

```
2075 0 OUTPUT ACTIVATE RMSEAOutput.  
2075 0 M> OUTPUT ACTIVATE RMSEAOutput.  
2076 0 TITLE 'Root Mean Square Error of Approximation'.  
2076 0 M> TITLE 'Root Mean Square Error of Approximation'.
```

Root Mean Square Error of Approximation

```
2077 0
2077 0 M>
2078 0 GET DATA
2078 0 M> GET DATA
2079 0 /TYPE=TXT /FILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\RMSEA\dataset.csv' /ENCODING='UTF8' /DELCASE=LINE /DELIMITERS=', ' /QUALIFIER='"'
2079 0 M> /TYPE=TXT /FILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\RMSEA\dataset.csv' /ENCODING='UTF8' /DELCASE=LINE /DELIMITERS=', ' /QUALIFIER='"'
2080 0 /ARRANGEMENT=DELIMITED /FIRSTCASE=2
2080 0 M> /ARRANGEMENT=DELIMITED /FIRSTCASE=2
2081 0 /VARIABLES=
2081 0 M> /VARIABLES=
2082 0 school A8 sex A8 age F8.0 address A8 famsize A8 Pstatus A8 Medu F8.0 Fedu F8.0
2082 0 M> school A8 sex A8 age F8.0 address A8 famsize A8 Pstatus A8 Medu F8.0 Fedu F8.0
2083 0 Mjob A16 Fjob A16 reason A16 guardian A16 traveltime F8.0 studytime F8.0 failures F8.0
2083 0 M> Mjob A16 Fjob A16 reason A16 guardian A16 traveltime F8.0 studytime F8.0 failures F8.0
2084 0 schoolsup A8 famsup A8 paid A8 activities A8 nursery A8 higher A8 internet A8 romantic A8
2084 0 M> schoolsup A8 famsup A8 paid A8 activities A8 nursery A8 higher A8 internet A8 romantic A8
2085 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.
2085 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.
2086 0 DATASET NAME RMSEADData.
2086 0 M> DATASET NAME RMSEADData.
2087 0 COMPUTE subject_id=$CASENUM.
2087 0 M> COMPUTE subject_id=$CASENUM.
2088 0 COMPUTE Dalc_R=6-Dalc.
2088 0 M> COMPUTE Dalc_R=6-Dalc.
2089 0 COMPUTE Walc_R=6-Walc.
2089 0 M> COMPUTE Walc_R=6-Walc.
```

Root Mean Square Error of Approximation

```
2090 0 RECODE schoolsup famsup paid activities higher internet ('no'=0) ('yes'=1)
2090 0 M> RECODE schoolsup famsup paid activities higher internet ('no'=0) ('yes'=1)
2091 0 INTO schoolsup_b famsup_b paid_b activities_b higher_b internet_b.
2091 0 M> INTO schoolsup_b famsup_b paid_b activities_b higher_b internet_b
.
2092 0 EXECUTE.
2092 0 M> EXECUTE.
2093 0
2093 0 M>
2094 0 * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
2094 0 M> * BEGIN METHOD-SPECIFIC SPSS WORKFLOW.
2095 0 TITLE 'Root Mean Square Error of Approximation'.
2095 0 M> TITLE 'Root Mean Square Error of Approximation'.
```

Root Mean Square Error of Approximation

```
2096 0 SUBTITLE 'Noncentral discrepancy per degree of freedom'.  
2096 0 M> SUBTITLE 'Noncentral discrepancy per degree of freedom'.
```

Root Mean Square Error of Approximation
Noncentral discrepancy per degree of freedom

```

2097  0  FACTOR /VARIABLES=G1 G2 G3 famrel freetime goout /MISSING=LISTWISE /A
NALYSIS=G1 G2 G3 famrel freetime goout
2097  0 M>  FACTOR /VARIABLES=G1 G2 G3 famrel freetime goout /MISSING=LISTWISE
 /ANALYSIS=G1 G2 G3 famrel freetime goout
2098  0  /PRINT=INITIAL EXTRACTION KMO CORRELATION /PLOT=EIGEN
2098  0 M>  /PRINT=INITIAL EXTRACTION KMO CORRELATION /PLOT=EIGEN
2099  0  /CRITERIA=FACTORS(2) ITERATE(500) /EXTRACTION=PAF /ROTATION=NOROTATE
 /METHOD=CORRELATION.
2099  0 M>  /CRITERIA=FACTORS(2) ITERATE(500) /EXTRACTION=PAF /ROTATION=NOROT
ATE /METHOD=CORRELATION.

```

Factor Analysis

Notes

Output Created		18-JUL-2026 10:57:33
Comments		
Input	Data	D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\RMSEA\dataset. csv
	Active Dataset	RMSEADData
	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.

Root Mean Square Error of Approximation
Noncentral discrepancy per degree of freedom

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	00:00:00.36
	Elapsed Time	00:00:00.21
	Maximum Memory Required	5704 (5.570K) bytes

[RMSEADData]

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

Root Mean Square Error of Approximation
Noncentral discrepancy per degree of freedom

Communalities

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

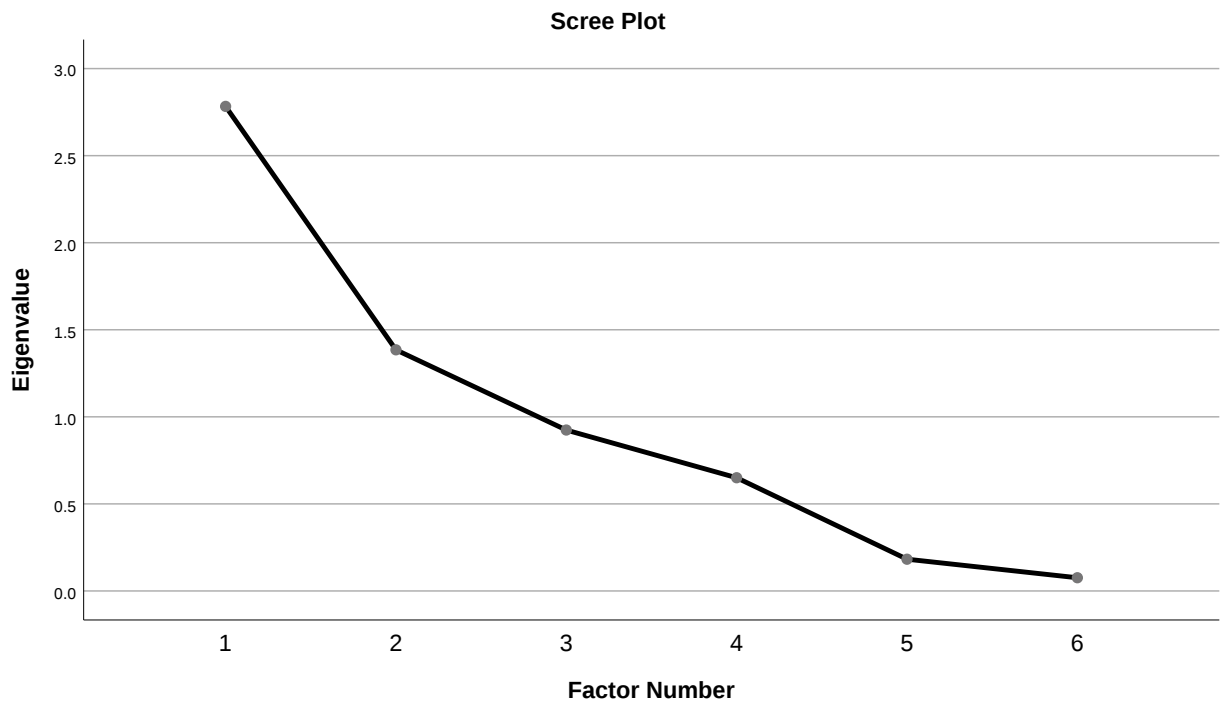
Extraction Method: Principal Axis
Factoring.

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.

Root Mean Square Error of Approximation
Noncentral discrepancy per degree of freedom



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.

```
2100 0 RELIABILITY /VARIABLES=G1 G2 G3 /SCALE('Academic measurement block')
ALL /MODEL=ALPHA /STATISTICS=DESCRIPTIVE SCALE CORR.
2100 0 M> RELIABILITY /VARIABLES=G1 G2 G3 /SCALE('Academic measurement block
') ALL /MODEL=ALPHA /STATISTICS=DESCRIPTIVE SCALE CORR
```

Root Mean Square Error of Approximation
Noncentral discrepancy per degree of freedom

Reliability

Notes

Output Created		18-JUL-2026 10:57:33
Comments		
Input	Data	D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\RMSEA\dataset. csv
	Active Dataset	RMSEADData
	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\RMSEA\rmsea_sp ss_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

Root Mean Square Error of Approximation
Noncentral discrepancy per degree of freedom

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

```
2101 0 RELIABILITY /VARIABLES=famrel freetime goout /SCALE('Social measureme
nt block') ALL /MODEL=ALPHA /STATISTICS=DESCRIPTIVE SC
ALE CORR.
```

Root Mean Square Error of Approximation
Noncentral discrepancy per degree of freedom

```
2101  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 10:57:33
Comments		
Input	Data	D:\DATA ANALYSIS\L Validity Factor Analysis and Scale Testing\RMSEA\dataset. csv
	Active Dataset	RMSEADData
	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\RMSEA\rmsea_sp ss_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	00:00:00.03
	Elapsed Time	00:00:00.03

Root Mean Square Error of Approximation
Noncentral discrepancy per degree of freedom

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

2102 0 ECHO 'RMSEA scales chi-square noncentrality by df and sample size'.

Root Mean Square Error of Approximation
Noncentral discrepancy per degree of freedom

```

2102  0 M>  ECHO 'RMSEA scales chi-square noncentrality by df and sample size'
.
RMSEA scales chi-square noncentrality by df and sample size
2103  0  * END METHOD-SPECIFIC SPSS WORKFLOW.
2103  0 M>  * END METHOD-SPECIFIC SPSS WORKFLOW.
2104  0
2104  0 M>
2105  0  SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scale T
esting\RMSEA\SPSS_Output\sav\rmsea_spss_ready_data.sav
      ' /COMPRESSED.
2105  0 M>  SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis and Scal
e Testing\RMSEA\SPSS_Output\sav\rmsea_spss_ready_data.
      sav' /COMPRESSED.

2106  0
2106  0 M>
2107  0  ECHO '=====
====='.
2107  0 M>  ECHO '=====
====='.
=====

2108  0  ECHO 'ROOT MEAN SQUARE ERROR OF APPROXIMATION'.
2108  0 M>  ECHO 'ROOT MEAN SQUARE ERROR OF APPROXIMATION'.
ROOT MEAN SQUARE ERROR OF APPROXIMATION
2109  0  ECHO 'Design: Population discrepancy per degree of freedom for the tw
o-factor CFA.'.
2109  0 M>  ECHO 'Design: Population discrepancy per degree of freedom for the
two-factor CFA.'.
Design: Population discrepancy per degree of freedom for the two-factor CFA.
2110  0  ECHO 'Null hypothesis: Population RMSEA is zero under exact approxima
te fit.'.
2110  0 M>  ECHO 'Null hypothesis: Population RMSEA is zero under exact approx
imate fit.'.
Null hypothesis: Population RMSEA is zero under exact approximate fit.
2111  0  ECHO 'Formula: RMSEA=sqrt(max[(chi2-df)/(df(n-1)),0]).'.
2111  0 M>  ECHO 'Formula: RMSEA=sqrt(max[(chi2-df)/(df(n-1)),0]).'.
Formula: RMSEA=sqrt(max[(chi2-df)/(df(n-1)),0]).
2112  0  ECHO 'Variables: G1, G2, G3, famrel, freetime, goout'.
2112  0 M>  ECHO 'Variables: G1, G2, G3, famrel, freetime, goout'.
Variables: G1, G2, G3, famrel, freetime, goout

```

Root Mean Square Error of Approximation
Noncentral discrepancy per degree of freedom

```
2113 0 ECHO 'Rows analyzed: 649'.
2113 0 M> ECHO 'Rows analyzed: 649'.
Rows analyzed: 649
2114 0 ECHO 'chi_square = 13.76397207713822'.
2114 0 M> ECHO 'chi_square = 13.76397207713822'.
chi_square = 13.76397207713822
2115 0 ECHO 'df = 8'.
2115 0 M> ECHO 'df = 8'.
df = 8
2116 0 ECHO 'n_cases = 649'.
2116 0 M> ECHO 'n_cases = 649'.
n_cases = 649
2117 0 ECHO 'noncentrality = 5.76397207713822'.
2117 0 M> ECHO 'noncentrality = 5.76397207713822'.
noncentrality = 5.76397207713822
2118 0 ECHO 'rmsea = 0.03334482463134081'.
2118 0 M> ECHO 'rmsea = 0.03334482463134081'.
rmsea = 0.03334482463134081
2119 0 ECHO 'Cross-check status: pass'.
2119 0 M> ECHO 'Cross-check status: pass'.
Cross-check status: pass
2120 0 ECHO '=====
====='.
2120 0 M> ECHO '=====
====='.
=====
2121 0
2121 0 M>
2122 0 OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis and
Scale Testing\RMSEA\SPSS_Output\spv\rmsea_spss_output.
spv'.
2122 0 M> OUTPUT SAVE OUTFILE='D:\DATA ANALYSIS\L Validity Factor Analysis a
nd Scale Testing\RMSEA\SPSS_Output\spv\rmsea_spss_outp
ut.spv'.
2123 0 OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=PRI
NTSETTING
2123 0 M> OUTPUT EXPORT /CONTENTS EXPORT=ALL LAYERS=PRINTSETTING MODELVIEWS=
PRINTSETTING
```