

```
1298 0 OUTPUT ACTIVATE GFIOoutput.  
1298 0 M> OUTPUT ACTIVATE GFIOoutput.  
1299 0 TITLE 'Goodness-of-Fit Index'.  
1299 0 M> TITLE 'Goodness-of-Fit Index'.
```

Goodness-of-Fit Index

```
1300 0
1300 0 M>
1301 0 GET DATA
1301 0 M> GET DATA
1302 0 /TYPE=TXT /FILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\GFI\dataset.csv' /ENCODING='UTF8' /DELCASE=
      LINE /DELIMITERS=', ' /QUALIFIER='''
1302 0 M> /TYPE=TXT /FILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\GFI\dataset.csv' /ENCODING='UTF8' /DELCA
      SE=LINE /DELIMITERS=', ' /QUALIFIER='''
1303 0 /ARRANGEMENT=DELIMITED /FIRSTCASE=2
1303 0 M> /ARRANGEMENT=DELIMITED /FIRSTCASE=2
1304 0 /VARIABLES=
1304 0 M> /VARIABLES=
1305 0 school A8 sex A8 age F8.0 address A8 famsize A8 Pstatus A8 Medu F8.0
      Fedu F8.0
1305 0 M> school A8 sex A8 age F8.0 address A8 famsize A8 Pstatus A8 Medu F
      8.0 Fedu F8.0
1306 0 Mjob A16 Fjob A16 reason A16 guardian A16 traveltime F8.0 studytime
      F8.0 failures F8.0
1306 0 M> Mjob A16 Fjob A16 reason A16 guardian A16 traveltime F8.0 studyti
      me F8.0 failures F8.0
1307 0 schoolsup A8 famsup A8 paid A8 activities A8 nursery A8 higher A8 in
      ternet A8 romantic A8
1307 0 M> schoolsup A8 famsup A8 paid A8 activities A8 nursery A8 higher A8
      internet A8 romantic A8
1308 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.
1308 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.
1309 0 DATASET NAME GFIData.
1309 0 M> DATASET NAME GFIData.
1310 0 COMPUTE subject_id=$CASENUM.
1310 0 M> COMPUTE subject_id=$CASENUM.
1311 0 COMPUTE Dalc_R=6-Dalc.
1311 0 M> COMPUTE Dalc_R=6-Dalc.
1312 0 COMPUTE Walc_R=6-Walc.
1312 0 M> COMPUTE Walc_R=6-Walc.
```

Goodness-of-Fit Index

```
1313 0 RECODE schoolsup famsup paid activities higher internet ('no'=0) ('yes'=1)
1313 0 M> RECODE schoolsup famsup paid activities higher internet ('no'=0) ('yes'=1)
1314 0 INTO schoolsup_b famsup_b paid_b activities_b higher_b internet_b.
1314 0 M> INTO schoolsup_b famsup_b paid_b activities_b higher_b internet_b
.
1315 0 EXECUTE.
1315 0 M> EXECUTE.
1316 0
1316 0 M>
1317 0 * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
1317 0 M> * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
1318 0 TITLE 'Goodness of Fit Index'.
1318 0 M> TITLE 'Goodness of Fit Index'.
```

Goodness of Fit Index

```
1319 0 SUBTITLE 'Weighted covariance-residual trace ratio'.  
1319 0 M> SUBTITLE 'Weighted covariance-residual trace ratio'.
```

Goodness of Fit Index
Weighted covariance-residual trace ratio

```

1320  0  FACTOR /VARIABLES=G1 G2 G3 famrel freetime goout /MISSING=LISTWISE /A
NALYSIS=G1 G2 G3 famrel freetime goout
1320  0 M>  FACTOR /VARIABLES=G1 G2 G3 famrel freetime goout /MISSING=LISTWISE
 /ANALYSIS=G1 G2 G3 famrel freetime goout
1321  0  /PRINT=INITIAL EXTRACTION KMO CORRELATION /PLOT=EIGEN
1321  0 M>  /PRINT=INITIAL EXTRACTION KMO CORRELATION /PLOT=EIGEN
1322  0  /CRITERIA=FACTORS(2) ITERATE(500) /EXTRACTION=PAF /ROTATION=NOROTATE
 /METHOD=CORRELATION.
1322  0 M>  /CRITERIA=FACTORS(2) ITERATE(500) /EXTRACTION=PAF /ROTATION=NOROT
ATE /METHOD=CORRELATION.

```

Factor Analysis

Notes

Output Created		18-JUL-2026 10:56:14
Comments		
Input	Data	D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\GFI\dataset.csv
	Active Dataset	GFIData
	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.

Goodness of Fit Index
Weighted covariance-residual trace ratio

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(2) ITERATE(500) /EXTRACTION=PAF /ROTATION=NOROTATE /METHOD=CORRELATIO N.
Resources	Processor Time	00:00:00.31
	Elapsed Time	00:00:00.35
	Maximum Memory Required	5704 (5.570K) bytes

[GFIData]

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

Goodness of Fit Index
Weighted covariance-residual trace ratio

Communalities

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

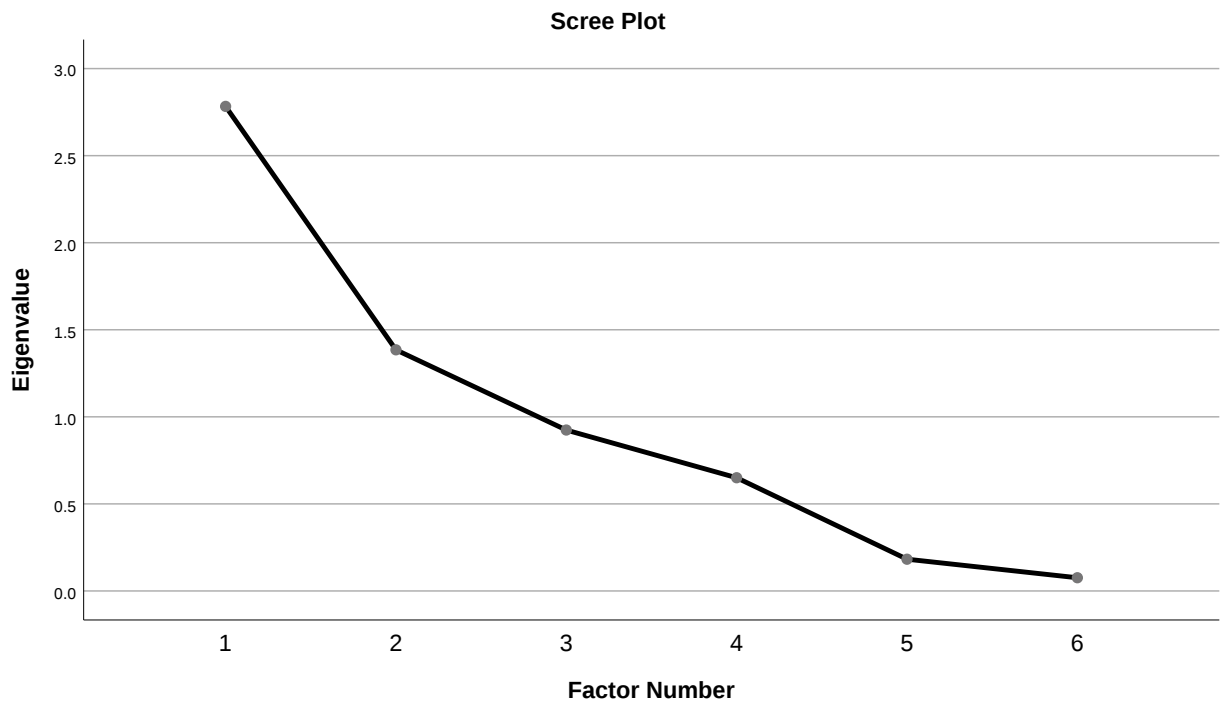
Extraction Method: Principal Axis Factoring.

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			

Extraction Method: Principal Axis Factoring.

Goodness of Fit Index
Weighted covariance-residual trace ratio



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.

```
1323 0 RELIABILITY /VARIABLES=G1 G2 G3 /SCALE('Academic measurement block')
ALL /MODEL=ALPHA /STATISTICS=DESCRIPTIVE SCALE CORR.
1323 0 M> RELIABILITY /VARIABLES=G1 G2 G3 /SCALE('Academic measurement block
') ALL /MODEL=ALPHA /STATISTICS=DESCRIPTIVE SCALE CORR
```

Goodness of Fit Index
Weighted covariance-residual trace ratio

Reliability

Notes

Output Created		18-JUL-2026 10:56:15
Comments		
Input	Data	D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\GFI\dataset.csv
	Active Dataset	GFIData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649
	Matrix Input	D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\GFI\gfi_spss_synt ax.sps
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=G1 G2 G3 /SCALE('Academic measurement block') ALL /MODEL=ALPHA /STATISTICS=DESCRIPT IVE SCALE CORR.
Resources	Processor Time	00:00:00.05
	Elapsed Time	00:00:00.04

Scale: Academic measurement block

Goodness of Fit Index
Weighted covariance-residual trace ratio

Case Processing Summary

		N	%
Cases	Valid	649	100.0
	Excluded ^a	0	.0
	Total	649	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.951	.953	3

Item Statistics

	Mean	Std. Deviation	N
G1	11.40	2.745	649
G2	11.57	2.914	649
G3	11.91	3.231	649

Inter-Item Correlation Matrix

	G1	G2	G3
G1	1.000	.865	.826
G2	.865	1.000	.919
G3	.826	.919	1.000

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
34.88	72.251	8.500	3

```
1324 0 RELIABILITY /VARIABLES=famrel freetime goout /SCALE('Social measureme
nt block') ALL /MODEL=ALPHA /STATISTICS=DESCRIPTIVE SC
ALE CORR.
```

Goodness of Fit Index
Weighted covariance-residual trace ratio

```
1324  0 M>  RELIABILITY /VARIABLES=famrel freetime goout /SCALE('Social measur
ement block') ALL /MODEL=ALPHA /STATISTICS=DESCRIPTIVE
SCALE CORR.
```

Reliability

Notes

Output Created		18-JUL-2026 10:56:15
Comments		
Input	Data	D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\GFI\dataset.csv
	Active Dataset	GFIData
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	649
	Matrix Input	D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\GFI\gfi_spss_synt ax.sps
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=famrel freetime goout /SCALE ('Social measurement block') ALL /MODEL=ALPHA /STATISTICS=DESCRIPT IVE SCALE CORR.
Resources	Processor Time	00:00:00.06
	Elapsed Time	00:00:00.05

Goodness of Fit Index
Weighted covariance-residual trace ratio

Scale: Social measurement block

Case Processing Summary

		N	%
Cases	Valid	649	100.0
	Excluded ^a	0	.0
	Total	649	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.419	.411	3

Item Statistics

	Mean	Std. Deviation	N
famrel	3.93	.956	649
freetime	3.18	1.051	649
goout	3.18	1.176	649

Inter-Item Correlation Matrix

	famrel	freetime	goout
famrel	1.000	.129	.090
freetime	.129	1.000	.346
goout	.090	.346	1.000

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
10.30	4.718	2.172	3

1325 0 ECHO 'GFI is absolute fit and does not use an independence baseline'.

Goodness of Fit Index
Weighted covariance-residual trace ratio

```
1325  0 M> ECHO 'GFI is absolute fit and does not use an independence baseline'.
GFI is absolute fit and does not use an independence baseline
1326  0 * END METHOD-SPECIFIC SPSS WORKFLOW.
1326  0 M> * END METHOD-SPECIFIC SPSS WORKFLOW.
1327  0
1327  0 M>
1328  0 SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\GFI\SPSS_Output\sav\gfi_spss_ready_data.sav' /COMPRESSED.
1328  0 M> SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\GFI\SPSS_Output\sav\gfi_spss_ready_data.sav' /COMPRESSED.
1329  0
1329  0 M>
1330  0 ECHO '=====
====='.
1330  0 M> ECHO '=====
====='.
=====
1331  0 ECHO 'GOODNESS-OF-FIT INDEX'.
1331  0 M> ECHO 'GOODNESS-OF-FIT INDEX'.
GOODNESS-OF-FIT INDEX
1332  0 ECHO 'Design: Absolute covariance reproduction fit for the two-factor CFA.'.
1332  0 M> ECHO 'Design: Absolute covariance reproduction fit for the two-factor CFA.'.
Design: Absolute covariance reproduction fit for the two-factor CFA.
1333  0 ECHO 'Null hypothesis: The fitted model does not improve the weighted residual trace over the saturated reference.'.
1333  0 M> ECHO 'Null hypothesis: The fitted model does not improve the weighted residual trace over the saturated reference.'.
Null hypothesis: The fitted model does not improve the weighted residual trace over the saturated reference.
1334  0 ECHO 'Formula:  $GFI=1-\frac{\text{tr}[(S^{-1}(S-\Sigma))(S^{-1}(S-\Sigma))]}{\text{tr}[(S^{-1}S)(S^{-1}S)]}$ '.
1334  0 M> ECHO 'Formula:  $GFI=1-\frac{\text{tr}[(S^{-1}(S-\Sigma))(S^{-1}(S-\Sigma))]}{\text{tr}[(S^{-1}S)(S^{-1}S)]}$ '.
Formula:  $GFI=1-\frac{\text{tr}[(S^{-1}(S-\Sigma))(S^{-1}(S-\Sigma))]}{\text{tr}[(S^{-1}S)(S^{-1}S)]}$ .
```

Goodness of Fit Index
Weighted covariance-residual trace ratio

```
1335 0 ECHO 'Variables: G1, G2, G3, famrel, freetime, goout'.
1335 0 M> ECHO 'Variables: G1, G2, G3, famrel, freetime, goout'.
Variables: G1, G2, G3, famrel, freetime, goout
1336 0 ECHO 'Rows analyzed: 649'.
1336 0 M> ECHO 'Rows analyzed: 649'.
Rows analyzed: 649
1337 0 ECHO 'df = 8'.
1337 0 M> ECHO 'df = 8'.
df = 8
1338 0 ECHO 'gfi = 0.9926350185704358'.
1338 0 M> ECHO 'gfi = 0.9926350185704358'.
gfi = 0.9926350185704358
1339 0 ECHO 'p_variables = 6'.
1339 0 M> ECHO 'p_variables = 6'.
p_variables = 6
1340 0 ECHO 'residual_trace = 0.044189888577385095'.
1340 0 M> ECHO 'residual_trace = 0.044189888577385095'.
residual_trace = 0.044189888577385095
1341 0 ECHO 'Cross-check status: pass'.
1341 0 M> ECHO 'Cross-check status: pass'.
Cross-check status: pass
1342 0 ECHO '=====
====='.
1342 0 M> ECHO '=====
====='.
=====
1343 0
1343 0 M>
1344 0 OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis and
Scale Testing\GFI\SPSS_Output\spv\gfi_spss_output.spv'
.
1344 0 M> OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis a
nd Scale Testing\GFI\SPSS_Output\spv\gfi_spss_output.s
pv'.
1345 0 OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=PRI
NTSETTING
1345 0 M> OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=
PRINTSETTING
```