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Games Howell Test Post Hoc Analysis

Games Howell Test Post Hoc Analysis
Import data

Games Howell Test Context

Games Howell Test Context
Group descriptives for G3 by studytime

Means

[GamesHowellTestData] D:\DATA ANALYSIS\F Post Hoc Tests\Games Howell Test\SPSS
_Output\sav\Games-Howell-Test-data.sav

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
G3 * studytime	649	100.0%	0	0.0%	649	100.0%

Report

G3

studytime	N	Mean	Std. Deviation	Variance	Minimum	Maximum
1	212	10.84	3.219	10.360	0	18
2	305	12.09	3.243	10.518	0	19
3	97	13.23	2.502	6.261	8	18
4	35	13.06	3.038	9.232	6	19
Total	649	11.91	3.231	10.437	0	19

Assumption and distribution context

Assumption and distribution context
 Boxplot, histogram, normality, and descriptives

Explore

Weekly study time group / post hoc factor

Case Processing Summary

	studytime	Valid		Cases Missing		Total	
		N	Percent	N	Percent	N	Percent
G3	1	212	100.0%	0	0.0%	212	100.0%
	2	305	100.0%	0	0.0%	305	100.0%
	3	97	100.0%	0	0.0%	97	100.0%
	4	35	100.0%	0	0.0%	35	100.0%

Descriptives

studytime		Statistic	Std. Error		
G3	1	Mean	10.84	.221	
		95% Confidence Interval for Mean	Lower Bound	10.41	
			Upper Bound	11.28	
		5% Trimmed Mean	11.04		
		Median	11.00		
		Variance	10.360		
		Std. Deviation	3.219		
		Minimum	0		
		Maximum	18		
		Range	18		
		Interquartile Range	3		
		Skewness	-1.078	.167	
		Kurtosis	3.117	.333	
		2	2	Mean	12.09
95% Confidence Interval for Mean	Lower Bound			11.73	
	Upper Bound			12.46	
5% Trimmed Mean	12.25				
Median	12.00				
Variance	10.518				
Std. Deviation	3.243				

Assumption and distribution context
Boxplot, histogram, normality, and descriptives

Descriptives

studytime		Statistic	Std. Error	
3	Minimum	0		
	Maximum	19		
	Range	19		
	Interquartile Range	4		
	Skewness	-1.028	.140	
	Kurtosis	3.044	.278	
	Mean	13.23	.254	
	95% Confidence Interval for Mean	Lower Bound	12.72	
		Upper Bound	13.73	
	5% Trimmed Mean	13.27		
	Median	13.00		
	Variance	6.261		
	Std. Deviation	2.502		
	Minimum	8		
Maximum	18			
Range	10			
Interquartile Range	4			
Skewness	-.190	.245		
Kurtosis	-.502	.485		
4	Mean	13.06	.514	
	95% Confidence Interval for Mean	Lower Bound	12.01	
		Upper Bound	14.10	
	5% Trimmed Mean	13.07		
	Median	13.00		
	Variance	9.232		
	Std. Deviation	3.038		
	Minimum	6		
	Maximum	19		
	Range	13		
	Interquartile Range	4		
	Skewness	.209	.398	
	Kurtosis	-.339	.778	

Assumption and distribution context
 Boxplot, histogram, normality, and descriptives

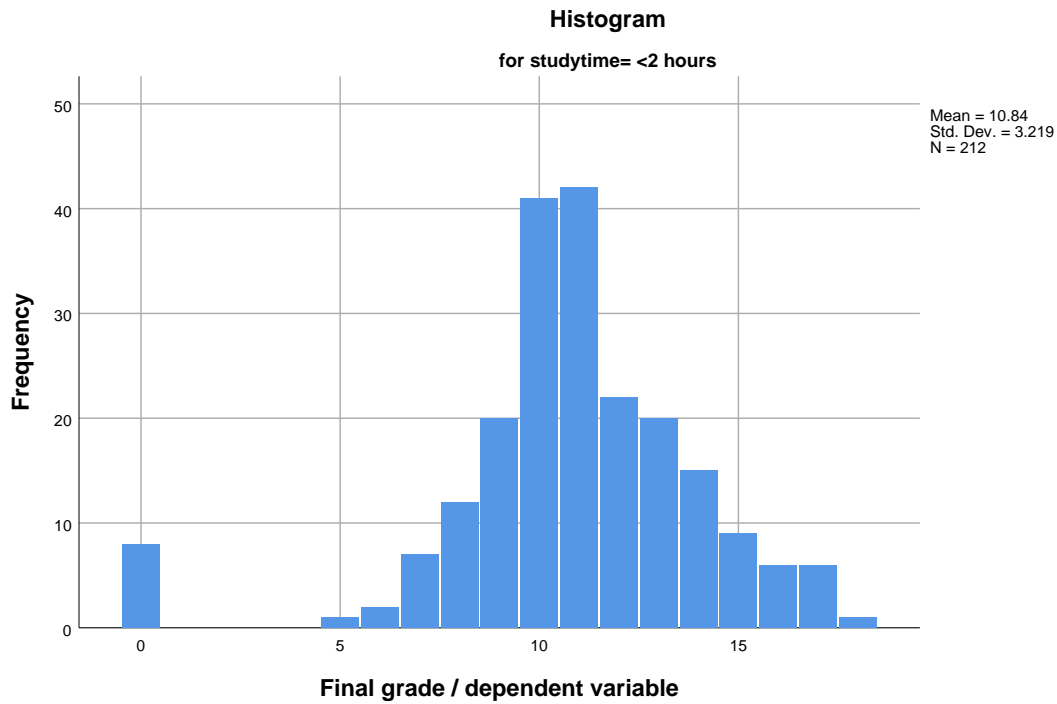
Tests of Normality

studytime	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
G3 1	.161	212	.000	.898	212	.000
2	.125	305	.000	.917	305	.000
3	.103	97	.013	.970	97	.025
4	.136	35	.099	.955	35	.166

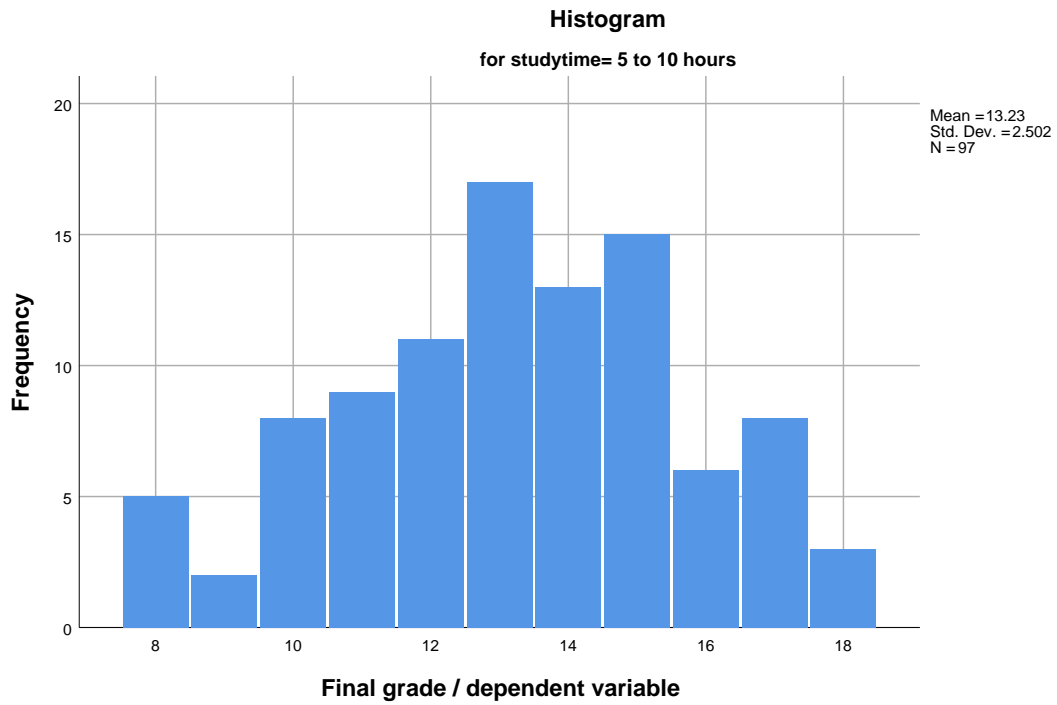
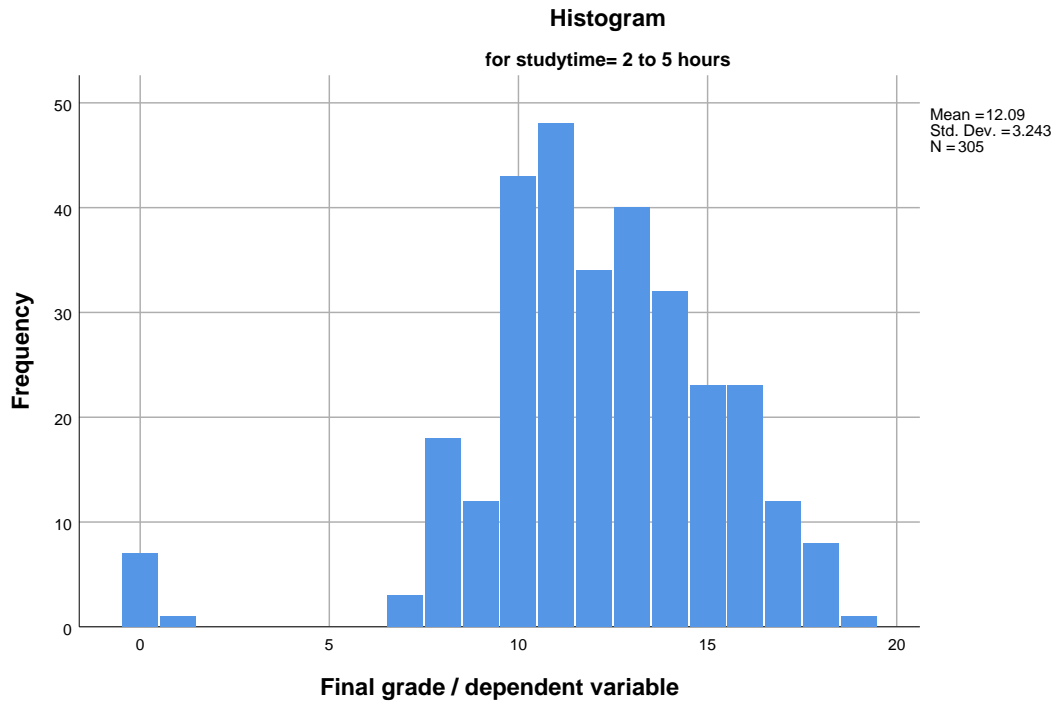
a. Lilliefors Significance Correction

Final grade / dependent variable

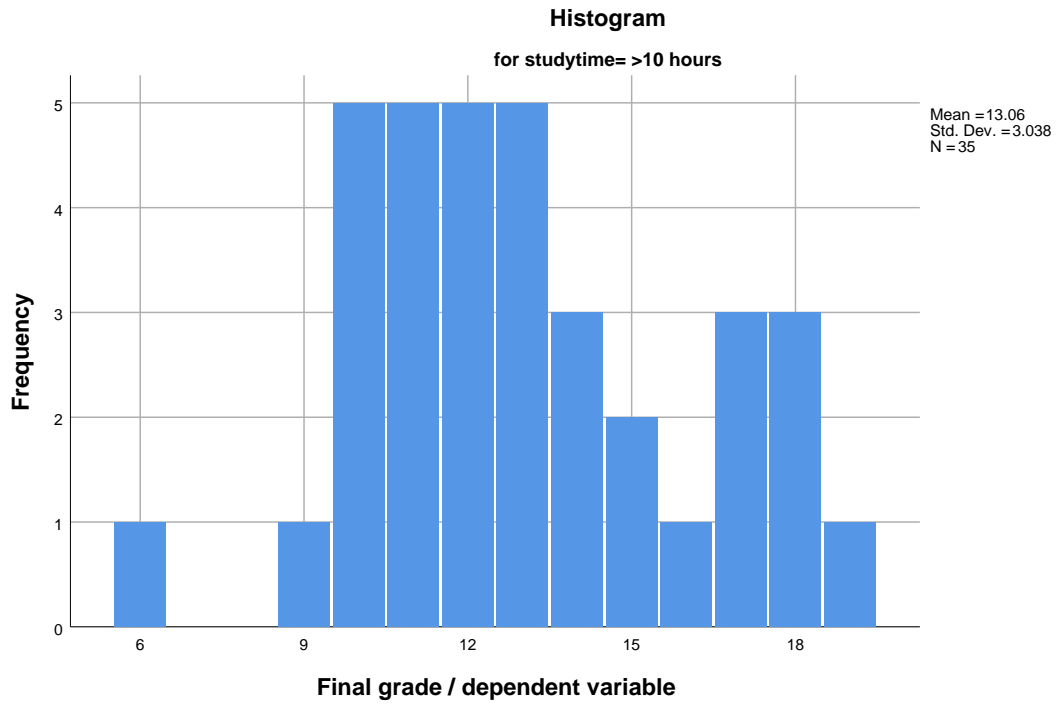
Histograms



Assumption and distribution context
Boxplot, histogram, normality, and descriptives



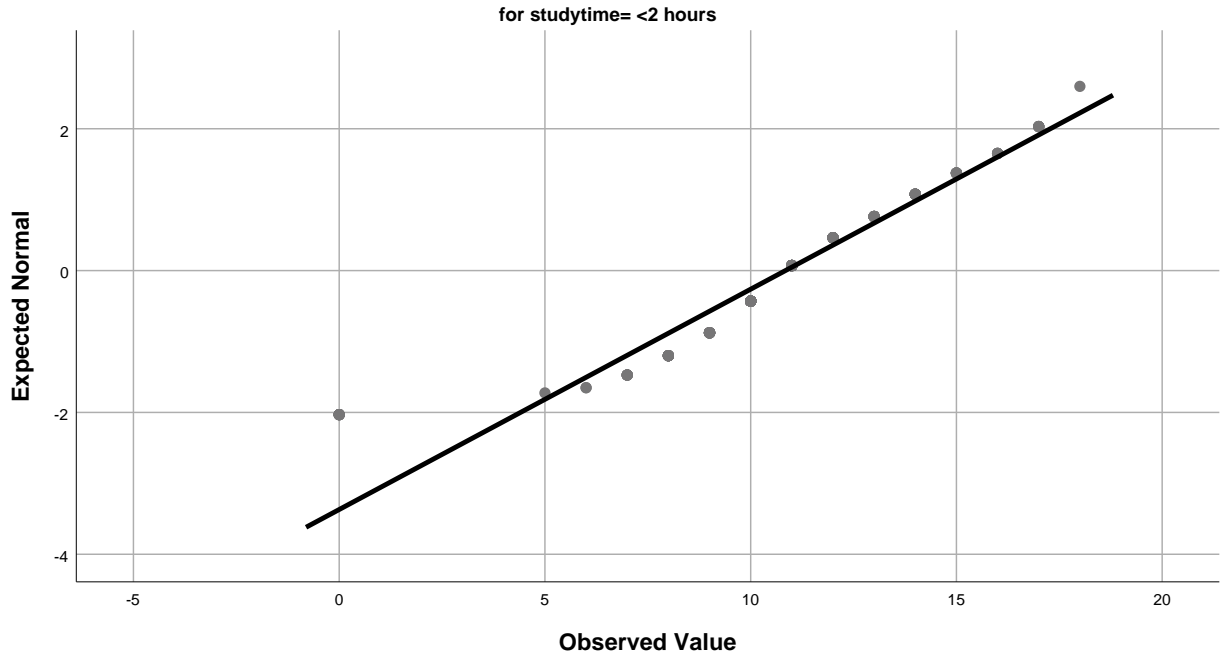
Assumption and distribution context
Boxplot, histogram, normality, and descriptives



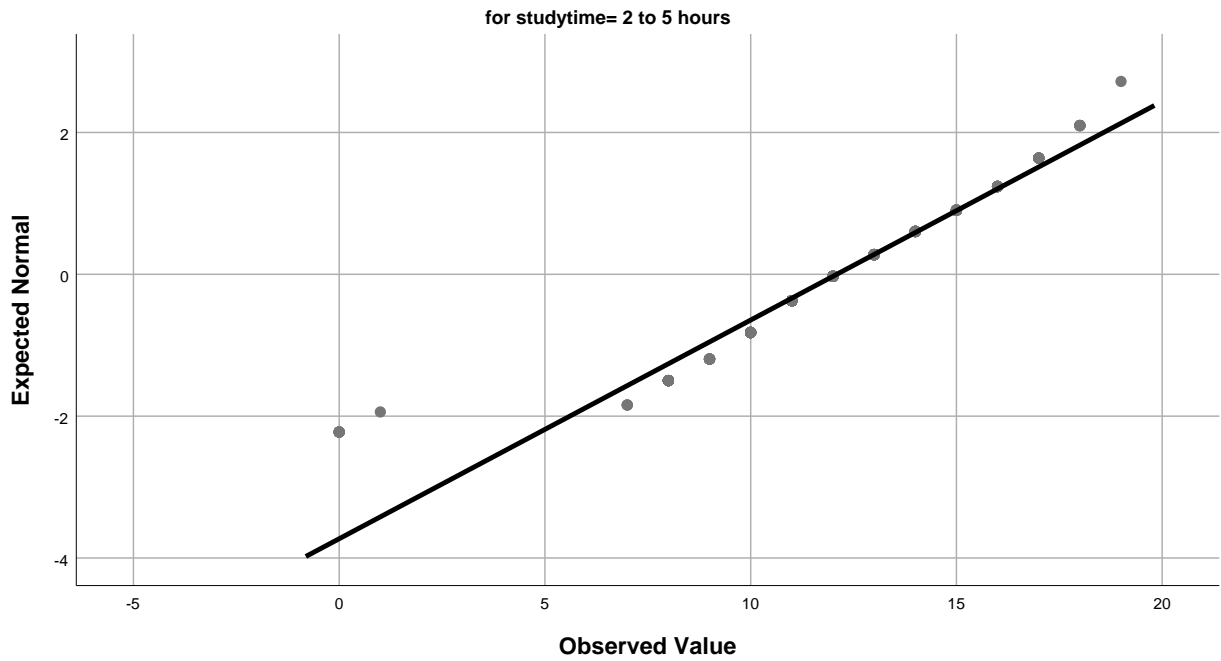
Normal Q-Q Plots

Assumption and distribution context
Boxplot, histogram, normality, and descriptives

Normal Q-Q Plot of Final grade / dependent variable

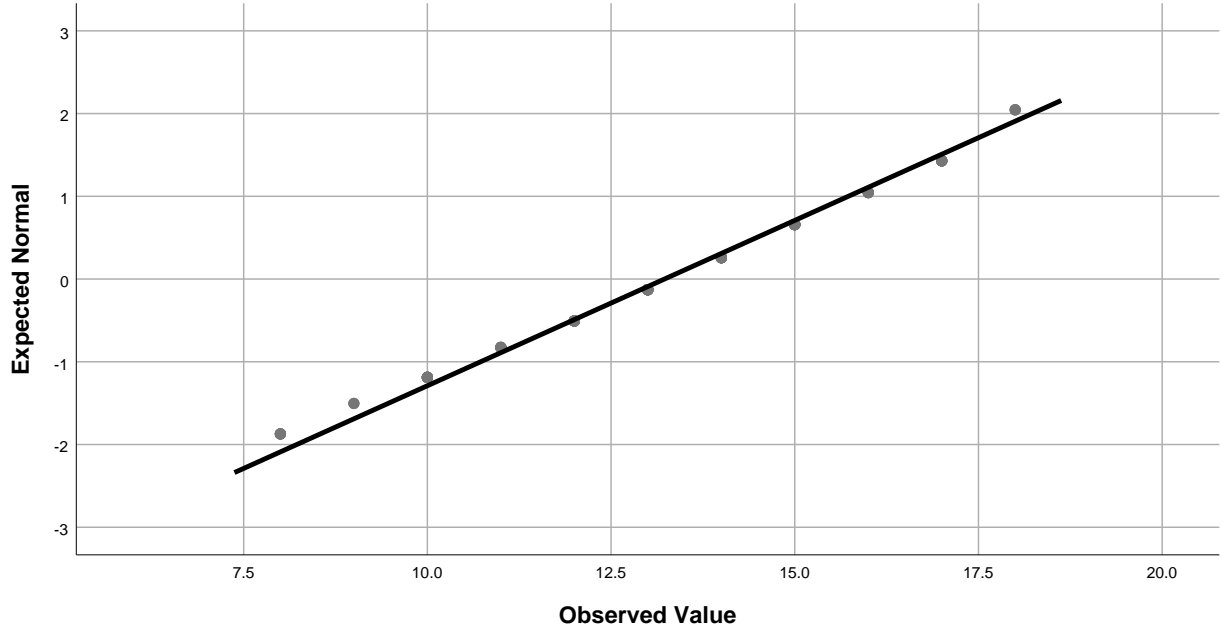


Normal Q-Q Plot of Final grade / dependent variable

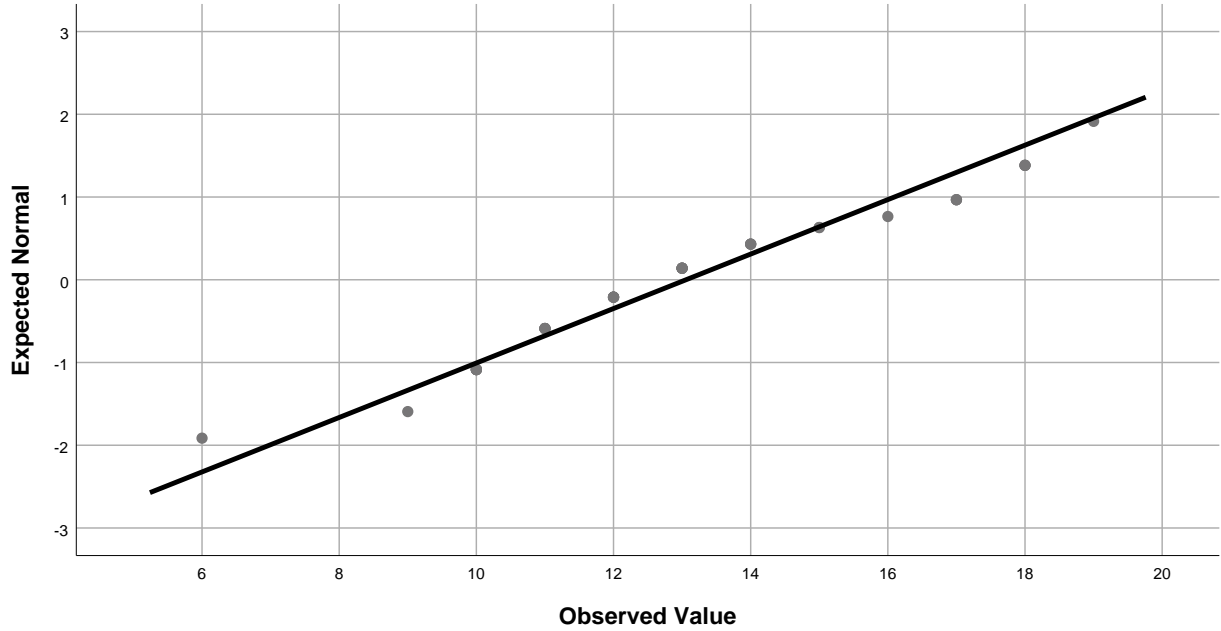


Assumption and distribution context
Boxplot, histogram, normality, and descriptives

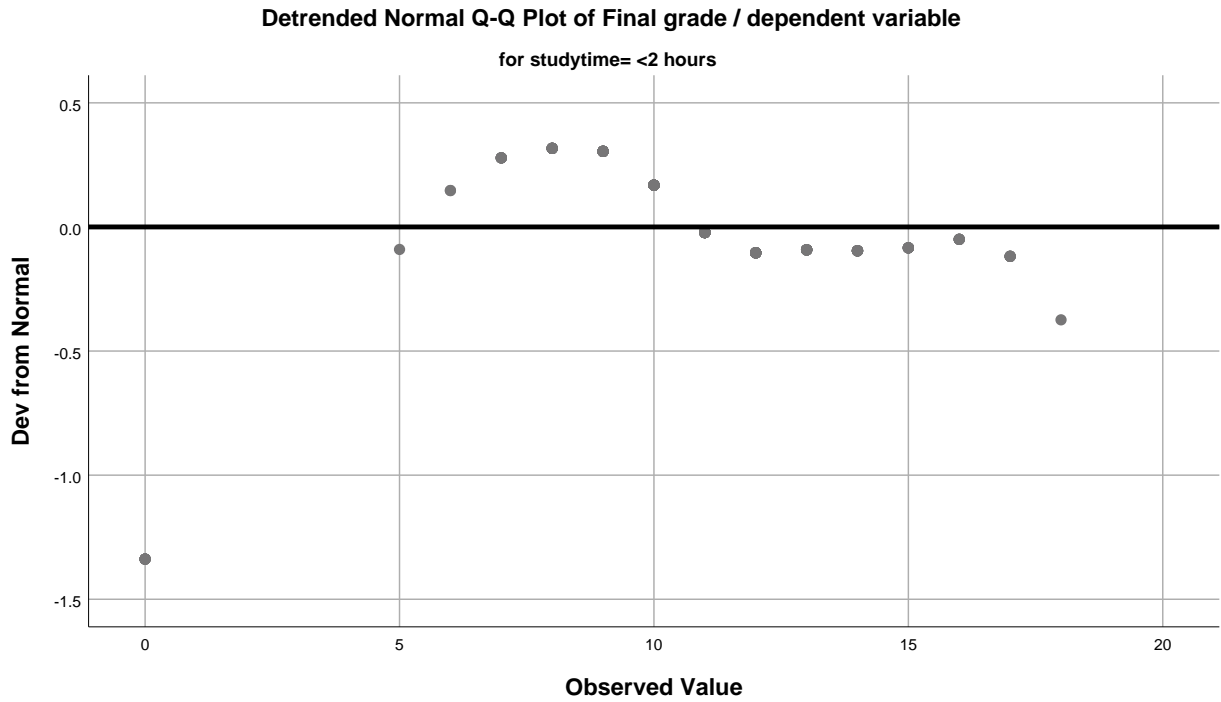
Normal Q-Q Plot of Final grade / dependent variable
for studytime= 5 to 10 hours



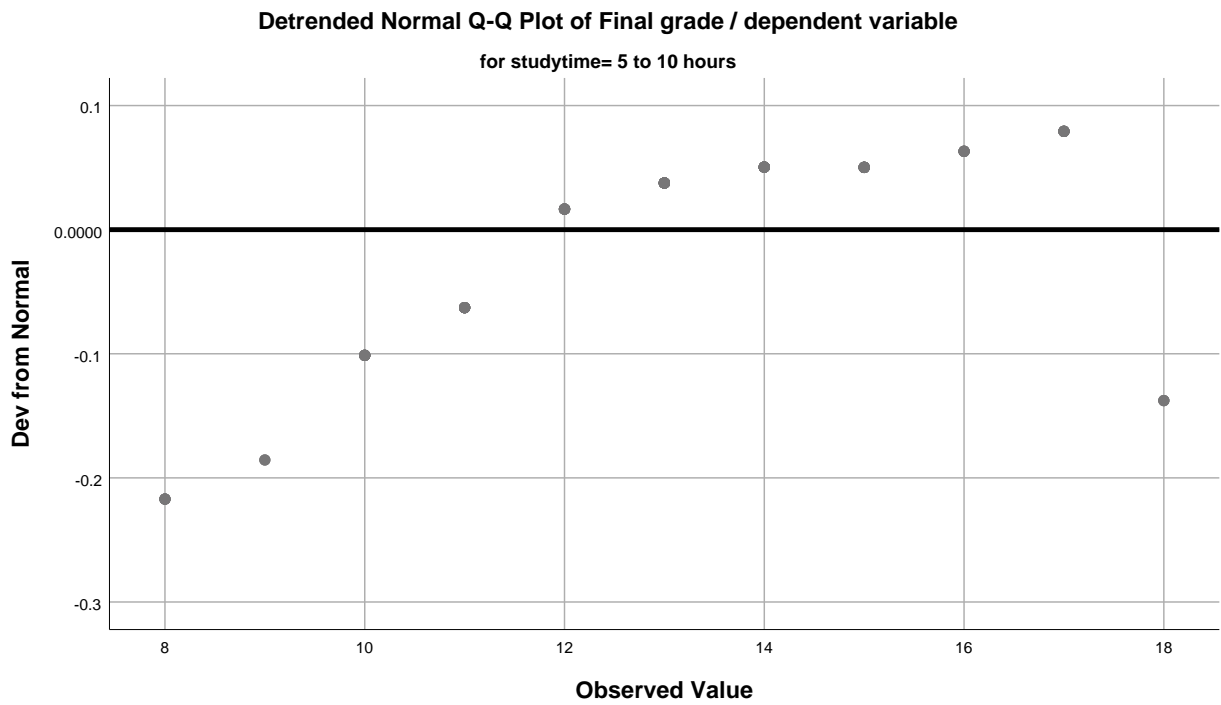
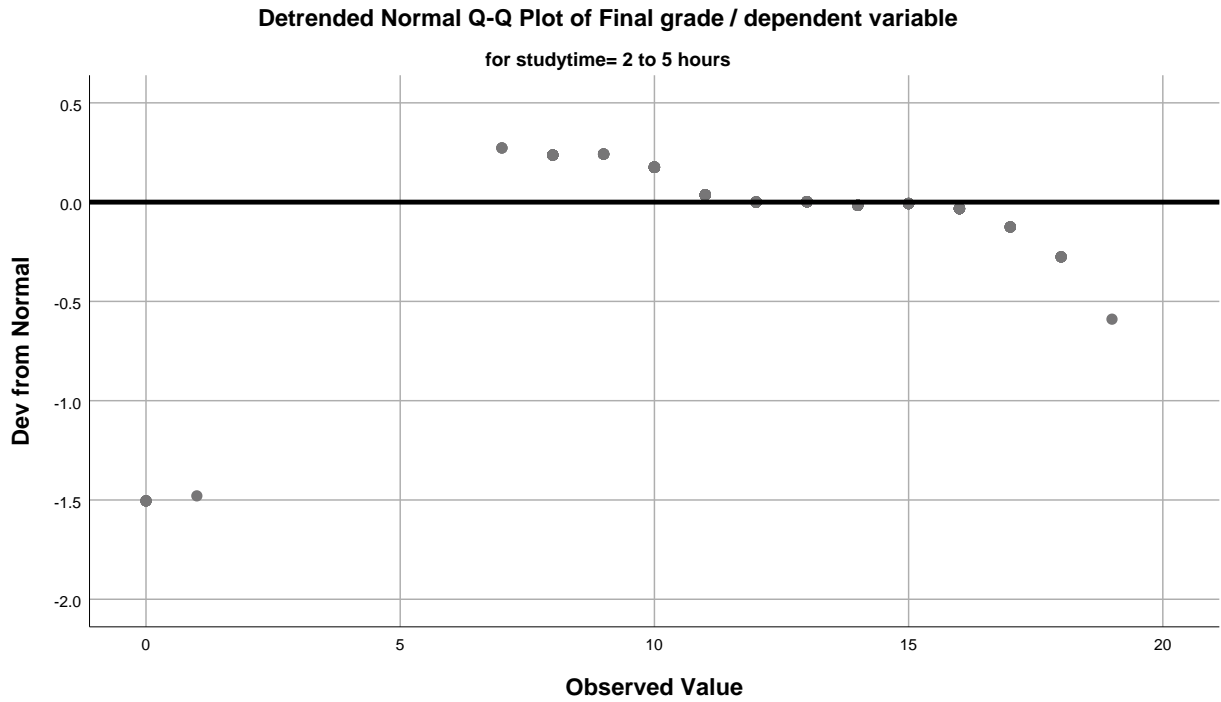
Normal Q-Q Plot of Final grade / dependent variable
for studytime= >10 hours



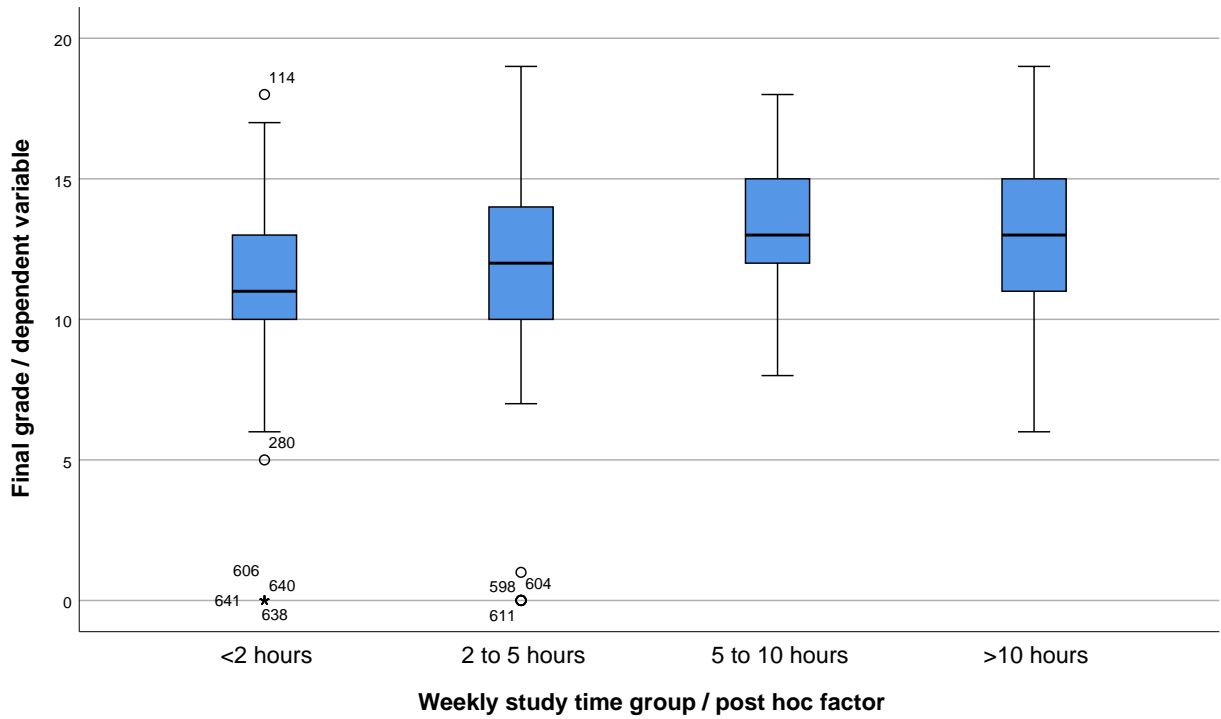
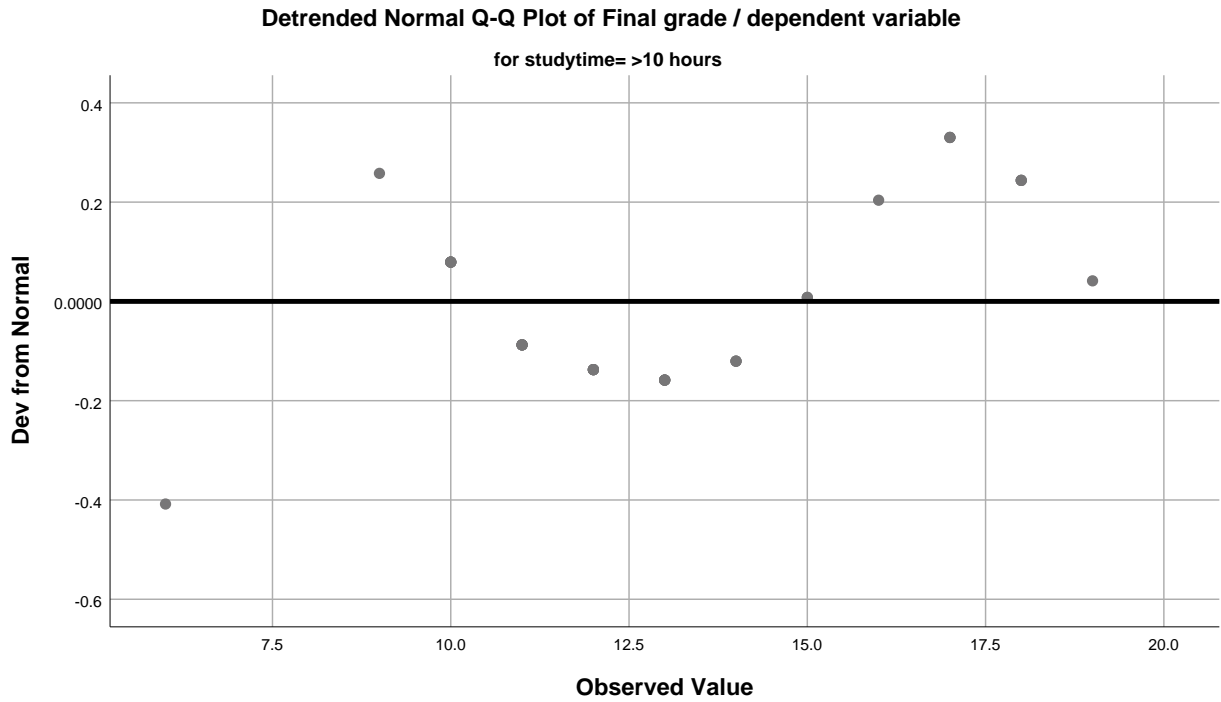
Detrended Normal Q-Q Plots



Assumption and distribution context
Boxplot, histogram, normality, and descriptives



Assumption and distribution context
Boxplot, histogram, normality, and descriptives



One-way ANOVA with Games Howell Post Hoc Test

One-way ANOVA with Games Howell Post Hoc Test
 Dependent variable: G3; factor: studytime

Oneway

Descriptives

G3

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum
					Lower Bound	Upper Bound	
1	212	10.84	3.219	.221	10.41	11.28	0
2	305	12.09	3.243	.186	11.73	12.46	0
3	97	13.23	2.502	.254	12.72	13.73	8
4	35	13.06	3.038	.514	12.01	14.10	6
Total	649	11.91	3.231	.127	11.66	12.16	0

Descriptives

G3

	Maximum
1	18
2	19
3	18
4	19
Total	19

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
G3	Based on Mean	.985	3	645	.400
	Based on Median	1.026	3	645	.380
	Based on Median and with adjusted df	1.026	3	609.885	.380
	Based on trimmed mean	1.081	3	645	.356

One-way ANOVA with Games Howell Post Hoc Test
 Dependent variable: G3; factor: studytime

ANOVA

G3

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	465.078	3	155.026	15.876	.000
Within Groups	6298.189	645	9.765		
Total	6763.267	648			

Robust Tests of Equality of Means

G3

	Statistic ^a	df1	df2	Sig.
Welch	18.183	3	139.101	.000

a. Asymptotically F distributed.

Post Hoc Tests

Multiple Comparisons

Dependent Variable: G3

Games-Howell

(I) studytime	(J) studytime	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-1.247*	.289	.000	-1.99	-.50
	3	-2.382*	.337	.000	-3.25	-1.51
	4	-2.213*	.559	.001	-3.70	-.72
2	1	1.247*	.289	.000	.50	1.99
	3	-1.135*	.315	.002	-1.95	-.32
	4	-.965	.546	.303	-2.42	.49
3	1	2.382*	.337	.000	1.51	3.25
	2	1.135*	.315	.002	.32	1.95
	4	.170	.573	.991	-1.35	1.69
4	1	2.213*	.559	.001	.72	3.70
	2	.965	.546	.303	-.49	2.42
	3	-.170	.573	.991	-1.69	1.35

One-way ANOVA with Games Howell Post Hoc Test
Dependent variable: G3; factor: studytime

*. The mean difference is significant at the 0.05 level.