```
FREQUENCIES VARIABLES=GPA hours success ACT
  /FORMAT=NOTABLE
  /STATISTICS=MINIMUM MAXIMUM
  /ORDER=ANALYSIS.
```

Frequencies

Statistics

		scaled GPA	hours attended sessions	success in course	ACT Score
N	Valid	263	241	264	265
	Missing	2	24	1	0
Minimum		11	6	3	0
Maximum		28	35	17	1

```
RMV /GPA_1=TREND(GPA).
```

Replace Missing Values

Result Variables

	Result Variable	N of Replaced Missing Values	Case Number of Non-Missing Values	
			First	Last
1	GPA_1	2	1	265

Result Variables

	N of Valid Cases	Creating Function
1	265	TREND(GPA)

```
SAVE OUTFILE='/Users/buchanan/OneDrive/stat help/statstools doc/model 3 double
 moderation2.sav'
  /COMPRESSED.
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
```

```
/DEPENDENT success
/METHOD=ENTER GPA_1 hours ACT
/SCATTERPLOT=(*ZPRED ,*ZRESID)
/RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID)
/SAVE MAHAL COOK LEVER.
```

Regression

[DataSet1] /Users/buchanan/OneDrive/stat help/statstools doc/model 3 double m
oderation2.sav

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ACT Score, TREND (GPA), hours attended sessions[b]	.	Enter

a. Dependent Variable: success in course

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.473[a]	.223	.214	1.919

a. Predictors: (Constant), ACT Score, TREND(GPA), hours attended sessions

b. Dependent Variable: success in course

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	249.878	3	83.293	22.629	.000[b]
	Residual	868.685	236	3.681		
	Total	1118.563	239			

a. Dependent Variable: success in course

b. Predictors: (Constant), ACT Score, TREND(GPA), hours attended sessions

Coefficients^a

		Unstandardized Coefficients		Standardized Coefficients	
Model		B	Std. Error	Beta	t
1	(Constant)	8.683	.937		9.271
	TREND(GPA)	-.080	.049	-.119	-1.627
	hours attended sessions	-.105	.028	-.279	-3.760
	ACT Score	1.290	.343	.223	3.762

Coefficients^a

Model		Sig.
1	(Constant)	.000
	TREND(GPA)	.105
	hours attended sessions	.000
	ACT Score	.000

a. Dependent Variable: success in course

Residuals Statistics^a

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.76	8.15	4.19	1.023	240
Std. Predicted Value	-1.393	3.873	.000	1.000	240
Standard Error of Predicted Value	.136	.533	.230	.091	240
Adjusted Predicted Value	2.76	8.16	4.19	1.018	240
Residual	-3.035	9.435	.000	1.906	240
Std. Residual	-1.582	4.918	.000	.994	240
Stud. Residual	-1.606	5.049	.000	1.006	240
Deleted Residual	-3.128	9.947	-.001	1.953	240
Stud. Deleted Residual	-1.611	5.335	.005	1.026	240
Mahal. Distance	.210	17.423	2.987	3.495	240
Cook's Distance	.000	.345	.006	.027	240
Centered Leverage Value	.001	.073	.012	.015	240

a. Dependent Variable: success in course
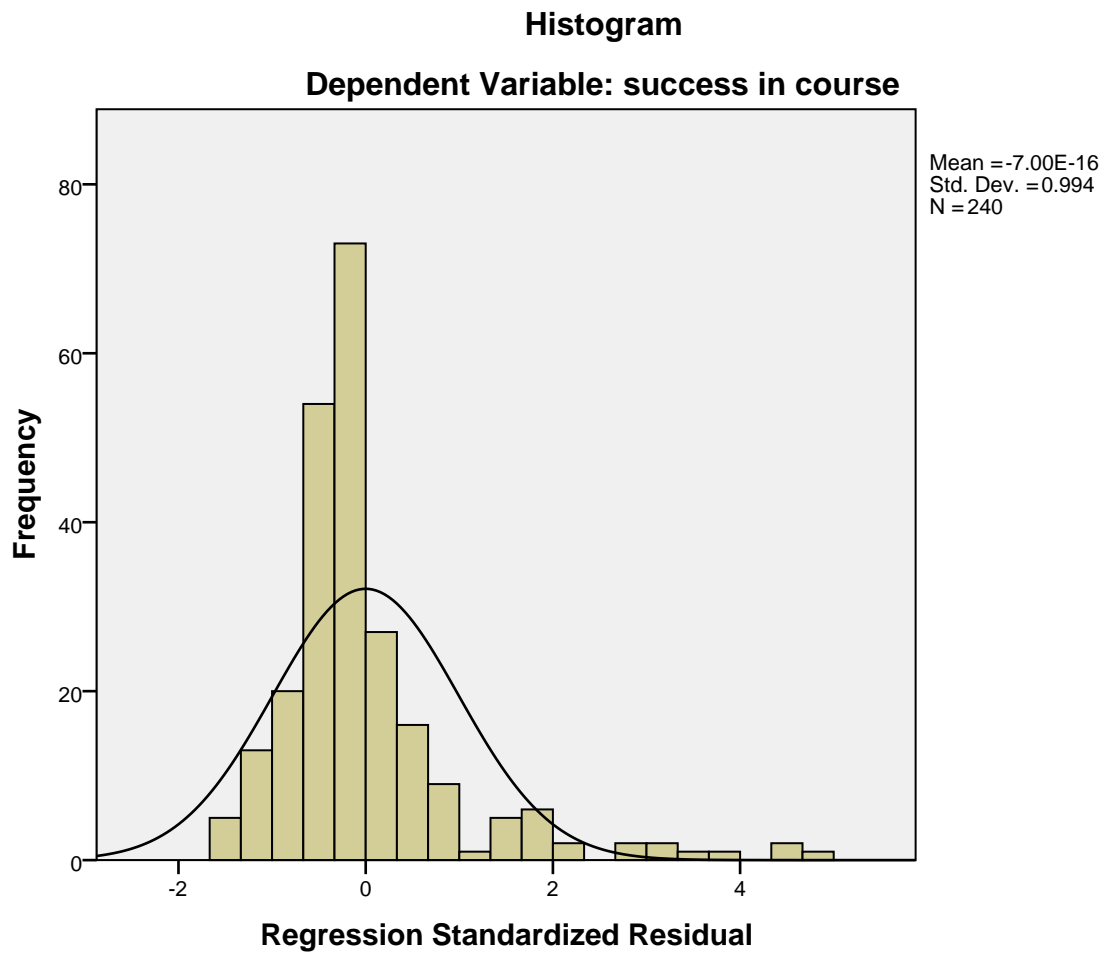
Charts

Histogram

Dependent Variable: success in course

Mean =-7.00E-16
Std. Dev. =0.994
N =240

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: success in course

Scatterplot

Dependent Variable: success in course
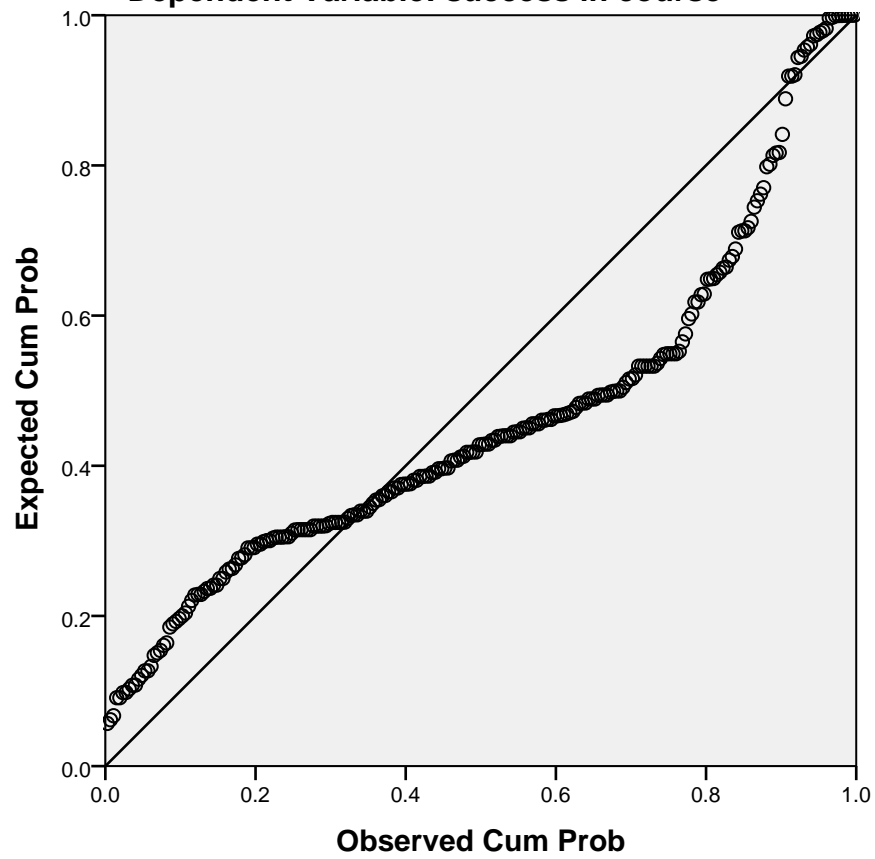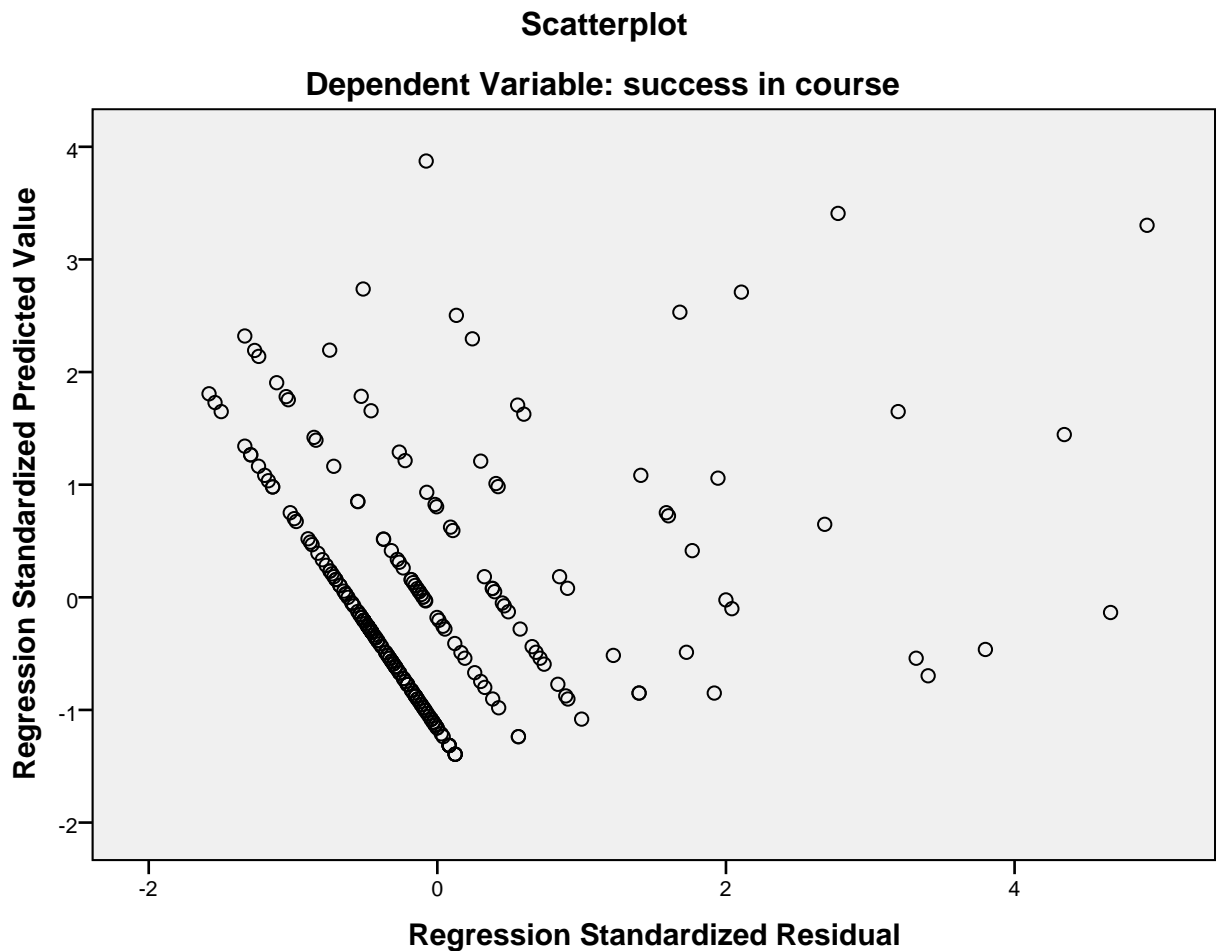

```
 SORT CASES BY MAH_1 (D).
RECODE MAH_1 (16.27 thru Highest=1) (ELSE=0) INTO mah_out.
EXECUTE.
SORT CASES BY COO_1 (D).
RECODE COO_1 (.0153 thru Highest=1) (ELSE=0) INTO cook_out.
EXECUTE.
RECODE LEV_1 (.0302 thru Highest=1) (ELSE=0) INTO lev_out.
EXECUTE.
SORT CASES BY LEV_1 (D).
COMPUTE out_sum=mah_out+cook_out+lev_out.
EXECUTE.
SORT CASES BY out_sum (D).

SAVE OUTFILE='/Users/buchanan/OneDrive/stat help/statstools doc/model 3 double
```

```
 moderation3.sav'
  /COMPRESSED.
CORRELATIONS
  /VARIABLES=GPA_1 hours ACT
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlations

[DataSet1] /Users/buchanan/OneDrive/stat help/statstools doc/model 3 double m
oderation3.sav

Correlations

		TREND(GPA)	hours attended sessions	ACT Score
TREND(GPA)	Pearson Correlation	1	.640[**]	-.146[*]
	Sig. (2-tailed)		.000	.020
	N	252	228	252
hours attended sessions	Pearson Correlation	.640[**]	1	-.084
	Sig. (2-tailed)	.000		.209
	N	228	228	228
ACT Score	Pearson Correlation	-.146[*]	-.084	1
	Sig. (2-tailed)	.020	.209	
	N	252	228	252

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

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

```
 REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT success
  /METHOD=ENTER GPA_1 hours ACT
  /SCATTERPLOT=(*ZPRED ,*ZRESID)
  /RESIDUALS HISTOGRAM(ZRESID) NORMPROB(ZRESID)
  /SAVE MAHAL COOK LEVER.
```

Regression

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ACT Score, hours attended sessions, TREND(GPA)[b]	.	Enter

a. Dependent Variable: success in course

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.331[a]	.110	.098	1.681

a. Predictors: (Constant), ACT Score, hours attended sessions, TREND(GPA)

b. Dependent Variable: success in course

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	77.683	3	25.894	9.161	.000[b]
	Residual	630.299	223	2.826		
	Total	707.982	226			

a. Dependent Variable: success in course

b. Predictors: (Constant), ACT Score, hours attended sessions, TREND(GPA)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	
		B	Std. Error	Beta	t
1	(Constant)	7.008	.908		7.717
	TREND(GPA)	-.054	.049	-.091	-1.102
	hours attended sessions	-.067	.029	-.188	-2.293
	ACT Score	.956	.333	.183	2.876

Coefficients[a]

Model		Sig.
1	(Constant)	.000
	TREND(GPA)	.272
	hours attended sessions	.023
	ACT Score	.004

a. Dependent Variable: success in course

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	3.15	6.01	4.01	.586	227
Std. Predicted Value	-1.466	3.421	.000	1.000	227
Standard Error of Predicted Value	.120	.508	.208	.080	227
Adjusted Predicted Value	3.15	6.02	4.01	.588	227
Residual	-2.396	9.018	.000	1.670	227
Std. Residual	-1.425	5.364	.000	.993	227
Stud. Residual	-1.454	5.380	-.001	1.002	227
Deleted Residual	-2.495	9.163	-.002	1.699	227
Stud. Deleted Residual	-1.458	5.755	.006	1.030	227
Mahal. Distance	.159	19.652	2.987	3.449	227
Cook's Distance	.000	.257	.004	.018	227
Centered Leverage Value	.001	.087	.013	.015	227

a. Dependent Variable: success in course
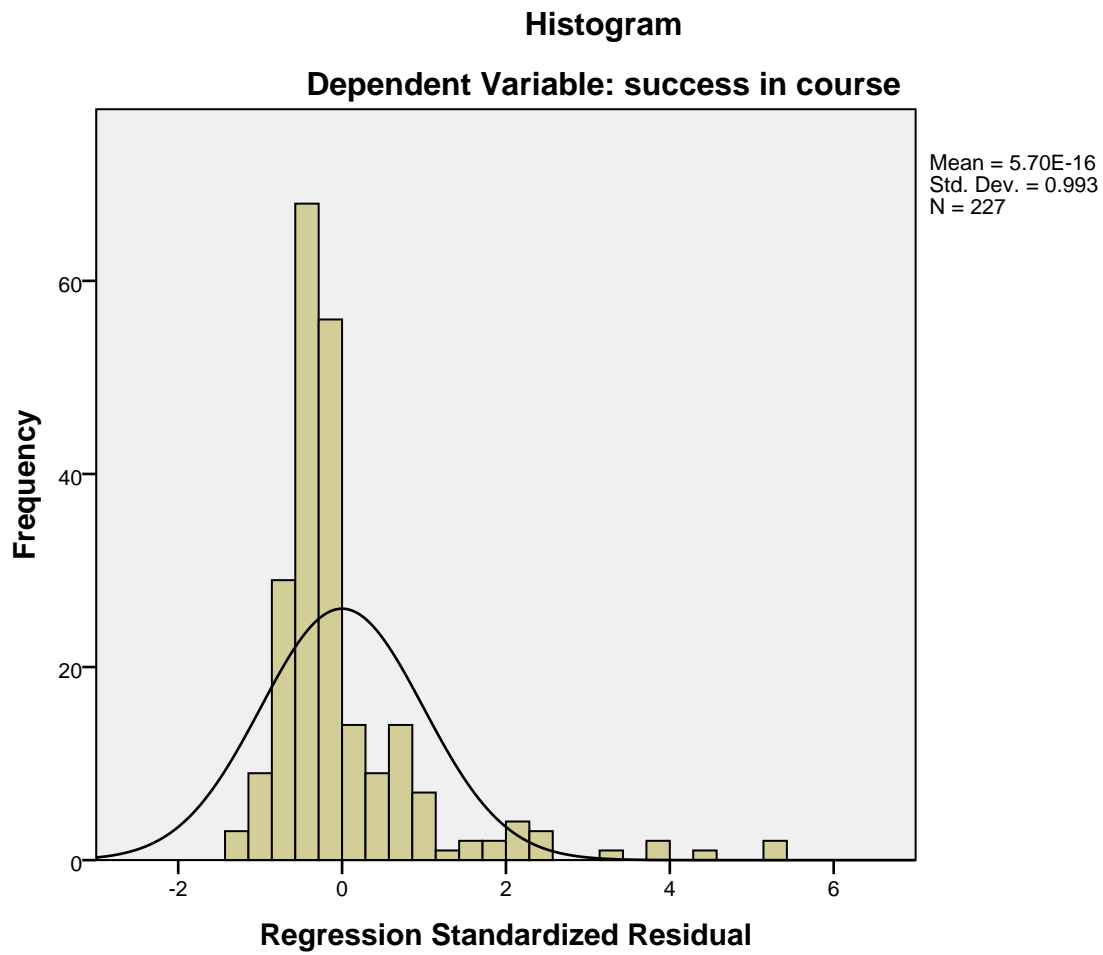
Charts

Histogram

Dependent Variable: success in course

Mean = 5.70E-16
Std. Dev. = 0.993
N = 227

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: success in course

Scatterplot

Dependent Variable: success in course
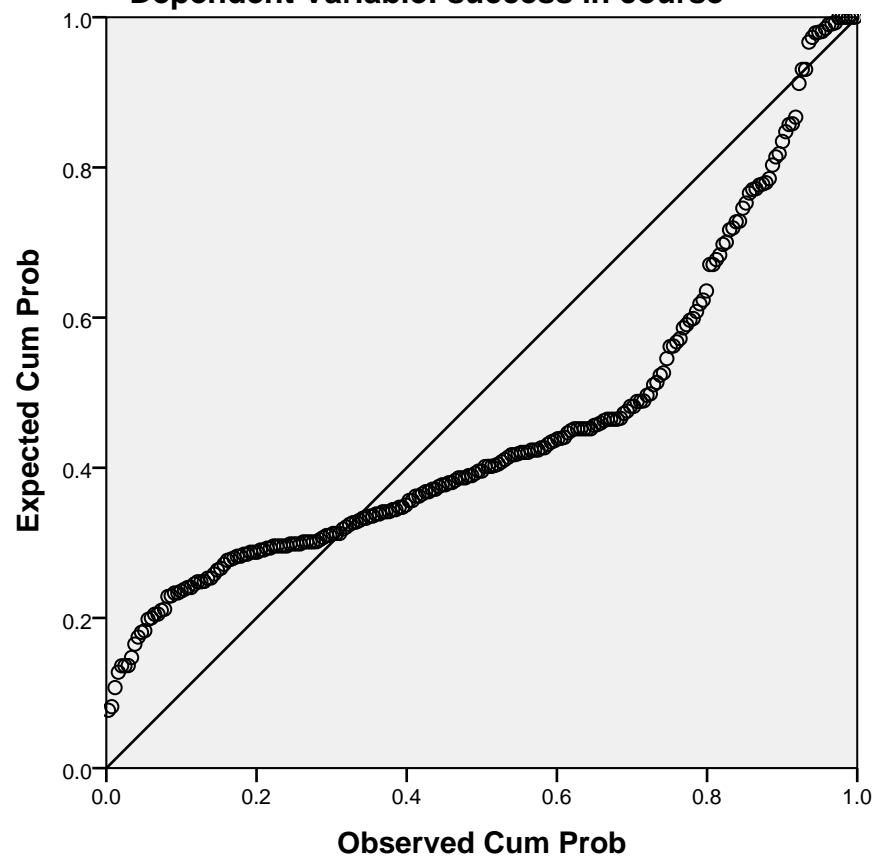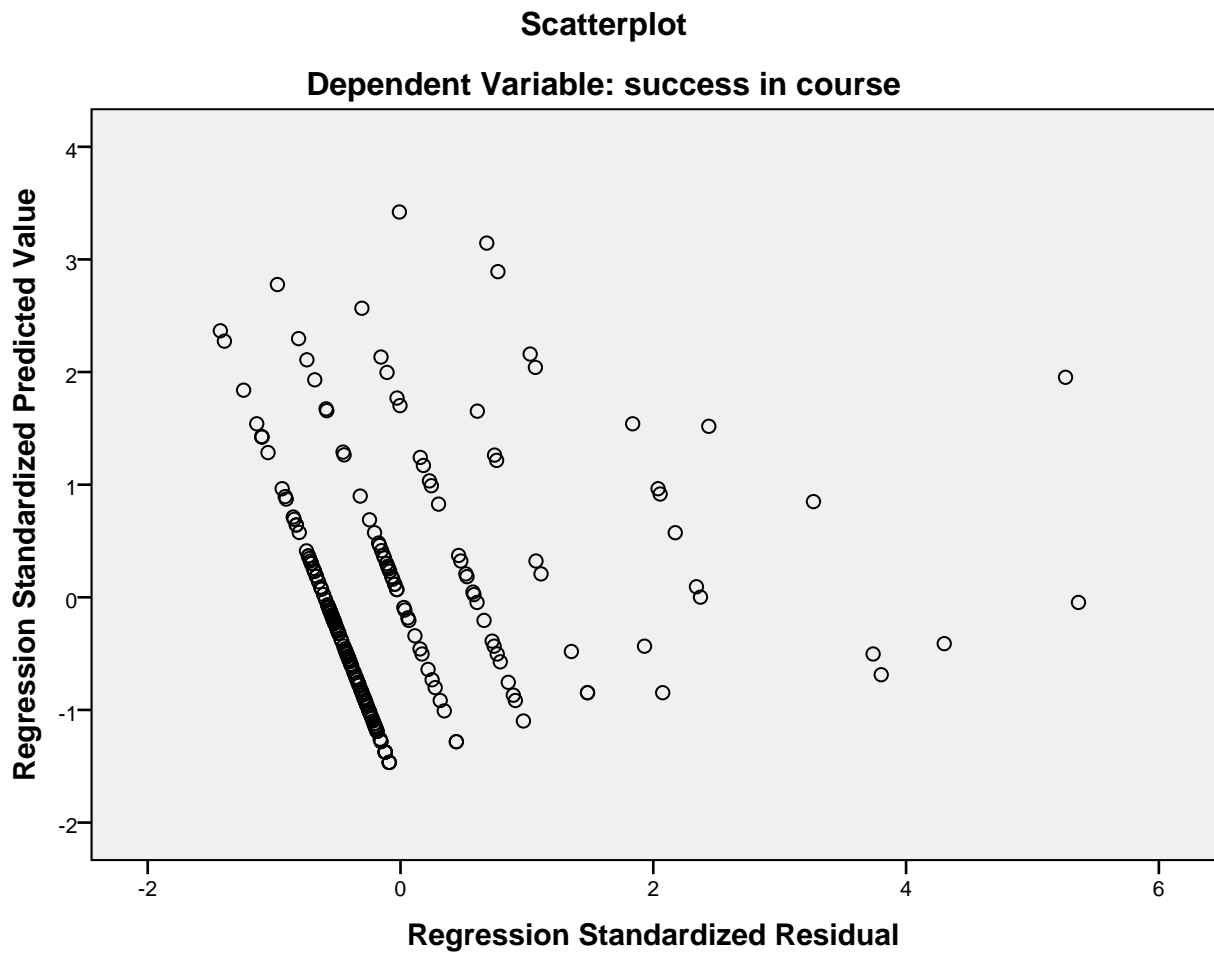

```
 /* PROCESS for SPSS v2.10 */.
/* Written by Andrew F. Hayes */.
/* www.afhayes.com */.
/* Copyright 2013 */.
/* Read the documentation */.
/* available in Appendix A of */.
/* Hayes (2013) prior to use */.
/* www.guilford.com/p/hayes3 */.
/* For proper results, variable */.
/* names in data file must be distinct */.
/* in the first eight characters */.
set printback = off.
```

Matrix

Run MATRIX procedure:

***************** PROCESS Procedure for SPSS Release 2.10 ****************

             Written by Andrew F. Hayes, Ph.D.   www.afhayes.com
      Documentation available in Hayes (2013). www.guilford.com/p/hayes3

****
Model = 3
    Y = success
    X = ACT
    M = GPA_1
    W = hours

Sample size
        227

****
Outcome: success

Model Summary
          R   R-sq   F   df1   df2   p
      .3355   .1125   4.6517   7.0000   219.0000   .0001

Model
              coeff   se   t   p   LLCI   ULCI
constant   3.9901   .1323   30.1710   .0000   3.7295   4.2508
GPA_1   -.0546   .0395   -1.3832   .1680   -.1324   .0232
ACT   1.0081   .4832   2.0862   .0381   .0557   1.9604
int_1   .0228   .1322   .1722   .8634   -.2378   .2834
hours   -.0635   .0219   -2.8953   .0042   -.1068   -.0203
int_2   -.0597   .0660   -.9042   .3669   -.1898   .0704
int_3   .0016   .0043   .3613   .7182   -.0070   .0101
int_4   -.0080   .0142   -.5628   .5741   -.0359   .0200

Interactions:

 int_1   ACT   X   GPA_1
 int_2   ACT   X   hours
 int_3   GPA_1   X   hours
 int_4   ACT   X   GPA_1   X   hours

```
****************************************************************************

Conditional effect of X on Y at values of the moderator(s):
      hours      GPA_1      Effect         se          t          p       LLCI
       ULCI
    -4.9698    -2.9884     1.1181      .6238     1.7923      .0745     -.1114
     2.3475
    -4.9698      .0000     1.3047      .6127     2.1293      .0343      .0971
     2.5123
    -4.9698     2.9884     1.4913      .7472     1.9957      .0472      .0186
     2.9640
      .0000    -2.9884      .9400      .7628     1.2323      .2192     -.5634
     2.4434
      .0000      .0000     1.0081      .4832     2.0862      .0381      .0557
     1.9604
      .0000     2.9884     1.0761      .4443     2.4222      .0162      .2005
     1.9517
     4.9698    -2.9884      .7619     1.0410      .7320      .4650    -1.2896
     2.8135
     4.9698      .0000      .7115      .5538     1.2846      .2003     -.3801
     1.8030
     4.9698     2.9884      .6610      .3678     1.7972      .0737     -.0639
     1.3858

Values for quantitative moderators are the mean and plus/minus one SD from me
an.
Values for dichotomous moderators are the two values of the moderator.

Conditional effect of X*M interaction at values of W:
      hours     Effect         se          t          p       LLCI       ULCI
    -4.9698      .0624      .1049      .5951      .5524     -.1444      .2692
      .0000      .0228      .1322      .1722      .8634     -.2378      .2834
     4.9698     -.0169      .1841     -.0918      .9270     -.3797      .3459

******************** JOHNSON-NEYMAN TECHNIQUE *************************

There are no statistical significance transition points within the observed r
ange of the moderator

****************************************************************************

Data for visualizing conditional effect of X of Y:
```

```
      ACT        hours       GPA_1        yhat
    -.1322     -4.9698     -2.9884      4.3446
     .8678     -4.9698     -2.9884      5.4626
    -.1322     -4.9698       .0000      4.1335
     .8678     -4.9698       .0000      5.4381
    -.1322     -4.9698      2.9884      3.9224
     .8678     -4.9698      2.9884      5.4137
    -.1322       .0000     -2.9884      4.0290
     .8678       .0000     -2.9884      4.9690
    -.1322       .0000       .0000      3.8569
     .8678       .0000       .0000      4.8650
    -.1322       .0000      2.9884      3.6848
     .8678       .0000      2.9884      4.7609
    -.1322      4.9698     -2.9884      3.7135
     .8678      4.9698     -2.9884      4.4754
    -.1322      4.9698       .0000      3.5803
     .8678      4.9698       .0000      4.2918
    -.1322      4.9698      2.9884      3.4472
     .8678      4.9698      2.9884      4.1082
```

******************** ANALYSIS NOTES AND WARNINGS ************************

Level of confidence for all confidence intervals in output:
    95.00

NOTE: The following variables were mean centered prior to analysis:
 ACT   GPA_1   hours

NOTE: Some cases were deleted due to missing data. The number of such cases
was:
  25

NOTE: All standard errors for continuous outcome models are based on the HC3
estimator

------ END MATRIX -----

 NEW FILE.
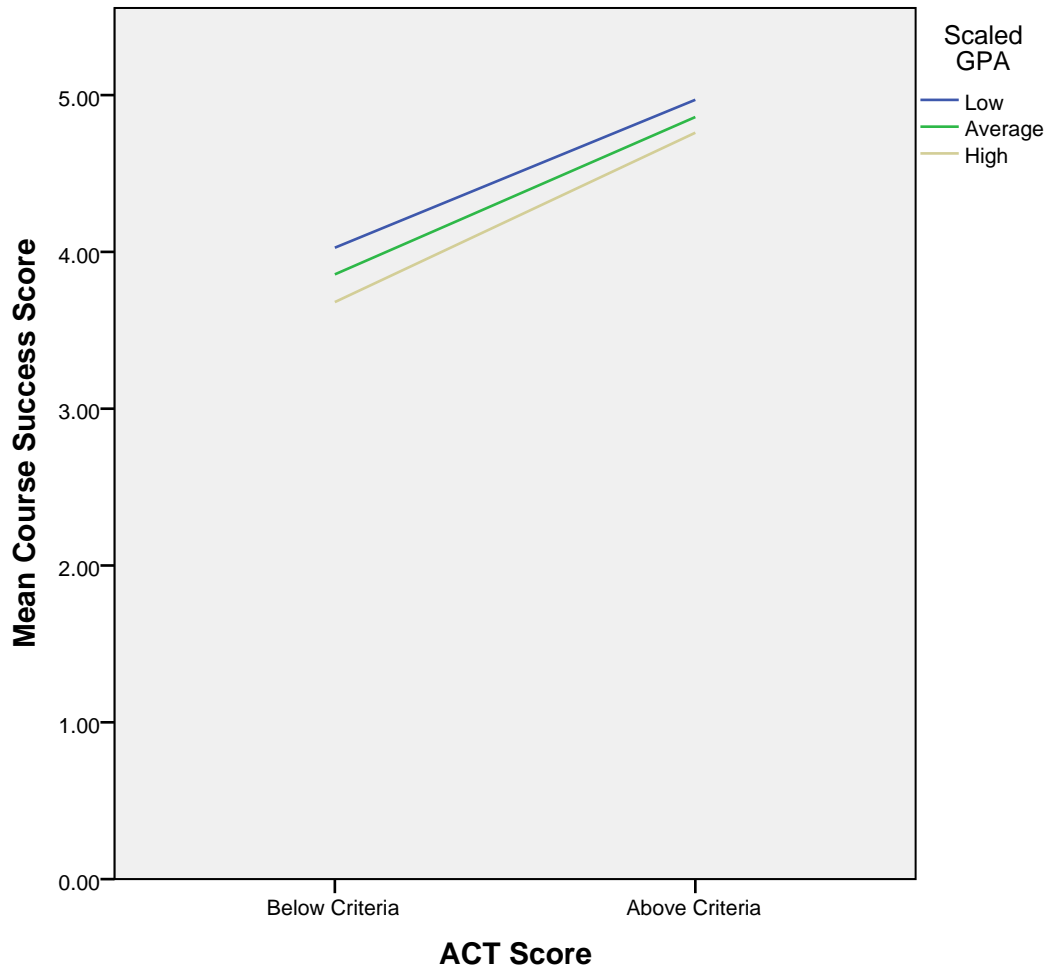DATASET NAME DataSet2 WINDOW=FRONT.
* Chart Builder.

```
GGRAPH
  /GRAPHDATASET NAME="graphdataset" VARIABLES=ACT MEAN(Success)[name="MEAN_Suc
cess"] GPA[LEVEL=NOMINAL] MISSING=LISTWISE REPORTMISSING=NO
  /GRAPHSPEC SOURCE=INLINE.
BEGIN GPL
  SOURCE: s=userSource(id("graphdataset"))
  DATA: ACT=col(source(s), name("ACT"), unit.category())
  DATA: MEAN_Success=col(source(s), name("MEAN_Success"))
  DATA: GPA=col(source(s), name("GPA"), unit.category())
  GUIDE: axis(dim(1), label("ACT Score"))
  GUIDE: axis(dim(2), label("Mean Course Success Score"))
  GUIDE: legend(aesthetic(aesthetic.color.interior), label("Scaled GPA"))
  SCALE: cat(dim(1), include(".00", "1.00"))
  SCALE: linear(dim(2), include(0))
  SCALE: cat(aesthetic(aesthetic.color.interior), include("-1.00", ".00", "1.0
0"))
  ELEMENT: line(position(ACT*MEAN_Success), color.interior(GPA), missing.wings
())
END GPL.
```

GGraph

```
[DataSet2]
```

```
 SORT CASES  BY Hours.
SPLIT FILE SEPARATE BY Hours.
* Chart Builder.
GGRAPH
  /GRAPHDATASET NAME="graphdataset" VARIABLES=ACT MEAN(Success)[name="MEAN_Suc
cess"] GPA[LEVEL=NOMINAL] MISSING=LISTWISE REPORTMISSING=NO
  /GRAPHSPEC SOURCE=INLINE.
BEGIN GPL
  SOURCE: s=userSource(id("graphdataset"))
  DATA: ACT=col(source(s), name("ACT"), unit.category())
  DATA: MEAN_Success=col(source(s), name("MEAN_Success"))
  DATA: GPA=col(source(s), name("GPA"), unit.category())
  GUIDE: axis(dim(1), label("ACT Score"))
  GUIDE: axis(dim(2), label("Mean Course Success Score"))
```

```
  GUIDE: legend(aesthetic(aesthetic.color.interior), label("Scaled GPA"))
  SCALE: cat(dim(1), include(".00", "1.00"))
  SCALE: linear(dim(2), include(0))
  SCALE: cat(aesthetic(aesthetic.color.interior), include("-1.00", ".00", "1.0
0"))
  ELEMENT: line(position(ACT*MEAN_Success), color.interior(GPA), missing.wings
())
END GPL.
```

GGraph

Hours of Study Sessions: Average

Mean Course Success Score vs ACT Score

Scaled GPA:
- Low
- Average
- High

Hours of Study Sessions: High

Mean Course Success Score

ACT Score

Scaled GPA
— Low
— Average
— High