

```
283 0 OUTPUT ACTIVATE ChiSquareFitTestOutput.  
283 0 M> OUTPUT ACTIVATE ChiSquareFitTestOutput.  
284 0 TITLE 'CFA Chi-Square Fit Test'.  
284 0 M> TITLE 'CFA Chi-Square Fit Test'.
```

CFA Chi-Square Fit Test

```

285 0
285 0 M>
286 0 GET DATA
286 0 M> GET DATA
287 0 /TYPE=TXT /FILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\Chi Square Fit Test\dataset.csv' /ENCODING=
      'UTF8' /DELCASE=LINE /DELIMITERS=', ' /QUALIFIER='''
287 0 M> /TYPE=TXT /FILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\Chi Square Fit Test\dataset.csv' /ENCODI
      NG='UTF8' /DELCASE=LINE /DELIMITERS=', ' /QUALIFIER='''
288 0 /ARRANGEMENT=DELIMITED /FIRSTCASE=2
288 0 M> /ARRANGEMENT=DELIMITED /FIRSTCASE=2
289 0 /VARIABLES=
289 0 M> /VARIABLES=
290 0 school A8 sex A8 age F8.0 address A8 famsize A8 Pstatus A8 Medu F8.0
      Fedu F8.0
290 0 M> school A8 sex A8 age F8.0 address A8 famsize A8 Pstatus A8 Medu F
      8.0 Fedu F8.0
291 0 Mjob A16 Fjob A16 reason A16 guardian A16 traveltime F8.0 studytime
      F8.0 failures F8.0
291 0 M> Mjob A16 Fjob A16 reason A16 guardian A16 traveltime F8.0 studyti
      me F8.0 failures F8.0
292 0 schoolsup A8 famsup A8 paid A8 activities A8 nursery A8 higher A8 in
      ternet A8 romantic A8
292 0 M> schoolsup A8 famsup A8 paid A8 activities A8 nursery A8 higher A8
      internet A8 romantic A8
293 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.
293 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.
294 0 DATASET NAME ChiSquareFitTestData.
294 0 M> DATASET NAME ChiSquareFitTestData.
295 0 COMPUTE subject_id=$CASENUM.
295 0 M> COMPUTE subject_id=$CASENUM.
296 0 COMPUTE Dalc_R=6-Dalc.
296 0 M> COMPUTE Dalc_R=6-Dalc.
297 0 COMPUTE Walc_R=6-Walc.
297 0 M> COMPUTE Walc_R=6-Walc.

```

CFA Chi-Square Fit Test

```
298 0 RECODE schoolsup famsup paid activities higher internet ('no'=0) ('yes'=1)
298 0 M> RECODE schoolsup famsup paid activities higher internet ('no'=0) ('yes'=1)
299 0 INTO schoolsup_b famsup_b paid_b activities_b higher_b internet_b.
299 0 M> INTO schoolsup_b famsup_b paid_b activities_b higher_b internet_b
.
300 0 EXECUTE.
300 0 M> EXECUTE.
301 0
301 0 M>
302 0 * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
302 0 M> * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
303 0 TITLE 'CFA Chi Square Fit Test'.
303 0 M> TITLE 'CFA Chi Square Fit Test'.
```

CFA Chi Square Fit Test

```
304 0 SUBTITLE 'Maximum-likelihood exact covariance-fit test'.  
304 0 M> SUBTITLE 'Maximum-likelihood exact covariance-fit test'.
```

CFA Chi Square Fit Test
Maximum-likelihood exact covariance-fit test

```

305  0  FACTOR /VARIABLES=G1 G2 G3 famrel freetime goout /MISSING=LISTWISE /A
NALYSIS=G1 G2 G3 famrel freetime goout
305  0 M>  FACTOR /VARIABLES=G1 G2 G3 famrel freetime goout /MISSING=LISTWISE
/ANALYSIS=G1 G2 G3 famrel freetime goout
306  0    /PRINT=INITIAL EXTRACTION KMO CORRELATION /PLOT=EIGEN
306  0 M>    /PRINT=INITIAL EXTRACTION KMO CORRELATION /PLOT=EIGEN
307  0    /CRITERIA=FACTORS(2) ITERATE(500) /EXTRACTION=PAF /ROTATION=NOROTATE
/METHOD=CORRELATION.
307  0 M>    /CRITERIA=FACTORS(2) ITERATE(500) /EXTRACTION=PAF /ROTATION=NOROT
ATE /METHOD=CORRELATION.

```

Factor Analysis

Notes

Output Created		18-JUL-2026 10:54:16
Comments		
Input	Data	D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\Chi Square Fit Test\dataset. csv
	Active Dataset	ChiSquareFitTestData
	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.

CFA Chi Square Fit Test
Maximum-likelihood exact covariance-fit test

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	00:00:00.81
	Elapsed Time	00:00:00.39
	Maximum Memory Required	5704 (5.570K) bytes

[ChiSquareFitTestData]

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

CFA Chi Square Fit Test
Maximum-likelihood exact covariance-fit test

Communalities

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

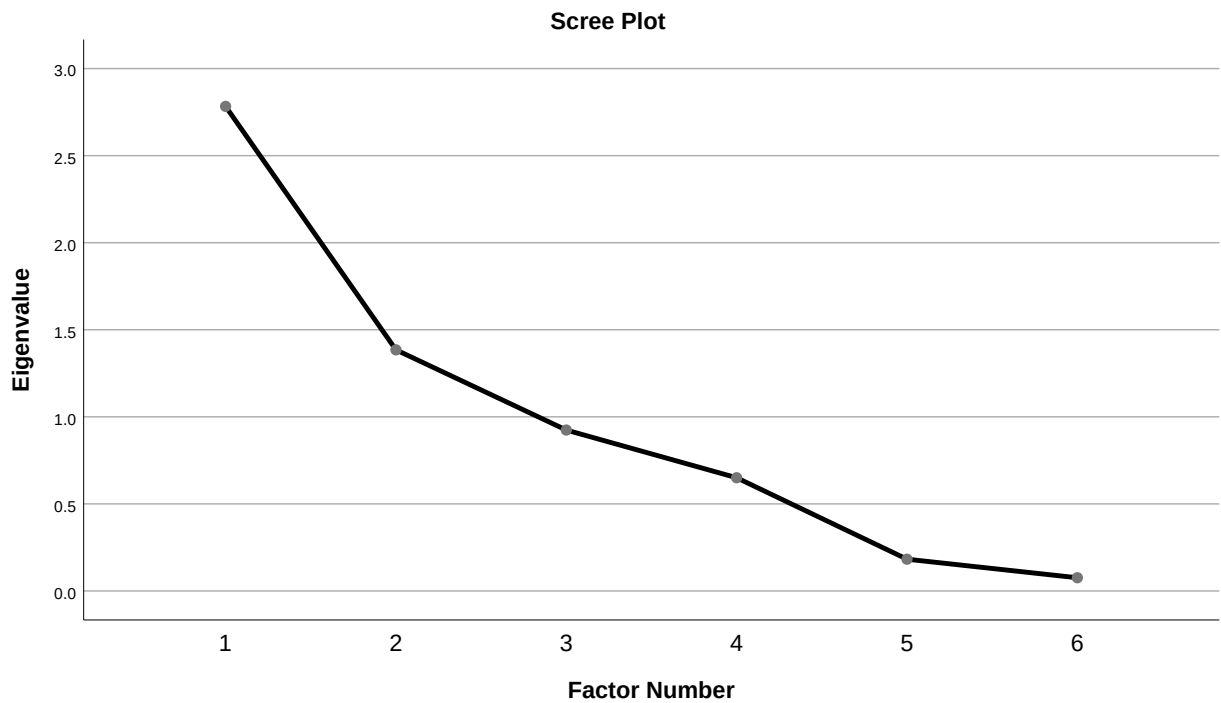
Extraction Method: Principal Axis Factoring.

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.

CFA Chi Square Fit Test
Maximum-likelihood exact covariance-fit test



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.

```
308 0 RELIABILITY /VARIABLES=G1 G2 G3 /SCALE('Academic measurement block')
ALL /MODEL=ALPHA /STATISTICS=DESCRIPTIVE SCALE CORR.
308 0 M> RELIABILITY /VARIABLES=G1 G2 G3 /SCALE('Academic measurement block
') ALL /MODEL=ALPHA /STATISTICS=DESCRIPTIVE SCALE CORR
```


CFA Chi Square Fit Test
Maximum-likelihood exact covariance-fit test

Reliability

Notes

Output Created		18-JUL-2026 10:54:16
Comments		
Input	Data	D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\Chi Square Fit Test\dataset. csv
	Active Dataset	ChiSquareFitTestData
	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\Chi Square Fit Test\chi_square_fit_test_s pss_syntax.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

CFA Chi Square Fit Test
Maximum-likelihood exact covariance-fit test

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

```
309 0 RELIABILITY /VARIABLES=famrel freetime goout /SCALE('Social measureme
nt block') ALL /MODEL=ALPHA /STATISTICS=DESCRIPTIVE SC
ALE CORR.
```

CFA Chi Square Fit Test
Maximum-likelihood exact covariance-fit test

```
309  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 10:54:16
Comments		
Input	Data	D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\Chi Square Fit Test\dataset. csv
	Active Dataset	ChiSquareFitTestData
	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\Chi Square Fit Test\chi_square_fit_test_s pss_syntax.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	00:00:00.05
	Elapsed Time	00:00:00.03

CFA Chi Square Fit Test
Maximum-likelihood exact covariance-fit test

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

CFA Chi Square Fit Test
Maximum-likelihood exact covariance-fit test

```
310 0 ECHO 'This exact-fit statistic is distinct from a contingency-table c
hi-square'.
310 0 M> ECHO 'This exact-fit statistic is distinct from a contingency-tabl
e chi-square'.
This exact-fit statistic is distinct from a contingency-table chi-square
311 0 * END METHOD-SPECIFIC SPSS WORKFLOW.
311 0 M> * END METHOD-SPECIFIC SPSS WORKFLOW.
312 0
312 0 M>
313 0 SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scale T
esting\Chi Square Fit Test\SPSS_Output\sav\chi-square-
fit-test_spss_ready_data.sav' /COMPRESSED.
313 0 M> SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scal
e Testing\Chi Square Fit Test\SPSS_Output\sav\chi-squa
re-fit-test_spss_ready_data.sav' /COMPRESSED.

314 0
314 0 M>
315 0 ECHO '=====
====='.
315 0 M> ECHO '=====
====='.
=====

316 0 ECHO 'CFA CHI-SQUARE FIT TEST'.
316 0 M> ECHO 'CFA CHI-SQUARE FIT TEST'.
CFA CHI-SQUARE FIT TEST
317 0 ECHO 'Design: Maximum-likelihood exact-fit test for the two-factor co
variance model.'.
317 0 M> ECHO 'Design: Maximum-likelihood exact-fit test for the two-factor
covariance model.'.
Design: Maximum-likelihood exact-fit test for the two-factor covariance model.
318 0 ECHO 'Null hypothesis: The model-implied covariance matrix equals the
population covariance matrix.'.
318 0 M> ECHO 'Null hypothesis: The model-implied covariance matrix equals
the population covariance matrix.'.
Null hypothesis: The model-implied covariance matrix equals the population cov
ariance matrix.
319 0 ECHO 'Formula:  $\chi^2=(n-1)F_{ML}$ ;  $df=p(p+1)/2-q$ '.
319 0 M> ECHO 'Formula:  $\chi^2=(n-1)F_{ML}$ ;  $df=p(p+1)/2-q$ '.
Formula:  $\chi^2=(n-1)F_{ML}$ ;  $df=p(p+1)/2-q$ .
```

CFA Chi Square Fit Test
Maximum-likelihood exact covariance-fit test

```
320 0 ECHO 'Variables: G1, G2, G3, famrel, freetime, goout'.
320 0 M> ECHO 'Variables: G1, G2, G3, famrel, freetime, goout'.
Variables: G1, G2, G3, famrel, freetime, goout
321 0 ECHO 'Rows analyzed: 649'.
321 0 M> ECHO 'Rows analyzed: 649'.
Rows analyzed: 649
322 0 ECHO 'chi_square = 13.76397207713822'.
322 0 M> ECHO 'chi_square = 13.76397207713822'.
chi_square = 13.76397207713822
323 0 ECHO 'df = 8'.
323 0 M> ECHO 'df = 8'.
df = 8
324 0 ECHO 'ml_discrepancy = 0.02124069764990466'.
324 0 M> ECHO 'ml_discrepancy = 0.02124069764990466'.
ml_discrepancy = 0.02124069764990466
325 0 ECHO 'n_cases = 649'.
325 0 M> ECHO 'n_cases = 649'.
n_cases = 649
326 0 ECHO 'p_value = 0.08812864506217727'.
326 0 M> ECHO 'p_value = 0.08812864506217727'.
p_value = 0.08812864506217727
327 0 ECHO 'Cross-check status: pass'.
327 0 M> ECHO 'Cross-check status: pass'.
Cross-check status: pass
328 0 ECHO '=====
====='.
328 0 M> ECHO '=====
====='.
=====
329 0
329 0 M>
330 0 OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis and
Scale Testing\Chi Square Fit Test\SPSS_Output\spv\chi-
square-fit-test_spss_output.spv'.
330 0 M> OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis a
nd Scale Testing\Chi Square Fit Test\SPSS_Output\spv\c
hi-square-fit-test_spss_output.spv'.
331 0 OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=PRI
NTSETTING
```

CFA Chi Square Fit Test
Maximum-likelihood exact covariance-fit test

```
331  0 M>  OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=  
PRINTSETTING
```