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Mauchlys Test of Sphericity

Mauchlys Test of Sphericity
Import data

Repeated-measures descriptives

Repeated-measures descriptives
G1 G2 G3

Descriptives

[MauchlysData] D:\DATA ANALYSIS\B Normality and Assumption Tests\Mauchlys Test of Sphericity\SPSS_Output\sav\Mauchlys-Test-of-Sphericity-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				

Mauchlys test of sphericity

Mauchly's test of sphericity
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

Mauchly's test of sphericity
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		

Mauchly's test of sphericity
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	

Mauchlys test of sphericity
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			

Mauchlys test with group context

Mauchlys test with group context
Repeated-measures GLM by sex

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

Mauchlys test with group context
Repeated-measures GLM by 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

Mauchly's test with group context
Repeated-measures GLM by 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.

Mauchlys test with group context
Repeated-measures GLM by 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	

Mauchlys test with group context
Repeated-measures GLM by 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	

Mauchlys test with group context
Repeated-measures GLM by 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 descriptives

Difference score descriptives
Sphericity context

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
diff_G2_G1	649	-9.00	11.00	.1710	1.47929	2.188
diff_G3_G2	649	-9.00	6.00	.3359	1.27824	1.634
diff_G3_G1	649	-11.00	11.00	.5069	1.82076	3.315
Valid N (listwise)	649					

Correlations

Correlations

		G1	G2	G3	diff_G2_G1	diff_G3_G2
G1	Pearson Correlation	1	.865**	.826**	-.152**	.117**
	Sig. (2-tailed)		.000	.000	.000	.003
	N	649	649	649	649	649
G2	Pearson Correlation	.865**	1	.919**	.364**	.042
	Sig. (2-tailed)	.000		.000	.000	.284
	N	649	649	649	649	649
G3	Pearson Correlation	.826**	.919**	1	.276**	.434**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	649	649	649	649	649
diff_G2_G1	Pearson Correlation	-.152**	.364**	.276**	1	-.134**
	Sig. (2-tailed)	.000	.000	.000		.001
	N	649	649	649	649	649
diff_G3_G2	Pearson Correlation	.117**	.042	.434**	-.134**	1
	Sig. (2-tailed)	.003	.284	.000	.001	
	N	649	649	649	649	649
diff_G3_G1	Pearson Correlation	-.041	.326**	.528**	.718**	.593**
	Sig. (2-tailed)	.292	.000	.000	.000	.000
	N	649	649	649	649	649

Difference score descriptives
Sphericity context

Correlations

		diff_G3_G1
G1	Pearson Correlation	-.041
	Sig. (2-tailed)	.292
	N	649
G2	Pearson Correlation	.326**
	Sig. (2-tailed)	.000
	N	649
G3	Pearson Correlation	.528**
	Sig. (2-tailed)	.000
	N	649
diff_G2_G1	Pearson Correlation	.718**
	Sig. (2-tailed)	.000
	N	649
diff_G3_G2	Pearson Correlation	.593**
	Sig. (2-tailed)	.000
	N	649
diff_G3_G1	Pearson Correlation	1
	Sig. (2-tailed)	
	N	649

** . Correlation is significant at the 0.01 level (2-tailed).

Explore

Case Processing Summary

	Valid		Cases 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 descriptives
Sphericity context

Descriptives

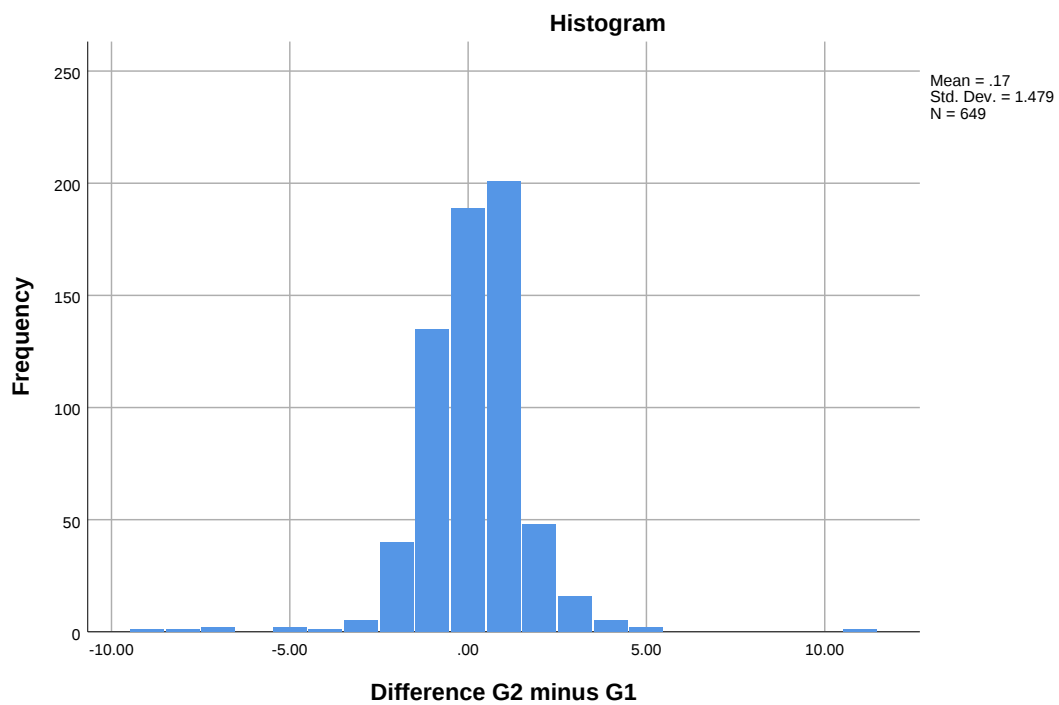
			Statistic	Std. Error
diff_G2_G1	Mean		.1710	.05807
	95% Confidence Interval for Mean	Lower Bound	.0570	
		Upper Bound	.2851	
	5% Trimmed Mean		.1815	
	Median		.0000	
	Variance		2.188	
	Std. Deviation		1.47929	
	Minimum		-9.00	
	Maximum		11.00	
	Range		20.00	
	Interquartile Range		2.00	
	Skewness		-.308	.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 descriptives
Sphericity context

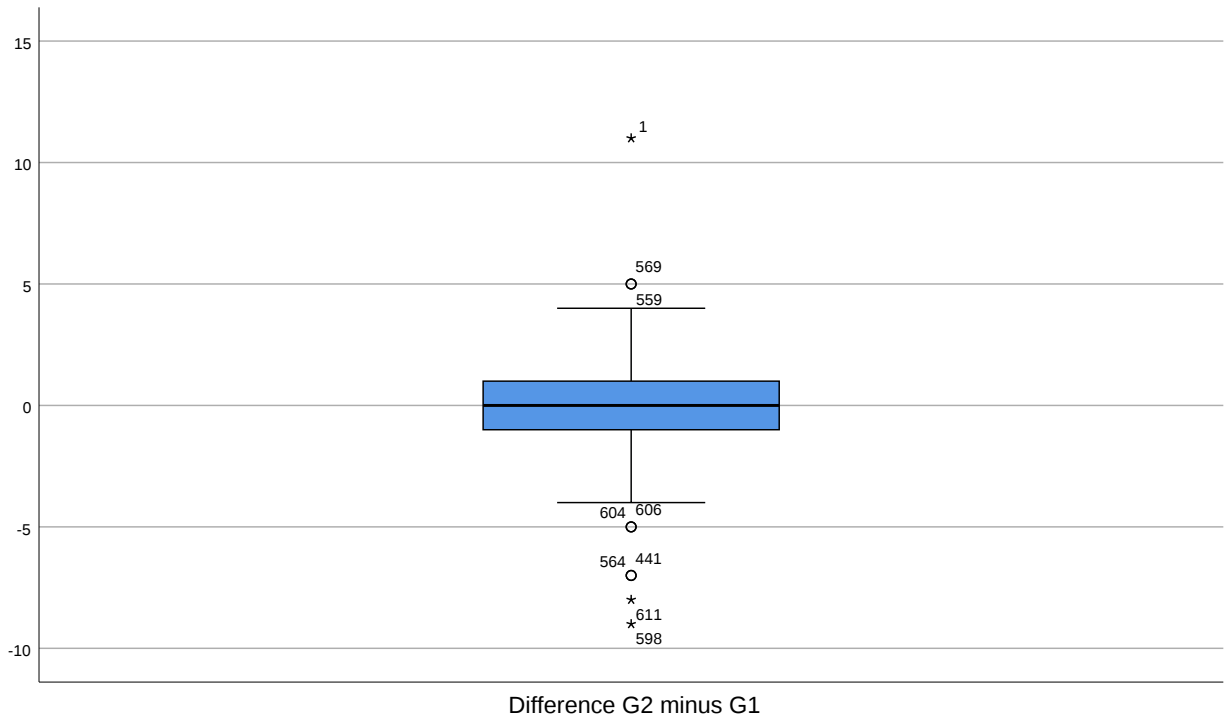
Descriptives

	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

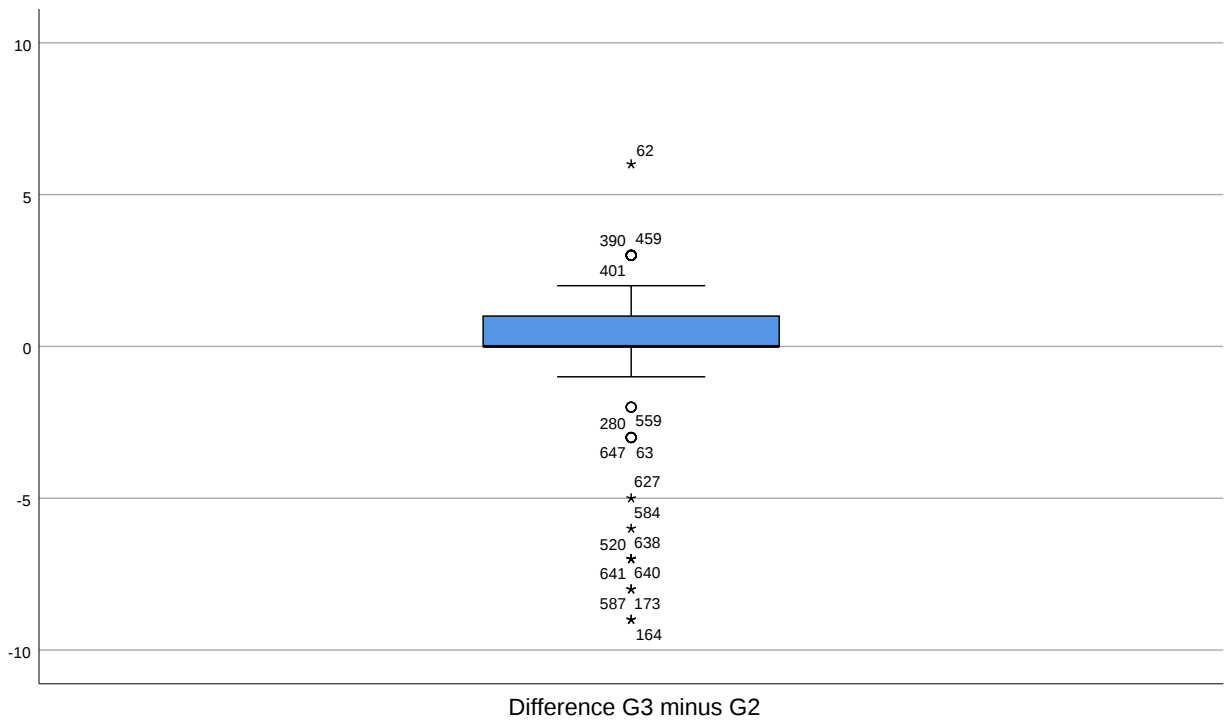
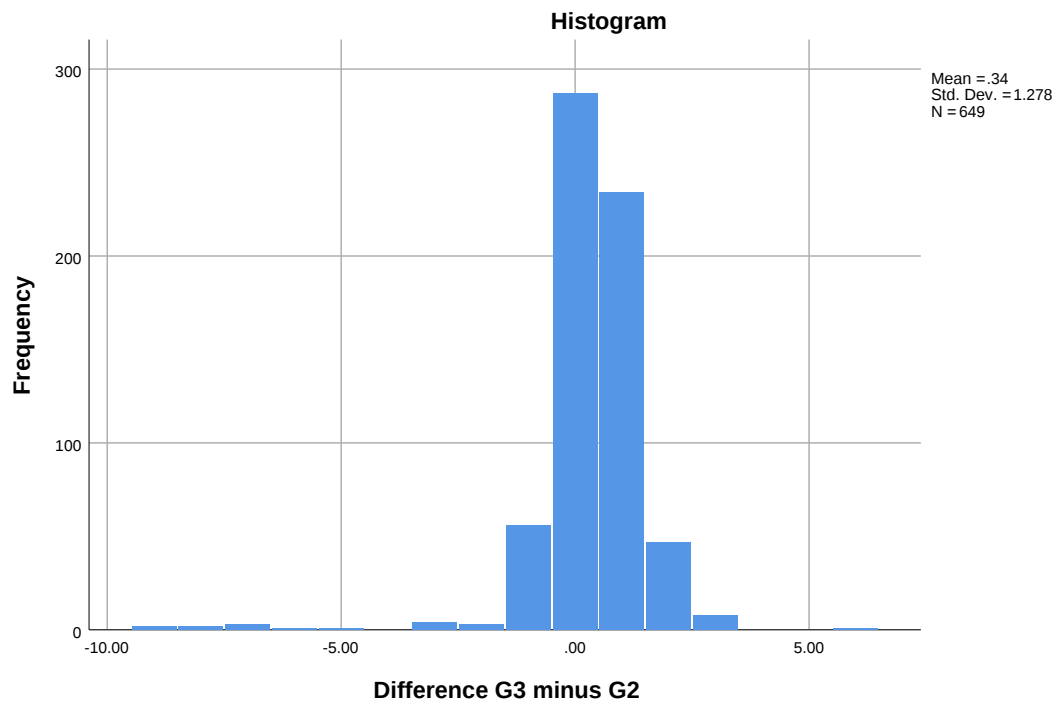


Difference score descriptives
Sphericity context



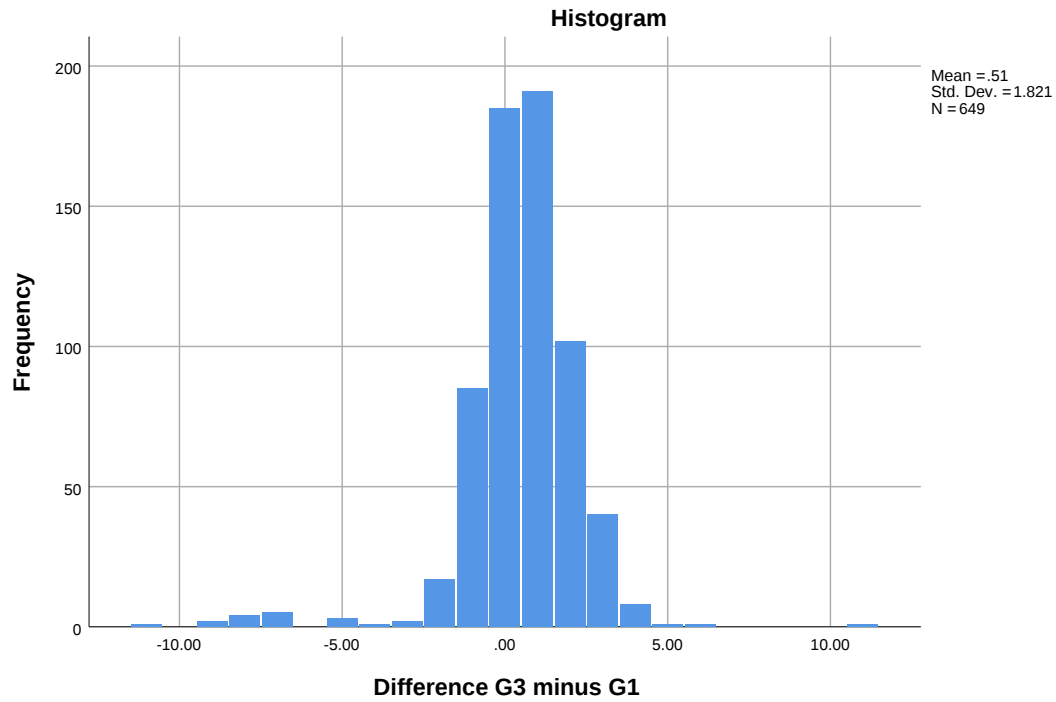
Difference G3 minus G2

Difference score descriptives Sphericity context



Difference score descriptives
Sphericity context

Difference G3 minus G1



Difference score descriptives Sphericity context

