```
> #clear active frame from previous analyses
> rm(mydata)
>
> #need the following line on first use
> # install.packages('lessR')
> library(haven)
> mydata = read_sav("c:/jason/spsswin/semclass/nphs 1994.sav")
>
> #library(psych)
> #describe(mydata)
>
> #library(summarytools)
> #freq(mydata)
>
>
> # note that all the model commands are enclosed single quotes
> model =  '
+ distress ~ a*conf + b*mastery
+ '
> #use for mediation model
> fit = sem(model, data = mydata, missing = 'listwise')
> summary(fit,fit.measures=TRUE, rsquare=TRUE, standardized=TRUE)
lavaan 0.6.15 ended normally after 1 iteration

  Estimator                                         ML
  Optimization method                           NLMINB
  Number of model parameters                         3

  Number of observations                           650

Model Test User Model:

  Test statistic                                 0.000
  Degrees of freedom                                 0

Model Test Baseline Model:

  Test statistic                               155.028
  Degrees of freedom                                 2
  P-value                                        0.000

User Model versus Baseline Model:

  Comparative Fit Index (CFI)                    1.000
  Tucker-Lewis Index (TLI)                       1.000

Loglikelihood and Information Criteria:

  Loglikelihood user model (H0)               -410.404
  Loglikelihood unrestricted model (H1)       -410.404

  Akaike (AIC)                                 826.807
  Bayesian (BIC)                               840.238
  Sample-size adjusted Bayesian (SABIC)        830.713

Root Mean Square Error of Approximation:

  RMSEA                                          0.000
  90 Percent confidence interval - lower         0.000
  90 Percent confidence interval - upper         0.000
  P-value H_0: RMSEA <= 0.050                       NA
  P-value H_0: RMSEA >= 0.080                       NA

Standardized Root Mean Square Residual:

  SRMR                                           0.000

Parameter Estimates:

  Standard errors                             Standard
  Information                                 Expected
  Information saturated (h1) model          Structured

Regressions:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
  distress ~
    conf       (a)   -0.051    0.022   -2.289    0.022   -0.051   -0.080
    mastery    (b)   -0.374    0.030  -12.652    0.000   -0.374   -0.444

Variances:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
   .distress          0.207    0.011   18.028    0.000    0.207    0.788

R-Square:
                   Estimate
    distress          0.212

 > #clear active frame from previous analyses
```

```
> rm(mydata)
>
> #need the following line on first use
> # install.packages('lessR')
> library(haven)
> mydata = read_sav("c:/jason/spsswin/semclass/nphs 1994.sav")
>
> #library(psych)
> #describe(mydata)
>
> #library(summarytools)
> #freq(mydata)
>
>
> # note that all the model commands are enclosed single quotes
> model =  '
+ mastery ~ a*conf
+ distress ~ b*mastery
+ distress ~ c*conf
+ #indirect effect
+       ab := a*b
+
+ #total effect
+ total := c + (a*b)
+ '
> #use for mediation model
> fit = sem(model, data = mydata, missing = 'listwise', se = 'bootstrap', bootstrap = 500)
> summary(fit,fit.measures=TRUE, rsquare=TRUE, standardized=TRUE)
lavaan 0.6.15 ended normally after 1 iteration

  Estimator                                         ML
  Optimization method                           NLMINB
  Number of model parameters                         5

  Number of observations                           650

Model Test User Model:

  Test statistic                                 0.000
  Degrees of freedom                                 0

Model Test Baseline Model:

  Test statistic                               164.902
  Degrees of freedom                                 3
  P-value                                        0.000

User Model versus Baseline Model:

  Comparative Fit Index (CFI)                    1.000
  Tucker-Lewis Index (TLI)                       1.000

Loglikelihood and Information Criteria:

  Loglikelihood user model (H0)              -1005.052
  Loglikelihood unrestricted model (H1)      -1005.052

  Akaike (AIC)                                2020.104
  Bayesian (BIC)                              2042.489
  Sample-size adjusted Bayesian (SABIC)       2026.614

Root Mean Square Error of Approximation:

  RMSEA                                          0.000
  90 Percent confidence interval - lower         0.000
  90 Percent confidence interval - upper         0.000
  P-value H_0: RMSEA <= 0.050                       NA
  P-value H_0: RMSEA >= 0.080                       NA

Standardized Root Mean Square Residual:
```

```
  SRMR                                           0.000

Parameter Estimates:

  Standard errors                             Bootstrap
  Number of requested bootstrap draws               500
  Number of successful bootstrap draws              500

Regressions:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
  mastery ~
    conf       (a)    0.093    0.033    2.838    0.005    0.093    0.123
  distress ~
    mastery    (b)   -0.374    0.039   -9.674    0.000   -0.374   -0.444
    conf       (c)   -0.051    0.028   -1.852    0.064   -0.051   -0.080

Variances:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
   .mastery           0.365    0.022   16.251    0.000    0.365    0.985
   .distress          0.207    0.017   12.138    0.000    0.207    0.788

R-Square:
                   Estimate
    mastery           0.015
    distress          0.212

Defined Parameters:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
    ab               -0.035    0.013   -2.739    0.006   -0.035   -0.054
    total            -0.086    0.032   -2.667    0.008   -0.086   -0.135

> parameterEstimates(fit, ci = TRUE, boot.ci.type = "perc", level = 0.95, standardized = TRUE)
       lhs op      rhs label    est    se      z pvalue ci.lower ci.upper std.lv std.all std.no
1  mastery  ~     conf     a  0.093 0.033  2.838  0.005    0.026    0.158  0.093   0.123   0.15
2 distress  ~  mastery     b -0.374 0.039 -9.674  0.000   -0.455   -0.305 -0.374  -0.444  -0.44
3 distress  ~     conf     c -0.051 0.028 -1.852  0.064   -0.114   -0.001 -0.051  -0.080  -0.10
4  mastery ~~  mastery        0.365 0.022 16.251  0.000    0.321    0.410  0.365   0.985   0.98
5 distress ~~ distress        0.207 0.017 12.138  0.000    0.174    0.242  0.207   0.788   0.78
6     conf ~~     conf        0.646 0.000     NA     NA    0.646    0.646  0.646   1.000   0.64
7       ab :=      a*b    ab -0.035 0.013 -2.739  0.006   -0.062   -0.010 -0.035  -0.054  -0.06
8    total :=  c+(a*b) total -0.086 0.032 -2.667  0.008   -0.150   -0.025 -0.086  -0.135  -0.16

>


 Mplus VERSION 8.9
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 INPUT INSTRUCTIONS


   title:  Data from 1994 NPHS survey;

   data:  file=nphs 1994.dat;  format=free;
       listwise=on;

   variable:  names = cheer nervous restless hopeless  worth effort
      confide crisis personal loved control problems change helpless pushed future anything
      conf distress mastery sex;

     usevariables= conf mastery distress;  !use this statement for selecting a subset of vari

     analysis:  type=general;  estimator=ml;

     model:  distress on conf mastery;


   output:  stdyx ;
```

```
*** WARNING
  Input line exceeded 90 characters. Some input may be truncated.
    usevariables= conf mastery distress;  !use this statement for selecting a subset of varia
   1 WARNING(S) FOUND IN THE INPUT INSTRUCTIONS


Data from 1994 NPHS survey;

SUMMARY OF ANALYSIS

Number of groups                                                 1
Number of observations                                         650

Number of dependent variables                                    1
Number of independent variables                                  2
Number of continuous latent variables                            0

Observed dependent variables

  Continuous
   DISTRESS

Observed independent variables
   CONF        MASTERY


Estimator                                                       ML
Information matrix                                        OBSERVED
Maximum number of iterations                                 1000
Convergence criterion                                   0.500D-04
Maximum number of steepest descent iterations                  20

Input data file(s)
  nphs 1994.dat

Input data format  FREE


UNIVARIATE SAMPLE STATISTICS


     UNIVARIATE HIGHER-ORDER MOMENT DESCRIPTIVE STATISTICS

         Variable/         Mean/     Skewness/   Minimum/ % with                Percentiles
        Sample Size      Variance    Kurtosis    Maximum  Min/Max      20%/60%    40%/80%    Median

     DISTRESS              1.413       1.901       1.000   31.85%       1.000      1.167      1.333
             650.000       0.263       3.831       3.667    0.31%       1.333      1.667
     CONF                  3.649      -2.802       0.000    2.15%       3.000      4.000      4.000
             650.000       0.646       8.248       4.000   78.46%       4.000      4.000
     MASTERY               3.756      -0.365       1.571    0.15%       3.286      3.714      3.857
             650.000       0.370       0.415       5.000    3.23%       4.000      4.143


THE MODEL ESTIMATION TERMINATED NORMALLY


MODEL FIT INFORMATION

Number of Free Parameters                       4

Loglikelihood

          H0 Value                       -410.404
          H1 Value                       -410.404

Information Criteria

          Akaike (AIC)                    828.807
          Bayesian (BIC)                  846.715
          Sample-Size Adjusted BIC        834.015
            (n* = (n + 2) / 24)

Chi-Square Test of Model Fit

          Value                             0.000
          Degrees of Freedom                    0
          P-Value                           0.0000

RMSEA (Root Mean Square Error Of Approximation)

          Estimate                          0.000
          90 Percent C.I.                   0.000  0.000
          Probability RMSEA <= .05          0.000

CFI/TLI
```

```
          CFI                                1.000
          TLI                                1.000

Chi-Square Test of Model Fit for the Baseline Model

          Value                            155.028
          Degrees of Freedom                 2
          P-Value                          0.0000

SRMR (Standardized Root Mean Square Residual)

          Value                              0.000


MODEL RESULTS

                                                    Two-Tailed
                    Estimate       S.E.  Est./S.E.    P-Value

 DISTRESS ON
    CONF              -0.051      0.022     -2.289      0.022
    MASTERY           -0.374      0.030    -12.653      0.000

 Intercepts
    DISTRESS           3.004      0.131     22.987      0.000

 Residual Variances
    DISTRESS           0.207      0.011     18.028      0.000


QUALITY OF NUMERICAL RESULTS

     Condition Number for the Information Matrix              0.128E-02
       (ratio of smallest to largest eigenvalue)


STANDARDIZED MODEL RESULTS


STDYX Standardization

                                                    Two-Tailed
                    Estimate       S.E.  Est./S.E.    P-Value

 DISTRESS ON
    CONF              -0.080      0.035     -2.295      0.022
    MASTERY           -0.444      0.032    -14.080      0.000

 Intercepts
    DISTRESS           5.860      0.217     26.941      0.000

 Residual Variances
    DISTRESS           0.788      0.028     27.673      0.000


R-SQUARE

    Observed                                        Two-Tailed
    Variable        Estimate       S.E.  Est./S.E.    P-Value

    DISTRESS           0.212      0.028      7.454      0.000


DIAGRAM INFORMATION

  Use View Diagram under the Diagram menu in the Mplus Editor to view the diagram.
  If running Mplus from the Mplus Diagrammer, the diagram opens automatically.

  Diagram output
    c:\jason\mplus\semclass\nphs 1994 reg.dgm

     Beginning Time:  11:26:41
        Ending Time:  11:26:41
       Elapsed Time:  00:00:00



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Mplus VERSION 8.9
```

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INPUT INSTRUCTIONS

```
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     confide crisis personal loved control problems change helpless pushed future anything
     conf distress mastery sex;

    usevariables= conf mastery distress;  !use this statement for selecting a subset of vari

    analysis:  type=general;  estimator=ml;

    model:  distress on conf mastery;


  output:  stdyx ;
```

*** WARNING
  Input line exceeded 90 characters. Some input may be truncated.
    usevariables= conf mastery distress; !use this statement for selecting a subset of varia
   1 WARNING(S) FOUND IN THE INPUT INSTRUCTIONS

Data from 1994 NPHS survey;

SUMMARY OF ANALYSIS

Number of groups	1
Number of observations	650
Number of dependent variables	1
Number of independent variables	2
Number of continuous latent variables	0

Observed dependent variables

  Continuous
   DISTRESS

Observed independent variables
   CONF   MASTERY

Estimator	ML
Information matrix	OBSERVED
Maximum number of iterations	1000
Convergence criterion	0.500D-04
Maximum number of steepest descent iterations	20

Input data file(s)
  nphs 1994.dat

Input data format FREE

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UNIVARIATE HIGHER-ORDER MOMENT DESCRIPTIVE STATISTICS

Variable/ Sample Size	Mean/ Variance	Skewness/ Kurtosis	Minimum/ Maximum	% with Min/Max	Percentiles 20%/60%	40%/80%	Median
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650.000	0.646	8.248	4.000	78.46%	4.000	4.000	
MASTERY	3.756	-0.365	1.571	0.15%	3.286	3.714	3.857
650.000	0.370	0.415	5.000	3.23%	4.000	4.143	

THE MODEL ESTIMATION TERMINATED NORMALLY

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Chi-Square Test of Model Fit

Value	0.000
Degrees of Freedom	0
P-Value	0.0000

RMSEA (Root Mean Square Error Of Approximation)

Estimate	0.000	
90 Percent C.I.	0.000	0.000
Probability RMSEA <= .05	0.000	

CFI/TLI

CFI	1.000
TLI	1.000

Chi-Square Test of Model Fit for the Baseline Model

Value	155.028
Degrees of Freedom	2
P-Value	0.0000

SRMR (Standardized Root Mean Square Residual)

Value	0.000

MODEL RESULTS

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
DISTRESS ON				
CONF	-0.051	0.022	-2.289	0.022
MASTERY	-0.374	0.030	-12.653	0.000
Intercepts				
DISTRESS	3.004	0.131	22.987	0.000
Residual Variances				
DISTRESS	0.207	0.011	18.028	0.000

QUALITY OF NUMERICAL RESULTS

Condition Number for the Information Matrix (ratio of smallest to largest eigenvalue) 0.128E-02

STANDARDIZED MODEL RESULTS

STDYX Standardization

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
DISTRESS ON				
CONF	-0.080	0.035	-2.295	0.022
MASTERY	-0.444	0.032	-14.080	0.000
Intercepts				
DISTRESS	5.860	0.217	26.941	0.000
Residual Variances				
DISTRESS	0.788	0.028	27.673	0.000

R-SQUARE

Observed Variable	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
DISTRESS	0.212	0.028	7.454	0.000

DIAGRAM INFORMATION

Use View Diagram under the Diagram menu in the Mplus Editor to view the diagram.
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Diagram output
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