

```
2135 0 OUTPUT ACTIVATE ScreePlotOutput.  
2135 0 M> OUTPUT ACTIVATE ScreePlotOutput.  
2136 0 TITLE 'Cattell Scree Plot Analysis'.  
2136 0 M> TITLE 'Cattell Scree Plot Analysis'.
```

Cattell Scree Plot Analysis

```
2137 0
2137 0 M>
2138 0 GET DATA
2138 0 M> GET DATA
2139 0 /TYPE=TXT /FILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\Scree Plot\dataset.csv' /ENCODING='UTF8' /D
      ELCASE=LINE /DELIMITERS=', ' /QUALIFIER='"'
2139 0 M> /TYPE=TXT /FILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\Scree Plot\dataset.csv' /ENCODING='UTF8'
      /DELCASE=LINE /DELIMITERS=', ' /QUALIFIER='"'
2140 0 /ARRANGEMENT=DELIMITED /FIRSTCASE=2
2140 0 M> /ARRANGEMENT=DELIMITED /FIRSTCASE=2
2141 0 /VARIABLES=
2141 0 M> /VARIABLES=
2142 0 school A8 sex A8 age F8.0 address A8 famsize A8 Pstatus A8 Medu F8.0
      Fedu F8.0
2142 0 M> school A8 sex A8 age F8.0 address A8 famsize A8 Pstatus A8 Medu F
      8.0 Fedu F8.0
2143 0 Mjob A16 Fjob A16 reason A16 guardian A16 traveltime F8.0 studytime
      F8.0 failures F8.0
2143 0 M> Mjob A16 Fjob A16 reason A16 guardian A16 traveltime F8.0 studyti
      me F8.0 failures F8.0
2144 0 schoolsup A8 famsup A8 paid A8 activities A8 nursery A8 higher A8 in
      ternet A8 romantic A8
2144 0 M> schoolsup A8 famsup A8 paid A8 activities A8 nursery A8 higher A8
      internet A8 romantic A8
2145 0 famrel F8.0 freetime F8.0 goout F8.0 Dalc F8.0 Walc F8.0 health F8.0
      absences F8.0 G1 F8.0 G2 F8.0 G3 F8.0.
2145 0 M> famrel F8.0 freetime F8.0 goout F8.0 Dalc F8.0 Walc F8.0 health F
      8.0 absences F8.0 G1 F8.0 G2 F8.0 G3 F8.0.
2146 0 DATASET NAME ScreePlotData.
2146 0 M> DATASET NAME ScreePlotData.
2147 0 COMPUTE subject_id=$CASENUM.
2147 0 M> COMPUTE subject_id=$CASENUM.
2148 0 COMPUTE Dalc_R=6-Dalc.
2148 0 M> COMPUTE Dalc_R=6-Dalc.
2149 0 COMPUTE Walc_R=6-Walc.
2149 0 M> COMPUTE Walc_R=6-Walc.
```

Cattell Scree Plot Analysis

```
2150  0  RECODE schoolsup famsup paid activities higher internet ('no'=0) ('yes'=1)
2150  0 M> RECODE schoolsup famsup paid activities higher internet ('no'=0) ('yes'=1)
2151  0  INTO schoolsup_b famsup_b paid_b activities_b higher_b internet_b.
2151  0 M> INTO schoolsup_b famsup_b paid_b activities_b higher_b internet_b
.
2152  0  EXECUTE.
2152  0 M> EXECUTE.
2153  0
2153  0 M>
2154  0  * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
2154  0 M> * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
2155  0  TITLE 'Cattell Scree Plot Analysis'.
2155  0 M> TITLE 'Cattell Scree Plot Analysis'.
```

Cattell Scree Plot Analysis

```
2156 0 SUBTITLE 'Eigenvalue coordinates and elbow inspection'.  
2156 0 M> SUBTITLE 'Eigenvalue coordinates and elbow inspection'.
```

Cattell Scree Plot Analysis
Eigenvalue coordinates and elbow inspection

```

2157  0  FACTOR /VARIABLES=G1 G2 G3 famrel freetime goout /MISSING=LISTWISE /A
NALYSIS=G1 G2 G3 famrel freetime goout
2157  0 M>  FACTOR /VARIABLES=G1 G2 G3 famrel freetime goout /MISSING=LISTWISE
 /ANALYSIS=G1 G2 G3 famrel freetime goout
2158  0  /PRINT=INITIAL EXTRACTION KMO CORRELATION /PLOT=EIGEN
2158  0 M>  /PRINT=INITIAL EXTRACTION KMO CORRELATION /PLOT=EIGEN
2159  0  /CRITERIA=FACTORS(6) ITERATE(500) /EXTRACTION=PC /ROTATION=NOROTATE
/METHOD=CORRELATION.
2159  0 M>  /CRITERIA=FACTORS(6) ITERATE(500) /EXTRACTION=PC /ROTATION=NOROTA
TE /METHOD=CORRELATION.

```

Factor Analysis

Notes

Output Created		18-JUL-2026 10:57:37
Comments		
Input	Data	D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\Scree Plot\dataset.csv
	Active Dataset	ScreePlotData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649
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.

Cattell Scree Plot Analysis
Eigenvalue coordinates and elbow inspection

Notes

Syntax		FACTOR /VARIABLES=G1 G2 G3 famrel freetime goout /MISSING=LISTWISE /ANALYSIS=G1 G2 G3 famrel freetime goout /PRINT=INITIAL EXTRACTION KMO CORRELATION /PLOT=EIGEN /CRITERIA=FACTORS(6) ITERATE(500) /EXTRACTION=PC /ROTATION=NOROTATE /METHOD=CORRELATIO N.
Resources	Processor Time	00:00:00.34
	Elapsed Time	00:00:00.31
	Maximum Memory Required	5704 (5.570K) bytes

[ScreePlotData]

Correlation Matrix

		G1	G2	G3	famrel	freetime	goout
Correlation	G1	1.000	.865	.826	.049	-.094	-.074
	G2	.865	1.000	.919	.090	-.107	-.079
	G3	.826	.919	1.000	.063	-.123	-.088
	famrel	.049	.090	.063	1.000	.129	.090
	freetime	-.094	-.107	-.123	.129	1.000	.346
	goout	-.074	-.079	-.088	.090	.346	1.000

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.732
Bartlett's Test of Sphericity	Approx. Chi-Square	2220.632
	df	15
	Sig.	.000

Cattell Scree Plot Analysis
Eigenvalue coordinates and elbow inspection

Communalities

	Initial	Extraction
G1	1.000	1.000
G2	1.000	1.000
G3	1.000	1.000
famrel	1.000	1.000
freetime	1.000	1.000
goout	1.000	1.000

Extraction Method: Principal Component Analysis.

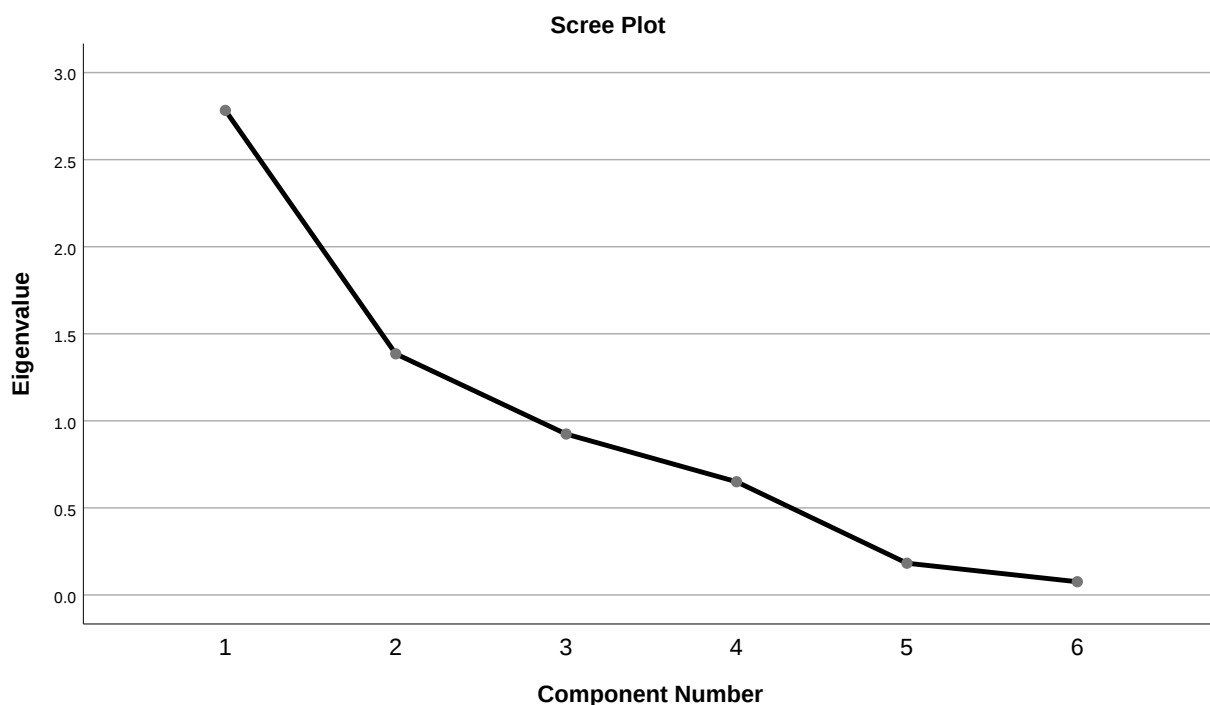
Total Variance Explained

Component	Total	Initial Eigenvalues		Extraction Sums of Squared Loadings		
		% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.783	46.381	46.381	2.783	46.381	46.381
2	1.385	23.080	69.461	1.385	23.080	69.461
3	.924	15.402	84.863	.924	15.402	84.863
4	.650	10.835	95.698	.650	10.835	95.698
5	.182	3.038	98.736	.182	3.038	98.736
6	.076	1.264	100.000	.076	1.264	100.000

Extraction Method: Principal Component Analysis.

Cattell Scree Plot Analysis

Eigenvalue coordinates and elbow inspection



Component Matrix^a

	Component					
	1	2	3	4	5	6
G1	.931	.084	-.083	-.023	.342	.050
G2	.966	.093	-.039	-.009	-.102	-.213
G3	.954	.067	-.055	-.003	-.234	.167
famrel	.085	.474	.873	.081	.011	.006
freetime	-.198	.763	-.193	-.584	-.010	.002
goout	-.163	.747	-.338	.550	-.001	.000

Extraction Method: Principal Component Analysis.

a. 6 components extracted.

2160 0 ECHO 'The scree elbow is separate from Kaiser and parallel-analysis rules'.

2160 0 M> ECHO 'The scree elbow is separate from Kaiser and parallel-analysis rules'.

The scree elbow is separate from Kaiser and parallel-analysis rules

Cattell Scree Plot Analysis
Eigenvalue coordinates and elbow inspection

2161 0 DESCRIPTIVES VARIABLES=G1 G2 G3 famrel freetime goout /STATISTICS=MEAN STDDEV MIN MAX.

2161 0 M> DESCRIPTIVES VARIABLES=G1 G2 G3 famrel freetime goout /STATISTICS=MEAN STDDEV MIN MAX.

Descriptives

Notes

Output Created		18-JUL-2026 10:57:38
Comments		
Input	Data	D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\Scree Plot\dataset.csv
	Active Dataset	ScreePlotData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649
Missing Value Handling	Definition of Missing	User defined missing values are treated as missing.
	Cases Used	All non-missing data are used.
Syntax		DESCRIPTIVES VARIABLES=G1 G2 G3 famrel freetime goout /STATISTICS=MEAN STDDEV MIN MAX.
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.04

Cattell Scree Plot Analysis
Eigenvalue coordinates and elbow inspection

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
G1	649	0	19	11.40	2.745
G2	649	0	19	11.57	2.914
G3	649	0	19	11.91	3.231
famrel	649	1	5	3.93	.956
freetime	649	1	5	3.18	1.051
goout	649	1	5	3.18	1.176
Valid N (listwise)	649				

```

2162 0 * END METHOD-SPECIFIC SPSS WORKFLOW.
2162 0 M> * END METHOD-SPECIFIC SPSS WORKFLOW.
2163 0
2163 0 M>
2164 0 SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scale T
esting\Scree Plot\SPSS_Output\sav\scree-plot_spss_read
y_data.sav' /COMPRESSED.
2164 0 M> SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scal
e Testing\Scree Plot\SPSS_Output\sav\scree-plot_spss_r
eady_data.sav' /COMPRESSED.

2165 0
2165 0 M>
2166 0 ECHO '=====
====='.
2166 0 M> ECHO '=====
====='.

=====
2167 0 ECHO 'CATTELL SCREE PLOT ANALYSIS'.
2167 0 M> ECHO 'CATTELL SCREE PLOT ANALYSIS'.
CATTELL SCREE PLOT ANALYSIS
2168 0 ECHO 'Design: Ordered correlation eigenvalues with first and second d
ifferences for elbow identification.'.
2168 0 M> ECHO 'Design: Ordered correlation eigenvalues with first and secon
d differences for elbow identification.'.
Design: Ordered correlation eigenvalues with first and second differences for
elbow identification.

```

Cattell Scree Plot Analysis
Eigenvalue coordinates and elbow inspection

```
2169 0 ECHO 'Null hypothesis: The eigenvalue sequence has no interpretable e
lbow above the scree.'.
2169 0 M> ECHO 'Null hypothesis: The eigenvalue sequence has no interpretabl
e elbow above the scree.'.
Null hypothesis: The eigenvalue sequence has no interpretable elbow above the
scree.
2170 0 ECHO 'Formula: Plot lambda_j versus j; inspect Delta lambda and Delta
^2 lambda for the break in slope.'.
2170 0 M> ECHO 'Formula: Plot lambda_j versus j; inspect Delta lambda and De
lta^2 lambda for the break in slope.'.
Formula: Plot lambda_j versus j; inspect Delta lambda and Delta^2 lambda for t
he break in slope.
2171 0 ECHO 'Variables: G1, G2, G3, famrel, freetime, goout'.
2171 0 M> ECHO 'Variables: G1, G2, G3, famrel, freetime, goout'.
Variables: G1, G2, G3, famrel, freetime, goout
2172 0 ECHO 'Rows analyzed: 649'.
2172 0 M> ECHO 'Rows analyzed: 649'.
Rows analyzed: 649
2173 0 ECHO 'components = 6'.
2173 0 M> ECHO 'components = 6'.
components = 6
2174 0 ECHO 'eigenvalues_above_one = 2'.
2174 0 M> ECHO 'eigenvalues_above_one = 2'.
eigenvalues_above_one = 2
2175 0 ECHO 'elbow_component = 2'.
2175 0 M> ECHO 'elbow_component = 2'.
elbow_component = 2
2176 0 ECHO 'first_two_variance = 0.694612262636963'.
2176 0 M> ECHO 'first_two_variance = 0.694612262636963'.
first_two_variance = 0.694612262636963
2177 0 ECHO 'largest_eigenvalue = 2.7828698961540006'.
2177 0 M> ECHO 'largest_eigenvalue = 2.7828698961540006'.
largest_eigenvalue = 2.7828698961540006
2178 0 ECHO 'Cross-check status: pass'.
2178 0 M> ECHO 'Cross-check status: pass'.
Cross-check status: pass
2179 0 ECHO '=====
====='.
.
```

Cattell Scree Plot Analysis
Eigenvalue coordinates and elbow inspection

```
2179  0 M>  ECHO '=====
====='.
=====
2180  0
2180  0 M>
2181  0  OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis and
Scale Testing\Scree Plot\SPSS_Output\spv\scree-plot_sp
        ss_output.spv'.
2181  0 M>  OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis a
nd Scale Testing\Scree Plot\SPSS_Output\spv\scree-plot
        _spss_output.spv'.
2182  0  OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=PRI
NTSETTING
2182  0 M>  OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=
PRINTSETTING
```