

Factor Analysis

A. Arranging your data

Click on the 'Variable View' window.

Give your variables names here.
Maximum eight characters and no spaces.

Give your variables proper labels here.

	Name	Type	Width	Decimals	Label	Values	Missing
1	p1	Numeric	8	2		None	None
2	p2	Numeric	8	2		None	None
3	p3	Numeric	8	2		None	None
4	p4	Numeric	8	2		None	None
5	p5	Numeric	8	2		None	None
6	p6	Numeric	8	2		None	None
7	p7	Numeric	8	2		None	None
8	p8	Numeric	8	2		None	None
9	p9	Numeric	8	2		None	None
10	p10	Numeric	8	2		None	None
11	p11	Numeric	8	2		None	None
12	p12	Numeric	8	2		None	None
13	p13	Numeric	8	2		None	None

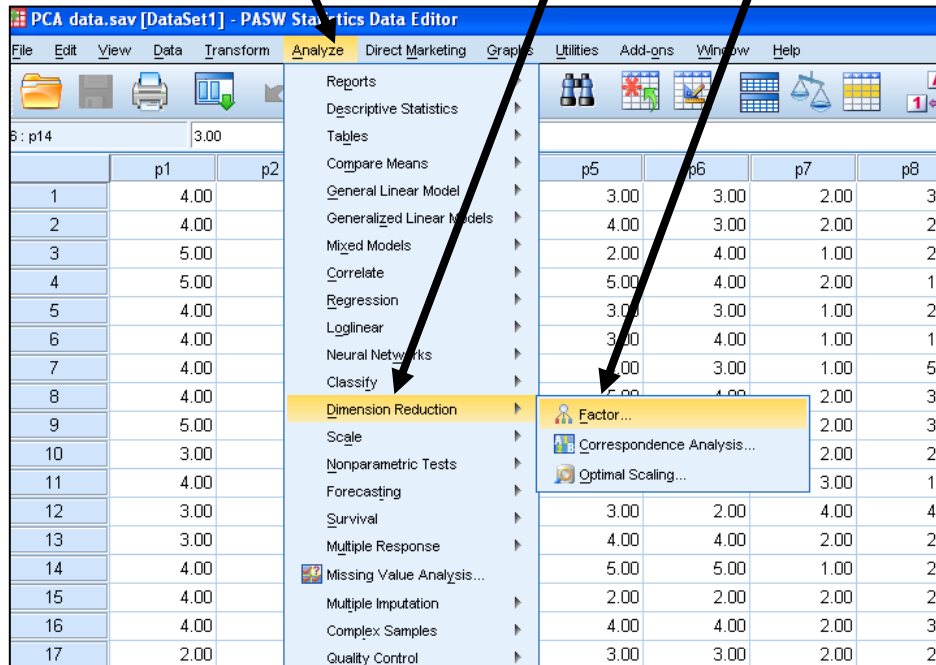
Click on the 'Data View' window.

In this example, we are performing Factor Analysis as a means data reduction.

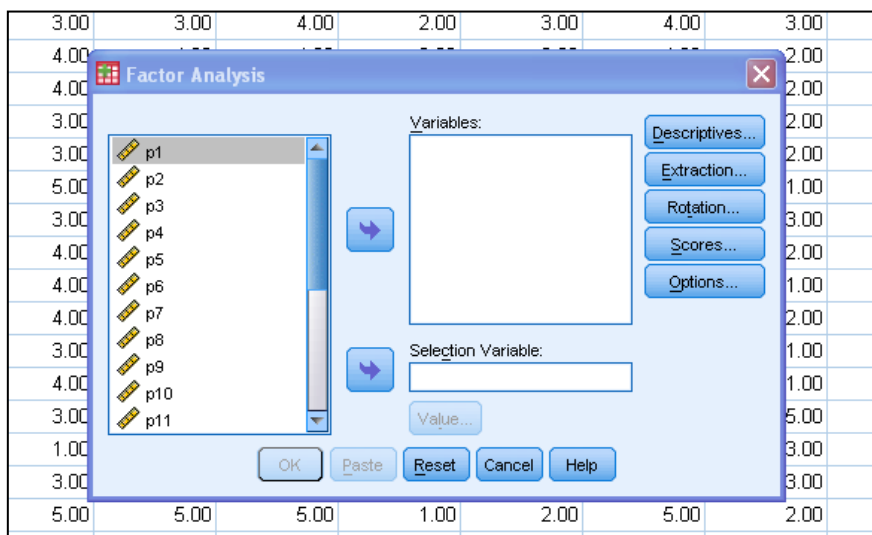
	p1	p2	p3	p4	p5	p6	p7	p8	p9	p10
1	4.00	2.00	2.00	4.00	3.00	3.00	2.00	3.00	3.00	4.00
2	4.00	1.00	1.00	3.00	4.00	3.00	2.00	2.00	4.00	3.00
3	5.00	1.00	2.00	3.00	2.00	4.00	1.00	2.00	4.00	2.00
4	5.00	1.00	2.00	5.00	5.00	4.00	2.00	1.00	2.00	3.00
5	4.00	1.00	2.00	3.00	3.00	3.00	1.00	2.00	4.00	2.00
6	4.00	1.00	1.00	4.00	3.00	4.00	1.00	1.00	1.00	4.00
7	4.00	1.00	1.00	4.00	4.00	3.00	1.00	5.00	1.00	5.00
8	4.00	1.00	2.00	4.00	5.00	4.00	2.00	3.00	4.00	1.00
9	5.00	1.00	3.00	3.00	3.00	4.00	2.00	3.00	4.00	3.00
10	3.00	1.00	2.00	4.00	4.00	4.00	2.00	2.00	4.00	2.00
11	4.00	1.00	2.00	4.00	5.00	3.00	3.00	1.00	3.00	2.00
12	3.00	1.00	2.00	3.00	3.00	2.00	4.00	4.00	2.00	2.00
13	3.00	1.00	1.00	3.00	4.00	4.00	2.00	2.00	4.00	2.00
14	4.00	1.00	1.00	5.00	5.00	5.00	1.00	2.00	5.00	1.00

B. Running the Factor Analysis

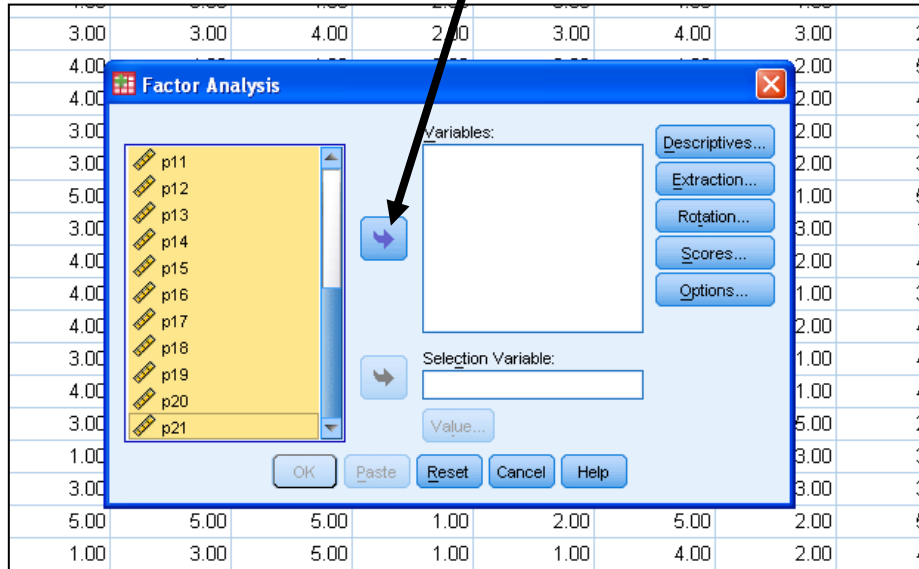
Go to 'Analyze' across the top. 'Dimension Reduction and 'Factor'



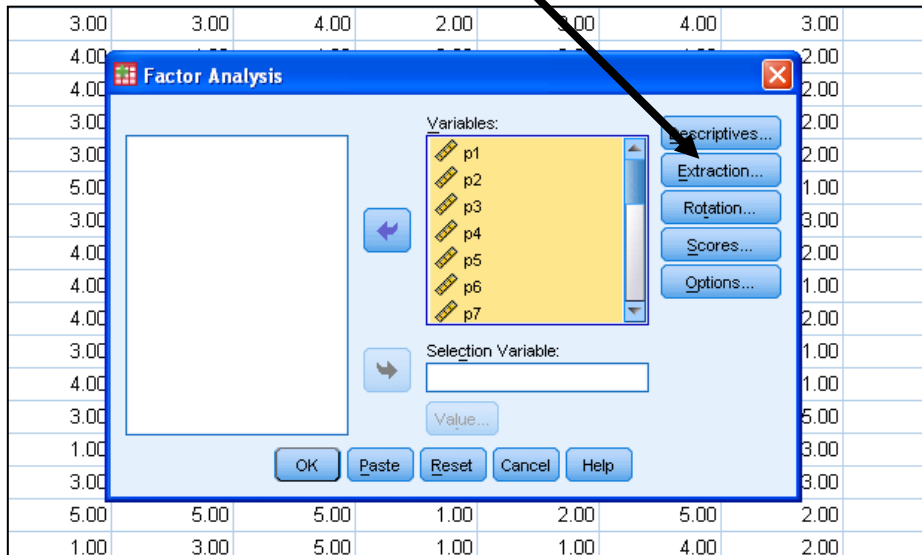
You will then see a box appear which looks like the one below



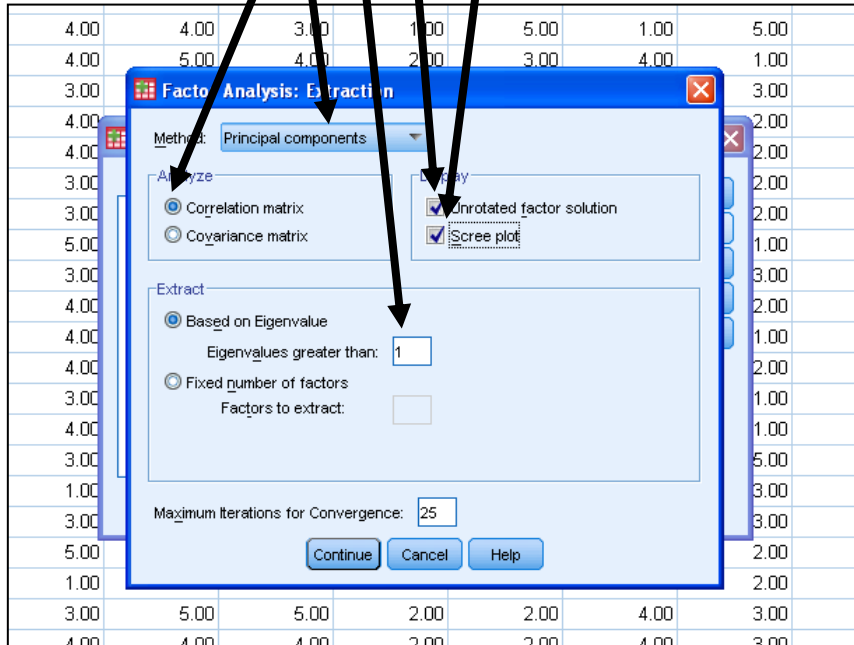
Highlight all of the items on the left and use the arrow to transfer these to the 'Variables' box on the right.



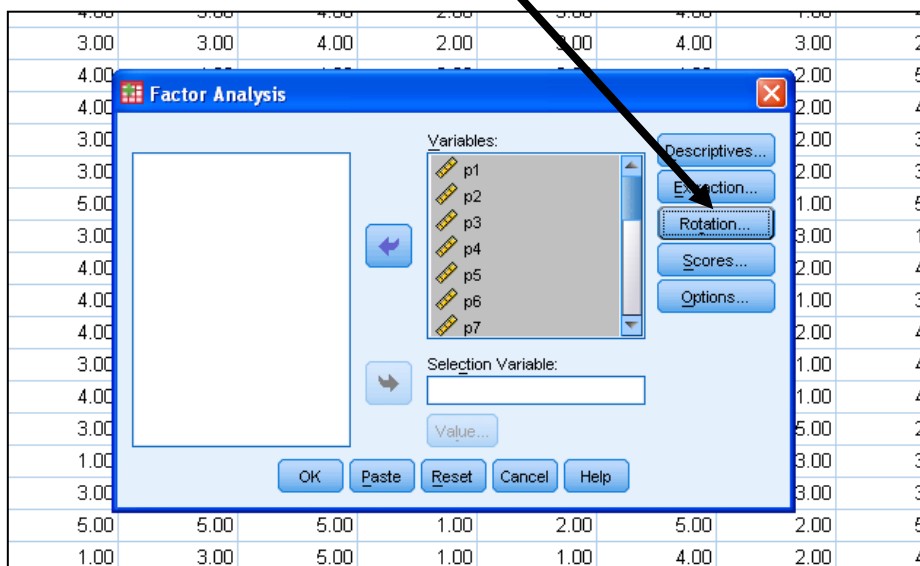
Click on 'Extraction'



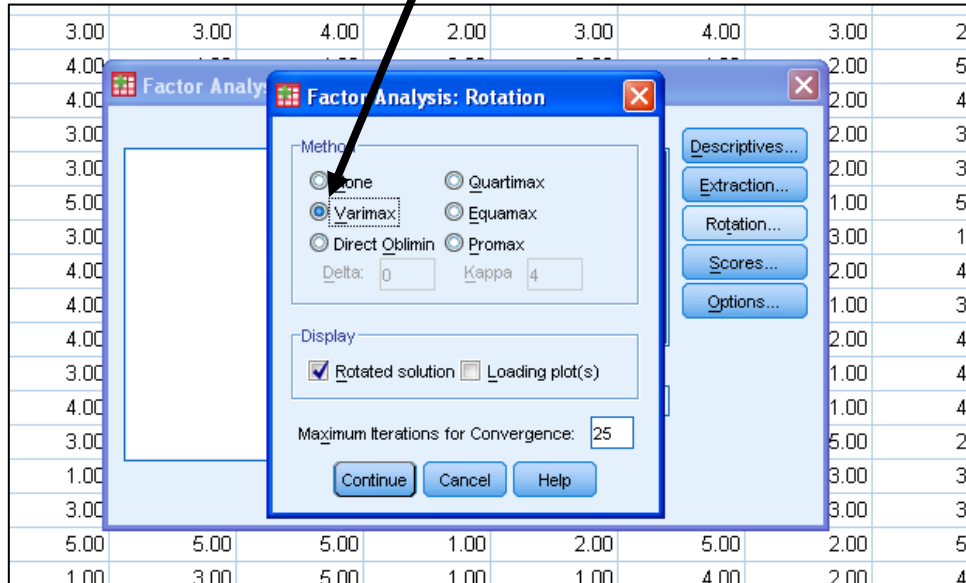
Choose 'Principal Components', 'Correlation Matrix', 'Unrotated factor solution', 'Scree Plot' and 'Eigenvalues greater than 1



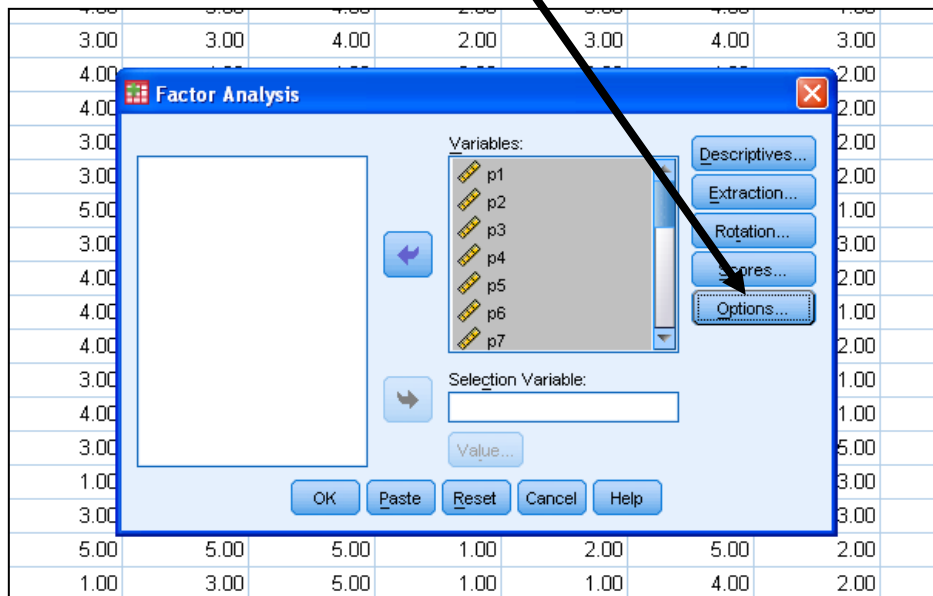
Back to this screen, click on 'Rotation'



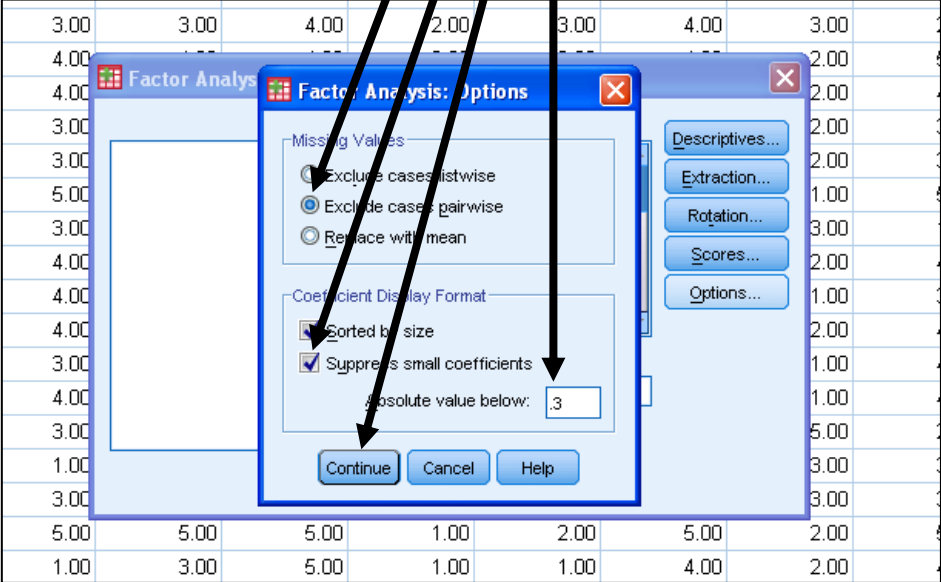
Click on 'Varimax'



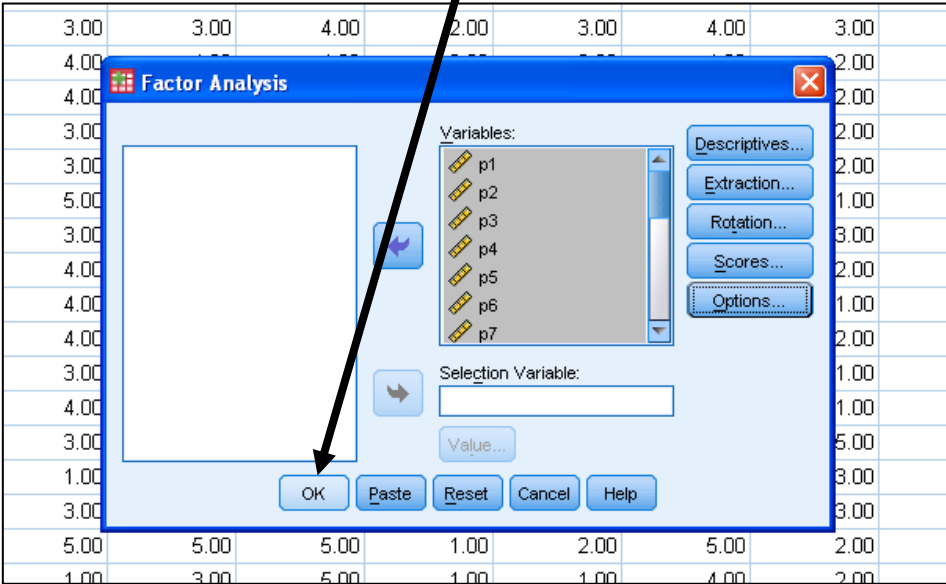
Back to this screen. Click 'Options'



Click 'Exclude cases pairwise', suppress small coefficients, Absolute values below .3 and 'Continue'



Click 'OK'



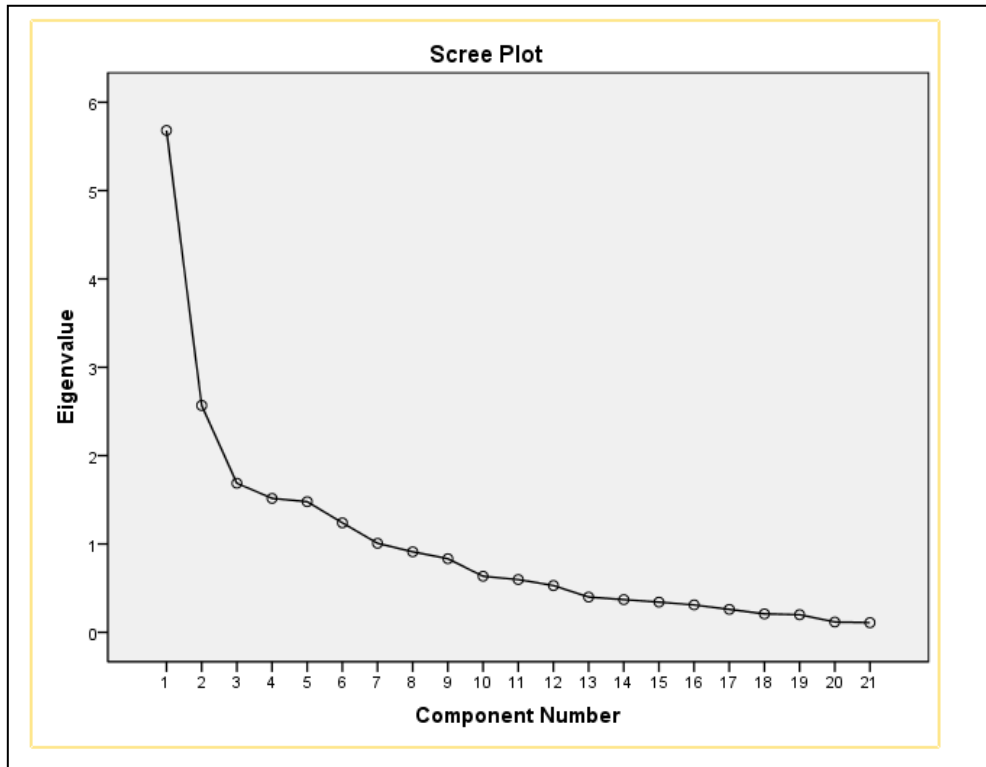
The Output

The table labelled 'Total Variance Explained' gives the percentage variance explained by each of the factors with Eigenvalues greater than one. Seven have been extracted on this basis.

Component	Total Variance Explained								
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.681	27.054	27.054	5.681	27.054	27.054	3.629	17.283	17.283
2	2.567	12.226	39.280	2.567	12.226	39.280	3.053	14.538	31.821
3	1.688	8.036	47.316	1.688	8.036	47.316	2.303	10.968	42.789
4	1.516	7.219	54.535	1.516	7.219	54.535	1.994	9.496	52.285
5	1.479	7.043	61.578	1.479	7.043	61.578	1.566	7.455	59.741
6	1.239	5.901	67.479	1.239	5.901	67.479	1.453	6.919	66.660
7	1.008	4.798	72.276	1.008	4.798	72.276	1.180	5.617	72.276
8	.912	4.341	76.617						
9	.833	3.966	80.583						
10	.635	3.022	83.605						
11	.597	2.844	86.449						
12	.529	2.519	88.968						
13	.400	1.903	90.871						
14	.370	1.763	92.634						
15	.342	1.629	94.263						
16	.310	1.478	95.741						
17	.260	1.237	96.978						
18	.209	.994	97.972						
19	.199	.949	98.922						
20	.117	.557	99.479						
21	.109	.521	100.000						

Extraction Method: Principal Component Analysis.

The Scree plot will show you how many of the factors are distinct from the rest.
Here possibly two, although you have to make a judgement.



The table labelled 'Rotated Component Matrix' gives the loadings of each item on each of the seven factors extracted with Eigenvalues greater than 1

	Component						
	1	2	3	4	5	6	7
p1						.903	
p2							.932
p3			.766				
p4				.856			
p5				.763			
p6	-.612			.397			
p7	.599		.422				
p8	.532					-.536	
p9	-.785						
p10	.391	.557					
p11	-.387		-.700	.329			
p12	.674		.444				
p13		.804					
p14		.544				.314	
p15	.801						
p16		.623	.384			-.372	.341
p17	-.657						
p18			-.690		.443		
p19		.758					
p20		-.616			.551		
p21					.691		

Extraction Method: Principal Component Analysis.
 Rotation Method: Varimax with Kaiser Normalization.
 a. Rotation converged in 9 iterations.