

```

*****
* Read in data
*****
.
. use "D:\jason\workshop\Moderating and Mediating\workshop.dta", clear
(Fictional job-performance data)

. des

Contains data from D:\jason\workshop\Moderating and Mediating\workshop.dta
  obs:      1,500      Fictional job-performance data
  vars:      8         22 Jul 2024 09:19
  size:     48,000     (_dta has notes)
-----
-----
variable name  storage  display  value  variable label
              type    format   label
-----
perform        float    %9.0g
perform2       float    %9.0g      dichotomous performance
support        float    %9.0g      Perceived supervisor support
satis          float    %9.0g      Job satisfaction
satis2         float    %17.0g     satis2      dichotomous satis
group2         float    %9.0g      group variable with 2 categories
group3         float    %9.0g      group variable with 3 categories
group2_support float    %9.0g      interaction between group2 and support
-----
Sorted by:

. sum

  Variable |      Obs      Mean   Std. Dev.   Min   Max
-----+-----
  perform |    1,500   5.005317   .8949845   2.35022  8.084294
  perform2 |    1,500     .518   .4998425     0     1
  support  |    1,500   2.008467   .5058316     .4     3.8
  satis    |    1,500   2.0212    .6087235     .4     4
  satis2   |    1,500   .4653333   .4989631     0     1
-----+-----
  group2   |    1,500     .52   .4997665     0     1
  group3   |    1,500   1.013333   .6000519     0     2
  group2_support |    1,500   1.0426   1.068091     0     3.8

.
.
*****
* 1. Mediation Analysis
*****
.
. /*****
> 1.1 Mediation within the regression framework
>
> 1. test if X predict Y
> 2. Test if X predict Z
> 3. Test if X remains an important predictor when Z is used to predict Y
> *****/
.
. reg perform support

  Source |      SS      df      MS      Number of obs   =    1,500
-----+-----
  Model |    258.99948      1    258.99948   F(1, 1498)      =    412.00
  Residual |   941.695491   1,498   .628635174   Prob > F        =    0.0000
-----+-----
  Total |  1200.69497   1,499   .800997312   R-squared       =    0.2157
  Total |  1200.69497   1,499   .800997312   Adj R-squared  =    0.2152
  Total |  1200.69497   1,499   .800997312   Root MSE      =    .79287
-----

```

	perform	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
support		.8217557	.0404849	20.30	0.000	.7423427	.9011687
_cons		3.354848	.0838499	40.01	0.000	3.190373	3.519324

```
. reg satis support
```

Source	SS	df	MS	Number of obs	=	1,500
Model	20.0948216	1	20.0948216	F(1, 1498)	=	56.23
Residual	535.351024	1,498	.357377186	Prob > F	=	0.0000
				R-squared	=	0.0362
				Adj R-squared	=	0.0355
Total	555.445846	1,499	.37054426	Root MSE	=	.59781

	satis	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
support		.2288945	.0305251	7.50	0.000	.1690181	.2887709
_cons		1.561473	.0632218	24.70	0.000	1.43746	1.685486

```
. reg perform support satis
```

Source	SS	df	MS	Number of obs	=	1,500
Model	691.131957	2	345.565979	F(2, 1497)	=	1015.21
Residual	509.563014	1,497	.340389455	Prob > F	=	0.0000
				R-squared	=	0.5756
				Adj R-squared	=	0.5750
Total	1200.69497	1,499	.800997312	Root MSE	=	.58343

	perform	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
support		.6161077	.0303447	20.30	0.000	.556585	.6756303
satis		.8984401	.0252156	35.63	0.000	.8489785	.9479017
_cons		1.951958	.0731933	26.67	0.000	1.808386	2.095531

```
.
.
.
. /*****
> 1.2 Mediation analysis within the structural equation modeling framework
> *****/
```

```
. sem (perform <- satis support) (satis <- support)
```

Endogenous variables

Observed: perform satis

Exogenous variables

Observed: support

Fitting target model:

Iteration 0: log likelihood = -3779.9224
 Iteration 1: log likelihood = -3779.9224

Structural equation model Number of obs = 1,500
 Estimation method = ml
 Log likelihood = -3779.9224

		OIM				
	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Structural						
perform						

satis		.8984401	.0251903	35.67	0.000	.849068	.9478123
support		.6161077	.0303143	20.32	0.000	.5566927	.6755227
_cons		1.951958	.0731201	26.70	0.000	1.808646	2.095271

satis							
support		.2288945	.0305047	7.50	0.000	.1691064	.2886826
_cons		1.561473	.0631796	24.71	0.000	1.437643	1.685303

var(e.perform)		.3397087	.0124044			.3162461	.364912
var(e.satis)		.3569007	.0130322			.3322507	.3833795

LR test of model vs. saturated: chi2(0) = 0.00, Prob > chi2 = .							

. estat teffects

Direct effects

		Coef.	OIM Std. Err.	z	P> z	[95% Conf. Interval]	
Structural							
perform							
	satis	.8984401	.0251903	35.67	0.000	.849068	.9478123
	support	.6161077	.0303143	20.32	0.000	.5566927	.6755227

	satis						
	support	.2288945	.0305047	7.50	0.000	.1691064	.2886826

Indirect effects

		Coef.	OIM Std. Err.	z	P> z	[95% Conf. Interval]	
Structural							
perform							
	satis	0	(no path)				
	support	.205648	.0280066	7.34	0.000	.150756	.26054

	satis						
	support	0	(no path)				

Total effects

		Coef.	OIM Std. Err.	z	P> z	[95% Conf. Interval]	
Structural							
perform							
	satis	.8984401	.0251903	35.67	0.000	.849068	.9478123
	support	.8217557	.0404579	20.31	0.000	.7424597	.9010516

	satis						
	support	.2288945	.0305047	7.50	0.000	.1691064	.2886826

```

.
.
. /*****
> 1.3 Mediation analysis within the Generalized structural equation modeling framework
> Use -nlcom- (Nonlinear combinations of estimators) to testimate the indirect and
> total effects Nonlinear combinations of estimators
> *****/
.
. gsem (perform2 <- satis support) (satis <- support)

```

Iteration 0: log likelihood = -2086.465
 Iteration 1: log likelihood = -2086.465

Generalized structural equation model Number of obs = 1,500

Response : perform2
 Family : Gaussian
 Link : identity

Response : satis
 Family : Gaussian
 Link : identity

Log likelihood = -2086.465

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	

perform2						
satis	.416984	.0170226	24.50	0.000	.3836203	.4503477
support	.2610247	.0204852	12.74	0.000	.2208744	.3011749
_cons	-.8490675	.0494116	-17.18	0.000	-.9459125	-.7522225

satis						
support	.2288945	.0305047	7.50	0.000	.1691064	.2886826
_cons	1.561473	.0631796	24.71	0.000	1.437643	1.685303

var(e.perform2)	.1551283	.0056645			.144414	.1666374
var(e.satis)	.3569007	.0130322			.3322507	.3833795

.
 . gsem, coeflegend

Generalized structural equation model Number of obs = 1,500

Response : perform2
 Family : Gaussian
 Link : identity

Response : satis
 Family : Gaussian
 Link : identity

Log likelihood = -2086.465

	Coef.	Legend

perform2		
satis	.416984	_b[perform2:satis]
support	.2610247	_b[perform2:support]
_cons	-.8490675	_b[perform2:_cons]

satis		
support	.2288945	_b[satis:support]
_cons	1.561473	_b[satis:_cons]

var(e.perform2)	.1551283	_b[/var(e.perform2)]
var(e.satis)	.3569007	_b[/var(e.satis)]

.
 .
 . * obtain the direct effect of SUPPORT

. nlcom _b[perform2:support]

 _nl_1: _b[perform2:support]

```

-----+-----
      |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----+-----
   _nl_1 |   .2610247   .0204852    12.74   0.000   .2208744   .3011749
-----+-----

```

```

. * obtain indirect effect of SUPPORT

```

```

. nlcom _b[perform2:satis]*_b[satis:support]

```

```

   _nl_1:  _b[perform2:satis]*_b[satis:support]

```

```

-----+-----
      |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----+-----
   _nl_1 |   .0954453   .0133034     7.17   0.000   .0693712   .1215195
-----+-----

```

```

. * obtain the total effect of SUPPORT

```

```

. nlcom _b[perform2:support] +_b[perform2:satis]*_b[satis:support]

```

```

   _nl_1:  _b[perform2:support] +_b[perform2:satis]*_b[satis:support]

```

```

-----+-----
      |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----+-----
   _nl_1 |   .35647     .0237962    14.98   0.000   .3098303   .4031098
-----+-----

```

```

. /*****
> 2. Moderation Analysis
> *****/

```

```

. /*****
> 2.1 OLS regression
> *****/

```

```

. reg perform c.support##i.group2

```

```

-----+-----
Source |      SS      df      MS      Number of obs   =    1,500
-----+-----
Model | 676.403429      3    225.46781   F(3, 1496)      =    643.34
Residual | 524.291542  1,496   .350462261   Prob > F        =    0.0000
Total | 1200.69497  1,499   .800997312   R-squared       =    0.5633
-----+-----
Adj R-squared =    0.5625
Root MSE     =    .592

```

```

-----+-----
perform |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-----+-----
support |   .867322   .0443059    19.58   0.000   .7804136   .9542304
1.group2 |   1.198578   .1255278     9.55   0.000   .9523492   1.444808
group2#c.support
1 |   -.071332   .0606025    -1.18   0.239   -.190207   .047543
_cons |   2.71444   .0918427    29.56   0.000   2.534286   2.894594
-----+-----

```

```

. margins i.group2, at(support=(0.4(0.4)3.8))

```

```

Adjusted predictions      Number of obs   =    1,500
Model VCE      : OLS

```

```

Expression      : Linear prediction, predict()

```

```

1._at      : support      =      .4
2._at      : support      =      .8
3._at      : support      =     1.2
4._at      : support      =     1.6
5._at      : support      =      2
6._at      : support      =     2.4
7._at      : support      =     2.8
8._at      : support      =     3.2
9._at      : support      =     3.6

```

		Delta-method					
		Margin	Std. Err.	t	P> t	[95% Conf. Interval]	
._at#group2							
	1 0	3.061369	.0747606	40.95	0.000	2.914722	3.208016
	1 1	4.231414	.0696665	60.74	0.000	4.09476	4.368069
	2 0	3.408298	.0580635	58.70	0.000	3.294403	3.522192
	2 1	4.54981	.0541458	84.03	0.000	4.443601	4.65602
	3 0	3.755226	.042211	88.96	0.000	3.672428	3.838025
	3 1	4.868206	.0394615	123.37	0.000	4.790801	4.945612
	4 0	4.102155	.0286413	143.23	0.000	4.045974	4.158337
	4 1	5.186602	.0270136	192.00	0.000	5.133614	5.239591
	5 0	4.449084	.0220691	201.60	0.000	4.405794	4.492374
	5 1	5.504998	.021198	259.69	0.000	5.463417	5.546579
	6 0	4.796013	.0279631	171.51	0.000	4.741162	4.850864
	6 1	5.823394	.0267593	217.62	0.000	5.770905	5.875884
	7 0	5.142942	.0412915	124.55	0.000	5.061946	5.223937
	7 1	6.14179	.0391133	157.03	0.000	6.065068	6.218513
	8 0	5.48987	.0570632	96.21	0.000	5.377938	5.601803
	8 1	6.460186	.0537656	120.15	0.000	6.354722	6.56565
	9 0	5.836799	.0737265	79.17	0.000	5.692181	5.981417
	9 1	6.778582	.0692727	97.85	0.000	6.6427	6.914464

```

. marginsplot
Variables that uniquely identify margins: support group2

```

```

. /*****
> 2.2 Logistic Regression
> *****/
. logit perform2 c.support##i.group2

```

```

Iteration 0:  log likelihood = -1038.7486
Iteration 1:  log likelihood = -659.85891
Iteration 2:  log likelihood = -652.76574
Iteration 3:  log likelihood = -652.74661
Iteration 4:  log likelihood = -652.74661

```

```

Logistic regression              Number of obs   =    1,500
                                LR chi2(3)       =    772.00
                                Prob > chi2         =    0.0000
Log likelihood = -652.74661      Pseudo R2      =    0.3716

```

		Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
perform2	support	2.763869	.2598518	10.64	0.000	2.254569	3.273169
1.group2		3.774881	.7287192	5.18	0.000	2.346617	5.203144

```

group2#c.support |
1 | -.299802 .3508138 -0.85 0.393 -.9873843 .3877803
_cons | -7.112312 .5925714 -12.00 0.000 -8.273731 -5.950893
-----

```

```

. margins i.group2, at(support=(0.4(0.4)3.8))

```

```

Adjusted predictions          Number of obs   =   1,500
Model VCE      : OIM

```

```

Expression   : Pr(perform2), predict()

```

```

1._at      : support      =      .4
2._at      : support      =      .8
3._at      : support      =     1.2
4._at      : support      =     1.6
5._at      : support      =      2
6._at      : support      =     2.4
7._at      : support      =     2.8
8._at      : support      =     3.2
9._at      : support      =     3.6

```

```

-----
|                Delta-method
|                Margin Std. Err.      z    P>|z|    [95% Conf. Interval]
-----+-----
 _at#group2 |
1 0 | .002456 .0012015   2.04  0.041   .0001011   .0048109
1 1 | .0869224 .0264277   3.29  0.001   .0351252   .1387197
2 0 | .0073826 .0028522   2.59  0.010   .0017924   .0129728
2 1 | .2032381 .0395449   5.14  0.000   .1257315   .2807447
3 0 | .0219742 .0062314   3.53  0.000   .0097608   .0341876
3 1 | .405994 .0390151  10.41  0.000   .3295259   .4824622
4 0 | .0635588 .0116426   5.46  0.000   .0407397   .0863779
4 1 | .6468167 .0233899  27.65  0.000   .6009733   .6926602
5 0 | .1701487 .0167444  10.16  0.000   .1373304   .202967
5 1 | .8307149 .0157661  52.69  0.000   .7998139   .861616
6 0 | .3824822 .0252949  15.12  0.000   .3329051   .4320592
6 1 | .9293226 .0118283  78.57  0.000   .9061395   .9525057
7 0 | .6517003 .0396307  16.44  0.000   .5740255   .729375
7 1 | .9724001 .0071041  136.88  0.000   .9584764   .9863239
8 0 | .8496769 .0340587  24.95  0.000   .7829231   .9164307
8 1 | .9895183 .003674  269.33  0.000   .9823173   .9967192
9 0 | .944675 .0190841  49.50  0.000   .9072708   .9820792
9 1 | .9960623 .0017482  569.76  0.000   .9926359   .9994887
-----

```

```

. marginsplot

```

```

Variables that uniquely identify margins: support group2

```

```

.
. /*****
> 2.3 Multiple group comparison within the SEM framework
> *****/
. sem ( perform <- support), group(group2) ginvariant(none)

```



```

. gsem ( perform <- support), group(group2) ginvariant(none)

Iteration 0:  log likelihood = -1339.6601
Iteration 1:  log likelihood = -1339.6601

Generalized structural equation model          Number of obs   =       1,500
Grouping variable = group2                    Number of groups =         2
Log likelihood   = -1339.6601

Group      : 0                               Number of obs   =       720
Response   : perform
Family     : Gaussian
Link       : identity

-----+-----
|          |          Coef.   Std. Err.      z    P>|z|    [95% Conf. Interval]
-----+-----
perform   |
  support |      .867322    .0449632   19.29  0.000    .7791958    .9554482
  _cons   |      2.71444    .0932051   29.12  0.000    2.531761    2.897119
-----+-----
var(e.perform) |      .3609368    .019023                .3255134    .400215
-----+-----

Group      : 1                               Number of obs   =       780
Response   : perform
Family     : Gaussian
Link       : identity

-----+-----
|          |          Coef.   Std. Err.      z    P>|z|    [95% Conf. Interval]
-----+-----
perform   |
  support |      .79599     .0406659   19.57  0.000    .7162862    .8756937
  _cons   |      3.913018    .0841581   46.50  0.000    3.748071    4.077965
-----+-----
var(e.perform) |      .3389962    .0171657                .3069677    .3743666
-----+-----

. estimates store unconstrained

. gsem ( perform <- support), group(group2) ginvariant(coef)

Iteration 0:  log likelihood = -1351.3797
Iteration 1:  log likelihood = -1340.4364
Iteration 2:  log likelihood = -1340.352
Iteration 3:  log likelihood = -1340.3519

Generalized structural equation model          Number of obs   =       1,500
Grouping variable = group2                    Number of groups =         2
Log likelihood   = -1340.3519

( 1) [perform]0bn.group2#c.support - [perform]1.group2#c.support = 0

Group      : 0                               Number of obs   =       720
Response   : perform
Family     : Gaussian
Link       : identity

-----+-----
|          |          Coef.   Std. Err.      z    P>|z|    [95% Conf. Interval]
-----+-----
perform   |
  support |      .8280806    .0302017   27.42  0.000    .7688864    .8872748
  _cons   |      2.793402    .0647698   43.13  0.000    2.666456    2.920349
-----+-----
var(e.perform) |      .3613185    .0190522                .3258416    .400658
-----+-----

```

```

Group          : 1                      Number of obs   =      780
Response       : perform
Family        : Gaussian
Link          : identity

```

```

-----
|          Coef.   Std. Err.      z    P>|z|      [95% Conf. Interval]
-----+-----
perform
  support |   .8280806   .0302017   27.42   0.000   .7688864   .8872748
    _cons |   3.848677   .0640452   60.09   0.000   3.72315   3.974203
-----+-----
var(e.perform) |   .3392667   .017187                .3071992   .3746817
-----

```

```
. estimates store constrained
```

```
.
```

```
. lrtest unconstrained constrained
```

```

Likelihood-ratio test                    LR chi2(1) =      1.38
(Assumption: constrained nested in unconstrained)  Prob > chi2 =    0.2395

```

```
.
```

```

./*****
> 3, Moderated mediation
> *****/

```

```

./*****
> 3.1 Moderated Mediation within the SEM framework
> *****/

```

```
.
```

```
. sem (perform <- satis support) (satis <- support), group(group2)
```

```
Endogenous variables
```

```
Observed: perform satis
```

```
Exogenous variables
```

```
Observed: support
```

```
Fitting target model:
```

```

Iteration 0: log likelihood = -3288.5208
Iteration 1: log likelihood = -3288.5208

```

```

Structural equation model                    Number of obs   =      1,500
Grouping variable = group2                  Number of groups =         2
Estimation method = ml
Log likelihood = -3288.5208

```

```
Group          : 0                      Number of obs   =      720
```

```

-----
|          Coef.   Std. Err.      z    P>|z|      [95% Conf. Interval]
-----+-----
Structural
perform
  satis |   .559254   .0439823   12.72   0.000   .4730503   .6454576
  support |   .7252061   .0421411   17.21   0.000   .6426112   .8078011
    _cons |   2.072436   .0982008   21.10   0.000   1.879966   2.264906
-----+-----
satis
  support |   .2541169   .0344289    7.38   0.000   .1866375   .3215963
    _cons |   1.147966   .0713684   16.09   0.000   1.008086   1.287845
-----

```

var(e.perform)	.2947484	.0155346		.2658209	.3268238
var(e.satis)	.2116234	.0111535		.1908541	.2346529

Group : 1 Number of obs = 780

	Coef.	OIM Std. Err.	z	P> z	[95% Conf. Interval]	
Structural						
perform						
satis	.5975472	.0350979	17.03	0.000	.5287566	.6663377
support	.6668424	.0355418	18.76	0.000	.5971818	.736503
_cons	2.764583	.0985592	28.05	0.000	2.57141	2.957755
satis						
support	.2161295	.0354231	6.10	0.000	.1467015	.2855576
_cons	1.921917	.0733082	26.22	0.000	1.778235	2.065598
var(e.perform)	.247152	.012515			.2238009	.2729395
var(e.satis)	.2572217	.0130249			.2329192	.2840599

LR test of model vs. saturated: chi2(0) = 0.00, Prob > chi2 = .

. estat teffects

Direct effects

	Coef.	OIM Std. Err.	z	P> z	[95% Conf. Interval]	
Structural						
perform						
satis						
0	.559254	.0439823	12.72	0.000	.4730503	.6454576
1	.5975472	.0350979	17.03	0.000	.5287566	.6663377
support						
0	.7252061	.0421411	17.21	0.000	.6426112	.8078011
1	.6668424	.0355418	18.76	0.000	.5971818	.736503
satis						
support						
0	.2541169	.0344289	7.38	0.000	.1866375	.3215963
1	.2161295	.0354231	6.10	0.000	.1467015	.2855576

Indirect effects

	Coef.	OIM Std. Err.	z	P> z	[95% Conf. Interval]	
Structural						
perform						
satis						
[*]	0	(no path)				
support						
0	.1421159	.0222633	6.38	0.000	.0984807	.1857511
1	.1291476	.0224852	5.74	0.000	.0850774	.1732178
satis						
support						
[*]	0	(no path)				

Note: [*] identifies parameter estimates constrained to be equal across groups.

Total effects

	Coef.	OIM Std. Err.	z	P> z	[95% Conf. Interval]	
Structural						
perform						
satis						
0	.559254	.0439823	12.72	0.000	.4730503	.6454576
1	.5975472	.0350979	17.03	0.000	.5287566	.6663377
support						
0	.867322	.0449632	19.29	0.000	.7791958	.9554482
1	.79599	.0406659	19.57	0.000	.7162862	.8756937
satis						
support						
0	.2541169	.0344289	7.38	0.000	.1866375	.3215963
1	.2161295	.0354231	6.10	0.000	.1467015	.2855576

```
. estat ginvariant
```

Tests for group invariance of parameters

	chi2	Wald Test df	p>chi2	chi2	Score Test df	p>chi2
Structural						
perform						
satis	0.463	1	0.4962	.	.	.
support	1.121	1	0.2897	.	.	.
_cons	24.749	1	0.0000	.	.	.
satis						
support	0.591	1	0.4419	.	.	.
_cons	57.225	1	0.0000	.	.	.
var(e.perform)	5.693	1	0.0170	.	.	.
var(e.satis)	7.071	1	0.0078	.	.	.

```
.
. /*****
> 3.2 Moderated Mediation within the GSEM framework
> *****/
.
. gsem (perform <- satis support) (satis <- support), group(group2) ginvariant(none)
```

```
Iteration 0: log likelihood = -2183.2949
Iteration 1: log likelihood = -2183.2949
```

```
Generalized structural equation model      Number of obs   =    1,500
Grouping variable = group2                Number of groups =         2
Log likelihood      = -2183.2949
```

```
Group      : 0      Number of obs   =    720
```

```
Response   : perform
Family     : Gaussian
Link       : identity
```

```
Response   : satis
Family     : Gaussian
Link       : identity
```

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
perform						
satis	.559254	.0439823	12.72	0.000	.4730503	.6454576

support		.7252061	.0421411	17.21	0.000	.6426112	.8078011
_cons		2.072436	.0982008	21.10	0.000	1.879966	2.264906

satis							
support		.2541169	.0344289	7.38	0.000	.1866375	.3215963
_cons		1.147966	.0713684	16.09	0.000	1.008086	1.287845

var(e.perform)		.2947484	.0155346			.2658209	.3268238
var(e.satis)		.2116234	.0111535			.1908541	.2346529

Group : 1 Number of obs = 780

Response : perform
Family : Gaussian
Link : identity

Response : satis
Family : Gaussian
Link : identity

		Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
perform							
satis		.5975472	.0350979	17.03	0.000	.5287566	.6663377
support		.6668424	.0355418	18.76	0.000	.5971818	.736503
_cons		2.764583	.0985592	28.05	0.000	2.57141	2.957755

satis							
support		.2161295	.0354231	6.10	0.000	.1467015	.2855576
_cons		1.921917	.0733082	26.22	0.000	1.778235	2.065598

var(e.perform)		.247152	.012515			.2238009	.2729395
var(e.satis)		.2572217	.0130249			.2329192	.2840599

. estimates store unconstrained

. gsem (perform <- satis support) (satis <- support), group(group2) ginvariant(coef)

Iteration 0: log likelihood = -2190.1285
Iteration 1: log likelihood = -2184.2616
Iteration 2: log likelihood = -2184.2453
Iteration 3: log likelihood = -2184.2453

Generalized structural equation model Number of obs = 1,500
Grouping variable = group2 Number of groups = 2
Log likelihood = -2184.2453

- (1) [perform]0bn.group2#c.satis - [perform]1.group2#c.satis = 0
- (2) [perform]0bn.group2#c.support - [perform]1.group2#c.support = 0
- (3) [satis]0bn.group2#c.support - [satis]1.group2#c.support = 0

Group : 0 Number of obs = 720

Response : perform
Family : Gaussian
Link : identity

Response : satis
Family : Gaussian
Link : identity

		Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
perform							
satis		.583145	.0274477	21.25	0.000	.5293484	.6369415

support		.6907071	.0271853	25.41	0.000	.6374249	.7439893
_cons		2.102213	.06561	32.04	0.000	1.97362	2.230806

satis							
support		.2356637	.0247035	9.54	0.000	.1872457	.2840817
_cons		1.185098	.0525835	22.54	0.000	1.082036	1.28816

var(e.perform)		.2950696	.0155583			.2660986	.3271947
var(e.satis)		.2117078	.0111603			.1909262	.2347515

Group : 1 Number of obs = 780

Response : perform
Family : Gaussian
Link : identity

Response : satis
Family : Gaussian
Link : identity

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	

perform						
satis		.583145	.0274477	21.25	0.000	.5293484 .6369415
support		.6907071	.0271853	25.41	0.000	.6374249 .7439893
_cons		2.750655	.0762224	36.09	0.000	2.601261 2.900048

satis						
support		.2356637	.0247035	9.54	0.000	.1872457 .2840817
_cons		1.882751	.0527558	35.69	0.000	1.779351 1.98615

var(e.perform)		.2473185	.0125285			.2239427 .2731343
var(e.satis)		.257322	.0130325			.2330057 .284176

. estimates store constrained

.

. lrtest unconstrained constrained

Likelihood-ratio test LR chi2(3) = 1.90
(Assumption: constrained nested in unconstrained) Prob > chi2 = 0.5933

.

```
./*****
> 4, Mediated Moderation within the SEM framework
> *****/
```

.

. sem (perform <- satis support group2 group2_support) (satis <- support group2 group2_support)

Endogenous variables

Observed: perform satis

Exogenous variables

Observed: support group2 group2_support

Fitting target model:

Iteration 0: log likelihood = -4445.257
Iteration 1: log likelihood = -4445.257

Structural equation model Number of obs = 1,500
Estimation method = ml
Log likelihood = -4445.257

	Coef.	OIM Std. Err.	z	P> z	[95% Conf. Interval]	
Structural						
perform						
satis	.5810184	.0276605	21.01	0.000	.5268048	.635232
support	.7196754	.0395247	18.21	0.000	.6422084	.7971424
group2	.7488988	.1122567	6.67	0.000	.5288796	.9689179
group2_support	-.0492607	.0532113	-0.93	0.355	-.1535528	.0550315
_cons	2.047451	.0866531	23.63	0.000	1.877614	2.217288
satis						
support	.2541169	.0363065	7.00	0.000	.1829575	.3252763
group2	.7739508	.1028637	7.52	0.000	.5723416	.97556
group2_support	-.0379874	.0496607	-0.76	0.444	-.1353206	.0593459
_cons	1.147966	.0752605	15.25	0.000	1.000458	1.295474
var(e.perform)	.2700829	.009862			.2514291	.2901206
var(e.satis)	.2353345	.0085932			.2190807	.2527942

LR test of model vs. saturated: chi2(0) = 0.00, Prob > chi2 = .

. estat teffects

Direct effects

	Coef.	OIM Std. Err.	z	P> z	[95% Conf. Interval]	
Structural						
perform						
satis	.5810184	.0276605	21.01	0.000	.5268048	.635232
support	.7196754	.0395247	18.21	0.000	.6422084	.7971424
group2	.7488988	.1122567	6.67	0.000	.5288796	.9689179
group2_support	-.0492607	.0532113	-0.93	0.355	-.1535528	.0550315
satis						
support	.2541169	.0363065	7.00	0.000	.1829575	.3252763
group2	.7739508	.1028637	7.52	0.000	.5723416	.97556
group2_support	-.0379874	.0496607	-0.76	0.444	-.1353206	.0593459

Indirect effects

	Coef.	OIM Std. Err.	z	P> z	[95% Conf. Interval]	
Structural						
perform						
satis	0	(no path)				
support	.1476466	.022235	6.64	0.000	.1040668	.1912264
group2	.4496796	.0634841	7.08	0.000	.325253	.5741063
group2_support	-.0220714	.0288729	-0.76	0.445	-.0786612	.0345185
satis						
support	0	(no path)				
group2	0	(no path)				
group2_support	0	(no path)				

Total effects

	Coef.	OIM Std. Err.	z	P> z	[95% Conf. Interval]	
Structural						

perform							
satis		.5810184	.0276605	21.01	0.000	.5268048	.635232
support		.867322	.0442468	19.60	0.000	.7805998	.9540442
group2		1.198578	.1253603	9.56	0.000	.9528766	1.44428
group2_support		-.071332	.0605217	-1.18	0.239	-.1899524	.0472883

satis							
support		.2541169	.0363065	7.00	0.000	.1829575	.3252763
group2		.7739508	.1028637	7.52	0.000	.5723416	.97556
group2_support		-.0379874	.0496607	-0.76	0.444	-.1353206	.0593459
