

*The FACTOR Procedure*

## Analysis for Project

## Principal Component Analysis Using R

### PROJ

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```
aclean <- read.csv("C:/Users/Eugenia/Dropbox/Multidimensional/proj/ACLEAN.csv", header=T)
head(aclean)
```

```
##   Ã~..K6A K6B K6C K6D K6E K6F
## 1      2  2  2  2  2  2
## 2      4  2  2  4  4  4
## 3      4  4  4  2  2  4
## 4      4  4  1  4  4  4
## 5      2  2  1  1  4  4
## 6      3  2  3  3  3  3
```

```
summary(aclean)
```

```
##   Ã~..K6A      K6B      K6C      K6D
## Min.   :1.000 Min.   :1.000 Min.   :1.000 Min.   :1.000
## 1st Qu.:1.000 1st Qu.:1.000 1st Qu.:1.000 1st Qu.:1.000
## Median :3.000 Median :3.000 Median :2.000 Median :2.000
## Mean   :2.612 Mean   :2.574 Mean   :2.271 Mean   :2.459
## 3rd Qu.:4.000 3rd Qu.:4.000 3rd Qu.:4.000 3rd Qu.:4.000
## Max.   :4.000 Max.   :4.000 Max.   :4.000 Max.   :4.000
##      K6E      K6F
## Min.   :1.000 Min.   :1.000
## 1st Qu.:2.000 1st Qu.:1.000
## Median :3.000 Median :3.000
## Mean   :2.802 Mean   :2.664
## 3rd Qu.:4.000 3rd Qu.:4.000
## Max.   :4.000 Max.   :4.000
```

```
pcadat2=prcomp(aclean,scale =T)
pcadat2
```

```
## Standard deviations (1, .., p=6):
## [1] 1.9090957 0.8453607 0.7249559 0.6649334 0.6158595 0.5419763
##
## Rotation (n x k) = (6 x 6):
##           PC1      PC2      PC3      PC4      PC5
```

*The FACTOR Procedure*

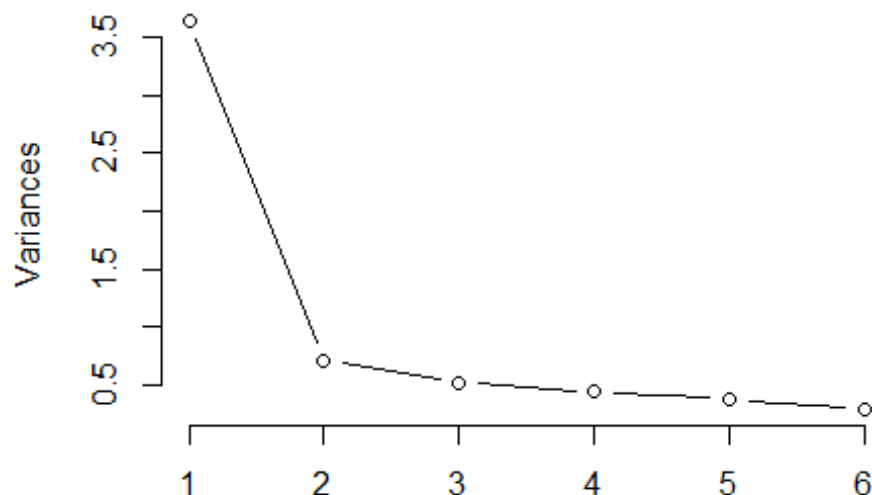
```
##  Ãˆˆ.K6A  0.3291981  0.85069768 -0.4051958  0.05038083 -0.03131571
##  K6B      0.4351230  0.05953043  0.4616117 -0.20441500 -0.41505658
##  K6C      0.4374420  0.06925502  0.5084110 -0.14296979  0.02922253
##  K6D      0.4251334 -0.12451436  0.1150699  0.66091758  0.55348949
##  K6E      0.4031235 -0.41493692 -0.4552240  0.29103298 -0.57855358
##  K6F      0.4095047 -0.28336698 -0.3791825 -0.64321355  0.42990528
##
##              PC6
##  Ãˆˆ.K6A  0.01547654
##  K6B     -0.61642625
##  K6C      0.72392834
##  K6D     -0.21760977
##  K6E      0.19663536
##  K6F     -0.09842475
```

```
summary(pcadat2)
```

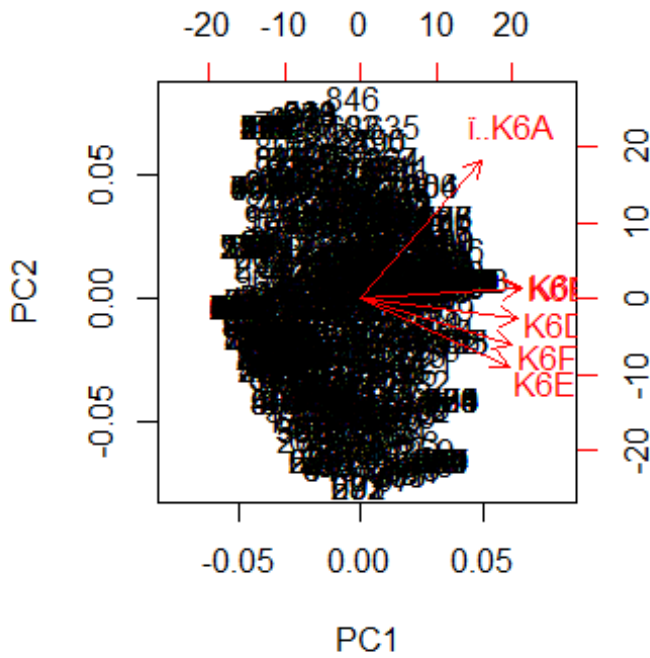
```
## Importance of components:
```

```
##              PC1    PC2    PC3    PC4    PC5    PC6
## Standard deviation  1.9091 0.8454 0.72496 0.66493 0.61586 0.54198
## Proportion of Variance 0.6074 0.1191 0.08759 0.07369 0.06321 0.04896
## Cumulative Proportion 0.6074 0.7266 0.81414 0.88783 0.95104 1.00000
```

```
screepLOT(pcadat2,type="line")
```

**pcadat2**

```
biplot(pcadat2,scale = 1)
```

*The FACTOR Procedure***Principal Axis Method**

<b>Input Data Type</b>	Raw Data
<b>Number of Records Read</b>	1005
<b>Number of Records Used</b>	1005
<b>N for Significance Tests</b>	1005

*The FACTOR Procedure*

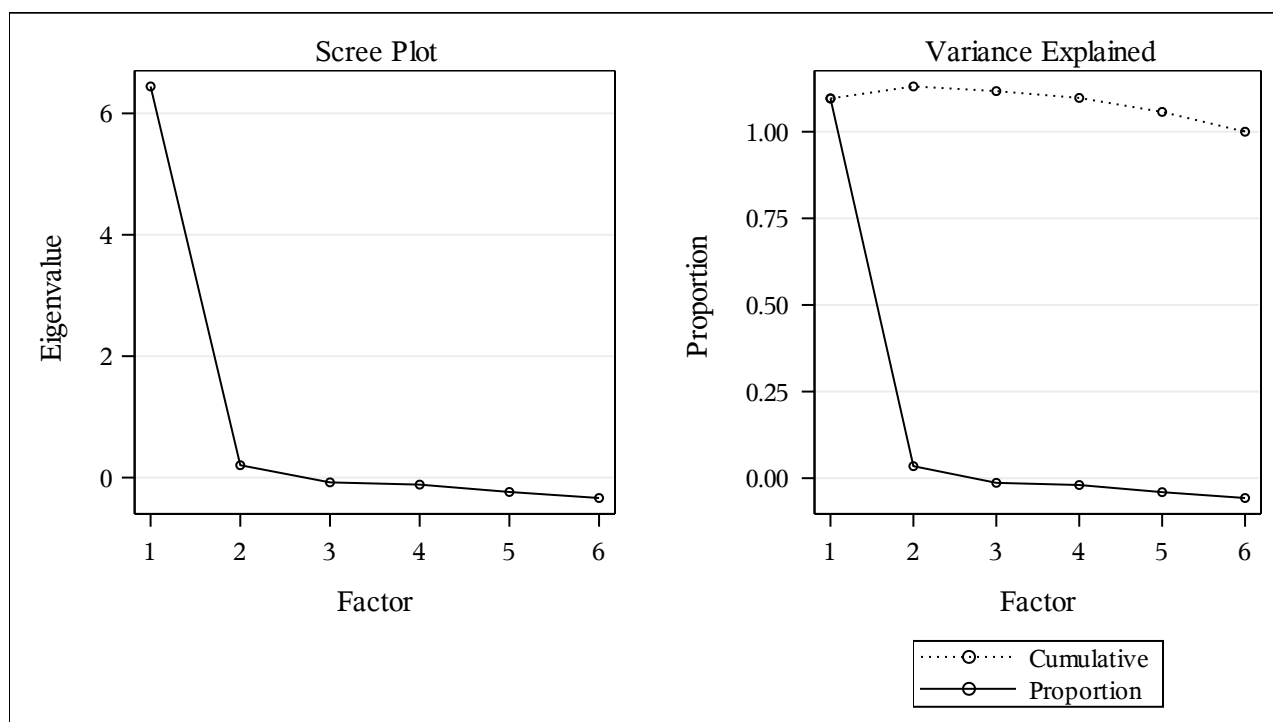
Means and Standard Deviations from 1005 Observations		
Variable	Mean	Std Dev
K6A	2.611940 3	1.311402 9
K6B	2.574129 4	1.276405 3
K6C	2.270646 8	1.263329 0
K6D	2.458706 5	1.258254 1
K6E	2.801990 0	1.203247 6
K6F	2.663681 6	1.315069 1

***The FACTOR Procedure******Initial Factor Method: Maximum Likelihood***

Prior Communalities Estimates: SMC					
K6A	K6B	K6C	K6D	K6E	K6F
0.2668296	0.5660980	0.5804778	0.5129929	0.4696462	0.4703239
5	2	3	0	3	1

Preliminary Eigenvalues: Total = 5.8791101 Average = 0.97985168				
	Eigenvalue	Difference	Proportion	Cumulative
1	6.44387474	6.24002882	1.0961	1.0961
2	0.20384593	0.28290471	0.0347	1.1307
3	-.07905878	0.03685714	-0.0134	1.1173
4	-.11591592	0.12118004	-0.0197	1.0976
5	-.23709596	0.09944395	-0.0403	1.0572
6	-.33653991		-0.0572	1.0000

***2 factors will be retained by the MINEIGEN criterion.***

**The FACTOR Procedure****Initial Factor Method: Maximum Likelihood**

Iteration	Criterion	Ridge	Change	Communalities					
<b>1</b>	0.005697	0.000	0.2498	0.2916	0.6712	0.7212	0.5740	0.7194	0.5171
	2	0		0	1	1	7	2	1
<b>2</b>	0.003956	0.000	0.0639	0.3046	0.6640	0.7319	0.5706	0.7833	0.5235
	1	0		5	0	1	5	4	3
<b>3</b>	0.003918	0.000	0.0201	0.3049	0.6644	0.7303	0.5704	0.8034	0.5217
	1	0		8	2	4	4	0	8
<b>4</b>	0.003917	0.000	0.0023	0.3053	0.6641	0.7304	0.5703	0.8057	0.5215
	2	0		1	2	8	3	3	5
<b>5</b>	0.003917	0.000	0.0004	0.3053	0.6641	0.7304	0.5703	0.8061	0.5214
	2	0		3	2	4	2	4	9

Convergence criterion  
satisfied.

**The FACTOR Procedure****Initial Factor Method: Maximum Likelihood**

Significance Tests Based on 1005 Observations			
Test	DF	Chi-Square	Pr > ChiSq
<b>H0: No common factors</b>	15	2699.8350	<.0001
<b>HA: At least one common factor</b>			
<b>H0: 2 Factors are sufficient</b>	4	3.9166	0.4174
<b>HA: More factors are needed</b>			

<b>Chi-Square without Bartlett's Correction</b>	3.932895
<b>Akaike's Information Criterion</b>	-4.067105
<b>Schwarz's Bayesian Criterion</b>	- 23.718077
<b>Tucker and Lewis's Reliability Coefficient</b>	1.000117

Squared Canonical Correlations	
Factor1	Factor2
0.9116278 8	0.5809303 3

Eigenvalues of the Weighted Reduced Correlation Matrix: Total = 11.7020235 Average = 1.95033725				
	Eigenvalue	Difference	Proportion	Cumulative
<b>1</b>	10.3157856	8.9295476	0.8815	0.8815
<b>2</b>	1.3862381	1.3375174	0.1185	1.0000
<b>3</b>	0.0487206	0.0212748	0.0042	1.0042
<b>4</b>	0.0274458	0.0365273	0.0023	1.0065
<b>5</b>	-0.0090815	0.0580037	-0.0008	1.0057
<b>6</b>	-0.0670852		-0.0057	1.0000

***The FACTOR Procedure******Initial Factor Method: Maximum Likelihood***

Factor Pattern				
	Factor1		Factor2	
K6A	52 *		-18	
K6B	78 *		-23	
K6C	80 *		-31	
K6D	75 *		-6	
K6E	81 *		40	
K6F	72 *		3	
Printed values are multiplied by 100 and rounded to the nearest integer. Values greater than 0.5 are flagged by an '*'.				

Variance Explained by Each Factor		
Factor	Weighted	Unweighted
Factor1	10.3157856	3.25244748
Factor2	1.3862381	0.34538969

Final Communality Estimates and Variable Weights		
Total Communality: Weighted = 11.702024 Unweighted = 3.597837		
Variable	Communality	Weight
K6A	0.30533448	1.43953016
K6B	0.66411748	2.97725293
K6C	0.73044441	3.70980729
K6D	0.57031713	2.32729942



***The FACTOR Procedure******Initial Factor Method: Maximum Likelihood***

Final Communality Estimates and Variable Weights		
Total Communality: Weighted = 11.702024 Unweighted = 3.597837		
Variable	Communality	Weight
K6E	0.80613912	5.15833387
K6F	0.52148454	2.08979980

***The FACTOR Procedure***  
***Rotation Method: Varimax***

Orthogonal Transformation Matrix		
	1	2
1	0.72908	0.68443
2	-0.68443	0.72908

Rotated Factor Pattern				
	Factor1		Factor2	
K6A	51 *		22	
K6B	73 *		37	
K6C	79 *		32	
K6D	59 *		48	
K6E	32		84 *	
K6F	50 *		52 *	
Printed values are multiplied by 100 and rounded to the nearest integer. Values greater than 0.5 are flagged by an '*'.				

Variance Explained by Each Factor		
Factor	Weighted	Unweighted
Factor1	6.13276867	2.11451866
Factor2	5.56925501	1.48331850

***The FACTOR Procedure***  
***Rotation Method: Varimax***

Final Communality Estimates and Variable Weights		
Total Communality: Weighted = 11.702024 Unweighted = 3.597837		
Variable	Communality	Weight
K6A	0.30533448	1.43953016
K6B	0.66411748	2.97725293
K6C	0.73044441	3.70980729
K6D	0.57031713	2.32729942
K6E	0.80613912	5.15833387
K6F	0.52148454	2.08979980

***The FACTOR Procedure***  
***Rotation Method: Varimax***

***Scoring Coefficients Estimated by Regression***

Squared Multiple Correlations of the Variables with Each Factor	
Factor1	Factor2
0.7567137 1	0.7358445 0

Standardized Scoring Coefficients		
	Factor1	Factor2
<b>K6A</b>	0.12431	- 0.03557
<b>K6B</b>	0.34748	- 0.06977
<b>K6C</b>	0.52202	- 0.17491
<b>K6D</b>	0.14983	0.06671
<b>K6E</b>	- 0.31774	0.87523
<b>K6F</b>	0.07788	0.11170

*The CALIS Procedure*  
*Covariance Structure Analysis: Model and Initial Values*

Modeling Information	
Maximum Likelihood Estimation	
Data Set	WORK.DAT
N Records Read	1005
N Records Used	1005
N Obs	1005
Model Type	LINEQS
Analysis	Covariances

Variables in the Model		
Endogenous	Manifest	K6A K6B K6C K6D K6E K6F
	Latent	
Exogenous	Manifest	
	Latent	F1 F2
	Error	E1 E2 E3 E4 E5 E6
Number of Endogenous Variables = 6 Number of Exogenous Variables = 8		

Initial Estimates for Linear Equations			
K6A	=	LV1F (. F + 1 E	
		1 ) 1	1
K6B	=	LV2F (. F + 1 E	
		1 ) 1	2
K6C	=	LV3F (. F + 1 E	
		1 ) 1	3
K6D	=	LV4F (. F + LV4F (. F + 1 E	
		1 ) 1 2 ) 2	4
K6E	=	LV5F (. F + 1 E	
		2 ) 2	5
K6F	=	LV6F (. F + 1 E	
		2 ) 2	6

***The CALIS Procedure***  
***Covariance Structure Analysis: Model and Initial Values***

Initial Estimates for Variances of Exogenous Variables			
Variable Type	Variable	Parameter	Estimate
Latent	F1		1.00000
	F2		1.00000
Error	E1	VARE1	.
	E2	VARE2	.
	E3	VARE3	.
	E4	VARE4	.
	E5	VARE5	.
	E6	VARE6	.

Initial Estimates for Covariances Among Exogenous Variables			
Var1	Var2	Parameter	Estimate
F2	F1	_Add1	.
NOTE: Parameters with prefix '_Add' are added by PROC CALIS.			

*The CALIS Procedure**Covariance Structure Analysis: Descriptive Statistics*

Simple Statistics		
Variable	Mean	Std Dev
<b>K6A</b>	2.6119 4	1.31140
<b>K6B</b>	2.5741 3	1.27641
<b>K6C</b>	2.2706 5	1.26333
<b>K6D</b>	2.4587 1	1.25825
<b>K6E</b>	2.8019 9	1.20325
<b>K6F</b>	2.6636 8	1.31507

*The CALIS Procedure*  
*Covariance Structure Analysis: Optimization*

Initial Estimation Methods	
1	Instrumental Variables Method
2	McDonald Method

Optimization Start Parameter Estimates			
N	Parameter	Estimate	Gradient
1	LV1F1	0.73165	0.00893
2	LV2F1	1.04072	-0.01341
3	LV3F1	1.05590	0.00141
4	LV4F1	0.73515	-0.00274
5	LV4F2	0.23503	-0.06678
6	LV5F2	0.93812	0.01847
7	LV6F2	1.02439	- 0.0002593
8	VARE1	1.18446	-0.00536
9	VARE2	0.54612	0.02700
10	VARE3	0.48108	-0.00117
11	VARE4	0.69195	0.02538
12	VARE5	0.56773	-0.03284
13	VARE6	0.68003	-0.00154
14	_Add1	0.85533	0.02677
Value of Objective Function = 0.0285622712			



*The CALIS Procedure*  
*Covariance Structure Analysis: Optimization*

*Levenberg-Marquardt Optimization*

*Scaling Update of More (1978)*

<b>Parameter Estimates</b>	1 4
<b>Functions (Observations)</b>	2 1

Optimization Start			
<b>Active Constraints</b>	0	<b>Objective Function</b>	0.028562271 2
<b>Max Abs Gradient Element</b>	0.066779813 3	<b>Radius</b>	1

<b>Iteration</b>	<b>Restarts</b>	<b>Function Calls</b>	<b>Active Constraints</b>	<b>Objective Function</b>	<b>Objective Function Change</b>	<b>Max Abs Gradient Element</b>	<b>Lambda</b>	<b>Ratio Between Actual and Predicted Change</b>
1	0	4	0	0.01830	0.0103	0.0347	0	0.925
2	0	6	0	0.01767	0.000636	0.00357	0	1.028
3	0	8	0	0.01766	4.05E-6	0.000198	0	1.064
4	0	10	0	0.01766	7.03E-8	0.000072	0	1.075
5	0	12	0	0.01766	1.403E-9	4.413E-6	0	1.071

Optimization Results			
<b>Iterations</b>	5	<b>Function Calls</b>	15
<b>Jacobian Calls</b>	7	<b>Active Constraints</b>	0
<b>Objective Function</b>	0.017661591 7	<b>Max Abs Gradient Element</b>	4.4133808E- 6

*The CALIS Procedure*  
*Covariance Structure Analysis: Optimization*

Optimization Results			
<b>Lambda</b>	0	<b>Actual Over Pred Change</b>	1.071256540
			2
<b>Radius</b>	0.000229499		
	1		

Convergence criterion (ABSGCONV=0.00001)  
satisfied.

*The CALIS Procedure**Covariance Structure Analysis: Maximum Likelihood Estimation*

Fit Summary		
Modeling Info	Number of Observations	1005
	Number of Variables	6
	Number of Moments	21
	Number of Parameters	14
	Number of Active Constraints	0
	Baseline Model Function Value	2.6967
	Baseline Model Chi-Square	2707.4756
	Baseline Model Chi-Square DF	15
	Pr > Baseline Model Chi-Square	<.0001
Absolute Index	Fit Function	0.0177
	Chi-Square	17.7322
	Chi-Square DF	7
	Pr > Chi-Square	0.0132
	Z-Test of Wilson & Hilferty	2.2166
	Hoelter Critical N	797
	Root Mean Square Residual (RMR)	0.0198
	Standardized RMR (SRMR)	0.0124
	Goodness of Fit Index (GFI)	0.9944
Parsimony Index	Adjusted GFI (AGFI)	0.9831
	Parsimonious GFI	0.4640
	RMSEA Estimate	0.0391
	RMSEA Lower 90% Confidence Limit	0.0167
	RMSEA Upper 90% Confidence Limit	0.0622
	Probability of Close Fit	0.7583
	ECVI Estimate	0.0457
	ECVI Lower 90% Confidence Limit	0.0370
	ECVI Upper 90% Confidence Limit	0.0622
	Akaike Information Criterion	45.7322
	Bozdogan CAIC	128.5106
	Schwarz Bayesian Criterion	114.5106
	McDonald Centrality	0.9947

*The CALIS Procedure**Covariance Structure Analysis: Maximum Likelihood Estimation*

Fit Summary		
<b>Incremental Index</b>	<b>Bentler Comparative Fit Index</b>	0.9960
	<b>Bentler-Bonett NFI</b>	0.9935
	<b>Bentler-Bonett Non-normed Index</b>	0.9915
	<b>Bollen Normed Index Rho1</b>	0.9860
	<b>Bollen Non-normed Index Delta2</b>	0.9960
	<b>James et al. Parsimonious NFI</b>	0.4636

*The CALIS Procedure**Covariance Structure Analysis: Maximum Likelihood Estimation*

Linear Equations					
K6A	=	0.725 (** F + 1.000 E			
		6 ) 1 0 1			
K6B	=	1.056 (** F + 1.000 E			
		1 ) 1 0 2			
K6C	=	1.061 (** F + 1.000 E			
		5 ) 1 0 3			
K6D	=	0.478 (** F + 0.518 (** F + 1.000 E			
		3 ) 1 3 ) 2 0 4			
K6E	=	0.925 (** F + 1.000 E			
		1 ) 2 0 5			
K6F	=	1.015 (** F + 1.000 E			
		3 ) 2 0 6			

Effects in Linear Equations						
Variable	Predictor	Parameter	Estimate	Standard Error	t Value	Pr >  t
K6A	F1	LV1F1	0.72558	0.04056	17.8900	<.0001
K6B	F1	LV2F1	1.05610	0.03496	30.2117	<.0001
K6C	F1	LV3F1	1.06151	0.03439	30.8662	<.0001
K6D	F1	LV4F1	0.47831	0.08906	5.3709	<.0001
K6D	F2	LV4F2	0.51825	0.09084	5.7053	<.0001
K6E	F2	LV5F2	0.92514	0.03537	26.1545	<.0001
K6F	F2	LV6F2	1.01532	0.03863	26.2801	<.0001

*The CALIS Procedure**Covariance Structure Analysis: Maximum Likelihood Estimation*

Estimates for Variances of Exogenous Variables						
Variable Type	Variable	Parameter	Estimate	Standard Error	t Value	Pr >  t
Latent	F1		1.00000			
	F2		1.00000			
Error	E1	VARE1	1.19332	0.05697	20.9464	<.0001
	E2	VARE2	0.51387	0.03487	14.7351	<.0001
	E3	VARE3	0.46919	0.03367	13.9348	<.0001
	E4	VARE4	0.66656	0.03617	18.4286	<.0001
	E5	VARE5	0.59192	0.03878	15.2641	<.0001
	E6	VARE6	0.69853	0.04627	15.0963	<.0001

Covariances Among Exogenous Variables						
Var1	Var2	Parameter	Estimate	Standard Error	t Value	Pr >  t
F2	F1	_Add1	0.84570	0.02029	41.6895	<.0001

Squared Multiple Correlations			
Variable	Error Variance	Total Variance	R-Square
K6A	1.19332	1.71978	0.3061
K6B	0.51387	1.62921	0.6846
K6C	0.46919	1.59600	0.7060
K6D	0.66656	1.58320	0.5790
K6E	0.59192	1.44780	0.5912
K6F	0.69853	1.72941	0.5961

*The CALIS Procedure**Covariance Structure Analysis: Maximum Likelihood Estimation***Standardized Results for Linear Equations**

K6 = 0.553 (\*\* F + 1.000 E  
 A 3 ) 1 0 1  
 K6 = 0.827 (\*\* F + 1.000 E  
 B 4 ) 1 0 2  
 K6 = 0.840 (\*\* F + 1.000 E  
 C 2 ) 1 0 3  
 K6 = 0.380 (\*\* F + 0.411 (\*\* F + 1.000 E  
 D 1 ) 1 9 ) 2 0 4  
 K6 = 0.768 (\*\* F + 1.000 E  
 E 9 ) 2 0 5  
 K6F = 0.772 (\*\* F + 1.000 E  
 1 ) 2 0 6

**Standardized Effects in Linear Equations**

Variable	Predictor	Parameter	Estimate	Standard Error	t Value	Pr >  t
K6A	F1	LV1F1	0.55328	0.02434	22.7309	<.0001
K6B	F1	LV2F1	0.82740	0.01393	59.3981	<.0001
K6C	F1	LV3F1	0.84025	0.01352	62.1604	<.0001
K6D	F1	LV4F1	0.38014	0.06988	5.4395	<.0001
K6D	F2	LV4F2	0.41188	0.07116	5.7885	<.0001
K6E	F2	LV5F2	0.76887	0.01814	42.3851	<.0001
K6F	F2	LV6F2	0.77207	0.01807	42.7330	<.0001

*The CALIS Procedure**Covariance Structure Analysis: Maximum Likelihood Estimation*

Standardized Results for Variances of Exogenous Variables						
Variable Type	Variable	Parameter	Estimate	Standard Error	t Value	Pr >  t
Latent	F1		1.00000			
	F2		1.00000			
Error	E1	VARE1	0.69388	0.02693	25.7618	<.0001
	E2	VARE2	0.31541	0.02305	13.6831	<.0001
	E3	VARE3	0.29398	0.02272	12.9416	<.0001
	E4	VARE4	0.42102	0.02404	17.5164	<.0001
	E5	VARE5	0.40884	0.02789	14.6566	<.0001
	E6	VARE6	0.40391	0.02790	14.4779	<.0001

Standardized Results for Covariances Among Exogenous Variables						
Var1	Var2	Parameter	Estimate	Standard Error	t Value	Pr >  t
F2	F1	_Add1	0.84570	0.02029	41.6895	<.0001



***The CALIS Procedure***

***Covariance Structure Analysis: Maximum Likelihood Estimation***

**Note** All parameters in the model are significant. No parameter can be dropped in the  
: Wald tests.

*The CALIS Procedure**Covariance Structure Analysis: Maximum Likelihood Estimation*

Rank Order of the 10 Largest LM Stat for Paths from Endogenous Variables				
To	From	LM Stat	Pr > ChiSq	Parm Change
K6E	K6C	10.68400	0.0011	- 0.15622
K6E	K6D	10.26112	0.0014	0.18872
K6F	K6D	10.26068	0.0014	- 0.20711
K6D	K6E	10.26045	0.0014	0.18589
K6D	K6F	10.25970	0.0014	- 0.17287
K6C	K6E	7.19041	0.0073	- 0.09994
K6D	K6B	4.18429	0.0408	- 0.12013
K6B	K6D	3.98775	0.0458	- 0.09503
K6F	K6C	3.83920	0.0501	0.10238
K6D	K6C	2.18495	0.1394	0.09506

Rank Order of the 5 Largest LM Stat for Paths from Exogenous Variables				
To	From	LM Stat	Pr > ChiSq	Parm Change
K6E	F1	10.25640	0.0014	- 0.63037
K6F	F1	10.25612	0.0014	0.69182
K6C	F2	1.20562	0.2722	- 0.14953

***The CALIS Procedure******Covariance Structure Analysis: Maximum Likelihood Estimation***

Rank Order of the 5 Largest LM Stat for Paths from Exogenous Variables				
To	From	LM Stat	Pr > ChiSq	Parm Change
K6B	F2	0.70151	0.4023	0.11301
K6A	F2	0.10034	0.7514	0.03636

Rank Order of the 10 Largest LM Stat for Paths with New Endogenous Variables				
To	From	LM Stat	Pr > ChiSq	Parm Change
F2	K6E	10.25868	0.0014	0.35866
F1	K6E	10.25808	0.0014	- 0.30331
F2	K6F	10.25800	0.0014	- 0.33354
F1	K6F	10.25741	0.0014	0.28207
F1	K6C	1.20569	0.2722	0.10732
F2	K6C	1.20569	0.2722	- 0.09076
F1	K6B	0.70154	0.4023	- 0.07406
F2	K6B	0.70152	0.4023	0.06263
F1	K6A	0.10035	0.7514	- 0.01026
F2	K6A	0.10034	0.7514	0.00868

**Note** No LM statistic in the default test set for the covariances of exogenous variables is nonsingular. Ranking is not displayed.

*The CALIS Procedure**Covariance Structure Analysis: Maximum Likelihood Estimation*

Rank Order of the 10 Largest LM Stat for Error Variances and Covariances				
Var1	Var2	LM Stat	Pr > ChiSq	Parm Change
E5	E4	10.26028	0.0014	0.11003
E6	E4	10.25987	0.0014	- 0.12076
E5	E3	7.77372	0.0053	- 0.07135
E4	E2	4.18433	0.0408	- 0.06173
E4	E3	2.18493	0.1394	0.04460
E6	E3	1.68007	0.1949	0.03622
E5	E1	1.09609	0.2951	- 0.03332
E5	E2	0.86205	0.3532	0.02409
E6	E1	0.79779	0.3718	0.03099
E4	E1	0.77518	0.3786	0.02872

*The FACTOR Procedure*

Obs	rmsea_null	rmsea_alternate	alpha	df	n	power
1	0.05	0.08	0.05	7	1005	0.77423

## Maximum Likelihood Method Output

Input Data Type	Raw Data
Number of Records Read	1005
Number of Records Used	1005
N for Significance Tests	1005

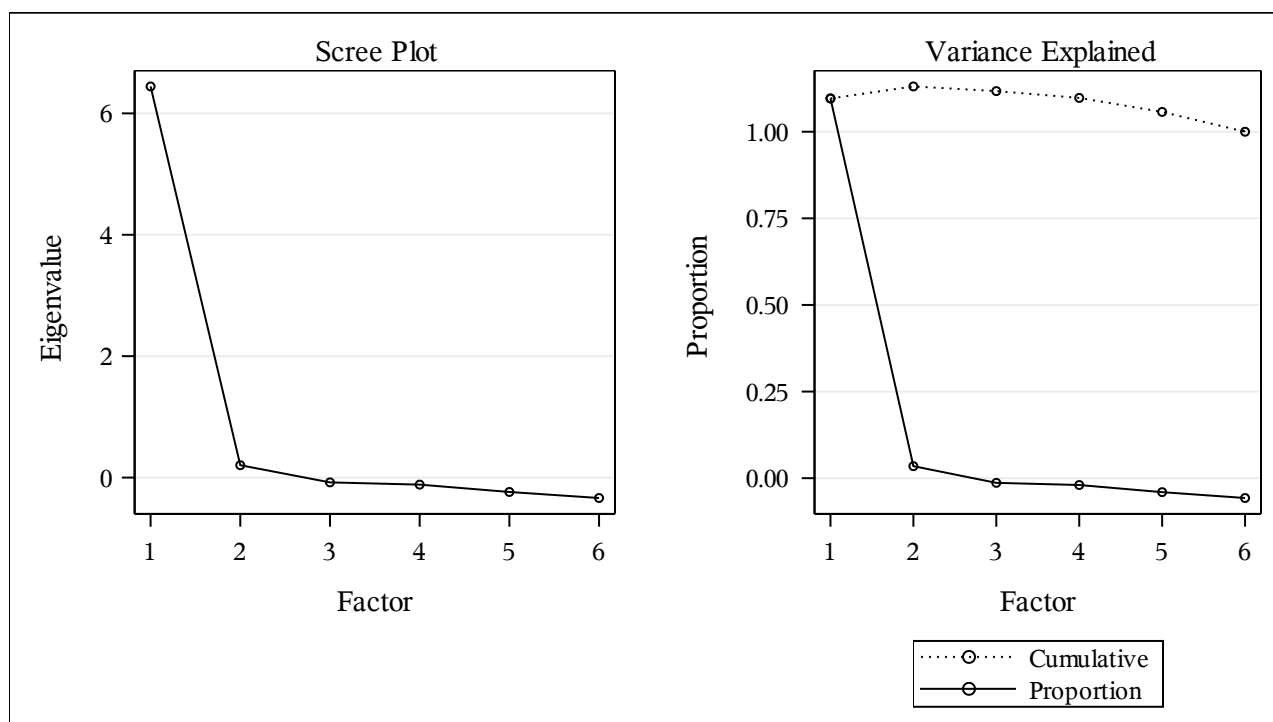
Means and Standard Deviations from 1005 Observations		
Variable	Mean	Std Dev
K6A	2.6119403	1.3114029
K6B	2.5741294	1.2764053
K6C	2.2706468	1.2633290
K6D	2.4587065	1.2582541
K6E	2.8019900	1.2032476
K6F	2.6636816	1.3150691

***The FACTOR Procedure******Initial Factor Method: Maximum Likelihood***

Prior Communality Estimates: SMC					
K6A	K6B	K6C	K6D	K6E	K6F
0.2668296	0.5660980	0.5804778	0.5129929	0.4696462	0.4703239
5	2	3	0	3	1

Preliminary Eigenvalues: Total = 5.8791101 Average = 0.97985168				
	Eigenvalue	Difference	Proportion	Cumulative
1	6.44387474	6.24002882	1.0961	1.0961
2	0.20384593	0.28290471	0.0347	1.1307
3	-.07905878	0.03685714	-0.0134	1.1173
4	-.11591592	0.12118004	-0.0197	1.0976
5	-.23709596	0.09944395	-0.0403	1.0572
6	-.33653991		-0.0572	1.0000

***2 factors will be retained by the NFACTOR criterion.***

**The FACTOR Procedure****Initial Factor Method: Maximum Likelihood**

Iteration	Criterion	Ridge	Change	Communalities					
1	0.005697	0.000	0.2498	0.2916	0.6712	0.7212	0.5740	0.7194	0.5171
	2	0		0	1	1	7	2	1
2	0.003956	0.000	0.0639	0.3046	0.6640	0.7319	0.5706	0.7833	0.5235
	1	0		5	0	1	5	4	3
3	0.003918	0.000	0.0201	0.3049	0.6644	0.7303	0.5704	0.8034	0.5217
	1	0		8	2	4	4	0	8
4	0.003917	0.000	0.0023	0.3053	0.6641	0.7304	0.5703	0.8057	0.5215
	2	0		1	2	8	3	3	5
5	0.003917	0.000	0.0004	0.3053	0.6641	0.7304	0.5703	0.8061	0.5214
	2	0		3	2	4	2	4	9

Convergence criterion  
satisfied.

*The FACTOR Procedure**Initial Factor Method: Maximum Likelihood*

Significance Tests Based on 1005 Observations			
Test	DF	Chi-Square	Pr > ChiSq
H0: No common factors	15	2699.8350	<.0001
HA: At least one common factor			
H0: 2 Factors are sufficient	4	3.9166	0.4174
HA: More factors are needed			

Chi-Square without Bartlett's Correction	3.932895
Akaike's Information Criterion	-4.067105
Schwarz's Bayesian Criterion	- 23.718077
Tucker and Lewis's Reliability Coefficient	1.000117

Squared Canonical Correlations	
Factor1	Factor2
0.9116278 8	0.5809303 3

Eigenvalues of the Weighted Reduced Correlation Matrix: Total = 11.7020235 Average = 1.95033725				
	Eigenvalue	Difference	Proportion	Cumulative
1	10.3157856	8.9295476	0.8815	0.8815
2	1.3862381	1.3375174	0.1185	1.0000
3	0.0487206	0.0212748	0.0042	1.0042
4	0.0274458	0.0365273	0.0023	1.0065
5	-0.0090815	0.0580037	-0.0008	1.0057
6	-0.0670852		-0.0057	1.0000



*The FACTOR Procedure**Initial Factor Method: Maximum Likelihood*

Factor Pattern				
	Factor1		Factor2	
K6A	52 *		-18	
K6B	78 *		-23	
K6C	80 *		-31	
K6D	75 *		-6	
K6E	81 *		40	
K6F	72 *		3	
Printed values are multiplied by 100 and rounded to the nearest integer. Values greater than 0.45 are flagged by an '*'.				

Variance Explained by Each Factor		
Factor	Weighted	Unweighted
Factor1	10.3157856	3.25244748
Factor2	1.3862381	0.34538969

Final Communality Estimates and Variable Weights		
Total Communality: Weighted = 11.702024 Unweighted = 3.597837		
Variable	Communality	Weight
K6A	0.30533448	1.43953016
K6B	0.66411748	2.97725293
K6C	0.73044441	3.70980729
K6D	0.57031713	2.32729942

***The FACTOR Procedure******Initial Factor Method: Maximum Likelihood***

Final Communality Estimates and Variable Weights		
Total Communality: Weighted = 11.702024 Unweighted = 3.597837		
Variable	Communality	Weight
K6E	0.80613912	5.15833387
K6F	0.52148454	2.08979980

***The FACTOR Procedure***  
***Rotation Method: Varimax***

Orthogonal Transformation Matrix		
	1	2
1	0.72908	0.68443
2	-0.68443	0.72908

Rotated Factor Pattern				
	Factor1		Factor2	
K6A	51 *		22	
K6B	73 *		37	
K6C	79 *		32	
K6D	59 *		48 *	
K6E	32		84 *	
K6F	50 *		52 *	
Printed values are multiplied by 100 and rounded to the nearest integer. Values greater than 0.45 are flagged by an '*'.				

Variance Explained by Each Factor		
Factor	Weighted	Unweighted
Factor1	6.13276867	2.11451866
Factor2	5.56925501	1.48331850

***The FACTOR Procedure***  
***Rotation Method: Varimax***

<b>Final Communality Estimates and Variable Weights</b>		
<b>Total Communality: Weighted = 11.702024 Unweighted = 3.597837</b>		
<b>Variable</b>	<b>Communality</b>	<b>Weight</b>
<b>K6A</b>	0.30533448	1.43953016
<b>K6B</b>	0.66411748	2.97725293
<b>K6C</b>	0.73044441	3.70980729
<b>K6D</b>	0.57031713	2.32729942
<b>K6E</b>	0.80613912	5.15833387
<b>K6F</b>	0.52148454	2.08979980

***The FACTOR Procedure***  
***Rotation Method: Varimax***

***Scoring Coefficients Estimated by Regression***

Squared Multiple Correlations of the Variables with Each Factor	
Factor1	Factor2
0.7567137 1	0.7358445 0

Standardized Scoring Coefficients		
	Factor1	Factor2
<b>K6A</b>	0.12431	- 0.03557
<b>K6B</b>	0.34748	- 0.06977
<b>K6C</b>	0.52202	- 0.17491
<b>K6D</b>	0.14983	0.06671
<b>K6E</b>	- 0.31774	0.87523
<b>K6F</b>	0.07788	0.11170

*The CALIS Procedure**Covariance Structure Analysis: Model and Initial Values*

Modeling Information	
Maximum Likelihood Estimation	
Data Set	WORK.DAT
N Records Read	1005
N Records Used	1005
N Obs	1005
Model Type	LINEQS
Analysis	Covariances

Variables in the Model		
Endogenous	Manifest	K6A K6B K6C K6D K6E K6F
	Latent	
Exogenous	Manifest	
	Latent	F1 F2
	Error	E1 E2 E3 E4 E5 E6
Number of Endogenous Variables = 6		
Number of Exogenous Variables = 8		

Initial Estimates for Linear Equations			
K6A	=	LV1F (. F + 1 E	
		1 ) 1	1
K6B	=	LV2F (. F + 1 E	
		1 ) 1	2
K6C	=	LV3F (. F + 1 E	
		1 ) 1	3
K6D	=	LV4F (. F + LV4F (. F + 1 E	
		1 ) 1 2 ) 2	4
K6E	=	LV5F (. F + 1 E	
		2 ) 2	5
K6F	=	LV6F (. F + LV6F (. F + 1 E	
		1 ) 1 2 ) 2	6

*The CALIS Procedure*  
*Covariance Structure Analysis: Model and Initial Values*

Initial Estimates for Variances of Exogenous Variables			
Variable Type	Variable	Parameter	Estimate
Latent	F1		1.00000
	F2		1.00000
Error	E1	VARE1	.
	E2	VARE2	.
	E3	VARE3	.
	E4	VARE4	.
	E5	VARE5	.
	E6	VARE6	.

Initial Estimates for Covariances Among Exogenous Variables			
Var1	Var2	Parameter	Estimate
F2	F1	_Add1	.
NOTE: Parameters with prefix '_Add' are added by PROC CALIS.			

*The CALIS Procedure**Covariance Structure Analysis: Descriptive Statistics*

Simple Statistics		
Variable	Mean	Std Dev
K6A	2.6119 4	1.31140
K6B	2.5741 3	1.27641
K6C	2.2706 5	1.26333
K6D	2.4587 1	1.25825
K6E	2.8019 9	1.20325
K6F	2.6636 8	1.31507



*The CALIS Procedure*  
*Covariance Structure Analysis: Optimization*

Initial Estimation Methods	
1	Instrumental Variables Method
2	McDonald Method

Optimization Start Parameter Estimates			
N	Parameter	Estimate	Gradient
1	LV1F1	0.73338	0.00845
2	LV2F1	1.04317	-0.01305
3	LV3F1	1.05839	-0.00515
4	LV4F1	0.73689	0.01065
5	LV4F2	0.28762	0.01242
6	LV5F2	1.14804	- 0.0003129
7	LV6F1	0.62417	0.00596
8	LV6F2	0.40357	-0.00101
9	VARE1	1.18193	-0.00483
10	VARE2	0.54100	0.02918
11	VARE3	0.47581	0.01679
12	VARE4	0.67654	-0.01461
13	VARE5	0.12981	-0.00277
14	VARE6	0.84305	-0.00259
15	_Add1	0.66277	-0.00563
Value of Objective Function = 0.008855655			

*The CALIS Procedure*  
*Covariance Structure Analysis: Optimization*

*Levenberg-Marquardt Optimization*

*Scaling Update of More (1978)*

<b>Parameter Estimates</b>	1 5
<b>Functions (Observations)</b>	2 1

Optimization Start			
<b>Active Constraints</b>	0	<b>Objective Function</b>	0.00885565 5
<b>Max Abs Gradient Element</b>	0.02918377 3	<b>Radius</b>	1

<b>Iteration</b>	<b>Restarts</b>	<b>Function Calls</b>	<b>Active Constraints</b>	<b>Objective Function</b>	<b>Objective Function Change</b>	<b>Max Abs Gradient Element</b>	<b>Lambda</b>	<b>Ratio Between Actual and Predicted Change</b>
1	0	5	0	0.00804	0.000818	0.0355	0.00224	0.599
2	0	7	0	0.00737	0.000667	0.000994	0	1.019
3	0	9	0	0.00737	1.312E-6	0.000089	0	0.984
4	0	11	0	0.00737	3.239E-9	5.541E-6	0	0.927

Optimization Results			
<b>Iterations</b>	4	<b>Function Calls</b>	14
<b>Jacobian Calls</b>	6	<b>Active Constraints</b>	0
<b>Objective Function</b>	0.007369429 7	<b>Max Abs Gradient Element</b>	5.5405391E- 6
<b>Lambda</b>	0	<b>Actual Over Pred Change</b>	0.927223757 2
<b>Radius</b>	0.000719821		

*The CALIS Procedure*  
*Covariance Structure Analysis: Optimization*

Convergence criterion (ABSGCONV=0.00001)  
satisfied.

*The CALIS Procedure**Covariance Structure Analysis: Maximum Likelihood Estimation*

Fit Summary		
Modeling Info	Number of Observations	1005
	Number of Variables	6
	Number of Moments	21
	Number of Parameters	15
	Number of Active Constraints	0
	Baseline Model Function Value	2.6967
	Baseline Model Chi-Square	2707.4756
	Baseline Model Chi-Square DF	15
	Pr > Baseline Model Chi-Square	<.0001
	Fit Function	0.0074
Absolute Index	Chi-Square	7.3989
	Chi-Square DF	6
	Pr > Chi-Square	0.2855
	Z-Test of Wilson & Hilferty	0.5684
	Hoelter Critical N	1709
	Root Mean Square Residual (RMR)	0.0116
	Standardized RMR (SRMR)	0.0073
	Goodness of Fit Index (GFI)	0.9976
	Adjusted GFI (AGFI)	0.9915
	Parsimonious GFI	0.3990
Parsimony Index	RMSEA Estimate	0.0152
	RMSEA Lower 90% Confidence Limit	0.0000
	RMSEA Upper 90% Confidence Limit	0.0457
	Probability of Close Fit	0.9738
	ECVI Estimate	0.0375
	ECVI Lower 90% Confidence Limit	0.0361
	ECVI Upper 90% Confidence Limit	0.0486
	Akaike Information Criterion	37.3989
	Bozdogan CAIC	126.0900
	Schwarz Bayesian Criterion	111.0900
	McDonald Centrality	0.9993

***The CALIS Procedure******Covariance Structure Analysis: Maximum Likelihood Estimation***

Fit Summary		
<b>Incremental Index</b>	<b>Bentler Comparative Fit Index</b>	0.9995
	<b>Bentler-Bonett NFI</b>	0.9973
	<b>Bentler-Bonett Non-normed Index</b>	0.9987
	<b>Bollen Normed Index Rho1</b>	0.9932
	<b>Bollen Non-normed Index Delta2</b>	0.9995
	<b>James et al. Parsimonious NFI</b>	0.3989

**The CALIS Procedure****Covariance Structure Analysis: Maximum Likelihood Estimation**

Linear Equations						
K6A	=	0.726 (** F + 1.000 E				
		3 ) 1	0	1		
K6B	=	1.054 (** F + 1.000 E				
		2 ) 1	0	2		
K6C	=	1.063 (** F + 1.000 E				
		0 ) 1	0	3		
K6D	=	0.650 (** F + 0.370 (** F + 1.000 E				
		4 ) 1	0 ) 2	0	4	
K6E	=	1.056 (** F + 1.000 E				
		8 ) 2	0	5		
K6F	=	0.502 (** F + 0.527 (** F + 1.000 E				
		3 ) 1	3 ) 2	0	6	

Effects in Linear Equations						
Variable	Predictor	Parameter	Estimate	Standard Error	t Value	Pr >  t
K6A	F1	LV1F1	0.72631	0.04054	17.9167	<.0001
K6B	F1	LV2F1	1.05418	0.03496	30.1521	<.0001
K6C	F1	LV3F1	1.06303	0.03435	30.9458	<.0001
K6D	F1	LV4F1	0.65043	0.09650	6.7401	<.0001
K6D	F2	LV4F2	0.36998	0.09668	3.8268	0.0001
K6E	F2	LV5F2	1.05678	0.08103	13.0415	<.0001
K6F	F1	LV6F1	0.50231	0.13066	3.8443	0.0001
K6F	F2	LV6F2	0.52730	0.13243	3.9817	<.0001

*The CALIS Procedure**Covariance Structure Analysis: Maximum Likelihood Estimation*

Estimates for Variances of Exogenous Variables						
Variable Type	Variable	Parameter	Estimate	Standard Error	t Value	Pr >  t
Latent	F1		1.00000			
	F2		1.00000			
Error	E1	VARE1	1.19226	0.05691	20.9487	<.0001
	E2	VARE2	0.51792	0.03485	14.8603	<.0001
	E3	VARE3	0.46596	0.03354	13.8936	<.0001
	E4	VARE4	0.67683	0.03726	18.1639	<.0001
	E5	VARE5	0.33101	0.15998	2.0691	0.0385
	E6	VARE6	0.81777	0.05207	15.7052	<.0001

Covariances Among Exogenous Variables						
Var1	Var2	Parameter	Estimate	Standard Error	t Value	Pr >  t
F2	F1	_Add1	0.71978	0.05687	12.6558	<.0001

Squared Multiple Correlations			
Variable	Error Variance	Total Variance	R-Square
K6A	1.19226	1.71978	0.3067
K6B	0.51792	1.62921	0.6821
K6C	0.46596	1.59600	0.7080
K6D	0.67683	1.58320	0.5725
K6E	0.33101	1.44780	0.7714
K6F	0.81777	1.72941	0.5271

*The CALIS Procedure**Covariance Structure Analysis: Maximum Likelihood Estimation***Standardized Results for Linear Equations**

K6 = 0.553 (\*\* F + 1.000 E  
 A 8 ) 1 0 1  
 K6 = 0.825 (\*\* F + 1.000 E  
 B 9 ) 1 0 2  
 K6 = 0.841 (\*\* F + 1.000 E  
 C 5 ) 1 0 3  
 K6 = 0.516 (\*\* F + 0.294 (\*\* F + 1.000 E  
 D 9 ) 1 0 ) 2 0 4  
 K6 = 0.878 (\*\* F + 1.000 E  
 E 3 ) 2 0 5  
 K6F = 0.382 (\*\* F + 0.401 (\*\* F + 1.000 E  
 0 ) 1 0 ) 2 0 6

**Standardized Effects in Linear Equations**

Variable	Predictor	Parameter	Estimate	Standard Error	t Value	Pr >  t
K6A	F1	LV1F1	0.55384	0.02431	22.7821	<.0001
K6B	F1	LV2F1	0.82590	0.01395	59.2043	<.0001
K6C	F1	LV3F1	0.84145	0.01345	62.5698	<.0001
K6D	F1	LV4F1	0.51693	0.07514	6.8794	<.0001
K6D	F2	LV4F2	0.29404	0.07639	3.8493	0.0001
K6E	F2	LV5F2	0.87828	0.06305	13.9295	<.0001
K6F	F1	LV6F1	0.38196	0.09870	3.8699	0.0001
K6F	F2	LV6F2	0.40096	0.09998	4.0103	<.0001



*The CALIS Procedure**Covariance Structure Analysis: Maximum Likelihood Estimation*

Standardized Results for Variances of Exogenous Variables						
Variable Type	Variable	Parameter	Estimate	Standard Error	t Value	Pr >  t
Latent	F1		1.00000			
	F2		1.00000			
Error	E1	VARE1	0.69326	0.02693	25.7450	<.0001
	E2	VARE2	0.31790	0.02304	13.7962	<.0001
	E3	VARE3	0.29195	0.02263	12.8999	<.0001
	E4	VARE4	0.42751	0.02463	17.3559	<.0001
	E5	VARE5	0.22863	0.11075	2.0643	0.0390
	E6	VARE6	0.47286	0.03051	15.4999	<.0001

Standardized Results for Covariances Among Exogenous Variables						
Var1	Var2	Parameter	Estimate	Standard Error	t Value	Pr >  t
F2	F1	_Add1	0.71978	0.05687	12.6558	<.0001

***The CALIS Procedure***

***Covariance Structure Analysis: Maximum Likelihood Estimation***

**Note** All parameters in the model are significant. No parameter can be dropped in the  
: Wald tests.

***The CALIS Procedure******Covariance Structure Analysis: Maximum Likelihood Estimation***

Rank Order of the 10 Largest LM Stat for Paths from Endogenous Variables				
To	From	LM Stat	Pr > ChiSq	Parm Change
K6E	K6B	5.02206	0.0250	0.11651
K6D	K6B	4.54354	0.0330	- 0.12393
K6B	K6E	4.20287	0.0404	0.07723
K6B	K6D	3.31508	0.0686	- 0.08610
K6E	K6C	3.23707	0.0720	- 0.10386
K6C	K6E	3.16421	0.0753	- 0.06711
K6D	K6C	2.31170	0.1284	0.09845
K6C	K6D	1.45229	0.2282	0.05729
K6D	K6A	0.88857	0.3459	0.02570
K6A	K6D	0.77922	0.3774	0.04147

Rank Order of the 3 Largest LM Stat for Paths from Exogenous Variables				
To	From	LM Stat	Pr > ChiSq	Parm Change
K6B	F2	3.28915	0.0697	0.12935
K6C	F2	2.87716	0.0898	- 0.12156
K6A	F2	0.02649	0.8707	- 0.01168

**The CALIS Procedure****Covariance Structure Analysis: Maximum Likelihood Estimation**

Rank Order of the 6 Largest LM Stat for Paths with New Endogenous Variables				
To	From	LM Stat	Pr > ChiSq	Parm Change
F2	K6B	3.28872	0.0698	0.12035
F1	K6B	3.28848	0.0698	- 0.16720
F2	K6C	2.87717	0.0898	- 0.12573
F1	K6C	2.87700	0.0899	0.17467
F2	K6A	0.02649	0.8707	- 0.00472
F1	K6A	0.02648	0.8707	0.00656

**Note** No LM statistic in the default test set for the covariances of exogenous variables is nonsingular. Ranking is not displayed.

Rank Order of the 10 Largest LM Stat for Error Variances and Covariances				
Var1	Var2	LM Stat	Pr > ChiSq	Parm Change
E5	E2	5.02232	0.0250	0.06035
E4	E2	4.54376	0.0330	- 0.06418
E5	E3	3.23684	0.0720	- 0.04839
E4	E3	2.31152	0.1284	0.04587
E4	E1	0.88853	0.3459	0.03064
E3	E2	0.59490	0.4405	0.03852
E3	E1	0.56402	0.4526	- 0.02482
E5	E1	0.53149	0.4660	- 0.02321
E6	E1	0.33854	0.5607	0.02036
E6	E2	0.27495	0.6000	- 0.01612

***The CALIS Procedure***

***Covariance Structure Analysis: Maximum Likelihood Estimation***

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Obs	rmsea_null	rmsea_alternate	alpha	df	n	power
1	0.05	0.08	0.05	6	100 5	0.7187 0

