

## Data Exercise 7: Factor Analysis

### View the Tutorial:

- Factor Analysis: <https://youtu.be/kmyZgwvMx6c>


### Directions

The following exercises seek to determine what underlying structure exists among the following variables in *profile-a.sav*: highest degree earned (*degree*), hours worked per week (*hrs1*), job satisfaction (*satjob*), years of education (*educ*), hours per day watching TV (*tvhours*), general happiness (*happy*), degree to which life is exciting (*life*), and degree to which the lot of the average person is getting worse (*anomia5*).

### 1) The following output was generated for the initial analysis. Varimax rotation was utilized.

#### a. Assess the eigenvalue criterion. How many components were retained? Is the eigenvalue appropriate, considering the number of factors and the communalities?

Three components were retained: those that are listed as greater than 1.00 in the initial Eigenvalues column of the Table of Total Variances. Mertler and Reinhart (2016) suggest that the eigenvalue criterion is fairly reliable when either the number of variables is less than 30 and communalities are greater than .70, or, when the number of individuals is greater than 250 and their mean communality is greater than or equal to .60. This dataset does not meet the former situation, since the number of variables is less than 30 but not all of the communalities are greater than .70 – in fact, there are only two that are. In that case, eigenvalue criterion is questionable. However, even when removing outliers using Mahalanobis distance, the dataset contains greater than 250 individuals and the mean communality is approximately .61. For that situation, the eigenvalue seems appropriate.



#### b. Assess the variance explained by the retained components. What is the total variability explained by the model? Is this amount adequate?

For variance, it is advised to retain components that account for at least 70% of total variability. However, the total amount of variability as seen by the initial model is 60.875%, which is lower than the recommended 70% and therefore not adequate. If using this criterion alone, a researcher may consider the inclusion of a fourth component, which would put the total variability explained by the model at 71.952%.

**c. Assess the scree plot. At which component does the plot begin to level off?**

It appears that at around either the third or fourth component the plot begins to level off, suggesting that at least the first two components should be retained, if not the third.

**d. Assess the residuals. How many residuals exceed the 0.05 criterion?**

Ten of the twenty-eight residuals (around 36%) of the residuals exceed the 0.05 criterion.


**e. Having applied the four criteria, do you believe the number of components retained in this analysis is appropriate? If not, what is your recommendation?**


I would consider adding a fourth component to the model to reevaluate the criteria. Inclusion of the fourth component will allow the model to meet the variance criterion and will likely reduce the number of residuals that exceed the 0.05 criterion.


**2) Assume that you believe four components should be retained from the analysis in the previous exercise. Conduct a factor analysis with varimax rotation (be sure to retain four components). (\*\*Refer to SPSS Output with the subheading “Factor Analysis – With 4 components --)**

**a. Evaluate each of the four criteria. Has the model fit improved? Explain.**

With the four-component model:

1) Eigenvalue = The communalities have all increased compared to the three-component model provided by Mertler and Reinhart (2016). Still, there are five communalities that remain under the .70 commonly accepted threshold, rendering the eigenvalue criterion questionable. However, when considering the optional case where one has greater than 250 individuals and the mean communality is greater than or equal to .60, the eigenvalue criterion has improved from the three-component model (with a greater mean communality) and is appropriate. 

2) Variance = The inclusion of four components now indicates that after rotation, Component 1 accounts for 23.58%, Component 2 accounts for 20.10%, Component 3 accounts for 15.38%, and Component 4 for 12.90% of the total variability accounted for by the model. This totals 71.95%, meeting the variance criterion. 


3) Scree Plot = This is the same, where the plot indicates at least the first two components should be retained (the third one possibly as well). 

4) Residuals = Indicate that the same amount of residuals are greater than .05 (10/28 or approx 36%). However, the residuals are closer to .05 and thus show improvement.

**b. Provide two alternatives for improving the model.**

3.1

1) Another component may be added to the model. This again improves all four criteria (\*\*Refer to SPSS output with subheading Factor Analysis – With 5 components -- )

2) The data could be screened for missing data, outliers, and assumptions of normality and linearity, if not already performed. As Mertler and Reinhart (2016) suggest, both assumptions should be evaluated, and any necessary transformations be made because 

3.2

“ensuring the quality of data will only improve the quality of the resulting factor or component solution.”

**Communalities**

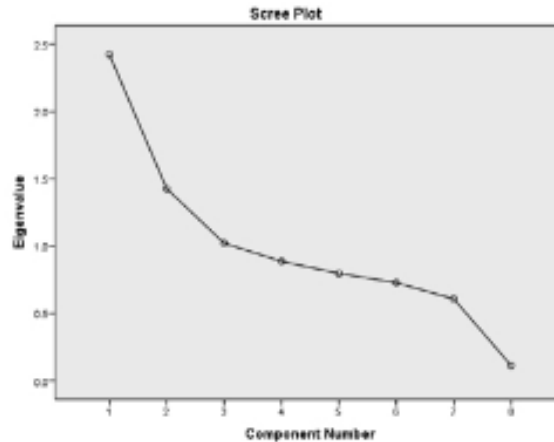
	Initial	Extraction
degree	1.000	.933
hrs1	1.000	.602
satjob	1.000	.447
educ	1.000	.939
tvhours	1.000	.556
happy	1.000	.576
life	1.000	.500
anomia5	1.000	.317

Extraction Method: Principal  
Component Analysis.

Total Variance Explained

Component	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	2.423	35.293	35.293	2.423	35.293	35.293	1.879	23.488	23.488
2	1.426	17.822	48.115	1.426	17.822	48.115	1.734	21.676	45.165
3	1.021	12.780	60.875	1.021	12.780	60.875	1.257	15.710	60.875
4	.886	11.077	71.952						
5	.796	9.955	81.907						
6	.720	9.094	91.001						
7	.607	7.589	98.590						
8	.113	1.410	100.000						

Extraction Method: Principal Component Analysis.



Reproduced Correlations

		degree	hrs1	satjob	educ	thours	happy	life	anomia5
Reproduced Correlation	degree	.933 <sup>a</sup>	.176	-.039	.935	-.239	-.119	.230	.118
	hrs1	.176	.602 <sup>a</sup>	-.239	.194	-.576	-.077	.141	-.049
	satjob	-.039	-.239	.447 <sup>a</sup>	-.062	.214	.469	-.436	-.297
	educ	.935	.194	-.062	.939 <sup>a</sup>	-.255	-.142	.252	.131
	thours	-.239	-.576	.214	-.255	.556 <sup>a</sup>	.066	-.136	.047
	happy	-.119	-.077	.469	-.142	.066	.576 <sup>a</sup>	-.526	-.412
	life	.230	.141	-.436	.252	-.136	-.526	.500 <sup>a</sup>	.371
	anomia5	.118	-.049	-.297	.131	.047	-.412	.371	.317 <sup>a</sup>
Residual <sup>b</sup>	degree		.004	-.068	-.050	.032	-.004	-.034	-.037
	hrs1		.004	.104	.011	.361	-.031	-.046	.112
	satjob		-.068	.104	-.037	-.105	-.197	.151	.158
	educ		-.050	.011	-.037	.026	-.002	-.029	-.012
	thours		.032	.361	-.105	.026	.014	-.012	-.099
	happy		-.004	-.031	-.197	-.002	.014	.159	.177
	life		-.034	-.046	.151	-.029	-.012	.159	-.217
	anomia5		-.037	.112	.158	-.012	-.099	.177	-.217

Extraction Method: Principal Component Analysis.

a. Reproduced communalities

b. Residuals are computed between observed and reproduced correlations. There are 12 (42.0%) nonredundant residuals with absolute values greater than 0.05.

**What to Turn In:**

- 1) Submit the SPSS output you created for this exercise as a single PDF document (not multiple). You may want to save the output files from SPSS to your own storage device, in case you need to make changes (PDF documents cannot be edited). In the output window in SPSS, you can use the File>Export feature to create the PDF.
- 2) In addition to the output, you must submit a written report that details what steps were taken for the analysis, providing a rationale where needed, and then you must provide any necessary interpretations of the analysis. The write up should be prepared and saved as a single Word document (.docx) with a 12 point font, in Times New Roman, and it should be double spaced with one inch margins.

## **Reference**

Mertler, Craig A. and Rachel V. Reinhart. Advanced and Multivariate Statistical Methods, 6th Edition. Routledge, 2016. VitalBook file.

FACTOR

```

/VARIABLES degree hrs1 satjob educ tvhours happy life anomia5
/MISSING LISTWISE
/ANALYSIS degree hrs1 satjob educ tvhours happy life anomia5
/PRINT INITIAL REPR EXTRACTION ROTATION
/FORMAT SORT
/PLOT EIGEN
/CRITERIA MINEIGEN(.885) ITERATE(25)
/EXTRACTION PC
/CRITERIA ITERATE(25)
/ROTATION VARIMAX
/SAVE REG(ALL)
/METHOD=CORRELATION

```

## Factor Analysis --With 4 components--

### Notes

Output Created		08-DEC-2018 09:08:28
Comments		
Input	Data	C: \Users\linds\AppData\Local \Packages\Microsoft. MicrosoftEdge_8wekyb3d 8bbwe\TempState\Downlo ads\profile-a (1).sav
	Active Dataset	DataSet4
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	1500
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.



## Notes

Syntax		<p>             FACTOR              /VARIABLES degree              hrs1 satjob educ tvhours              happy life anomia5              /MISSING LISTWISE              /ANALYSIS degree hrs1              satjob educ tvhours happy              life anomia5              /PRINT INITIAL REPR              EXTRACTION ROTATION              /FORMAT SORT              /PLOT EIGEN              /CRITERIA MINEIGEN(.              885) ITERATE(25)              /EXTRACTION PC              /CRITERIA ITERATE(25)              /ROTATION VARIMAX              /SAVE REG(ALL)                /METHOD=CORRELATIO              N.           </p>
Resources	Processor Time	00:00:00.13
	Elapsed Time	00:00:00.11
	Maximum Memory Required	9904 (9.672K) bytes
Variables Created	FAC1_2	Component score 1
	FAC2_2	Component score 2
	FAC3_2	Component score 3
	FAC4_2	Component score 4

### Communalities (Four-Component Model)

	Initial	Extraction
RS Highest Degree	1.000	.935
Number of Hours Worked Last Week	1.000	.659
Job Satisfaction	1.000	.537
Highest Year of School Completed	1.000	.939
HOURS PER DAY WATCHING TV	1.000	.558
GENERAL HAPPINESS	1.000	.578
Is life exciting or dull	1.000	.610
Lot of average man getting worse	1.000	.940

Extraction Method: Principal Component Analysis.

### Total Variance Explained

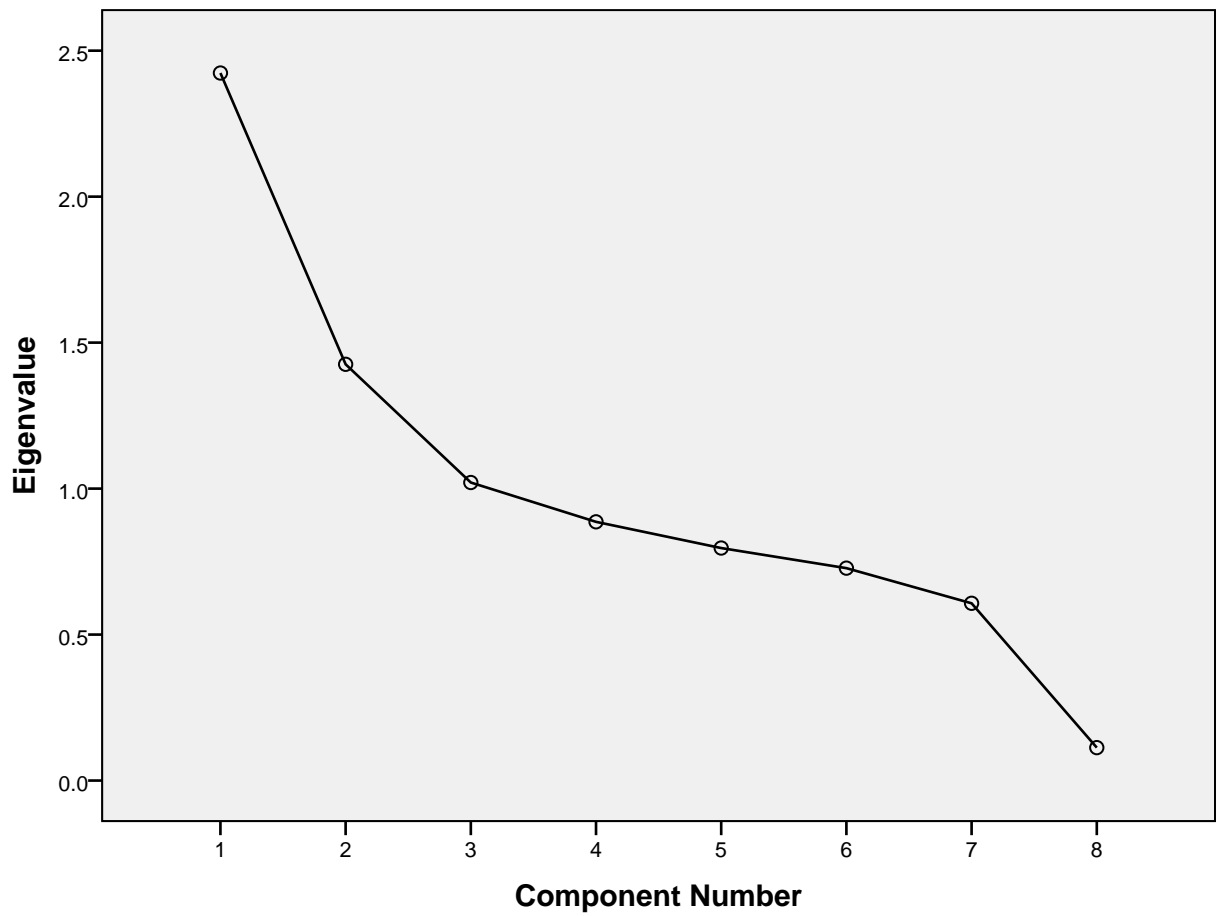
Component	Total	Initial Eigenvalues		Extraction Sums of Squared Loadings		
		% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.423	30.293	30.293	2.423	30.293	30.293
2	1.426	17.822	48.115	1.426	17.822	48.115
3	1.021	12.760	60.875	1.021	12.760	60.875
4	.886	11.077	71.952	.886	11.077	71.952
5	.796	9.955	81.907			
6	.728	9.094	91.001			
7	.607	7.589	98.590			
8	.113	1.410	100.000			

### Total Variance Explained

Component	Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	1.886	23.579	23.579
2	1.608	20.098	43.677
3	1.230	15.377	59.054
4	1.032	12.898	71.952
5			
6			
7			
8			

Extraction Method: Principal Component Analysis.

### Scree Plot



### Component Matrix<sup>a</sup>

	Component			
	1	2	3	4
Highest Year of School Completed	.805	.487	.232	-.009
RS Highest Degree	.782	.511	.246	-.047
Is life exciting or dull	.548	-.436	.099	-.332
GENERAL HAPPINESS	-.480	.570	-.145	.043
Job Satisfaction	-.420	.502	.133	.300
Number of Hours Worked Last Week	.407	.040	-.660	.239
HOURS PER DAY WATCHING TV	-.433	-.095	.600	-.046
Lot of average man getting worse	.324	-.386	.251	.789

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

### Reproduced Correlations

		RS Highest Degree	Number of Hours Worked Last Week	Job Satisfaction
Reproduced Correlation	RS Highest Degree	.935 <sup>a</sup>	.165	-.053
	Number of Hours Worked Last Week	.165	.659 <sup>a</sup>	-.167
	Job Satisfaction	-.053	-.167	.537 <sup>a</sup>
	Highest Year of School Completed	.936	.191	-.065
	HOURS PER DAY WATCHING TV	-.237	-.586	.200
	GENERAL HAPPINESS	-.121	-.067	.481
	Is life exciting or dull	.246	.061	-.536
	Lot of average man getting worse	.080	.140	-.060
Residual <sup>b</sup>	RS Highest Degree		.016	-.054
	Number of Hours Worked Last Week	.016		.032
	Job Satisfaction	-.054	.032	

### Reproduced Correlations

		Highest Year of School Completed	HOURS PER DAY WATCHING TV	GENERAL HAPPINESS
Reproduced Correlation	RS Highest Degree	.936	-.237	-.121
	Number of Hours Worked Last Week	.191	-.586	-.067
	Job Satisfaction	-.065	.200	.481
	Highest Year of School Completed	.939 <sup>a</sup>	-.255	-.142
	HOURS PER DAY WATCHING TV	-.255	.558 <sup>a</sup>	.064
	GENERAL HAPPINESS	-.142	.064	.578 <sup>a</sup>
	Is life exciting or dull	.255	-.121	-.540
	Lot of average man getting worse	.124	.011	-.378
Residual <sup>b</sup>	RS Highest Degree	-.050	.030	-.002
	Number of Hours Worked Last Week	.013	.372	-.042
	Job Satisfaction	-.035	-.091	-.209

### Reproduced Correlations

		Is life exciting or dull	Lot of average man getting worse
Reproduced Correlation	RS Highest Degree	.246	.080
	Number of Hours Worked Last Week	.061	.140
	Job Satisfaction	-.536	-.060
	Highest Year of School Completed	.255	.124
	HOURS PER DAY WATCHING TV	-.121	.011
	GENERAL HAPPINESS	-.540	-.378
	Is life exciting or dull	.610 <sup>a</sup>	.109
	Lot of average man getting worse	.109	.940 <sup>a</sup>
Residual <sup>b</sup>	RS Highest Degree	-.050	-2.048E-5
	Number of Hours Worked Last Week	.033	-.077
	Job Satisfaction	.250	-.078

### Reproduced Correlations

		RS Highest Degree	Number of Hours Worked Last Week	Job Satisfaction
	Highest Year of School Completed	-.050	.013	-.035
	HOURS PER DAY WATCHING TV	.030	.372	-.091
	GENERAL HAPPINESS	-.002	-.042	-.209
	Is life exciting or dull	-.050	.033	.250
	Lot of average man getting worse	-2.048E-5	-.077	-.078

### Reproduced Correlations

		Highest Year of School Completed	HOURS PER DAY WATCHING TV	GENERAL HAPPINESS
	Highest Year of School Completed		.026	-.002
	HOURS PER DAY WATCHING TV	.026		.016
	GENERAL HAPPINESS	-.002	.016	
	Is life exciting or dull	-.032	-.027	.173
	Lot of average man getting worse	-.005	-.063	.143

### Reproduced Correlations

		Is life exciting or dull	Lot of average man getting worse
	Highest Year of School Completed	-.032	-.005
	HOURS PER DAY WATCHING TV	-.027	-.063
	GENERAL HAPPINESS	.173	.143
	Is life exciting or dull		.044
	Lot of average man getting worse	.044	

Extraction Method: Principal Component Analysis.

a. Reproduced communalities

b. Residuals are computed between observed and reproduced correlations. There are 11 (39.0%) nonredundant residuals with absolute values greater than 0.05.

### Rotated Component Matrix<sup>a</sup>

	Component			
	1	2	3	4
RS Highest Degree	.956	-.087	.118	.017
Highest Year of School Completed	.951	-.099	.146	.059
Is life exciting or dull	.186	-.758	.018	.006
Job Satisfaction	.030	.710	-.176	.033
GENERAL HAPPINESS	-.059	.695	.000	-.302
Number of Hours Worked Last Week	.067	-.045	.801	.105
HOURS PER DAY WATCHING TV	-.150	.107	-.721	.062
Lot of average man getting worse	.052	-.122	.038	.960

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

### Component Transformation Matrix

Component	1	2	3	4
1	.718	-.536	.389	.215
2	.595	.720	.085	-.346
3	.358	-.061	-.892	.270
4	-.051	.437	.213	.872

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

FACTOR

```

/VARIABLES degree hrs1 satjob educ tvhours happy life anomia5
/MISSING LISTWISE
/ANALYSIS degree hrs1 satjob educ tvhours happy life anomia5
/PRINT INITIAL REPR EXTRACTION ROTATION
/FORMAT SORT
/PLOT EIGEN
/CRITERIA MINEIGEN(.795) ITERATE(25)
/EXTRACTION PC
/CRITERIA ITERATE(25)

```



```

/ROTATION VARIMAX
/SAVE REG(ALL)
/METHOD=CORRELATION

```

## Factor Analysis -- With 5 components --

### Notes

Output Created		08-DEC-2018 09:29:11
Comments		
Input	Data	C:\Users\linds\AppData\Local\Packages\Microsoft.MicrosoftEdge_8wekyb3d8bbwe\TempState\Downloads\profile-a (1).sav
	Active Dataset	DataSet4
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	1500
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.

## Notes

Syntax		<p>             FACTOR              /VARIABLES degree              hrs1 satjob educ tvhours              happy life anomia5              /MISSING LISTWISE              /ANALYSIS degree hrs1              satjob educ tvhours happy              life anomia5              /PRINT INITIAL REPR              EXTRACTION ROTATION              /FORMAT SORT              /PLOT EIGEN              /CRITERIA MINEIGEN(.              795) ITERATE(25)              /EXTRACTION PC              /CRITERIA ITERATE(25)              /ROTATION VARIMAX              /SAVE REG(ALL)                /METHOD=CORRELATIO              N.           </p>
Resources	Processor Time	00:00:00.13
	Elapsed Time	00:00:00.11
	Maximum Memory Required	9904 (9.672K) bytes
Variables Created	FAC1_3	Component score 1
	FAC2_3	Component score 2
	FAC3_3	Component score 3
	FAC4_3	Component score 4
	FAC5_3	Component score 5

### Communalities

	Initial	Extraction
RS Highest Degree	1.000	.939
Number of Hours Worked Last Week	1.000	.929
Job Satisfaction	1.000	.597
Highest Year of School Completed	1.000	.941
HOURS PER DAY WATCHING TV	1.000	.977
GENERAL HAPPINESS	1.000	.578
Is life exciting or dull	1.000	.642
Lot of average man getting worse	1.000	.949

Extraction Method: Principal Component Analysis.

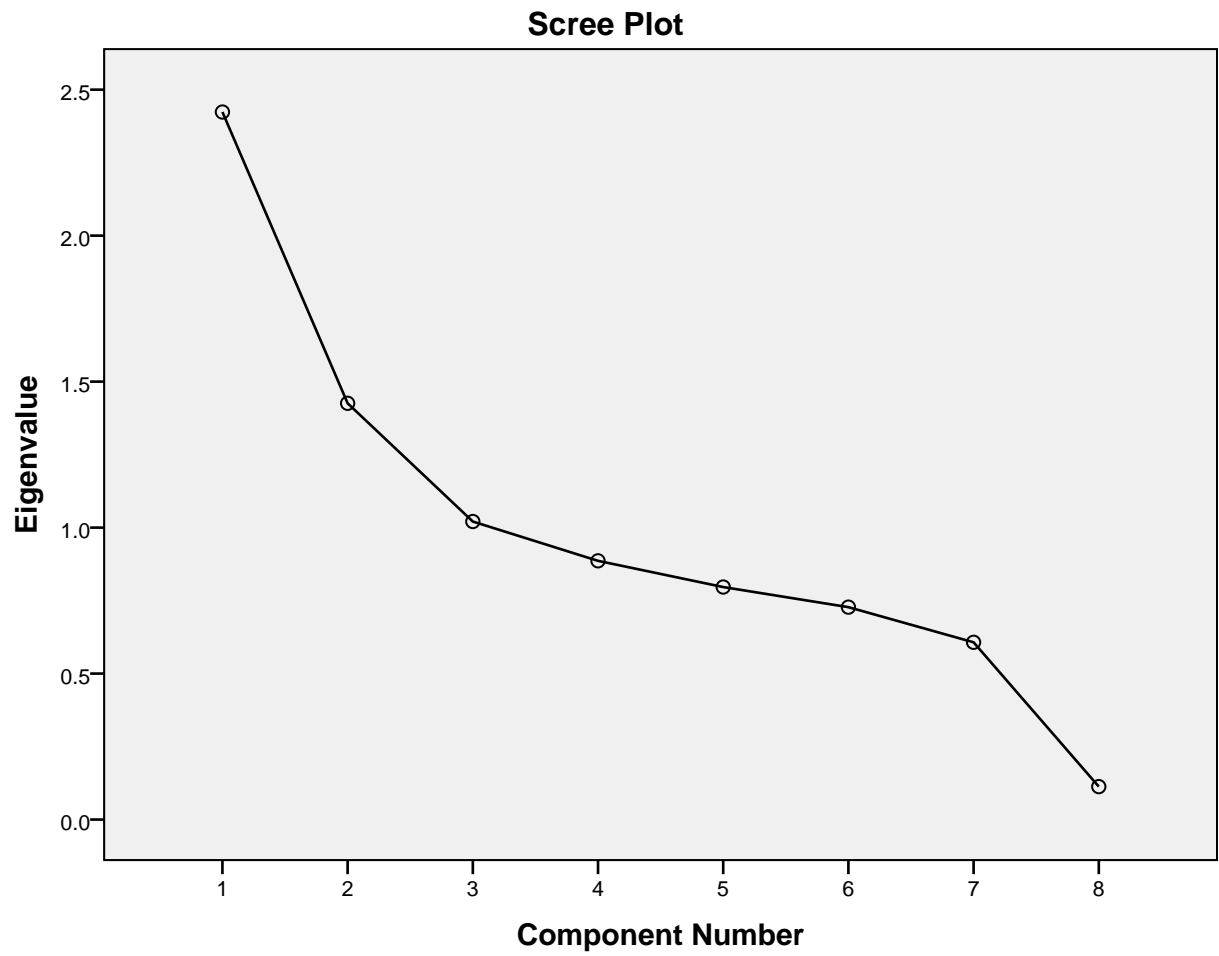
### Total Variance Explained

Component	Total	Initial Eigenvalues		Extraction Sums of Squared Loadings		
		% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.423	30.293	30.293	2.423	30.293	30.293
2	1.426	17.822	48.115	1.426	17.822	48.115
3	1.021	12.760	60.875	1.021	12.760	60.875
4	.886	11.077	71.952	.886	11.077	71.952
5	.796	9.955	81.907	.796	9.955	81.907
6	.728	9.094	91.001			
7	.607	7.589	98.590			
8	.113	1.410	100.000			

### Total Variance Explained

Component	Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	1.901	23.761	23.761
2	1.608	20.101	43.863
3	1.028	12.852	56.714
4	1.010	12.626	69.340
5	1.005	12.567	81.907
6			
7			
8			

Extraction Method: Principal Component Analysis.



### Component Matrix<sup>a</sup>

	Component				
	1	2	3	4	5
Highest Year of School Completed	.805	.487	.232	-.009	.048
RS Highest Degree	.782	.511	.246	-.047	.065
Is life exciting or dull	.548	-.436	.099	-.332	-.180
GENERAL HAPPINESS	-.480	.570	-.145	.043	-.013
Job Satisfaction	-.420	.502	.133	.300	-.246
Number of Hours Worked Last Week	.407	.040	-.660	.239	.519
Lot of average man getting worse	.324	-.386	.251	.789	-.097
HOURS PER DAY WATCHING TV	-.433	-.095	.600	-.046	.647

Extraction Method: Principal Component Analysis.

a. 5 components extracted.

### Reproduced Correlations

		RS Highest Degree	Number of Hours Worked Last Week	Job Satisfaction
Reproduced Correlation	RS Highest Degree	.939 <sup>a</sup>	.198	-.069
	Number of Hours Worked Last Week	.198	.929 <sup>a</sup>	-.295
	Job Satisfaction	-.069	-.295	.597 <sup>a</sup>
	Highest Year of School Completed	.939	.216	-.077
	HOURS PER DAY WATCHING TV	-.195	-.251	.041
	GENERAL HAPPINESS	-.122	-.073	.485
	Is life exciting or dull	.234	-.032	-.491
	Lot of average man getting worse	.074	.090	-.036
Residual <sup>b</sup>	RS Highest Degree		-.018	-.038
	Number of Hours Worked Last Week	-.018		.160
	Job Satisfaction	-.038	.160	

### Reproduced Correlations

		Highest Year of School Completed	HOURS PER DAY WATCHING TV	GENERAL HAPPINESS
Reproduced Correlation	RS Highest Degree	.939	-.195	-.122
	Number of Hours Worked Last Week	.216	-.251	-.073
	Job Satisfaction	-.077	.041	.485
	Highest Year of School Completed	.941 <sup>a</sup>	-.224	-.143
	HOURS PER DAY WATCHING TV	-.224	.977 <sup>a</sup>	.056
	GENERAL HAPPINESS	-.143	.056	.578 <sup>a</sup>
	Is life exciting or dull	.246	-.238	-.538
	Lot of average man getting worse	.119	-.051	-.377
Residual <sup>b</sup>	RS Highest Degree	-.053	-.012	-.001
	Number of Hours Worked Last Week	-.012	.037	-.035
	Job Satisfaction	-.023	.068	-.212

### Reproduced Correlations

		Is life exciting or dull	Lot of average man getting worse
Reproduced Correlation	RS Highest Degree	.234	.074
	Number of Hours Worked Last Week	-.032	.090
	Job Satisfaction	-.491	-.036
	Highest Year of School Completed	.246	.119
	HOURS PER DAY WATCHING TV	-.238	-.051
	GENERAL HAPPINESS	-.538	-.377
	Is life exciting or dull	.642 <sup>a</sup>	.126
	Lot of average man getting worse	.126	.949 <sup>a</sup>
Residual <sup>b</sup>	RS Highest Degree	-.038	.006
	Number of Hours Worked Last Week	.127	-.027
	Job Satisfaction	.206	-.102

### Reproduced Correlations

		RS Highest Degree	Number of Hours Worked Last Week	Job Satisfaction
	Highest Year of School Completed	-.053	-.012	-.023
	HOURS PER DAY WATCHING TV	-.012	.037	.068
	GENERAL HAPPINESS	-.001	-.035	-.212
	Is life exciting or dull	-.038	.127	.206
	Lot of average man getting worse	.006	-.027	-.102

### Reproduced Correlations

		Highest Year of School Completed	HOURS PER DAY WATCHING TV	GENERAL HAPPINESS
	Highest Year of School Completed		-.005	-.001
	HOURS PER DAY WATCHING TV	-.005		.024
	GENERAL HAPPINESS	-.001	.024	
	Is life exciting or dull	-.024	.089	.171
	Lot of average man getting worse	.000	.000	.142

### Reproduced Correlations

		Is life exciting or dull	Lot of average man getting worse
	Highest Year of School Completed	-.024	.000
	HOURS PER DAY WATCHING TV	.089	.000
	GENERAL HAPPINESS	.171	.142
	Is life exciting or dull		.027
	Lot of average man getting worse	.027	

Extraction Method: Principal Component Analysis.

a. Reproduced communalities

b. Residuals are computed between observed and reproduced correlations. There are 10 (35.0%) nonredundant residuals with absolute values greater than 0.05.



### Rotated Component Matrix<sup>a</sup>

	Component				
	1	2	3	4	5
RS Highest Degree	.960	-.087	.014	.068	-.066
Highest Year of School Completed	.955	-.098	.058	.082	-.093
Is life exciting or dull	.173	-.749	.027	-.135	-.182
Job Satisfaction	.009	.720	.065	-.270	-.044
GENERAL HAPPINESS	-.060	.697	-.297	-.008	-.009
Lot of average man getting worse	.048	-.126	.964	.036	-.017
Number of Hours Worked Last Week	.124	-.068	.041	.945	-.121
HOURS PER DAY WATCHING TV	-.121	.074	-.016	-.119	.971

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

### Component Transformation Matrix

Component	1	2	3	4	5
1	.725	-.534	.216	.252	-.280
2	.595	.724	-.338	.020	-.082
3	.336	-.064	.271	-.684	.585
4	-.043	.429	.867	.247	-.040
5	.072	-.047	-.120	.638	.755

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

# Index of comments

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- 2.1      should be 12
- 3.1      this will not change the underlying problem of communalities/scree plot; might add or remove variables
- 3.2      yes but screening should be a given; you might try another rotation method