1 **Factorial structure of the indicators in Big Five Plus Inventory**

2 Cristian Opariuc-Dan[1,2,3], Gabriela Nicuță[3], and & Ticu Constantin[3]

3 [1] Ovidius University

4 Constanta

5 Romania

6 [2] Bucharest University

7 Bucharest

8 Romania

9 [3] Al. I. Cuza University

10 Iassy

11 Romania

Author Note

Correspondence concerning this article should be addressed to Cristian Opariuc-Dan, Ovidius University Campus, Aleea Universității, No. 2, Constanța, Romania. E-mail: copariuc@gmail.com

Abstract

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²⁹ **Factorial structure of the indicators in Big Five Plus Inventory**

³⁰ **Methods**

³¹ In this paper we aimed to conduct an exploratory study on the **analysis of how the**
³² **theoretical Big Five model is supported by data**. The volume of the data collected,
³³ even if it is very large and gives power to the study, does not constitute a representative
³⁴ sample because no sampling technique was used, but represents the results of tests performed
³⁵ with the Big Five Plus Personality Inventory (Constantin et al., 2019) during 2015-2020 on
³⁶ the population of Romania. The answers resulted either from an online administration
³⁷ using the PsihoProfile site, or from the classic administration, pencil-paper, followed by the
³⁸ introduction of the answers in the platform in order to automatically rate and generate
³⁹ assessment's protocols.

⁴⁰ Basically, the manifest variables represent the 240 dichotomous items of the **BigFive Plus**
⁴¹ **Personality Inventory**, the analysis falling into the domain of confirmatory factor analysis
⁴² using categorical indicators, more precisely dichotomous, and implies a specific approach.

⁴³ The model does not provide for the existence of indicators loaded in more than one latent
⁴⁴ trait, each latent factor loading 8 indicators, therefore they will also represent categorical
⁴⁵ latent variables, because an amplitude of 8 points cannot qualify them as continuous vari-
⁴⁶ ables.

⁴⁷ The latent factors that load the 8 indicators are, in turn, loaded by one of the five Big Five
⁴⁸ dimensions, resulting in a *second-order factor analysis model* (Byrne, 2013) with uncorrelated
⁴⁹ second-order factors, which are represented as follows:

⁵⁰ - **Extraversion**, exogenous latent variable that loads a number of 6 endogenous latent
⁵¹ variables: *Friendliness*, *Gregariousness*, *Assertiveness*, *Activity level*, *Excitement seek-*
⁵² *ing* and *Cheerfulness.*

- **Agreeableness**, exogenous latent variable that loads a number of 6 endogenous latent variables: *Trust*, *Morality*, *Altruism*, *Cooperation*, *Modesty* and *Sympathy*.

- **Neuroticism**, exogenous latent variable that loads a number of 6 endogenous latent variables: *Anxiety*, *Anger*, *Depression*, *Timidity*, *Immoderation* and *Vulnerability*.

- **Conscientiousness**, exogenous latent variable that loads a number of 6 endogenous latent variables: *Self-efficacy*, *Orderliness*, *Dutifulness*, *Achievement-striving*, *Self-discipline* și *Cautiousness*.

- **Openness to experience**, exogenous latent variable that loads a number of 6 endogenous latent variables: *Imagination*, *Artistic interests*, *Emotionality*, *Adventurousness*, *Intellect* and *Liberalism*.

Participants

A total of *14706* protocols were collected, administered to a number of *7907 males (53.80%)* and *6799 females (46.20%)* (see Table 1), most of them being *university graduates (n=4014, representing 27.30%)*, followed by *high school graduated (n=3388, representing 23%)* and the persons with *master's degrees (n=1764, representing 12%)*. The research group also contains graduates of *post-secondary schools (n=1402, representing 9.50%)* and graduates of *arts and crafts schools (n=653, representing 4.40%)*, the other categories being much less represented. (see Table 2)

We note, however, that a large number of people did not specify the level of education *(n=2813, reprezentând 19.10%)*, which will be removed from the analysis that involves the use of this variabile (see Table 2).

Regarding the data gathering method, a number of *7907 protocols* were administered in *paper-pencil form (53.80%), 6799 protocols* being collected directly *online (46.20%)* (see Table 3)

77 Respondents ranged in age from *min=35.7* and *max=84* years, with a *median age of 35*
78 years *(m=35.7, sd=11.89)* (see Table 4)

Material

80 The test used is Big Five Plus Personality Inventory (Constantin et al., 2019), being de-
81 veloped and validated on Romanian population (**NEEDS CITATION**) and allows the
82 assessment of five meta-factors of personality (**Extraversion, Agreeableness, Neuroti-**
83 **cism, Conscientiousness** and **Openness to experience**), but also 30 facets subordinated
84 to them.

85 The inventory contains a number of 240 dichotomous items, 48 for the assessment of each
86 of the five dimensions (meta-factors) and eight for each of the 30 facets. The examinee is
87 instructed to choose between two assertions the one that best describes him/her. (e.g. **When**
88 **I am at a party:** *(a) I am in the middle of the action, surrounded by others; (b) I prefer*
89 *to stand aside and observe.*).

90 The two answer options represents extremes of the target psychological dimension and are
91 indented to be similar in terms of social desirability. The average time to complete the
92 questionnaire is 35 minutes.

93 A research conducted by the authors of the inventory on a number of **1340 Romanian**
94 **people** (Constantin et al., 2019) led to acceptable internal consistencies, both on the entire
95 national normative sample and by the gender (see Table 5 & 6)

96 It can be noted that, from the authors' research, the minimum value of the Cronbach α
97 coefficient was 0.572, and the maximum value was 0.917, both values being obtained on the
98 normative sample.The factors with low values of internal consistency and which pose prob-
99 lems regarding the reliability of the measurement are: *Cooperation (0.641), Timidity (0.649),*
100 *Dutifulness (0.648), Achievement-striving (0.646), Intellect (0.572), Liberalism (0.607), .*

Procedure

The analysis will involve the initial study of the internal consistency, for each scale, using the α Cronbach (Cronbach, 1951) in order to calculate the internal consistency coefficient α (Guttman λ_3), then comparing the coefficients with the values reported by authors (Constantin et al., 2019).

We will then test the model in which the latent trait loads the 8 indicators, for each of the 6 facets of a dimension, and the existence of the common dimension for all 6 latent factors. After interpreting the parameters and diagnosing the models, they will be re-specified, identifying, if necessary, better explanatory models.

In the first phase we will present the comparative analysis of the authors regarding the internal consistency using the **alpha Cronbach method of τ-equivalent reliability** (Cronbach, 1951), including both global indicators and those broken down by *gender* and *method of data gathering (pencil-paper or online).* The analysis eas performed using the **psych** package (Revelle, 2021), starting from the condition of the cumulative items, the total score resulting from summing the score of the 8 items (8 point of theoretical range), with identifying the items' negative variance and automatically recording. A non-parametric re-sampling was also used, simulating 100 samples in order to verify the stability of the parameters.

In the second phase, the Big Five Plus Inventory analysis will be performed according to a classical model of confirmatory factor analysis with uncorrelated second order factors, which will be analyzed using the **lavaan** package.(Rosseel, 2012). Since the indicators are dichotomous, we will use the *method of estimating the thresholds of the response categories* in which each indicator becomes loaded in the latent trait and determines an active response (1-Yes) if it exceeds its threshold value, established by the item's position on the latent continuum. As an estimator, we will compute one from the categories of methods based on the least squares, namely **WLSM"**, which uses only the diagonal of the weighted matrix "W" (**DWLS**) and, for statistical tests, adjusted means. The "Satorra Bentler" version of

127 the χ^2 test was used to test the overall fit, adjusting the means. (Skrondal & Rabe-Hesketh,
128 2005).

Data analysis

130 All analyzes were performed using: R (Version 4.1.2; R Core Team, 2021) and the R-packages
131 *dplyr* (Version 1.0.7; Wickham et al., 2021), *epiDisplay* (Version 3.5.0.1; Chongsuvivatwong,
132 2018), *foreign* (Version 0.8.81; R Core Team, 2020), *kableExtra* (Version 1.3.4; Zhu, 2021),
133 *knitr* (Version 1.37; Xie, 2015), *lavaan* (Version 0.6.9; Rosseel, 2012), *MASS* (Version 7.3.54;
134 Venables & Ripley, 2002a), *nnet* (Version 7.3.16; Venables & Ripley, 2002b), *nortest* (Ver-
135 sion 1.0.4; Gross & Ligges, 2015), *papaja* (Version 0.1.0.9997; Aust & Barth, 2020), *psych*
136 (Version 2.1.9; Revelle, 2021), *purrr* (Version 0.3.4; Henry & Wickham, 2020), *rbbt* (Version
137 0.0.0.9000; Dunnington & Wiernik, 2021), *stargazer* (Version 5.2.2; Hlavac, 2018), *survival*
138 (Version 3.2.13; Terry M. Therneau & Patricia M. Grambsch, 2000), and *tinylabels* (Version
139 0.2.2; Barth, 2021)

Results

Scales' reliability

142 '

Extraversion

144 The results obtained for the **Extraversion dimension** and the associated facets (α between
145 0.65 and 0.90 in our sample (n=14706)) do not differ much from those of the authors (α
146 between 0.70 and 0.92), resulting in good consistency coefficients, with small estimation
147 errors (see Table 7).

148 After re-sampling using a number of 100 simulated samples, the values of the consistency
149 coefficients proved to be stable both at the general construct (**Extraversion:** Base α=0.90,

150 Boot α=0.897 - 0.903, Uniqueness=0.897 - 0.903, GFI=0.988 - 0.989) and at the level of the

151 facets (see Table 8).

152 Analyzing the items, we found that their removal does not cause a significant increase in

153 the internal consistency of any facet (see Tables 9 & 10), therefore, both the **extraversion**

154 **dimension** and its 6 facets have a good reliability and good indicators of uniqueness.

Agreeableness

156 The results obtained for the **Agreeableness dimension** and the associated facets (α be-

157 tween 0.59 and 0.80 in our sample (n=14706)) do not differ much from those of the authors

158 (α between 0.70 and 0.92), resulting in good consistency coefficients, with small estimation

159 errors (see Table 11).

160 After re-sampling using a number of 100 simulated samples, the values of the consistency

161 coefficients proved to be stable both at the general construct (**Agreeableness:** Base α=0.80,

162 Boot α=0.792 - 0.804, Uniqueness=0.792 - 0.804, GFI=0.988 - 0.989) and at the level of the

163 facets (see Table 12).

164 Analyzing the items, we found that their removal does not cause a significant increase in the

165 internal consistency of any facet (see Tables 13 & 14), therefore, both the **agreeableness**

166 **dimension** and its 6 facets have a good reliability and good indicators of uniqueness.

Neuroticism

168 The results obtained for the **Neuroticism dimension** and the associated facets (α between

169 0.72 and 0.92 in our sample (n=14706)) do not differ much from those of the authors (α

170 between 0.70 and 0.92), resulting in good consistency coefficients, with small estimation

171 errors (see Table 15).

172 After re-sampling using a number of 100 simulated samples, the values of the consistency

173 coefficients proved to be stable both at the general construct (**Neuroticism:** Base α=0.92,

174 Boot α=0.922 - 0.927, Uniqueness=0.922 - 0.927, GFI=0.976 - 0.979) and at the level of the

175 facets (see Table 16).

176 Analyzing the items, we found that their removal does not cause a significant increase in

177 the internal consistency of any facet (see Tables 17 & 18), therefore, both the **neuroticism**

178 **dimension** and its 6 facets have a good reliability and good indicators of uniqueness.

Conscientiousness

180 The results obtained for the **Conscientiousness dimension** and the associated facets (α

181 between 0.56 and 0.86 in our sample (n=14706)) do not differ much from those of the authors

182 (α between 0.70 and 0.92), resulting in good consistency coefficients, with small estimation

183 errors (see Table 19).

184 After re-sampling using a number of 100 simulated samples, the values of the consistency

185 coefficients proved to be stable both at the general construct (**Conscientiousness:** Base

186 α=0.86, Boot α=0.853 - 0.861, Uniqueness=0.853 - 0.861, GFI=0.989 - 0.99) and at the

187 level of the facets (see Table 20).

188 Analyzing the items, we found that their removal does not cause a significant increase in the

189 internal consistency of any facet (see Tables 21 & 22), therefore, both the **conscientiousness**

190 **dimension** and its 6 facets have a good reliability and good indicators of uniqueness.

Openness

192 The results obtained for the **Openness dimension** and the associated facets (α between

193 0.49 and 0.82 in our sample (n=14706)) do not differ much from those of the authors (α

194 between 0.70 and 0.92), resulting in good consistency coefficients, with small estimation

195 errors (see Table 23).

196 After re-sampling using a number of 100 simulated samples, the values of the consistency

197 coefficients proved to be stable both at the general construct (**Openness:** Base α=0.82,

198 Boot α=0.813 - 0.824, Uniqueness=0.813 - 0.824, GFI=0.988 - 0.988) and at the level of the

199 facets (see Table 24).

200 Analyzing the items, we found that their removal does not cause a significant increase in

201 the internal consistency of any facet (see Tables 25 & 26), therefore, both the **openness**

202 **dimension** and its 6 facets have a good reliability and good indicators of uniqueness.

203 **Data screening and descriptive statistics**

204 **Confirmatory Factor Analisys**

205   **Discussion**

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Table 1

Participants' gender

	Frequency	Percent	Cum. percent
Male	7907	53.8	53.8
Female	6799	46.2	100.0
Total	14706	100.0	100.0

Table 2

Participants' educational level

	Frequency	%(NA+)	%(NA-)
Illiterate	11	0.1	0.1
Primary (4 years)	284	1.9	2.4
Gymnasium (8 years)	240	1.6	2.0
Arts and crafts school	653	4.4	5.5
Highschool (12 years)	3388	23.0	28.5
Post graduated school	1402	9.5	11.8
University (Bachelor level)	4014	27.3	33.8
University (Master level)	1764	12.0	14.8
Doctoral school	137	0.9	1.2
NA's	2813	19.1	0.0
Total	14706	100.0	100.0

Table 3

Type of data gathering

	Frequency	Percent	Cum. percent
Paper-Pencil	7907	53.8	53.8
Online	6799	46.2	100.0
Total	14706	100.0	100.0

Table 4

Participants' age

n	mean	sd	median	min	max	range	skewness	kurtosis
14706	35.7	11.89	35	16	84	68	0.31	-0.71

Table 5

Alpha Cronbach - Authors' research on normative sample (n=1340)

Dimension/Facet	Male	Female	Normative sample
EXTRAVERSION	0.92	0.914	0.917
- Friendliness	0.742	0.748	0.744
- Gregariousness	0.781	0.767	0.775
- Assertiveness	0.712	0.692	0.702
- Activity level	0.727	0.669	0.696
- Excitement seeking	0.802	0.762	0.786
- Cheerfulness	0.716	0.75	0.735
AGREEABLENESS	0.844	0.826	0.838
- Trust	0.647	0.672	0.66
- Morality	0.711	0.703	0.708
- Altruism	0.655	0.65	0.653
- Cooperation	0.645	0.635	0.641
- Modesty	0.65	0.666	0.66
- Sympathy	0.717	0.653	0.705
NEUROTICISM	0.875	0.877	0.879
- Anxiety	0.7	0.7	0.708
- Anger	0.834	0.839	0.839
- Depression	0.737	0.717	0.73
- Timidity	0.623	0.665	0.649
- Immoderation	0.779	0.738	0.761
- Vulnerability	0.741	0.742	0.746

Table 6

Alpha Cronbach - Authors' research on normative sample (n=1340)

Dimension/Facet	Male	Female	Normative sample
CONSCIENTIOUSNESS	0.857	0.82	0.84
- Self-efficacy	0.67	0.675	0.679
- Orderliness	0.653	0.647	0.65
- Dutifulness	0.674	0.608	0.648
- Achievement-striving	0.655	0.639	0.646
- Self-discipline	0.699	0.596	0.655
- Cautiousness	0.748	0.704	0.729
OPENNESS TO EXPERIENCE	0.82	0.809	0.813
- Imagination	0.653	0.665	0.658
- Artistic interests	0.744	0.702	0.732
- Emotionality	0.421	0.51	0.671
- Adventurousness	0.753	0.744	0.75
- Intellect	0.564	0.579	0.572
- Liberalism	0.628	0.587	0.607

Table 7

Extraversion - Global alpha Cronbach

Variable	Alpha	CI 95%	Std	G6	Avg r	Avg SE	Mean	SD	Initial
EXTRAVERSION	0.90	0.898 - 0.903	0.90	0.91	0.16	0	26.48	9.64	0.92
Friendliness	0.73	0.729 - 0.741	0.73	0.73	0.26	0	4.94	2.28	0.74
Gregariousness	0.77	0.765 - 0.776	0.77	0.76	0.30	0	4.44	2.39	0.78
Assertiveness	0.69	0.682 - 0.696	0.69	0.67	0.22	0	4.12	2.18	0.70
Activity	0.65	0.644 - 0.66	0.65	0.65	0.19	0	4.89	2.08	0.70
Excitement	0.76	0.757 - 0.768	0.76	0.75	0.29	0	3.30	2.30	0.79
Cheerfulness	0.68	0.675 - 0.689	0.68	0.67	0.21	0	4.80	2.09	0.74

Table 8

Extraversion - Global alpha Cronbach after bootstrapping

Variable	Base alpha	Alpha boot	Unidim	GFI
EXTRAVERSION	0.90	0.897 - 0.903	0.557 - 0.58	0.988 - 0.989
Friendliness	0.73	0.724 - 0.743	0.574 - 0.609	0.98 - 0.983
Gregariousness	0.77	0.764 - 0.778	0.663 - 0.691	0.987 - 0.99
Assertiveness	0.69	0.68 - 0.697	0.501 - 0.529	0.987 - 0.989
Activity	0.65	0.64 - 0.661	0.427 - 0.459	0.978 - 0.981
Excitement	0.76	0.756 - 0.771	0.641 - 0.67	0.984 - 0.987
Cheerfulness	0.68	0.672 - 0.69	0.481 - 0.512	0.985 - 0.987

Table 9

Alpha if item is deleted (Friendliness, Gregariousness, Assertiveness)

	Facet name	Facet	Deleted	Std	G6	Avg r	SE
I1	Friendliness	0.735	0.711	0.710	0.701	0.260	0.004
I5	Friendliness	0.735	0.710	0.710	0.703	0.259	0.004
I10	Friendliness	0.735	0.703	0.702	0.689	0.252	0.004
I16	Friendliness	0.735	0.710	0.709	0.692	0.258	0.004
I18	Friendliness	0.735	0.697	0.697	0.688	0.247	0.004
I25	Friendliness	0.735	0.723	0.723	0.715	0.271	0.003
I34	Friendliness	0.735	0.726	0.727	0.717	0.275	0.003
I40	Friendliness	0.735	0.682	0.683	0.673	0.235	0.004
I2	Gregariousness	0.770	0.745	0.745	0.725	0.295	0.003
I6	Gregariousness	0.770	0.735	0.735	0.717	0.284	0.003
I11	Gregariousness	0.770	0.770	0.770	0.751	0.324	0.003
I17	Gregariousness	0.770	0.737	0.737	0.716	0.286	0.003
I19	Gregariousness	0.770	0.752	0.752	0.734	0.303	0.003
I26	Gregariousness	0.770	0.737	0.737	0.718	0.286	0.003
I35	Gregariousness	0.770	0.741	0.741	0.720	0.290	0.003
I41	Gregariousness	0.770	0.749	0.749	0.728	0.299	0.003
I3	Assertiveness	0.689	0.639	0.638	0.619	0.201	0.005
I7	Assertiveness	0.689	0.698	0.697	0.675	0.248	0.004
I12	Assertiveness	0.689	0.660	0.658	0.636	0.216	0.004
I20	Assertiveness	0.689	0.666	0.665	0.646	0.221	0.004
I21	Assertiveness	0.689	0.645	0.642	0.621	0.204	0.004
I27	Assertiveness	0.689	0.645	0.644	0.625	0.205	0.004
I36	Assertiveness	0.689	0.651	0.648	0.630	0.208	0.004
I42	Assertiveness	0.689	0.667	0.665	0.647	0.221	0.004

Table 10

Alpha Cronbach if item is deleted (Activity level, Excitement seeking, Cheerfulness)

	Facet name	Facet	Deleted	Std	G6	Avg r	SE
I4	Activity	0.652	0.615	0.619	0.611	0.188	0.005
I13	Activity	0.652	0.617	0.618	0.616	0.188	0.005
I22	Activity	0.652	0.600	0.603	0.594	0.178	0.005
I28	Activity	0.652	0.656	0.657	0.645	0.215	0.004
I31	Activity	0.652	0.649	0.651	0.644	0.210	0.004
I37	Activity	0.652	0.649	0.651	0.647	0.210	0.004
I43	Activity	0.652	0.577	0.581	0.579	0.165	0.005
I44	Activity	0.652	0.593	0.594	0.587	0.173	0.005
I8	Excitement	0.762	0.741	0.740	0.719	0.289	0.003
I14	Excitement	0.762	0.729	0.727	0.708	0.276	0.003
I23	Excitement	0.762	0.741	0.740	0.725	0.289	0.003
I29	Excitement	0.762	0.733	0.733	0.716	0.281	0.003
I32	Excitement	0.762	0.762	0.763	0.744	0.315	0.003
I38	Excitement	0.762	0.734	0.734	0.717	0.282	0.003
I45	Excitement	0.762	0.745	0.743	0.729	0.293	0.003
I47	Excitement	0.762	0.708	0.708	0.687	0.257	0.004
I9	Cheerfulness	0.682	0.625	0.626	0.607	0.193	0.005
I15	Cheerfulness	0.682	0.667	0.664	0.650	0.220	0.004
I24	Cheerfulness	0.682	0.614	0.612	0.592	0.184	0.005
I30	Cheerfulness	0.682	0.670	0.668	0.653	0.223	0.004
I33	Cheerfulness	0.682	0.633	0.632	0.615	0.197	0.005
I39	Cheerfulness	0.682	0.663	0.659	0.645	0.216	0.004
I46	Cheerfulness	0.682	0.665	0.661	0.649	0.218	0.004
I48	Cheerfulness	0.682	0.673	0.671	0.653	0.225	0.004

Table 11

Agreeableness - Global alpha Cronbach

Variable	Alpha	CI 95%	Std	G6	Avg r	Avg SE	Mean	SD	Initial
AGREEABLENESS	0.80	0.793 - 0.803	0.80	0.84	0.08	0.00	31.04	6.71	0.92
Altruism	0.59	0.579 - 0.598	0.59	0.57	0.15	0.01	5.20	1.75	0.74
Cooperation	0.63	0.623 - 0.64	0.63	0.61	0.17	0.00	4.96	1.94	0.78
Modesty	0.65	0.639 - 0.655	0.64	0.63	0.18	0.00	4.12	2.02	0.70
Morality	0.65	0.643 - 0.659	0.67	0.67	0.20	0.00	6.25	1.74	0.70
Sympathy	0.70	0.696 - 0.709	0.70	0.69	0.23	0.00	4.55	2.14	0.79
Trust	0.71	0.7 - 0.714	0.71	0.74	0.23	0.00	5.04	2.19	0.74

Table 12

Agreeableness - Global alpha Cronbach after bootstrapping

Variable	Base alpha	Alpha boot	Unidim	GFI
AGREEABLENESS	0.80	0.792 - 0.804	0.24 - 0.263	0.988 - 0.989
Altruism	0.59	0.578 - 0.602	0.366 - 0.401	0.996 - 0.997
Cooperation	0.63	0.619 - 0.65	0.397 - 0.446	0.987 - 0.989
Modesty	0.65	0.634 - 0.658	0.432 - 0.468	0.991 - 0.993
Morality	0.65	0.638 - 0.661	0.454 - 0.487	0.983 - 0.986
Sympathy	0.70	0.693 - 0.712	0.518 - 0.554	0.983 - 0.987
Trust	0.71	0.699 - 0.717	0.51 - 0.545	0.965 - 0.969

Table 13

Alpha if item is deleted (Altruism, Cooperation, Modesty)

	Facet name	Facet	Deleted	Std	G6	Avg r	SE
I51	Altruism	0.588	0.568	0.569	0.540	0.159	0.005
I55	Altruism	0.588	0.549	0.548	0.518	0.147	0.006
I60	Altruism	0.588	0.567	0.574	0.546	0.161	0.005
I68	Altruism	0.588	0.572	0.576	0.545	0.162	0.005
I69	Altruism	0.588	0.548	0.558	0.529	0.153	0.006
I75	Altruism	0.588	0.536	0.548	0.519	0.148	0.006
I84	Altruism	0.588	0.540	0.554	0.522	0.150	0.006
I90	Altruism	0.588	0.559	0.563	0.535	0.156	0.005
I52	Cooperation	0.632	0.587	0.582	0.563	0.166	0.005
I61	Cooperation	0.632	0.634	0.628	0.609	0.194	0.005
I70	Cooperation	0.632	0.567	0.564	0.542	0.156	0.005
I76	Cooperation	0.632	0.613	0.608	0.591	0.181	0.005
I79	Cooperation	0.632	0.635	0.631	0.611	0.197	0.005
I85	Cooperation	0.632	0.590	0.585	0.566	0.168	0.005
I91	Cooperation	0.632	0.552	0.551	0.526	0.149	0.006
I92	Cooperation	0.632	0.611	0.606	0.589	0.180	0.005
I56	Modesty	0.647	0.604	0.602	0.579	0.177	0.005
I62	Modesty	0.647	0.619	0.617	0.597	0.187	0.005
I71	Modesty	0.647	0.598	0.596	0.569	0.174	0.005
I77	Modesty	0.647	0.618	0.616	0.593	0.186	0.005
I80	Modesty	0.647	0.595	0.591	0.569	0.171	0.005
I86	Modesty	0.647	0.640	0.637	0.615	0.201	0.005
I93	Modesty	0.647	0.640	0.640	0.618	0.202	0.005
I95	Modesty	0.647	0.610	0.607	0.582	0.181	0.005

Table 14

Alpha Cronbach if item is deleted (Morality, Sympathy, Trust)

	Facet name	Facet	Deleted	Std	G6	Avg r	SE
I50	Morality	0.651	0.605	0.624	0.622	0.192	0.005
I54	Morality	0.651	0.615	0.630	0.628	0.196	0.005
I59	Morality	0.651	0.659	0.667	0.663	0.222	0.004
I65	Morality	0.651	0.608	0.621	0.617	0.189	0.005
I67	Morality	0.651	0.599	0.616	0.612	0.187	0.005
I74	Morality	0.651	0.606	0.625	0.600	0.192	0.005
I83	Morality	0.651	0.613	0.631	0.605	0.196	0.005
I89	Morality	0.651	0.652	0.666	0.663	0.222	0.004
I57	Sympathy	0.702	0.688	0.685	0.673	0.237	0.004
I63	Sympathy	0.702	0.701	0.702	0.687	0.252	0.004
I72	Sympathy	0.702	0.673	0.672	0.652	0.227	0.004
I78	Sympathy	0.702	0.650	0.649	0.637	0.209	0.004
I81	Sympathy	0.702	0.680	0.680	0.659	0.233	0.004
I87	Sympathy	0.702	0.680	0.678	0.666	0.231	0.004
I94	Sympathy	0.702	0.653	0.649	0.634	0.209	0.004
I96	Sympathy	0.702	0.659	0.658	0.646	0.216	0.004
I49	Trust	0.707	0.674	0.678	0.706	0.231	0.004
I53	Trust	0.707	0.671	0.673	0.700	0.227	0.004
I58	Trust	0.707	0.687	0.692	0.675	0.243	0.004
I64	Trust	0.707	0.668	0.672	0.702	0.227	0.004
I66	Trust	0.707	0.677	0.681	0.712	0.234	0.004
I73	Trust	0.707	0.653	0.655	0.681	0.213	0.004
I82	Trust	0.707	0.709	0.712	0.735	0.261	0.004
I88	Trust	0.707	0.686	0.691	0.675	0.243	0.004

Table 15

Neuroticism - Global alpha Cronbach

Variable	Alpha	CI 95%	Std	G6	Avg r	Avg SE	Mean	SD	Initial
NEUROTICISM	0.92	0.923 - 0.926	0.93	0.94	0.21	0	15.52	10.11	0.92
Anxiety	0.81	0.802 - 0.811	0.81	0.79	0.34	0	2.19	2.30	0.74
Anger	0.84	0.834 - 0.841	0.84	0.83	0.39	0	2.54	2.47	0.78
Depression	0.78	0.775 - 0.785	0.79	0.77	0.32	0	2.02	2.11	0.70
Immoderation	0.72	0.716 - 0.728	0.72	0.72	0.25	0	2.76	2.19	0.70
Timidity	0.72	0.718 - 0.731	0.73	0.71	0.25	0	3.27	2.26	0.79
Vulnerability	0.79	0.783 - 0.793	0.79	0.78	0.32	0	2.46	2.18	0.74

Table 16

Neuroticism - Global alpha Cronbach after bootstrapping

Variable	Base alpha	Alpha boot	Unidim	GFI
NEUROTICISM	0.92	0.922 - 0.927	0.634 - 0.656	0.976 - 0.979
Anxiety	0.81	0.8 - 0.814	0.741 - 0.769	0.991 - 0.993
Anger	0.84	0.833 - 0.843	0.802 - 0.821	0.987 - 0.99
Depression	0.78	0.773 - 0.785	0.696 - 0.719	0.984 - 0.988
Immoderation	0.72	0.712 - 0.731	0.555 - 0.593	0.98 - 0.983
Timidity	0.72	0.717 - 0.733	0.558 - 0.585	0.977 - 0.981
Vulnerability	0.79	0.782 - 0.793	0.671 - 0.696	0.967 - 0.973

Table 17

Alpha if item is deleted (Anxiety, Anger, Depression)

	Facet name	Facet	Deleted	Std	G6	Avg r	SE
I97	Anxiety	0.806	0.789	0.790	0.768	0.349	0.003
I101	Anxiety	0.806	0.779	0.780	0.757	0.336	0.003
I106	Anxiety	0.806	0.786	0.787	0.765	0.346	0.003
I112	Anxiety	0.806	0.801	0.802	0.780	0.367	0.002
I114	Anxiety	0.806	0.791	0.791	0.769	0.351	0.003
I121	Anxiety	0.806	0.773	0.774	0.749	0.328	0.003
I130	Anxiety	0.806	0.773	0.775	0.751	0.330	0.003
I136	Anxiety	0.806	0.785	0.785	0.762	0.343	0.003
I98	Anger	0.838	0.812	0.813	0.797	0.383	0.002
I102	Anger	0.838	0.822	0.822	0.806	0.398	0.002
I107	Anger	0.838	0.826	0.827	0.811	0.406	0.002
I113	Anger	0.838	0.829	0.830	0.815	0.411	0.002
I115	Anger	0.838	0.807	0.809	0.789	0.376	0.002
I122	Anger	0.838	0.817	0.818	0.798	0.390	0.002
I131	Anger	0.838	0.814	0.813	0.798	0.383	0.002
I137	Anger	0.838	0.821	0.821	0.806	0.396	0.002
I99	Depression	0.780	0.771	0.781	0.762	0.337	0.003
I103	Depression	0.780	0.767	0.775	0.758	0.330	0.003
I108	Depression	0.780	0.750	0.759	0.741	0.311	0.003
I116	Depression	0.780	0.753	0.759	0.739	0.310	0.003
I117	Depression	0.780	0.772	0.778	0.759	0.334	0.003
I123	Depression	0.780	0.758	0.769	0.751	0.322	0.003
I132	Depression	0.780	0.742	0.756	0.736	0.307	0.003
I138	Depression	0.780	0.731	0.740	0.719	0.289	0.003

Table 18

Alpha Cronbach if item is deleted (Immoderation, Timidity, Vulnerability)

	Facet name	Facet	Deleted	Std	G6	Avg r	SE
I104	Immoderation	0.722	0.716	0.718	0.707	0.267	0.004
I110	Immoderation	0.722	0.718	0.721	0.706	0.270	0.004
I119	Immoderation	0.722	0.686	0.687	0.673	0.239	0.004
I125	Immoderation	0.722	0.685	0.689	0.675	0.240	0.004
I128	Immoderation	0.722	0.678	0.681	0.671	0.234	0.004
I134	Immoderation	0.722	0.718	0.721	0.709	0.269	0.004
I141	Immoderation	0.722	0.683	0.685	0.667	0.237	0.004
I143	Immoderation	0.722	0.665	0.667	0.650	0.223	0.004
I100	Timidity	0.725	0.710	0.710	0.694	0.259	0.004
I109	Timidity	0.725	0.748	0.748	0.727	0.298	0.003
I118	Timidity	0.725	0.669	0.669	0.648	0.224	0.004
I124	Timidity	0.725	0.691	0.692	0.674	0.243	0.004
I127	Timidity	0.725	0.684	0.685	0.668	0.237	0.004
I133	Timidity	0.725	0.699	0.700	0.684	0.250	0.004
I139	Timidity	0.725	0.667	0.667	0.648	0.223	0.004
I140	Timidity	0.725	0.701	0.702	0.685	0.252	0.004
I105	Vulnerability	0.788	0.767	0.766	0.755	0.319	0.003
I111	Vulnerability	0.788	0.806	0.803	0.787	0.369	0.002
I120	Vulnerability	0.788	0.762	0.761	0.749	0.312	0.003
I126	Vulnerability	0.788	0.743	0.743	0.725	0.292	0.003
I129	Vulnerability	0.788	0.747	0.747	0.729	0.296	0.003
I135	Vulnerability	0.788	0.743	0.743	0.729	0.292	0.003
I142	Vulnerability	0.788	0.761	0.759	0.748	0.310	0.003
I144	Vulnerability	0.788	0.782	0.782	0.770	0.339	0.003

Table 19

Conscientiousness - Global alpha Cronbach

Variable	Alpha	CI 95%	Std	G6	Avg r	Avg SE	Mean	SD	Initial
CONSCIENTIOUSNESS	0.86	0.855 - 0.861	0.86	0.88	0.11	0.00	31.52	7.90	0.92
Self Efficacy	0.73	0.728 - 0.74	0.74	0.72	0.26	0.00	5.54	2.13	0.74
Order	0.72	0.712 - 0.725	0.71	0.73	0.24	0.00	4.77	2.19	0.78
Dutifulness	0.56	0.547 - 0.567	0.57	0.55	0.14	0.01	5.76	1.70	0.70
Achievement striving	0.67	0.66 - 0.675	0.67	0.65	0.20	0.00	4.69	2.03	0.70
Self Discipline	0.69	0.679 - 0.693	0.69	0.68	0.22	0.00	5.44	2.05	0.79
Cautiousness	0.70	0.688 - 0.702	0.70	0.69	0.22	0.00	5.41	2.08	0.74

Table 20

Conscientiousness - Global alpha Cronbach after bootstrapping

Variable	Base alpha	Alpha boot	Unidim	GFI
CONSCIENTIOUSNESS	0.86	0.853 - 0.861	0.395 - 0.422	0.989 - 0.99
Self Efficacy	0.73	0.726 - 0.742	0.596 - 0.628	0.989 - 0.992
Order	0.72	0.711 - 0.726	0.522 - 0.553	0.97 - 0.973
Dutifulness	0.56	0.543 - 0.573	0.324 - 0.361	0.99 - 0.992
Achievement striving	0.67	0.658 - 0.679	0.463 - 0.495	0.986 - 0.988
Self Discipline	0.69	0.676 - 0.696	0.5 - 0.533	0.985 - 0.988
Cautiousness	0.70	0.686 - 0.703	0.508 - 0.539	0.982 - 0.985

Table 21

Alpha if item is deleted (Self Efficacy, Order, Dutifulness)

	Facet name	Facet	Deleted	Std	G6	Avg r	SE
I145	Self Efficacy	0.734	0.707	0.710	0.685	0.259	0.004
I154	Self Efficacy	0.734	0.697	0.700	0.676	0.250	0.004
I160	Self Efficacy	0.734	0.734	0.736	0.711	0.284	0.003
I162	Self Efficacy	0.734	0.722	0.726	0.700	0.275	0.003
I169	Self Efficacy	0.734	0.702	0.701	0.676	0.251	0.004
I178	Self Efficacy	0.734	0.713	0.714	0.688	0.263	0.004
I184	Self Efficacy	0.734	0.685	0.690	0.663	0.241	0.004
I192	Self Efficacy	0.734	0.695	0.697	0.672	0.247	0.004
I146	Order	0.719	0.695	0.688	0.709	0.240	0.004
I149	Order	0.719	0.695	0.688	0.713	0.239	0.004
I155	Order	0.719	0.675	0.670	0.647	0.225	0.004
I161	Order	0.719	0.665	0.658	0.681	0.216	0.004
I163	Order	0.719	0.681	0.675	0.698	0.229	0.004
I170	Order	0.719	0.720	0.721	0.740	0.269	0.004
I179	Order	0.719	0.710	0.703	0.724	0.252	0.004
I185	Order	0.719	0.680	0.675	0.652	0.229	0.004
I147	Dutifulness	0.557	0.593	0.595	0.566	0.173	0.005
I150	Dutifulness	0.557	0.534	0.545	0.524	0.146	0.006
I156	Dutifulness	0.557	0.525	0.539	0.518	0.143	0.006
I164	Dutifulness	0.557	0.502	0.517	0.494	0.133	0.006
I165	Dutifulness	0.557	0.512	0.521	0.499	0.135	0.006
I171	Dutifulness	0.557	0.504	0.517	0.496	0.133	0.006
I180	Dutifulness	0.557	0.500	0.516	0.493	0.132	0.006
I186	Dutifulness	0.557	0.514	0.528	0.508	0.138	0.006

Table 22

Alpha Cronbach if item is deleted (Achievement striving, Self Discipline, Cautiousness)

	Facet name	Facet	Deleted	Std	G6	Avg r	SE
I148	Achievement striving	0.667	0.616	0.615	0.592	0.186	0.005
I151	Achievement striving	0.667	0.633	0.631	0.613	0.196	0.005
I157	Achievement striving	0.667	0.661	0.661	0.638	0.217	0.004
I166	Achievement striving	0.667	0.615	0.611	0.592	0.183	0.005
I172	Achievement striving	0.667	0.668	0.666	0.646	0.222	0.004
I181	Achievement striving	0.667	0.640	0.638	0.619	0.201	0.004
I187	Achievement striving	0.667	0.587	0.585	0.558	0.168	0.005
I188	Achievement striving	0.667	0.667	0.664	0.644	0.220	0.004
I152	Self Discipline	0.686	0.670	0.672	0.649	0.227	0.004
I158	Self Discipline	0.686	0.639	0.644	0.631	0.205	0.005
I167	Self Discipline	0.686	0.676	0.679	0.670	0.232	0.004
I173	Self Discipline	0.686	0.675	0.678	0.668	0.231	0.004
I175	Self Discipline	0.686	0.624	0.630	0.614	0.196	0.005
I182	Self Discipline	0.686	0.654	0.658	0.648	0.215	0.004
I189	Self Discipline	0.686	0.656	0.657	0.634	0.215	0.004
I191	Self Discipline	0.686	0.655	0.659	0.652	0.217	0.004
I153	Cautiousness	0.695	0.678	0.680	0.668	0.233	0.004
I159	Cautiousness	0.695	0.687	0.686	0.676	0.238	0.004
I168	Cautiousness	0.695	0.677	0.680	0.671	0.233	0.004
I174	Cautiousness	0.695	0.699	0.700	0.685	0.250	0.004
I176	Cautiousness	0.695	0.661	0.662	0.651	0.219	0.004
I177	Cautiousness	0.695	0.638	0.640	0.627	0.202	0.005
I183	Cautiousness	0.695	0.642	0.644	0.625	0.205	0.004
I190	Cautiousness	0.695	0.638	0.640	0.619	0.203	0.005

Table 23

Openess - Global alpha Cronbach

Variable	Alpha	CI 95%	Std	G6	Avg r	Avg SE	Mean	SD	Initial
OPENESS	0.82	0.814 - 0.823	0.82	0.85	0.09	0.00	17.13	7.04	0.92
Imagination	0.69	0.679 - 0.694	0.69	0.68	0.22	0.00	2.16	1.96	0.74
Artistic intrest	0.76	0.753 - 0.764	0.76	0.74	0.28	0.00	2.97	2.30	0.78
Emotionality	0.64	0.633 - 0.65	0.65	0.68	0.19	0.00	5.03	1.96	0.70
Adventure spirit	0.72	0.712 - 0.724	0.72	0.71	0.24	0.00	3.17	2.21	0.70
Intellect	0.52	0.507 - 0.529	0.52	0.52	0.12	0.01	3.35	1.62	0.79
Liberalism	0.49	0.477 - 0.5	0.48	0.47	0.11	0.01	3.77	1.65	0.74

Table 24

Openess - Global alpha Cronbach after bootstrapping

Variable	Base alpha	Alpha boot	Unidim	GFI
OPENESS	0.82	0.813 - 0.824	0.279 - 0.303	0.988 - 0.988
Imagination	0.69	0.673 - 0.699	0.5 - 0.542	0.986 - 0.989
Artistic intrest	0.76	0.751 - 0.765	0.646 - 0.674	0.992 - 0.994
Emotionality	0.64	0.63 - 0.652	0.404 - 0.436	0.963 - 0.968
Adventure spirit	0.72	0.711 - 0.726	0.56 - 0.588	0.985 - 0.988
Intellect	0.52	0.506 - 0.532	0.253 - 0.283	0.982 - 0.986
Liberalism	0.49	0.469 - 0.506	0.23 - 0.265	0.993 - 0.994

Table 25

Alpha if item is deleted (Imagination, Artistic interest, Emotionality)

	Facet name	Facet	Deleted	Std	G6	Avg r	SE
I193	Imagination	0.687	0.667	0.672	0.652	0.227	0.004
I197	Imagination	0.687	0.647	0.650	0.628	0.210	0.004
I202	Imagination	0.687	0.637	0.642	0.620	0.204	0.005
I208	Imagination	0.687	0.645	0.649	0.630	0.209	0.004
I210	Imagination	0.687	0.625	0.631	0.609	0.196	0.005
I217	Imagination	0.687	0.686	0.691	0.669	0.242	0.004
I226	Imagination	0.687	0.668	0.673	0.655	0.228	0.004
I232	Imagination	0.687	0.678	0.680	0.660	0.233	0.004
I194	Artistic interest	0.758	0.734	0.735	0.711	0.284	0.003
I198	Artistic interest	0.758	0.726	0.727	0.702	0.276	0.003
I203	Artistic interest	0.758	0.723	0.725	0.701	0.274	0.003
I209	Artistic interest	0.758	0.729	0.730	0.707	0.279	0.003
I211	Artistic interest	0.758	0.730	0.732	0.711	0.281	0.003
I218	Artistic interest	0.758	0.751	0.753	0.733	0.303	0.003
I227	Artistic interest	0.758	0.733	0.736	0.715	0.284	0.003
I233	Artistic interest	0.758	0.735	0.737	0.716	0.285	0.003
I195-	Emotionality	0.641	0.682	0.690	0.703	0.241	0.004
I199	Emotionality	0.641	0.612	0.629	0.626	0.195	0.005
I204	Emotionality	0.641	0.591	0.598	0.621	0.175	0.005
I212	Emotionality	0.641	0.601	0.620	0.619	0.189	0.005
I213	Emotionality	0.641	0.579	0.582	0.603	0.166	0.005
I219	Emotionality	0.641	0.602	0.611	0.634	0.183	0.005
I228	Emotionality	0.641	0.624	0.635	0.660	0.199	0.005
I234	Emotionality	0.641	0.578	0.594	0.627	0.173	0.005

Table 26

Alpha Cronbach if item is deleted (Adventure spirit, Intellect, Liberalism)

	Facet name	Facet	Deleted	Std	G6	Avg r	SE
I196	Adventure spirit	0.718	0.690	0.692	0.674	0.243	0.004
I205	Adventure spirit	0.718	0.686	0.689	0.671	0.240	0.004
I214	Adventure spirit	0.718	0.688	0.691	0.674	0.242	0.004
I220	Adventure spirit	0.718	0.656	0.660	0.634	0.217	0.004
I223	Adventure spirit	0.718	0.668	0.669	0.645	0.224	0.004
I229	Adventure spirit	0.718	0.715	0.717	0.697	0.266	0.004
I235	Adventure spirit	0.718	0.712	0.714	0.694	0.263	0.004
I236	Adventure spirit	0.718	0.702	0.705	0.687	0.254	0.004
I200	Intellect	0.518	0.451	0.457	0.461	0.107	0.007
I206	Intellect	0.518	0.487	0.478	0.478	0.116	0.006
I215	Intellect	0.518	0.462	0.444	0.437	0.102	0.007
I221	Intellect	0.518	0.498	0.503	0.495	0.126	0.006
I224	Intellect	0.518	0.441	0.451	0.449	0.105	0.007
I230	Intellect	0.518	0.547	0.560	0.550	0.154	0.006
I237	Intellect	0.518	0.488	0.476	0.467	0.115	0.006
I239	Intellect	0.518	0.484	0.476	0.480	0.115	0.006
I201	Liberalism	0.489	0.416	0.413	0.392	0.092	0.007
I207	Liberalism	0.489	0.487	0.485	0.460	0.119	0.006
I216	Liberalism	0.489	0.493	0.486	0.461	0.119	0.006
I222	Liberalism	0.489	0.449	0.447	0.423	0.104	0.007
I225	Liberalism	0.489	0.467	0.462	0.441	0.109	0.007
I231	Liberalism	0.489	0.418	0.413	0.393	0.091	0.007
I238	Liberalism	0.489	0.439	0.434	0.415	0.099	0.007
I240	Liberalism	0.489	0.466	0.459	0.440	0.108	0.007