

Host

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Canonical Correlation

Canonical Correlation
Import data

Canonical Correlation Variable Blocks

```
>Warning # 2004.  Command name: SUBTITLE  
>The subtitle given exceeds 60 characters in length.  The first 60 characters  
>will be used.
```

Canonical Correlation Variable Blocks
Set X contains background/study predictors; Set Y contains g

Descriptives

[CanonicalCorrelationData] D:\DATA ANALYSIS\G Correlation Tests\Canonical Correlation\SPSS_Output\sav\Canonical-Correlation-data.sav

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Student age	649	15	22	16.74	1.218
Mother education	649	0	4	2.51	1.135
Father education	649	0	4	2.31	1.100
Travel time	649	1	4	1.57	.749
Weekly study time	649	1	4	1.93	.830
Past class failures	649	0	3	.22	.593
First period grade	649	0	19	11.40	2.745
Second period grade	649	0	19	11.57	2.914
Final grade	649	0	19	11.91	3.231
Valid N (listwise)	649				

Canonical Correlation Input Matrix

```
>Warning # 2004.  Command name: SUBTITLE  
>The subtitle given exceeds 60 characters in length.  The first 60 characters  
>will be used.
```

Canonical Correlation Input Matrix
 Pearson correlations used as the starting context for canoni

Correlations

Correlations

		Student age	Mother education	Father education
Student age	Pearson Correlation	1	-.108**	-.121**
	Sig. (2-tailed)		.006	.002
	N	649	649	649
Mother education	Pearson Correlation	-.108**	1	.647**
	Sig. (2-tailed)	.006		.000
	N	649	649	649
Father education	Pearson Correlation	-.121**	.647**	1
	Sig. (2-tailed)	.002	.000	
	N	649	649	649
Travel time	Pearson Correlation	.034	-.265**	-.208**
	Sig. (2-tailed)	.380	.000	.000
	N	649	649	649
Weekly study time	Pearson Correlation	-.008	.097*	.050
	Sig. (2-tailed)	.831	.013	.200
	N	649	649	649
Past class failures	Pearson Correlation	.320**	-.172**	-.166**
	Sig. (2-tailed)	.000	.000	.000
	N	649	649	649
First period grade	Pearson Correlation	-.174**	.260**	.218**
	Sig. (2-tailed)	.000	.000	.000
	N	649	649	649
Second period grade	Pearson Correlation	-.107**	.264**	.225**
	Sig. (2-tailed)	.006	.000	.000
	N	649	649	649
Final grade	Pearson Correlation	-.107**	.240**	.212**
	Sig. (2-tailed)	.007	.000	.000
	N	649	649	649

Canonical Correlation Input Matrix
 Pearson correlations used as the starting context for canoni

Correlations

		Travel time	Weekly study time	Past class failures
Student age	Pearson Correlation	.034	-.008	.320**
	Sig. (2-tailed)	.380	.831	.000
	N	649	649	649
Mother education	Pearson Correlation	-.265**	.097*	-.172**
	Sig. (2-tailed)	.000	.013	.000
	N	649	649	649
Father education	Pearson Correlation	-.208**	.050	-.166**
	Sig. (2-tailed)	.000	.200	.000
	N	649	649	649
Travel time	Pearson Correlation	1	-.063	.098*
	Sig. (2-tailed)		.108	.013
	N	649	649	649
Weekly study time	Pearson Correlation	-.063	1	-.147**
	Sig. (2-tailed)	.108		.000
	N	649	649	649
Past class failures	Pearson Correlation	.098*	-.147**	1
	Sig. (2-tailed)	.013	.000	
	N	649	649	649
First period grade	Pearson Correlation	-.154**	.261**	-.384**
	Sig. (2-tailed)	.000	.000	.000
	N	649	649	649
Second period grade	Pearson Correlation	-.154**	.240**	-.386**
	Sig. (2-tailed)	.000	.000	.000
	N	649	649	649
Final grade	Pearson Correlation	-.127**	.250**	-.393**
	Sig. (2-tailed)	.001	.000	.000
	N	649	649	649

Canonical Correlation Input Matrix
 Pearson correlations used as the starting context for canoni

Correlations

		First period grade	Second period grade	Final grade
Student age	Pearson Correlation	-.174**	-.107**	-.107**
	Sig. (2-tailed)	.000	.006	.007
	N	649	649	649
Mother education	Pearson Correlation	.260**	.264**	.240**
	Sig. (2-tailed)	.000	.000	.000
	N	649	649	649
Father education	Pearson Correlation	.218**	.225**	.212**
	Sig. (2-tailed)	.000	.000	.000
	N	649	649	649
Travel time	Pearson Correlation	-.154**	-.154**	-.127**
	Sig. (2-tailed)	.000	.000	.001
	N	649	649	649
Weekly study time	Pearson Correlation	.261**	.240**	.250**
	Sig. (2-tailed)	.000	.000	.000
	N	649	649	649
Past class failures	Pearson Correlation	-.384**	-.386**	-.393**
	Sig. (2-tailed)	.000	.000	.000
	N	649	649	649
First period grade	Pearson Correlation	1	.865**	.826**
	Sig. (2-tailed)		.000	.000
	N	649	649	649
Second period grade	Pearson Correlation	.865**	1	.919**
	Sig. (2-tailed)	.000		.000
	N	649	649	649
Final grade	Pearson Correlation	.826**	.919**	1
	Sig. (2-tailed)	.000	.000	
	N	649	649	649

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

* . Correlation is significant at the 0.05 level (2-tailed).

Canonical Correlation Assumption Context

>Warning # 2004. Command name: SUBTITLE

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

Canonical Correlation Assumption Context
 Check descriptive patterns, outliers, and normality context

Explore

Case Processing Summary

	Valid		Cases Missing		Total	
	N	Percent	N	Percent	N	Percent
Student age	649	100.0%	0	0.0%	649	100.0%
Mother education	649	100.0%	0	0.0%	649	100.0%
Father education	649	100.0%	0	0.0%	649	100.0%
Travel time	649	100.0%	0	0.0%	649	100.0%
Weekly study time	649	100.0%	0	0.0%	649	100.0%
Past class failures	649	100.0%	0	0.0%	649	100.0%
First period grade	649	100.0%	0	0.0%	649	100.0%
Second period grade	649	100.0%	0	0.0%	649	100.0%
Final grade	649	100.0%	0	0.0%	649	100.0%

Descriptives

		Statistic	Std. Error	
Student age	Mean	16.74	.048	
	95% Confidence Interval for Mean	Lower Bound	16.65	
		Upper Bound	16.84	
	5% Trimmed Mean	16.69		
	Median	17.00		
	Variance	1.484		
	Std. Deviation	1.218		
	Minimum	15		
	Maximum	22		
	Range	7		
	Interquartile Range	2		
	Skewness	.417	.096	
	Kurtosis	.072	.192	
Mother education	Mean	2.51	.045	
	95% Confidence Interval for Mean	Lower Bound	2.43	
		Upper Bound	2.60	
	5% Trimmed Mean	2.53		

Canonical Correlation Assumption Context
 Check descriptive patterns, outliers, and normality context

Descriptives

		Statistic	Std. Error	
	Median	2.00		
	Variance	1.287		
	Std. Deviation	1.135		
	Minimum	0		
	Maximum	4		
	Range	4		
	Interquartile Range	2		
	Skewness	-.030	.096	
	Kurtosis	-1.261	.192	
Father education	Mean	2.31	.043	
	95% Confidence Interval for Mean	Lower Bound	2.22	
		Upper Bound	2.39	
	5% Trimmed Mean	2.30		
	Median	2.00		
	Variance	1.210		
	Std. Deviation	1.100		
	Minimum	0		
	Maximum	4		
	Range	4		
	Interquartile Range	2		
	Skewness	.215	.096	
	Kurtosis	-1.109	.192	
	Travel time	Mean	1.57	.029
95% Confidence Interval for Mean		Lower Bound	1.51	
		Upper Bound	1.63	
5% Trimmed Mean		1.49		
Median		1.00		
Variance		.560		
Std. Deviation		.749		
Minimum		1		
Maximum		4		
Range	3			

Canonical Correlation Assumption Context
 Check descriptive patterns, outliers, and normality context

Descriptives

		Statistic	Std. Error	
	Interquartile Range	1		
	Skewness	1.248	.096	
	Kurtosis	1.109	.192	
Weekly study time	Mean	1.93	.033	
	95% Confidence Interval for Mean	Lower Bound	1.87	
		Upper Bound	1.99	
	5% Trimmed Mean	1.87		
	Median	2.00		
	Variance	.688		
	Std. Deviation	.830		
	Minimum	1		
	Maximum	4		
	Range	3		
	Interquartile Range	1		
	Skewness	.700	.096	
	Kurtosis	.038	.192	
	Past class failures	Mean	.22	.023
95% Confidence Interval for Mean		Lower Bound	.18	
		Upper Bound	.27	
5% Trimmed Mean		.12		
Median		.00		
Variance		.352		
Std. Deviation		.593		
Minimum		0		
Maximum		3		
Range		3		
Interquartile Range		0		
Skewness		3.093	.096	
Kurtosis		9.824	.192	
First period grade		Mean	11.40	.108
	95% Confidence Interval for Mean	Lower Bound	11.19	
		Upper Bound	11.61	

Canonical Correlation Assumption Context
 Check descriptive patterns, outliers, and normality context

Descriptives

		Statistic	Std. Error
	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
Second period grade	Mean	11.57	.114
	95% Confidence Interval for Mean	Lower Bound	11.35
		Upper Bound	11.79
	5% Trimmed Mean	11.60	
	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
Final grade	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	

Canonical Correlation Assumption Context
 Check descriptive patterns, outliers, and normality context

Descriptives

	Statistic	Std. Error
Range	19	
Interquartile Range	4	
Skewness	-.913	.096
Kurtosis	2.712	.192

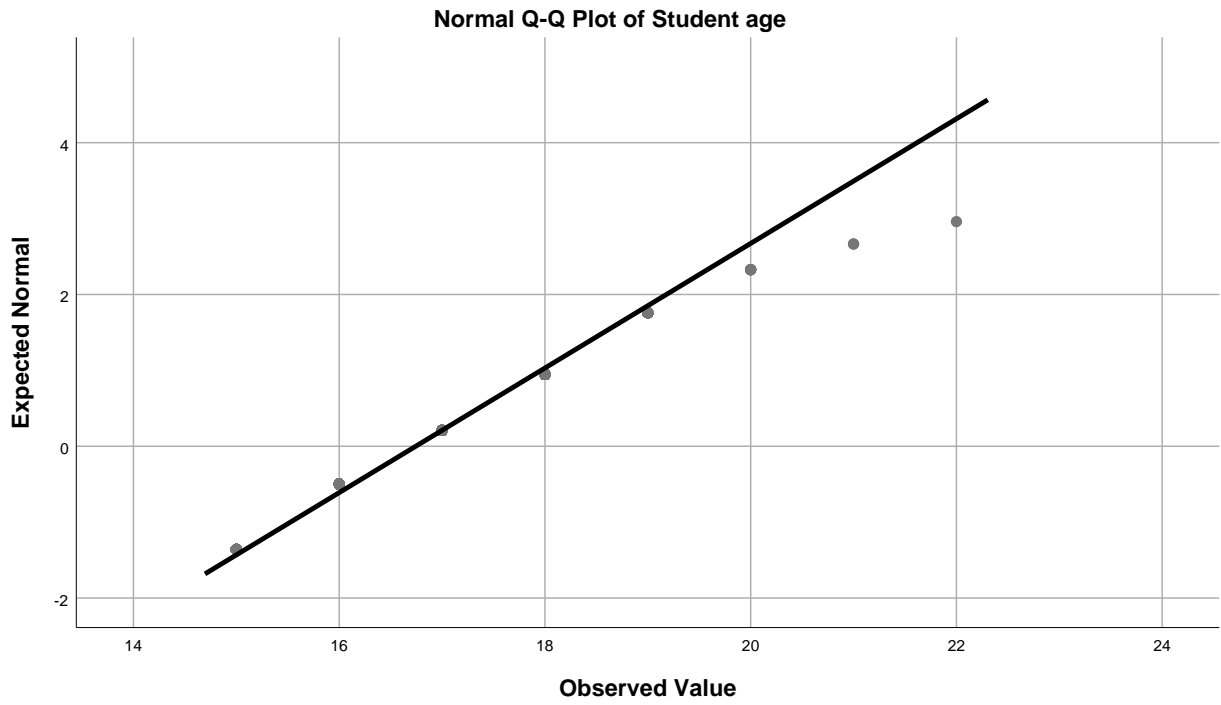
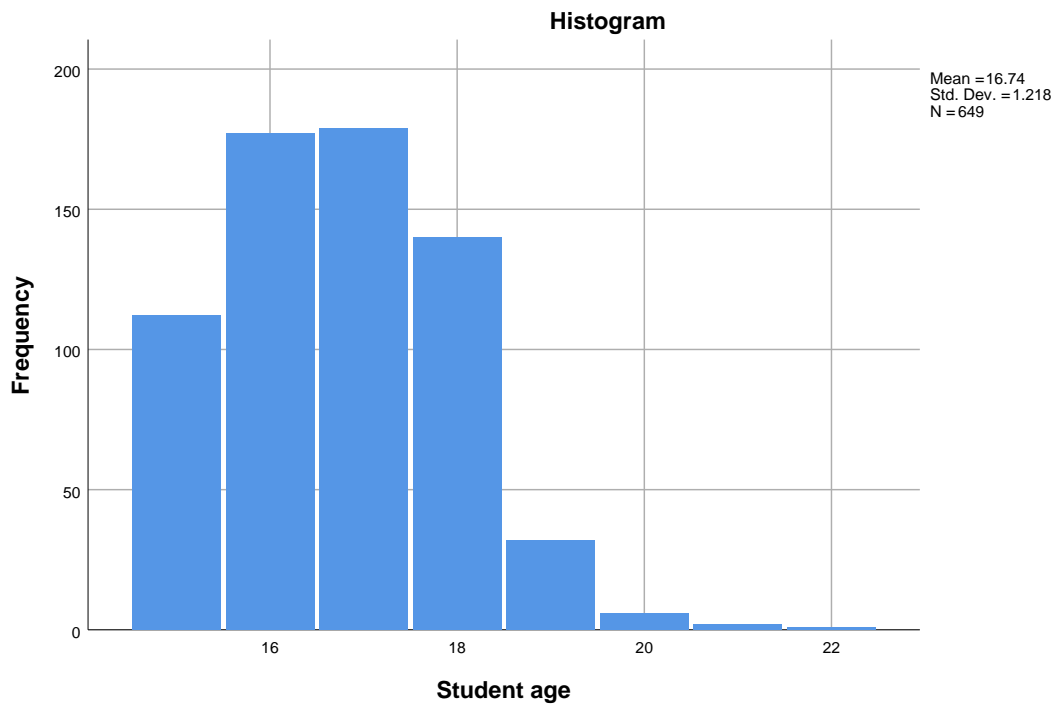
Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Student age	.175	649	.000	.916	649	.000
Mother education	.191	649	.000	.870	649	.000
Father education	.211	649	.000	.875	649	.000
Travel time	.340	649	.000	.725	649	.000
Weekly study time	.263	649	.000	.825	649	.000
Past class failures	.492	649	.000	.424	649	.000
First period grade	.086	649	.000	.986	649	.000
Second period grade	.088	649	.000	.962	649	.000
Final grade	.124	649	.000	.926	649	.000

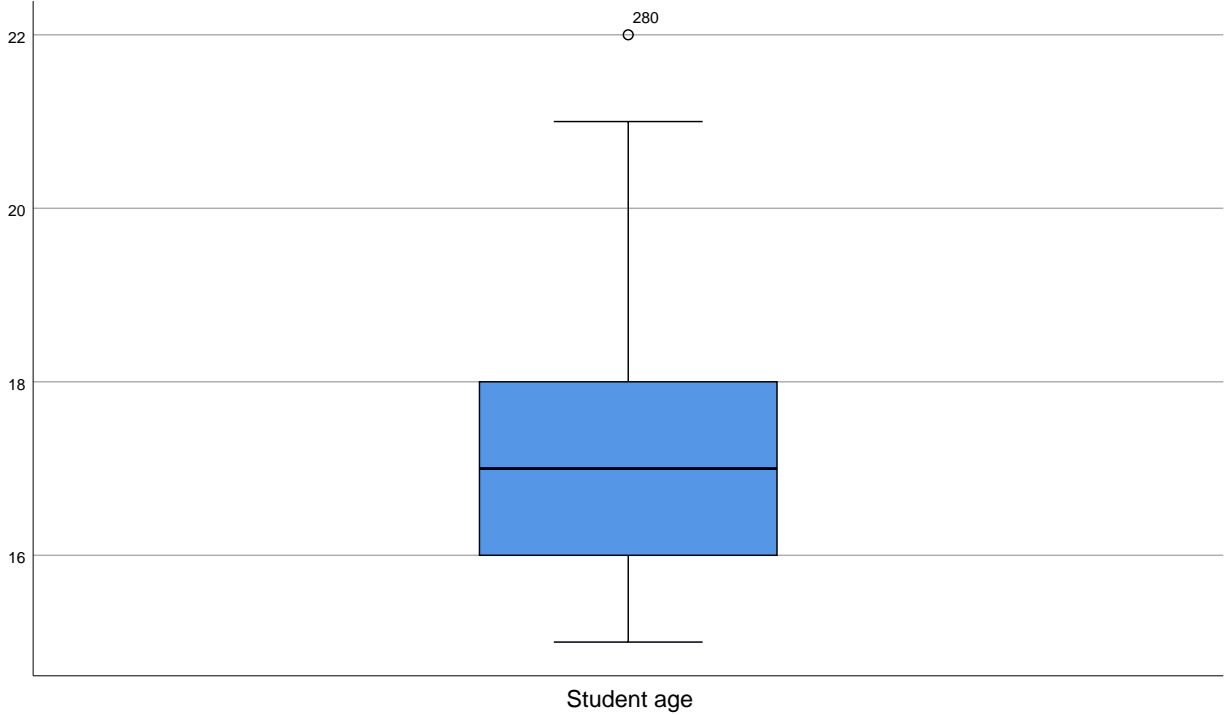
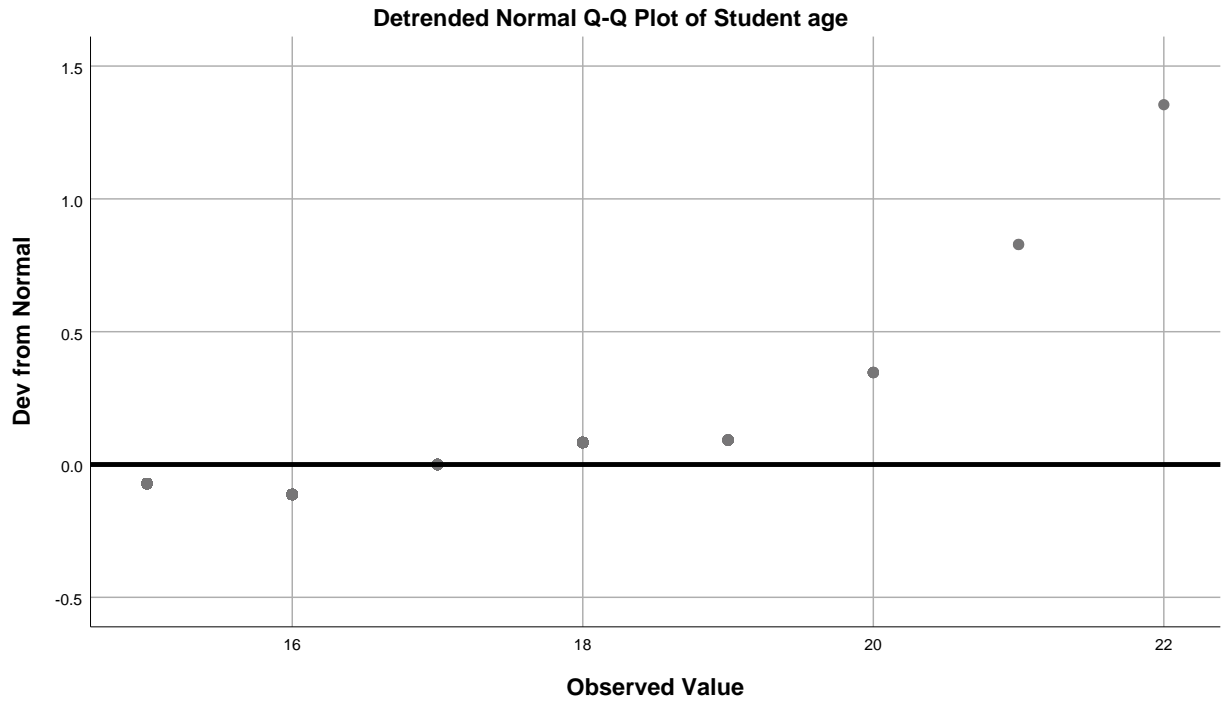
a. Lilliefors Significance Correction

Student age

Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context

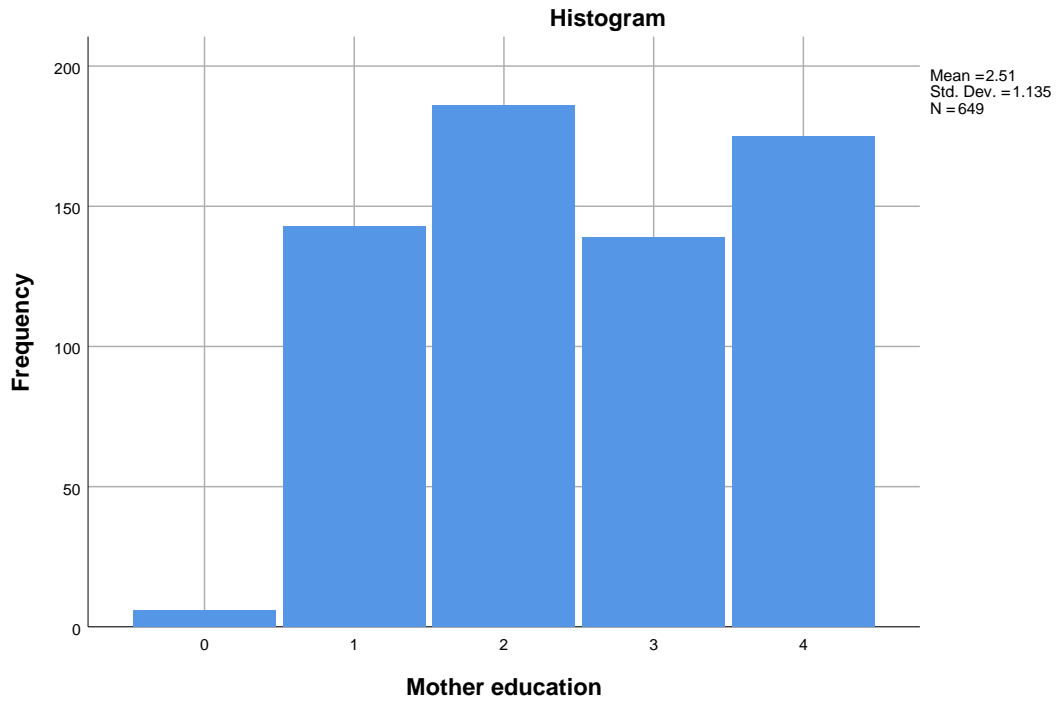


Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context

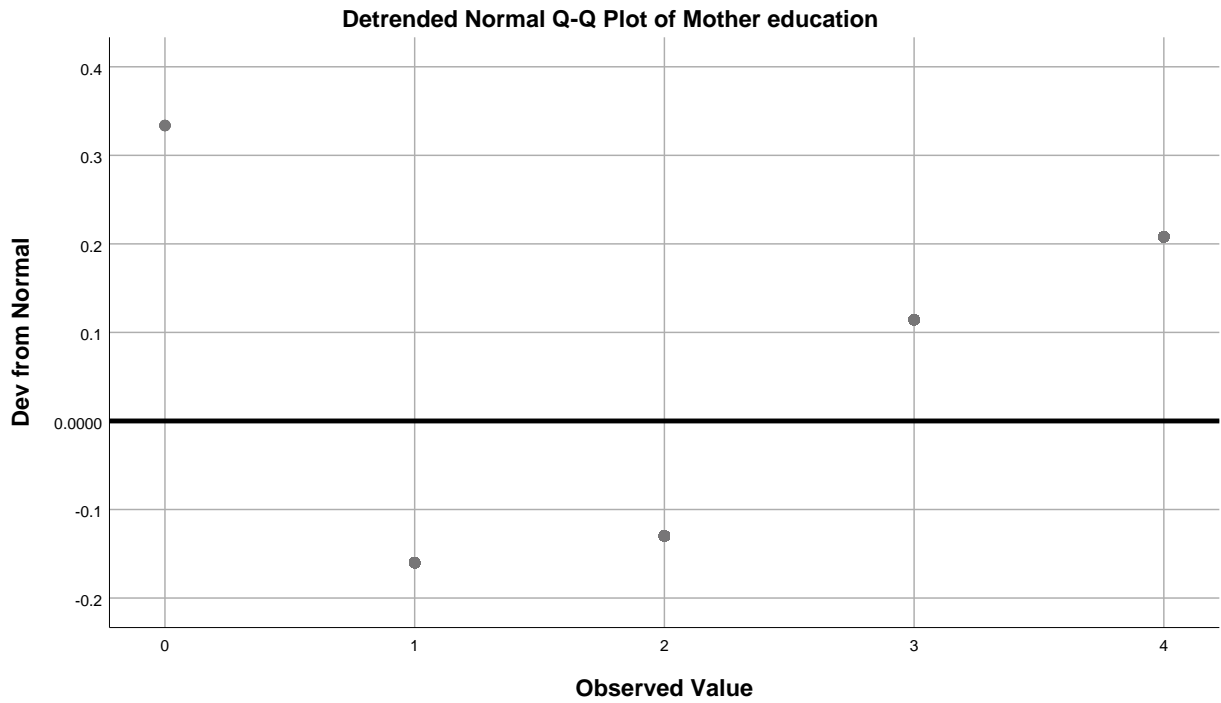
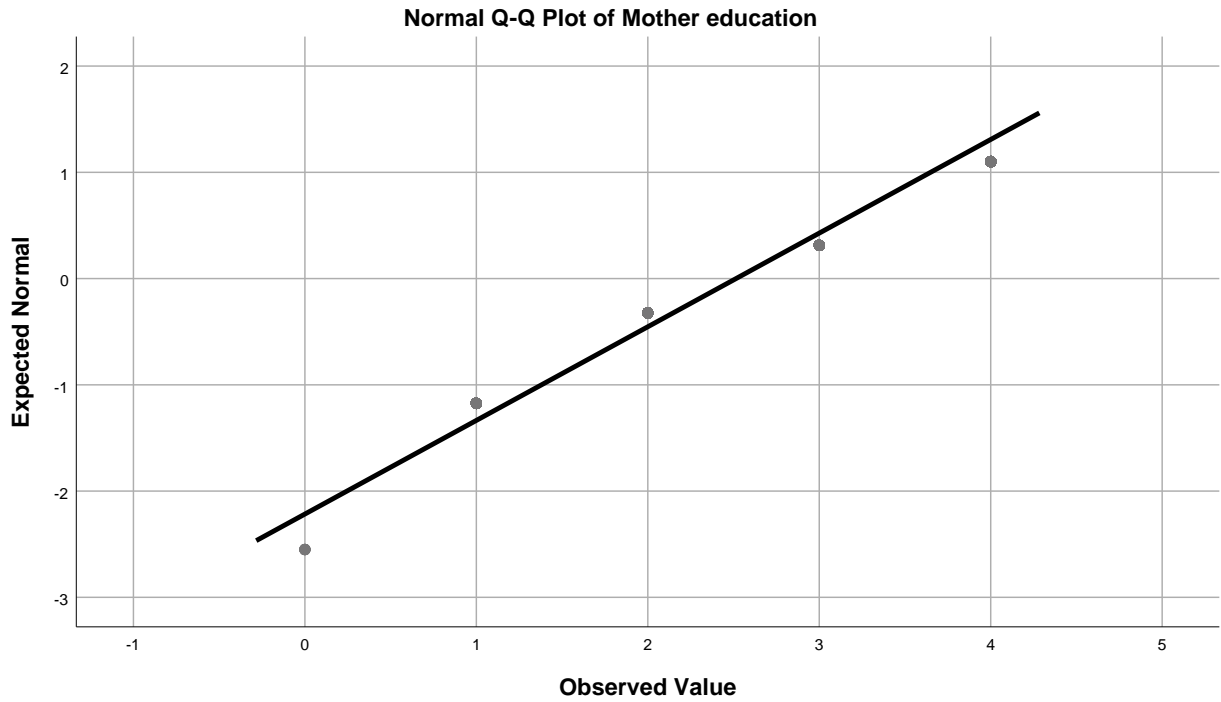


Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context

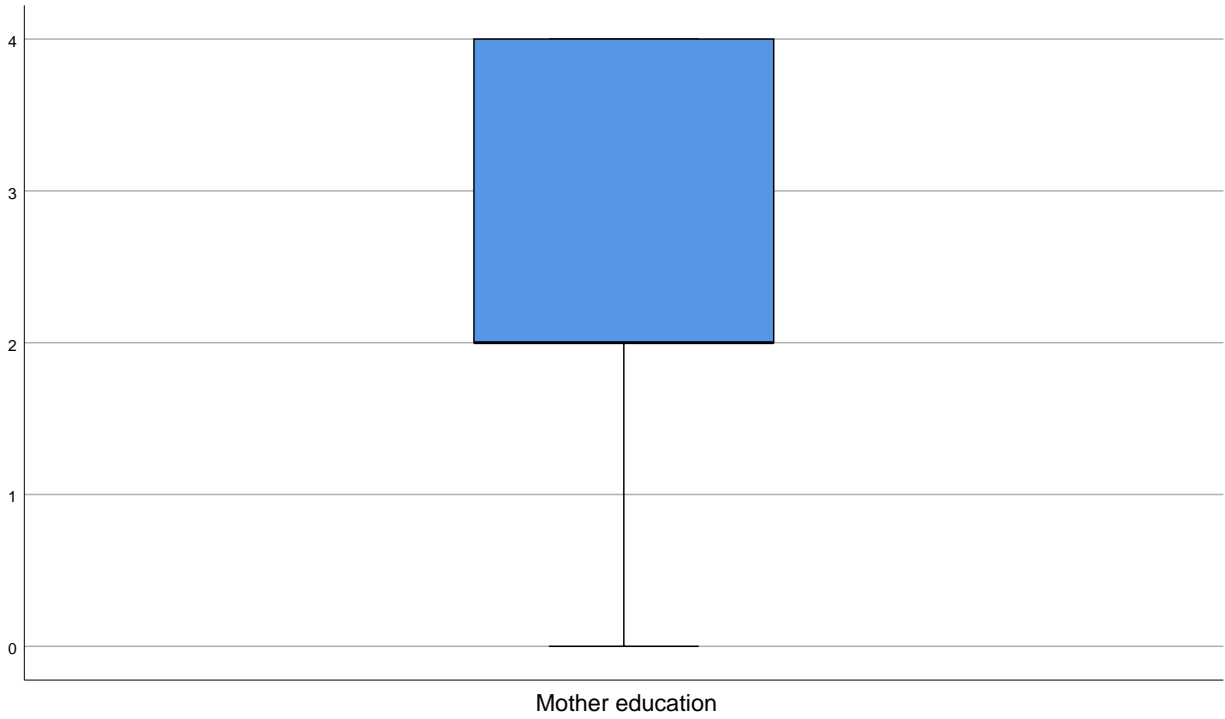
Mother education



Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context

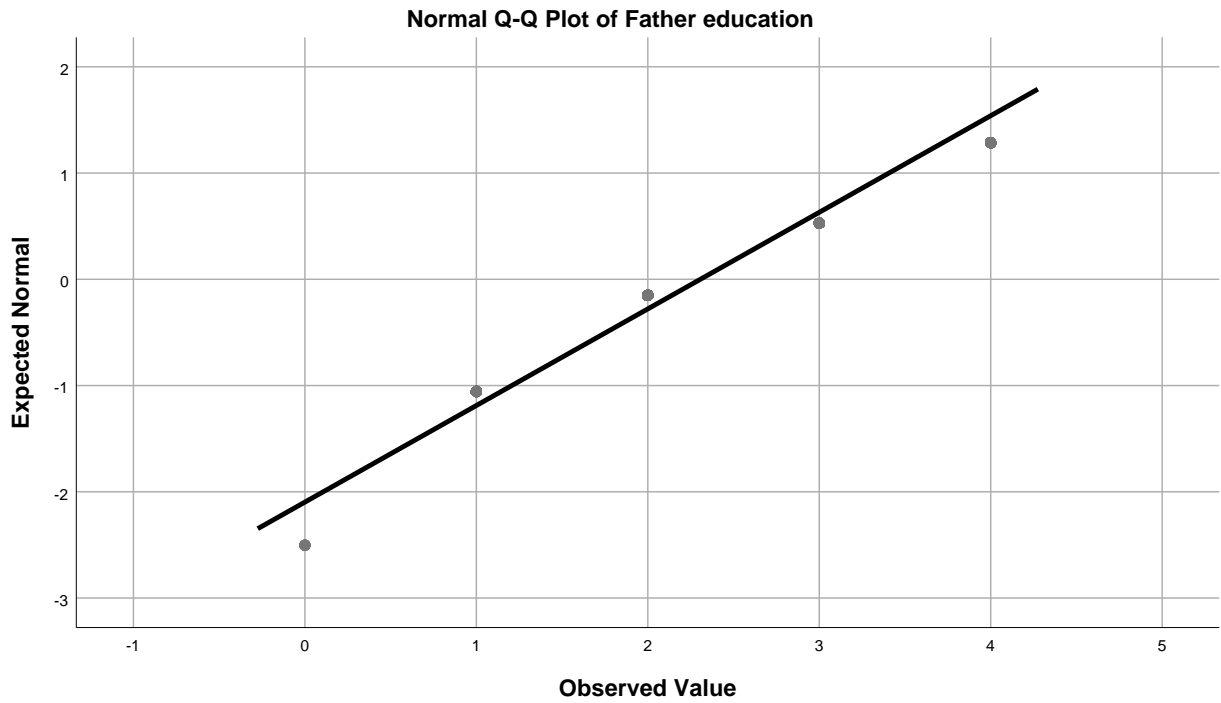
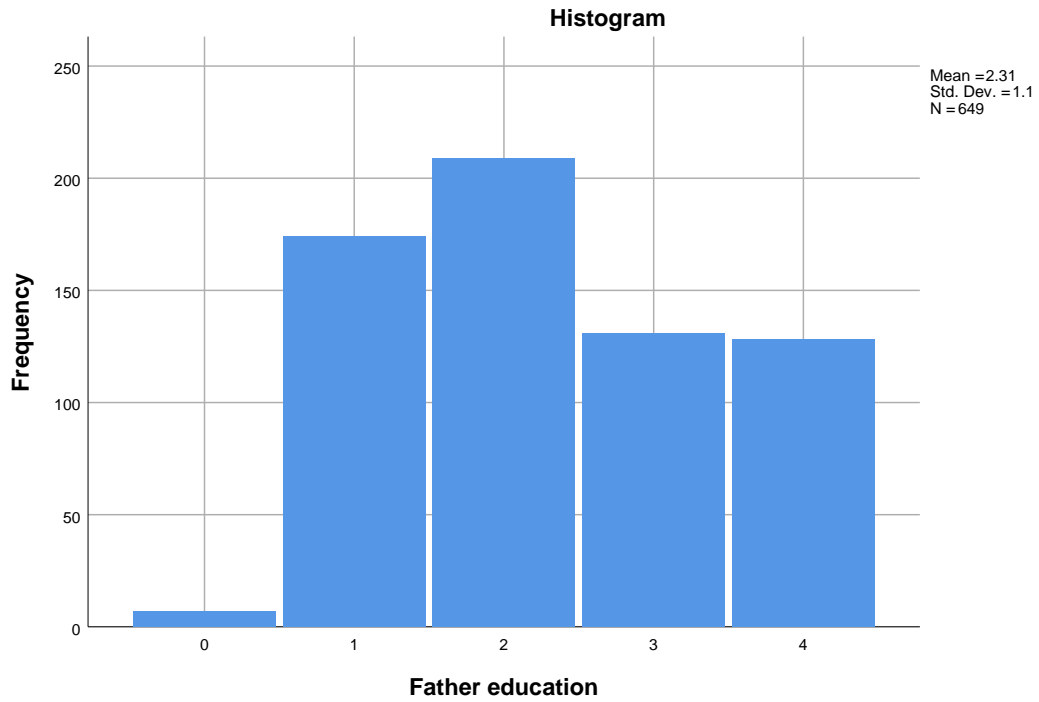


Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context

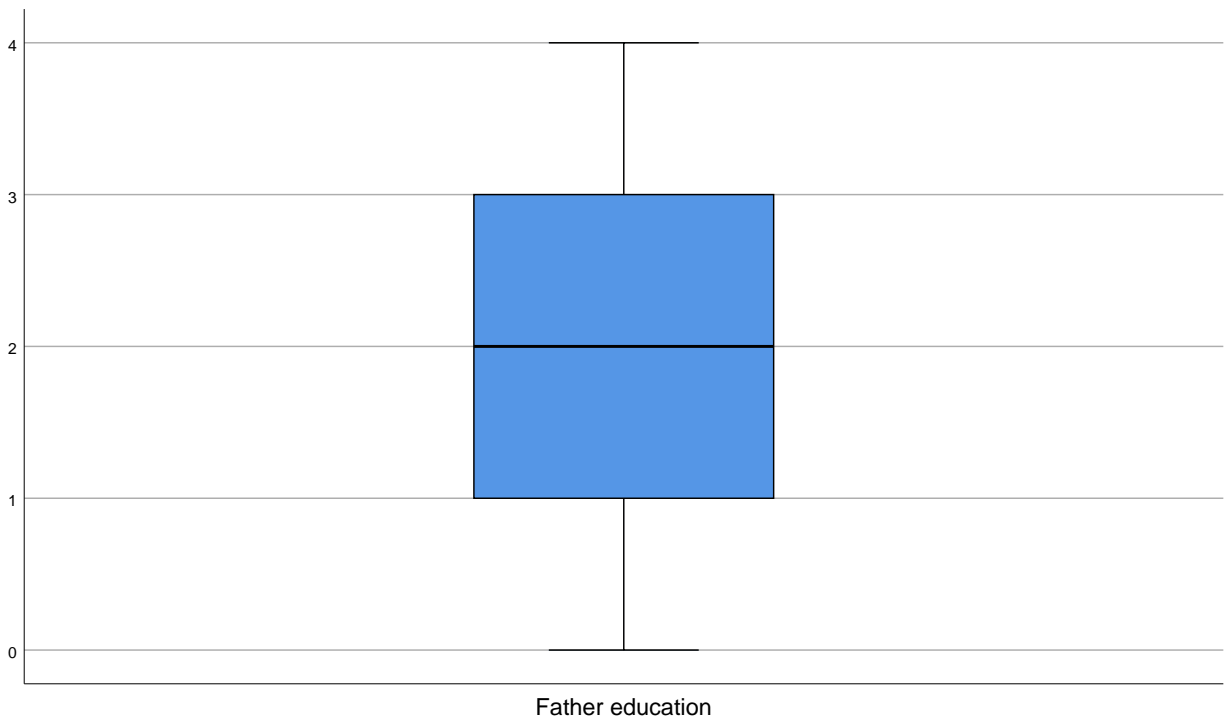
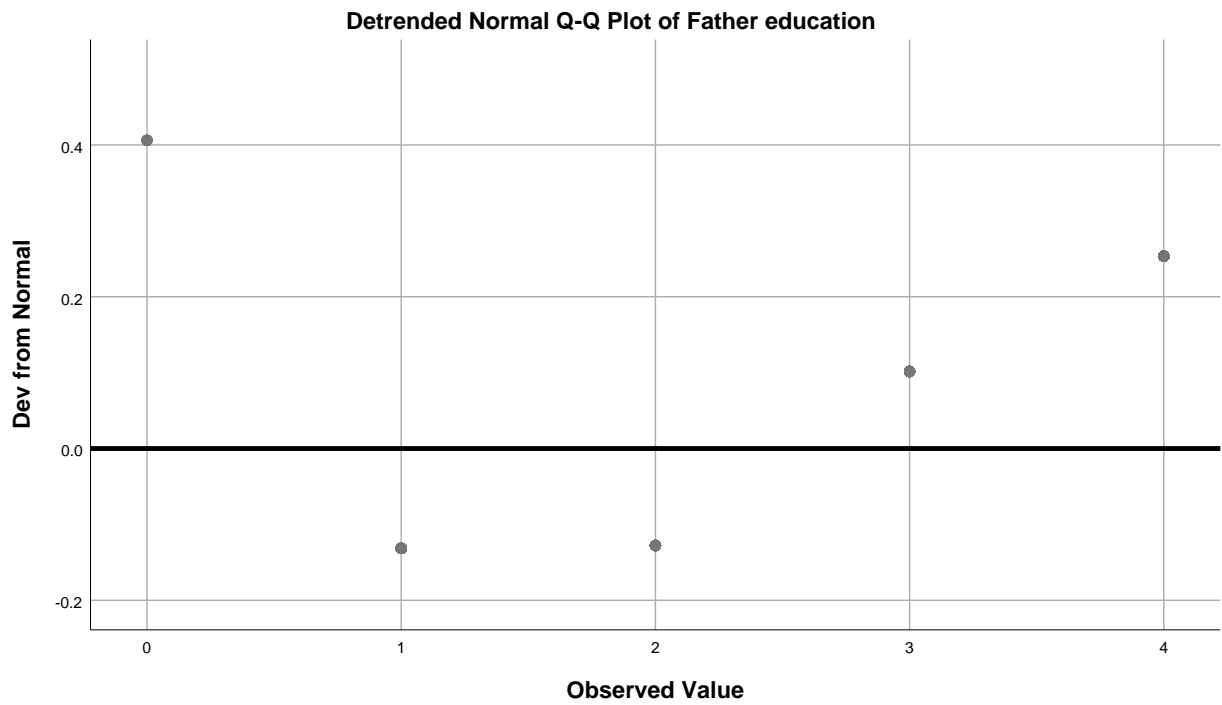


Father education

Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context

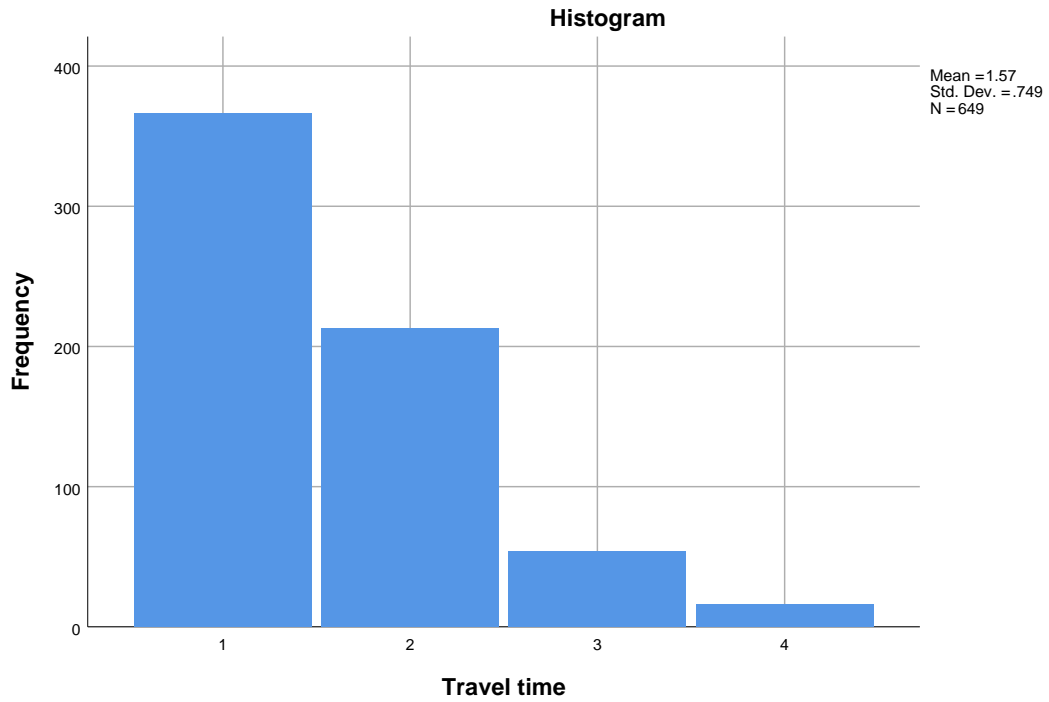


Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context

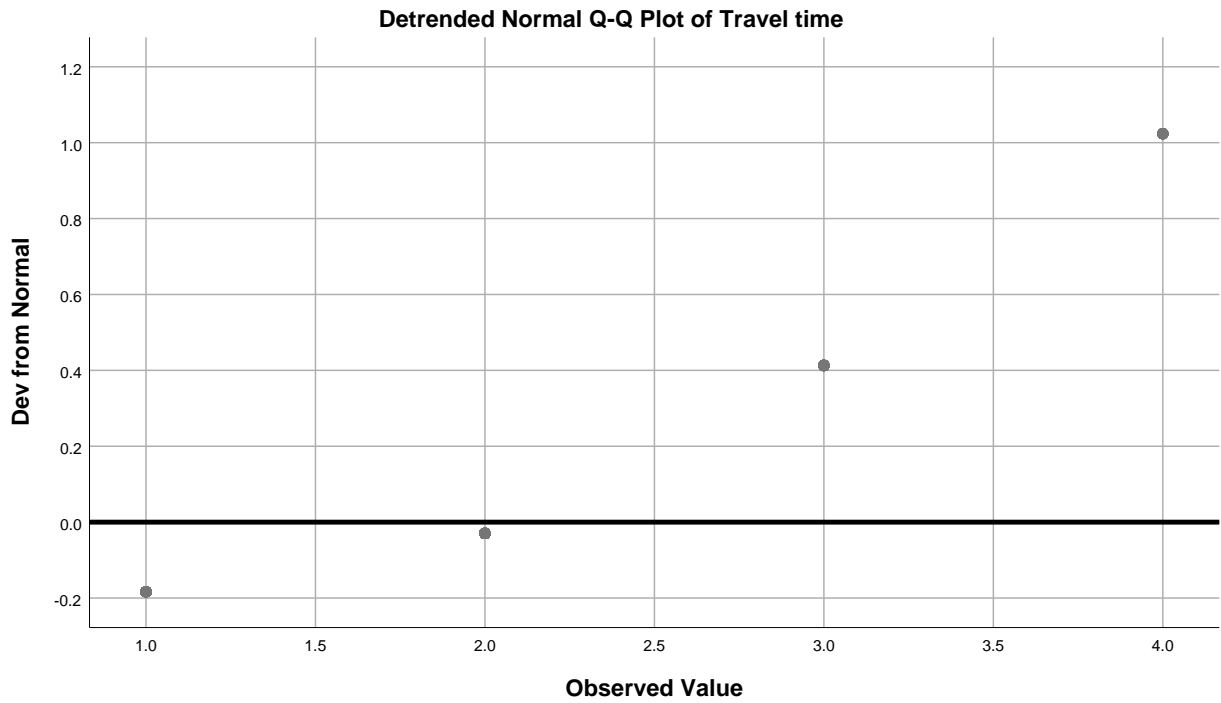
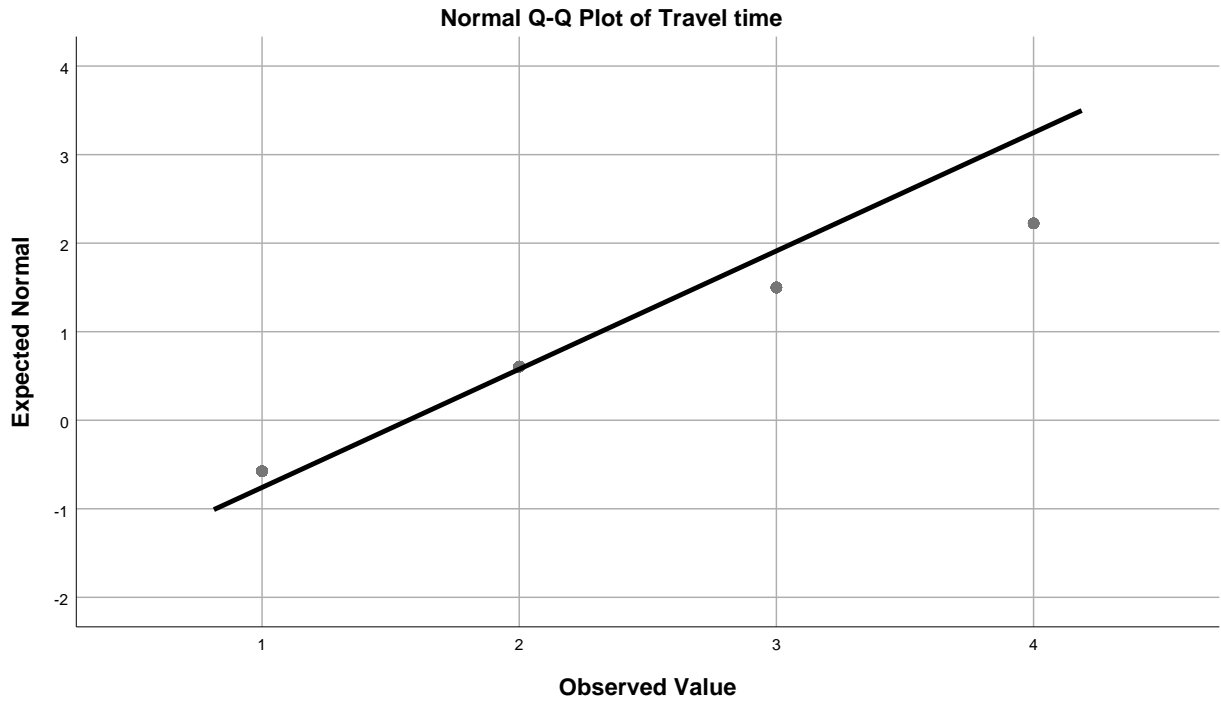


Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context

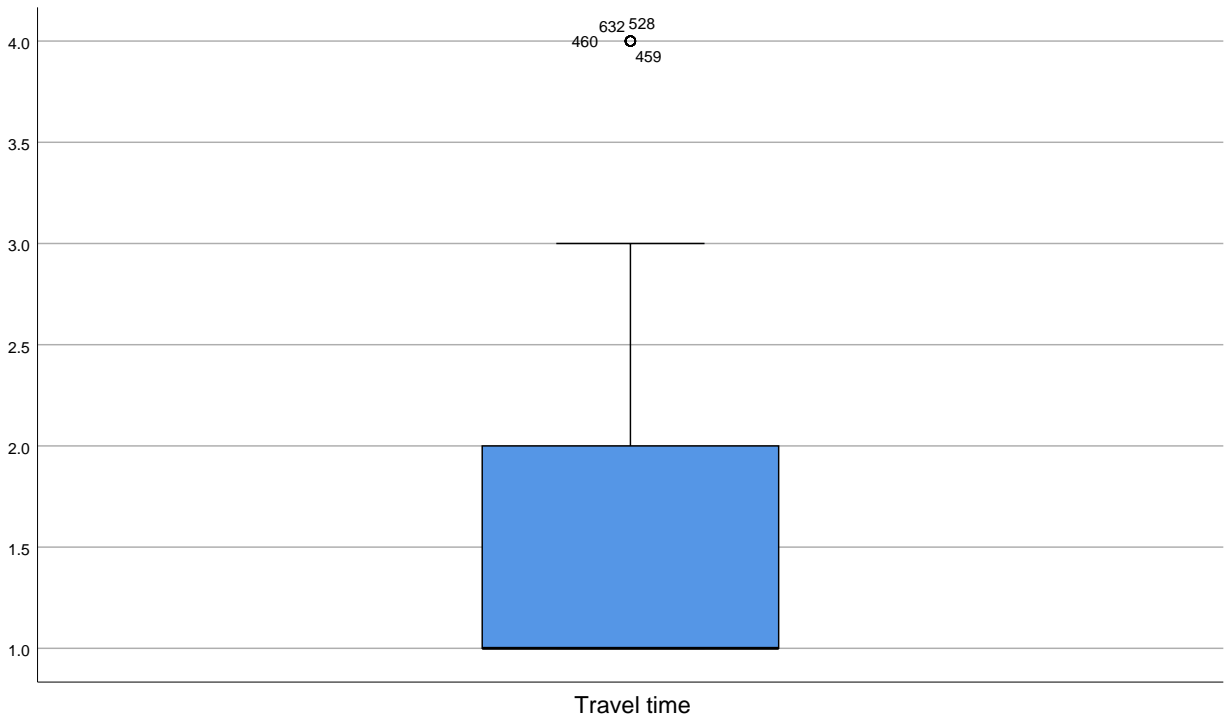
Travel time



Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context

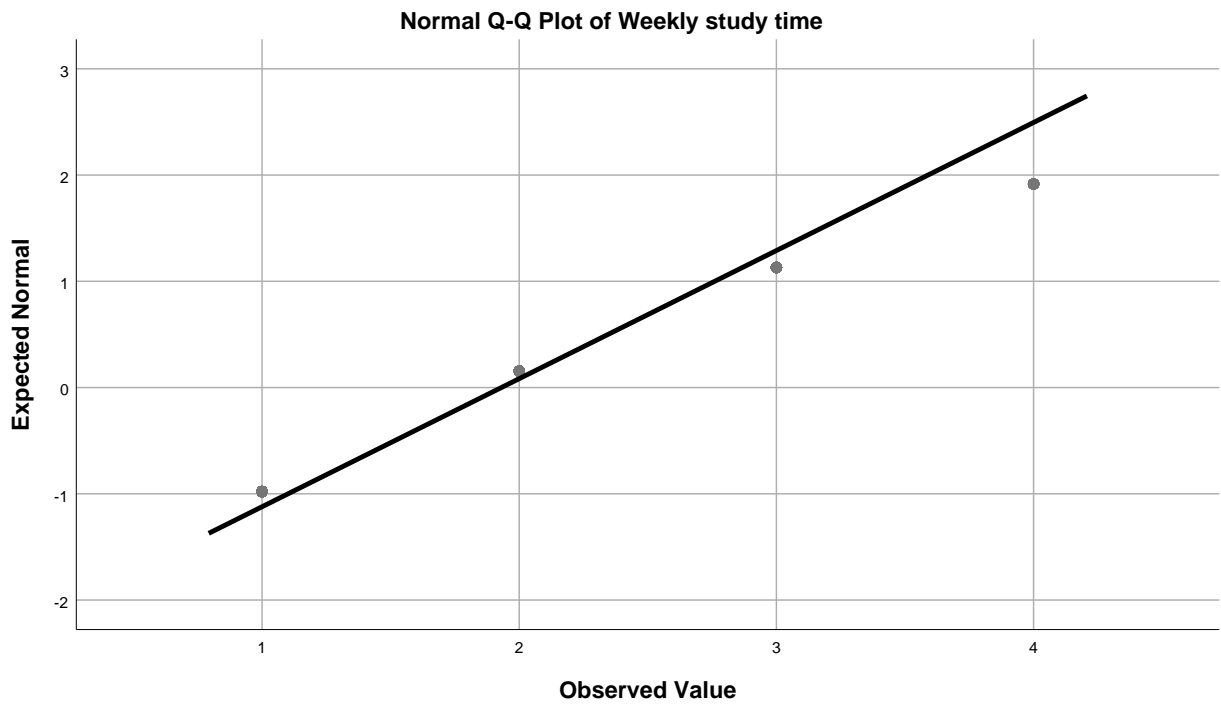
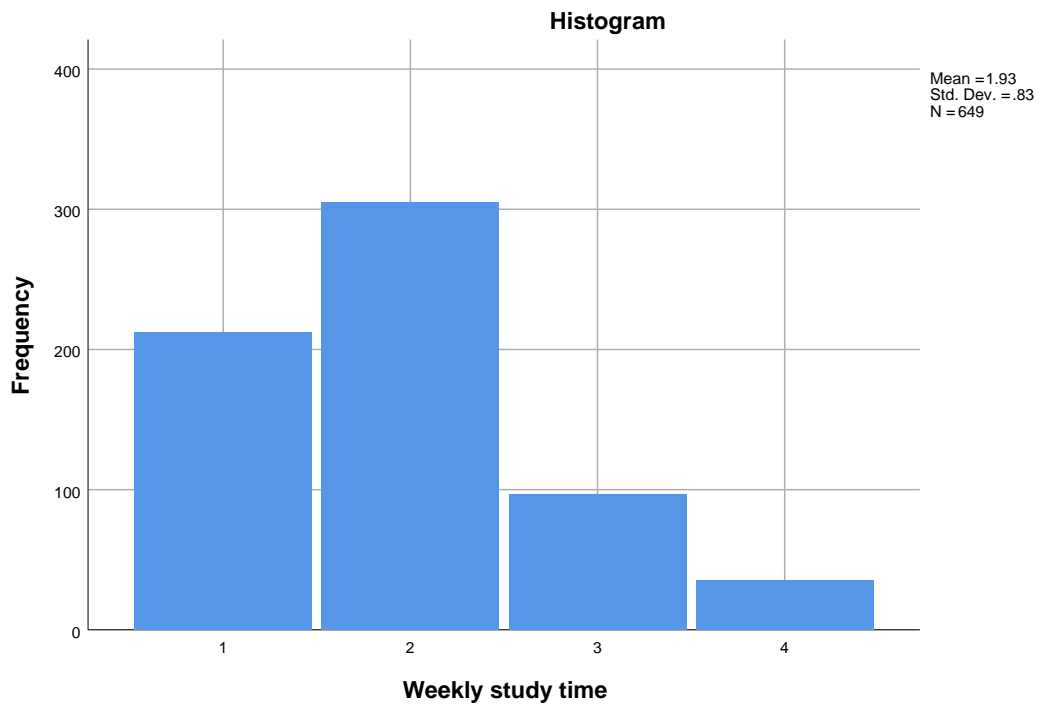


Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context

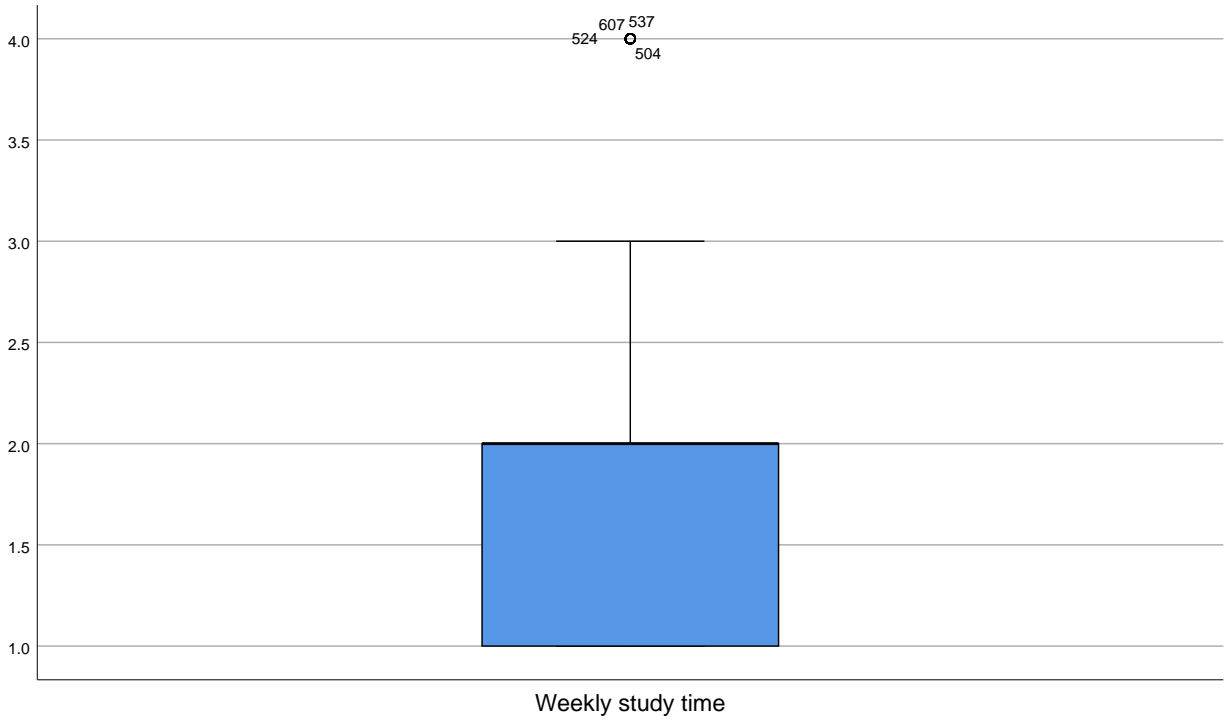
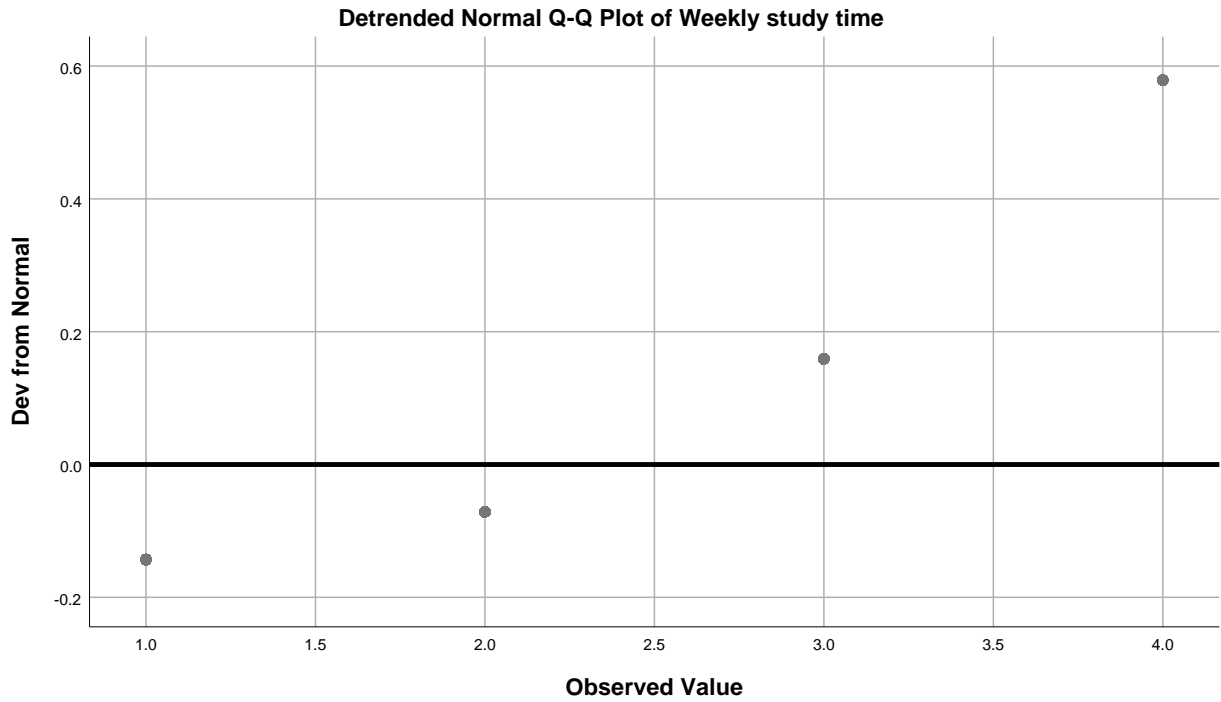


Weekly study time

Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context

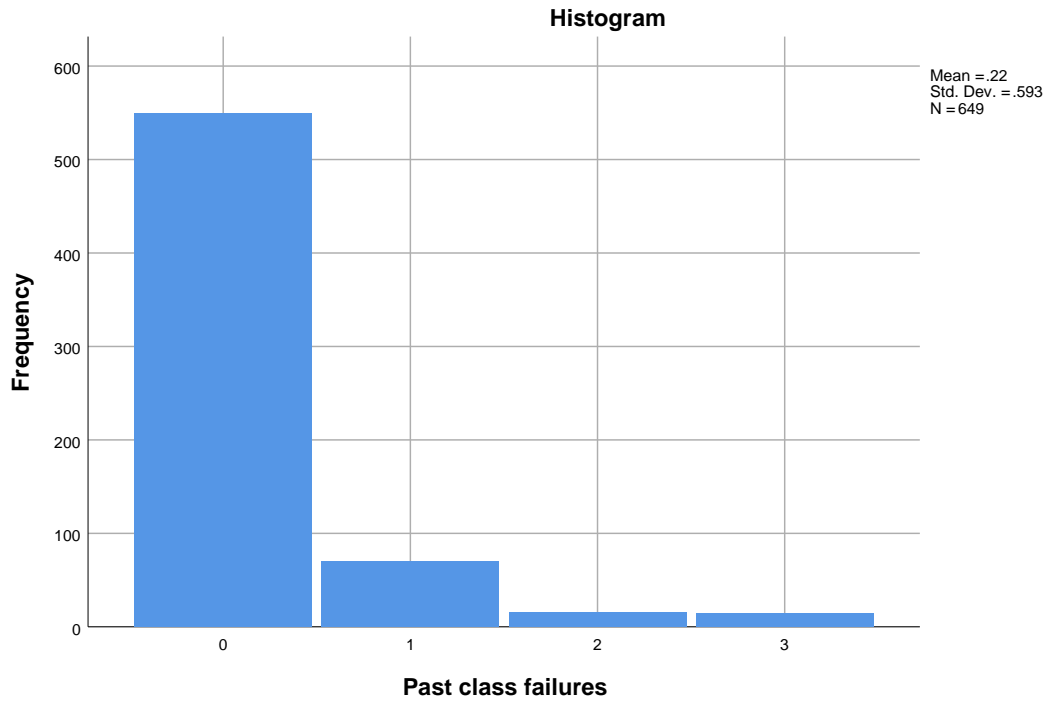


Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context

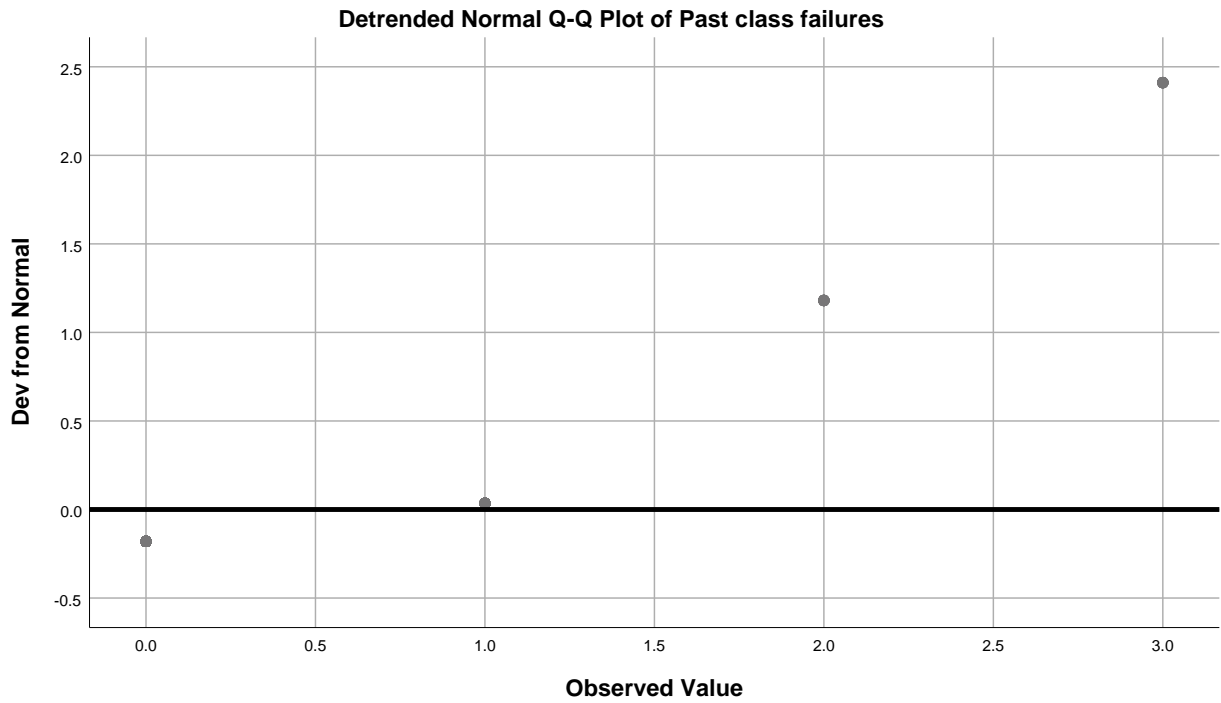
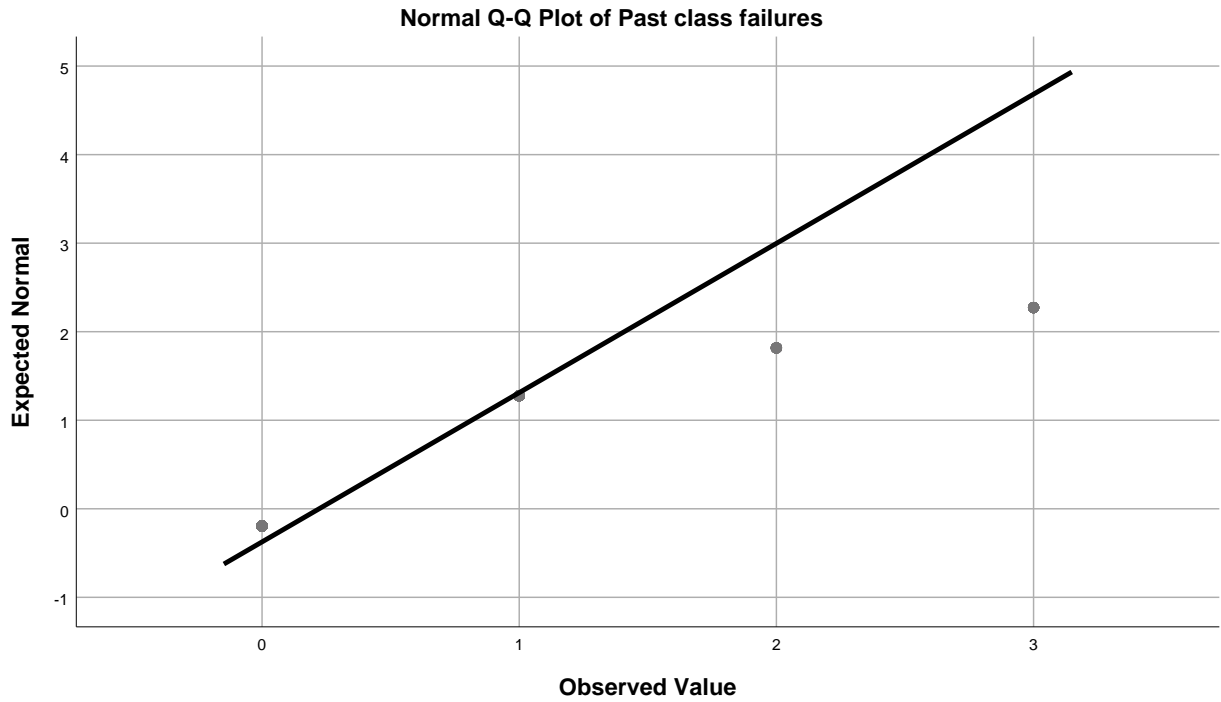


Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context

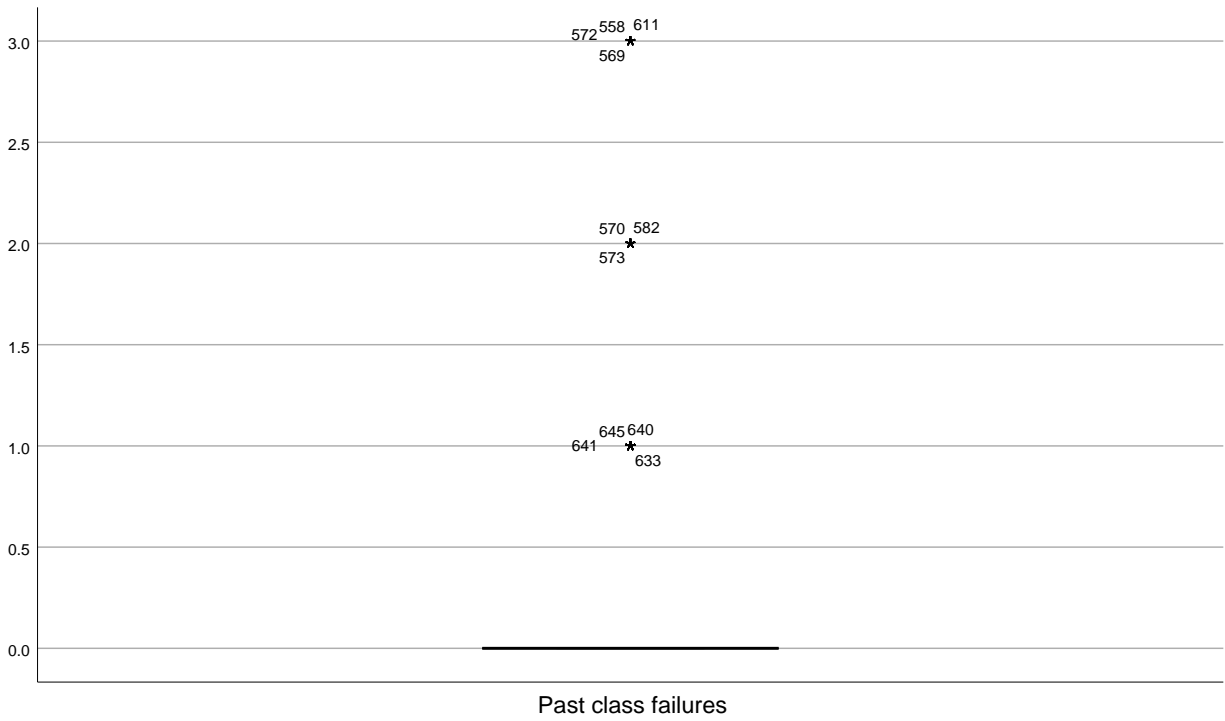
Past class failures



Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context

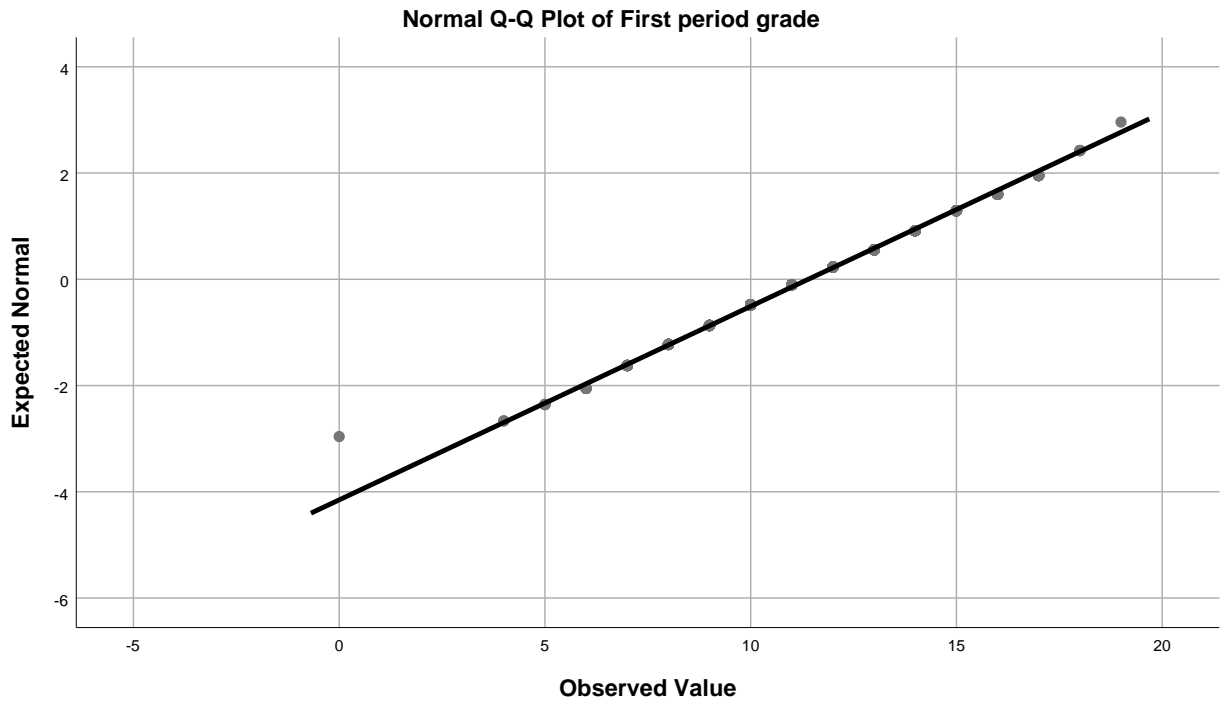
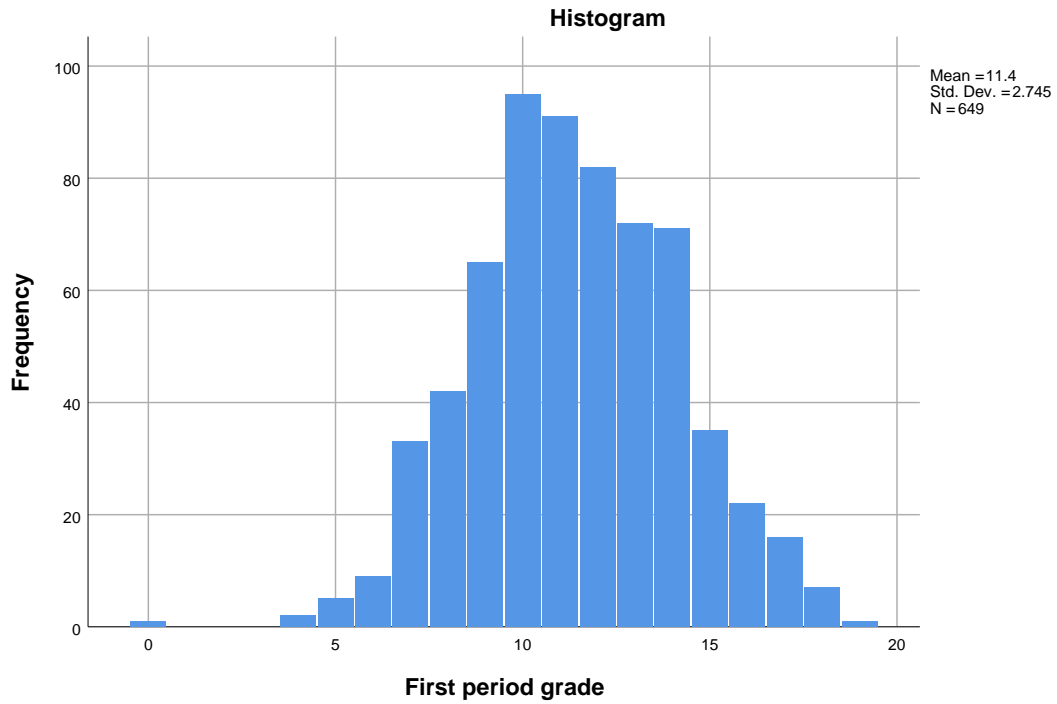


Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context

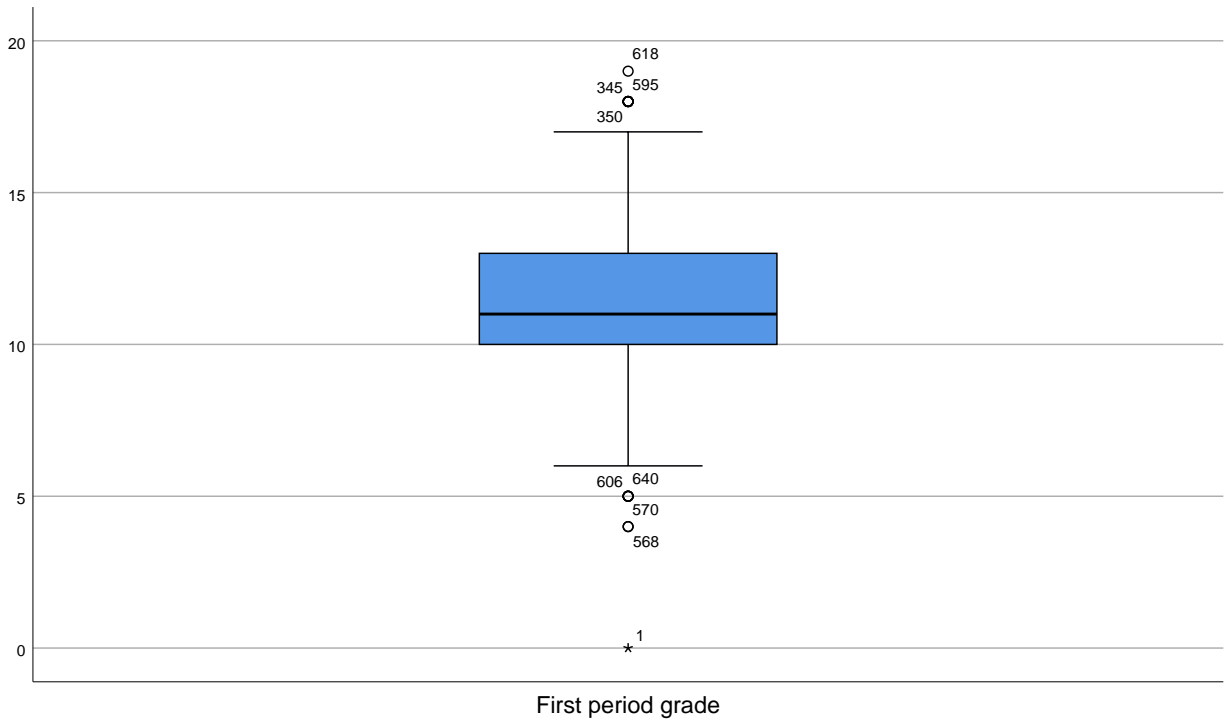
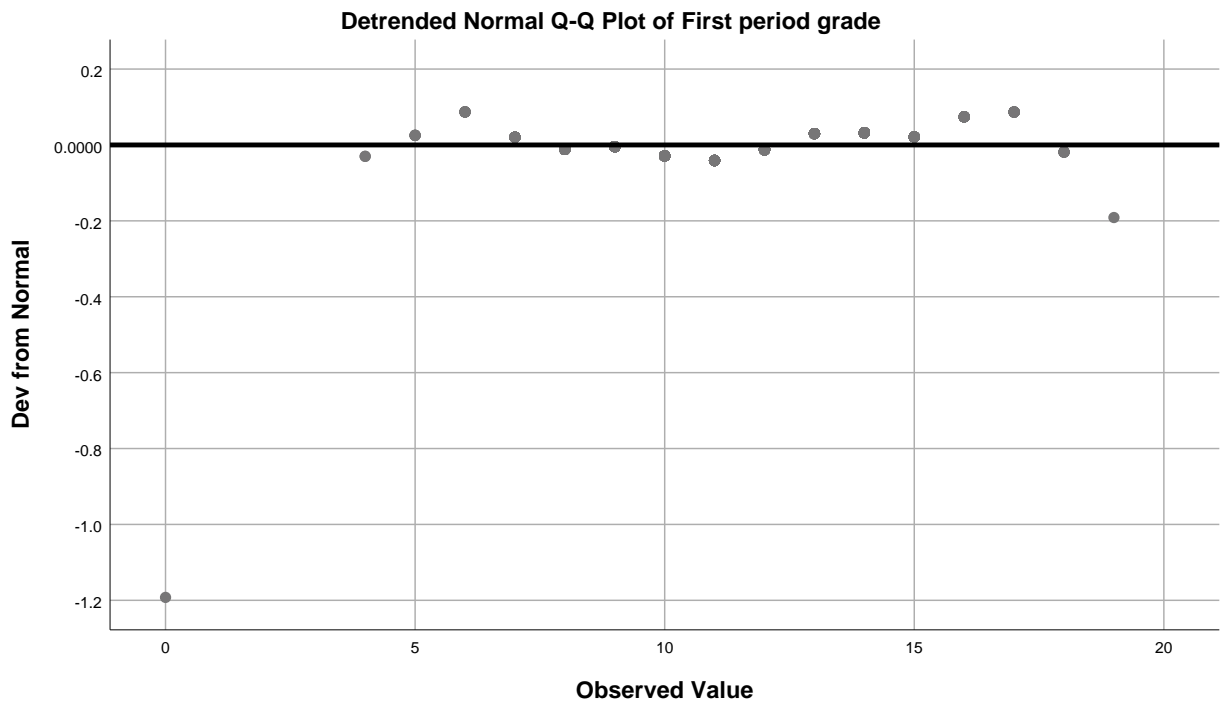


First period grade

Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context

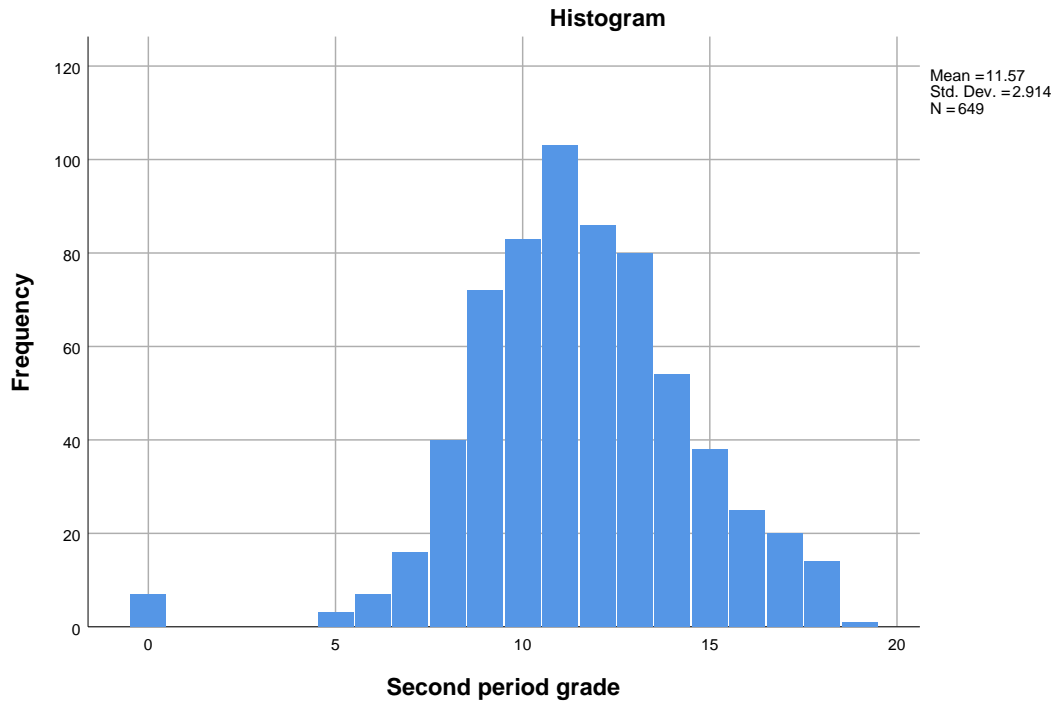


Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context

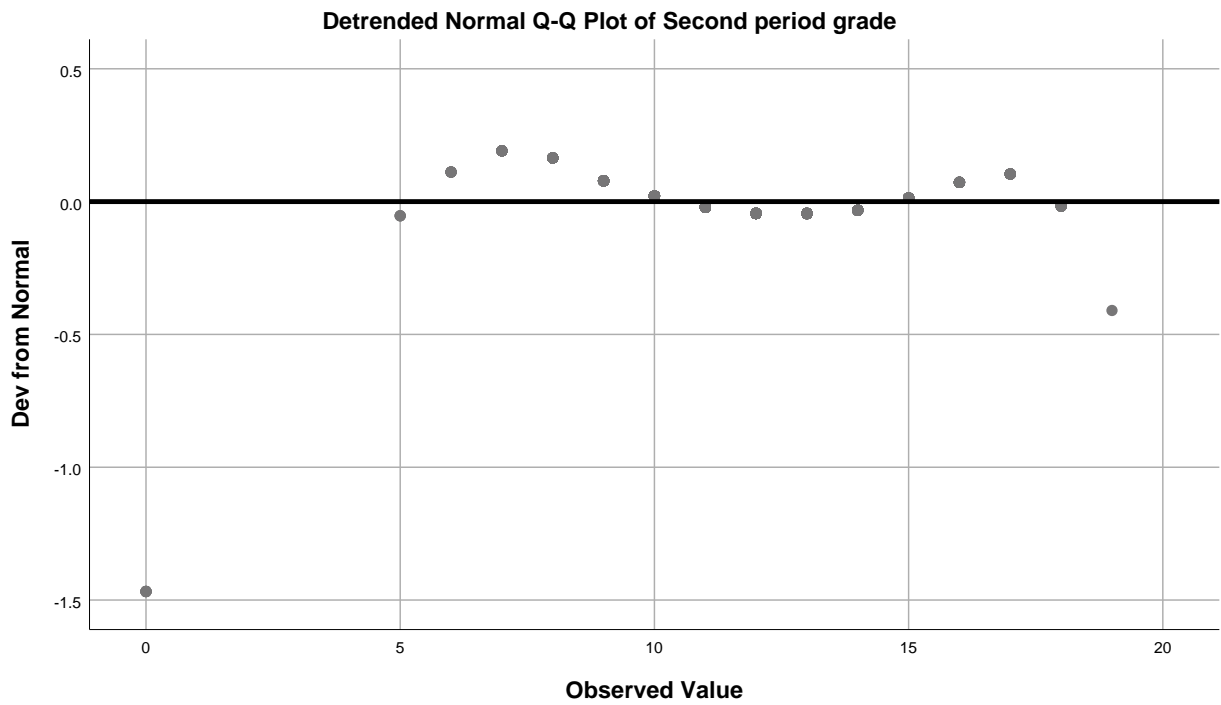
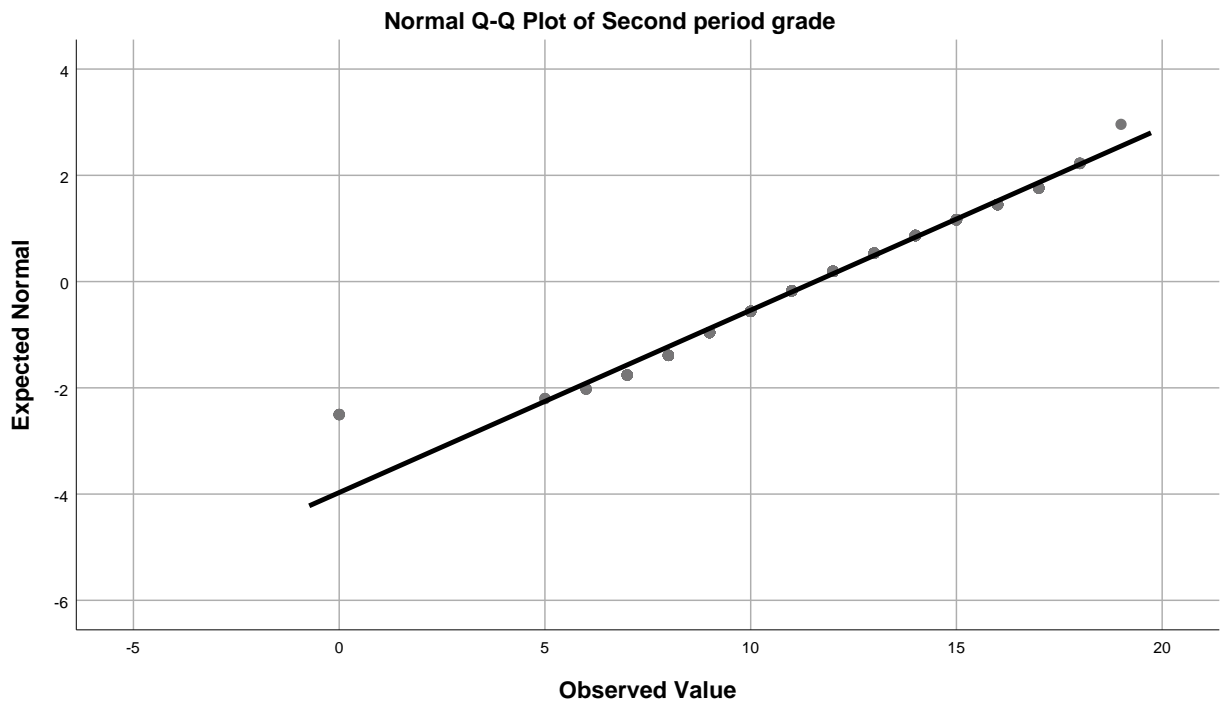


Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context

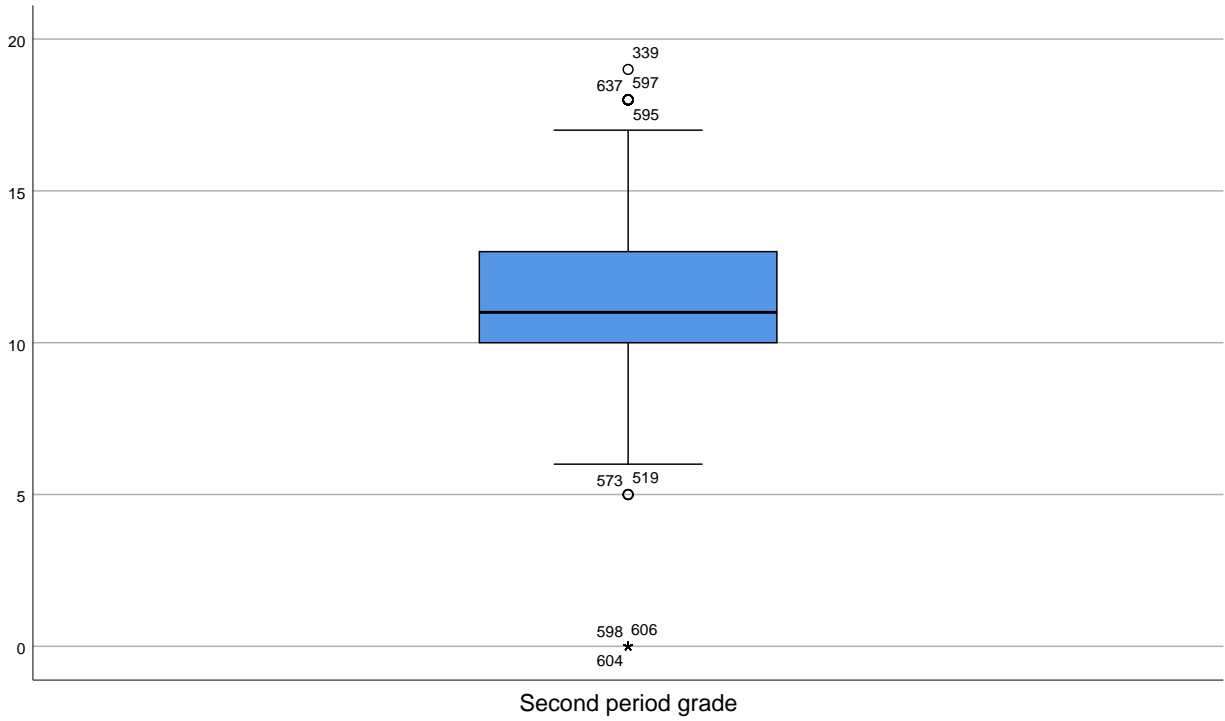
Second period grade



Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context

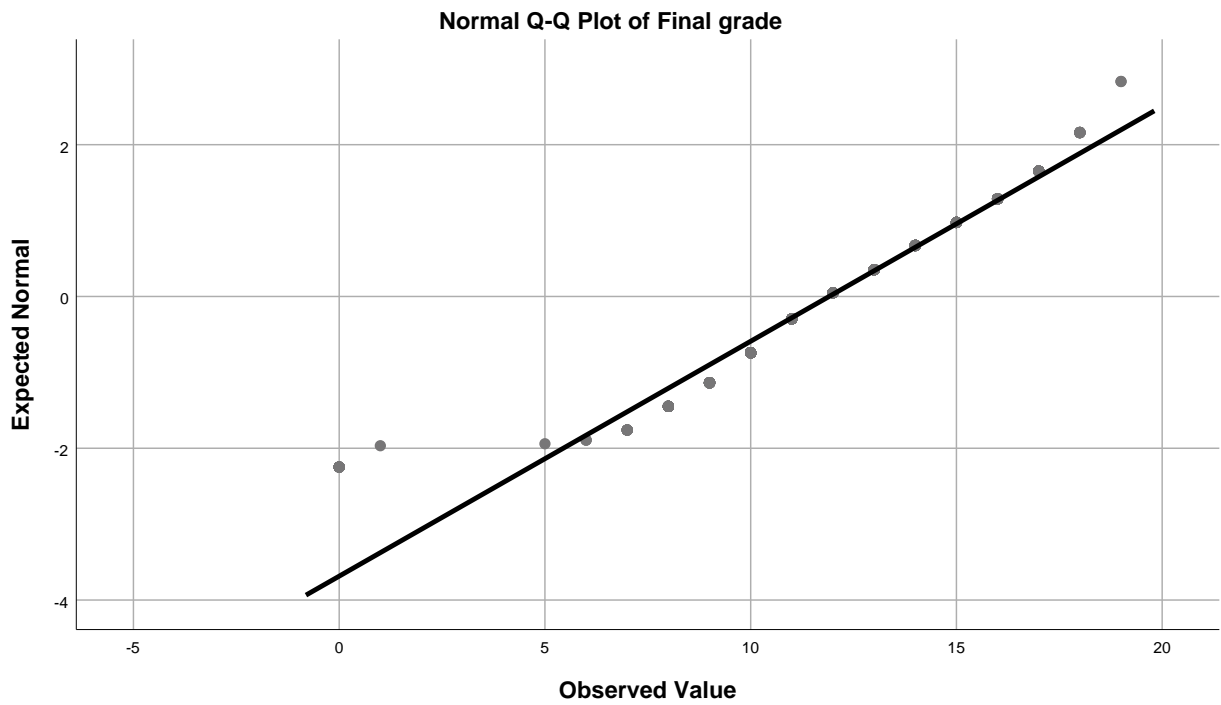
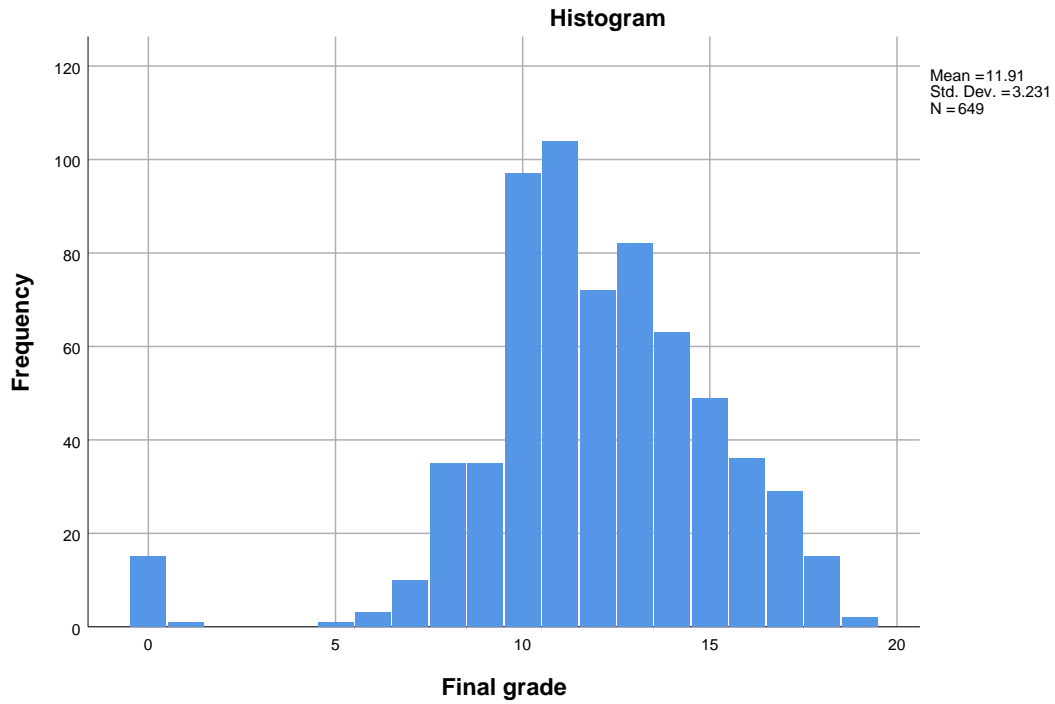


Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context

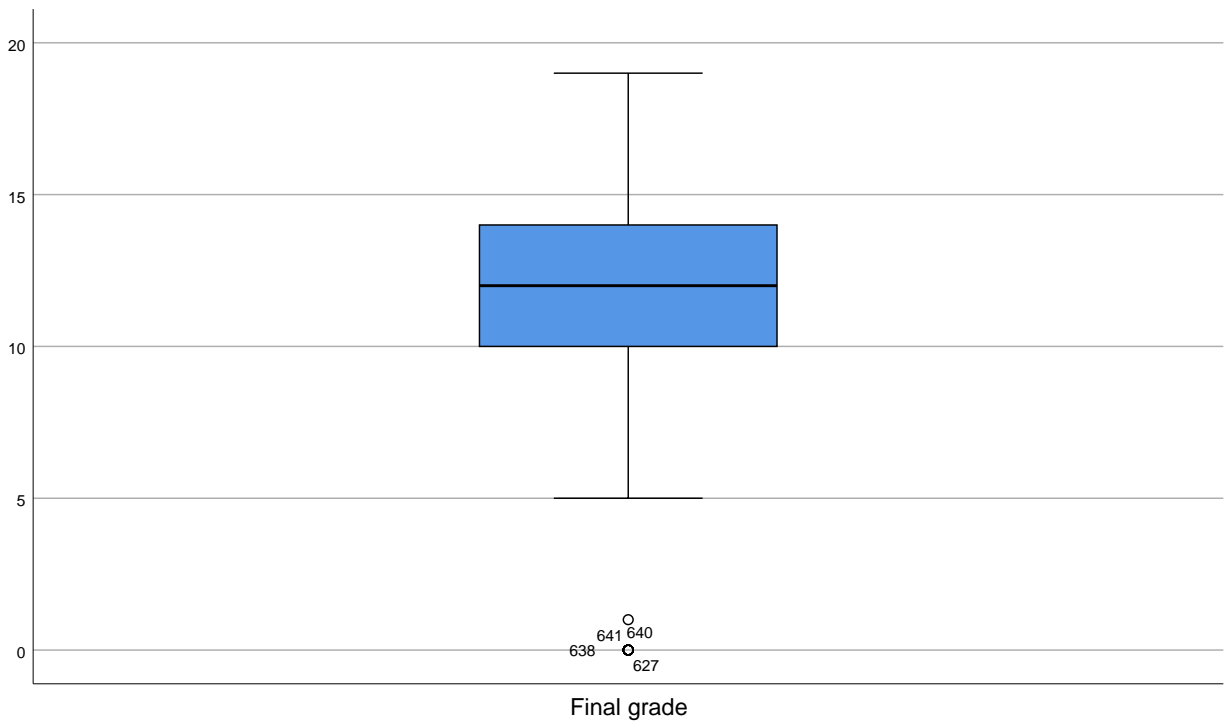
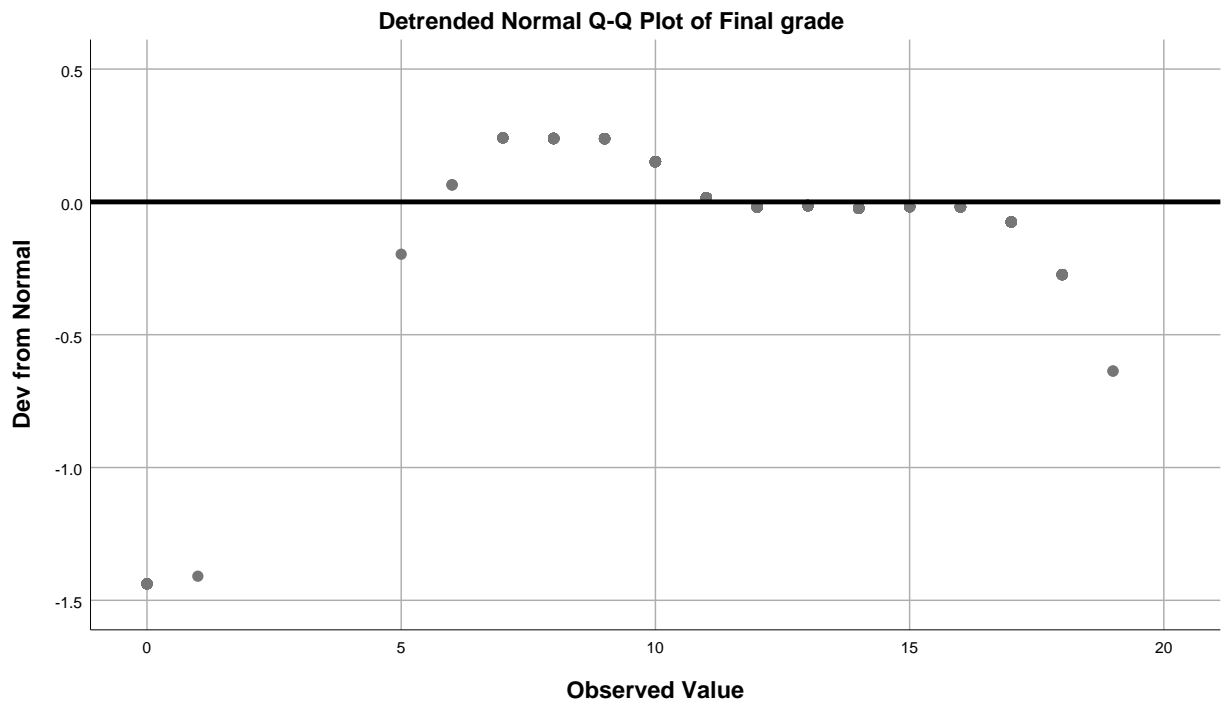


Final grade

Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context



Canonical Correlation Assumption Context
Check descriptive patterns, outliers, and normality context



Canonical Correlation Analysis

```
>Warning # 2004.  Command name: SUBTITLE  
>The subtitle given exceeds 60 characters in length.  The first 60 characters  
>will be used.
```

Canonical Correlation Analysis
SPSS MANOVA with DISCRIM estimates canonical correlations be

Manova

The default error term in MANOVA has been changed from WITHIN CELLS to
WITHIN+RESIDUAL. Note that these are the same for all full factorial designs.

Canonical Correlation Analysis
SPSS MANOVA with DISCRIM estimates canonical correlations be

* * * * * A n a l y s i s o f V a r i a n c e * *
* * * * *

649 cases accepted.
0 cases rejected because of out-of-range factor values.
0 cases rejected because of missing data.
1 non-empty cell.

1 design will be processed.

Canonical Correlation Analysis
 SPSS MANOVA with DISCRIM estimates canonical correlations be

***** Analysis of Variance -- Design 1*****

EFFECT .. WITHIN CELLS Regression
 Multivariate Tests of Significance (S = 3, M = 1, N = 319)

Test Name	Value	Approx. F	Hypoth. DF	Error D
Pillais	.27907	10.97455	18.00	1926
.00	.000			
Hotellings	.36172	12.83431	18.00	1916
.00	.000			
Wilks	.72869	11.91033	18.00	1810
.68	.000			
Roys	.24835			

 Eigenvalues and Canonical Correlations

Root No.	Eigenvalue	Pct.	Cum. Pct.	Canon Cor.
1	.33041	91.34360	91.34360	.49835
.24835				
2	.02308	6.37961	97.72321	.15019
.02256				
3	.00824	2.27679	100.00000	.09038
.00817				

 Dimension Reduction Analysis

Roots	Wilks L.	F	Hypoth. DF	Error D
F	Sig. of F			

Canonical Correlation Analysis
 SPSS MANOVA with DISCRIM estimates canonical correlations be

1 TO 3	.72869	11.91033	18.00	1810.6
8	.000			
2 TO 3	.96946	2.00361	10.00	1282.0
0	.030			
3 TO 3	.99183	1.32181	4.00	642.0
0	.260			

 EFFECT .. WITHIN CELLS Regression (Cont.)
 Univariate F-tests with (6,642) D. F.

Variable	Sq. Mul. R	Adj. R-sq.	Hypoth. MS	Error MS
F	Sig. of F			
G1	.23188	.22470	188.73799	5.84301
32.30151	.000			
G2	.22523	.21799	206.50239	6.63870
31.10584	.000			
G3	.22313	.21586	251.50901	8.18413
30.73130	.000			

 Raw canonical coefficients for DEPENDENT variables
 Function No.

Variable	1	2	3
G1	-.18937	.70904	-.04798
G2	-.05901	-.44334	.87995
G3	-.11028	-.21279	-.75625

 Standardized canonical coefficients for DEPENDENT variables
 Function No.

Canonical Correlation Analysis
 SPSS MANOVA with DISCRIM estimates canonical correlations be

Variable	1	2	3
G1	-.51986	1.94650	-.13172
G2	-.17193	-1.29172	2.56386
G3	-.35627	-.68745	-2.44318

 Correlations between DEPENDENT and canonical variables
 Function No.

Variable	1	2	3
G1	-.96299	.26108	.06696
G2	-.94885	-.23949	.20575
G3	-.94380	-.26540	-.19700

 Variance in dependent variables explained by canonical variables

CAN. VAR.	Pct Var DEP	Cum Pct DEP	Pct Var COV	Cum Pct CO
1	90.61394	90.61394	22.50399	22.5039
2	6.53186	97.14580	.14733	22.6513
3	2.85420	100.00000	.02331	22.6746

 Raw canonical coefficients for COVARIATES
 Function No.

COVARIATE	1	2	3
age	.02431	-.83600	.05120

Canonical Correlation Analysis
 SPSS MANOVA with DISCRIM estimates canonical correlations be

Medu	-.23421	.05193	.54468
Fedu	-.11362	-.18404	-.09871
travelti	.15644	-.14831	-.84879
studytim	-.47651	.27704	-.42936
failures	1.12835	.81910	.55038

Standardized canonical coefficients for COVARIATES
 CAN. VAR.

COVARIATE	1	2	3
age	.02962	-1.01836	.06237
Medu	-.26572	.05892	.61797
Fedu	-.12497	-.20243	-.10857
travelti	.11712	-.11104	-.63545
studytim	-.39527	.22981	-.35616
failures	.66938	.48592	.32651

Correlations between COVARIATES and canonical variables
 CAN. VAR.

Covariate	1	2	3
age	.29494	-.85050	.09443
Medu	-.53449	.00571	.61861
Fedu	-.45598	-.08692	.34424
travelti	.30499	-.08664	-.72010
studytim	-.53368	.16926	-.31022
failures	.81507	.13878	.24847

Variance in covariates explained by canonical variables

Canonical Correlation Analysis
 SPSS MANOVA with DISCRIM estimates canonical correlations be

CAN. VAR.	Pct Var DEP	Cum Pct DEP	Pct Var COV	Cum Pct COV
1	6.71689	6.71689	27.04605	27.0460
2	.29561	7.01250	13.10583	40.1518
3	.16154	7.17404	19.77679	59.9286

Regression analysis for WITHIN CELLS error term
 --- Individual Univariate .9500 confidence intervals
 Dependent variable .. G1 First period grade

COVARIATE	B	Beta	Std. Err.	t-Value	S
ig. of t	Lower -95%	CL- Upper			
age	-.1211744052	-.0537678865	.08259	-1.46714	
.143	-.28336	.04101			
Medu	.3231997502	.1335706775	.11213	2.88227	
.004	.10301	.54339			
Fedu	.1282336506	.0513787010	.11387	1.12612	
.261	-.09537	.35184			
travelti	-.2361671464	-.0644050421	.13196	-1.78963	
.074	-.49530	.02297			
studytim	.6504706233	.1965462660	.11627	5.59442	
.000	.42215	.87879			
failures	-1.3892409969	-.3002065562	.17299	-8.03092	
.000	-1.72893	-1.04955			
Dependent variable .. G2		Second period grade			

COVARIATE	B	Beta	Std. Err.	t-Value	S
ig. of t	Lower -95%	CL- Upper			
age	.0568861173	.0237830179	.08804	.64616	
.518	-.11599	.22976			

Canonical Correlation Analysis
 SPSS MANOVA with DISCRIM estimates canonical correlations be

Medu	.3467439328	.1350198387	.11953	2.90101
.004	.11204	.58145		
Fedu	.1704699410	.0643542934	.12138	1.40445
.161	-.06788	.40882		
travelti	-.2459720738	-.0632025777	.14066	-1.74867
.081	-.52219	.03024		
studytim	.6042041185	.1720162172	.12394	4.87515
.000	.36084	.84757		
failures	-1.6105786263	-.3279239336	.18439	-8.73467
.000	-1.97266	-1.24850		
Dependent variable .. G3		Final grade		

COVARIATE	B	Beta	Std. Err.	t-Value	S
ig. of t	Lower -95%	CL- Upper			
age	.0677595114	.0255491160	.09775	.69321	
.488	-.12419	.25970			
Medu	.3178627794	.1116280486	.13271	2.39516	
.017	.05726	.57846			
Fedu	.2020148012	.0687793153	.13477	1.49898	
.134	-.06262	.46665			
travelti	-.1697854948	-.0393454499	.15618	-1.08712	
.277	-.47647	.13690			
studytim	.7130801354	.1830918412	.13761	5.18200	
.000	.44287	.98329			
failures	-1.8516632589	-.3400150456	.20473	-9.04444	
.000	-2.25368	-1.44964			

Canonical Correlation Analysis
 SPSS MANOVA with DISCRIM estimates canonical correlations be

***** Analysis of Variance -- Design 1*****

EFFECT .. CONSTANT

Multivariate Tests of Significance (S = 1, M = 1/2, N = 319)

Test Name	Value	Exact F	Hypoth. DF	Error D
Pillais	.09783	23.13325	3.00	640
.00	.000			
Hotellings	.10844	23.13325	3.00	640
.00	.000			
Wilks	.90217	23.13325	3.00	640
.00	.000			
Roys	.09783			

Note.. F statistics are exact.

 Eigenvalues and Canonical Correlations

Root No.	Eigenvalue	Pct.	Cum. Pct.	Canon Cor.
1	.10844	100.00000	100.00000	.31278

 EFFECT .. CONSTANT (Cont.)

Univariate F-tests with (1,642) D. F.

Variable	Hypoth. SS	Error SS	Hypoth. MS	Error M
G1	384.59443	3751.21153	384.59443	5.8430
1	65.82130			

Canonical Correlation Analysis
 SPSS MANOVA with DISCRIM estimates canonical correlations be

G2	222.38600	4262.04578	222.38600	6.6387
0	33.49842	.000		
G3	216.32514	5254.21250	216.32514	8.1841
3	26.43227	.000		

EFFECT .. CONSTANT (Cont.)
 Raw discriminant function coefficients
 Function No.

Variable	1
G1	.53853
G2	-.05481
G3	-.09519

Standardized discriminant function coefficients
 Function No.

Variable	1
G1	1.30175
G2	-.14121
G3	-.27233

Estimates of effects for canonical variables
 Canonical Variable

Parameter	1
1	4.99587

Canonical Correlation Analysis
SPSS MANOVA with DISCRIM estimates canonical correlations be

Correlations between DEPENDENT and canonical variables
Canonical Variable

Variable	1
G1	.97236
G2	.69367
G3	.61618

Abbreviated Name	Extended Name
studytim	studytime
travelti	traveltime