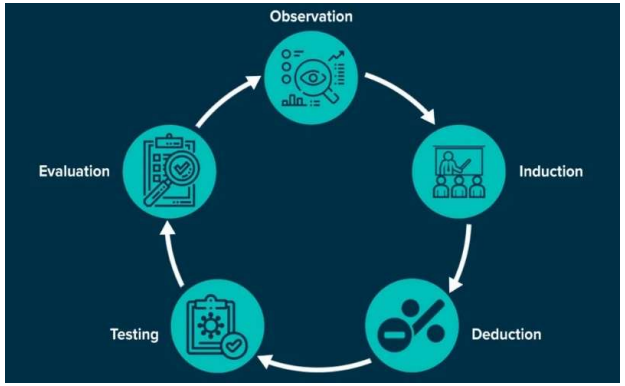
Empirical research in management and economics
Exercise

Thorsten Pachur, Linus Hof, Rebecca West, Sebastian Hellmann, Nuno Busch

Technical University of Munich
School of Management
Chair of Behavioral Research Methods



Organizational ability questionnaire

7-point Likert scale (1 = strongly disagree, 4 = neither, 7 = strongly agree).

Item no	Item description
1	I like to have a plan to work to in everyday life
2	I feel frustrated when things don't go to plan
3	I get most things done in a day that I want to
4	I stick to a plan once I have made it
6	I enjoy spontaneity and uncertainty (*)
7	I feel frustrated if I can't find something I need
9	I find it difficult to follow a plan through (*)
10	I am an organized person
11	I like to know what I have to do in a day
12	Disorganized people annoy me
13	I leave things to the last minute (*)
14	I have many different plans relating to the same goal (*)
16	I like to have my documents filed and in order
17	I find it easy to work in a disorganized environment (*)

Item no	Item description
18	I make 'to do' lists and achieve most of the things on it
19	My workspace is messy and disorganized (*)
20	I like to be organized
21	Interruptions to my daily routine annoy me
22	I feel that I am wasting my time
23	I forget the plans I have made (*)
24	I prioritize the things I have to do
25	I like to work in an organized environment
26	I feel relaxed when I don't have a routine (*)
27	I set deadlines for myself and achieve them
28	I change rather aimlessly from one activity to another during the day (*)
29	I have trouble organizing the things I have to do (*)
30	I put tasks off to another day (*)
31	I feel restricted by schedules and plans (*)

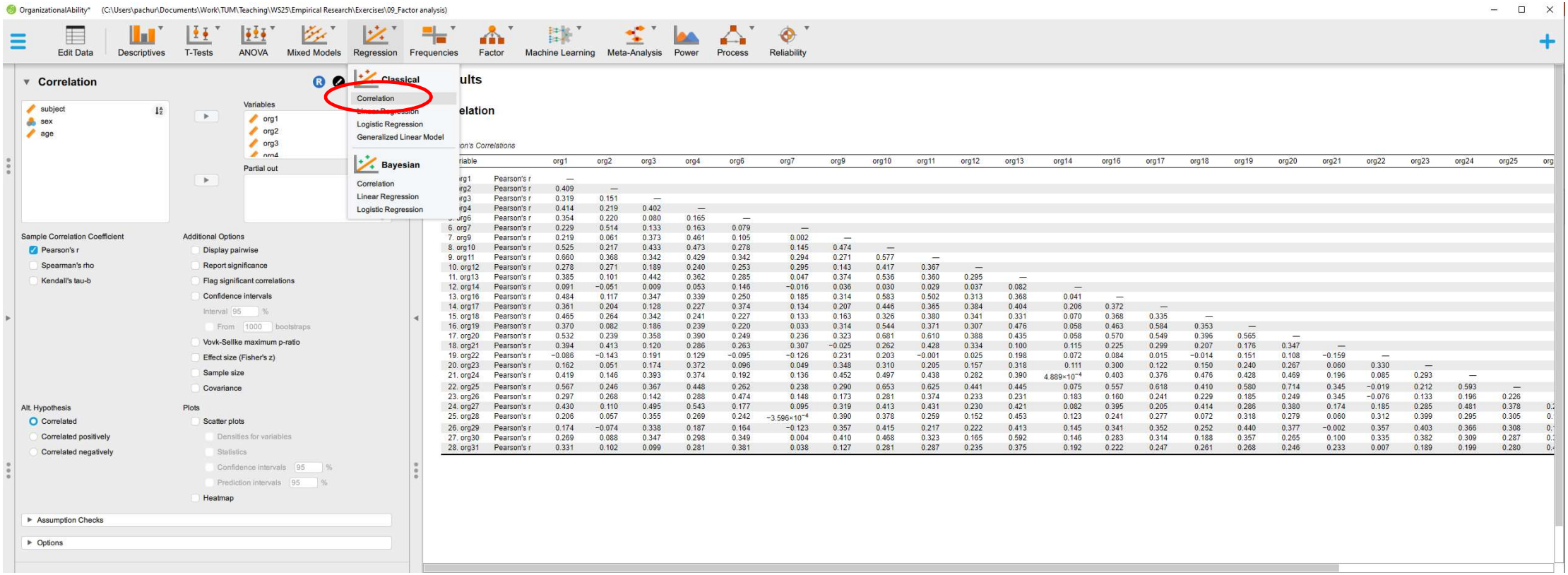
(*) = reverse coded

Exercise

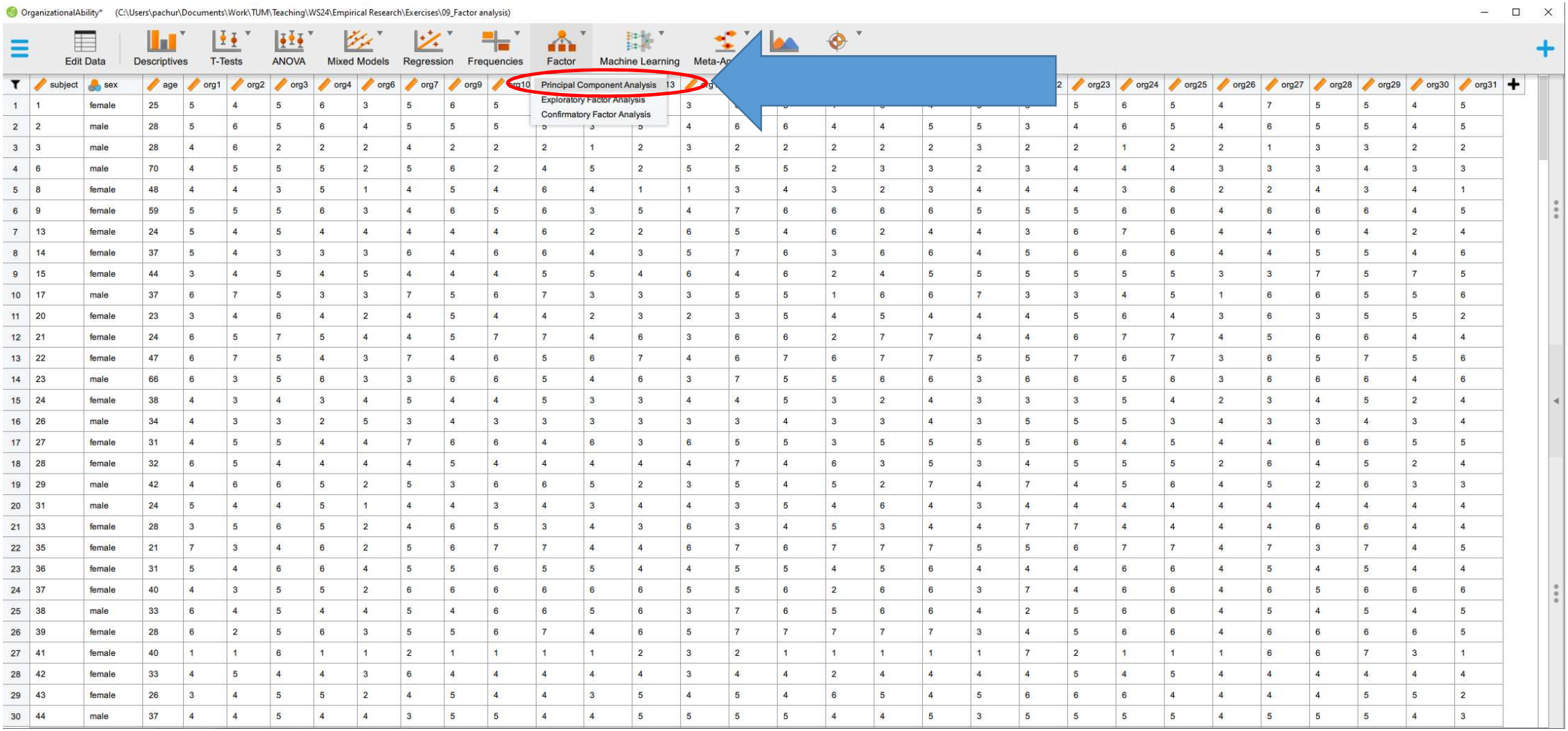
- Open dataset “OrganizationalAbility.csv“

→ Organizational ability questionnaire (*N* = 239)

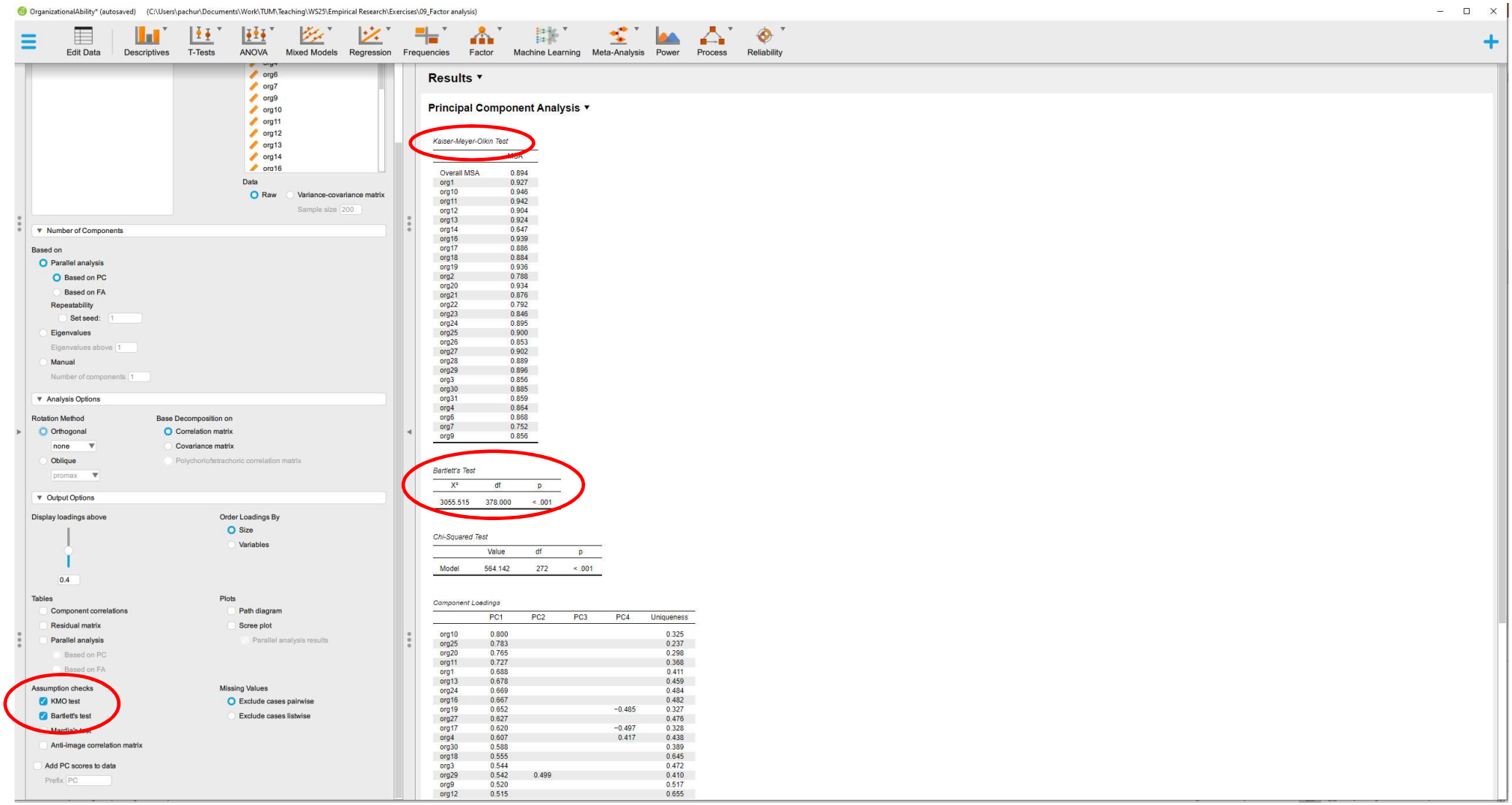
- Conduct a principal component analysis with JASP
  - How many factors would you retain (based on scree test, based on parallel analysis)?
  - Would you use orthogonal or oblique rotation?
  - How do you interpret the extracted factors? Find a descriptive name for each factor.
  - Produce each person‘s factor score on each of the extracted factors

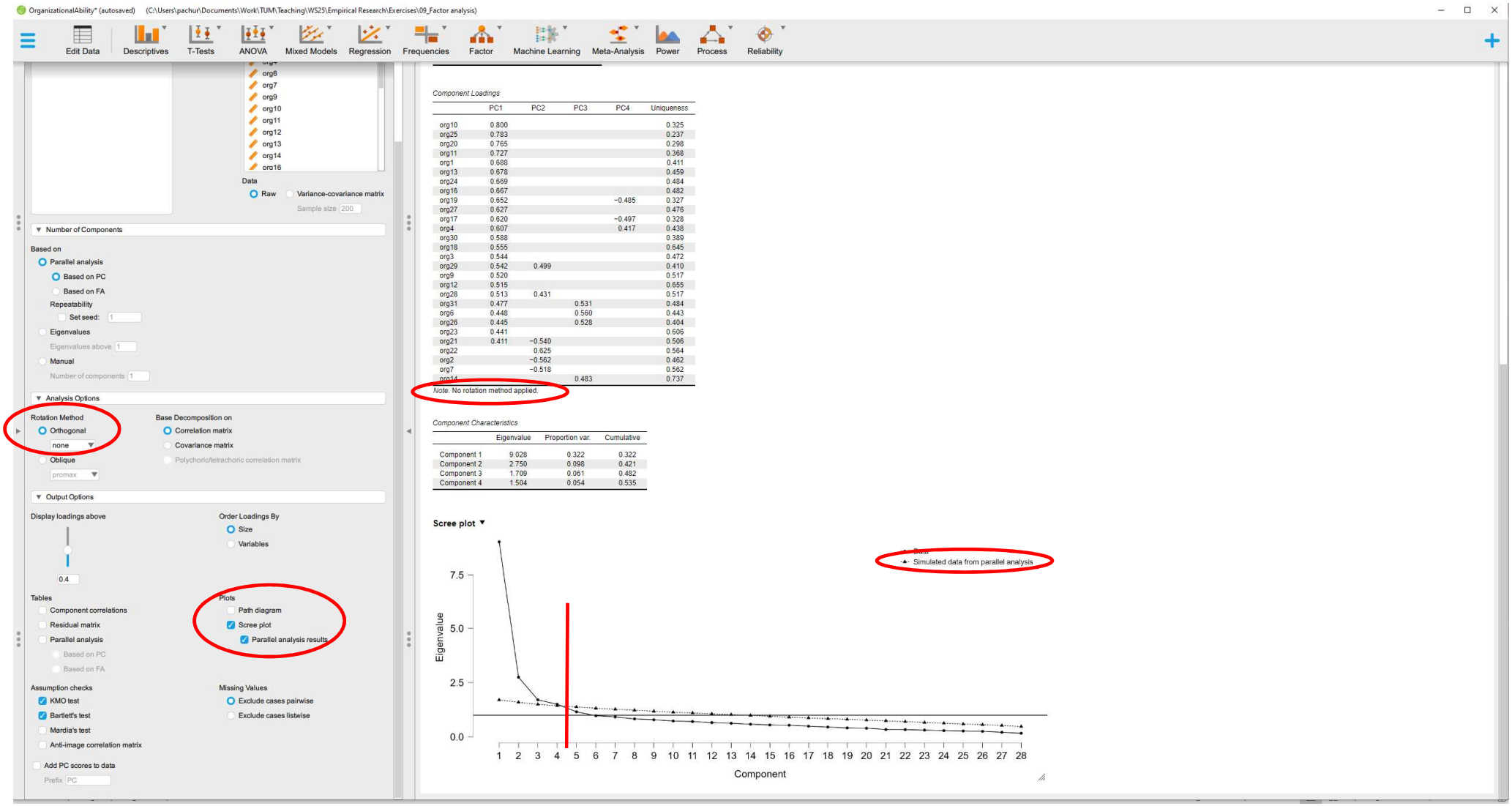


riable		org1	org2	org3	org4	org6	org7	org9	org10	org11	org12	org13	org14	org16	org17	org18	org19	org20	org21	org22	org23	org24	org25	org
rg1	Pearson's r	—																						
rg2	Pearson's r	0.409	—																					
rg3	Pearson's r	0.319	0.151	—																				
rg4	Pearson's r	0.414	0.219	0.402	—																			
rg6	Pearson's r	0.354	0.220	0.080	0.165	—																		
6. org7	Pearson's r	0.229	0.514	0.133	0.163	0.079	—																	
7. org9	Pearson's r	0.219	0.061	0.373	0.461	0.105	0.002	—																
8. org10	Pearson's r	0.525	0.217	0.433	0.473	0.278	0.145	0.474	—															
9. org11	Pearson's r	0.660	0.368	0.342	0.429	0.342	0.294	0.271	0.577	—														
10. org12	Pearson's r	0.278	0.271	0.189	0.240	0.253	0.295	0.143	0.417	0.367	—													
11. org13	Pearson's r	0.385	0.101	0.442	0.362	0.285	0.047	0.374	0.536	0.360	0.295	—												
12. org14	Pearson's r	0.091	−0.051	0.009	0.053	0.146	−0.016	0.036	0.030	0.029	0.037	0.082	—											
13. org16	Pearson's r	0.484	0.117	0.347	0.339	0.250	0.185	0.314	0.583	0.502	0.313	0.368	0.041	—										
14. org17	Pearson's r	0.361	0.204	0.128	0.227	0.374	0.134	0.207	0.446	0.365	0.384	0.404	0.206	0.372	—									
15. org18	Pearson's r	0.465	0.264	0.342	0.241	0.227	0.133	0.163	0.326	0.380	0.341	0.331	0.070	0.368	0.335	—								
16. org19	Pearson's r	0.370	0.082	0.186	0.239	0.220	0.033	0.314	0.544	0.371	0.307	0.476	0.058	0.463	0.584	0.353	—							
17. org20	Pearson's r	0.532	0.239	0.358	0.390	0.249	0.236	0.323	0.681	0.610	0.388	0.435	0.058	0.570	0.549	0.396	0.565	—						
18. org21	Pearson's r	0.394	0.413	0.120	0.286	0.263	0.307	−0.025	0.262	0.428	0.334	0.100	0.115	0.225	0.299	0.207	0.176	0.347	—					
19. org22	Pearson's r	−0.086	−0.143	0.191	0.129	−0.095	−0.126	0.231	0.203	−0.001	0.025	0.198	0.072	0.084	0.015	−0.014	0.151	0.108	−0.159	—				
20. org23	Pearson's r	0.162	0.051	0.174	0.372	0.098	0.049	0.348	0.310	0.205	0.157	0.318	0.111	0.300	0.122	0.150	0.240	0.267	0.060	0.330	—			
21. org24	Pearson's r	0.419	0.146	0.393	0.374	0.192	0.136	0.452	0.497	0.438	0.282	0.390	4.889×10^{-4}	0.403	0.376	0.476	0.428	0.469	0.196	0.085	0.293	—		
22. org25	Pearson's r	0.567	0.246	0.367	0.448	0.262	0.238	0.290	0.653	0.625	0.441	0.445	0.075	0.557	0.618	0.410	0.580	0.714	0.345	−0.019	0.212	0.593	—	
23. org26	Pearson's r	0.297	0.268	0.142	0.288	0.474	0.148	0.173	0.281	0.374	0.233	0.231	0.183	0.160	0.241	0.229	0.185	0.249	0.345	−0.076	0.133	0.196	0.226	
24. org27	Pearson's r	0.430	0.110	0.495	0.543	0.177	0.095	0.319	0.413	0.431	0.230	0.421	0.082	0.395	0.205	0.414	0.286	0.380	0.174	0.185	0.285	0.481	0.378	0.2
25. org28	Pearson's r	0.206	0.057	0.355	0.269	0.242	-3.596×10^{-4}	0.390	0.378	0.259	0.152	0.453	0.123	0.241	0.277	0.072	0.318	0.279	0.060	0.312	0.399	0.295	0.305	0.
26. org29	Pearson's r	0.174	−0.074	0.338	0.187	0.164	−0.123	0.357	0.415	0.217	0.222	0.413	0.145	0.341	0.352	0.252	0.440	0.377	−0.002	0.357	0.403	0.366	0.308	0.1
27. org30	Pearson's r	0.269	0.088	0.347	0.298	0.349	0.004	0.410	0.468	0.323	0.165	0.592	0.146	0.283	0.314	0.188	0.357	0.265	0.100	0.335	0.382	0.309	0.287	0.3
28. org31	Pearson's r	0.331	0.102	0.099	0.281	0.381	0.038	0.127	0.281	0.287	0.235	0.375	0.192	0.222	0.247	0.261	0.268	0.246	0.233	0.007	0.189	0.199	0.280	0.4



	subject	sex	age	org1	org2	org3	org4	org6	org7	org9	org10	13	org23	org24	org25	org26	org27	org28	org29	org30	org31
1	1	female	25	5	4	5	6	3	5	6	5	3	5	6	5	4	7	5	5	4	5
2	2	male	28	5	6	5	6	4	5	5	5	4	6	5	4	6	5	5	4	5	5
3	3	male	28	4	6	2	2	2	4	2	2	2	1	2	2	1	3	3	2	2	2
4	6	male	70	4	5	5	5	2	5	6	2	4	5	2	4	4	4	3	3	3	4
5	8	female	48	4	4	3	5	1	4	5	4	6	4	1	1	3	4	3	2	3	4
6	9	female	59	5	5	5	6	3	4	6	5	6	3	5	4	7	6	6	6	6	5
7	13	female	24	5	4	5	4	4	4	4	4	6	2	2	6	5	4	6	2	4	4
8	14	female	37	5	4	3	3	3	6	4	6	6	4	3	5	7	6	3	6	6	4
9	15	female	44	3	4	5	4	5	4	4	4	5	5	4	6	4	6	2	4	5	5
10	17	male	37	6	7	5	3	3	7	5	6	7	3	3	3	5	5	1	6	6	7
11	20	female	23	3	4	6	4	2	4	5	4	4	2	3	2	3	5	4	5	4	4
12	21	female	24	6	5	7	5	4	4	5	7	7	4	6	3	6	6	2	7	7	4
13	22	female	47	6	7	5	4	3	7	4	6	5	6	7	4	6	7	6	7	7	5
14	23	male	66	6	3	5	6	3	3	6	6	5	4	6	3	7	5	5	6	6	3
15	24	female	38	4	3	4	3	4	5	4	4	5	3	3	4	4	5	3	2	4	3
16	26	male	34	4	3	3	2	5	3	4	3	3	3	3	3	3	4	3	3	4	3
17	27	female	31	4	5	5	4	4	7	6	6	4	6	3	6	5	5	3	5	5	5
18	28	female	32	6	5	4	4	4	4	5	4	4	4	4	4	7	4	6	3	5	3
19	29	male	42	4	6	6	5	2	5	3	6	6	5	2	3	5	4	5	2	7	4
20	31	male	24	5	4	4	5	1	4	4	3	4	3	4	4	3	5	4	6	4	3
21	33	female	28	3	5	6	5	2	4	6	5	3	4	3	6	3	4	5	3	4	4
22	35	female	21	7	3	4	6	2	5	6	7	7	4	4	6	7	6	7	7	7	5
23	36	female	31	5	4	6	6	4	5	5	6	5	5	4	4	5	5	4	5	6	4
24	37	female	40	4	3	5	5	2	6	6	6	6	6	6	5	5	6	2	6	6	3
25	38	male	33	6	4	5	4	4	5	4	6	6	5	6	3	7	6	5	6	6	4
26	39	female	28	6	2	5	6	3	5	5	6	7	4	6	5	7	7	7	7	7	3
27	41	female	40	1	1	6	1	1	2	1	1	1	1	2	3	2	1	1	1	1	1
28	42	female	33	4	5	4	4	3	6	4	4	4	4	4	3	4	4	2	4	4	4
29	43	female	26	3	4	5	5	2	4	5	4	4	3	5	4	5	4	6	5	4	5
30	44	male	37	4	4	5	4	4	3	5	5	4	4	5	5	5	5	4	4	5	3


OrganizationalAbility* (autosaved)
Edit Data
Descriptives
T-Tests
ANOVA
Mixed Models
Regression
Frequencies
Factor
Machine Learning
Meta-Analysis
Power
Process
Reliability
org6
org7
org9
org10
org11
org12
org13
org14
org16
Data
Raw
Variance-covariance matrix
Sample size 200
Number of Components
Based on
Parallel analysis
Based on PC
Based on FA
Repeatability
Set seed: 1
Eigenvalues
Eigenvalues above 1
Manual
Number of components 1
Analysis Options
Rotation Method
Orthogonal
none
Oblique
promax
Base Decomposition on
Correlation matrix
Covariance matrix
Polychoric/tetrachoric correlation matrix
Output Options
Display loadings above
0.4
Order Loadings By
Size
Variables
Tables
Component correlations
Residual matrix
Parallel analysis
Based on PC
Based on FA
Plots
Path diagram
Scree plot
Parallel analysis results
Assumption checks
KMO test
Bartlett's test
Anti-image correlation matrix
Add PC scores to data
Prefix PC
Missing Values
Exclude cases pairwise
Exclude cases listwise
Results
Principal Component Analysis
Kaiser-Meyer-Olkin Test
MSA
Overall MSA 0.894
org1 0.927
org10 0.946
org11 0.942
org12 0.904
org13 0.924
org14 0.647
org16 0.939
org17 0.886
org18 0.884
org19 0.936
org2 0.788
org20 0.934
org21 0.876
org22 0.792
org23 0.846
org24 0.895
org25 0.900
org26 0.853
org27 0.902
org28 0.889
org29 0.896
org3 0.856
org30 0.885
org31 0.859
org4 0.864
org6 0.868
org7 0.752
org9 0.856
Bartlett's Test
X² df p
3055.515 378.000 < .001
Chi-Squared Test
Value df p
Model 564.142 272 < .001
Component Loadings
PC1 PC2 PC3 PC4 Uniqueness
org10 0.800 0.325
org25 0.783 0.237
org20 0.765 0.298
org11 0.727 0.368
org1 0.688 0.411
org13 0.678 0.459
org24 0.669 0.484
org16 0.667 0.482
org19 0.652 −0.485 0.327
org27 0.627 0.476
org17 0.620 −0.497 0.328
org4 0.607 0.417 0.438
org30 0.588 0.389
org18 0.555 0.645
org3 0.544 0.472
org29 0.542 0.499 0.410
org9 0.520 0.517
org12 0.515 0.655



Note: Because the number of components is based on parallel analysis (which relies on simulations, that involve random variation), sometimes a solution with **only three components** is proposed

OrganizationalAbility* (C:\Users\pachur\Documents\Work\TUM\Teaching\WS25\Empirical Research\Exercises\09_Factor analysis)

Edit Data | Descriptives | T-Tests | ANOVA | Mixed Models | Regression | Frequencies | Factor | Machine Learning | Meta-Analysis | Power | Process | Reliability

org6
org7
org9
org10
org11
org12
org13
org14
org16

Data
Raw | Variance-covariance matrix
Sample size 200

▼ Number of Components

Based on
Parallel analysis
Based on PC
Based on FA
Repeatability
Set seed: 1
Eigenvalues
Eigenvalues above 1
Manual
Number of components 1

▼ Analysis Options

Rotation Method
Orthogonal
varimax
promax

Base Decomposition on
Correlation matrix
Covariance matrix
Polychoric/tetrachoric correlation matrix

▼ Output Options

Display loadings above
0.4

Order Loadings By
Size
Variables

Tables
Component correlations
Residual matrix
Parallel analysis
Based on PC
Based on FA

Plots
Path diagram
Scree plot
Parallel analysis results

Assumption checks
KMO test
Bartlett's test
Mardia's test
Anti-image correlation matrix

Missing Values
Exclude cases pairwise
Exclude cases listwise

Add PC scores to data
Prefix PC

Component Loadings ▼

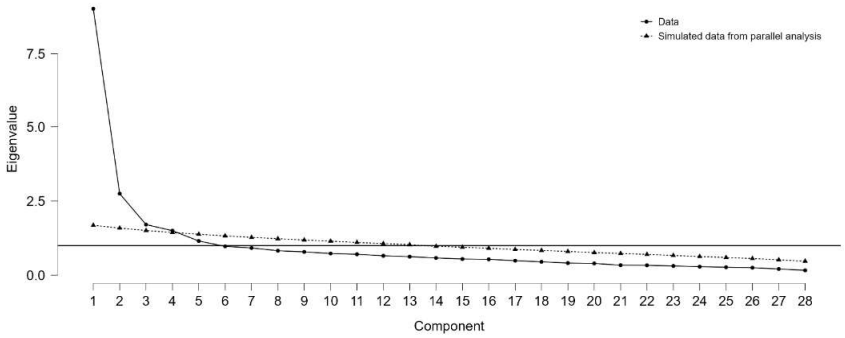
	PC1	PC2	PC3	PC4	Uniqueness
org25	0.805				0.237
org19	0.768				0.327
org20	0.766				0.298
org17	0.746				0.328
org10	0.644	0.464			0.325
org16	0.630				0.482
org24	0.545	0.427			0.484
org11	0.518		0.518		0.368
org1	0.501		0.513		0.411
org18	0.484				0.645
org12	0.482				0.655
org13	0.421	0.530			0.459
org29	0.402	0.513			0.410
org9		0.659			0.517
org3		0.632			0.472
org27		0.613			0.476
org30		0.607		0.454	0.389
org23		0.603			0.606
org28		0.596			0.517
org4		0.585	0.431		0.438
org22		0.562			0.564
org2			0.718		0.462
org7			0.647		0.562
org21			0.577		0.506
org6				0.679	0.443
org31				0.652	0.484
org26				0.651	0.404
org14				0.501	0.737

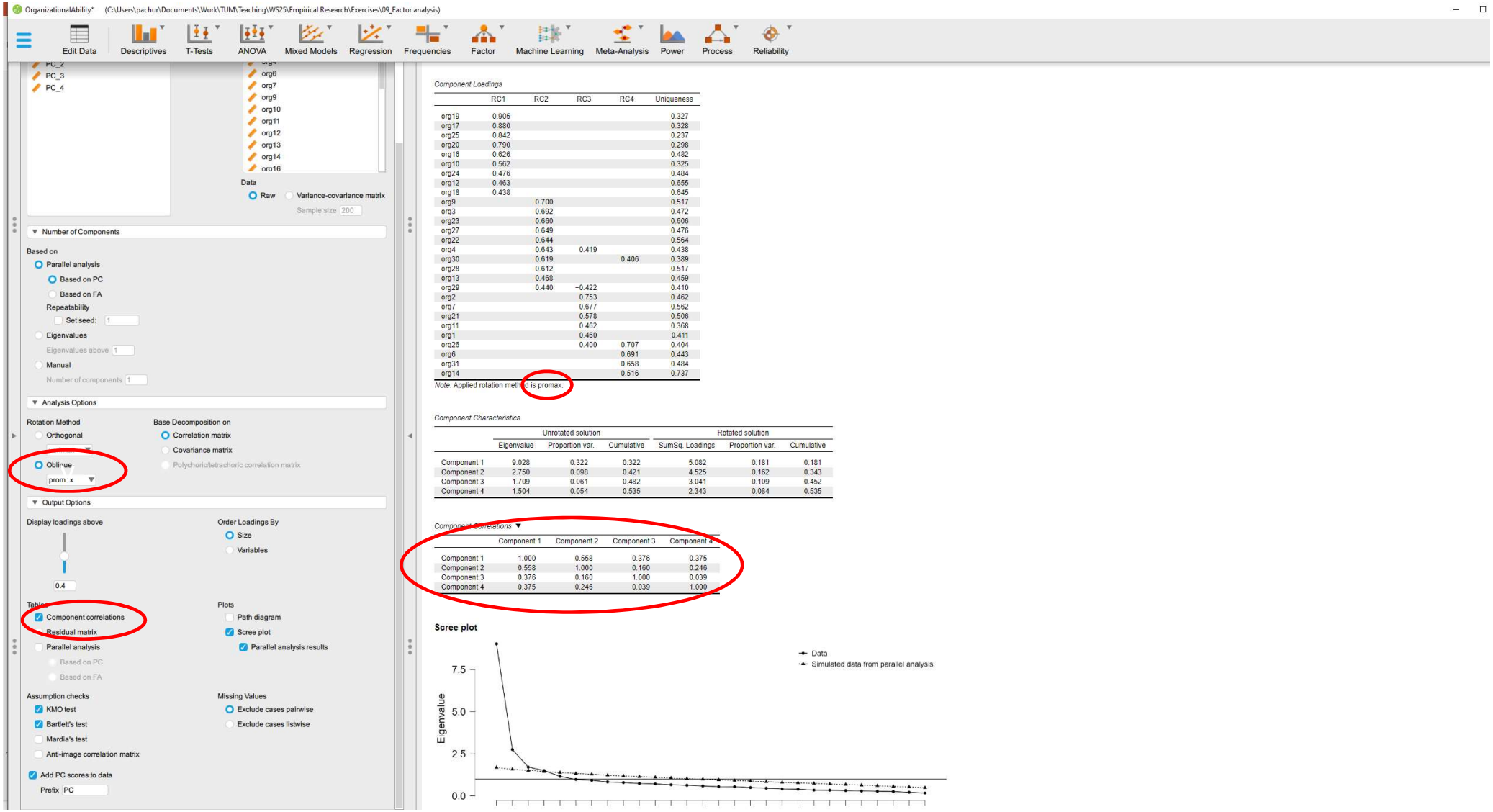
Note. Applied rotation method is varimax.

Component Characteristics

	Unrotated solution			Rotated solution		
	Eigenvalue	Proportion var.	Cumulative	SumSq. Loadings	Proportion var.	Cumulative
Component 1	9.028	0.322	0.322	5.250	0.188	0.188
Component 2	2.750	0.098	0.421	4.348	0.155	0.343
Component 3	1.709	0.061	0.482	3.003	0.107	0.450
Component 4	1.504	0.054	0.535	2.389	0.085	0.535

Scree plot




OrganizationalAbility* (C:\Users\pachur\Documents\Work\TUM\Teaching\WS25\Empirical Research\Exercises\09_Factor analysis)
Edit Data
Descriptives
T-Tests
ANOVA
Mixed Models
Regression
Frequencies
Factor
Machine Learning
Meta-Analysis
Power
Process
Reliability
PC_3
PC_4
org6
org7
org9
org10
org11
org12
org13
org14
org16
Data
Raw
Variance-covariance matrix
Sample size 200
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promax
Base Decomposition on
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Display loadings above
0.4
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KMO test
Bartlett's test
Mardia's test
Anti-image correlation matrix
Missing Values
Exclude cases pairwise
Exclude cases listwise
Add PC scores to data
Prefix PC
Component Loadings
RC1 RC2 RC3 RC4 Uniqueness
org19 0.905 0.327
org17 0.880 0.328
org25 0.842 0.237
org20 0.790 0.298
org16 0.626 0.482
org10 0.562 0.325
org24 0.476 0.484
org12 0.463 0.655
org18 0.438 0.645
org9 0.700 0.517
org3 0.692 0.472
org23 0.660 0.606
org27 0.649 0.476
org22 0.644 0.564
org4 0.643 0.419 0.438
org30 0.619 0.406 0.389
org28 0.612 0.517
org13 0.468 0.459
org29 0.440 −0.422 0.410
org2 0.753 0.462
org7 0.677 0.562
org21 0.578 0.506
org11 0.462 0.368
org1 0.460 0.411
org26 0.400 0.707 0.404
org6 0.691 0.443
org31 0.658 0.484
org14 0.516 0.737
Note. Applied rotation method is promax.
Component Characteristics
Unrotated solution Rotated solution
Eigenvalue Proportion var. Cumulative SumSq. Loadings Proportion var. Cumulative
Component 1 9.028 0.322 0.322 5.082 0.181 0.181
Component 2 2.750 0.098 0.421 4.525 0.162 0.343
Component 3 1.709 0.061 0.482 3.041 0.109 0.452
Component 4 1.504 0.054 0.535 2.343 0.084 0.535
Component Correlations
Component 1 Component 2 Component 3 Component 4
Component 1 1.000 0.558 0.376 0.375
Component 2 0.558 1.000 0.160 0.246
Component 3 0.376 0.160 1.000 0.039
Component 4 0.375 0.246 0.039 1.000
Scree plot
Data
Simulated data from parallel analysis
Eigenvalue
7.5
5.0
2.5
0.0

Organizational ability questionnaire

7-point Likert scale (1 = strongly disagree, 4 = neither, 7 = strongly agree).

Item no	Item description
1	I like to have a plan to work to in everyday life
2	I feel frustrated when things don't go to plan
3	I get most things done in a day that I want to
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Item no	Item description
18	I make 'to do' lists and achieve most of the things on it
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30	I put tasks off to another day (*)
31	I feel restricted by schedules and plans (*)

(*) = reverse coded

Organizational ability questionnaire

Preference for organization	
19	My workspace is messy and disorganized (*)
17	I find it easy to work in a disorganized environment (*)
25	I like to work in an organized environment
20	I like to be organized
16	I like to have my documents filed and in order
10	I am an organized person
24	I prioritize the things I have to do
12	Disorganized people annoy me
18	I make ‘to do’ lists and achieve most of the things on it

Goal achievement	
9	I find it difficult to follow a plan through (*)
3	I get most things done in a day that I want to
23	I forget the plans I have made (*)
27	I set deadlines for myself and achieve them
22	I feel that I am wasting my time (*)
4	I stick to a plan once I have made it
30	I put tasks off to another day (*)
28	I change rather aimlessly from one activity to another during the day (*)
13	I leave things to the last minute (*)
29	I have trouble organizing the things I have to do (*)

Acceptance of interruptions	
2	I feel frustrated when things don’t go to plan
7	I feel frustrated if I can’t find something I need
21	Interruptions to my daily routine annoy me
11	I like to know what I have to do in a day
1	I like to have a plan to work to in everyday life

Preference for routine	
26	I feel relaxed when I don’t have a routine (*)
6	I enjoy spontaneity and uncertainty (*)
31	I feel restricted by schedules and plans (*)
14	I have many different plans relating to the same goal (*)

(*) = reverse coded

Factor scores