Factor Analysis for Questionnaire Data

Standalone verified Python analysis

Method: Factor Analysis for Questionnaire Data

Method type: factor_analysis

Design: Two-factor principal-axis analysis of six ordered questionnaire items using Spearman correlations and varimax rotation.

Variables: famrel, freetime, goout, Dalc, Walc, health

Inference scope: Factor retention and loading interpretation are the primary tasks; Bartlett's factorability test is reported only as an applicable diagnostic.

Formula: R_s=cor(ranks); h_i^2=sum(lambda_ij^2); varimax maximizes variance of squared loadings.

Source rows: 649

Calculated metrics:

factors: 2

overall_kmo: 0.5687859036563742

bartlett_chi_square: 546.1019150641591

bartlett_df: 15

bartlett_p_value: 9.757783019303014e-107

mean_communality: 0.38067120225972556

iterations: 500

Independent reference values:

factors: 2

overall_kmo: 0.5687859036563742

bartlett_chi_square: 546.1019150641591

bartlett_df: 15

bartlett_p_value: 9.757783019303014e-107

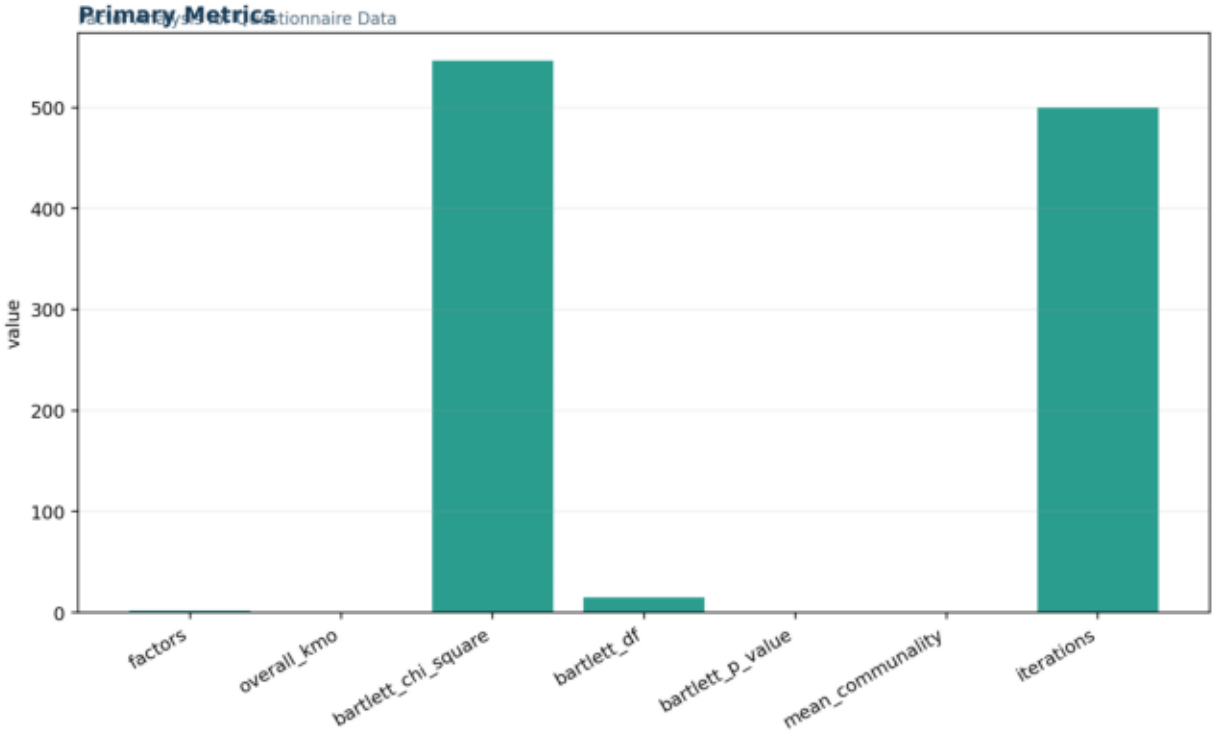
mean_communality: 0.38067120225972556

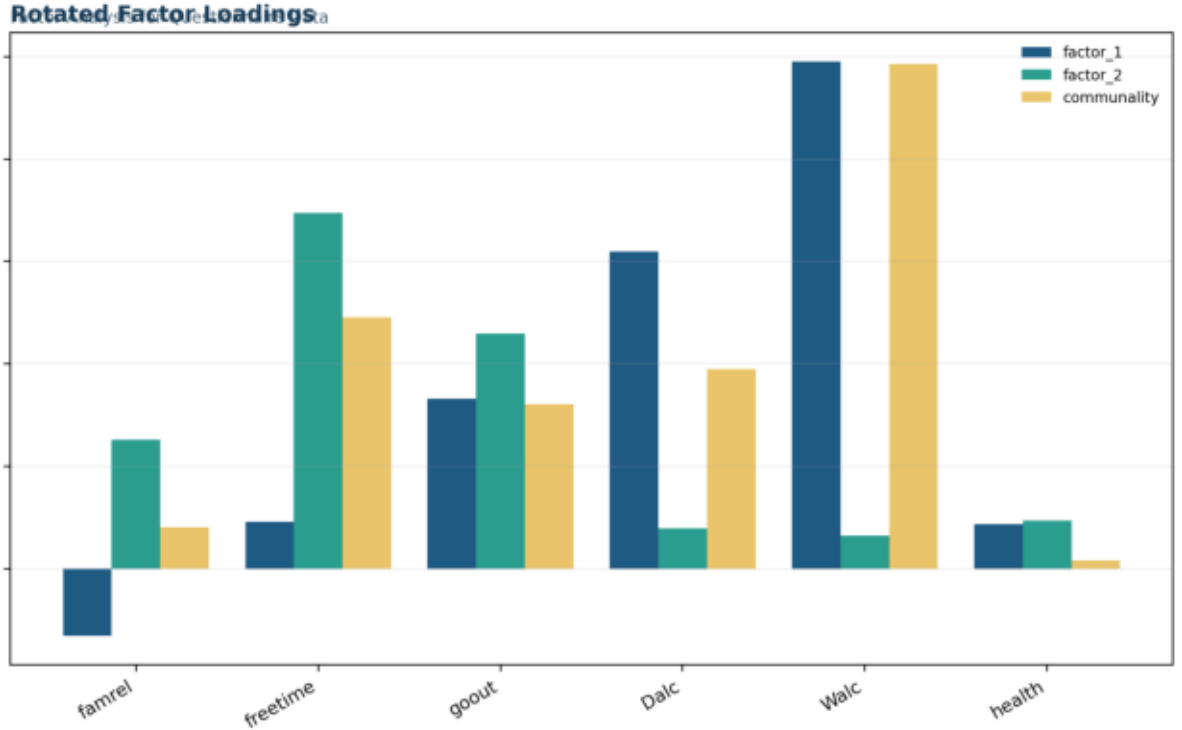
iterations: 500

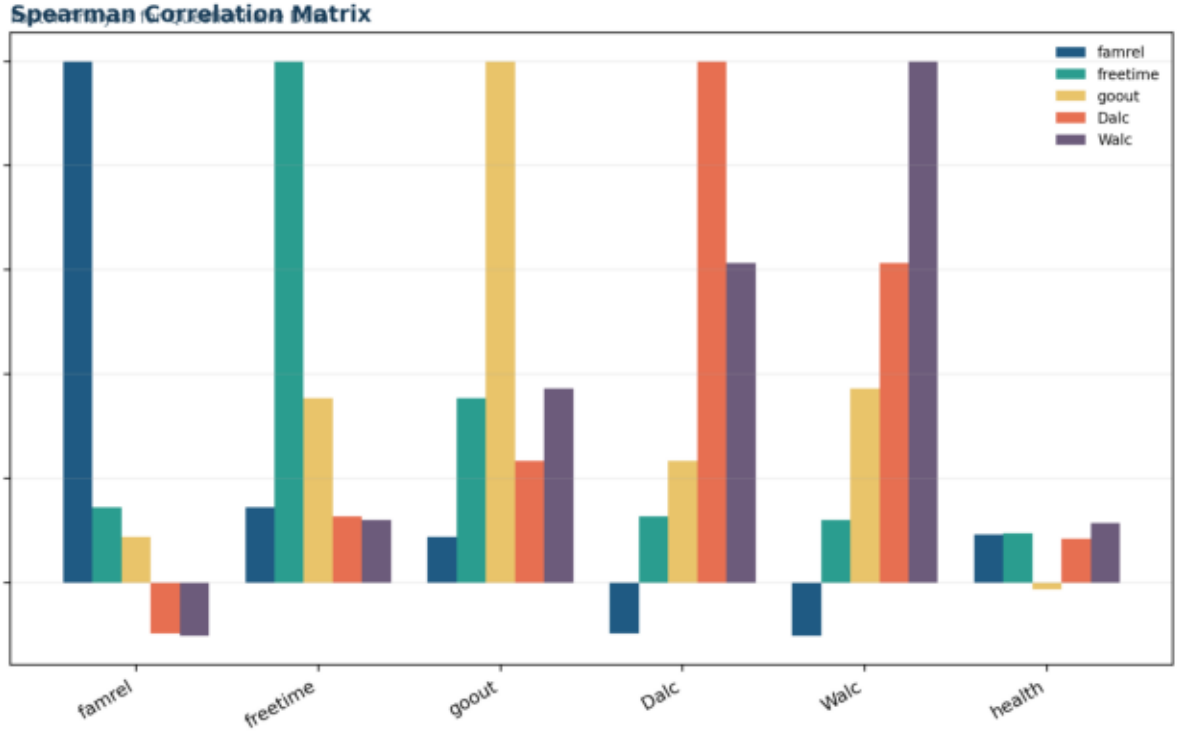
Interpretation:

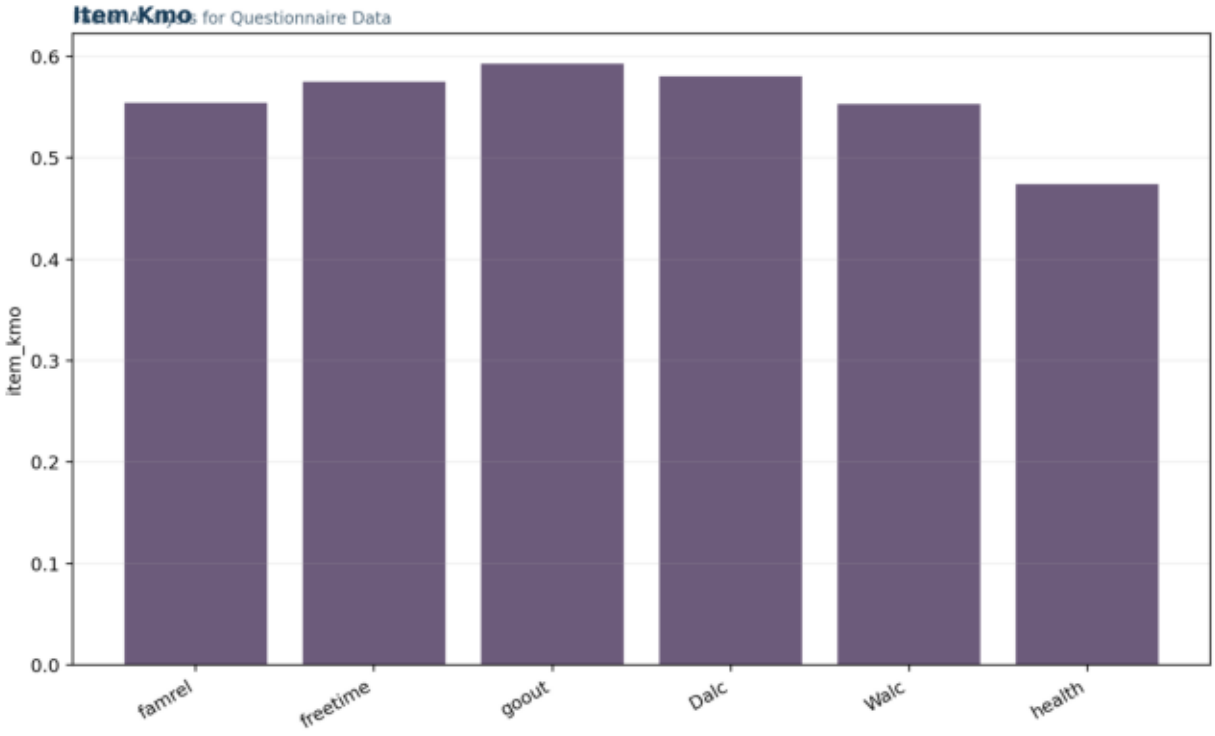
Principal-axis extraction uses the six-item Spearman correlation matrix.

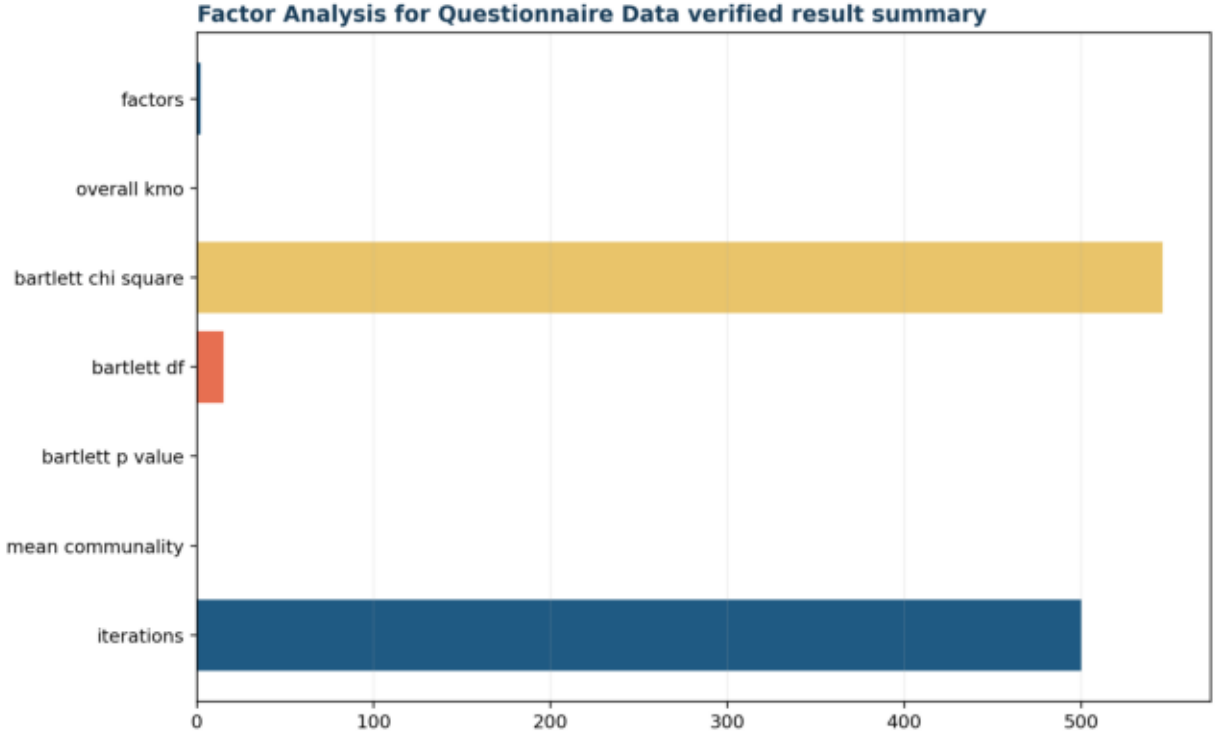
Two factors were rotated; overall KMO=0.568786.


Primary Metrics
Questionnaire Data
value
0
100
200
300
400
500
factors
overall_kmo
bartlett_chi_square
bartlett_df
bartlett_p_value
mean_communality
iterations


Rotated Factor Loadings
factor_1
factor_2
communality
1.0
0.8
0.6
0.4
0.2
0.0
famrel
freetime
goout
Dalc
Walc
health


Spearman Correlation Matrix
famrel
freetime
goout
Dalc
Walc
1.0
0.8
0.6
0.4
0.2
0.0
famrel
freetime
goout
Dalc
Walc
health


Item Kmo
Analysis for Questionnaire Data
item_kmo
0.0
0.1
0.2
0.3
0.4
0.5
0.6
famrel
freetime
goout
Dalc
Walc
health


Factor Analysis for Questionnaire Data verified result summary
factors
overall kmo
bartlett chi square
bartlett df
bartlett p value
mean communality
iterations
0
100
200
300
400
500

Primary Metrics

metric	value
factors	2
overall_kmo	0.568786
bartlett_chi_square	546.102
bartlett_df	15
bartlett_p_value	9.75778e-107
mean_communality	0.380671
iterations	500

Rotated Factor Loadings

item	factor_1	factor_2	communality
famrel	-0.13135	0.251463	0.0804864
freetime	0.0918096	0.694456	0.490698
goout	0.331894	0.458877	0.320722
Dalc	0.619309	0.0789142	0.389771
Walc	0.990829	0.0647642	0.985936
health	0.0869618	0.0940818	0.0164137

Spearman Correlation Matrix

item	famrel	freetime	goout	Dalc	Walc	health
famrel	1	0.144123	0.0877753	-0.0975293	-0.102033	0.0925423
freetime	0.144123	1	0.354345	0.127172	0.120148	0.0951054
goout	0.0877753	0.354345	1	0.233977	0.372455	-0.0121221
Dalc	-0.0975293	0.127172	0.233977	1	0.613056	0.0849465
Walc	-0.102033	0.120148	0.372455	0.613056	1	0.114282
health	0.0925423	0.0951054	-0.0121221	0.0849465	0.114282	1

Item Kmo

item	item_kmo
famrel	0.554126
freetime	0.575256
goout	0.593096
Dalc	0.580367
Walc	0.553114
health	0.474282