

Host

Notes

Output Created		12-JUL-2026 11:02:06
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\sav\Random-Effects-Regression-data.sav
	Active Dataset	RandomEffectsData
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		HOST COMMAND=["if not exist "D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output " mkdir "D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output "].
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.08

Host

Notes

Output Created		12-JUL-2026 11:02:06
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\sav\Random-Effects-Regression-data.sav
	Active Dataset	RandomEffectsData
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		HOST COMMAND=["if not exist "D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\sav" mkdir "D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\sav""].
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.07

Host

Notes

Output Created		12-JUL-2026 11:02:06
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\sav\Random-Effects-Regression-data.sav
	Active Dataset	RandomEffectsData
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		HOST COMMAND=["if not exist "D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\spv" mkdir "D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\spv""].
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.08

Host

Notes

Output Created		12-JUL-2026 11:02:07
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\sav\Random-Effects-Regression-data.sav
	Active Dataset	RandomEffectsData
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		HOST COMMAND=["if not exist "D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\pdf" mkdir "D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\pdf""].
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.06

Host

Notes

Output Created		12-JUL-2026 11:02:07
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\sav\Random-Effects-Regression-data.sav
	Active Dataset	RandomEffectsData
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		HOST COMMAND=['del /Q "D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\sav*.sav" 2>nul'].
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.06

D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\sav\Random-Effects-Regression-data.sav

Host

Notes

Output Created		12-JUL-2026 11:02:07
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\ sav\Random-Effects- Regression-data.sav
	Active Dataset	RandomEffectsData
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		HOST COMMAND=['del /Q "D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\ spv*.spv" 2>nul'].
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.06

Host

Notes

Output Created		12-JUL-2026 11:02:07
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\ sav\Random-Effects- Regression-data.sav
	Active Dataset	RandomEffectsData
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		HOST COMMAND=['del /Q "D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\ pdf*.pdf" 2>nul'].
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.07

Random Effects Regression

Random Effects Regression
Import dataset.csv

Dataset Name

Notes

Output Created		12-JUL-2026 11:02:07
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\dataset.csv
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649
Syntax		DATASET NAME RandomEffectsData WINDOW=FRONT.
Resources	Processor Time	00:00:00.00
	Elapsed Time	00:00:00.00

Warnings

The active dataset will replace the existing dataset named
RandomEffectsData.

Random Effects Regression

Random Effects Regression
Prepare repeated grade data

Variables to Cases

Notes

Output Created		12-JUL-2026 11:02:07
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\dataset.csv
	Active Dataset	RandomEffectsData
	Filter	<none>
	Weight	<none>
	Split File	<none>
Syntax		VARSTOCASES /MAKE grade_score FROM G1 G2 G3 /INDEX=grade_period /KEEP=student_id school sex age address famsize Pstatus Medu Fedu traveltime studytime failures schoolsup famsup paid activities nursery higher internet romantic famrel freetime goout Dalc Walc health absences /NULL=DROP.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02

Generated Variables

Name	Label
grade_period	<none>
grade_score	<none>

Random Effects Regression
Prepare repeated grade data

**Processing
Statistics**

Variables In	34
Variables Out	29

Random Effects Regression

Random Effects Regression
Prepared data summaries and charts

Frequencies

Notes

Output Created		12-JUL-2026 11:02:08
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\ sav\Random-Effects- Regression-data.sav
	Active Dataset	RandomEffectsData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	1947
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data.
Syntax		FREQUENCIES VARIABLES=grade_perio d school_MS sex_M address_U /ORDER=ANALYSIS.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02

Statistics

		Grade period: 1=G1, 2=G2, 3=G3	school_MS	sex_M	address_U
N	Valid	1947	1947	1947	1947
	Missing	0	0	0	0

Frequency Table

Random Effects Regression
Prepared data summaries and charts

Grade period: 1=G1, 2=G2, 3=G3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	G1	649	33.3	33.3	33.3
	G2	649	33.3	33.3	66.7
	G3	649	33.3	33.3	100.0
	Total	1947	100.0	100.0	

school_MS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Reference / No	1269	65.2	65.2	65.2
	Target / Yes	678	34.8	34.8	100.0
	Total	1947	100.0	100.0	

sex_M

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Reference / No	1149	59.0	59.0	59.0
	Target / Yes	798	41.0	41.0	100.0
	Total	1947	100.0	100.0	

address_U

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Reference / No	591	30.4	30.4	30.4
	Target / Yes	1356	69.6	69.6	100.0
	Total	1947	100.0	100.0	

Descriptives

Random Effects Regression
Prepared data summaries and charts

Notes

Output Created		12-JUL-2026 11:02:08
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\ sav\Random-Effects- Regression-data.sav
	Active Dataset	RandomEffectsData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	1947
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	All non-missing data are used.
Syntax		DESCRIPTIVES VARIABLES=grade_score studytime failures absences age Medu Fedu traveltime famrel freetime goout Dalc Walc health /STATISTICS=MEAN STDDEV MIN MAX.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.01

Random Effects Regression
Prepared data summaries and charts

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Repeated grade outcome created from G1, G2, and G3	1947	0	19	11.63	2.976
studytime	1947	1	4	1.93	.829
failures	1947	0	3	.22	.593
absences	1947	0	32	3.66	4.638
age	1947	15	22	16.74	1.218
Medu	1947	0	4	2.51	1.134
Fedu	1947	0	4	2.31	1.099
traveltime	1947	1	4	1.57	.748
famrel	1947	1	5	3.93	.955
freetime	1947	1	5	3.18	1.051
goout	1947	1	5	3.18	1.175
Dalc	1947	1	5	1.50	.924
Walc	1947	1	5	2.28	1.284
health	1947	1	5	3.54	1.446
Valid N (listwise)	1947				

Means

Random Effects Regression
Prepared data summaries and charts

Notes

Output Created		12-JUL-2026 11:02:08
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\ sav\Random-Effects- Regression-data.sav
	Active Dataset	RandomEffectsData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	1947
Missing Value Handling	Definition of Missing	For each dependent variable in a table, user- defined missing values for the dependent and all grouping variables are treated as missing.
	Cases Used	Cases used for each table have no missing values in any independent variable, and not all dependent variables have missing values.
Syntax		MEANS TABLES=grade_score BY grade_period /CELLS=COUNT MEAN STDDEV MIN MAX.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02

Random Effects Regression
Prepared data summaries and charts

Case Processing Summary

	Included		Cases Excluded		Total	
	N	Percent	N	Percent	N	Percent
Repeated grade outcome created from G1, G2, and G3 * Grade period: 1=G1, 2=G2, 3=G3	1947	100.0%	0	0.0%	1947	100.0%

Report

Repeated grade outcome created from G1, G2, and G3

Grade period: 1=G1, 2=G2, 3=G3

	N	Mean	Std. Deviation	Minimum	Maximum
G1	649	11.40	2.745	0	19
G2	649	11.57	2.914	0	19
G3	649	11.91	3.231	0	19
Total	1947	11.63	2.976	0	19

Explore

Random Effects Regression
Prepared data summaries and charts

Notes

Output Created		12-JUL-2026 11:02:08
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\ sav\Random-Effects- Regression-data.sav
	Active Dataset	RandomEffectsData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	1947
Missing Value Handling	Definition of Missing	User-defined missing values for dependent variables are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any dependent variable or factor used.
Syntax		EXAMINE VARIABLES=grade_score BY grade_period /PLOT BOXPLOT HISTOGRAM NPLOT /COMPARE GROUPS /STATISTICS DESCRIPTIVES /INTERVAL 95 /MISSING LISTWISE /NOTOTAL.
Resources	Processor Time	00:00:08.02
	Elapsed Time	00:00:03.64

Grade period: 1=G1, 2=G2, 3=G3

Random Effects Regression
Prepared data summaries and charts

Case Processing Summary

		Cases			
		Valid		Missing	
Grade period: 1=G1, 2=G2, 3=G3		N	Percent	N	Percent
Repeated grade outcome created from G1, G2, and G3	G1	649	100.0%	0	0.0%
	G2	649	100.0%	0	0.0%
	G3	649	100.0%	0	0.0%

Case Processing Summary

		Cases	
		Total	
Grade period: 1=G1, 2=G2, 3=G3		N	Percent
Repeated grade outcome created from G1, G2, and G3	G1	649	100.0%
	G2	649	100.0%
	G3	649	100.0%

Descriptives

Grade period: 1=G1, 2=G2, 3=G3			Statistic	Std. Error
Repeated grade outcome created from G1, G2, and G3	G1	Mean	11.40	.108
		95% Confidence Interval for Mean	Lower Bound	11.19
			Upper Bound	11.61
		5% Trimmed Mean	11.39	
		Median	11.00	
		Variance	7.536	
		Std. Deviation	2.745	
		Minimum	0	
		Maximum	19	
		Range	19	
		Interquartile Range	3	
		Skewness	-.003	.096
		Kurtosis	.037	.192
	G2	Mean	11.57	.114
		95% Confidence Interval for Mean	Lower Bound	11.35
			Upper Bound	11.79
		5% Trimmed Mean	11.60	

Random Effects Regression
Prepared data summaries and charts

Descriptives

Grade period: 1=G1, 2=G2, 3=G3		Statistic	Std. Error
G3	Median	11.00	
	Variance	8.489	
	Std. Deviation	2.914	
	Minimum	0	
	Maximum	19	
	Range	19	
	Interquartile Range	3	
	Skewness	-.360	.096
	Kurtosis	1.662	.192
	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

Tests of Normality

Grade period: 1=G1, 2=G2, 3=G3		Kolmogorov-Smirnov ^a			Shapiro-...
		Statistic	df	Sig.	Statistic
Repeated grade outcome created from G1, G2, and G3	G1	.086	649	.000	.986
	G2	.088	649	.000	.962
	G3	.124	649	.000	.926

Random Effects Regression
Prepared data summaries and charts

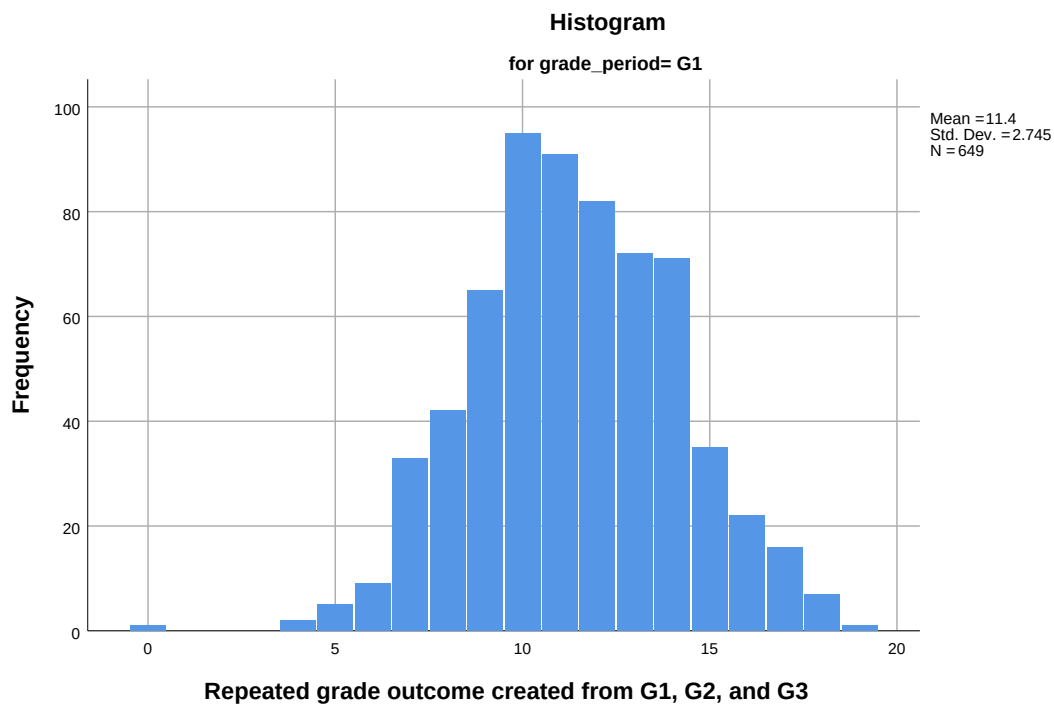
Tests of Normality

	Grade period: 1=G1, 2=G2, 3=G3		Shapiro-Wilk	
			df	Sig.
	Repeated grade outcome created from G1, G2, and G3	G1	649	.000
		G2	649	.000
		G3	649	.000

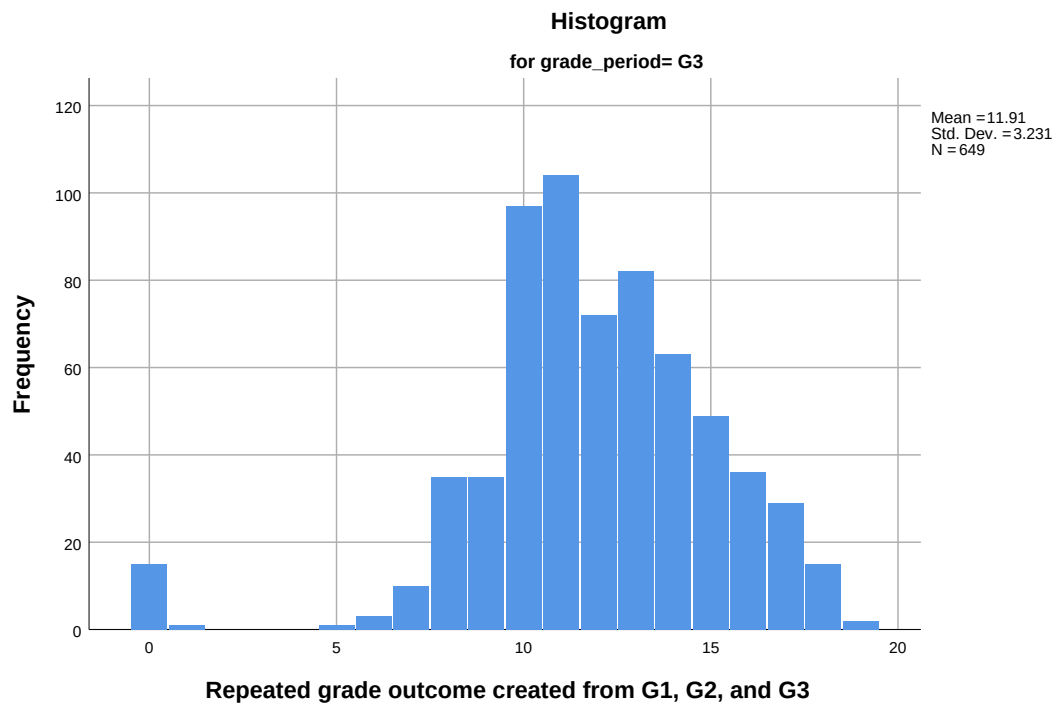
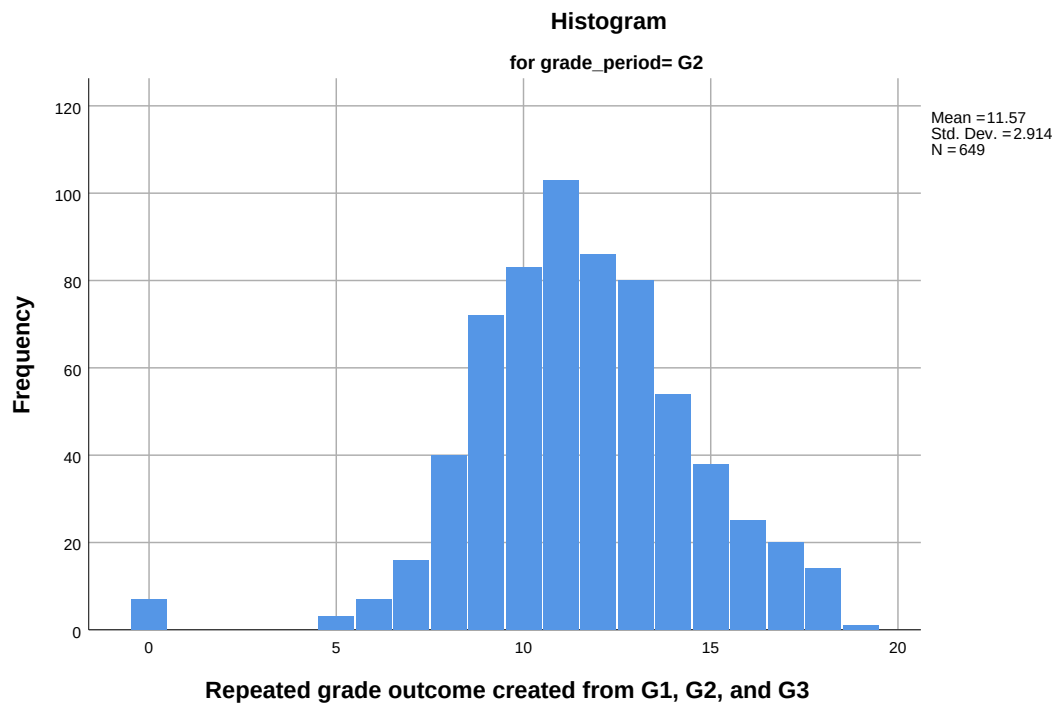
a. Lilliefors Significance Correction

Repeated grade outcome created from G1, G2, and G3

Histograms

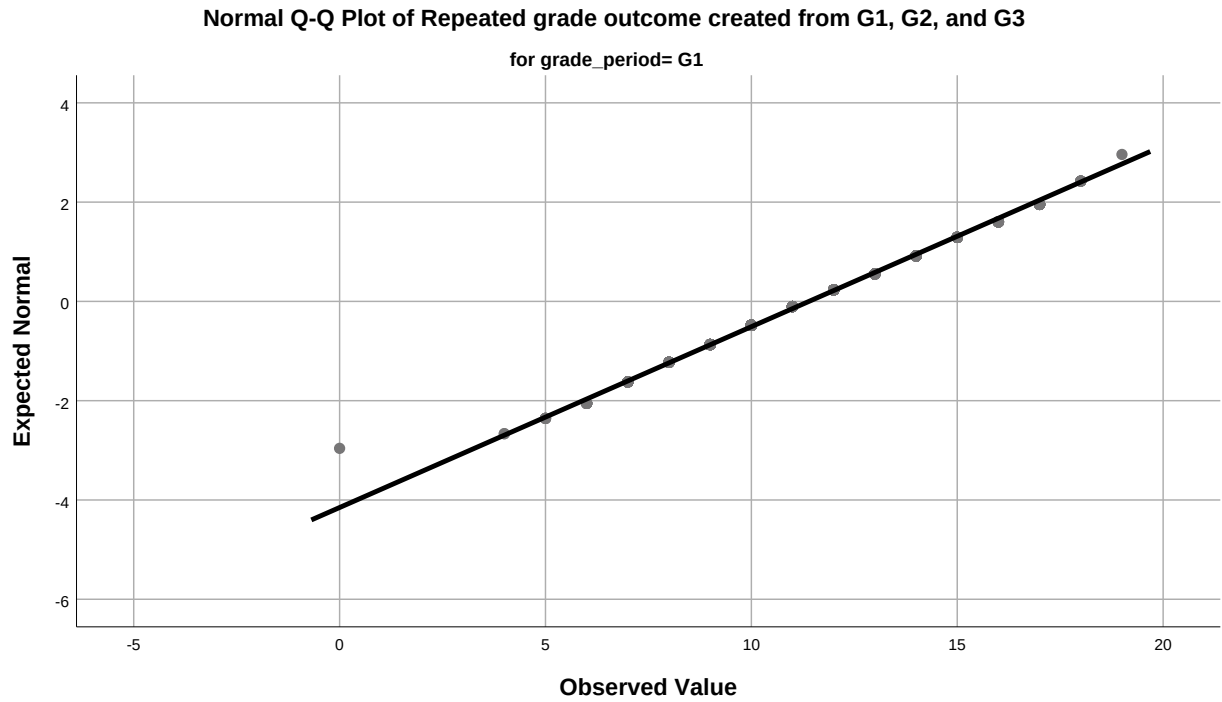


Random Effects Regression
Prepared data summaries and charts



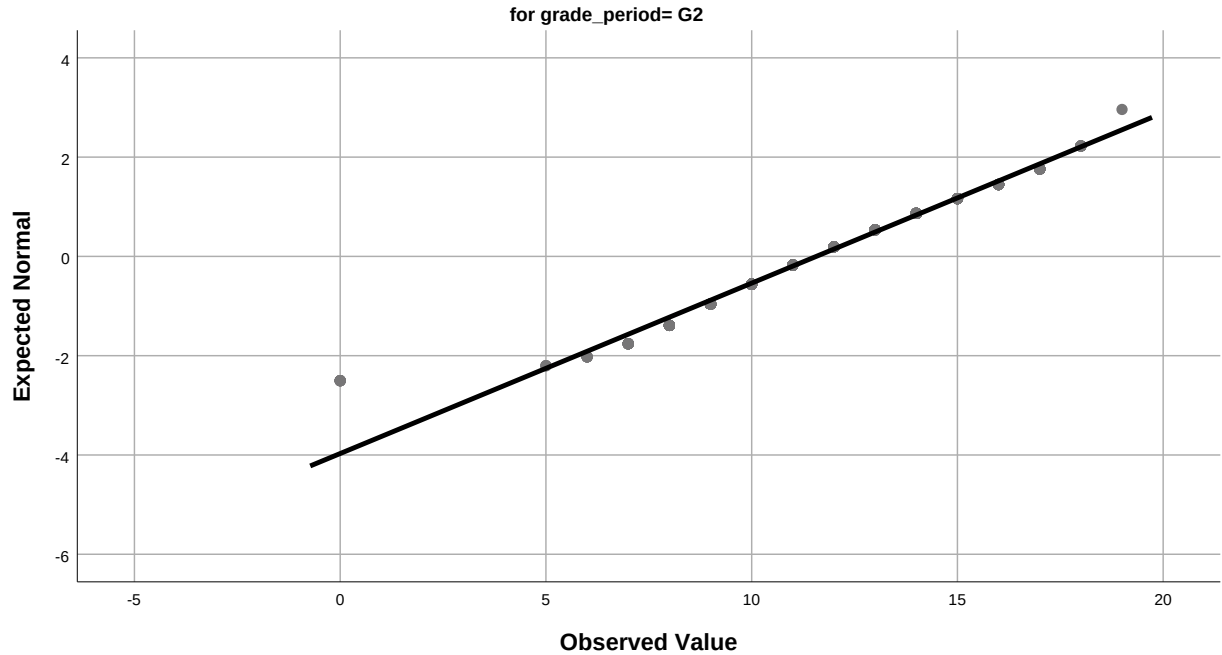
Random Effects Regression
Prepared data summaries and charts

Normal Q-Q Plots

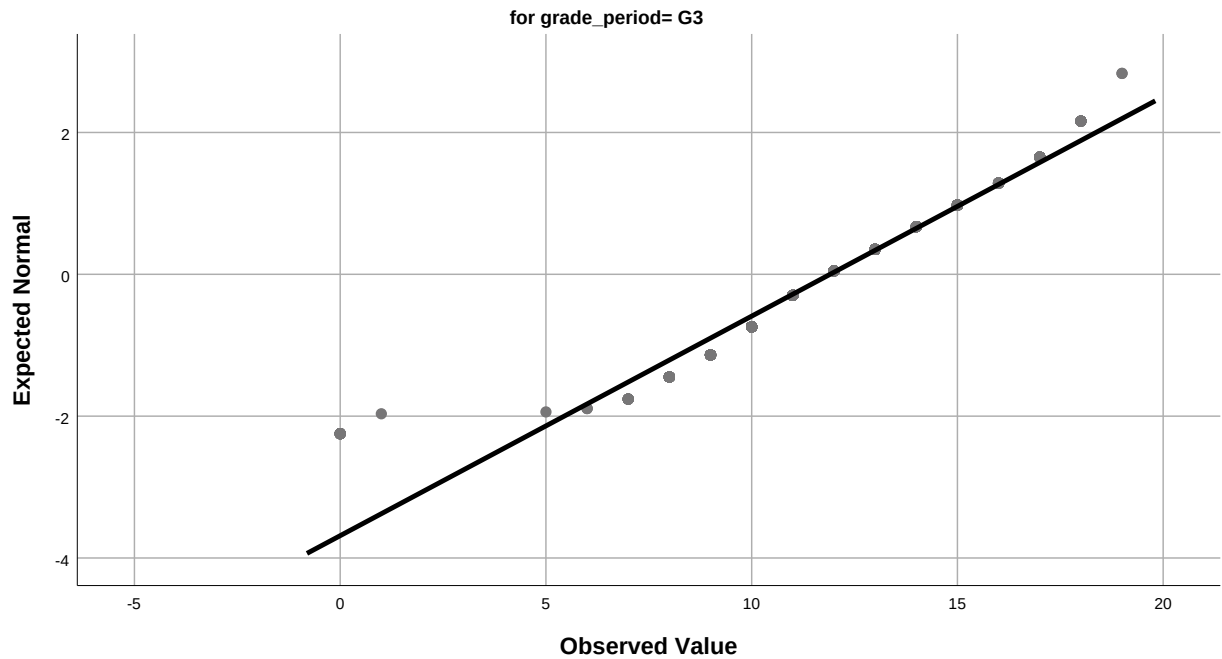


Random Effects Regression
Prepared data summaries and charts

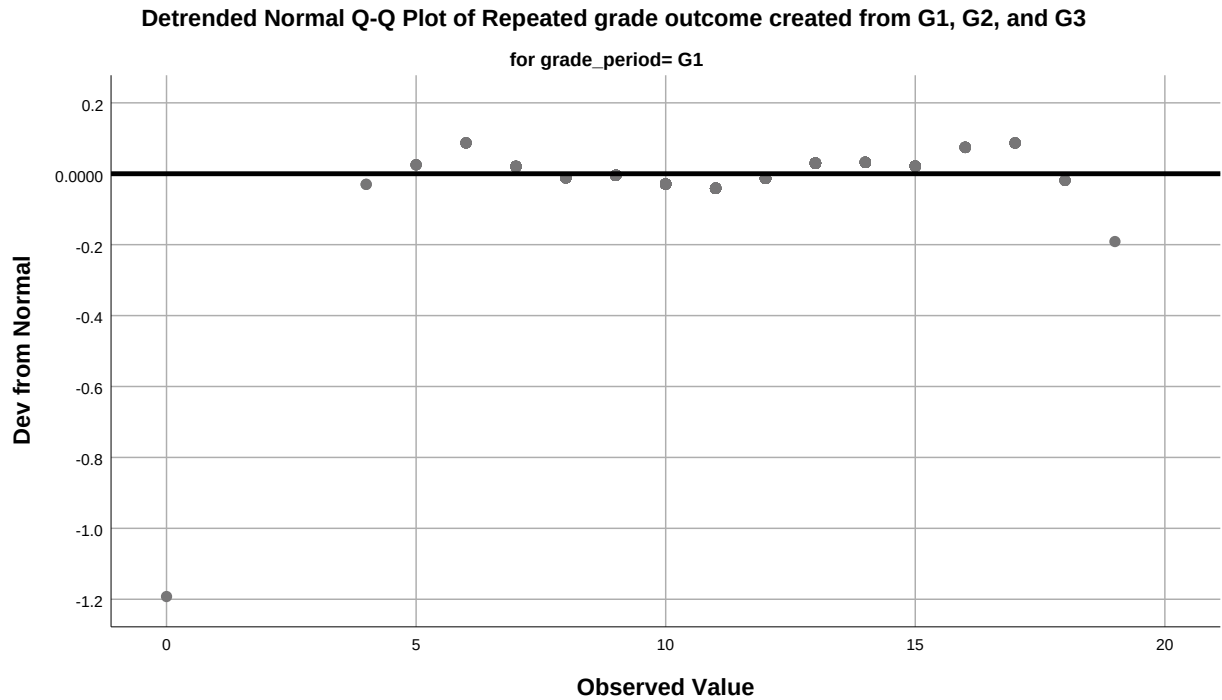
Normal Q-Q Plot of Repeated grade outcome created from G1, G2, and G3



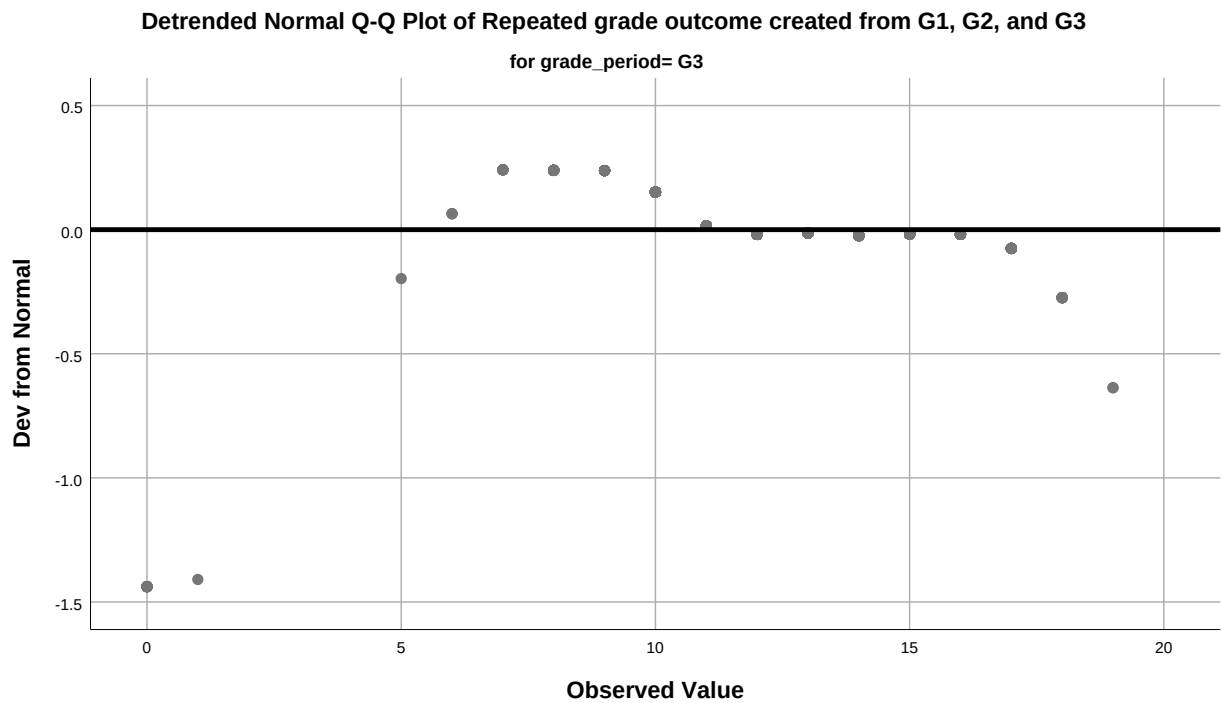
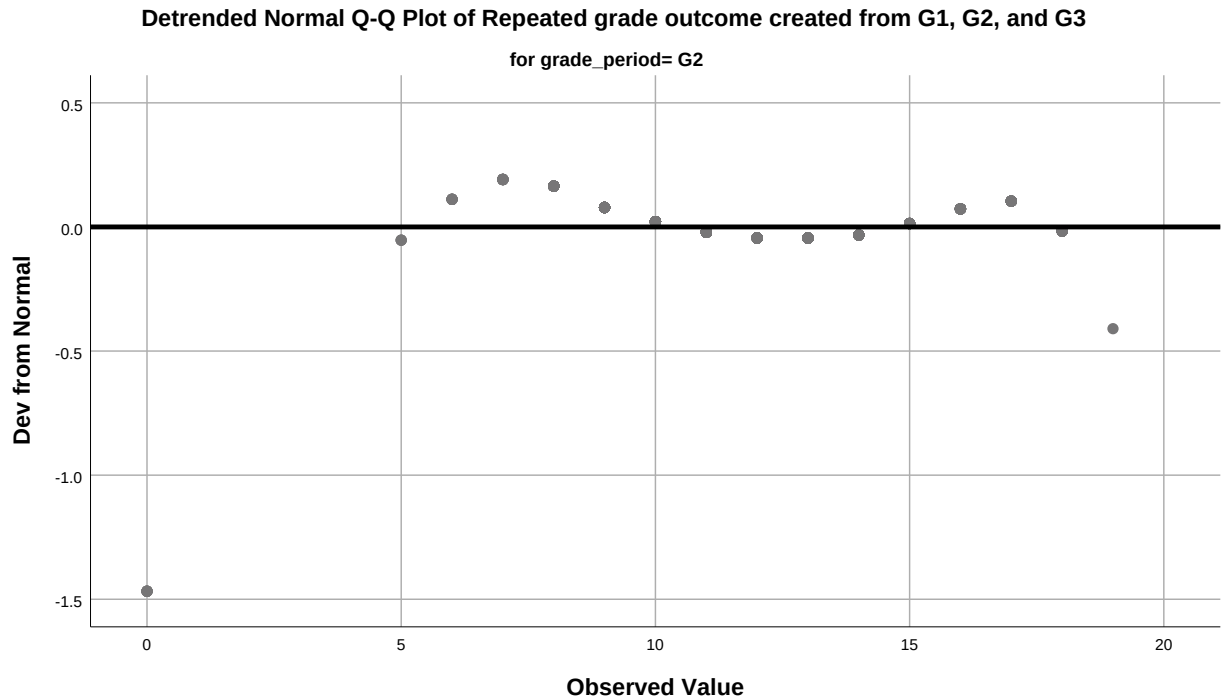
Normal Q-Q Plot of Repeated grade outcome created from G1, G2, and G3



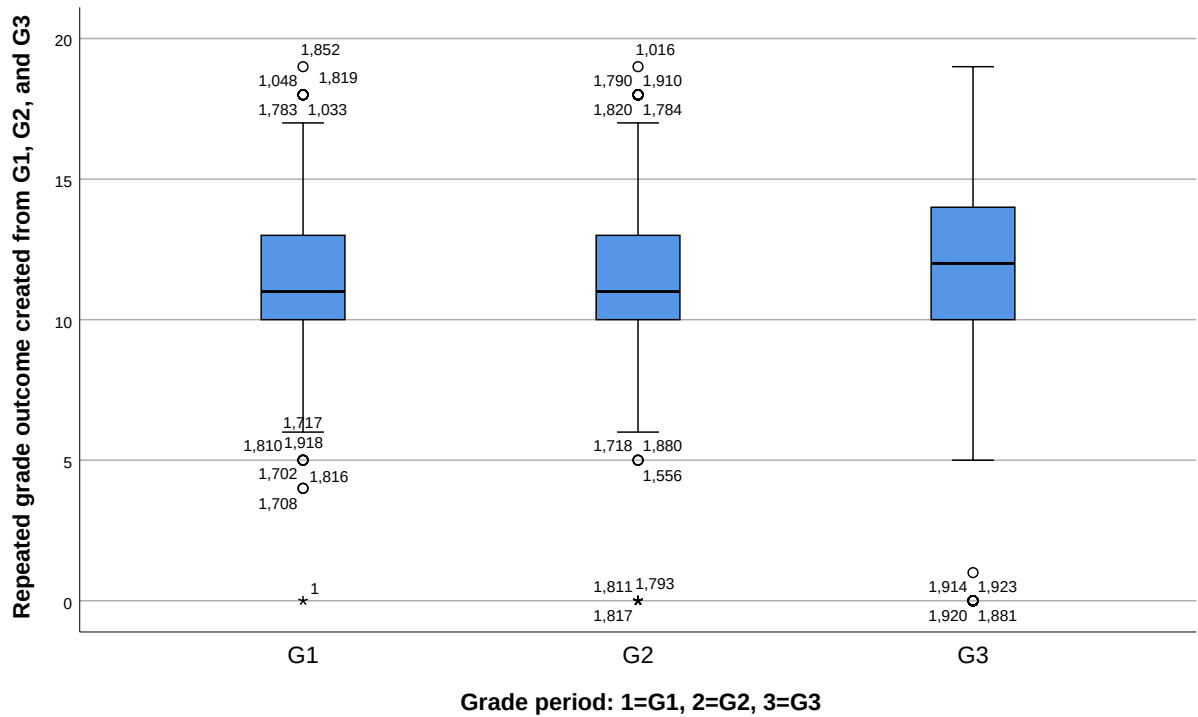
Detrended Normal Q-Q Plots



Random Effects Regression
Prepared data summaries and charts



Random Effects Regression Prepared data summaries and charts



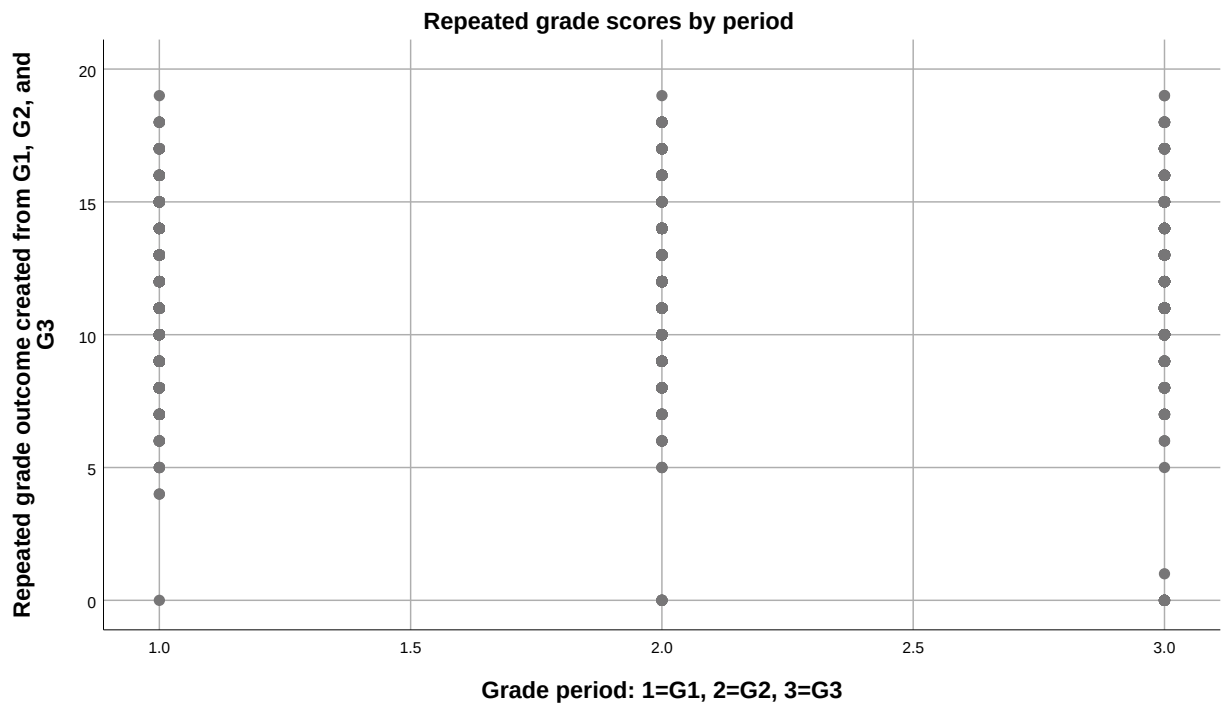
Graph

Random Effects Regression
Prepared data summaries and charts

Notes

Output Created		12-JUL-2026 11:02:12
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\ sav\Random-Effects- Regression-data.sav
	Active Dataset	RandomEffectsData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	1947
Syntax		GRAPH /SCATTERPLOT(BIVAR) =grade_period WITH grade_score /TITLE='Repeated grade scores by period'.
Resources	Processor Time	00:00:00.88
	Elapsed Time	00:00:00.42

Random Effects Regression
Prepared data summaries and charts



Random Effects Regression

Random Effects Regression
Null random-intercept model

Mixed Model Analysis

Notes

Output Created		12-JUL-2026 11:02:12
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\ sav\Random-Effects- Regression-data.sav
	Active Dataset	RandomEffectsData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	1947
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the model.
Syntax		MIXED grade_score /CRITERIA=CIN(95) MXITER(100) MXSTEP (10) SCORING(1) SINGULAR (0.000000000001) HCONVERGE(0, ABSOLUTE) LCONVERGE(0, ABSOLUTE) PCONVERGE(0.000001, ABSOLUTE) /FIXED=INTERCEPT SSTYPE(3) /METHOD=ML /PRINT=SOLUTION TESTCOV /RANDOM=INTERCEPT SUBJECT(student_id) COVTYPE(VC).

Random Effects Regression
Null random-intercept model

Notes

Resources	Processor Time	00:00:00.14
	Elapsed Time	00:00:00.06

Model Dimension^a

		Number of Levels	Covariance Structure	Number of Parameters	Subject Variables
Fixed Effects	Intercept	1		1	
Random Effects	Intercept ^b	1	Variance Components	1	student_id
Residual				1	
Total		2		3	

a. Dependent Variable: Repeated grade outcome created from G1, G2, and G3.

b. As of version 11.5, the syntax rules for the RANDOM subcommand have changed. Your command syntax may yield results that differ from those produced by prior versions. If you are using version 11 syntax, please consult the current syntax reference guide for more information.

Information Criteria^a

-2 Log Likelihood	7883.198
Akaike's Information Criterion (AIC)	7889.198
Hurvich and Tsai's Criterion (AICC)	7889.210
Bozdogan's Criterion (CAIC)	7908.920
Schwarz's Bayesian Criterion (BIC)	7905.920

The information criteria are displayed in smaller-is-better form.

a. Dependent Variable: Repeated grade outcome created from G1, G2, and G3.

Fixed Effects

Random Effects Regression
Null random-intercept model

Type III Tests of Fixed Effects^a

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	649	10942.121	.000

a. Dependent Variable: Repeated grade outcome created from G1, G2, and G3.

Estimates of Fixed Effects^a

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	11.625064	.111133	649	104.605	.000	11.406840	11.843289

a. Dependent Variable: Repeated grade outcome created from G1, G2, and G3.

Covariance Parameters

Estimates of Covariance Parameters^a

Parameter		Estimate	Std. Error	Wald Z	Sig.	95% ...
						Lower Bound
Residual		1.254237	.049233	25.475	.000	1.161361
Intercept [subject = student_id]	Variance	7.597482	.445268	17.063	.000	6.773030

Estimates of Covariance Parameters^a

Parameter		95% Confidence .
		Upper Bound
Residual		1.354541
Intercept [subject = student_id]	Variance	8.522290

a. Dependent Variable: Repeated grade outcome created from G1, G2, and G3.

Random Effects Regression

Random Effects Regression
Full random-intercept regression model

Mixed Model Analysis

Notes

Output Created		12-JUL-2026 11:02:12
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\ sav\Random-Effects- Regression-data.sav
	Active Dataset	RandomEffectsData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	1947
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the model.

Random Effects Regression
Full random-intercept regression model

Notes

Syntax		MIXED grade_score WITH period2 period3 studytime failures absences age school_MS sex_M address_U /CRITERIA=CIN(95) MXITER(100) MXSTEP (10) SCORING(1) SINGULAR (0.000000000001) HCONVERGE(0, ABSOLUTE) LCONVERGE(0, ABSOLUTE) PCONVERGE(0.000001, ABSOLUTE) /FIXED=period2 period3 studytime failures absences age school_MS sex_M address_U SSTYPE(3) /METHOD=ML /PRINT=SOLUTION TESTCOV /RANDOM=INTERCEPT SUBJECT(student_id) COVTYPE(VC) /SAVE=PRED (mixed_pred) RESID (mixed_resid).
Resources	Processor Time	00:00:00.34
	Elapsed Time	00:00:00.19
Variables Created	mixed_pred	Predicted Values
	mixed_resid	Residuals

Random Effects Regression
Full random-intercept regression model

Model Dimension^a

		Number of Levels	Covariance Structure	Number of Parameters	Subject Variables
Fixed Effects	Intercept	1		1	
	period2	1		1	
	period3	1		1	
	studytime	1		1	
	failures	1		1	
	absences	1		1	
	age	1		1	
	school_MS	1		1	
	sex_M	1		1	
	address_U	1		1	
Random Effects	Intercept ^b	1	Variance Components	1	student_id
Residual				1	
Total		11		12	

a. Dependent Variable: Repeated grade outcome created from G1, G2, and G3.

b. As of version 11.5, the syntax rules for the RANDOM subcommand have changed. Your command syntax may yield results that differ from those produced by prior versions. If you are using version 11 syntax, please consult the current syntax reference guide for more information.

Random Effects Regression
Full random-intercept regression model

Information Criteria^a

-2 Log Likelihood	7600.953
Akaike's Information Criterion (AIC)	7624.953
Hurvich and Tsai's Criterion (AICC)	7625.115
Bozdogan's Criterion (CAIC)	7703.842
Schwarz's Bayesian Criterion (BIC)	7691.842

The information criteria are displayed in smaller-is-better form.

a. Dependent Variable: Repeated grade outcome created from G1, G2, and G3.

Fixed Effects

Type III Tests of Fixed Effects^a

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	649.807	62.059	.000
period2	1	1298.000	7.992	.005
period3	1	1298.000	70.210	.000
studytime	1	649.000	17.038	.000
failures	1	649.000	87.958	.000
absences	1	649.000	10.067	.002
age	1	649.000	.097	.756
school_MS	1	649.000	42.260	.000
sex_M	1	649.000	5.707	.017
address_U	1	649.000	3.036	.082

a. Dependent Variable: Repeated grade outcome created from G1, G2, and G3.

Random Effects Regression
Full random-intercept regression model

Estimates of Fixed Effects^a

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	11.039662	1.401370	649.807	7.878	.000	8.287901	13.791423
period2	.171032	.060499	1298.000	2.827	.005	.052345	.289720
period3	.506934	.060499	1298.000	8.379	.000	.388246	.625621
studytime	.495218	.119974	649.000	4.128	.000	.259634	.730802
failures	-1.609632	.171628	649.000	-9.379	.000	-1.946645	-1.272618
absences	-.067401	.021243	649.000	-3.173	.002	-.109114	-.025688
age	.025818	.083003	649.000	.311	.756	-.137168	.188804
school_MS	-1.429521	.219899	649.000	-6.501	.000	-1.861321	-.997720
sex_M	-.473532	.198225	649.000	-2.389	.017	-.862772	-.084292
address_U	.382934	.219775	649.000	1.742	.082	-.048621	.814490

a. Dependent Variable: Repeated grade outcome created from G1, G2, and G3.

Covariance Parameters

Estimates of Covariance Parameters^a

Parameter	Estimate	Std. Error	Wald Z	Sig.	95% ...
					Lower Bound
Residual	1.187727	.046622	25.475	.000	1.099775
Intercept [subject = student_id]	Variance 5.390238	.321581	16.762	.000	4.795407

Estimates of Covariance Parameters^a

Parameter	Variance	95% Confidence .
		Upper Bound
Residual		1.282712
Intercept [subject = student_id]	Variance	6.058854

a. Dependent Variable: Repeated grade outcome created from G1, G2, and G3.

Random Effects Regression

Random Effects Regression
Pooled OLS comparison

Regression

Notes

Output Created		12-JUL-2026 11:02:13
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\ sav\Random-Effects- Regression-data.sav
	Active Dataset	RandomEffectsData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	1947
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any variable used.
Syntax		REGRESSION /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA CI(95) /DEPENDENT grade_score /METHOD=ENTER period2 period3 studytime failures absences age school_MS sex_M address_U /SAVE PRED(ols_pred) RESID(ols_resid).
Resources	Processor Time	00:00:00.23
	Elapsed Time	00:00:00.14
	Memory Required	9792 bytes
	Additional Memory Required for Residual Plots	0 bytes

Random Effects Regression
Pooled OLS comparison

Notes

Variables Created or Modified	ols_pred	Unstandardized Predicted Value
	ols_resid	Unstandardized Residual

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	address_U, period3, sex_M, age, absences, studytime, failures, school_MS, period2 ^b	.	Enter

a. Dependent Variable: Repeated grade outcome created from G1, G2, and G3

b. All requested variables entered.

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.507 ^a	.257	.253	2.571

a. Predictors: (Constant), address_U, period3, sex_M, age, absences, studytime, failures, school_MS, period2

b. Dependent Variable: Repeated grade outcome created from G1, G2, and G3

Random Effects Regression
Pooled OLS comparison

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4426.999	9	491.889	74.394	.000 ^b
	Residual	12807.298	1937	6.612		
	Total	17234.297	1946			

a. Dependent Variable: Repeated grade outcome created from G1, G2, and G3

b. Predictors: (Constant), address_U, period3, sex_M, age, absences, studytime, failures, school_MS, period2

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	11.040	.869		12.711	.000
	period2	.171	.143	.027	1.198	.231
	period3	.507	.143	.080	3.551	.000
	studytime	.495	.074	.138	6.688	.000
	failures	-1.610	.106	-.321	-15.196	.000
	absences	-.067	.013	-.105	-5.141	.000
	age	.026	.051	.011	.504	.614
	school_MS	-1.430	.136	-.229	-10.533	.000
	sex_M	-.474	.122	-.078	-3.871	.000
	address_U	.383	.136	.059	2.823	.005

Random Effects Regression
Pooled OLS comparison

Coefficients^a

Model		95.0% Confidence Interval for B	
		Lower Bound	Upper Bound
1	(Constant)	9.336	12.743
	period2	-.109	.451
	period3	.227	.787
	studytime	.350	.640
	failures	-1.817	-1.402
	absences	-.093	-.042
	age	-.075	.126
	school_MS	-1.696	-1.163
	sex_M	-.713	-.234
	address_U	.117	.649

a. Dependent Variable: Repeated grade outcome created from G1, G2, and G3

Residuals Statistics^a

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	5.11	14.38	11.63	1.508	1947
Residual	-12.608	7.788	.000	2.565	1947
Std. Predicted Value	-4.321	1.823	.000	1.000	1947
Std. Residual	-4.903	3.029	.000	.998	1947

a. Dependent Variable: Repeated grade outcome created from G1, G2, and G3

Random Effects Regression

Random Effects Regression
Saved-value diagnostics

Descriptives

Notes

Output Created		12-JUL-2026 11:02:13
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\ sav\Random-Effects- Regression-data.sav
	Active Dataset	RandomEffectsData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	1947
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	All non-missing data are used.
Syntax		DESCRIPTIVES VARIABLES=mixed_pred mixed_resid ols_pred ols_resid /STATISTICS=MEAN STDDEV MIN MAX.
Resources	Processor Time	00:00:00.06
	Elapsed Time	00:00:00.03

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Predicted Values	1947	1.61	18.61	11.6251	2.70165
Residuals	1947	-7.48	5.77	.0000	.90517
Unstandardized Predicted Value	1947	5.10703	14.37512	11.6250642	1.50828454
Unstandardized Residual	1947	-12.60815	7.78797	.0000000	2.56541330
Valid N (listwise)	1947				

Random Effects Regression
Saved-value diagnostics

Explore

Notes

Output Created		12-JUL-2026 11:02:13
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\ sav\Random-Effects- Regression-data.sav
	Active Dataset	RandomEffectsData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	1947
Missing Value Handling	Definition of Missing	User-defined missing values for dependent variables are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any dependent variable or factor used.
Syntax		EXAMINE VARIABLES=mixed_resid ols_resid /PLOT HISTOGRAM NPLOT /STATISTICS DESCRIPTIVES /INTERVAL 95 /MISSING LISTWISE.
Resources	Processor Time	00:00:03.69
	Elapsed Time	00:00:02.65

Total Sample

Random Effects Regression
Saved-value diagnostics

Case Processing Summary

	Valid		Cases Missing		Total	
	N	Percent	N	Percent	N	Percent
Residuals	1947	100.0%	0	0.0%	1947	100.0%
Unstandardized Residual	1947	100.0%	0	0.0%	1947	100.0%

Descriptives

		Statistic	Std. Error
Residuals	Mean	.0000	.02051
	95% Confidence Interval for Mean	Lower Bound	-.0402
		Upper Bound	.0402
	5% Trimmed Mean	.0169	
	Median	.0213	
	Variance	.819	
	Std. Deviation	.90517	
	Minimum	-7.48	
	Maximum	5.77	
	Range	13.25	
	Interquartile Range	.89	
	Skewness	-1.046	.055
	Kurtosis	12.367	.111
Unstandardized Residual	Mean	.0000000	.05813991
	95% Confidence Interval for Mean	Lower Bound	-.1140231
		Upper Bound	.1140231
	5% Trimmed Mean	.0217573	
	Median	-.1150799	
	Variance	6.581	
	Std. Deviation	2.56541330	
	Minimum	-12.60815	
	Maximum	7.78797	
	Range	20.39612	
	Interquartile Range	3.10408	
	Skewness	-.370	.055

Random Effects Regression Saved-value diagnostics

Descriptives

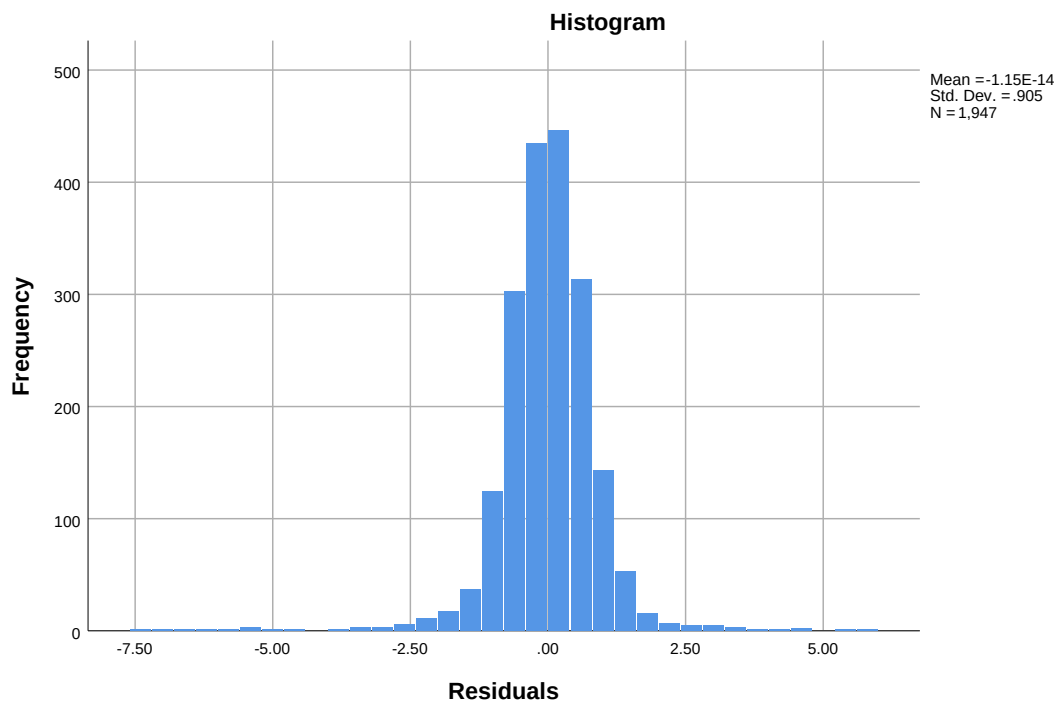
	Statistic	Std. Error
Kurtosis	2.164	.111

Tests of Normality

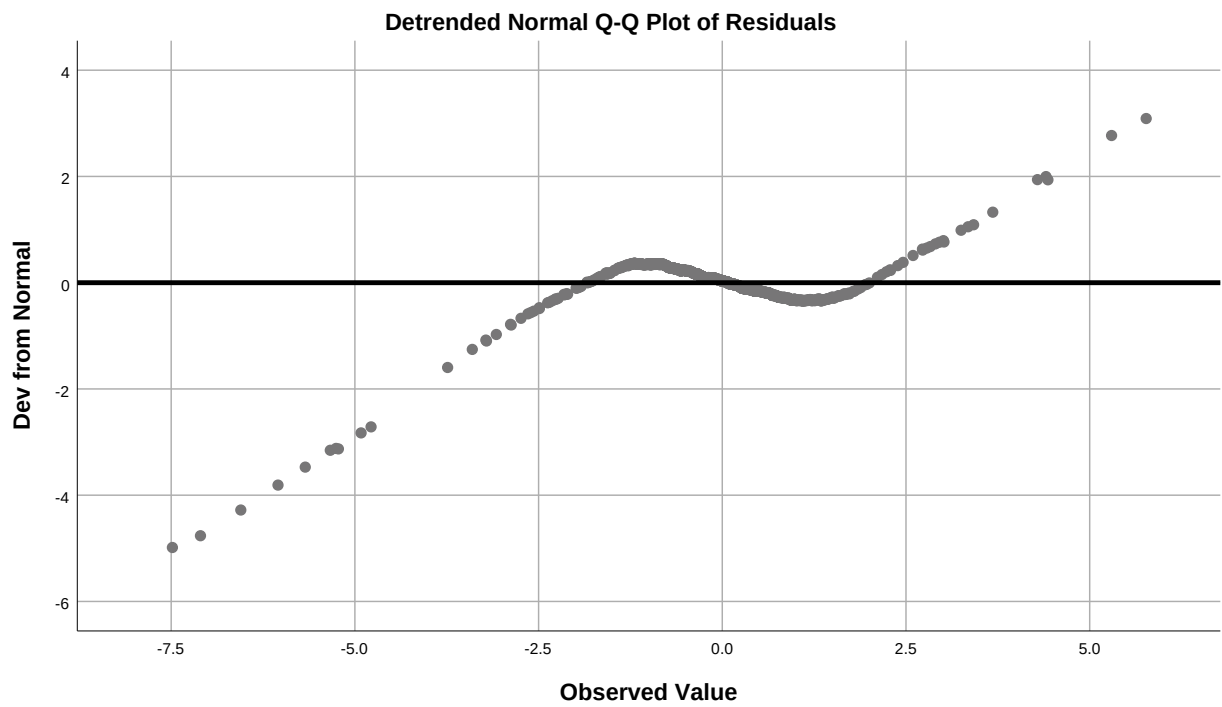
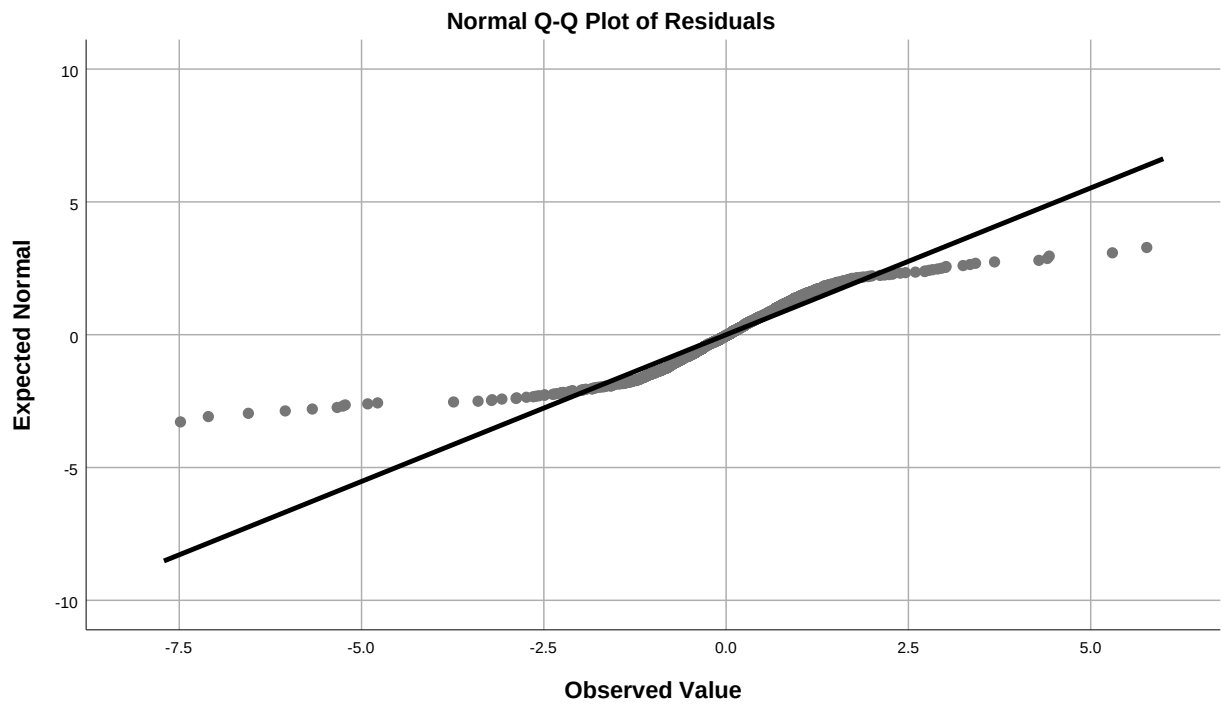
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Residuals	.080	1947	.000	.873	1947	.000
Unstandardized Residual	.042	1947	.000	.968	1947	.000

a. Lilliefors Significance Correction

Residuals

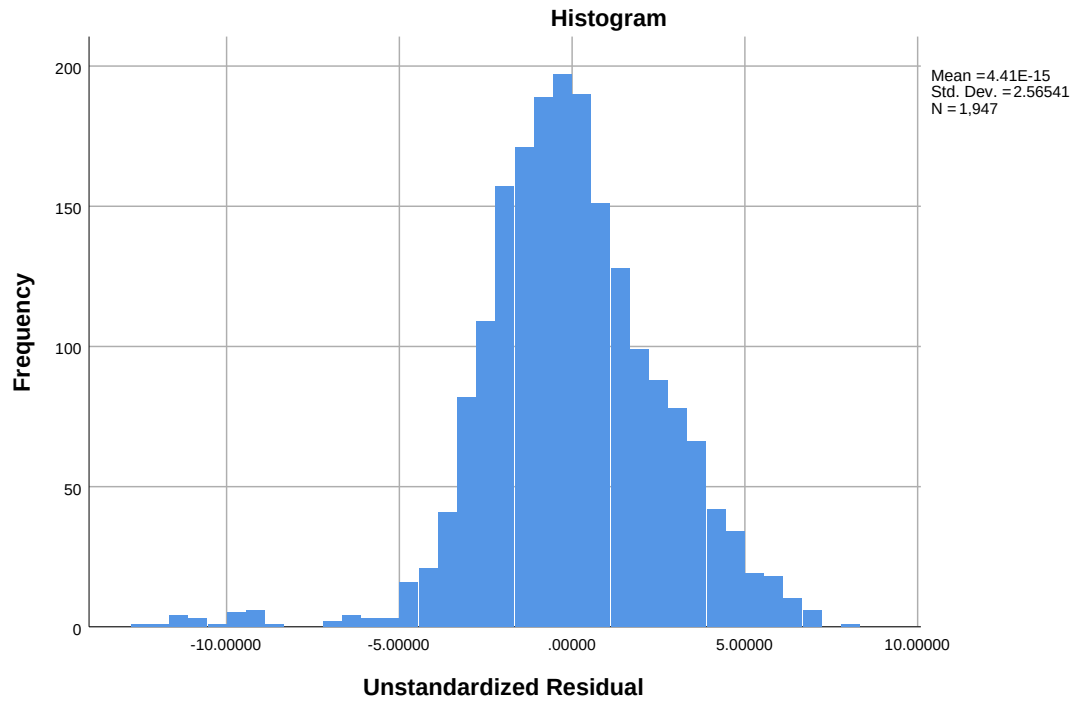


Random Effects Regression
Saved-value diagnostics

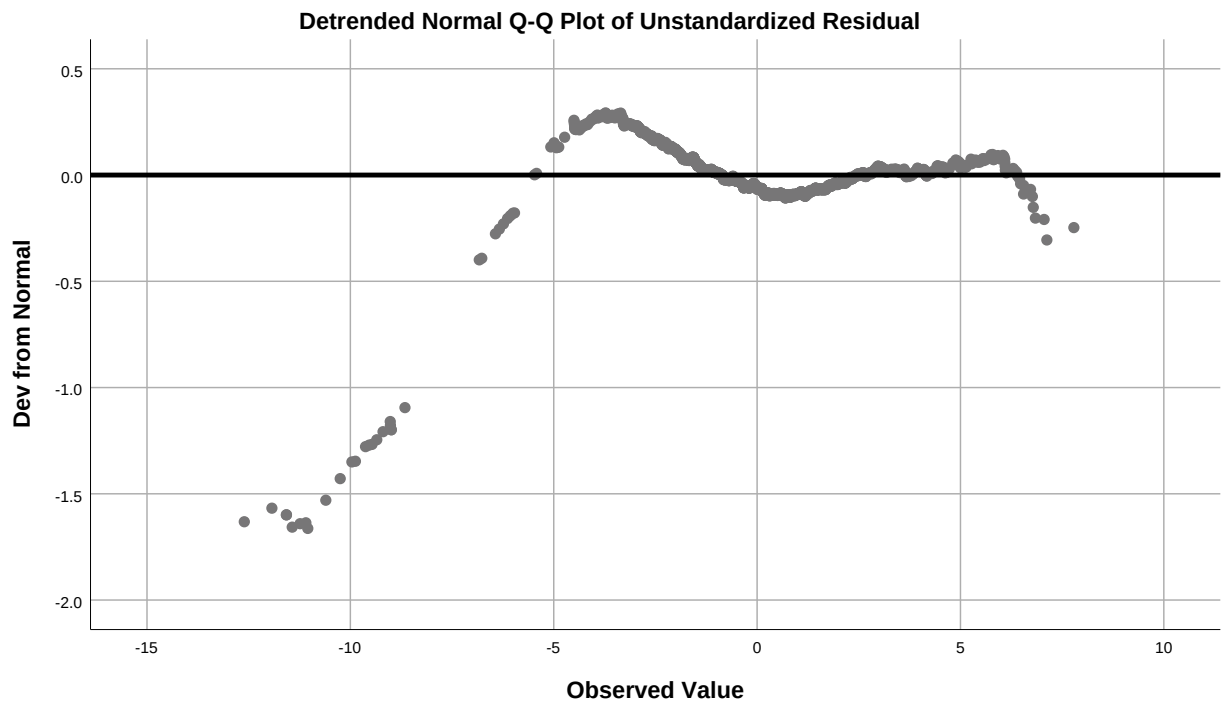
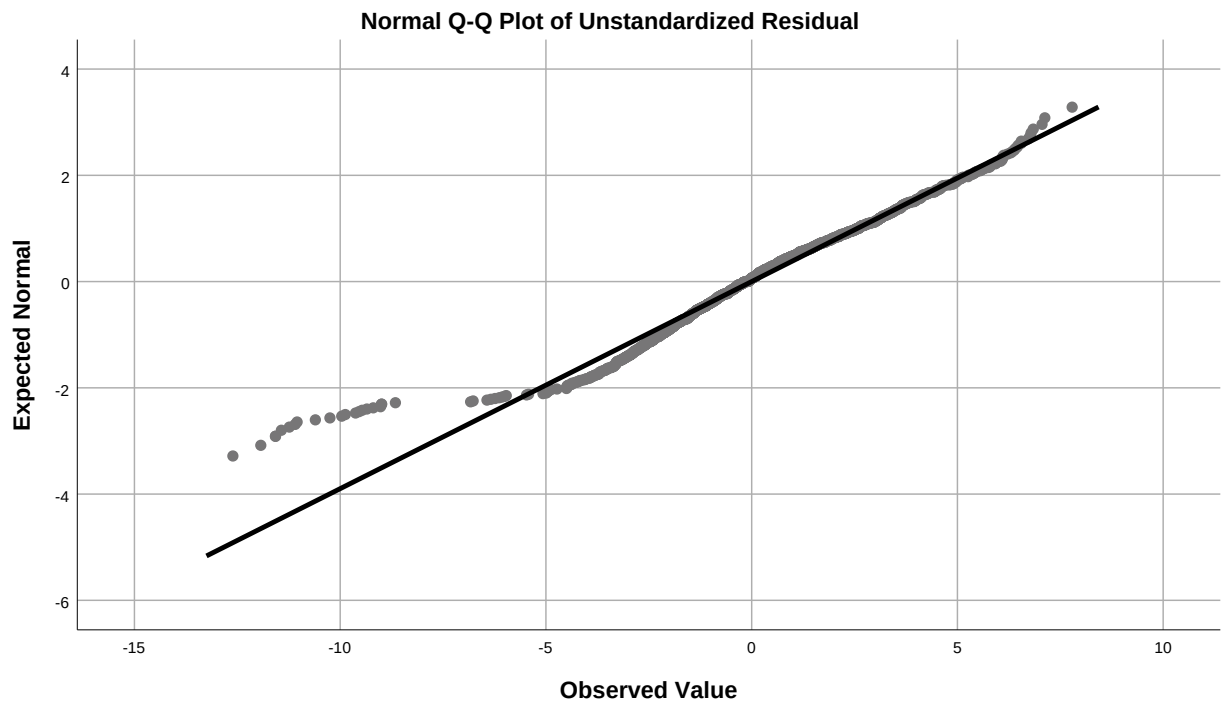


Random Effects Regression
Saved-value diagnostics

Unstandardized Residual



Random Effects Regression
Saved-value diagnostics



Random Effects Regression
Saved-value diagnostics

Graph

Notes

Output Created		12-JUL-2026 11:02:16
Comments		
Input	Data	D:\DATA ANALYSIS\H Regression Tests and Models\Random Effects Regression\SPSS_Output\ sav\Random-Effects- Regression-data.sav
	Active Dataset	RandomEffectsData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	1947
Syntax		GRAPH /SCATTERPLOT(BIVAR) =mixed_pred WITH mixed_resid /TITLE='Random-effects residuals versus fitted values'.
Resources	Processor Time	00:00:00.53
	Elapsed Time	00:00:00.40

Random Effects Regression
Saved-value diagnostics

