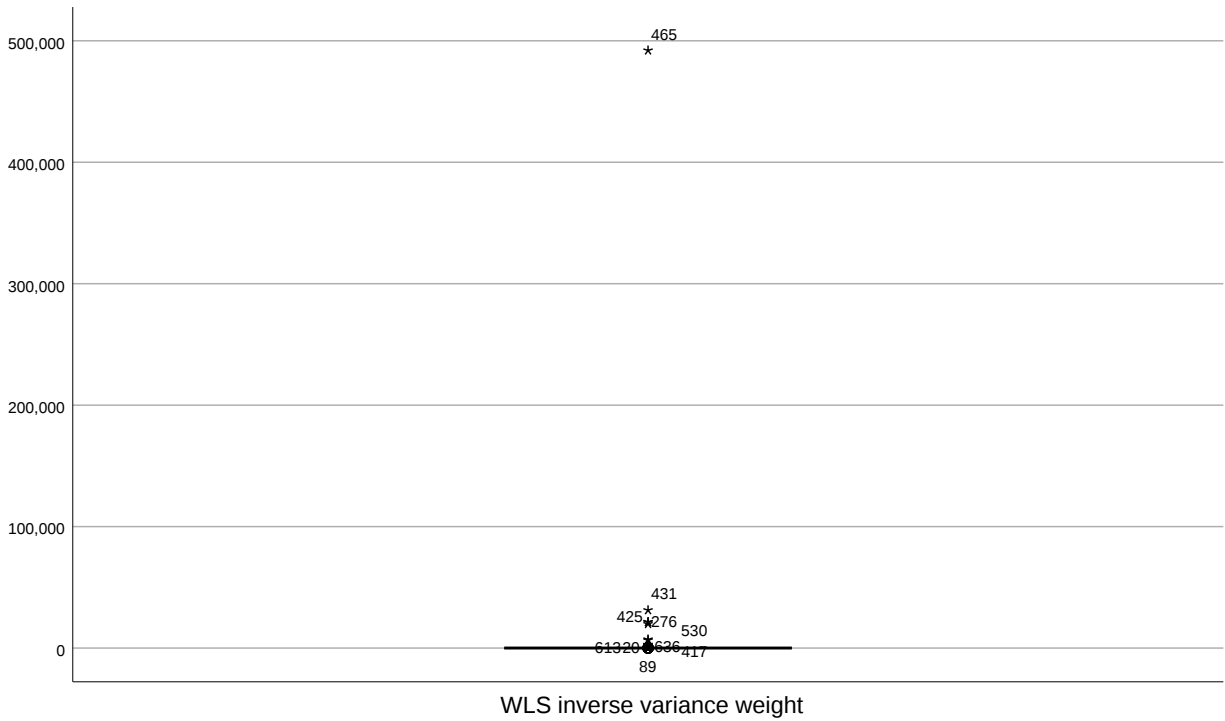
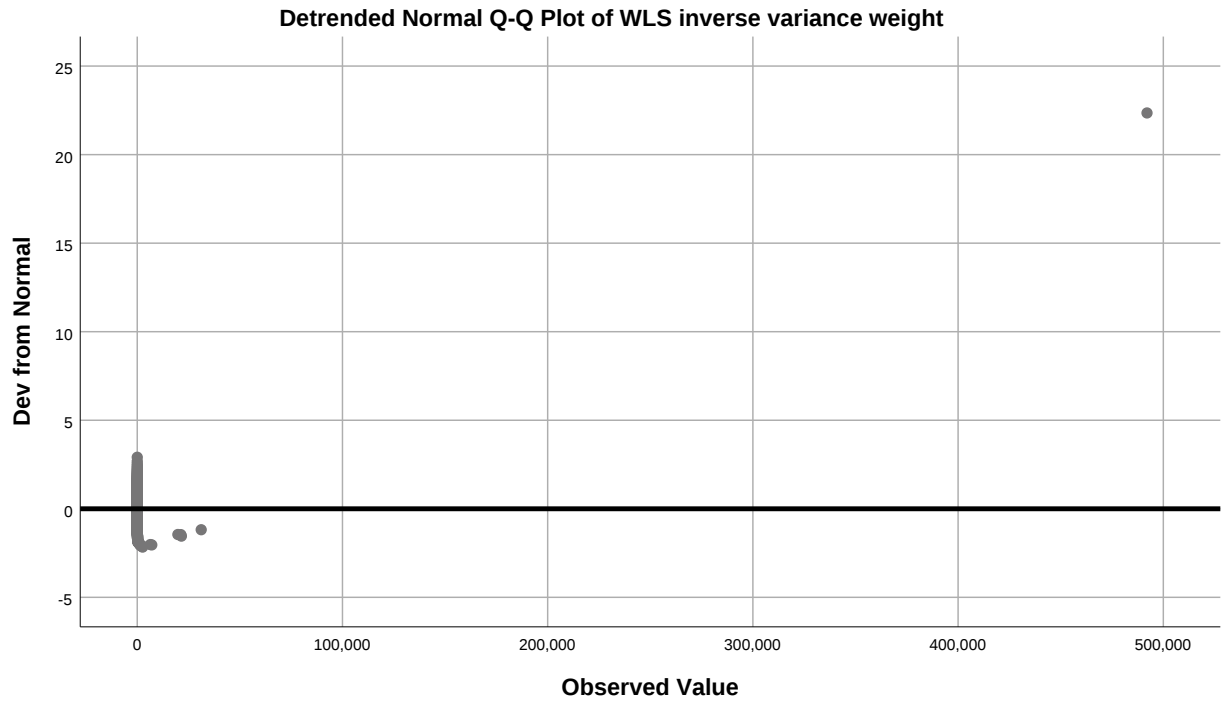
WLS inverse variance weight

WLS Weight and Residual Diagnostics
Weight distribution and OLS residual pattern



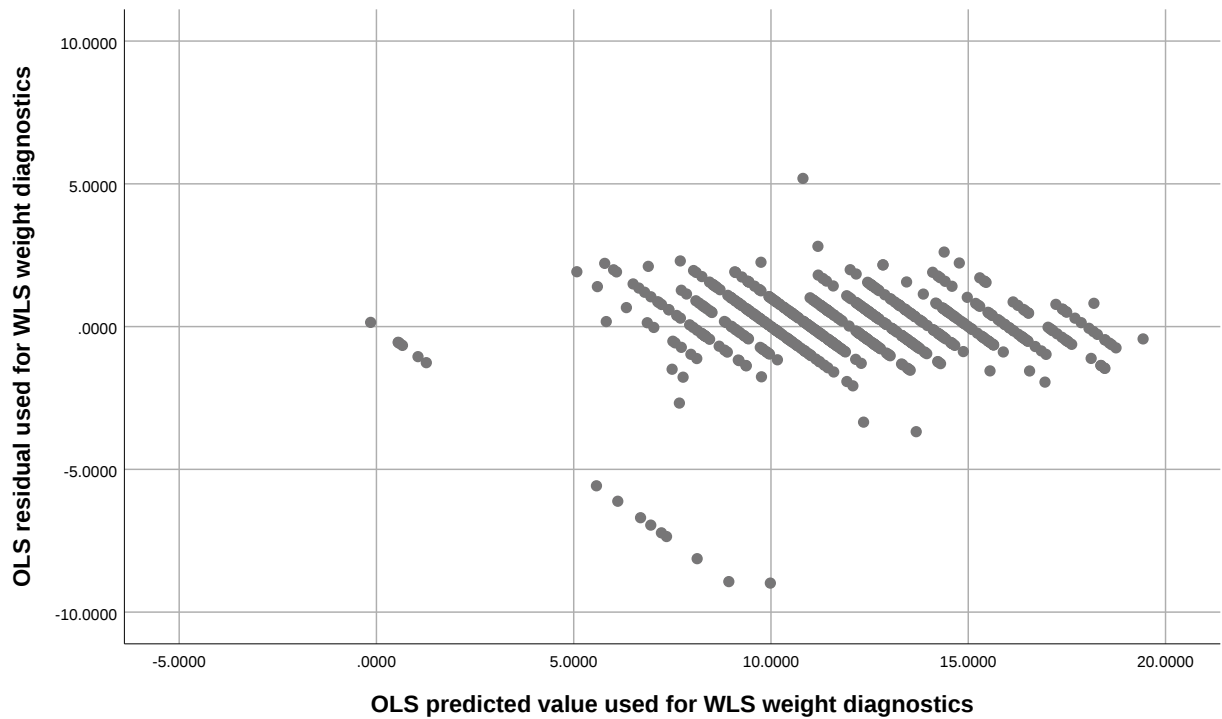
WLS Weight and Residual Diagnostics

Weight distribution and OLS residual pattern



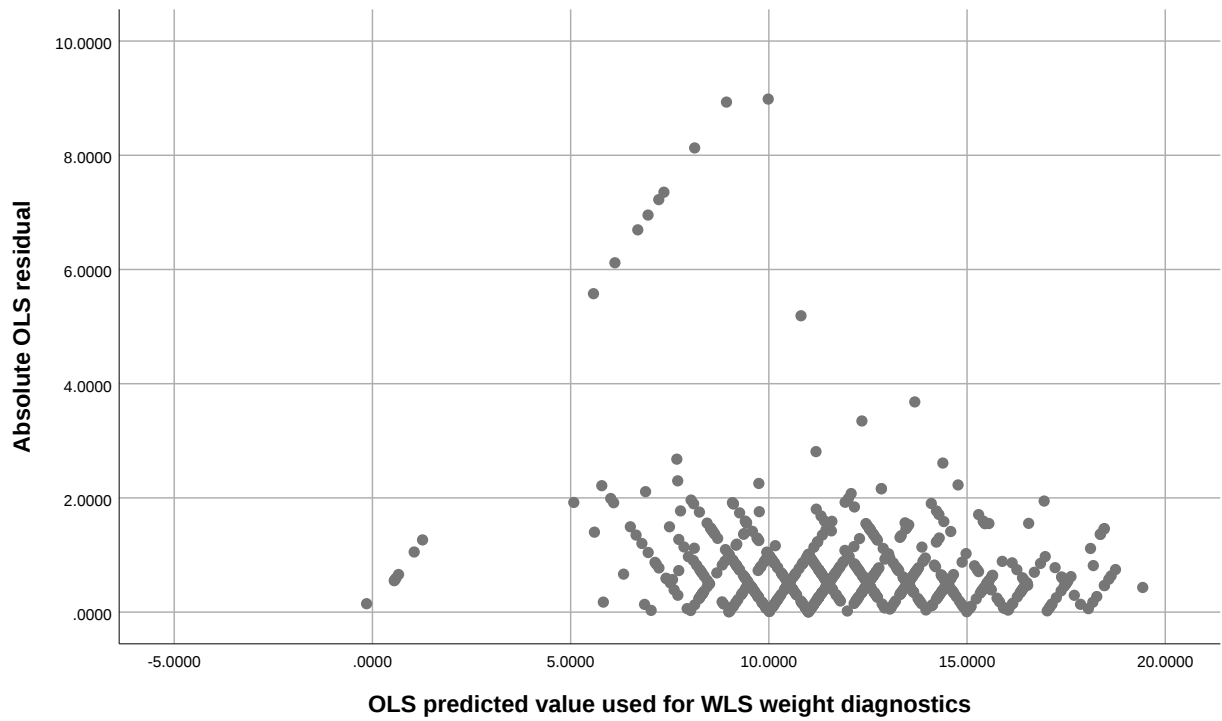
WLS Weight and Residual Diagnostics
Weight distribution and OLS residual pattern

Graph



Graph

WLS Weight and Residual Diagnostics
Weight distribution and OLS residual pattern



Weighted Least Squares Regression

Weighted Least Squares Regression
Weighted regression using inverse residual variance weights

Regression

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	Internet access dummy: yes, Sex dummy: 1 = male, 0 = female, Higher education intention dummy: yes, Second period grade, School dummy: 1 = MS, 0 = GP, Number of past class failures, traveltime, Student age, Medu, Weekly study time group, School absences, health, First period grade, Address dummy: 1 = urban, 0 = rural, Fedu ^b	.	Enter

a. Dependent Variable: Final grade / default continuous outcome for WLS regression

b. All requested variables entered.

Weighted Least Squares Regression
Weighted regression using inverse residual variance weights

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	1.000 ^a	.999	.999	.032

a. Predictors: (Constant), Internet access dummy: yes, Sex dummy: 1 = male, 0 = female, Higher education intention dummy: yes, Second period grade, School dummy: 1 = MS, 0 = GP, Number of past class failures, traveltime, Student age, Medu, Weekly study time group, School absences, health, First period grade, Address dummy: 1 = urban, 0 = rural, Fedu

b. Dependent Variable: Final grade / default continuous outcome for WLS regression

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	763862.036	15	50924.136	50171720.62	.000 ^b
	Residual	635.882	626487	.001		
	Total	764497.918	626502			

a. Dependent Variable: Final grade / default continuous outcome for WLS regression

b. Predictors: (Constant), Internet access dummy: yes, Sex dummy: 1 = male, 0 = female, Higher education intention dummy: yes, Second period grade, School dummy: 1 = MS, 0 = GP, Number of past class failures, traveltime, Student age, Medu, Weekly study time group, School absences, health, First period grade, Address dummy: 1 = urban, 0 = rural, Fedu

Weighted Least Squares Regression
Weighted regression using inverse residual variance weights

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.647	.004		-172.484	.000
	First period grade	.131	.000	.106	778.375	.000
	Second period grade	.877	.000	.930	6056.876	.000
	Weekly study time group	.050	.000	.028	218.312	.000
	Number of past class failures	-.213	.000	-.048	-517.153	.000
	School absences	.017	.000	.064	541.973	.000
	Student age	.035	.000	.021	167.258	.000
	Medu	-.048	.000	-.032	-167.101	.000
	Fedu	.036	.000	.024	106.621	.000
	traveltime	.137	.000	.050	453.697	.000
	health	-.048	.000	-.036	-295.598	.000
	School dummy: 1 = MS, 0 = GP	-.183	.000	-.052	-403.195	.000
	Sex dummy: 1 = male, 0 = female	-.180	.000	-.036	-457.090	.000
	Address dummy: 1 = urban, 0 = rural	.177	.000	.062	399.889	.000
	Higher education intention dummy: yes	.199	.001	.023	255.559	.000
	Internet access dummy: yes	.055	.001	.019	109.764	.000

Weighted Least Squares Regression
Weighted regression using inverse residual variance weights

Coefficients^a

Model		95.0% Confidence Interval for B	
		Lower Bound	Upper Bound
1	(Constant)	-.655	-.640
	First period grade	.130	.131
	Second period grade	.877	.877
	Weekly study time group	.050	.051
	Number of past class failures	-.214	-.212
	School absences	.017	.017
	Student age	.035	.035
	Medu	-.048	-.047
	Fedu	.035	.036
	traveltime	.137	.138
	health	-.049	-.048
	School dummy: 1 = MS, 0 = GP	-.184	-.182
	Sex dummy: 1 = male, 0 = female	-.181	-.180
	Address dummy: 1 = urban, 0 = rural	.176	.178
	Higher education intention dummy: yes	.198	.201
	Internet access dummy: yes	.054	.056

a. Dependent Variable: Final grade / default continuous outcome for WLS regression

Weighted Least Squares Regression
Weighted regression using inverse residual variance weights

Collinearity Diagnostics^a

Model	Dimension	Eigenvalue	Condition Index	(Constant)	Variance Proportions	
					First period grade	Second period grade
1	1	12.225	1.000	.00	.00	.00
	2	1.880	2.550	.00	.00	.00
	3	1.027	3.451	.00	.00	.00
	4	.533	4.787	.00	.00	.00
	5	.189	8.033	.00	.00	.00
	6	.052	15.361	.00	.00	.00
	7	.040	17.430	.00	.00	.00
	8	.019	25.611	.00	.00	.00
	9	.012	31.825	.00	.00	.01
	10	.010	34.255	.00	.00	.00
	11	.005	51.176	.00	.01	.02
	12	.004	54.318	.00	.00	.00
	13	.002	81.695	.00	.00	.03
	14	.001	100.457	.02	.05	.02
	15	.000	190.125	.02	.76	.70
	16	6.320E-5	439.804	.95	.17	.21

Weighted Least Squares Regression
Weighted regression using inverse residual variance weights

Collinearity Diagnostics^a

Model	Dimension	Variance Proportions				
		Weekly study time group	Number of past class failures	School absences	Student age	Medu
1	1	.00	.00	.00	.00	.00
	2	.00	.00	.00	.00	.00
	3	.00	.13	.00	.00	.00
	4	.00	.00	.03	.00	.00
	5	.00	.00	.03	.00	.02
	6	.03	.14	.09	.00	.00
	7	.22	.07	.04	.00	.01
	8	.01	.06	.06	.00	.00
	9	.06	.26	.01	.00	.01
	10	.02	.01	.01	.00	.15
	11	.33	.00	.04	.00	.21
	12	.01	.07	.03	.00	.33
	13	.18	.08	.04	.00	.00
	14	.01	.04	.49	.05	.05
	15	.01	.04	.13	.00	.03
	16	.13	.09	.01	.95	.20

Weighted Least Squares Regression
Weighted regression using inverse residual variance weights

Collinearity Diagnostics^a

Model	Dimension	Variance Proportions				
		Fedu	traveltime	health	School dummy: 1 = MS, 0 = GP	Sex dummy: 1 = male, 0 = female
1	1	.00	.00	.00	.00	.00
	2	.00	.00	.00	.00	.00
	3	.00	.00	.00	.00	.00
	4	.00	.00	.00	.00	.00
	5	.01	.00	.00	.00	.00
	6	.00	.00	.00	.01	.00
	7	.01	.01	.00	.00	.00
	8	.00	.01	.00	.03	.43
	9	.09	.02	.00	.31	.00
	10	.13	.18	.02	.00	.01
	11	.16	.23	.06	.00	.03
	12	.13	.02	.00	.33	.00
	13	.01	.25	.86	.12	.24
	14	.01	.03	.03	.04	.21
	15	.09	.25	.02	.16	.05
	16	.37	.00	.00	.00	.00

Weighted Least Squares Regression
Weighted regression using inverse residual variance weights

Collinearity Diagnostics^a

Model	Dimension	Variance Proportions		
		Address dummy: 1 = urban, 0 = rural	Higher education intention dummy: yes	Internet access dummy: yes
1	1	.00	.00	.00
	2	.01	.00	.01
	3	.00	.00	.00
	4	.00	.00	.01
	5	.06	.00	.00
	6	.23	.00	.17
	7	.01	.00	.15
	8	.00	.01	.00
	9	.01	.00	.03
	10	.08	.03	.01
	11	.01	.06	.00
	12	.47	.28	.21
	13	.00	.02	.01
	14	.00	.21	.31
	15	.08	.06	.05
	16	.04	.33	.05

a. Dependent Variable: Final grade / default continuous outcome for WLS regression

Residuals Statistics^a

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-.14	19.38	11.02	1.104	626503
Residual	-8.983	5.238	.000	.032	626503
Std. Predicted Value	-10.107	7.573	.000	1.000	626503
Std. Residual	-281.957	164.415	.000	1.000	626503

a. Dependent Variable: Final grade / default continuous outcome for WLS regression

WLS Model Diagnostics After Weighting

WLS Model Diagnostics After Weighting
Fitted values and residual context

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Unstandardized Predicted Value	649	-.14448	19.37759	11.8944981	2.98038088
Unstandardized Residual	649	-8.98286	5.23809	.0115112	1.23402807
Valid N (listwise)	649				

Explore

Case Processing Summary

	Valid		Cases Missing		Total	
	N	Percent	N	Percent	N	Percent
Unstandardized Residual	649	100.0%	0	0.0%	649	100.0%

Descriptives

		Statistic	Std. Error
Unstandardized Residual	Mean	.0115112	.04843984
	95% Confidence Interval for Mean	Lower Bound	-.0836068
		Upper Bound	.1066292
	5% Trimmed Mean	.0820514	
	Median	-.0012556	
	Variance	1.523	
	Std. Deviation	1.23402807	
	Minimum	-8.98286	
	Maximum	5.23809	
	Range	14.22095	
	Interquartile Range	1.11728	
	Skewness	-2.889	.096
	Kurtosis	18.331	.192

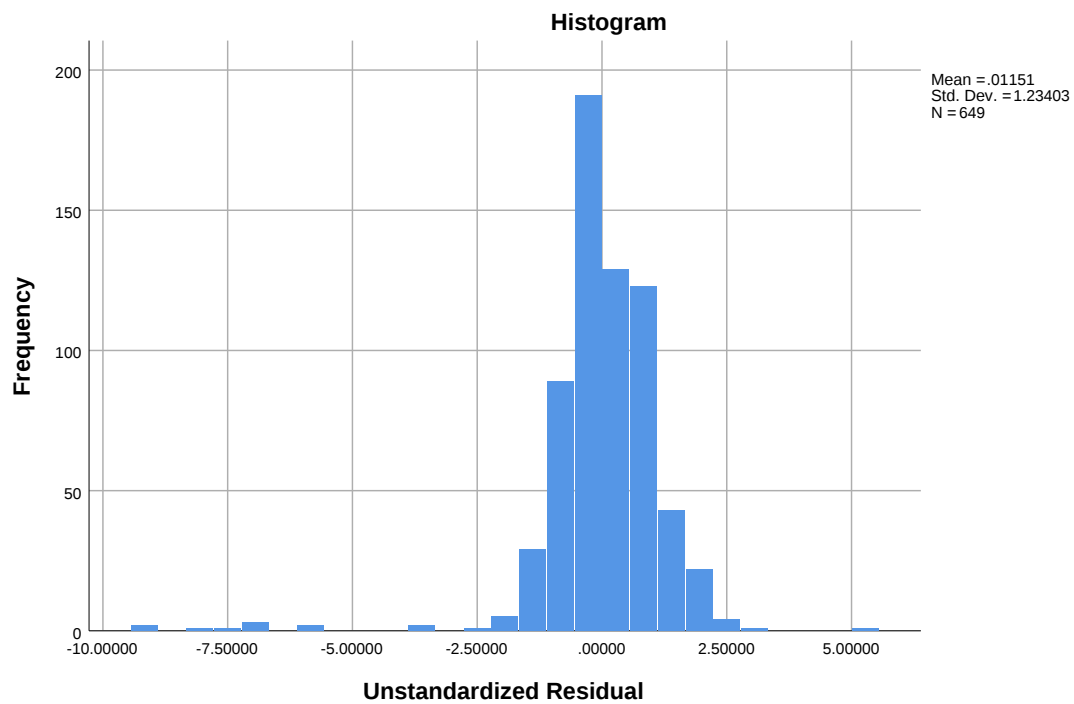
WLS Model Diagnostics After Weighting Fitted values and residual context

Tests of Normality

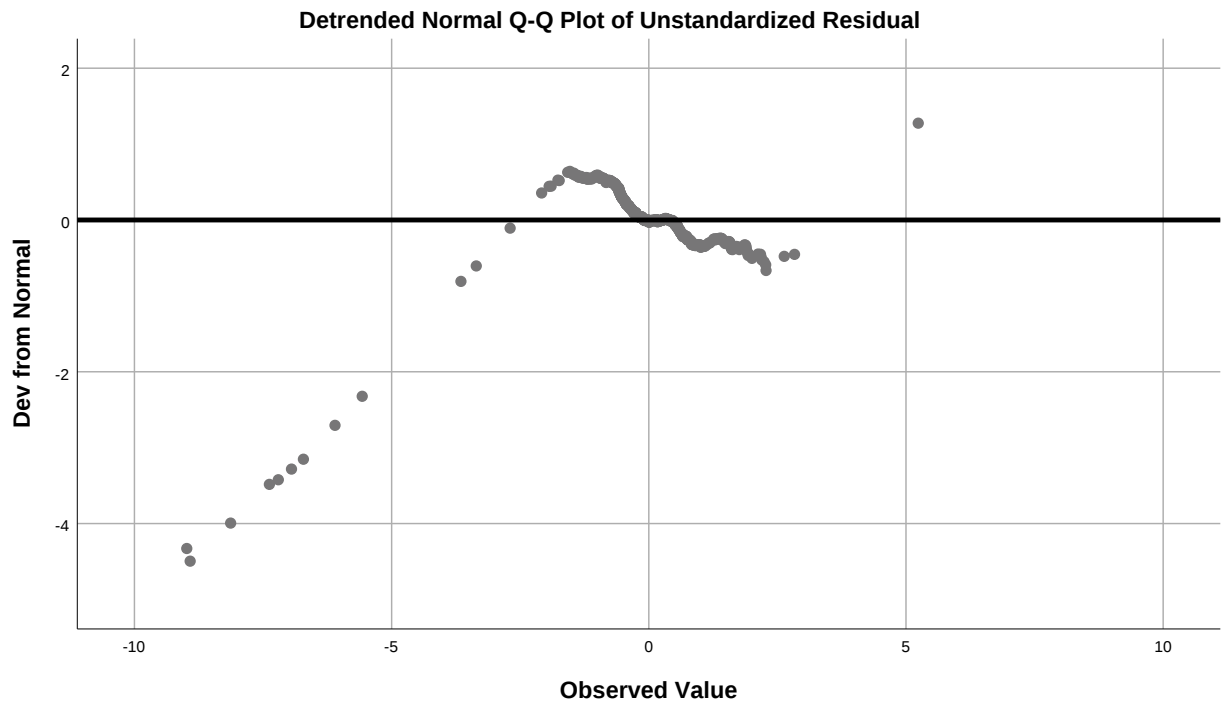
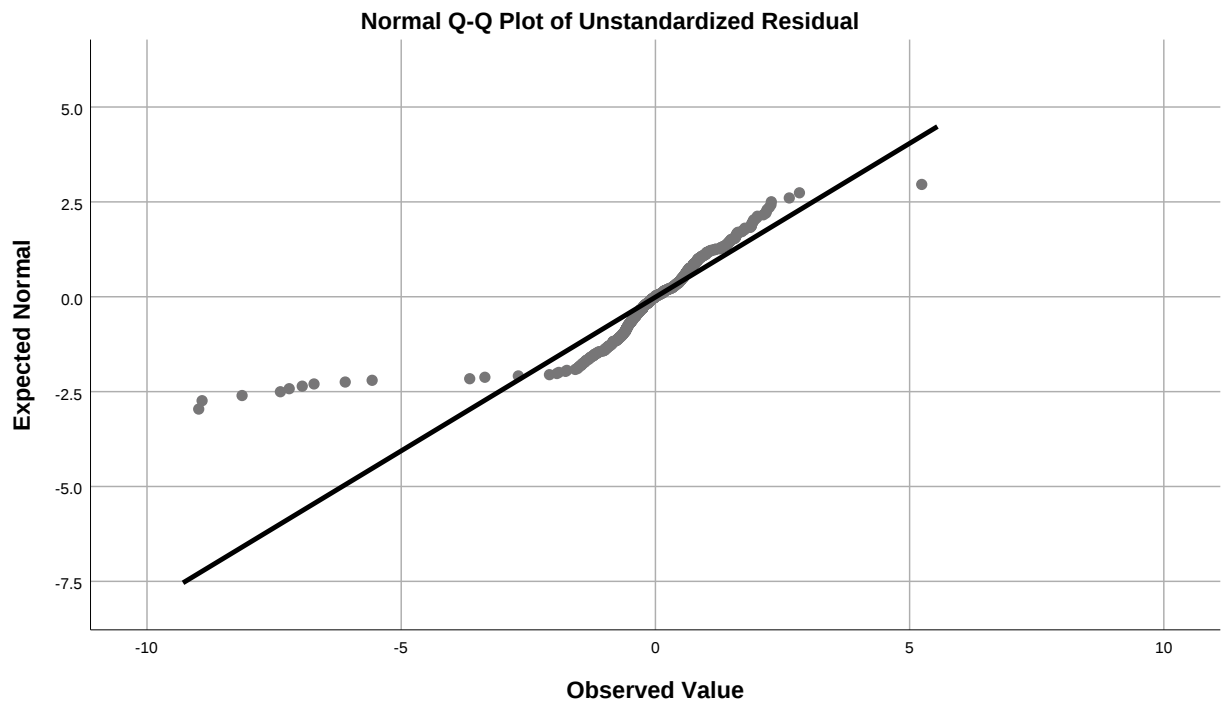
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unstandardized Residual	.142	649	.000	.763	649	.000

a. Lilliefors Significance Correction

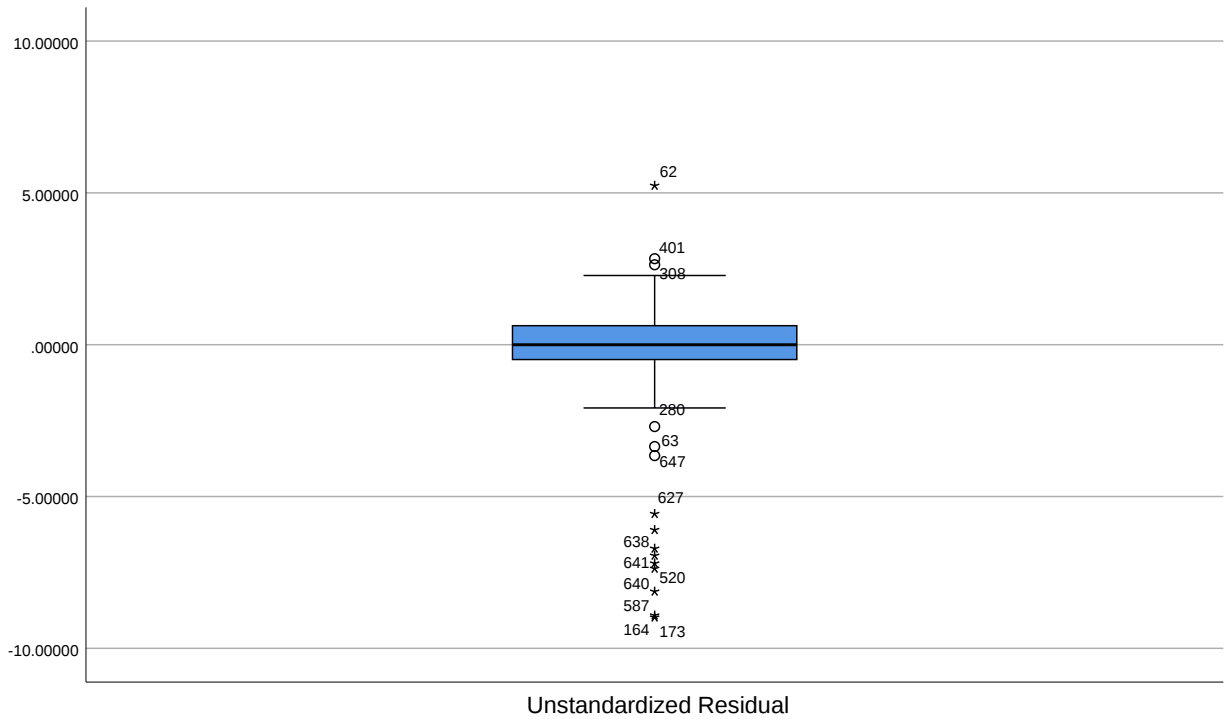
Unstandardized Residual



WLS Model Diagnostics After Weighting
Fitted values and residual context

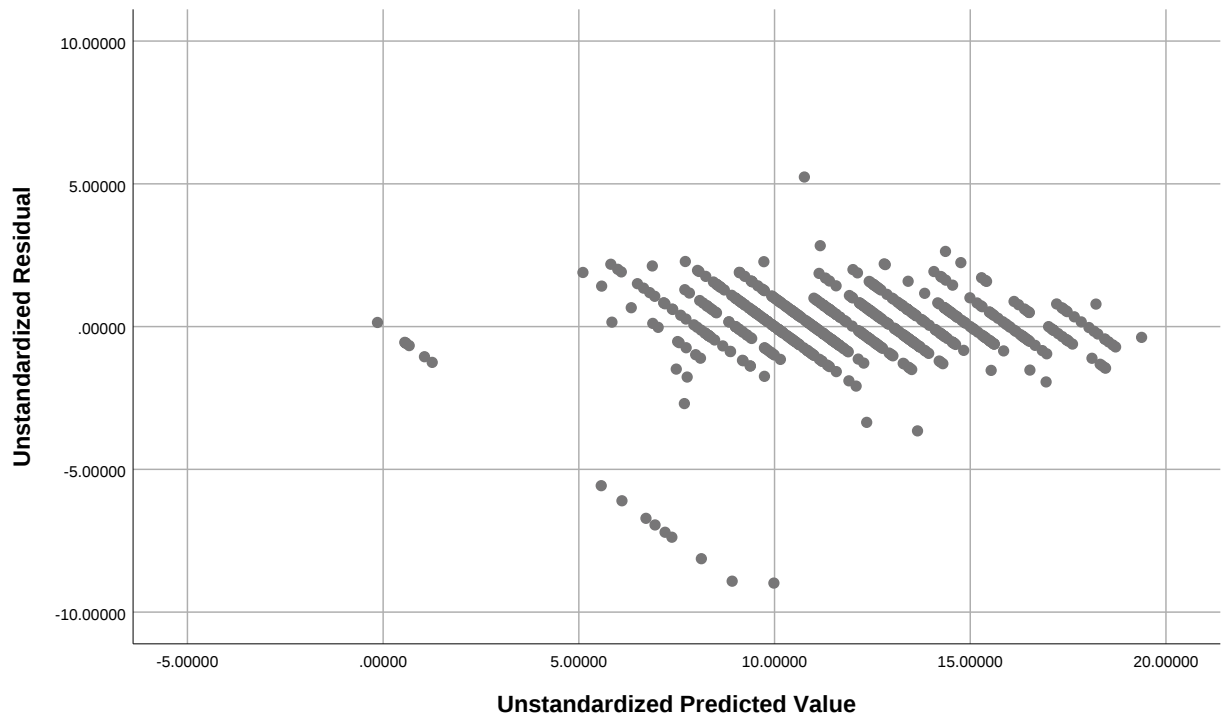


WLS Model Diagnostics After Weighting
Fitted values and residual context



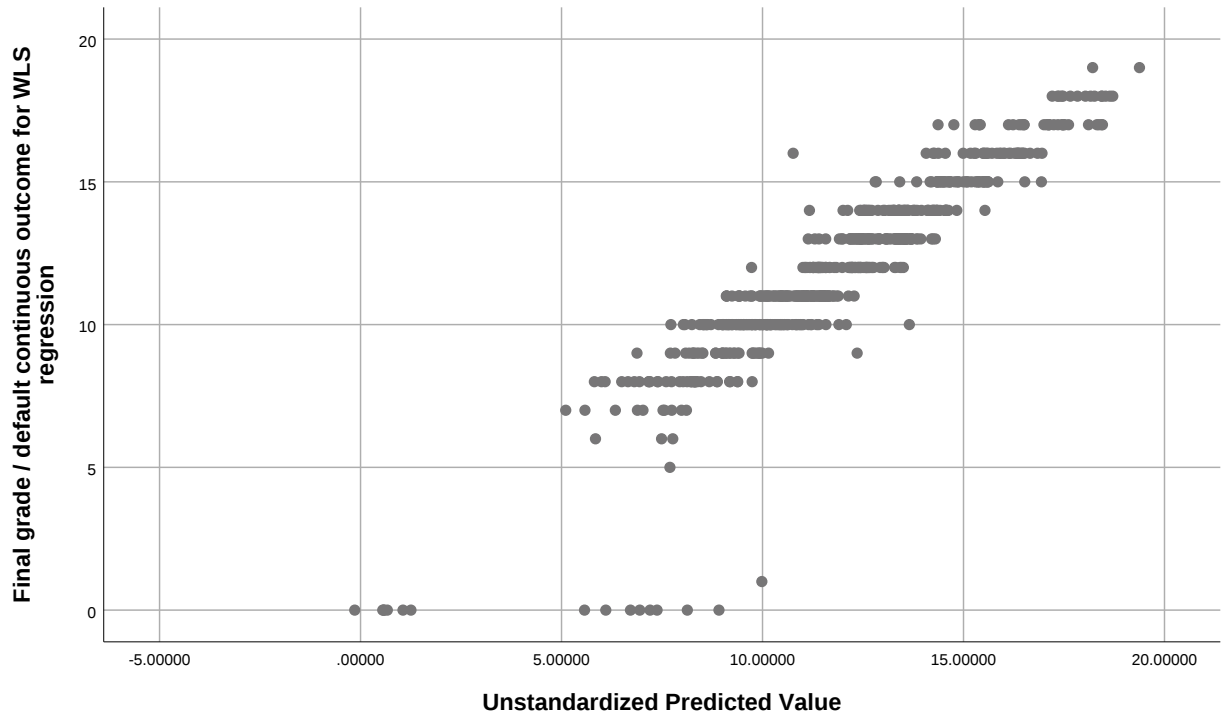
Graph

WLS Model Diagnostics After Weighting
Fitted values and residual context



Graph

WLS Model Diagnostics After Weighting
Fitted values and residual context



WLS Reporting Notes

WLS Reporting Notes
How to report the model