

## Introduction

A study was conducted to develop a questionnaire on personality traits from which scores for aspects of these traits could be computed on 459 subjects. The investigators collected data on 44 items relating to personality and proposed to conduct a series of classical psychometric analyses. We used the personality data set for our analyses which had 44 items and 459 subjects.

First we Perform a Cronbach alpha analysis of these items to see if this set of items show good internal consistency reliability. We also wanted to check if this set of items is not unidimensional in nature.

Cronbach Coefficient Alpha with Deleted Variable					
Deleted Variable	Raw Variables		Standardized Variables		Label
	Correlation with Total	Alpha	Correlation with Total	Alpha	
PERS01	0.115322	0.494125	0.193133	0.541044	talkative
PERS02	0.103488	0.495543	0.075806	0.552534	finds fault
PERS03	0.221838	0.484285	0.282547	0.532102	does a thorough job
PERS04	-.031134	0.513328	-.072538	0.566672	depressed
PERS05	0.239227	0.481928	0.299280	0.530410	original
PERS06	0.037296	0.503904	0.000445	0.559770	reserved
PERS07	0.120373	0.494023	0.185577	0.541792	helpful
PERS08	0.012346	0.506048	-.053074	0.564841	careless
PERS09	-.012009	0.509749	0.033564	0.556604	relaxed
PERS10	0.327328	0.473970	0.353368	0.524903	curious
PERS11	0.229818	0.480804	0.260613	0.534310	full of energy
PERS12	0.048652	0.502313	0.007173	0.559128	starts quarrels
PERS13	0.163515	0.489388	0.232625	0.537114	reliable
PERS14	0.129619	0.492465	0.087930	0.551359	tense

Cronbach Coefficient Alpha with Deleted Variable					
Deleted Variable	Raw Variables		Standardized Variables		Label
	Correlation with Total	Alpha	Correlation with Total	Alpha	
PERS15	0.289352	0.474976	0.304203	0.529911	ingenious
PERS16	0.303362	0.475740	0.341662	0.526100	generates enthusiasm in others
PERS17	0.129166	0.492855	0.150552	0.545246	forgiving
PERS18	-.111507	0.523965	-.154111	0.574264	disorganized
PERS19	0.111865	0.494583	0.100735	0.550115	worries
PERS20	0.307513	0.473469	0.334727	0.526808	imaginative
PERS21	-.055850	0.516863	-.089387	0.568251	quiet
PERS22	0.140924	0.491662	0.189310	0.541423	trusting
PERS23	-.116223	0.523538	-.182349	0.576863	lazy
PERS24	0.030157	0.504684	0.073654	0.552742	emotionally stable
PERS25	0.218314	0.482705	0.249095	0.535466	inventive
PERS26	0.203769	0.483965	0.238285	0.536549	assertive
PERS27	0.057585	0.501104	0.001496	0.559670	cold and aloof
PERS28	0.130740	0.492520	0.206886	0.539679	perseveres
PERS29	0.180864	0.486679	0.133799	0.546889	moody
PERS30	0.240186	0.481075	0.252662	0.535109	values artistic experiences
PERS31	0.010617	0.507477	-.021783	0.561883	shy
PERS32	0.203083	0.485940	0.263744	0.533996	considerate
PERS33	0.141534	0.492455	0.186925	0.541659	efficient

Cronbach Coefficient Alpha with Deleted Variable					
Deleted Variable	Raw Variables		Standardized Variables		Label
	Correlation with Total	Alpha	Correlation with Total	Alpha	
PERS34	-.022018	0.509083	0.008056	0.559044	calm in tense situations
PERS35	-.023857	0.511046	-.044707	0.564052	prefers routine work
pers36	0.133281	0.492108	0.181822	0.542164	outgoing
PERS37	0.002290	0.507921	-.050095	0.564560	sometimes rude
PERS38	0.208989	0.484393	0.264390	0.533931	sticks to plans
PERS39	0.113426	0.494348	0.060459	0.554016	nervous
PERS40	0.322415	0.474862	0.350630	0.525183	reflective
PERS41	-.119604	0.521643	-.151861	0.574056	few artistic interests
PERS42	0.156074	0.490531	0.216176	0.538755	co-operative
PERS43	0.060367	0.500526	0.001616	0.559658	distractable
PERS44	0.175324	0.486852	0.191341	0.541222	sophisticated in art & music

Cronbach Coefficient Alpha	
Variables	Alpha
Raw	0.501080
Standardized	0.553674

None of the alpha values meet the Nunnally acceptable criterion. The resulting alpha values of both the “raw” 0.50 and the “standardized” of 0.55 do not meet the acceptability criterion of Nunnally (1978) of 0.70 or greater. Hence this set of items does not show good internal consistency reliability.

	PER S01	PER S02	PER S03	PER S04	PER S05	PER S06	PER S07	PER S08	PER S09	PER S10	PER S11	PER S12	PER S13	PER S14	
<b>PERS 01</b>  <b>talkati ve</b>	1.000 00	0.069 12	0.203 87	- 0.265 09	0.289 54	- 0.452 38	0.279 79	- 0.095 75	0.070 66	0.205 94	0.132 63	- 0.110 21	0.282 76	- 0.084 93	0
		0.151 0	<.000 1	<.000 1	<.000 1	<.000 1	<.000 1	0.046 5	0.142 1	<.000 1	0.005 7	0.021 8	<.000 1	0.077 5	0
<b>PERS 02</b>  <b>finds fault</b>	0.069 12	1.000 00	- 0.011 62	0.118 80	- 0.115 43	0.067 23	- 0.263 91	0.081 15	- 0.152 75	0.102 12	0.078 04	0.267 66	- 0.102 76	0.170 61	0
	0.151 0		0.809 4	0.013 4	0.016 3	0.162 6	<.000 1	0.091 7	0.001 4	0.033 6	0.104 9	<.000 1	0.032 5	0.000 4	0
<b>PERS 03</b>  <b>does a thoro ugh job</b>	0.203 87	- 0.011 62	1.000 00	- 0.111 03	0.211 55	0.042 12	0.337 52	- 0.386 83	0.092 51	0.196 44	0.064 57	- 0.144 15	0.549 28	- 0.000 81	0
	<.000 1	0.809 4		0.020 8	<.000 1	0.382 0	<.000 1	<.000 1	0.054 4	<.000 1	0.179 9	0.002 6	<.000 1	0.986 6	0

It is not unidimensional as there are huge differences between the variables. Personality 01 talkative has correlation of  $R=0.0691$  with personality 02 finds fault, whereas personality 01 talkative has correlation of  $R=0.2038$  with personality 03 does a thorough job, whereas personality 01 talkative has correlation of  $R=-0.2650$  with personality 04 depressed. There are much differences in the correlation among the variables hence it does not seem unidimensional.

Next we perform an exploratory factor analysis of these data using VARIMAX rotation to see if these 44 items can be reduced in dimension. We also wanted to see which factors “loaded high” and what each latent factor is measuring.

Eigenvalues of the Reduced Correlation Matrix: Total = 18.8906099 Average = 0.42933204				
	Eigenvalue	Difference	Proportion	Cumulative
1	6.74330944	3.07030268	0.3570	0.3570

Eigenvalues of the Reduced Correlation Matrix: Total = 18.8906099 Average = 0.42933204				
	Eigenvalue	Difference	Proportion	Cumulative
2	3.67300676	1.21157192	0.1944	0.5514
3	2.46143484	0.45358435	0.1303	0.6817
4	2.00785050	0.34720656	0.1063	0.7880
5	1.66064393	0.65809519	0.0879	0.8759
6	1.00254874	0.30436583	0.0531	0.9290
7	0.69818291	0.10235951	0.0370	0.9659
8	0.59582340	0.01263112	0.0315	0.9975

**6 factors will be retained by the MINEIGEN criterion.**

Yes, these 44 items be reduced in dimension to 6 items as most the of variance in proportion is by the first 4 variables.

6 factors will be retained by the Mineigen criterion >1 according to Kaiser criterion. From the reduced correlation matrix we can see that 6 factors are sufficient to reduce matrix.

So this rotated factor pattern will give a better idea of the items based on the factors.

Rotated Factor Pattern							
		Factor1	Factor2	Factor3	Factor4	Factor5	Factor6
PERS01	talkative	0.11905	-0.69049	0.06246	0.32001	0.06160	0.25824
PERS02	finds fault	0.05110	-0.10953	0.20275	-0.47659	-0.01336	0.29854
PERS03	does a thorough job	0.65538	0.00275	0.04125	0.19276	0.09333	0.12952
PERS04	depressed	-0.14064	0.22320	0.54457	-0.19331	-0.03494	-0.06353
PERS05	original	0.22044	-0.27413	-0.16525	0.11274	0.54740	0.04765
PERS06	reserved	0.07885	0.69296	0.16651	-0.10322	0.02952	-0.03392

Rotated Factor Pattern							
		Factor1	Factor2	Factor3	Factor4	Factor5	Factor6
PERS07	helpful	0.31851	-0.11336	-0.01244	0.52755	0.13001	-0.02782
PERS08	careless	-0.59307	0.05424	0.14599	-0.09328	-0.06711	0.19724
PERS09	relaxed	0.07139	0.02912	-0.67026	0.11269	0.08066	0.13676
PERS10	curious	0.13004	-0.09965	0.06165	0.05211	0.39850	0.26164
PERS11	full of energy	0.05884	-0.14595	-0.25423	0.01301	0.16882	0.47543
PERS12	starts quarrels	-0.17143	-0.00797	0.08220	-0.36743	-0.05499	0.21071
PERS13	reliable	0.58075	-0.07442	0.03187	0.33255	0.12097	0.01920
PERS14	tense	-0.04481	0.13729	0.66796	-0.07292	-0.02205	0.11853
PERS15	ingenious	0.14741	0.10866	0.05961	-0.06139	0.46838	0.06868
PERS16	generates enthusiasm in others	0.06552	-0.34459	-0.12658	0.10521	0.23468	0.49540
PERS17	forgiving	-0.03692	-0.02452	-0.10747	0.34767	0.05018	0.15281
PERS18	disorganized	-0.65824	0.01710	0.01044	0.03547	-0.01285	0.02524
PERS19	worries	0.07605	0.14879	0.59664	0.10835	0.09708	-0.06284
PERS20	imaginative	0.04351	-0.17997	0.10393	0.07452	0.48075	0.16000
PERS21	quiet	0.00974	0.81196	0.10493	-0.05444	-0.01815	-0.10126
PERS22	trusting	0.12838	-0.11826	-0.01831	0.59662	0.01644	0.12378
PERS23	lazy	-0.63374	0.02390	0.11726	-0.24364	-0.07336	0.02284
PERS24	emotionally stable	0.06546	-0.08158	-0.60113	0.07550	0.10528	0.15513
PERS25	inventive	0.01306	-0.16585	-0.12078	-0.08468	0.52282	0.14286
PERS26	assertive	0.11693	-0.39989	-0.22499	-0.17787	0.16751	0.43541

Rotated Factor Pattern							
		Factor1	Factor2	Factor3	Factor4	Factor5	Factor6
<b>PERS27</b>	cold and aloof	-0.08507	0.27685	0.13351	-0.38939	-0.07720	0.17345
<b>PERS28</b>	perseveres	0.62077	-0.06477	-0.00304	0.24622	0.12190	0.05287
<b>PERS29</b>	moody	-0.08546	0.09857	0.47576	-0.18718	0.01271	0.17123
<b>PERS30</b>	values artistic experiences	-0.00674	0.09237	-0.02544	0.08524	0.55017	0.02280
<b>PERS31</b>	shy	-0.06032	0.65530	0.17075	0.08141	0.00044	-0.05180
<b>PERS32</b>	considerate	0.30090	-0.03516	0.03446	0.62400	0.08041	0.12217
<b>PERS33</b>	efficient	0.60218	0.06075	-0.07417	-0.00125	-0.00976	0.22110
<b>PERS34</b>	calm in tense situations	0.08519	0.02288	-0.58446	-0.02958	0.02245	0.15611
<b>PERS35</b>	prefers routine work	0.02139	0.24148	0.04254	-0.01398	-0.22031	0.10787
<b>pers36</b>	outgoing	0.00474	-0.56893	-0.17043	0.19871	0.05219	0.36463
<b>PERS37</b>	sometimes rude	-0.31479	-0.08201	0.09616	-0.47055	-0.03353	0.21579
<b>PERS38</b>	sticks to plans	0.50877	-0.02762	-0.07814	0.11776	0.12677	0.19244
<b>PERS39</b>	nervous	-0.12125	0.41252	0.51000	0.00272	-0.08427	0.13755
<b>PERS40</b>	reflective	0.10852	0.05324	-0.02330	0.14789	0.57691	0.03839
<b>PERS41</b>	few artistic interests	-0.08160	0.10444	0.03814	-0.10740	-0.42959	0.15029
<b>PERS42</b>	co-operative	0.26816	-0.14112	0.03007	0.57533	0.10861	0.07485
<b>PERS43</b>	distractable	-0.51106	-0.00865	0.21009	-0.08314	-0.05229	0.22829
<b>PERS44</b>	sophisticated in art & music	-0.02581	0.06016	-0.06632	0.04348	0.50636	-0.01531

PERS03 does a thorough job loaded high on factor 1 since it is greater than 0.50

PERS04 depressed loaded high on factor 3 since it is greater than 0.50.

PERS05 original loaded high on factor 5 since it is greater than 0.50.

PERS06 reserved loaded high on factor 2 since it is greater than 0.50.  
PERS07 helpful loaded high on factor 4 since it is greater than 0.50.  
PERS13 reliable loaded high on factor 1 since it is greater than 0.50.  
PERS14 tense loaded high on factor 3 since it is greater than 0.50.  
PERS19 worries loaded high on factor 3 since it is greater than 0.50.  
PERS22 trusting loaded high on factor 4 since it is greater than 0.50.  
PERS25 inventive loaded high on factor 5 since it is greater than 0.50.  
PERS28 perseveres loaded high on factor 1 since it is greater than 0.50.  
PERS30 values artistic experience loaded high on factor 5 since it is greater than 0.50.  
PERS31 shy loaded high on factor 2 since it is greater than 0.50.  
PERS33 efficient loaded high on factor 1 since it is greater than 0.50.  
PERS38 sticks to plan loaded high on factor 1 since it is greater than 0.50.  
PERS39 nervous loaded high on factor 3 since it is greater than 0.50.  
PERS40 reflective loaded high on factor 5 since it is greater than 0.50.  
PERS42 co-operative loaded high on factor 4 since it is greater than 0.50.  
PERS44 sophisticated in art and music loaded high on factor 5 since it is greater than 0.50.

Factor 1 loads high on the following items Personality03 does a thorough job, Personality13 reliable, Personality28 perseveres Personality33 efficient, Personality38 sticks to plan.  
Factor 2 loads high on the following items Personality06 reserved Personality31 shy  
Factor 3 loads high on the following items Personality04 depressed Personality14 tense  
Personality19 worries Personality39 nervous  
Factor 4 loads high on the following items Personality07 helpful Personality22 trusting  
Personality42 co-operative  
Factor 5 loads high on the following items Personality05 original Personality25 inventive  
Personality40 reflective Personality44 sophisticated in art and music  
None of the personalities loaded high on factor 6.

From our analyses, it looks like factor 1 is measuring the dependability and efficiency skills of a person.

Factor 2 is measuring the level of shyness in ones personality

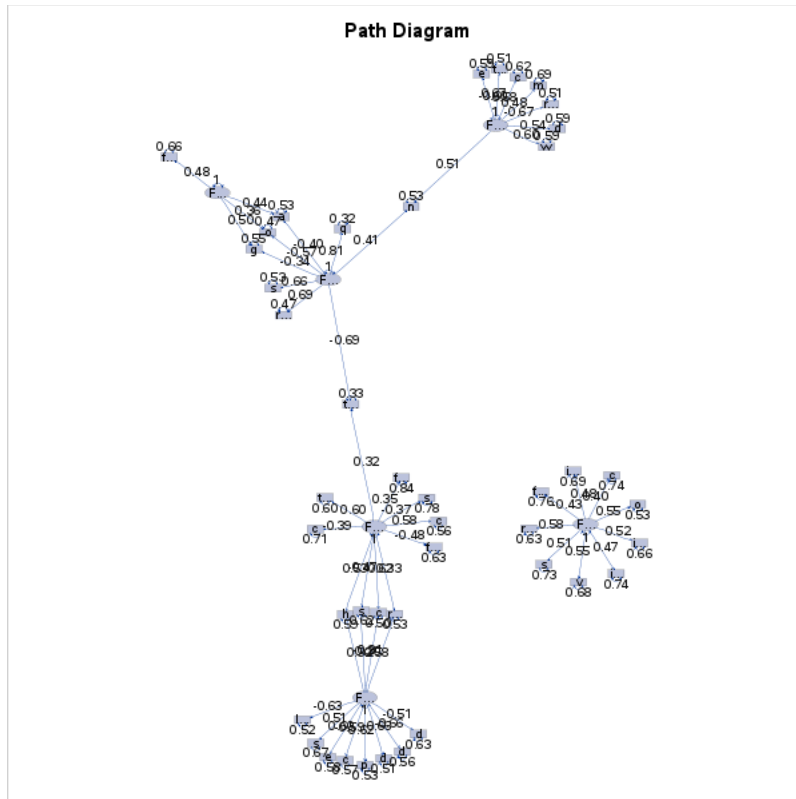
Factor 3 is measuring the level of depression and anxiety

Factor 4 is measuring the helpfulness and collaborative nature

Factor 5 is measuring the qualities of originality and skills in a personality.

This is the path diagram





## Conclusion

By performing the a Cronbach alpha analysis of these items we can conclude tht there is not unidimensionality in these items and the correlations are not equal for all. We can also conclude that there is not good internal consistency and reliability as the Cronbach alpha values are not not meeting the acceptability criterion of Nunnally (1978) of 0.70 or greater. From our exploratory factor analysis we can conclude that 6 factors are enough to retain in this model based on the Kaiser criterion of using minimum eigen value of 1. The 44 items collect information on various personality traits in order to detect the traits of dependability, collaborative nature, nervousness, depression and skills of invention and originality of ideas.