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Greenhouse Geisser Correction

Greenhouse Geisser Correction
Import data

Repeated-measures descriptives

Repeated-measures descriptives
G1 G2 G3

Descriptives

[GreenhouseGeisserData] D:\DATA ANALYSIS\B Normality and Assumption Tests\Greenhouse Geisser Correction\SPSS_Output\sav\Greenhouse-Geisser-Correction-data.sav

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
G1	649	0	19	11.40	2.745
G2	649	0	19	11.57	2.914
G3	649	0	19	11.91	3.231
Valid N (listwise)	649				

Greenhouse Geisser correction

Greenhouse Geisser correction
Repeated-measures GLM

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

Time	Dependent Variable
1	G1
2	G2
3	G3

Descriptive Statistics

	Mean	Std. Deviation	N
G1	11.40	2.745	649
G2	11.57	2.914	649
G3	11.91	3.231	649

Multivariate Tests^a

Effect		Value	F	Hypothesis df	Error df	Sig.
Time	Pillai's Trace	.085	29.882 ^b	2.000	647.000	.000
	Wilks' Lambda	.915	29.882 ^b	2.000	647.000	.000
	Hotelling's Trace	.092	29.882 ^b	2.000	647.000	.000
	Roy's Largest Root	.092	29.882 ^b	2.000	647.000	.000

Multivariate Tests^a

Effect		Partial Eta Squared
Time	Pillai's Trace	.085
	Wilks' Lambda	.085
	Hotelling's Trace	.085
	Roy's Largest Root	.085

a. Design: Intercept
Within Subjects Design: Time

b. Exact statistic

Greenhouse Geisser correction
Repeated-measures GLM

Mauchly's Test of Sphericity^a

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon ^b Greenhouse-Geisser
Time	.827	122.814	2	.000	.853

Mauchly's Test of Sphericity^a

Measure: MEASURE_1

Within Subjects Effect	Epsilon ^b	
	Huynh-Feldt	Lower-bound
Time	.855	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Time	Sphericity Assumed	86.331	2	43.165	36.287	.000
	Greenhouse-Geisser	86.331	1.705	50.628	36.287	.000
	Huynh-Feldt	86.331	1.709	50.509	36.287	.000
	Lower-bound	86.331	1.000	86.331	36.287	.000
Error(Time)	Sphericity Assumed	1541.669	1296	1.190		
	Greenhouse-Geisser	1541.669	1104.961	1.395		
	Huynh-Feldt	1541.669	1107.581	1.392		
	Lower-bound	1541.669	648.000	2.379		

Greenhouse Geisser correction
Repeated-measures GLM

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Partial Eta Squared
Time	Sphericity Assumed	.053
	Greenhouse-Geisser	.053
	Huynh-Feldt	.053
	Lower-bound	.053
Error(Time)	Sphericity Assumed	
	Greenhouse-Geisser	
	Huynh-Feldt	
	Lower-bound	

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.
Time	Linear	83.391	1	83.391	50.309	.000
	Quadratic	2.940	1	2.940	4.075	.044
Error(Time)	Linear	1074.109	648	1.658		
	Quadratic	467.560	648	.722		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Time	Partial Eta Squared
Time	Linear	.072
	Quadratic	.006
Error(Time)	Linear	
	Quadratic	

Greenhouse Geisser correction
Repeated-measures GLM

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	263121.703	1	263121.703	10925.261	.000	.944
Error	15606.297	648	24.084			

Greenhouse Geisser by group context

General Linear Model

Within-Subjects Factors

Measure: MEASURE_1

Time	Dependent Variable
1	G1
2	G2
3	G3

Between-Subjects Factors

		N
sex	F	383
	M	266

Descriptive Statistics

	sex	Mean	Std. Deviation	N
G1	F	11.64	2.794	383
	M	11.06	2.641	266
	Total	11.40	2.745	649
G2	F	11.82	2.968	383
	M	11.21	2.800	266
	Total	11.57	2.914	649
G3	F	12.25	3.124	383
	M	11.41	3.321	266
	Total	11.91	3.231	649

Greenhouse Geisser by group context
Repeated-measures GLM with sex

**Box's Test of
Equality of
Covariance
Matrices^a**

Box's M	41.630
F	6.902
df1	6
df2	2213064.321
Sig.	.000

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + sex
Within Subjects Design: Time

Multivariate Tests^a

Effect		Value	F	Hypothesis df	Error df	Sig.
Time	Pillai's Trace	.075	26.059 ^b	2.000	646.000	.000
	Wilks' Lambda	.925	26.059 ^b	2.000	646.000	.000
	Hotelling's Trace	.081	26.059 ^b	2.000	646.000	.000
	Roy's Largest Root	.081	26.059 ^b	2.000	646.000	.000
Time * sex	Pillai's Trace	.009	2.775 ^b	2.000	646.000	.063
	Wilks' Lambda	.991	2.775 ^b	2.000	646.000	.063
	Hotelling's Trace	.009	2.775 ^b	2.000	646.000	.063
	Roy's Largest Root	.009	2.775 ^b	2.000	646.000	.063

Greenhouse Geisser by group context
Repeated-measures GLM with sex

Multivariate Tests^a

Effect		Partial Eta Squared
Time	Pillai's Trace	.075
	Wilks' Lambda	.075
	Hotelling's Trace	.075
	Roy's Largest Root	.075
Time * sex	Pillai's Trace	.009
	Wilks' Lambda	.009
	Hotelling's Trace	.009
	Roy's Largest Root	.009

a. Design: Intercept + sex
Within Subjects Design: Time

b. Exact statistic

Mauchly's Test of Sphericity^a

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon ^b Greenhouse-Geisser
Time	.827	122.617	2	.000	.853

Mauchly's Test of Sphericity^a

Measure: MEASURE_1

Within Subjects Effect	Epsilon ^b	
	Huynh-Feldt	Lower-bound
Time	.856	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept + sex
Within Subjects Design: Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Greenhouse Geisser by group context
Repeated-measures GLM with sex

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Time	Sphericity Assumed	75.480	2	37.740	31.813	.000
	Greenhouse-Geisser	75.480	1.705	44.264	31.813	.000
	Huynh-Feldt	75.480	1.712	44.091	31.813	.000
	Lower-bound	75.480	1.000	75.480	31.813	.000
Time * sex	Sphericity Assumed	6.588	2	3.294	2.777	.063
	Greenhouse-Geisser	6.588	1.705	3.863	2.777	.071
	Huynh-Feldt	6.588	1.712	3.848	2.777	.071
	Lower-bound	6.588	1.000	6.588	2.777	.096
Error(Time)	Sphericity Assumed	1535.081	1294	1.186		
	Greenhouse-Geisser	1535.081	1103.264	1.391		
	Huynh-Feldt	1535.081	1107.594	1.386		
	Lower-bound	1535.081	647.000	2.373		

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Partial Eta Squared
Time	Sphericity Assumed	.047
	Greenhouse-Geisser	.047
	Huynh-Feldt	.047
	Lower-bound	.047
Time * sex	Sphericity Assumed	.004
	Greenhouse-Geisser	.004
	Huynh-Feldt	.004
	Lower-bound	.004
Error(Time)	Sphericity Assumed	
	Greenhouse-Geisser	
	Huynh-Feldt	
	Lower-bound	

Greenhouse Geisser by group context
Repeated-measures GLM with sex

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.
Time	Linear	73.213	1	73.213	44.331	.000
	Quadratic	2.266	1	2.266	3.143	.077
Time * sex	Linear	5.577	1	5.577	3.377	.067
	Quadratic	1.011	1	1.011	1.402	.237
Error(Time)	Linear	1068.532	647	1.652		
	Quadratic	466.549	647	.721		

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Time	Partial Eta Squared
Time	Linear	.064
	Quadratic	.005
Time * sex	Linear	.005
	Quadratic	.002
Error(Time)	Linear	
	Quadratic	

Greenhouse Geisser by group context
Repeated-measures GLM with sex

Levene's Test of Equality of Error Variances^a

		Levene Statistic	df1	df2	Sig.
G1	Based on Mean	1.292	1	647	.256
	Based on Median	1.258	1	647	.263
	Based on Median and with adjusted df	1.258	1	644.907	.263
	Based on trimmed mean	1.398	1	647	.237
G2	Based on Mean	.750	1	647	.387
	Based on Median	.961	1	647	.327
	Based on Median and with adjusted df	.961	1	645.870	.327
	Based on trimmed mean	.685	1	647	.408
G3	Based on Mean	.004	1	647	.950
	Based on Median	.007	1	647	.933
	Based on Median and with adjusted df	.007	1	633.314	.933
	Based on trimmed mean	.018	1	647	.895

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + sex
Within Subjects Design: Time

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	251888.112	1	251888.112	10590.986	.000	.942
sex	218.532	1	218.532	9.188	.003	.014
Error	15387.765	647	23.783			

Difference score context

Difference score context
Sphericity-related differences

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
diff_G2_G1	649	-9.00	11.00	.1710	1.47929
diff_G3_G2	649	-9.00	6.00	.3359	1.27824
diff_G3_G1	649	-11.00	11.00	.5069	1.82076
Valid N (listwise)	649				

Explore

Case Processing Summary

	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
diff_G2_G1	649	100.0%	0	0.0%	649	100.0%
diff_G3_G2	649	100.0%	0	0.0%	649	100.0%
diff_G3_G1	649	100.0%	0	0.0%	649	100.0%

Difference score context
Sphericity-related differences

Descriptives

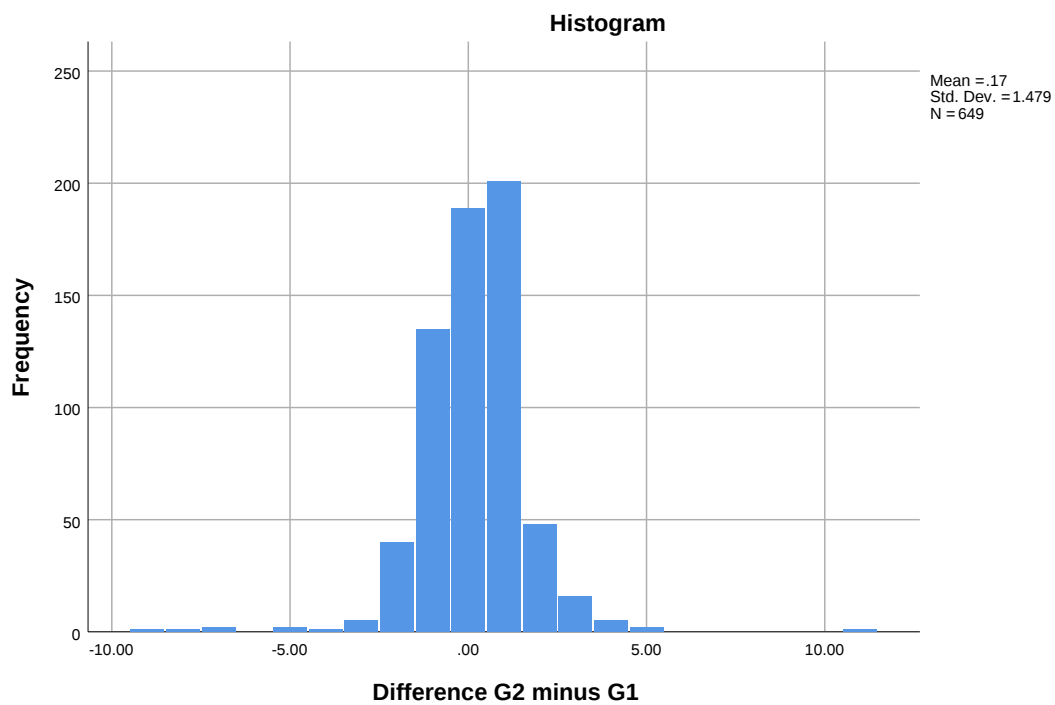
			Statistic	Std. Error
diff_G2_G1	Mean		.1710	.05807
	95% Confidence Interval for Mean	Lower Bound	.0570	
		Upper Bound	.2851	
	5% Trimmed Mean		.1815	
	Median		.0000	
	Variance		2.188	
	Std. Deviation		1.47929	
	Minimum		-9.00	
	Maximum		11.00	
	Range		20.00	
	Interquartile Range		2.00	
	Skewness		-.308	.096
	Kurtosis		9.272	.192
diff_G3_G2	Mean		.3359	.05018
	95% Confidence Interval for Mean	Lower Bound	.2374	
		Upper Bound	.4344	
	5% Trimmed Mean		.4135	
	Median		.0000	
	Variance		1.634	
	Std. Deviation		1.27824	
	Minimum		-9.00	
	Maximum		6.00	
	Range		15.00	
	Interquartile Range		1.00	
	Skewness		-3.031	.096
	Kurtosis		19.487	.192
diff_G3_G1	Mean		.5069	.07147
	95% Confidence Interval for Mean	Lower Bound	.3666	
		Upper Bound	.6473	
	5% Trimmed Mean		.6173	
	Median		1.0000	
	Variance		3.315	

Difference score context
Sphericity-related differences

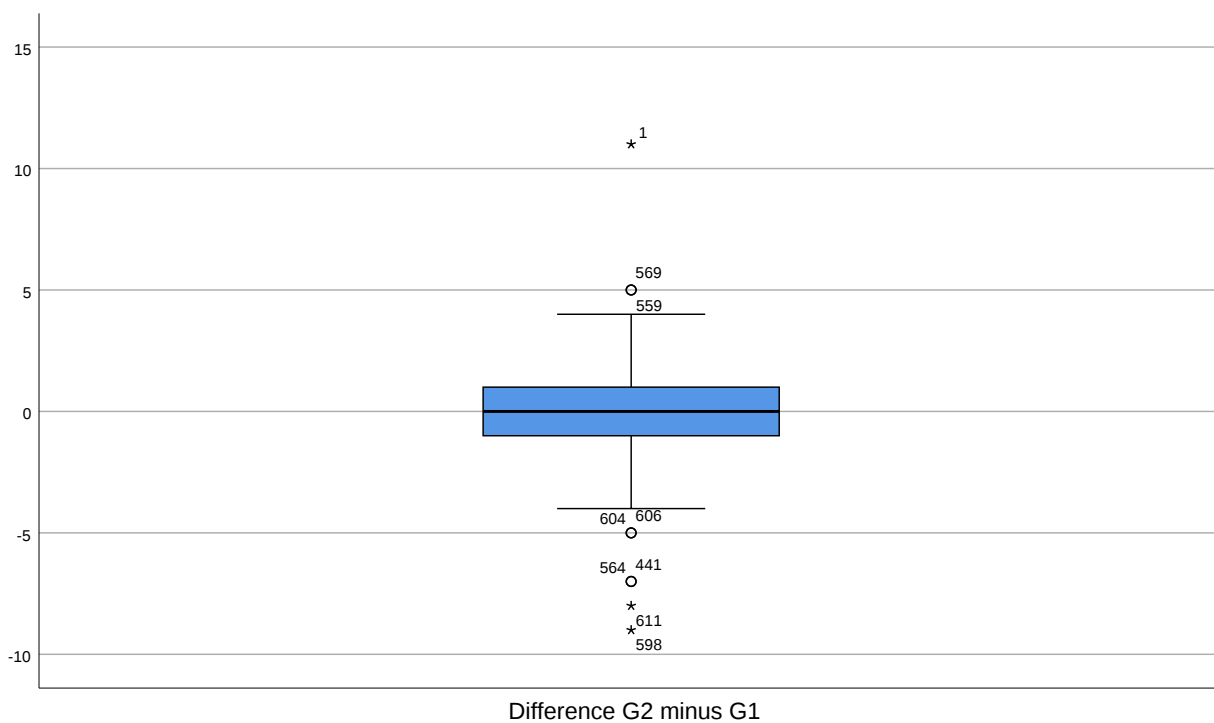
Descriptives

	Statistic	Std. Error
Std. Deviation	1.82076	
Minimum	-11.00	
Maximum	11.00	
Range	22.00	
Interquartile Range	1.00	
Skewness	-1.628	.096
Kurtosis	10.023	.192

Difference G2 minus G1

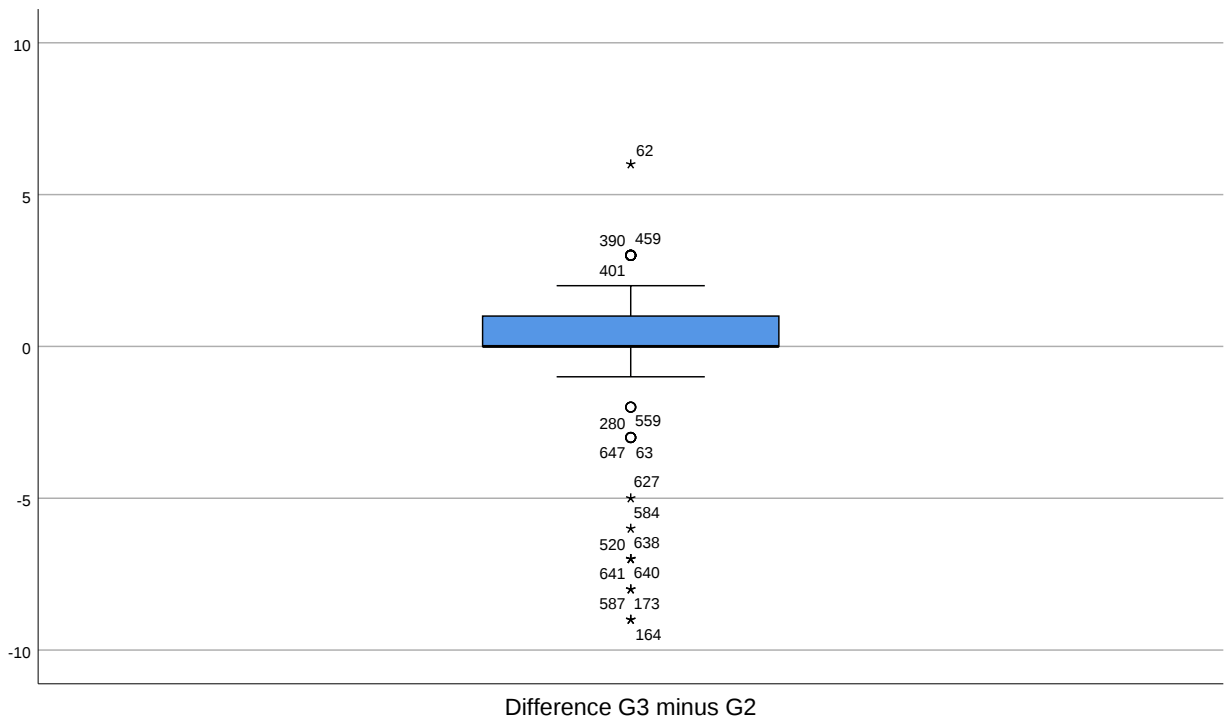
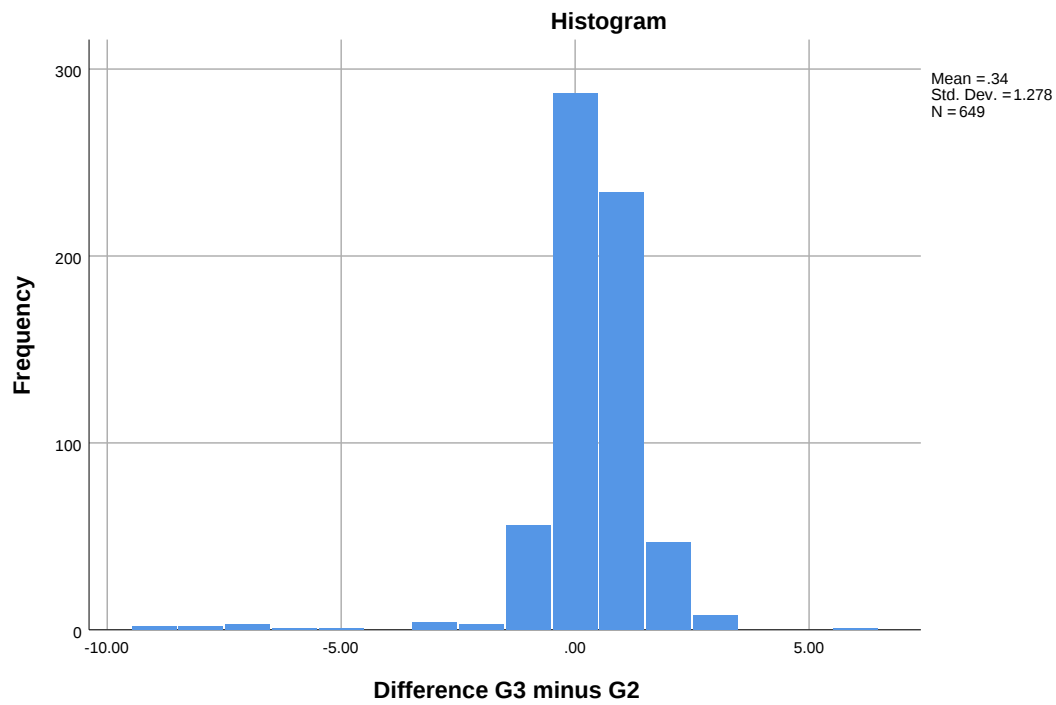


Difference score context
Sphericity-related differences



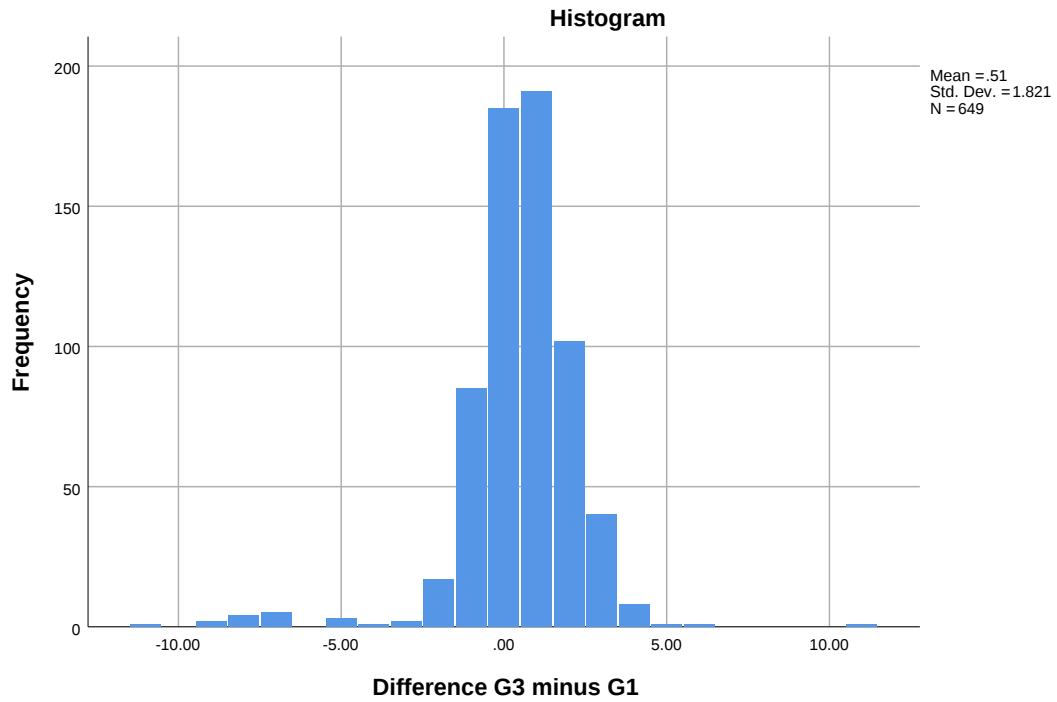
Difference G3 minus G2

Difference score context
Sphericity-related differences



Difference score context
Sphericity-related differences

Difference G3 minus G1



Difference score context Sphericity-related differences

