```
1118  0  OUTPUT ACTIVATE FactorAnalysisinSPSSOutput.
1118  0 M>  OUTPUT ACTIVATE FactorAnalysisinSPSSOutput.
1119  0  TITLE 'SPSS-Style Principal Axis Factoring'.
1119  0 M>  TITLE 'SPSS-Style Principal Axis Factoring'.
```

```
1120  0
1120  0 M>
1121  0  GET DATA
1121  0 M>  GET DATA
1122  0   /TYPE=TXT /FILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Sca
le Testing\Factor Analysis in SPSS\dataset.csv' /ENCOD
            ING='UTF8' /DELCASE=LINE /DELIMITERS=',' /QUALIFIER='"'
1122  0 M>   /TYPE=TXT /FILE='D:\DATA ANALYSIS\L Validity Factor Analysis and
Scale Testing\Factor Analysis in SPSS\dataset.csv' /EN
              CODING='UTF8' /DELCASE=LINE /DELIMITERS=',' /QUALIFIER='"'
1123  0   /ARRANGEMENT=DELIMITED /FIRSTCASE=2
1123  0 M>   /ARRANGEMENT=DELIMITED /FIRSTCASE=2
1124  0   /VARIABLES=
1124  0 M>   /VARIABLES=
1125  0   school A8 sex A8 age F8.0 address A8 famsize A8 Pstatus A8 Medu F8.0
 Fedu F8.0
1125  0 M>   school A8 sex A8 age F8.0 address A8 famsize A8 Pstatus A8 Medu F
8.0 Fedu F8.0
1126  0   Mjob A16 Fjob A16 reason A16 guardian A16 traveltime F8.0 studytime
F8.0 failures F8.0
1126  0 M>   Mjob A16 Fjob A16 reason A16 guardian A16 traveltime F8.0 studyti
me F8.0 failures F8.0
1127  0   schoolsup A8 famsup A8 paid A8 activities A8 nursery A8 higher A8 in
ternet A8 romantic A8
1127  0 M>   schoolsup A8 famsup A8 paid A8 activities A8 nursery A8 higher A8
 internet A8 romantic A8
1128  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.
1128  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.
1129  0  DATASET NAME FactorAnalysisinSPSSData.
1129  0 M>  DATASET NAME FactorAnalysisinSPSSData.
1130  0  COMPUTE subject_id=$CASENUM.
1130  0 M>  COMPUTE subject_id=$CASENUM.
1131  0  COMPUTE Dalc_R=6-Dalc.
1131  0 M>  COMPUTE Dalc_R=6-Dalc.
1132  0  COMPUTE Walc_R=6-Walc.
1132  0 M>  COMPUTE Walc_R=6-Walc.
```

```
1133  0  RECODE schoolsup famsup paid activities higher internet ('no'=0) ('ye
s'=1)
1133  0 M>  RECODE schoolsup famsup paid activities higher internet ('no'=0) (
'yes'=1)
1134  0   INTO schoolsup_b famsup_b paid_b activities_b higher_b internet_b.
1134  0 M>   INTO schoolsup_b famsup_b paid_b activities_b higher_b internet_b
.
1135  0  EXECUTE.
1135  0 M>  EXECUTE.
1136  0
1136  0 M>
1137  0  * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
1137  0 M>  * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
1138  0  TITLE 'SPSS Principal Axis Factor Analysis'.
1138  0 M>  TITLE 'SPSS Principal Axis Factor Analysis'.
```

```
1139  0  SUBTITLE 'Native PAF with Kaiser-normalized varimax'.
1139  0 M>  SUBTITLE 'Native PAF with Kaiser-normalized varimax'.
```

```
1140  0  FACTOR /VARIABLES=G1 G2 G3 famrel freetime goout /MISSING=LISTWISE /A
NALYSIS=G1 G2 G3 famrel freetime goout
1140  0 M>  FACTOR /VARIABLES=G1 G2 G3 famrel freetime goout /MISSING=LISTWISE
 /ANALYSIS=G1 G2 G3 famrel freetime goout
1141  0   /PRINT=INITIAL EXTRACTION KMO CORRELATION ROTATION /PLOT=EIGEN ROTAT
ION
1141  0 M>   /PRINT=INITIAL EXTRACTION KMO CORRELATION ROTATION /PLOT=EIGEN RO
TATION
1142  0   /CRITERIA=FACTORS(2) ITERATE(500) /EXTRACTION=PAF /ROTATION=VARIMAX
/METHOD=CORRELATION.
1142  0 M>   /CRITERIA=FACTORS(2) ITERATE(500) /EXTRACTION=PAF /ROTATION=VARIM
AX /METHOD=CORRELATION.
```

Factor Analysis

Notes

Output Created		18-JUL-2026 10:55:54
Comments		
Input	Data	D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\Factor Analysis in SPSS\dataset.csv
	Active Dataset	FactorAnalysisinSPSSData
	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.

SPSS Principal Axis Factor Analysis
Native PAF with Kaiser-normalized varimax

Notes

Syntax		FACTOR /VARIABLES=G1 G2 G3 famrel freetime goout /MISSING=LISTWISE /ANALYSIS=G1 G2 G3 famrel freetime goout /PRINT=INITIAL EXTRACTION KMO CORRELATION ROTATION /PLOT=EIGEN ROTATION /CRITERIA=FACTORS(2) ITERATE(500) /EXTRACTION=PAF /ROTATION=VARIMAX /METHOD=CORRELATIO...
Resources	Processor Time	00:00:00.64
	Elapsed Time	00:00:00.55
	Maximum Memory Required	5704 (5.570K) bytes

[FactorAnalysisinSPSSData]

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

SPSS Principal Axis Factor Analysis
Native PAF with Kaiser-normalized varimax

Communalities

	Initial	Extraction
G1	.755	.775
G2	.880	.966
G3	.849	.878
famrel	.034	.045
freetime	.140	.474
goout	.125	.252

Extraction Method: Principal Axis Factoring.

Total Variance Explained

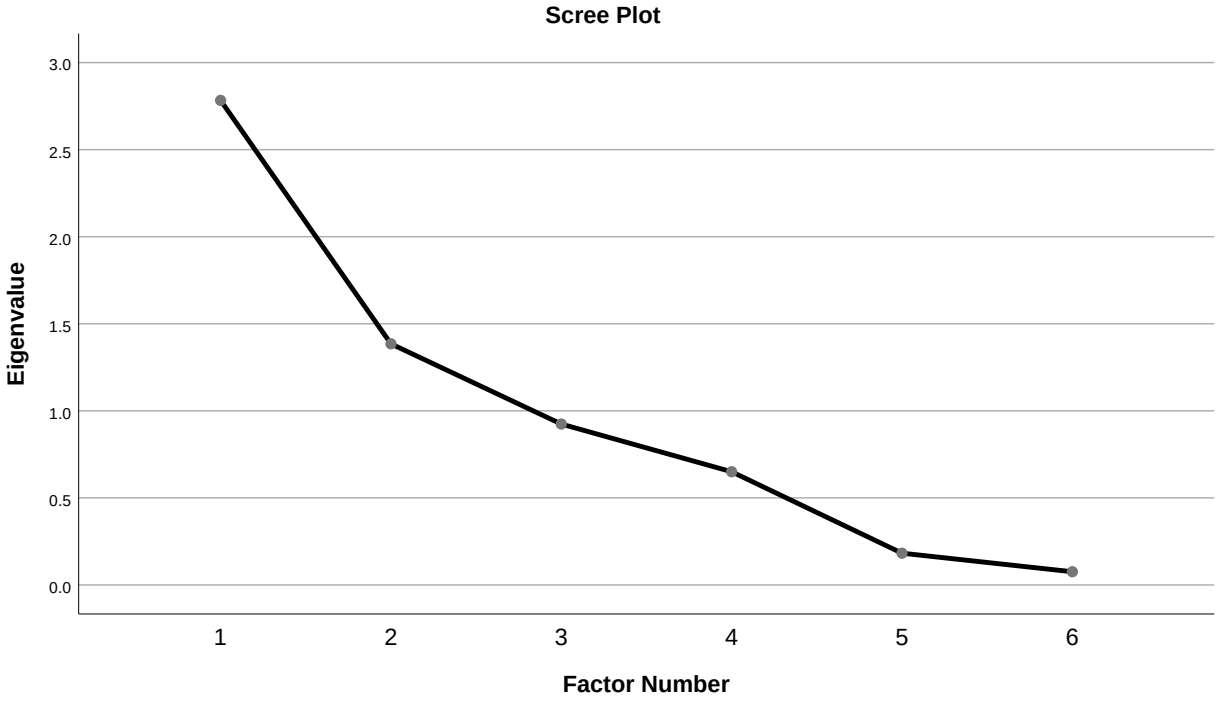
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.783	46.381	46.381	2.650	44.166	44.166
2	1.385	23.080	69.461	.740	12.337	56.503
3	.924	15.402	84.863			
4	.650	10.835	95.698			
5	.182	3.038	98.736			
6	.076	1.264	100.000			

Total Variance Explained

	Rotation Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %
1	2.640	44.008	44.008
2	.750	12.495	56.503
3			
4			
5			
6			

Extraction Method: Principal Axis Factoring.

SPSS Principal Axis Factor Analysis
Native PAF with Kaiser-normalized varimax



Factor Matrix[a]

	Factor	
	1	2
G1	.879	.053
G2	.980	.070
G3	.936	.033
famrel	.061	.204
freetime	-.153	.671
goout	-.114	.489

Extraction Method: Principal Axis Factoring.

a. 2 factors extracted. 41 iterations required.

SPSS Principal Axis Factor Analysis
Native PAF with Kaiser-normalized varimax

Rotated Factor Matrix[a]

	Factor	
	1	2
G1	.880	-.009
G2	.983	.000
G3	.936	-.033
famrel	.076	.199
freetime	-.106	.681
goout	-.079	.496

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

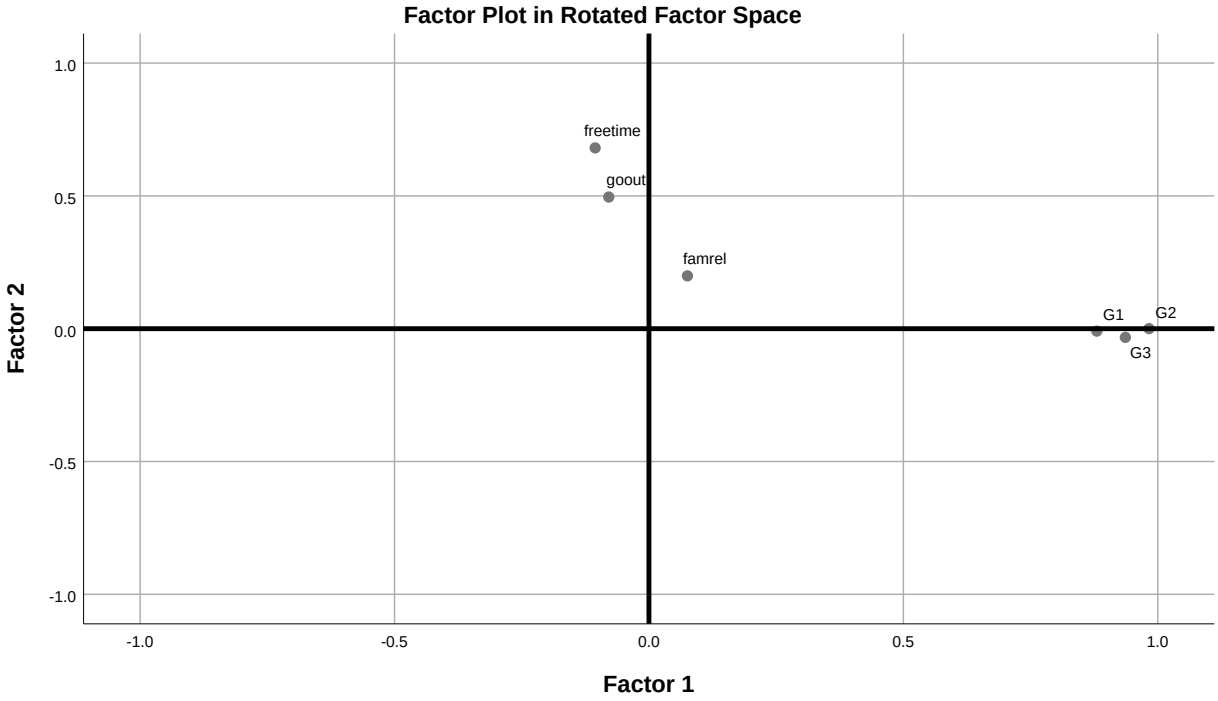
a. Rotation converged in 3 iterations.

Factor Transformation Matrix

Factor	1	2
1	.998	-.071
2	.071	.998

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

SPSS Principal Axis Factor Analysis
Native PAF with Kaiser-normalized varimax




```
1143  0  ECHO 'This is the native SPSS factor-analysis workflow'.
1143  0 M>  ECHO 'This is the native SPSS factor-analysis workflow'.
This is the native SPSS factor-analysis workflow
1144  0  DESCRIPTIVES VARIABLES=G1 G2 G3 famrel freetime goout /STATISTICS=MEA
N STDDEV MIN MAX.
1144  0 M>  DESCRIPTIVES VARIABLES=G1 G2 G3 famrel freetime goout /STATISTICS=
MEAN STDDEV MIN MAX.
```

Descriptives

SPSS Principal Axis Factor Analysis
Native PAF with Kaiser-normalized varimax

Notes

Output Created		18-JUL-2026 10:55:54
Comments		
Input	Data	D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\Factor Analysis in SPSS\dataset.csv
	Active Dataset	FactorAnalysisinSPSSData
	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	00:00:00.07

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				

```
1145  0  * END METHOD-SPECIFIC SPSS WORKFLOW.
```

```
1145  0 M>  * END METHOD-SPECIFIC SPSS WORKFLOW.
1146  0
1146  0 M>
1147  0  SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scale T
esting\Factor Analysis in SPSS\SPSS_Output\sav\factor-
           analysis-in-spss_spss_ready_data.sav' /COMPRESSED.
1147  0 M>  SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scal
e Testing\Factor Analysis in SPSS\SPSS_Output\sav\fact
              or-analysis-in-spss_spss_ready_data.sav' /COMPRESSED.
1148  0
1148  0 M>
1149  0  ECHO '============================================================
=========='.
1149  0 M>  ECHO '============================================================
============'.
==============================================================================
1150  0  ECHO 'SPSS-STYLE PRINCIPAL AXIS FACTORING'.
1150  0 M>  ECHO 'SPSS-STYLE PRINCIPAL AXIS FACTORING'.
SPSS-STYLE PRINCIPAL AXIS FACTORING
1151  0  ECHO 'Design: Principal-axis extraction with Kaiser-normalized varima
x rotation and diagnostic tables.'.
1151  0 M>  ECHO 'Design: Principal-axis extraction with Kaiser-normalized var
imax rotation and diagnostic tables.'.
Design: Principal-axis extraction with Kaiser-normalized varimax rotation and
diagnostic tables.
1152  0  ECHO 'Null hypothesis: The retained factors have no salient rotated l
oadings.'.
1152  0 M>  ECHO 'Null hypothesis: The retained factors have no salient rotate
d loadings.'.
Null hypothesis: The retained factors have no salient rotated loadings.
1153  0  ECHO 'Formula: PAF iterates communalities; varimax maximizes variance
 of squared normalized loadings.'.
1153  0 M>  ECHO 'Formula: PAF iterates communalities; varimax maximizes varia
nce of squared normalized loadings.'.
Formula: PAF iterates communalities; varimax maximizes variance of squared nor
malized loadings.
1154  0  ECHO 'Variables: G1, G2, G3, famrel, freetime, goout'.
1154  0 M>  ECHO 'Variables: G1, G2, G3, famrel, freetime, goout'.
Variables: G1, G2, G3, famrel, freetime, goout
```

```
1155  0  ECHO 'Rows analyzed: 649'.
1155  0 M>  ECHO 'Rows analyzed: 649'.
Rows analyzed: 649
1156  0  ECHO 'bartlett_chi_square = 2220.6317415901754'.
1156  0 M>  ECHO 'bartlett_chi_square = 2220.6317415901754'.
bartlett_chi_square = 2220.6317415901754
1157  0  ECHO 'bartlett_p_value = 0.0'.
1157  0 M>  ECHO 'bartlett_p_value = 0.0'.
bartlett_p_value = 0.0
1158  0  ECHO 'factors = 2'.
1158  0 M>  ECHO 'factors = 2'.
factors = 2
1159  0  ECHO 'kmo = 0.7319770330640147'.
1159  0 M>  ECHO 'kmo = 0.7319770330640147'.
kmo = 0.7319770330640147
1160  0  ECHO 'rotation_loading_maximum = 0.982458749894515'.
1160  0 M>  ECHO 'rotation_loading_maximum = 0.982458749894515'.
rotation_loading_maximum = 0.982458749894515
1161  0  ECHO 'Cross-check status: pass'.
1161  0 M>  ECHO 'Cross-check status: pass'.
Cross-check status: pass
1162  0  ECHO '================================================================
=========='.
1162  0 M>  ECHO '================================================================
============'.
================================================================================
1163  0
1163  0 M>
1164  0  OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis and
Scale Testing\Factor Analysis in SPSS\SPSS_Output\spv\
            factor-analysis-in-spss_spss_output.spv'.
1164  0 M>  OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis a
nd Scale Testing\Factor Analysis in SPSS\SPSS_Output\s
               pv\factor-analysis-in-spss_spss_output.spv'.
1165  0  OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=PRI
NTSETTING
1165  0 M>  OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=
PRINTSETTING
```