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THE GENERAL FACTOR OF PERSONALITY: TOWARD A COMPREHENSIVE GENERAL DIMENSION IN THE NON-COGNITIVE DOMAIN OF PERSONALITY

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Summary

- Since 2007, the general factor of personality (GFP) has been increasingly in the focus of the empirical research of the personality structure. In several studies, the substantial connections between GFP and other prominent psychological variables have been established. GFP very essentially correlated with the dimensions of well-being, emotionality or affect, motivation, coping, self-esteem and others. Thus, it may be hypothesized that GFP could represent a very comprehensive common dimension underlying the entire non-cognitive domain of psychological variables including personality, emotions, motivation, well-being, self-esteem and coping. In this study, different multivariate analyses of the non-cognitive domain of personality have been performed. The results confirmed the existence of a very broad general factor that substantially loaded the major dimensions of personality, emotionality (affect), motivation, well-being, self-concept, self-esteem and coping. Consequently, GFP can be interpreted as a representative of still more general non-cognitive factor of personality. In the light of our results, further advances and refinements in the structural modeling of personality and other non-cognitive psychological domains can be proposed.

Introduction

- Since 2007 (Musek, 2007), the general factor of personality (GFP) has been increasingly in the focus of the empirical research of the personality structure.

- After it, approximately 50 articles were published, seriously focused on the concept of GFP, in leading national and international scientific journals.

- They address a broad spectrum of the issues concerning the GFP including its generality, its psychological nature, its connections with other psychological variables, its genetic, evolutionary and neuroscientific basis etc.

- In several studies, the substantial connections between GFP and other prominent psychological variables have been established, especially in conative (non.cognitive) domain of personality.

- In the results of different studies, GFP very essentially correlated with the dimensions of well-being, emotionality or affect, motivation, coping, self-esteem and others.

Hypotheses

- Three general hypotheses can be assumed on the basis of previous considerations
- I: structural analyses of variables in non-cognitive domain of personality will yield a strong and general first latent dimension
- II: this overall dimension will correlate very high with the GFP (extracted on the basis of correlations between the Big Five)
- III: the variables in the non-cognitive domain of personality form a definite three-level structure encompassing one general factor and several primary factors

Method

- Empirical testing of previously mentioned hypotheses was performed on the data of two rather distant samples

- First one: Slovenian sample (367 participants /181 males, 186 females/, from 16 to 28 years /mean age 18.92 with SD 1,96 age/; mostly university students)

- The second: American (USA) MIDUS 2 sample (3751 participants /1680 males, 2071 females/, from 30 to 84 years /mean age 55.75 with SD 12.17/; population representative in the age range)

Variables and instruments: SLO sample

Variables in the model

- 20 variables: Big Five dimensions (Extr, EmStab, Consc, Agree, Open), mental health (ANX, DEPR, LON), emotional subjective wellbeing (PAF, NAF, SAT), self-discrepancies (REALID, REALMOR), self-concept (SDQ, SAQ), self-esteem (SESTEEM), gender schema (MASC, FEM), self-construal (INTERD, INDEP)

Measures/instruments

- Modified BFI (John, Donahue & Kentle, 1991)
- STAI-X2 (Spielberger, 1970)
- CES-D (Radloff, 1977)
- UCLA Loneliness Scale (Russel, Peplau & Cutrona, 1980)
- PANAS (Watson, Clark & Tellegen, 1984)
- SWLS (Diener et al, 1985)
- Beliefs about self-conceptions (modified after Wood et al., 1997; Avsec, 1998)
- SDQ-III (Marsh, 1992)
- SAQ (Pelham & Swann, 1989)
- SLCS (Tafarodi & Swann, 1995)
- MFQ (Masculinity and Femininity Questionnaire; Avsec & Musek, 1998)

Variables and instruments: MIDUS II sample

Variables in the model

- 24 variables: Big Five dimensions (NEUR, EXTR, AGRE, OPEN, CONS), agency (AGEN), wellbeing (SATI, NEAF, POAF, AUTO, MAST, GROW, RELA, PURP, SACC), optimism (OPTI), self-esteem (SEST), self-construal (INTD,INDP), coping (PRCP, EMCP), generativity (GENE), spirituality (SPIR), mindfulness (MIND)

Measures/instruments

- MIDI Personality Scales (Lachman & Weaver, 1997; Rossi, 2001)
- Life Satisfaction Scale (Prenda & Lachman, 2001)
- PANAS Negative Adjectives (Mroczek & Kolarz, 1998)
- PANAS Positive Adjectives (Mroczek & Kolarz, 1998)
- Psychological Wellbeing Scales MIDUS II (modified PWBS; Ryff, 1989; Ryff & Keyes, 1995)
- Optimism Scale (modified LOT; Scheier & Carver, 1985; Scheier, Carver & Bridges, 1994)
- Self-esteem Scale (modified after Rosenberg, 1965)
- Self-construal Scale (Singelis, 1994)
- COPE Combined Scales (modified after Carver, Scheier & Weintraub, 1989; King, Seltzer & Ryff, 1997)
- Modified Loyola Generativity Scale (McAdams & de St. Aubin, 1992)
- Spirituality Scale and
- Mindfulness Scale (Garfield, Ryff & Singer, 2001; Rossi, 2001)

Results: Factorizability of data

- SLO Sample
  - KMO = 0.880
  - Factor extraction criteria

- MIDUS 2 Sample
  - KMO = 0.933
  - Factor extraction criteria

Non Graphical Solutions to Scree Test

○ Eigenvalues (>mean = 4)
△ Parallel Analysis (n = 3)
Optimal Coordinates (n = 3)
Acceleration Factor (n = 1)

Non Graphical Solutions to Scree Test

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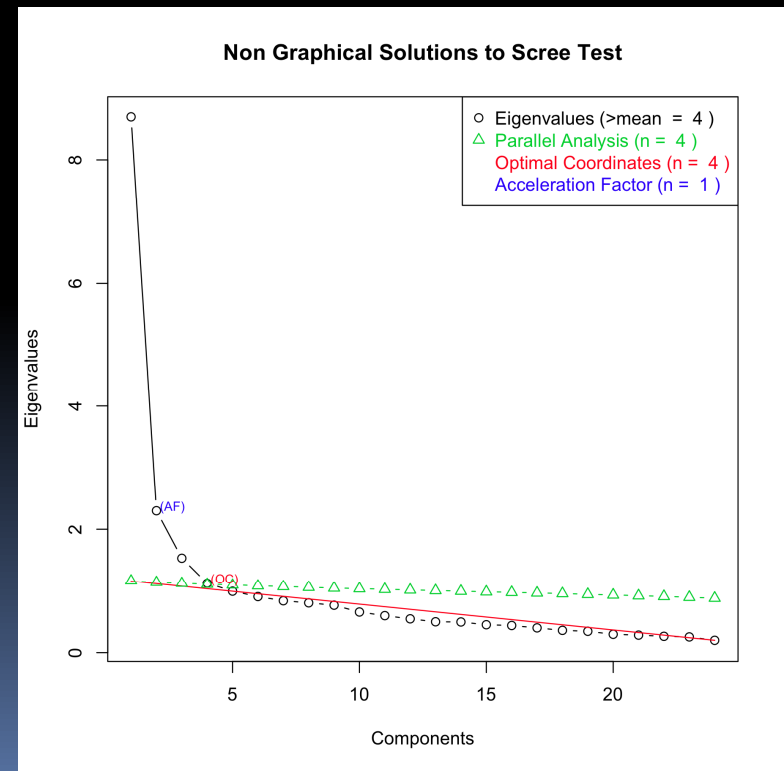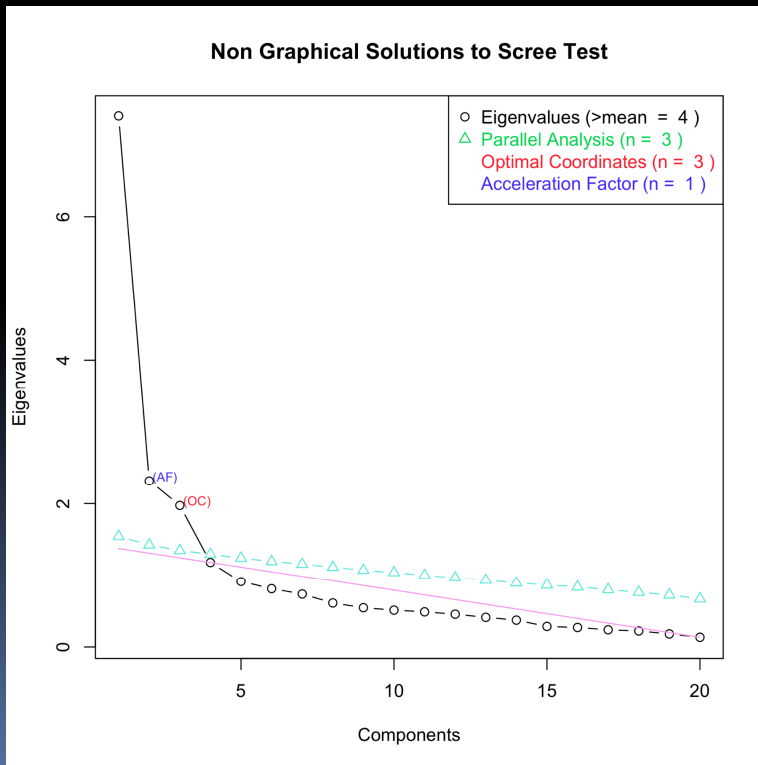
Results (cont.)

- One-factor solution loadings
  - SLO Sample (left)
  - MIDUS 2 Sample (right)
- Congruence between PC, PA and ML dimensions was perfect (therefore, only PC results are displayed)
- Very high correlations between GFO and comprehensive g (.84 for SLO and .80 for MIDUS)
- Comprehensive g is identical with first dimension of MFA (Multiple Factor Analysis) – correlations 1.00 for SLO and .99 for MIDUS

	PC1	h2	u2
Extr	0.66	0.4321	0.57
EmStab	0.64	0.4068	0.59
Consc	0.38	0.1480	0.85
Agree	0.31	0.0971	0.90
Open	0.50	0.2469	0.75
ANX	-0.82	0.6766	0.32
DEPR	-0.70	0.4906	0.51
LON	-0.74	0.5509	0.45
PAF	0.61	0.3660	0.63
NAF	-0.56	0.3134	0.69
SAT	0.60	0.3579	0.64
REALID	-0.72	0.5178	0.48
REALMOR	-0.55	0.3008	0.70
SDQ	0.82	0.6766	0.32
SAQ	0.66	0.4334	0.57
SESTEEM	0.84	0.7000	0.30
MASC	0.52	0.2721	0.73
FEM	-0.20	0.0402	0.96
INTERD	-0.05	0.0026	1.00
INDEP	0.61	0.3728	0.63
% var	0.37		

	PC1	h2	u2
NEUR	-0.56	0.3126	0.69
EXTR	0.63	0.3946	0.61
AGRE	0.41	0.1687	0.83
OPEN	0.59	0.3518	0.65
CONS	0.53	0.2760	0.72
AGEN	0.50	0.2549	0.75
SATI	0.49	0.2414	0.76
NEAF	-0.55	0.3065	0.69
POAF	0.71	0.4991	0.50
AUTO	0.62	0.3793	0.62
MAST	0.81	0.6536	0.35
GROW	0.78	0.6079	0.39
RELA	0.74	0.5406	0.46
PURP	0.77	0.5884	0.41
SACC	0.84	0.7120	0.29
OPTI	0.73	0.5268	0.47
SEST	0.81	0.6520	0.35
INTD	-0.07	0.0053	0.99
INDP	0.36	0.1279	0.87
PRCP	0.66	0.4325	0.57
EMCP	-0.48	0.2320	0.77
GENE	0.54	0.2905	0.71
SPIR	0.23	0.0530	0.95
MIND	0.29	0.0858	0.91
% var	0.36		

The structure of non-cognitive personality domain

- Several further structural analyses were performed including exploratory and confirmatory factor analyses
  - Best structural models were bifactor models for all structural solutions
- I will focus on the results of omegaSem analyses (algorithm of Psych package in R program language)

- omegaSem info:
  - The function is a combination of exploratory and confirmatory factor analysis
    - First, it performs Schmid Leiman transformation of the correlation matrix
    - Then, it modifies the factor solution in the aproppriate manner and applies a confirmatory factor analysis to it

OmegaSem solutions

- Bifactor models for 2- to 6 factor solutions (compared with one-factor solution)

SLO

	χ2 (df)	p	fit	α	G.6	Omega_t	RMSEA	BIC	TLI (NNFI)	Srmr (Csrmr)	Omega_h	Omega_h (cfa)
1	1589.4 (170)	0.000	4.68	0.9	0.93		0.157	594.04	0.571	0.09 (0.14)		
2	1133.83 (151)	0.000	3.34	0.9	0.93	0.91	0.139	249.7	0.613	0.07 (0.11)	0.58	
3	705.83 (133)	0.000	2.09	0.9	0.93	0.93	0.113	-72.9	0.738	0.04 (0.06)	0.57	
4	392.91 (116)	0.000	1.16	0.9	0.93	0.93	0.085	-286.28	0.846	0.03 (0.05)	0.79	0.77
5	280.82 (100)	0.000	0.83	0.9	0.93	0.94	0.074	-304.69	0.855	0.02 (0.04)	0.73	0.82
6	210.28 (85)	0.000	0.62	0.9	0.93	0.94	0.067	-287.4	0.832	0.02 (0.04)	0.74	0.84

MIDUS 2

	χ2 (df)	p	fit	α	G.6	Omega_t	RMSEA	BIC	TLI (NNFI)	Srmr (Csrmr)	Omega_h	Omega_h (cfa)
1	12104 (251)	0.000	-	0.91	0.93	0.93	0.112	10030	0.701	0.086 (-)		
2	7282.75 (229)	0.000	1.95	0.9	0.93	0.91	0.091	5398.14	0.782	0.04 (0.06)	0.6	
3	4923.02 (207)	0.000	1.32	0.91	0.93	0.93	0.078	3219.45	0.838	0.03 (0.05)	0.6	0.34
4	3699.94 (186)	0.000	0.99	0.91	0.93	0.93	0.071	2169.2	0.864	0.02 (0.04)	0.6	0.36
5	2504.87 (166)	0.000	0.67	0.91	0.93	0.94	0.061	1138.73	0.891	0.02 (0.03)	0.78	0.72
6	1673.03 (147)	0.000	0.62	0.9	0.93	0.94	0.053	463.25	0.897	0.01 (0.03)	0.75	0.84

Confirmatory factor analyses

- Schmid Leiman solution with 6 primaries for SLO sample

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Schmid Leiman Factor loadings greater than  0.2
             g    F1*    F2*    F3*    F4*    F5*    F6*    h2   u2   p2
Extr       0.53         0.67                             0.74 0.26 0.40
EmStab     0.49 -0.45                0.26                0.54 0.46 0.38
Consc      0.30                      0.41   0.28         0.36 0.64 0.22
Agree      0.22                      0.27   0.34         0.25 0.75 0.16
Open       0.41                                   -0.44  0.42 0.58 0.37
ANX-       0.74 -0.56                                    0.87 0.13 0.65
DEPR-      0.62 -0.39                                    0.56 0.44 0.70
LON-       0.65 -0.41  0.20                0.21          0.71 0.29 0.64
PAF        0.54         0.29                0.37  -0.43  0.72 0.28 0.41
NAF-       0.43 -0.46                     -0.21          0.48 0.52 0.33
SAT        0.58                0.24         0.23          0.49 0.51 0.68
REALID-    0.54                      0.69                0.80 0.20 0.37
REALMOR-   0.38                      0.74                0.70 0.30 0.20
SDQ        0.85                0.36                      0.85 0.15 0.85
SAQ        0.59         0.20                             0.44 0.56 0.79
SESTEEM    0.84                0.34                      0.84 0.16 0.85
MASC       0.44         0.56                      -0.27  0.60 0.40 0.28
FEM-                                       -0.76        0.66 0.34 0.04
INTERD-                                    -0.48 -0.20  0.30 0.70 0.03
INDEP      0.50         0.35                             0.40 0.60 0.64

With eigenvalues of:
   g   F1*   F2*   F3*   F4*   F5*   F6*
5.71  1.11  1.13  0.39  1.44  1.35  0.62
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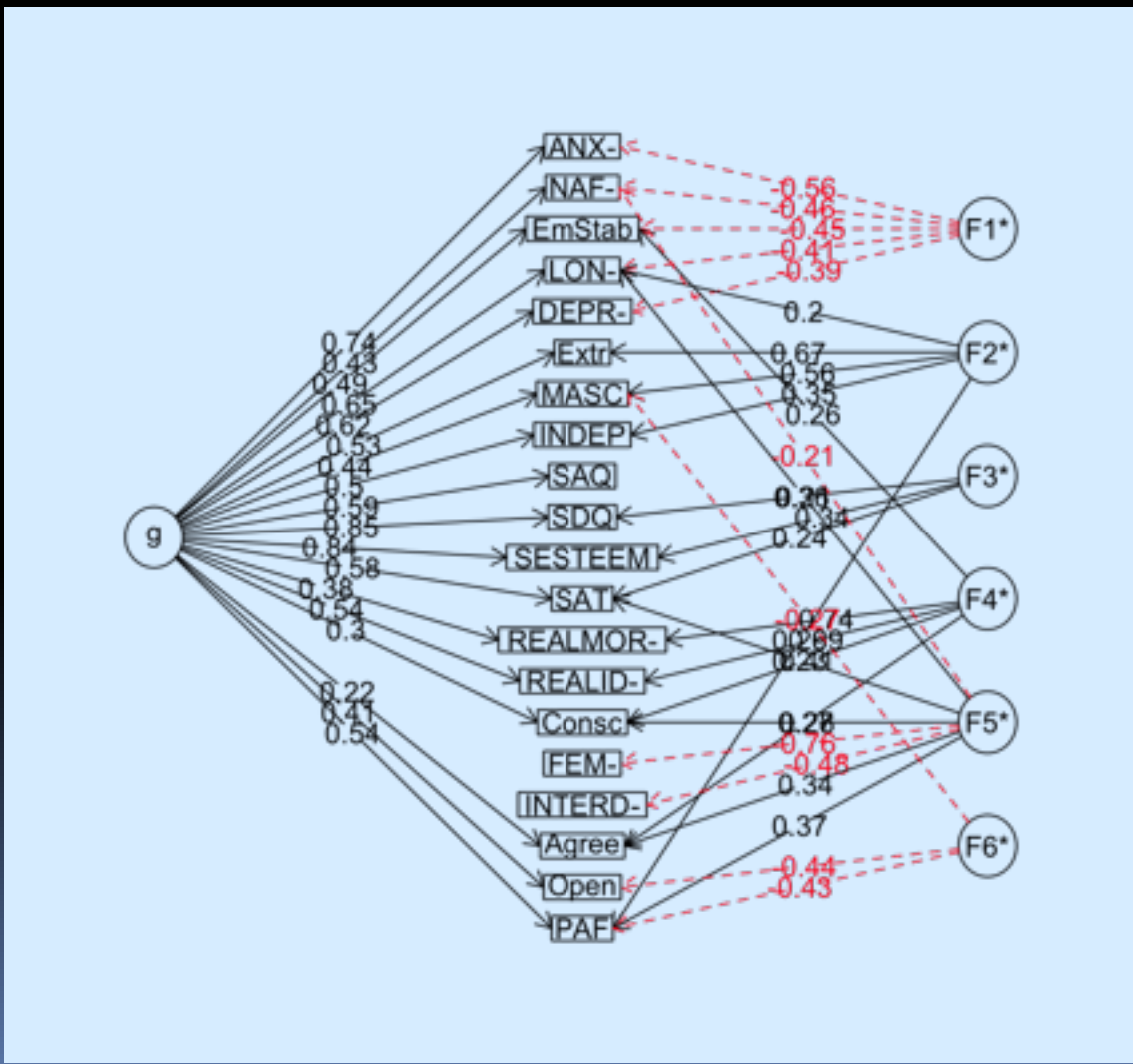
Results (cont.)

- Graphical presentation (negative loadings in red)

Results (cont.)

- Schmid Leiman solution with 6 primaries for MIDUS 2 sample

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Schmid Leiman Factor loadings greater than  0.2
          g    F1*   F2*   F3*   F4*   F5*   F6*    h2   u2   p2
NEUR-  0.47                    0.64                    0.64 0.36 0.36
EXTR   0.48          0.42                        0.44 0.61 0.39 0.36
AGRE   0.30                                      0.73 0.64 0.36 0.13
OPEN   0.44          0.44                  0.34  0.23 0.56 0.44 0.31
CONS   0.44                                0.21       0.29 0.71 0.68
AGEN   0.37          0.77                             0.74 0.26 0.19
SATI   0.45                                           0.27 0.73 0.75
NEAF-  0.49                    0.51                    0.52 0.48 0.45
POAF   0.61                    0.21                    0.49 0.51 0.77
AUTO   0.51          0.38                             0.46 0.54 0.59
MAST   0.78                    0.25                    0.73 0.27 0.82
GROW   0.74   0.23                         0.23       0.67 0.33 0.81
RELA   0.71   0.21                               0.32 0.67 0.33 0.75
PURP   0.78   0.29                                    0.71 0.29 0.86
SACC   0.84   0.24                                    0.81 0.19 0.86
OPTI   0.67                    0.22                    0.54 0.46 0.84
SEST   0.77                    0.24                    0.71 0.29 0.82
INTD-                                                 0.06 0.94 0.08
INDP   0.24          0.27                             0.17 0.83 0.35
PRCP   0.54          0.22            0.21  0.26       0.47 0.53 0.57
EMCP-  0.45                    0.36        0.28       0.44 0.56 0.45
GENE   0.44          0.21                             0.33 0.67 0.50
SPIR                                0.68             0.50 0.50 0.06
MIND   0.20                          0.71            0.55 0.45 0.07

With eigenvalues of:
   g   F1*   F2*   F3*   F4*   F5*   F6*
 6.96 0.39  1.38  1.13  1.11  0.54  1.04
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Results (cont.)

- Graphical presentation
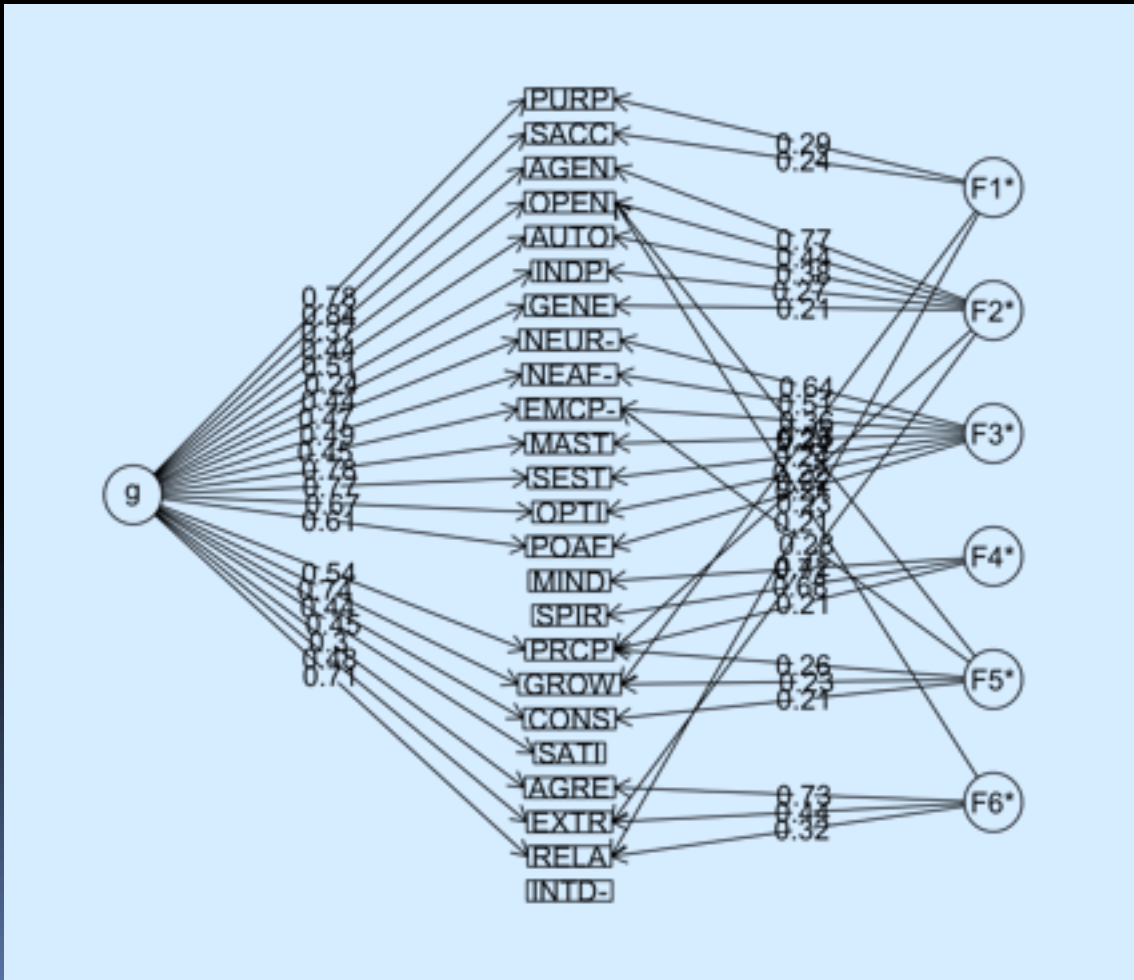
Conclusions

- Structural analyses of variables in non cognitive domain of personality yielded a strong and general first latent dimension

- This overall dimension correlated very high with the GFP (extracted on the basis of correlations between the Big Five) – it is practically identical with the GFP

- The variables in the non-cognitive domain of personality form a definite three-level structure encompassing one general factor and several primary factors

- Among different structural model solutions of the non-cognitive dimensions of personality, the bifactor solutions yielded the best fitting

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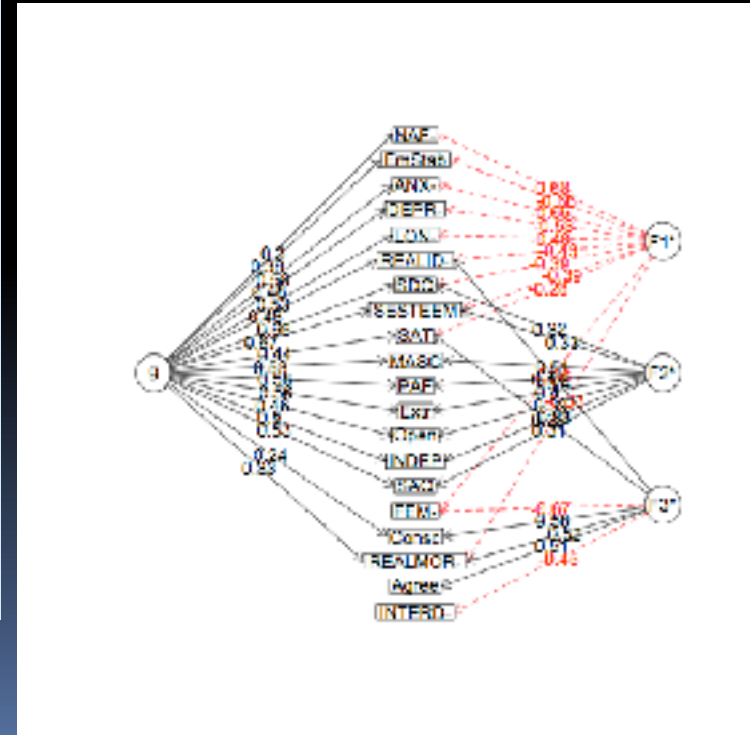
Appendix

Bifactor solution with 3 primaries (SLO)

```
 Omega Hierarchical:      0.56
Omega H asymptotic:      0.6
Omega Total              0.93

Schmid Leiman Factor loadings greater than  0.2
             g    F1*   F2*   F3*   h2   u2    p2
Extr        0.56       0.40        0.49 0.51 0.64
EmStab      0.38 -0.66             0.58 0.42 0.25
Consc       0.24             0.58 0.42 0.58 0.14
Agree                        0.51 0.31 0.69 0.11
Open        0.46       0.39        0.36 0.64 0.58
ANX-        0.58 -0.65             0.79 0.21 0.43
DEPR-       0.48 -0.53             0.53 0.47 0.44
LON-        0.53 -0.48             0.55 0.45 0.51
PAF         0.58       0.49        0.62 0.38 0.55
NAF-        0.30 -0.68             0.57 0.43 0.16
SAT         0.44 -0.28       0.25 0.37 0.63 0.54
REALID-     0.48 -0.43       0.40 0.58 0.42 0.40
REALMOR-    0.33 -0.33       0.52 0.49 0.51 0.23
SDQ         0.66 -0.39  0.32       0.69 0.31 0.63
SAQ         0.53        0.31       0.43 0.57 0.66
SESTEEM     0.67 -0.39  0.33       0.71 0.29 0.64
MASC        0.53        0.51       0.59 0.41 0.48
FEM-             -0.36       -0.67 0.60 0.40 0.03
INTERD-                      -0.45 0.22 0.78 0.02
INDEP       0.50        0.33       0.38 0.62 0.66
```
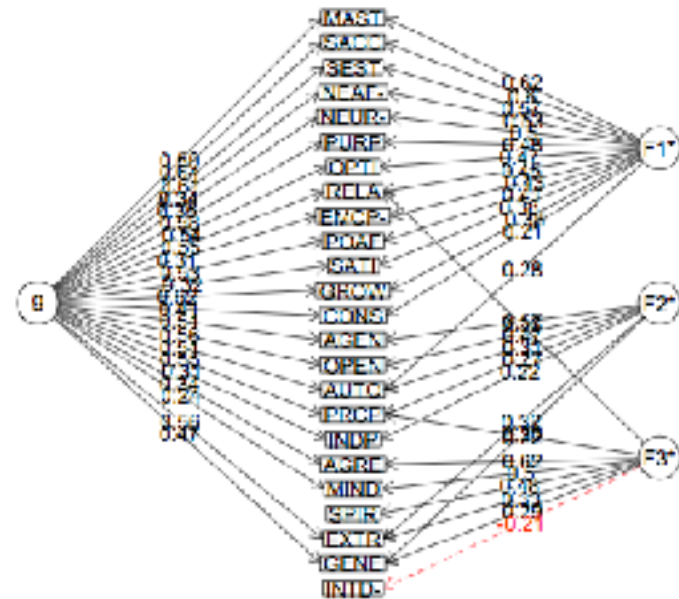
Bifactor solution with 3 primaries (MIDUS 2)

```
Omega Hierarchical:     0.6
Omega H asymptotic:     0.65
Omega Total             0.93

Schmid Leiman Factor loadings greater than  0.2
            g    F1*    F2*    F3*    h2    u2    p2
NEUR-  0.35  0.50                    0.39 0.61 0.32
EXTR   0.56         0.32   0.33 0.53 0.47 0.59
AGRE   0.34                    0.62 0.50 0.50 0.23
OPEN   0.56         0.47         0.55 0.45 0.56
CONS   0.41  0.21                    0.25 0.75 0.68
AGEN   0.51         0.57         0.60 0.40 0.44
SATI   0.32  0.38                    0.27 0.73 0.39
NEAF-  0.34  0.53                    0.42 0.58 0.28
POAF   0.53  0.41                    0.46 0.54 0.60
AUTO   0.51  0.28  0.31              0.46 0.54 0.57
MAST   0.59  0.62                    0.74 0.26 0.48
GROW   0.62  0.38                    0.59 0.41 0.65
RELA   0.55  0.45         0.36 0.64 0.36 0.47
PURP   0.58  0.48                    0.59 0.41 0.57
SACC   0.64  0.60                    0.78 0.22 0.53
OPTI   0.54  0.47                    0.51 0.49 0.56
SEST   0.61  0.57                    0.72 0.28 0.52
INTD-                    -0.21 0.06 0.94 0.04
INDP   0.31         0.22         0.16 0.84 0.62
PRCP   0.55         0.27   0.22 0.45 0.55 0.66
EMCP-  0.31  0.43                    0.31 0.69 0.30
GENE   0.47         0.26   0.29 0.38 0.62 0.58
SPIR                            0.48 0.27 0.73 0.13
MIND   0.24                    0.50 0.31 0.69 0.19
```
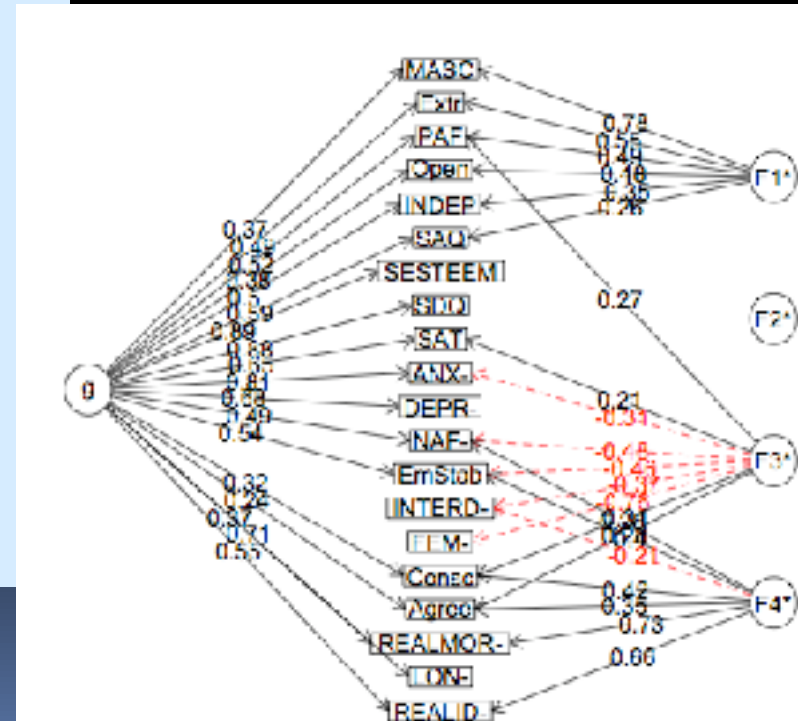
Bifactor solution with 4 primaries (SLO)

```
Omega Hierarchical:      0.78
Omega H asymptotic:      0.84
Omega Total              0.93

Schmid Leiman Factor loadings greater than  0.2
              g    F1*   F2*    F3*    F4*   h2   u2   p2
Extr        0.49  0.55                     0.58 0.42 0.44
EmStab      0.54              -0.46   0.40 0.66 0.34 0.45
Consc       0.32               0.31   0.42 0.38 0.62 0.25
Agree       0.24               0.28   0.35 0.27 0.73 0.21
Open        0.38  0.48                     0.38 0.62 0.39
ANX-        0.81              -0.31        0.77 0.23 0.85
DEPR-       0.68                           0.53 0.47 0.89
LON-        0.71                           0.53 0.47 0.94
PAF         0.52  0.49         0.27        0.59 0.41 0.46
NAF-        0.49              -0.48   0.28 0.59 0.41 0.42
SAT         0.65               0.21        0.47 0.53 0.89
REALID-     0.55                     0.66 0.76 0.24 0.41
REALMOR-    0.37                     0.73 0.68 0.32 0.21
SDQ         0.88                           0.80 0.20 0.98
SAQ         0.59  0.26                     0.43 0.57 0.81
SESTEEM     0.89                           0.81 0.19 0.97
MASC        0.37  0.78                     0.76 0.24 0.18
FEM-                         -0.76        0.64 0.36 0.04
INTERD-                      -0.37 -0.21 0.19 0.81 0.03
INDEP       0.50  0.35                     0.39 0.61 0.65
```

Bifactor solution with 4 primaries (MIDUS 2)

```
Omega Hierarchical:      0.6
Omega H asymptotic:      0.64
Omega Total              0.93

Schmid Leiman Factor loadings greater than  0.2
          g    F1*   F2*   F3*   F4*    h2   u2    p2
NEUR- 0.35 0.51                      0.40 0.60 0.30
EXTR  0.57       0.37  0.43          0.67 0.33 0.48
AGRE  0.35             0.66          0.56 0.44 0.22
OPEN  0.54       0.46                0.54 0.46 0.55
CONS  0.41 0.20                      0.25 0.75 0.66
AGEN  0.50       0.62                0.63 0.37 0.39
SATI  0.32 0.40                      0.28 0.72 0.37
NEAF- 0.34 0.56              -0.20   0.47 0.53 0.24
POAF  0.53 0.42                      0.50 0.50 0.56
AUTO  0.49 0.28 0.32                 0.45 0.55 0.54
MAST  0.59 0.63                      0.74 0.26 0.47
GROW  0.63 0.36              0.34    0.66 0.34 0.60
RELA  0.56 0.45        0.36          0.65 0.35 0.49
PURP  0.59 0.47              0.29    0.65 0.35 0.53
SACC  0.64 0.60                      0.77 0.23 0.53
OPTI  0.54 0.46                      0.52 0.48 0.55
SEST  0.60 0.57                      0.71 0.29 0.51
INTD-              -0.23             0.07 0.93 0.03
INDP  0.30       0.23                0.16 0.84 0.57
PRCP  0.55       0.24        0.30    0.49 0.51 0.62
EMCP- 0.30 0.42        -0.23         0.35 0.65 0.27
GENE  0.47       0.23  0.22  0.25    0.39 0.61 0.57
SPIR  0.20             0.37  0.29    0.27 0.73 0.14
MIND  0.26             0.41  0.27    0.30 0.70 0.20
```