

```
2619 0 OUTPUT ACTIVATE VarimaxRotationOutput.  
2619 0 M> OUTPUT ACTIVATE VarimaxRotationOutput.  
2620 0 TITLE 'Varimax Orthogonal Rotation'.  
2620 0 M> TITLE 'Varimax Orthogonal Rotation'.
```

Varimax Orthogonal Rotation

```
2621 0
2621 0 M>
2622 0 GET DATA
2622 0 M> GET DATA
2623 0 /TYPE=TXT /FILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\Varimax Rotation\dataset.csv' /ENCODING='UTF8' /DELCASE=LINE /DELIMITERS=', ' /QUALIFIER='''
2623 0 M> /TYPE=TXT /FILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\Varimax Rotation\dataset.csv' /ENCODING='UTF8' /DELCASE=LINE /DELIMITERS=', ' /QUALIFIER='''
2624 0 /ARRANGEMENT=DELIMITED /FIRSTCASE=2
2624 0 M> /ARRANGEMENT=DELIMITED /FIRSTCASE=2
2625 0 /VARIABLES=
2625 0 M> /VARIABLES=
2626 0 school A8 sex A8 age F8.0 address A8 famsize A8 Pstatus A8 Medu F8.0 Fedu F8.0
2626 0 M> school A8 sex A8 age F8.0 address A8 famsize A8 Pstatus A8 Medu F8.0 Fedu F8.0
2627 0 Mjob A16 Fjob A16 reason A16 guardian A16 traveltime F8.0 studytime F8.0 failures F8.0
2627 0 M> Mjob A16 Fjob A16 reason A16 guardian A16 traveltime F8.0 studytime F8.0 failures F8.0
2628 0 schoolsup A8 famsup A8 paid A8 activities A8 nursery A8 higher A8 internet A8 romantic A8
2628 0 M> schoolsup A8 famsup A8 paid A8 activities A8 nursery A8 higher A8 internet A8 romantic A8
2629 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.
2629 0 M> 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.
2630 0 DATASET NAME VarimaxRotationData.
2630 0 M> DATASET NAME VarimaxRotationData.
2631 0 COMPUTE subject_id=$CASENUM.
2631 0 M> COMPUTE subject_id=$CASENUM.
2632 0 COMPUTE Dalc_R=6-Dalc.
2632 0 M> COMPUTE Dalc_R=6-Dalc.
2633 0 COMPUTE Walc_R=6-Walc.
2633 0 M> COMPUTE Walc_R=6-Walc.
```

Varimax Orthogonal Rotation

```
2634 0 RECODE schoolsup famsup paid activities higher internet ('no'=0) ('yes'=1)
2634 0 M> RECODE schoolsup famsup paid activities higher internet ('no'=0) ('yes'=1)
2635 0 INTO schoolsup_b famsup_b paid_b activities_b higher_b internet_b.
2635 0 M> INTO schoolsup_b famsup_b paid_b activities_b higher_b internet_b
.
2636 0 EXECUTE.
2636 0 M> EXECUTE.
2637 0
2637 0 M>
2638 0 * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
2638 0 M> * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
2639 0 TITLE 'Varimax Orthogonal Rotation'.
2639 0 M> TITLE 'Varimax Orthogonal Rotation'.
```

Varimax Orthogonal Rotation

```
2640 0 SUBTITLE 'Orthogonal variance maximization of squared loadings'.  
2640 0 M> SUBTITLE 'Orthogonal variance maximization of squared loadings'.
```

Varimax Orthogonal Rotation
Orthogonal variance maximization of squared loadings

```

2641  0  FACTOR /VARIABLES=G1 G2 G3 famrel freetime goout /MISSING=LISTWISE /A
NALYSIS=G1 G2 G3 famrel freetime goout
2641  0 M>  FACTOR /VARIABLES=G1 G2 G3 famrel freetime goout /MISSING=LISTWISE
 /ANALYSIS=G1 G2 G3 famrel freetime goout
2642  0  /PRINT=INITIAL EXTRACTION KMO CORRELATION ROTATION /PLOT=EIGEN ROTAT
ION
2642  0 M>  /PRINT=INITIAL EXTRACTION KMO CORRELATION ROTATION /PLOT=EIGEN RO
TATION
2643  0  /CRITERIA=FACTORS(2) ITERATE(500) /EXTRACTION=PAF /ROTATION=VARIMAX
/METHOD=CORRELATION.
2643  0 M>  /CRITERIA=FACTORS(2) ITERATE(500) /EXTRACTION=PAF /ROTATION=VARIM
AX /METHOD=CORRELATION.

```

Factor Analysis

Notes

Output Created		18-JUL-2026 10:58:15
Comments		
Input	Data	D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\Varimax Rotation\dataset.csv
	Active Dataset	VarimaxRotationData
	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.

Varimax Orthogonal Rotation
Orthogonal variance maximization of squared loadings

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	00:00:00.41
	Elapsed Time	00:00:00.37
	Maximum Memory Required	5704 (5.570K) bytes

[VarimaxRotationData]

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

Varimax Orthogonal Rotation
Orthogonal variance maximization of squared loadings

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

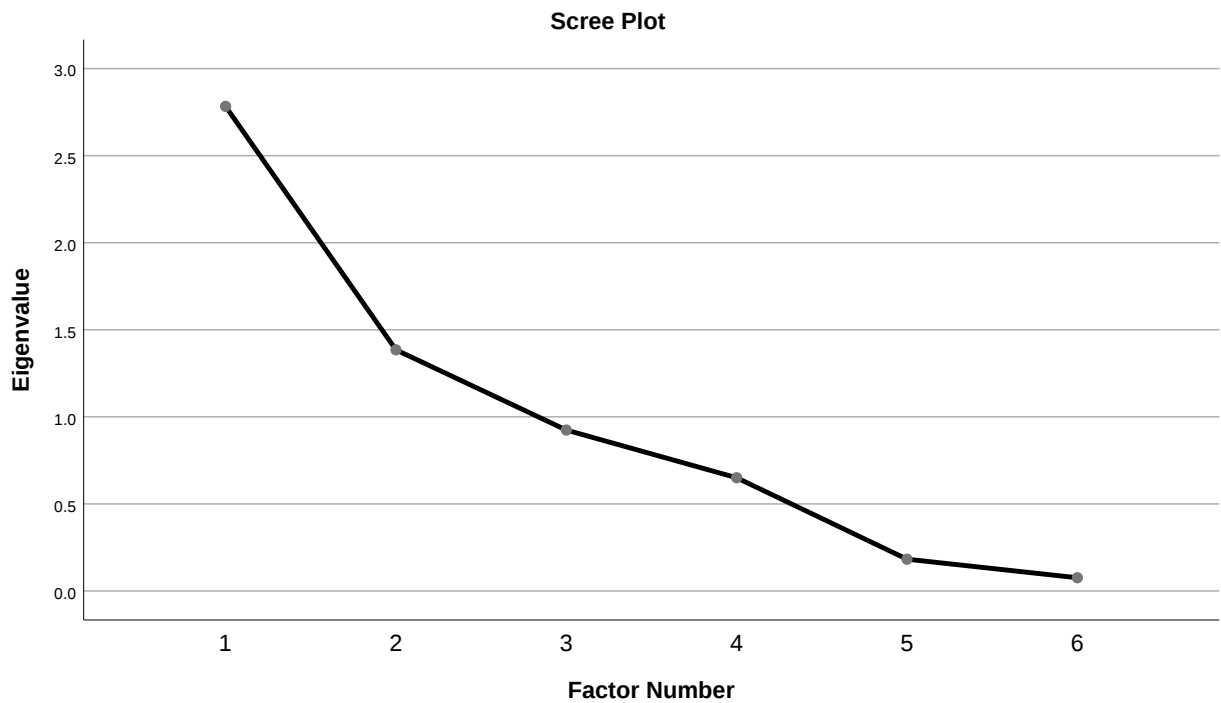
Factor	Total	Initial Eigenvalues		Extraction Sums of Squared Loadings		
		% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.783	46.381	46.381	2.650	44.166	44.166
2	1.385	23.080	69.461	.740	12.337	56.503
3	.924	15.402	84.863			
4	.650	10.835	95.698			
5	.182	3.038	98.736			
6	.076	1.264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

Total Variance Explained

Factor	Rotation Sums of Squared Loadings		
	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.

Varimax Orthogonal Rotation
Orthogonal variance maximization of squared loadings



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.

Varimax Orthogonal Rotation
Orthogonal variance maximization of squared loadings

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.

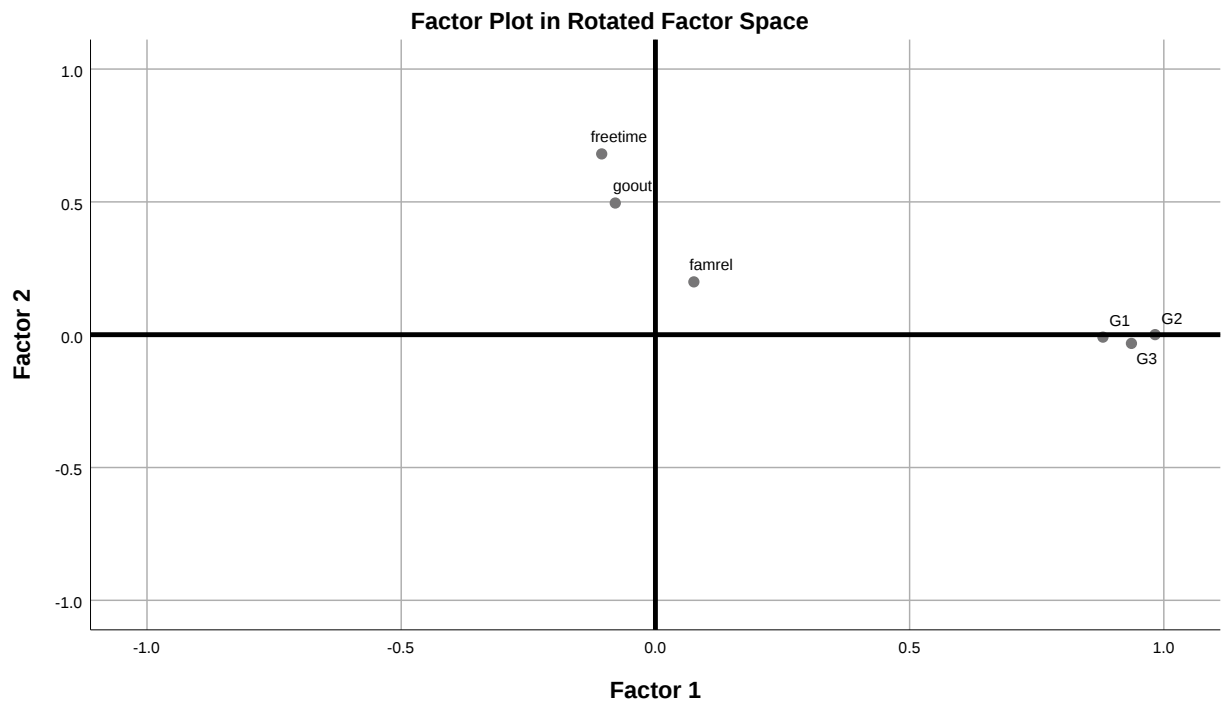
Factor Transformation Matrix

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

Extraction Method: Principal Axis Factoring.

Rotation Method: Varimax with Kaiser Normalization.

Varimax Orthogonal Rotation
Orthogonal variance maximization of squared loadings



```

2644 0 ECHO 'Varimax constrains the factor correlation to zero'.
2644 0 M> ECHO 'Varimax constrains the factor correlation to zero'.
Varimax constrains the factor correlation to zero
2645 0 DESCRIPTIVES VARIABLES=G1 G2 G3 famrel freetime goout /STATISTICS=MEAN
STDDEV MIN MAX.
2645 0 M> DESCRIPTIVES VARIABLES=G1 G2 G3 famrel freetime goout /STATISTICS=
MEAN STDDEV MIN MAX.

```

Descriptives

Varimax Orthogonal Rotation
Orthogonal variance maximization of squared loadings

Notes

Output Created		18-JUL-2026 10:58:16
Comments		
Input	Data	D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\Varimax Rotation\dataset.csv
	Active Dataset	VarimaxRotationData
	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	00:00:00.02

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				

2646 0 * END METHOD-SPECIFIC SPSS WORKFLOW.

Varimax Orthogonal Rotation
Orthogonal variance maximization of squared loadings

```

2646  0 M> * END METHOD-SPECIFIC SPSS WORKFLOW.
2647  0
2647  0 M>
2648  0 SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scale T
esting\Varimax Rotation\SPSS_Output\sav\varimax-rotati
on_spss_ready_data.sav' /COMPRESSED.
2648  0 M> SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scal
e Testing\Varimax Rotation\SPSS_Output\sav\varimax-rot
ation_spss_ready_data.sav' /COMPRESSED.
2649  0
2649  0 M>
2650  0 ECHO '=====
====='.
2650  0 M> ECHO '=====
====='.
=====
2651  0 ECHO 'VARIMAX ORTHOGONAL ROTATION'.
2651  0 M> ECHO 'VARIMAX ORTHOGONAL ROTATION'.
VARIMAX ORTHOGONAL ROTATION
2652  0 ECHO 'Design: Orthogonal simple-structure rotation of two principal-a
xis factors.'.
2652  0 M> ECHO 'Design: Orthogonal simple-structure rotation of two principa
l-axis factors.'.
Design: Orthogonal simple-structure rotation of two principal-axis factors.
2653  0 ECHO 'Null hypothesis: Varimax does not increase simple structure whi
le preserving orthogonal factors.'.
2653  0 M> ECHO 'Null hypothesis: Varimax does not increase simple structure
while preserving orthogonal factors.'.
Null hypothesis: Varimax does not increase simple structure while preserving o
rthogonal factors.
2654  0 ECHO 'Formula: Maximize sum_j[sum_i l_ij^4-(sum_i l_ij^2)^2/p] subjec
t to T'T=I.'.
2654  0 M> ECHO 'Formula: Maximize sum_j[sum_i l_ij^4-(sum_i l_ij^2)^2/p] sub
ject to T'T=I.'.
Formula: Maximize sum_j[sum_i l_ij^4-(sum_i l_ij^2)^2/p] subject to T'T=I.
2655  0 ECHO 'Variables: G1, G2, G3, famrel, freetime, goout'.
2655  0 M> ECHO 'Variables: G1, G2, G3, famrel, freetime, goout'.
Variables: G1, G2, G3, famrel, freetime, goout
2656  0 ECHO 'Rows analyzed: 649'.

```

Varimax Orthogonal Rotation
Orthogonal variance maximization of squared loadings

```
2656  0 M> ECHO 'Rows analyzed: 649'.
Rows analyzed: 649
2657  0 ECHO 'cross_loading_items = 0'.
2657  0 M> ECHO 'cross_loading_items = 0'.
cross_loading_items = 0
2658  0 ECHO 'factors = 2'.
2658  0 M> ECHO 'factors = 2'.
factors = 2
2659  0 ECHO 'maximum_rotated_loading = 0.982458749894515'.
2659  0 M> ECHO 'maximum_rotated_loading = 0.982458749894515'.
maximum_rotated_loading = 0.982458749894515
2660  0 ECHO 'orthogonality_error = 2.220446049250313e-16'.
2660  0 M> ECHO 'orthogonality_error = 2.220446049250313e-16'.
orthogonality_error = 2.220446049250313e-16
2661  0 ECHO 'Cross-check status: pass'.
2661  0 M> ECHO 'Cross-check status: pass'.
Cross-check status: pass
2662  0 ECHO '=====
====='.
2662  0 M> ECHO '=====
====='.
=====
2663  0
2663  0 M>
2664  0 OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis and
Scale Testing\Varimax Rotation\SPSS_Output\spv\varimax
-rotation_spss_output.spv'.
2664  0 M> OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis a
nd Scale Testing\Varimax Rotation\SPSS_Output\spv\vari
max-rotation_spss_output.spv'.
2665  0 OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=PRI
NTSETTING
2665  0 M> OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=
PRINTSETTING
```