E X P L O R E R

R e l e a s e 4 . 0

A Program for Common Factor Analysis
and Related Models for Data Analysis

Date and Time : 06-Jun-2017, 12:46:30
Number of variables : 10
Command file : rosenberg_ols.txt
Listing file : rosenberg_lis

L i s t i n g o f C o m m a n d F i l e

```
<data>
   matrix = raw; file = 'rosenberg.dat';
   format = '(3x,10f3.0)';

<headers>
   'Rosenberg Self-Esteem Scale';
   'Two oblique factor solution';

<analysis>
   method = ols;
   matrix = cor;
   trans=dq;
   number =2;
   boots = 500;

<output>
   all;

<end>
```

Program Step:
Univariate Statistics

U n i v a r i a t e S u m m a r y S t a t i s t i c s

No. / Name	Mean / No.Cases / Coef.Var.	Std. Dev. / Variance / S.E.Mean	Skewness / Kurtosis / Skew/S.E.	Min. Val. / Min. Z / Kurt/S.E.	Max. Val. / Max. Z / Min.Case	Range / Z-Range / Max.Case
1	5.119	1.290	-1.856	1.000	6.000	5.000
Var 1	210	1.665	2.956	-3.192	0.683	3.875
	0.252	0.089	-10.982	8.744	13	2
2	5.033	1.336	-1.668	1.000	6.000	5.000
Var 2	210	1.784	2.068	-3.020	0.724	3.744
	0.265	0.092	-9.867	6.118	13	2
3	5.090	1.300	-1.675	1.000	6.000	5.000
Var 3	210	1.690	2.309	-3.146	0.700	3.846
	0.255	0.090	-9.910	6.830	13	3
4	4.819	1.259	-1.306	1.000	6.000	5.000
Var 4	210	1.584	1.251	-3.034	0.938	3.972
	0.261	0.087	-7.727	3.701	27	2
5	4.881	1.474	-1.420	1.000	6.000	5.000
Var 5	210	2.172	1.056	-2.633	0.759	3.392
	0.302	0.102	-8.398	3.124	12	2
6	4.681	1.358	-1.032	1.000	6.000	5.000
Var 6	210	1.845	0.229	-2.710	0.971	3.681
	0.290	0.094	-6.105	0.676	98	2
7	4.657	1.403	-1.087	1.000	6.000	5.000
Var 7	210	1.968	0.347	-2.607	0.957	3.564
	0.301	0.097	-6.433	1.027	13	2
8	4.319	1.589	-0.792	1.000	6.000	5.000
Var 8	210	2.525	-0.430	-2.089	1.058	3.147
	0.368	0.110	-4.683	-1.272	20	4
9	4.452	1.418	-0.987	1.000	6.000	5.000
Var 9	210	2.010	0.366	-2.435	1.092	3.527
	0.318	0.098	-5.839	1.083	18	6
10	4.814	1.546	-1.282	1.000	6.000	5.000
Var 10	210	2.391	0.558	-2.467	0.767	3.233
	0.321	0.107	-7.583	1.650	13	2

Program Step:
Univariate Statistics

M o s t E x t r e m e Z - S c o r e s

No.	Case	Var. No.	Variable	Z-value
1	13	1	Var 1	-3.192
2	70	1	Var 1	-3.192
3	119	1	Var 1	-3.192
4	130	1	Var 1	-3.192
5	153	1	Var 1	-3.192
6	157	1	Var 1	-3.192
7	161	1	Var 1	-3.192
8	164	1	Var 1	-3.192
9	166	1	Var 1	-3.192
10	176	1	Var 1	-3.192

Program Step:
Correlational Analysis

C o r r e l a t i o n M a t r i x

		1 Var 1	2 Var 2	3 Var 3	4 Var 4	5 Var 5
1	Var 1	1.000				
2	Var 2	0.900	1.000			
3	Var 3	0.758	0.775	1.000		
4	Var 4	0.682	0.690	0.630	1.000	
5	Var 5	0.606	0.610	0.682	0.548	1.000
6	Var 6	0.819	0.792	0.713	0.682	0.621
7	Var 7	0.773	0.780	0.644	0.591	0.610
8	Var 8	0.404	0.399	0.484	0.405	0.411
9	Var 9	0.460	0.457	0.538	0.392	0.475
10	Var 10	0.627	0.598	0.670	0.477	0.532

		6 Var 6	7 Var 7	8 Var 8	9 Var 9	10 Var 10
6	Var 6	1.000				
7	Var 7	0.851	1.000			
8	Var 8	0.546	0.511	1.000		
9	Var 9	0.498	0.497	0.560	1.000	
10	Var 10	0.662	0.610	0.521	0.702	1.000

Program Step:
Latent Roots and Vectors

E i g e n v a l u e s o f R

No.	Value	% Trace	Cum. %	No.	Value	% Trace	Cum. %
1	6.50952	65.095	65.095	6	0.33067	3.307	93.325
2	1.00183	10.018	75.113	7	0.26829	2.683	96.008
3	0.55894	5.589	80.703	8	0.17443	1.744	97.752
4	0.50171	5.017	85.720	9	0.13509	1.351	99.103
5	0.42982	4.298	90.018	10	0.08970	0.897	100.000

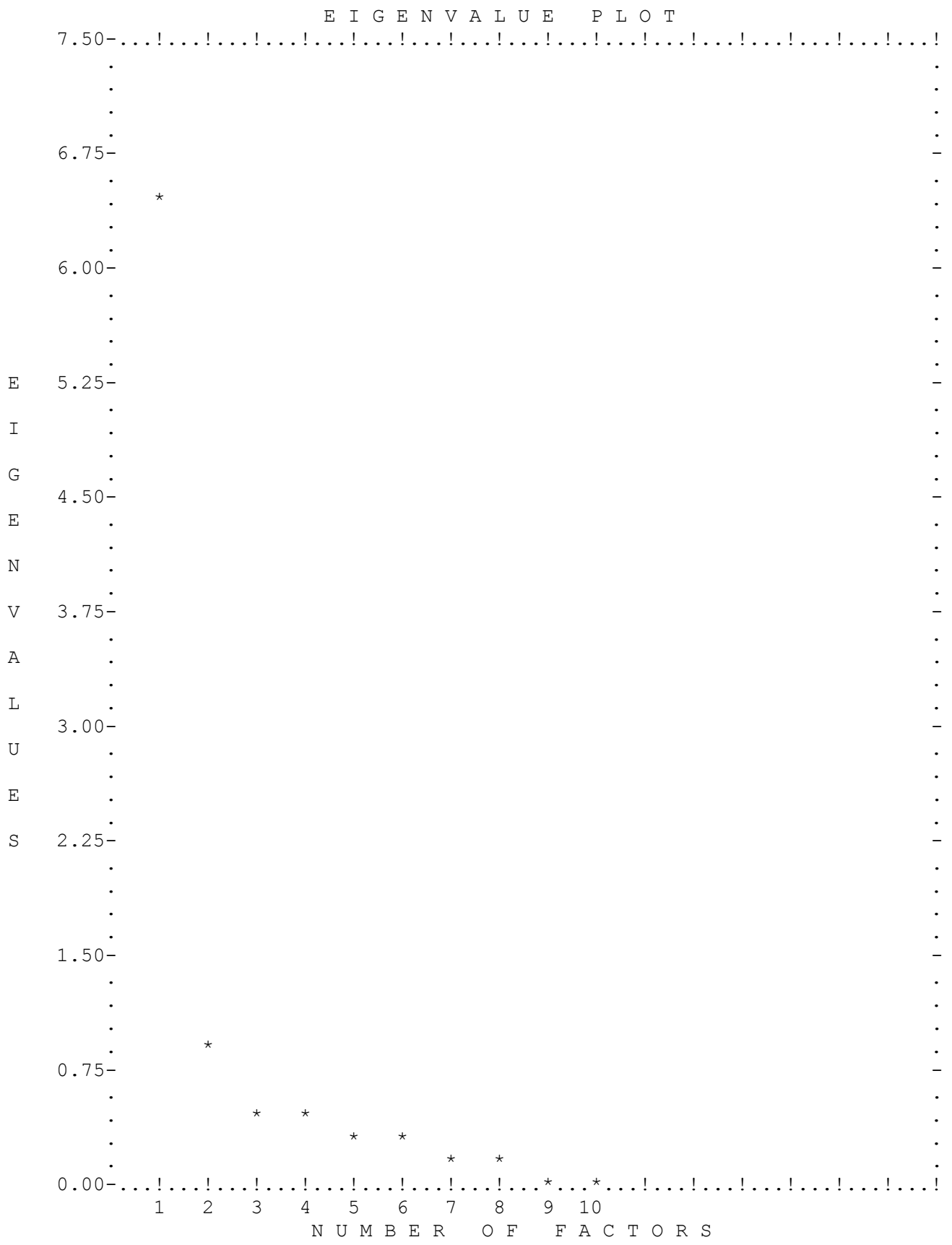
R is the unaltered correlation matrix.

Theta (reliability of first principal component) = 0.940
Condition number (largest/smallest eigenvalue) = 0.72569725E+02

The trace of a matrix is the sum of its diagonal elements. If the matrix is Gramian (no eigenvalues less than zero), then the trace represents the total variance. If some of the eigenvalues are negative then percentages are based on just non-negative elements.

For this problem the positive trace is: 10.000.

Total iterations for eigenvalues was: 17.


E I G E N V A L U E P L O T
7.50
6.75
6.00
5.25
4.50
3.75
3.00
2.25
1.50
0.75
0.00
E I G E N V A L U E S
1 2 3 4 5 6 7 8 9 10
N U M B E R O F F A C T O R S

Program Step:
Multivariate Statistics

M u l t i v a r i a t e S u m m a r y

S t a t i s t i c s

Multivariate skewness	=	20.722
Approximate z	=	19.940
Multivariate kurtosis	=	75.611
Approximate z	=	35.364
Mean Mahalanobis distance	=	9.952
Generalized variance	=	0.11219153E+00
Determinant of R	=	0.14739831E-03

Bartlett's test for complete independence of correlations:

Chi-square	=	1807.116
Degrees of freedom	=	45
Approximate z	=	34.571

(Note: Skewness and Kurtosis measures, discussed in Mardia (1972), are expressed as deviations from expected values. Maximum likelihood estimators are used in computing multivariate statistics.)

Program Step:
Multivariate Statistics

M o s t E x t r e m e C a s e s

No.	Case	Mahalanobis D-Square	df	D-Sq./df
1	130	51.663	10	5.166
2	95	50.511	10	5.051
3	18	50.022	10	5.002
4	127	48.066	10	4.807
5	74	39.240	10	3.924
6	139	35.153	10	3.515
7	176	32.447	10	3.245
8	70	30.822	10	3.082
9	58	30.370	10	3.037
10	198	30.242	10	3.024

(Note: If multivariate normality holds,
D-square is approximately distributed
as chi-square in large samples.)

Program Step:
Partial/Multiple Correlation

Measures of Sampling Adequacy

1 Var 1 0.947	5 Var 5 0.972	9 Var 9 0.924
2 Var 2 0.935	6 Var 6 0.948	10 Var 10 0.948
3 Var 3 0.961	7 Var 7 0.947	
4 Var 4 0.978	8 Var 8 0.954	

Total MSA = 0.951, median = 0.948.
Kaiser-Myer-Olkin statistic = 0.913.

(Note: This is Kaiser's final (1981) version of the MSA. A value of -.999 means that the MSA is unacceptable. KMO is an earlier version of MSA)

Program Step:
Initial Factor Solution

Common Factor Extraction Summary:
Method = Least-squares

Iteration	Max. Residual	Difference
0	0.0618600	
1	0.0341150	0.0277450
2	0.0215460	0.0125690
3	0.0028102	0.0187359
4	0.0001045	0.0027057
5	0.0000014	0.0001031
6	0.0000006	0.0000008

Program Step:
Initial Factor Solution

C o m m u n a l i t i e s

No.	Name	Initial	Final	Difference (Initial - Final)	Unique Variances
1	Var 1	0.847	0.868	-0.020	0.132
2	Var 2	0.850	0.872	-0.021	0.128
3	Var 3	0.727	0.710	0.017	0.290
4	Var 4	0.552	0.551	0.001	0.449
5	Var 5	0.530	0.513	0.017	0.487
6	Var 6	0.823	0.815	0.008	0.185
7	Var 7	0.774	0.722	0.051	0.278
8	Var 8	0.443	0.439	0.003	0.561
9	Var 9	0.559	0.741	-0.182	0.259
10	Var 10	0.655	0.690	-0.036	0.310
	Means:	0.676	0.692	-0.016	0.308
	Medians:	0.727	0.722	0.003	0.290

Program Step:
Initial Factor Solution

		Initial Loadings	
		F 1	F 2
1	Var 1	0.892	-0.270
2	Var 2	0.889	-0.287
3	Var 3	0.843	-0.012
4	Var 4	0.726	-0.156
5	Var 5	0.716	0.006
6	Var 6	0.897	-0.106
7	Var 7	0.845	-0.090
8	Var 8	0.588	0.306
9	Var 9	0.662	0.551
10	Var 10	0.770	0.313

Program Step:
Residuals Analysis

R e s i d u a l C o r r e l a t i o n s
(Diagonal contains unique variances)

		1 Var 1	2 Var 2	3 Var 3	4 Var 4	5 Var 5
1	Var 1	0.132				
2	Var 2	0.030	0.128			
3	Var 3	0.003	0.023	0.290		
4	Var 4	-0.007	0.000	0.016	0.449	
5	Var 5	-0.031	-0.025	0.079	0.029	0.487
6	Var 6	-0.009	-0.035	-0.044	0.015	-0.020
7	Var 7	-0.004	0.003	-0.069	-0.037	0.005
8	Var 8	-0.038	-0.036	-0.008	0.026	-0.012
9	Var 9	0.018	0.027	-0.012	-0.002	-0.002
10	Var 10	0.025	0.004	0.025	-0.033	-0.021

		6 Var 6	7 Var 7	8 Var 8	9 Var 9	10 Var 10
6	Var 6	0.185				
7	Var 7	0.084	0.278			
8	Var 8	0.052	0.042	0.561		
9	Var 9	-0.037	-0.012	0.003	0.259	
10	Var 10	0.005	-0.012	-0.028	0.020	0.310

(Residual correlations are remainders after subtracting reproduced correlations from original correlations. If a covariance matrix was factored then residuals were standardized.)

Program Step:
Residuals Analysis

Distribution of Standardized Residuals
(Based on sub-diagonal elements of correlation matrix):

Interval	Freq.	Pct.	H i s t o g r a m
> .5	0	0.0	
.4 - .5	0	0.0	
.3 - .4	0	0.0	
.2 - .3	0	0.0	
.1 - .2	0	0.0	
0 - .1	25	55.6	************************
-.1 - 0	20	44.4	********************
-.2 - -.1	0	0.0	
-.3 - -.2	0	0.0	
-.4 - -.3	0	0.0	
-.5 - -.4	0	0.0	
< -.5	0	0.0	

(Note: Each symbol represents 1.00 correlations.)

Residual Summary Statistics (for sub-diagonal elements):

Minimum value	=	-0.069 (between Var 7	and Var 3)
Maximum value	=	0.084 (between Var 7	and Var 6)
Average (root-mean-square)	=	0.029	

Program Step:
Residuals Analysis

Largest Residual for Each Variable Pair

1	Var 1	with	8	Var 8	= -0.038
2	Var 2	with	8	Var 8	= -0.036
3	Var 3	with	5	Var 5	= 0.079
4	Var 4	with	7	Var 7	= -0.037
5	Var 5	with	3	Var 3	= 0.079
6	Var 6	with	7	Var 7	= 0.084
7	Var 7	with	6	Var 6	= 0.084
8	Var 8	with	6	Var 6	= 0.052
9	Var 9	with	6	Var 6	= -0.037
10	Var 10	with	4	Var 4	= -0.033

Program Step:
Initial Factor Solution

Factor Score Weights

		F 1	F 2
1	Var 1	0.170	-0.395
2	Var 2	0.199	-0.487
3	Var 3	0.118	0.104
4	Var 4	0.048	-0.040
5	Var 5	0.067	-0.014
6	Var 6	0.220	-0.065
7	Var 7	0.075	0.044
8	Var 8	0.053	0.122
9	Var 9	0.139	0.648
10	Var 10	0.090	0.307

Program Step:
Initial Factor Solution

Covariance of Score Estimates

	F 1	F 2
F 1	0.964	-0.024
F 2	-0.021	0.744

(Estimated score variances are on the diagonal. Covariances are below the diagonal and correlations are above.)

(NOTE: The diagonal values are squared-multiple correlations of factors with variables.)

(Factor scores weights are estimated by regression method.)

Program Step:
Oblique Primary Factors

Oblique Transformation Summary:
Method = Quartimin
Delta = 0.000

No. of random starts = 50
Non-random criterion = 0.0000000
Best random criterion = 0.0000000
Non-random start is retained

Program Step:
Oblique Primary Factors

Q u a r t i m i n F a c t o r P a t t e r n

		F 1	F 2
1	Var 1	1.000	-0.107
2	Var 2	1.016	-0.130
3	Var 3	0.678	0.221
4	Var 4	0.744	-0.003
5	Var 5	0.558	0.209
6	Var 6	0.824	0.112
7	Var 7	0.765	0.118
8	Var 8	0.126	0.571
9	Var 9	-0.085	0.916
10	Var 10	0.262	0.631

Sums of Squared Loadings:

F 1	F 2
4.714	1.711

(Elements of the pattern matrix are standardized weights for the regression of the factors on the variables.)

Program Step:
Oblique Primary Factors

F a c t o r C o r r e l a t i o n s

	F 1	F 2
F 1	1.000	
F 2	0.675	1.000

Program Step:
Oblique Primary Factors

F a c t o r S t r u c t u r e

		F 1	F 2
1	Var 1	0.928	0.568
2	Var 2	0.929	0.556
3	Var 3	0.827	0.678
4	Var 4	0.742	0.499
5	Var 5	0.699	0.586
6	Var 6	0.899	0.667
7	Var 7	0.845	0.635
8	Var 8	0.511	0.656
9	Var 9	0.533	0.859
10	Var 10	0.688	0.808

Sums of Squared Loadings:

F 1	F 2
5.989	4.353

(Elements of the structure matrix are correlations of the variables with the factors. Column sums of squares are measures of the factor's total contribution, irrespective of the other factors.)

Program Step:
Oblique Reference Factors

R e f e r e n c e S t r u c t u r e

		F 1	F 2
1	Var 1	0.738	-0.079
2	Var 2	0.750	-0.096
3	Var 3	0.500	0.163
4	Var 4	0.549	-0.002
5	Var 5	0.412	0.154
6	Var 6	0.608	0.082
7	Var 7	0.565	0.087
8	Var 8	0.093	0.422
9	Var 9	-0.063	0.676
10	Var 10	0.193	0.466

Sums of Squared Loadings:

F 1	F 2
2.569	0.932

(Elements of the reference structure matrix are semipartial correlations. Column sums of squares are measures of the factor's 'unique' contribution to the total variance.)

Program Step:
Oblique Primary Factors

I n d e x e s o f F a c t o r S i m p l i c i t y

1 Var 1 0.978	5 Var 5 0.754	9 Var 9 0.983
2 Var 2 0.968	6 Var 6 0.964	10 Var 10 0.706
3 Var 3 0.808	7 Var 7 0.953	
4 Var 4 1.000	8 Var 8 0.907	

Total IFS = 0.948; median = 0.964.

Loadings in the interval (-.10, +.10) = 2 (10.0%)
Loadings in the interval (-.15, +.15) = 7 (35.0%)
Loadings in the interval (-.20, +.20) = 7 (35.0%)
Hyperplane count (Kaiser-Cerny, 1978) = 10 (50.0%)

Program Step:
Oblique Primary Factors

S o r t e d L o a d i n g s

		F 1	F 2
2	Var 2	1.016	.0
1	Var 1	1.000	.0
6	Var 6	0.824	.0
7	Var 7	0.765	.0
4	Var 4	0.744	.0
3	Var 3	0.678	0.221
5	Var 5	0.558	0.209
9	Var 9	.0	0.916
10	Var 10	0.262	0.631
8	Var 8	.0	0.571

(Note: Values above 0.395 were considered highly salient;
values below 0.204 were set to zero.)

Program Step:
Factor Scale and Item Analysis

F a c t o r S c a l e S u m m a r y S t a t i s t i c s

Factor scales are defined by items with salient loadings above 0.395.
Scale fit indexes are: SFI = 1 - SSQ(nonsalient)/SSQ(total).

Average (RMS) of scale items:

F 1	F 2
0.813	0.722

Average (RMS) of nonscale items:

F 1	F 2
0.101	0.055

Scale fit indexes:

F 1	F 2
0.981	0.914

Overall Scale Fit Index	=	0.963
Bentler's Matrix Simplicity Measure	=	0.996
Lorenzo-Seva's Factor Simplicity Index	=	0.472

Program Step:
Factor Scale and Item Analysis

F a c t o r A n a l y s i s o f S c a l e I t e m s

Scale based on Factor 1

No.	Name	F 1	Commun-ality	Unique-ness
2	Var 2	0.920	0.846	0.154
1	Var 1	0.919	0.844	0.156
6	Var 6	0.901	0.811	0.189
7	Var 7	0.848	0.719	0.281
4	Var 4	0.745	0.555	0.445
3	Var 3	0.830	0.689	0.311
5	Var 5	0.710	0.504	0.496

Sum of squares: 4.968
McDonald's omega: 0.944

No. Iterations = 5

Program Step:
Factor Scale and Item Analysis

F a c t o r A n a l y s i s o f S c a l e I t e m s

Scale based on Factor 2

No.	Name	F 2	Commun-ality	Unique-ness
9	Var 9	0.868	0.753	0.247
10	Var 10	0.809	0.654	0.346
8	Var 8	0.645	0.416	0.584

Sum of squares: 1.823
McDonald's omega: 0.821

No. Iterations = 13

Program Step:
Factor Scale and Item Analysis

F a c t o r S c a l e C o r r e l a t i o n s

	F 1	F 2
F 1	1.000	
F 2	0.688	1.000

(Note: These correlations are for scales formed by simple summation of the items which define them. If no values define a scale, then -9.999 is printed)

Program Step:
Factor Scale and Item Analysis

Coefficient alpha for scale items (standardized):

F 1	F 2
0.943	0.815

Coefficient alpha for scale items (raw):

F 1	F 2
0.930	0.735

(Note: alpha cannot be computed for scales with less than two items.
In this case, a value of zero is printed.)

Program Step:
Factor Scale and Item Analysis

I t e m A n a l y s i s f o r F a c t o r S c a l e s

Scale Based on Factor 1:

No.	Name	Item-Wtd. Total Correlation	Alpha without item: Raw	Standardized
1	Var 1	0.883	0.911	0.928
2	Var 2	0.884	0.914	0.927
3	Var 3	0.807	0.919	0.934
4	Var 4	0.724	0.926	0.942
5	Var 5	0.693	0.933	0.944
6	Var 6	0.869	0.911	0.929
7	Var 7	0.817	0.917	0.933

Mean item-total r = 0.811
Standardized alpha= 0.943
Standard error = 0.006
Large sample Z = 155.225
95% C.I. = (0.931, 0.955)

Program Step:
Factor Scale and Item Analysis

I t e m A n a l y s i s f o r F a c t o r S c a l e s

Scale Based on Factor 2:

No.	Name	Item-Wtd. Total Correlation	Alpha without item: Raw	Standardized
8	Var 8	0.586	0.721	0.825
9	Var 9	0.724	0.672	0.685
10	Var 10	0.692	0.553	0.718

Mean item-total r = 0.667
Standardized alpha= 0.815
Standard error = 0.022
Large sample Z = 36.411
95% C.I. = (0.771, 0.859)

Program Step:
Oblique Primary Factors

Factor Score Weights

		F 1	F 2
1	Var 1	0.248	-0.092
2	Var 2	0.296	-0.122
3	Var 3	0.094	0.156
4	Var 4	0.056	0.016
5	Var 5	0.068	0.046
6	Var 6	0.229	0.142
7	Var 7	0.064	0.087
8	Var 8	0.026	0.113
9	Var 9	0.001	0.490
10	Var 10	0.025	0.252

Program Step:
Oblique Primary Factors

Covariance of Score Estimates

	F 1	F 2
F 1	0.962	0.730
F 2	0.668	0.870

(Estimated score variances are on the diagonal. Covariances are below the diagonal and correlations are above.)

(NOTE: The diagonal values are squared-multiple correlations of factors with variables.)

(Factor scores weights are estimated by regression method.)

Program Step:
Standard Errors

S t a n d a r d E r r o r s o f L o a d i n g s

		F 1	F 2
1	Var 1	0.044	0.054
2	Var 2	0.046	0.054
3	Var 3	0.121	0.127
4	Var 4	0.073	0.076
5	Var 5	0.128	0.123
6	Var 6	0.072	0.084
7	Var 7	0.083	0.093
8	Var 8	0.122	0.113
9	Var 9	0.101	0.100
10	Var 10	0.118	0.114

Standard Error Summary Statistics:

Number of samples = 500
Number of Heywood Cases = 14
Non-fixable Heywood Cases = 10
Number of mis-matches = 0
Effective number samples = 490
Percentage of effective = 98%

Average SE = 0.09222

(A mis-match occurs when the bootstrapped loadings cannot be aligned with the original loadings.)

Bonferroni corrected Z-scores for 95% confidence interval:
For loadings, Z = 2.773
For correlations, Z = 1.960

Program Step:
Standard Errors

S t a n d a r d E r r o r s o f C o r r e l a t i o n s

	F 1	F 2
F 1	0.000	
F 2	0.072	0.000

Program Step:
Standard Errors

Confidence Intervals

for Factor Loadings

	F 1	F 2
1	(0.877, 1.123)	(-0.256, 0.043)
2	(0.890, 1.143)	(-0.278, 0.019)
3	(0.344, 1.012)	(-0.132, 0.574)
4	(0.542, 0.946)	(-0.214, 0.208)
5	(0.203, 0.914)	(-0.133, 0.551)
6	(0.625, 1.023)	(-0.120, 0.343)
7	(0.536, 0.995)	(-0.140, 0.377)
8	(-0.213, 0.465)	(0.258, 0.884)
9	(-0.366, 0.195)	(0.639, 1.193)
10	(-0.064, 0.588)	(0.316, 0.947)

Program Step:
Standard Errors

C o n f i d e n c e I n t e r v a l s

f o r F a c t o r C o r r e l a t i o n s

	F 1	F 2
F 1	(0.000, 0.000)	
F 2	(0.591, 0.744)	(0.000, 0.000)