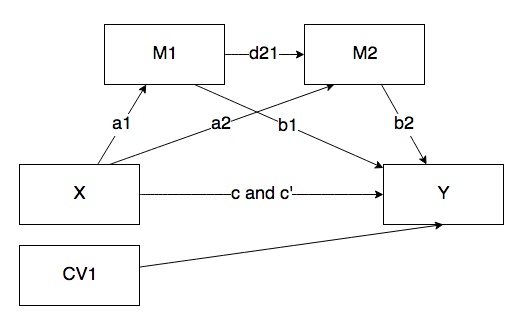
Type of Analysis:

Serial Mediation with Two Mediators and a Covariate (Model 6)

Model Visualization:



IV(s):

* X: Q151 – what grade will you get in this course?
* M1: Q31 – are the exams a good representation of the course material?
* M2: Q41 – are the grades fair?
* CV: Q121 – this is a course I wanted to take?

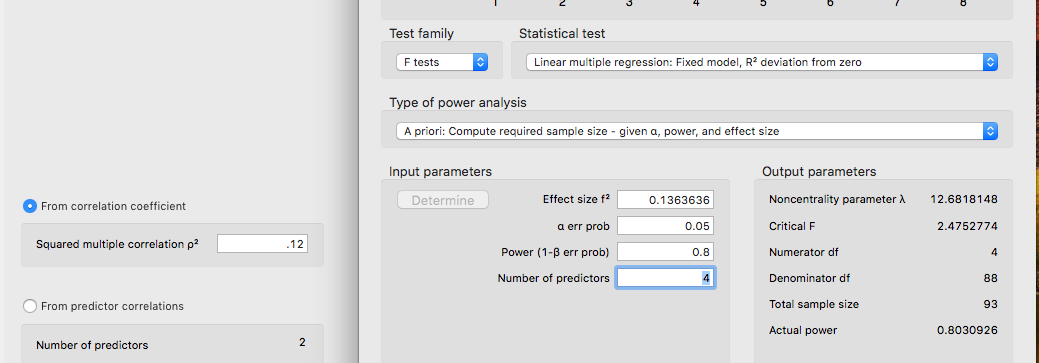
DV:

* Y: Q11 – overall course rating

Power:

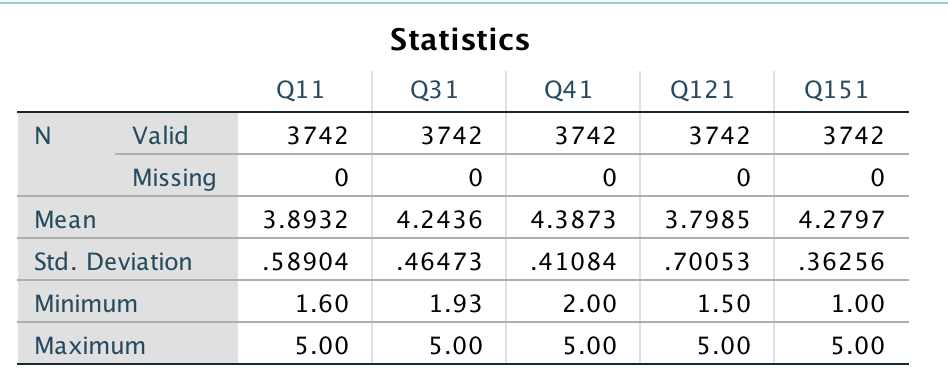
Figure out the number of predictors: 4 predictors

Also care about R2: .12 is a guess

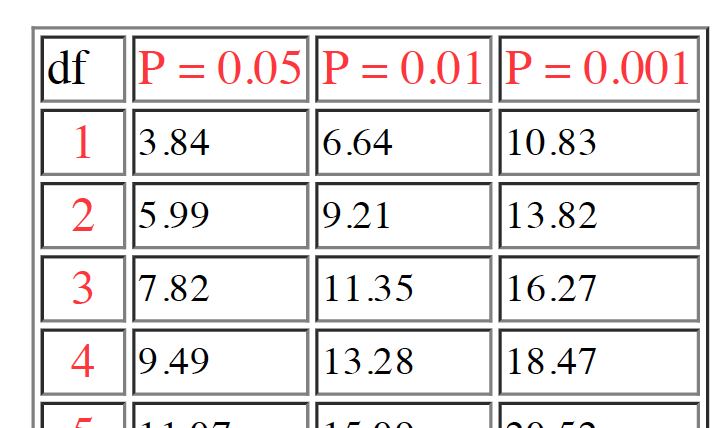


Data Screening:

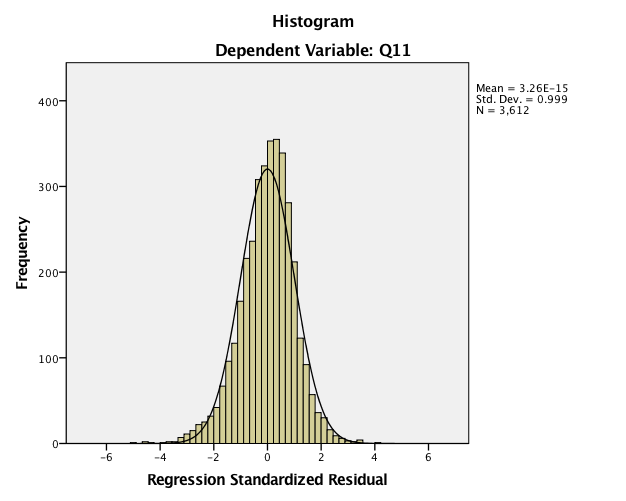
* Accurate Data
* Missing Data



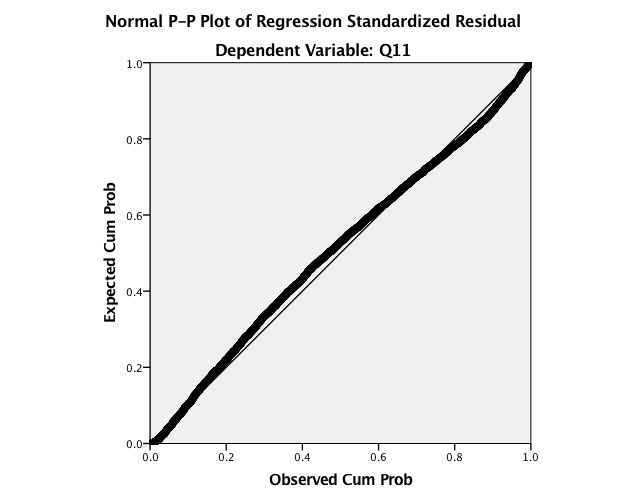
* Outliers
  + Mahalanobis
    - DF = 4
    - Cut off equals = 18.47



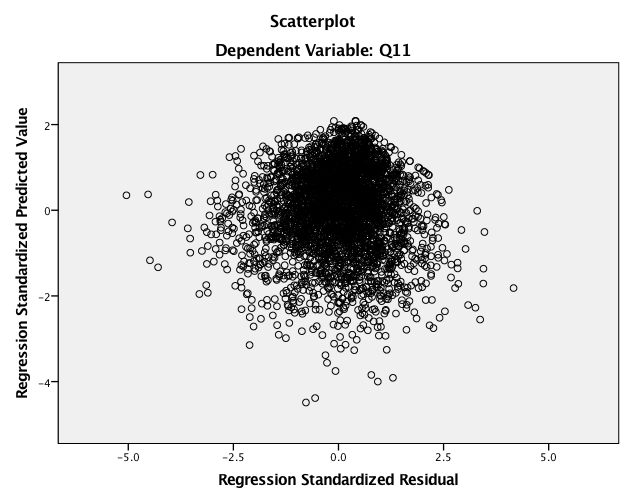
* + Cooks
    - 4/(N – k – 1)
    - 4/(3742 – 4 - 1) = .0011
  + Leverage
    - (2K + 2)/N
    - (2\*4 + 2) / 3742 = .0027
* Assumptions:
  + Additivity – run correlations here – just don’t want them to be .90.
  + Normality



* + Linearity



* + Homogeneity/Homoscedasticity



Analysis:

Run MATRIX procedure:  
  
\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* PROCESS Procedure for SPSS Version 3.00 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
  
          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com  
    Documentation available in Hayes (2018). www.guilford.com/p/hayes3  
  
\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
Model  : 6  
    Y  : Q11  
    X  : Q151  
   M1  : Q31  
   M2  : Q41  
  
Covariates:  
 Q121  
  
Sample  
Size:  3612  
  
\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
OUTCOME VARIABLE:  
 Q31

Model Summary  
          R       R-sq        MSE     F(HC0)        df1        df2          p  
      .4338      .1882      .1510   355.4263     2.0000  3609.0000      .0000  
  
Model  
              coeff    se(HC0)          t          p       LLCI       ULCI  
constant     2.0140      .0869    23.1789      .0000     1.8437     2.1844  
Q151          .4299      .0208    20.6547      .0000      .3891      .4707  
Q121          .1102      .0100    11.0757      .0000      .0907      .1297

Overall model *F*(2, 3609) = 355.43, *p* < .001, *R2* = .19 – significant

Grade in course predicts exams fairness *b* = 0.43, *t*(3609) = 20.65,  *p* < .001 – a1 path

Wanted to take predicts exams fairness *b* = 0.11, *t*(3609) = 11.08, *p* < .001

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
OUTCOME VARIABLE:  
 Q41  
  
Model Summary  
          R       R-sq        MSE     F(HC0)        df1        df2          p  
      .7635      .5829      .0578  1423.5512     3.0000  3608.0000      .0000  
  
Model  
              coeff    se(HC0)          t          p       LLCI       ULCI  
constant     1.1979      .0572    20.9376      .0000     1.0857     1.3100  
Q151          .1141      .0142     8.0504      .0000      .0863      .1418  
Q31           .5596      .0123    45.6144      .0000      .5355      .5836  
Q121          .0884      .0066    13.3273      .0000      .0754      .1014

Grade in course predicts fair grading *b* = 0.11, *t*(3608) = 8.05, *p* < .001 – a2 path

Exam fairness predicts fair grading *b* = 0.56, *t*(3608) = 45.61, *p* < .001 – d21 path

Wanted to take predicts fair grading *b* = 0.09, *t*(3608) = 13.33, *p* < .001

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
OUTCOME VARIABLE:  
 Q11

Model Summary  
          R       R-sq        MSE     F(HC0)        df1        df2          p  
      .8103      .6566      .1098  1668.5211     4.0000  3607.0000      .0000  
  
Model  
              coeff    se(HC0)          t          p       LLCI       ULCI  
constant    -1.3165      .0827   -15.9159      .0000    -1.4787    -1.1543  
Q151          .0152      .0201      .7577      .4487     -.0242      .0546  
Q31           .5548      .0214    25.9094      .0000      .5129      .5968  
Q41           .4200      .0255    16.4891      .0000      .3701      .4700  
Q121          .2465      .0089    27.6797      .0000      .2290      .2639

Overall grade does not predict course rating *b* = 0.02, *t*(3607) = 0.76, *p* = .449 – c’ path

Exam fairness predicts course rating *b* = 0.55, *t*(3607) = 25.91, *p* < .001 – b1 path

Grading system fairness predicts course rating *b* = 0.42, *t*(3607) = 16.49, *p* < .001 – b2 path

Wanted to take predicts course rating *b* = 0.25, *t*(3607) = 27.68, *p* < .001  
  
\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* TOTAL EFFECT MODEL \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
OUTCOME VARIABLE:  
 Q11  
  
Model Summary  
          R       R-sq        MSE     F(HC0)        df1        df2          p  
      .5745      .3300      .2142   949.8509     2.0000  3609.0000      .0000  
  
Model  
              coeff    se(HC0)          t          p       LLCI       ULCI  
constant      .7775      .0968     8.0292      .0000      .5876      .9673  
Q151          .4027      .0241    16.6904      .0000      .3554      .4500  
Q121          .3707      .0117    31.6985      .0000      .3478      .3936

Course grade predicts overall course rating *b* = 0.40, *t*(3609) = 16.69, *p* < .001 – c path

Wanted to take predicts overall rating, *b* = 0.37, *t*(3609) = 31.70, *p* < .001

\*\*\*\*\*\*\*\*\*\*\*\*\*\* TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y \*\*\*\*\*\*\*\*\*\*\*\*\*\*  
  
Total effect of X on Y  
     Effect    se(HC0)          t          p       LLCI       ULCI  
      .4027      .0241    16.6904      .0000      .3554      .4500  
  
Direct effect of X on Y  
     Effect    se(HC0)          t          p       LLCI       ULCI  
      .0152      .0201      .7577      .4487     -.0242      .0546  
  
Indirect effect(s) of X on Y:  
          Effect     BootSE   BootLLCI   BootULCI  
TOTAL      .3874      .0198      .3493      .4269  
Ind1       .2385      .0158      .2082      .2706 – x through m1  
Ind2       .0479      .0067      .0353      .0617 – x through m2  
Ind3       .1010      .0081      .0852      .1173 – x through m1 through m2  
  
Indirect effect key:  
Ind1 Q151        ->    Q31         ->    Q11  
Ind2 Q151        ->    Q41         ->    Q11  
Ind3 Q151        ->    Q31         ->    Q41         ->    Q11

Indirect 1 (explain) exam fairness mediates the relationship between course grade and overall rating, indirect = 0.24, *SE* = 0.02, 95% CI [0.21, 0.27]

Grading system mediates the relationship between course grade and overall rating, indirect = 0.05, *SE* = 0.01, 95% CI [0.04, 0.06]

Exam fairness and the grading system mediated the relationship between course grade and overall rating, indirect = 0.10, *SE* = 0.01, 95% CI [0.09, 0.12]  
  
\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* ANALYSIS NOTES AND ERRORS \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  
  
Level of confidence for all confidence intervals in output:  
  95.0000  
  
Number of bootstrap samples for percentile bootstrap confidence intervals:  
  5000  
  
NOTE: A heteroscedasticity consistent standard error and covariance matrix estimator was used.  
  
------ END MATRIX -----