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## Duncans Multiple Range Test

Duncans Multiple Range Test  
Import data

## Duncans Multiple Range Test Context

Duncans Multiple Range Test Context  
Group descriptives for G3 by studytime

## Means

[DuncanData] D:\DATA ANALYSIS\F Post Hoc Tests\Duncans Multiple Range Test\SPSS\_Output\sav\Duncans-Multiple-Range-Test-data.sav

### Case Processing Summary

|                | Included |         | Cases 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      |

## Distribution and Assumption Context

>Warning # 2004. Command name: SUBTITLE

>The subtitle given exceeds 60 characters in length. The first 60 characters  
>will be used.

Distribution and Assumption Context  
Review boxplots, histograms, normality, and descriptive outp

## Explore

### Weekly study time group / post hoc factor

#### Case Processing Summary

|    |           | Valid |         | Cases Missing |         | Total |         |
|----|-----------|-------|---------|---------------|---------|-------|---------|
|    | studytime | 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 | Mean                             | 12.09       | .186       |
|           |   | 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       |            |

Distribution and Assumption Context  
Review boxplots, histograms, normality, and descriptive outp

### 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          |            |
| 4         | Interquartile Range              | 4           |            |
|           | Skewness                         | -.190       | .245       |
|           | Kurtosis                         | -.502       | .485       |
|           | 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       |



Distribution and Assumption Context  
Review boxplots, histograms, normality, and descriptive outp

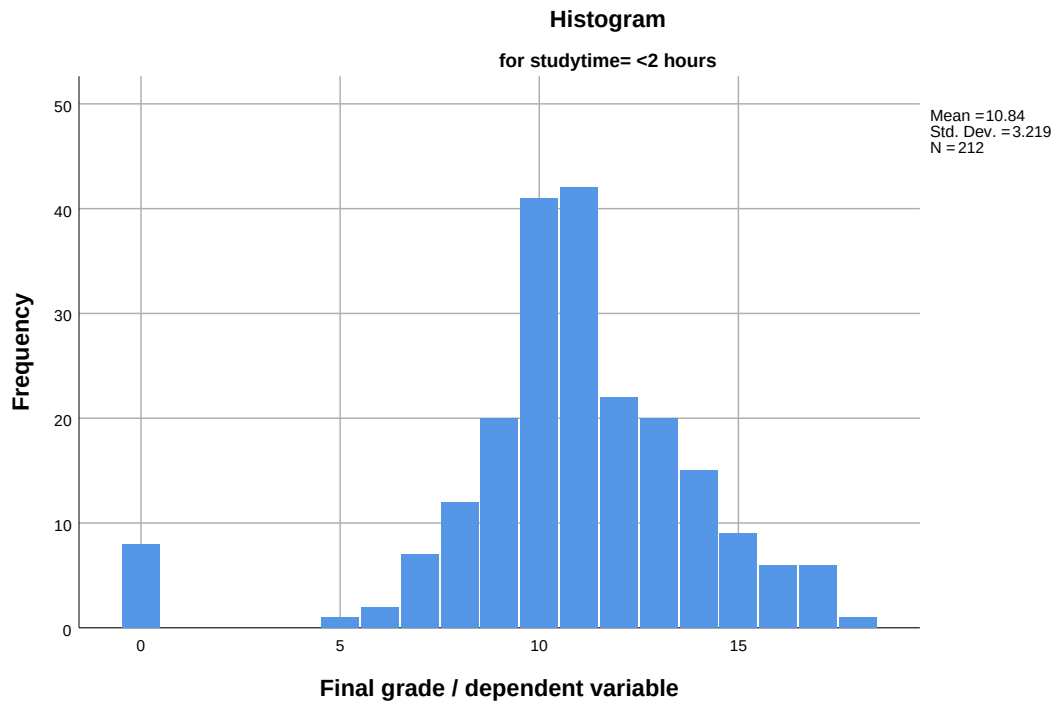
### Tests of Normality

|    |           | Kolmogorov-Smirnov <sup>a</sup> |     |      | Shapiro-Wilk |     |      |
|----|-----------|---------------------------------|-----|------|--------------|-----|------|
|    | studytime | 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 |

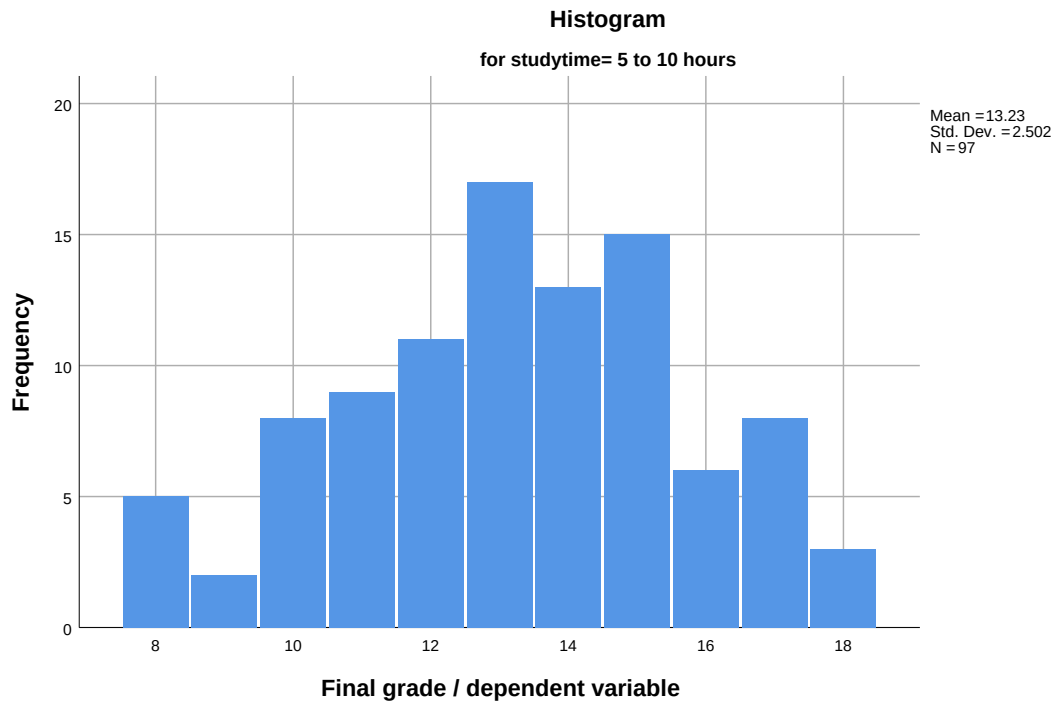
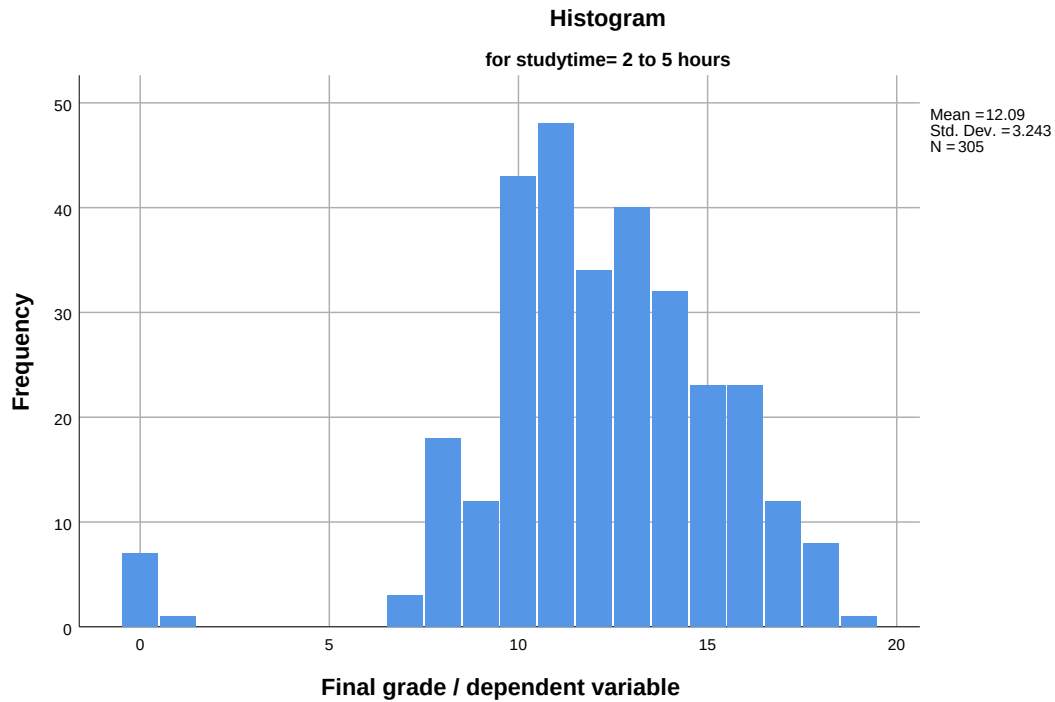
a. Lilliefors Significance Correction

## Final grade / dependent variable

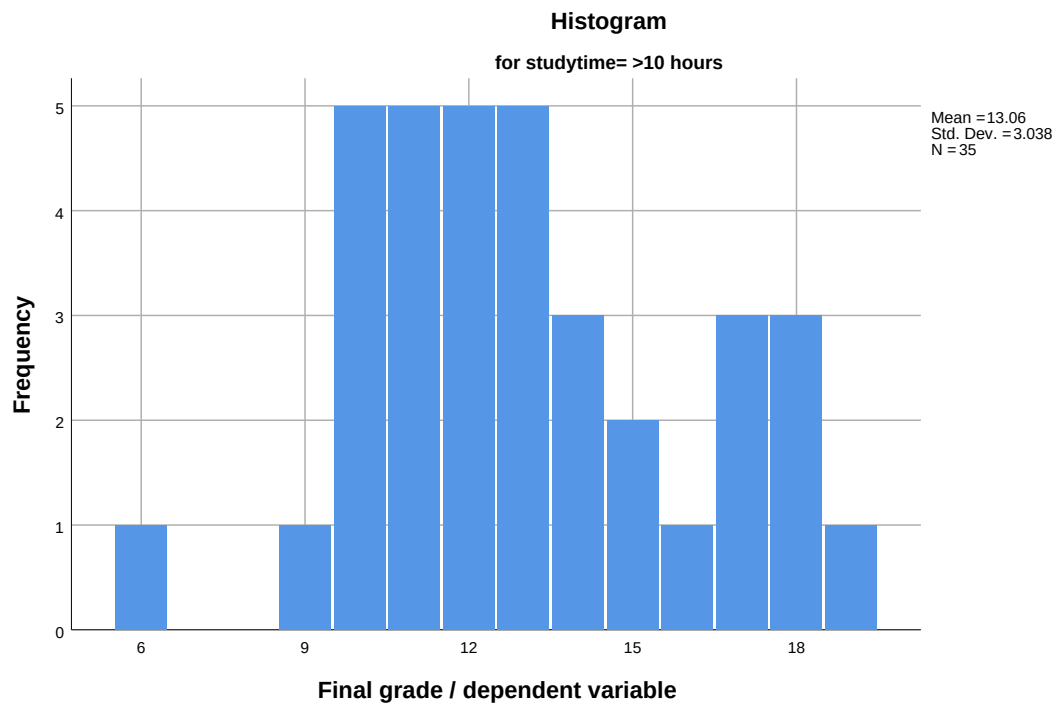
### Histograms



Distribution and Assumption Context  
Review boxplots, histograms, normality, and descriptive outp

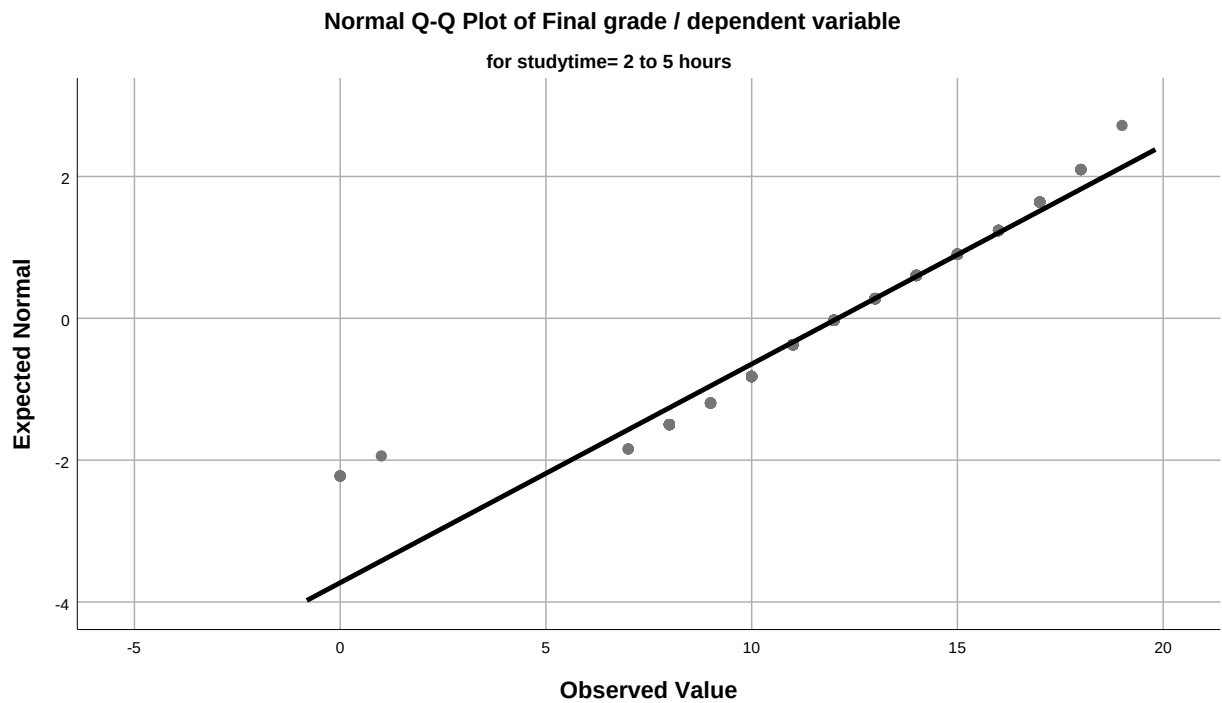
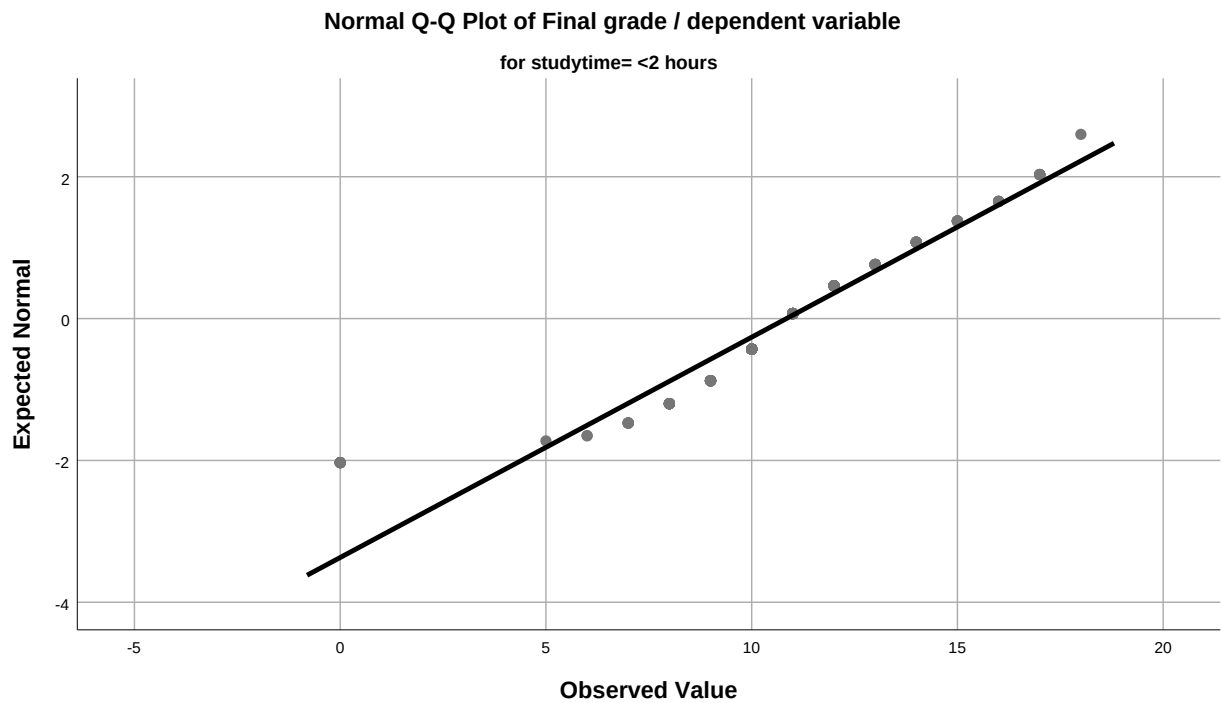


Distribution and Assumption Context  
Review boxplots, histograms, normality, and descriptive outp

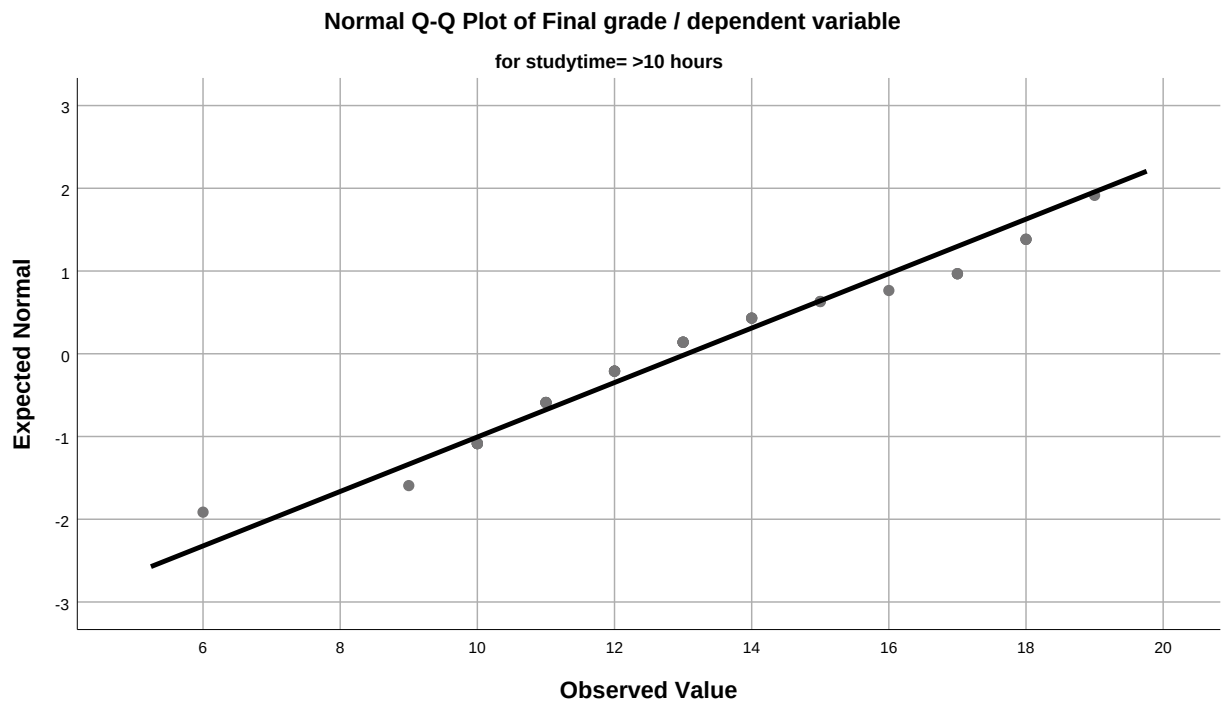
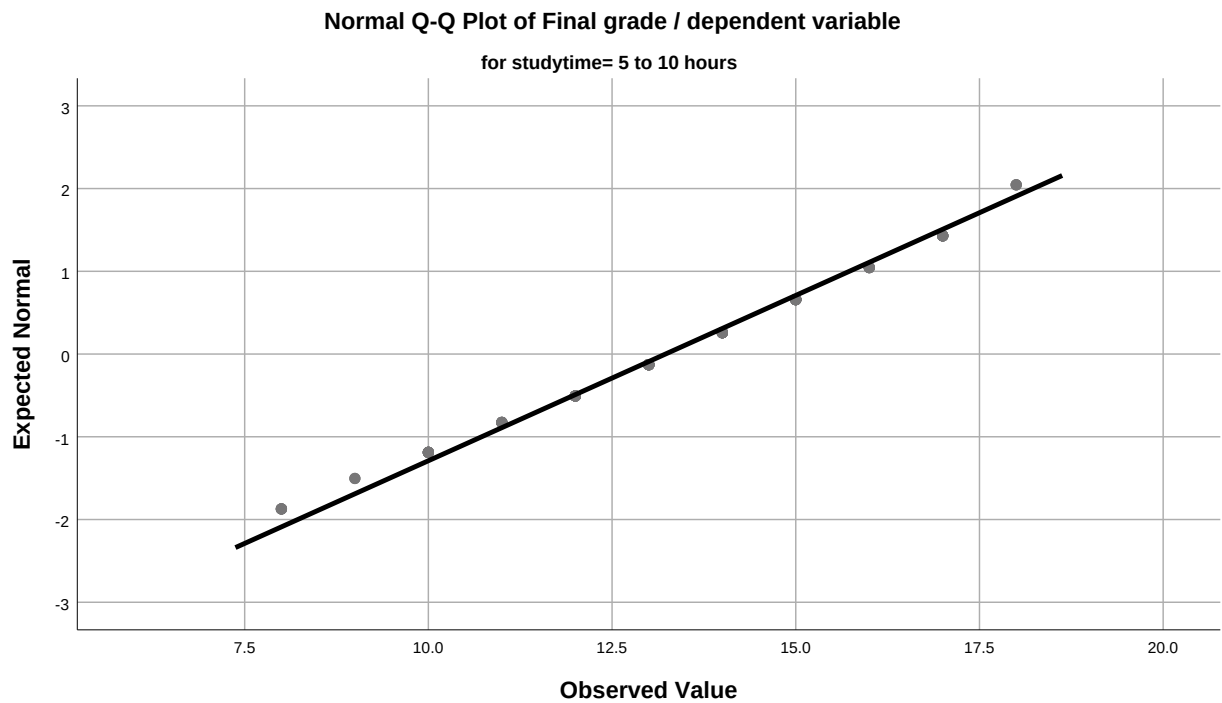


## Normal Q-Q Plots

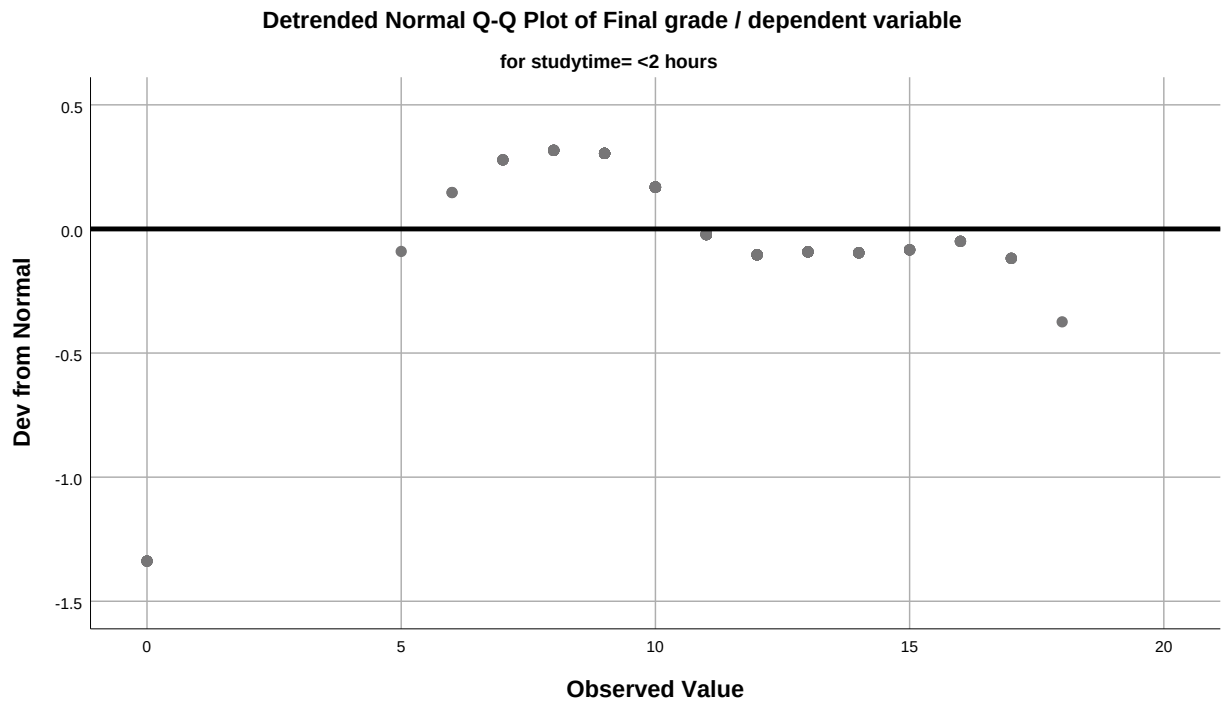
Distribution and Assumption Context  
Review boxplots, histograms, normality, and descriptive outp



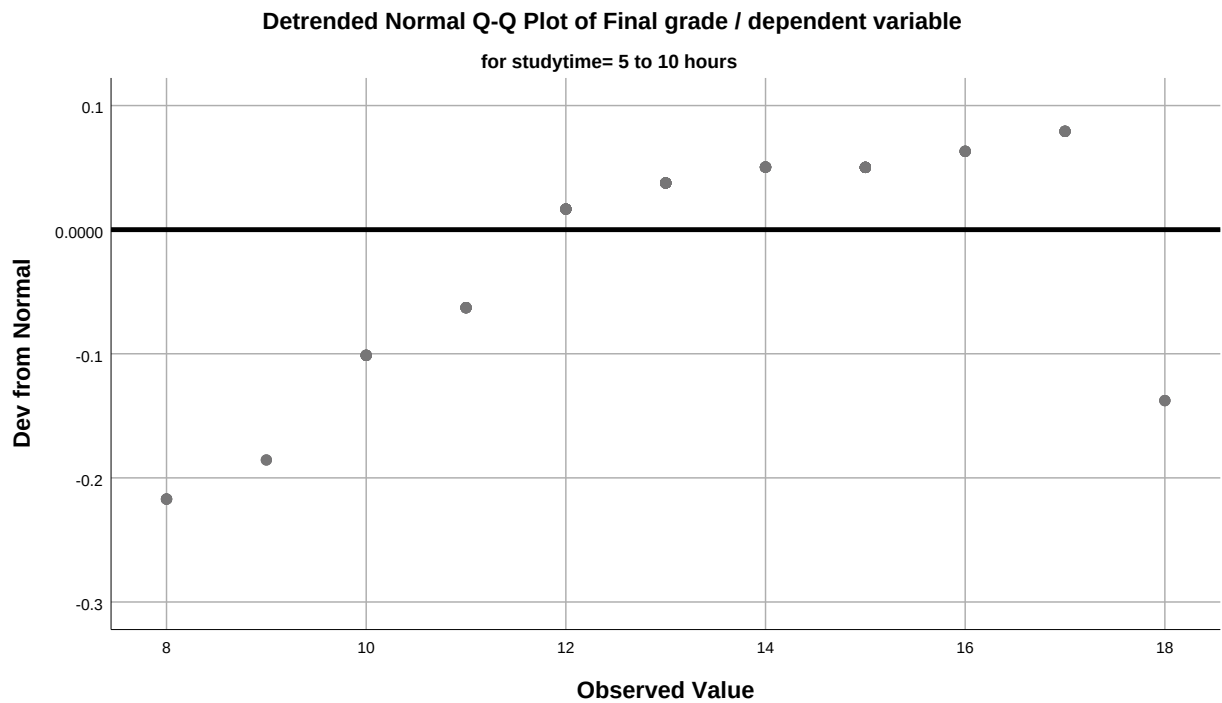
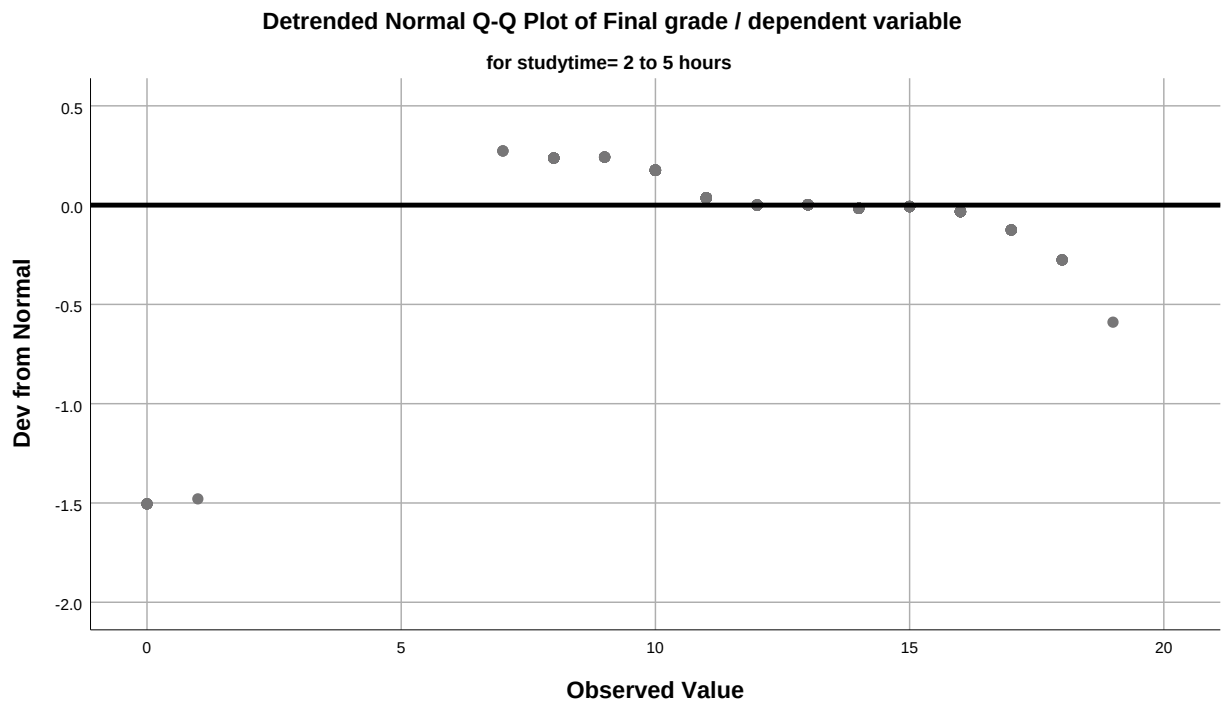
Distribution and Assumption Context  
Review boxplots, histograms, normality, and descriptive outp



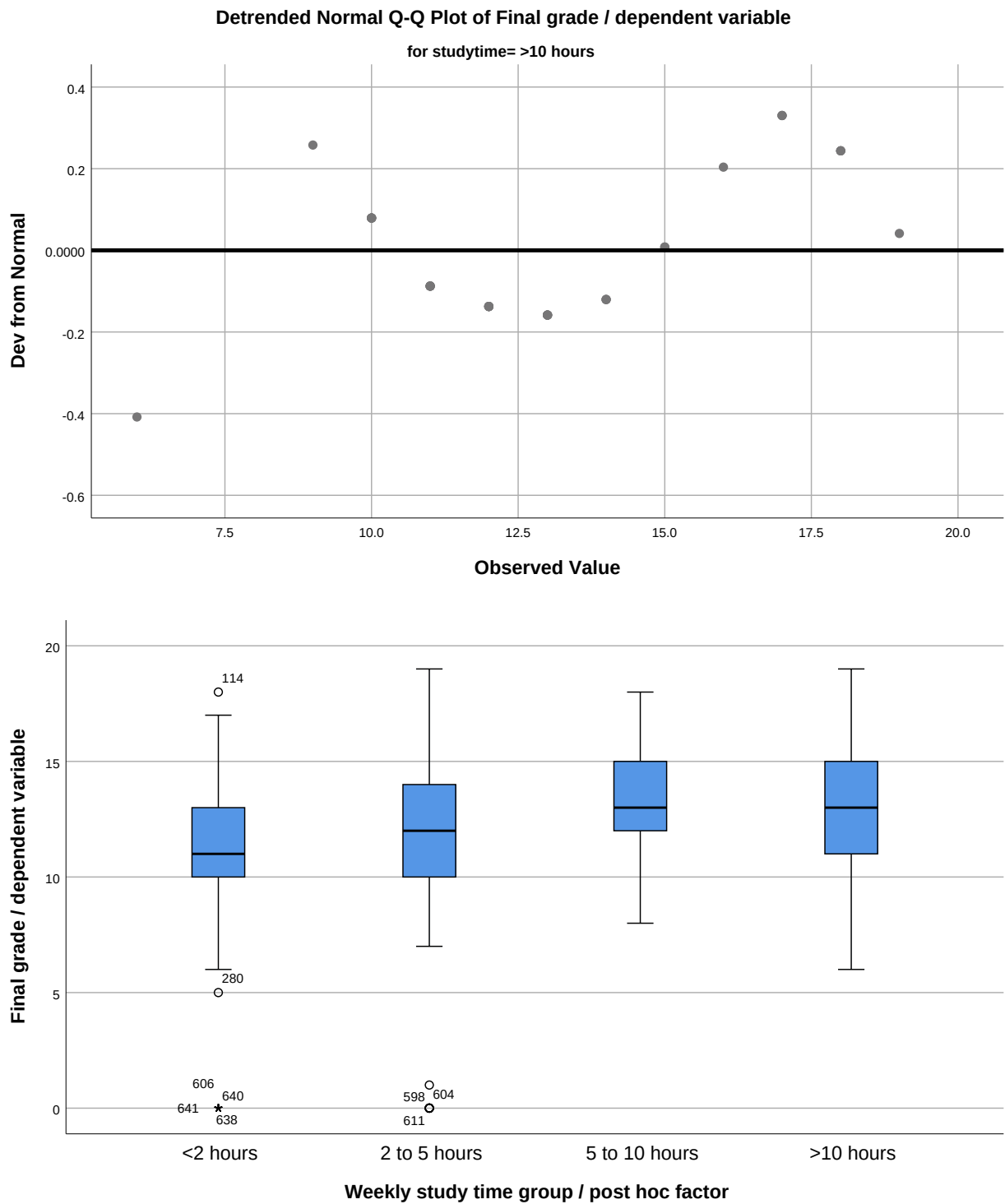
## Detrended Normal Q-Q Plots



Distribution and Assumption Context  
Review boxplots, histograms, normality, and descriptive outp



Distribution and Assumption Context  
Review boxplots, histograms, normality, and descriptive outp





## One-Way ANOVA with Duncans Multiple Range Test

One-Way ANOVA with Duncans Multiple Range 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 Duncans Multiple Range 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 |             |        |      |

### Post Hoc Tests

#### Homogeneous Subsets

G3

Duncan<sup>a,b</sup>

| studytime | N   | Subset for alpha = .05 |       |       |
|-----------|-----|------------------------|-------|-------|
|           |     | 1                      | 2     | 3     |
| 1         | 212 | 10.84                  |       |       |
| 2         | 305 |                        | 12.09 |       |
| 4         | 35  |                        |       | 13.06 |
| 3         | 97  |                        |       | 13.23 |
| Sig.      |     | 1.000                  | 1.000 | .723  |

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 85.331.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.