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RELATIONSHIP BETWEEN ANTHROPOMETRICAL SOMATOTYPE AND PERSONALITY OF BIOLOGY STUDENTS

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Abstract: *In the study we analyze the relationship between personality and anthropometrical somatotype. The sample represents 40 students of average age 21 years at the University of Ljubljana, Slovenia. Anthropometrical measurements were taken for calculation of Heath-Carter somatotype (ten parameters). The average somatotype of the sample is 4.0 for endomorphic component, 4.2 for mesomorphic component and 3.0 for ectomorphic component. The average somatotype of the sample is mesomorph-endomorph. Personality characteristics of biology students were assessed by the Big Five Questionnaire. The mean scores for the five personality dimensions obtained with our sample of male students were, in comparison to the Slovenian male population, similar with respect to Agreeableness and Openness, but the students scored above the population mean for Energy, Conscientiousness and Emotional Stability. At the facet level, the students scored higher for Activity, Dominance, Persistence, Emotional Control and Openness to Culture than did the Slovenian male population, while the students did not deviate from the population mean levels for Cooperation, Kindness, Preciseness, Impulse Control and Openness to Experience. No significant differences in personality dimensions were found between the subjects classified into the three somytotype groups. However, some low correlations between personality measures and the anthropometrical somatotype were observed.*

Keywords: *Anthropometrical somatotype; Personality; Students; Slovenia.*

Introduction

In the development of the science of biotypology the idea of the relationship between temperament and body shape has a long history. In the second century AD, the Greek physician Galen applied the idea of four bodily »humours«, which had persisted for many centuries. In the fourth century BC Aristotle observed that the specific body always involves a specific character. Avicena in the eleventh century recommended the study of temperament as it related to character. The development of anthropology has created new studies of human morphology. In Körperbau und Character (1921) Kretschmer described four physical and psychic types called athletic, pycnic, asthenic and displasic physiques. Sheldon in 1940 introduced his concept of »somatotype« and its components of endomorphy, mesomorphy and ectomorphy, and related them to varieties of temperament (Sheldon 1940). Heath-Carter's modification of Sheldon's method have produced a useful, widely used research tool for the study of human somatic variation (Carter 1990).

Personality

Personality traits are relatively consistent and meaningful characteristics in ways of behaving, thinking, feeling, reacting etc., by which individuals reliably differ while temperamental traits are more specific styles of behaviour, emotionality and regulation of emotion and attention (e.g. reactivity, intensity of reaction, effortful control, negative emotionality). Taking the individual as a focal unit of analysis, personality is defined as a unique, dynamic organization of those psychophysical systems (configurations of multiple traits) that determine the individual's characteristic adjustment to his/her environment (Allport 1937, Ahadi 1994). Thus, two major empirical approaches to the structure of personality are recognized: trait-centred and person-centred approaches. The trait-centred approaches isolate specific personality characteristics and study their correlational structure for a particular population in order to obtain a dimensional latent structure of these characteristics, while the person-centred approaches describe the personality structure of each individual by a constellation of multiple traits within the person and seek to find characteristic patterns of these constellations among the individuals in the population (Mervielde and Asendorpf 2000). Since the present study aims at investigating the relationships between particular broad-band personality traits, i.e. the personality dimensions, and anthropometrical somatotype as well as between more narrowly defined personality traits, i.e. the particular facets of these broad dimensions, our approach can be considered as trait-centred.

The Big Five personality dimensions

In the personality psychology there is a substantial agreement regarding the main personality dimensions, as the Big Five-Factor Model (FFM) has been demonstrated to summarize the organization of personality traits in adults and children in many countries and language communities (e.g. McCrae and Costa 1997). The FFM dimensions are referred to as Extraversion (or Energy), Agreeableness, Conscientiousness, Neuroticism (also Emotional Stability-reversed), and Openness. Extraversion is widely described as a trait that concerns differences in preference for social interaction and lively activity. Furthermore, it describes people who are readily expressing their feelings and desires, easily take charge in a group, prefer an environment that stimulates them. Agreeableness mostly determines the quality of social interaction. Agreeable individuals are generally characterized as being friendly, generous, trustful, tolerant, patient, altruistic, kind, affectionate and honest. Conscientiousness includes the individual's characteristics such as hardworking, ambitious, industrious, dutiful, neat and tidy, efficient, determined orderly and reliable. Neuroticism taps characteristics most widely referred to as emotional instability, and tap traits such as anxiety, timidity, insecurity, lack of confidence and dependency, while the markers of the Openness are more intellectual in their nature. Open individuals are generally described as imaginative, cultured, reflective, analytical, creative, sophisticated, having wide interests and curious (for an overview see also Kohnstamm et al. 1998). It should be also noticed that each of the five personality dimensions is bipolar, i.e. consisting of the two opposite poles, for example extraverted-introverted, agreeable-disagreeable etc.

Based on the theory of the Big Five, psychometrically sound instruments to measure individual differences were developed, e.g. NEO-PI-R (Costa and McCrae 1992) that were translated and adapted for use in other language communities, among them also in Italy (Caprara et al. 1993) and Slovenia (Caprara et al. 1997). The latter, the so-called Big

Five Questionnaire (BFQ) was standardized in Slovenia and used for the purposes of the present study. Several scores are derived from this assessment tool: the aforementioned five dimensional scores. Each of these five dimensions is further divided into two facet (lower order, more specific traits). Energy decomposes into Activity and Dominance; Agreeableness consists of Cooperation and Kindness; Conscientiousness taps Preciseness and Persistence; Emotional Stability includes Emotional and Impulse Control; and finally, Openness is described by Openness to Culture and Openness to Experience. The BFQ also contains the Lie scale in order to identify the extent to which the individuals tend to present themselves in a positive, socially desirable fashion.

Recent advances in personality psychology suggest that personality traits (general dimensions as well as more specific facets of these dimensions) have a substantial genetic component, little or no component that can be attributed to shared environment (e.g. being socialized by the same parents), and a residual component representing non-shared environment (e.g. specific individual experiences that affect psychological development). All of the five dimensions are heritable, at least moderately. Personality traits are considered to be biologically based, but this does not necessarily mean that they can not be reshaped by the environment. Experience of acculturation or life events, for example, can change personality profiles; traumatic stress may contribute to atrophy of the hippocampus; perceptual and learning experience shape the development of the brain (for a review see McCrae et al. 2000, Plomin et al. 1997, Zupančič 2004).

In sum, this study was intended to explore whether there are any significant relations between the body type and personality characteristics as measured by the Heath-Carter anthropometrical somatotype and the Big Five personality questionnaire based on the participants' self-report.

Subjects and Methods

The subjects were represented by a sample of 40 male students of Biology at the University of Ljubljana. They were from 18 to 24 years old. Mean value was 20.5 years (Table 1). Measurements were done at the Chair of Anthropology in winter of the school-year 2000/2001. Subjects were measured barefoot in light underwear.

Table 1. Age distribution of sample.

Age (years)	n	%
18	1	2.5
19	17	42.5
20	3	7.5
21	9	22.5
22	4	10.0
23	4	10.0
24	2	5.0

Anthropometry

Anthropometrical measurements were done according to standard methods and with standard instruments (Heyward 1996). Skinfolds were measured with a Slim Guide caliper with 0.1 cm precision and with constant pressure of $10g/mm^2$. Body mass was measured by the Tanita TBF-305 which calculated also body fat (in % and in kg).

The sample for comparison of somatotype was 64 students of the Biotechnical Faculty measured in 1988 by the same technique and instruments (Tomazo-Ravnik 1994). Basic statistics was calculated (Petz 1981).

Psychological measurements

The BFQ (Caprara et al. 1997), an instrument standardized on the Slovenian population of older adolescents and adults of different ages, was employed. As already described in the Introduction section, the five broad-band personality dimensions, ten more specific facets of these dimensions, and the tendency to present the self in a desirable way (the so-called Lie scale scores) are measured through individuals' self reports on this assessment tool.

The BFQ consists of 49 items that are rated along a 5-point rating scale. Each participant rates to what extent each of the particular statements applies to his characteristics. Standard instructions on how to fill-in the questionnaires are written on the front page of the BFQ and the participants are asked to answer all of the items. The experimenter can explain eventual ambiguities with respect to the item content, but the explanations should not be suggestive of the participant's answer.

A computer scoring programme was used to calculate BFQ raw scores for each of the 16 variables (described above), while the transformation table (younger males – under 21 years; middle age group of males – between 21 and 35) was used to convert the raw into the standard scores.

Pearson correlation coefficients were calculated for all of the anthropometric parameters and personality scores by employing the Statistica for Windows 5.0 computer programme. Anthropometrical lists of measurements and answers to the BFQ test were kept at the Chair of Anthropology Department of Biology, Biotechnical Faculty, University of Ljubljana. Statistical analyses were made by ANOVA, post hoc test (Scheffé-test) and Pearson's correlation coefficient.

Results

Anthropometrical somatotype

In the Table 2 we present the basic statistics of the whole group of students.

Mean somatotype for the group of students of biology was mesomorphic endomorph with the values 4.0–4.2–3.0. Values for somatoplot position were for x=-1 and for y=1.4.

According to our plan of study to find out the intensity and kind of correlation between somatotype and personality dimensions we divided the sample of 40 measured and tested students after calculation of the Heath-Carter anthropometrical somatotype to three subsamples (Table 3). In first there were the students with dominance of endomorphy, in the second students with dominance of mesomorphy, and in the third the students with dominance of ectomorphic component (Tables 4–6).

Table 2. Basic statistics of anthropometric parameters.

Parameters	M	SE_M	SD	SE_{SD}	V_{min}	V_{max}	KV
Age (years)	21.0	0.3	1.8	0.2	18.7	24.9	8.0
Height (cm)	179.0	1.2	7.7	0.9	160.5	193.2	4.0
Weight (kg)	72.4	1.5	9.6	1.1	53.2	91.6	13.0
Flexed upper arm girth (cm)	30.6	0.4	2.8	0.3	24.5	35.0	9.0
Max. calf girth (cm)	37.4	0.4	2.5	0.3	33.0	43.5	7.0
Triceps skinfold (mm)	12.4	0.9	5.6	0.6	3.8	24.3	46.0
Subscapular skinfold (mm)	15.2	0.8	4.8	0.6	6.5	25.0	31.0
Supraspinal skinfold (mm)	14.5	1.0	6.6	0.7	4.2	30.3	46.0
Medial calf skinfold (mm)	9.4	0.6	3.8	0.4	2.3	19.0	40.0
Biepicondylar humerus (cm)	7.0	0.1	0.4	0.0	6.2	8.21	6.0
Biepicondylar femur (cm)	9.5	0.1	0.4	0.0	9.0	10.7	4.0
Fat (kg)	10.5	0.8	5.1	0.6	0.8	22.2	48.0
Fat (%)	14.0	0.9	5.7	0.6	1.1	24.2	41.0
Endomorphy	4.0	0.2	1.5	0.2	1.2	6.4	37.6
Mesomorphy	4.2	0.2	1.3	0.2	1.6	6.5	22.9
Ectomorphy	3.0	0.2	1.4	0.2	0.8	6.0	35.5

Table 3. Number of students after dominance of components.

Components	n	%
Endomorphs	15	37.5
Mesomorphs	14	35.0
Ectomorphs	11	27.5
Total	40	100.0

Table 4. Basic statistics for anthropometric measurements for students with dominance in endomorphy.

Parameters	M	SE_M	SD	SE_{SD}	V_{min}	V_{max}	KV
Age (years)	21.4	0.4	1.7	0.3	19.0	24.9	8.1
Height (cm)	180.4	2.0	7.7	1.4	167.0	193.0	4.2
Weight (kg)	78.0	2.1	8.1	1.5	65.4	91.6	10.4
Flexed upper arm girth (cm)	31.6	0.6	2.2	0.4	28.5	35.0	6.9
Max. calf girth (cm)	38.0	0.6	2.3	0.4	34.4	41.5	6.1
Triceps skinfold (mm)	16.7	1.4	5.2	1.0	7.3	24.0	31.4
Subscapular skinfold (mm)	18.6	0.8	3.1	0.6	13.7	23.5	16.4
Supraspinal skinfold (mm)	20.2	1.1	4.4	0.8	14.0	30.3	21.8
Medial calf skinfold (mm)	12.2	0.9	3.6	0.7	8.0	19.0	29.6
Biepicondylar humerus (cm)	7.1	0.1	0.4	0.1	6.6	8.1	5.4
Biepicondylar femur (cm)	9.5	0.1	0.3	0.1	9.0	10.1	3.3
Fat (kg)	14.0	1.0	3.9	0.7	5.9	22.2	27.6
Fat (%)	17.9	1.0	3.9	0.7	7.6	24.2	21.9
Endomorphy	5.2	0.2	0.8	0.2	3.8	6.4	16.1
Mesomorphy	4.2	0.3	1.1	0.2	2.8	6.1	25.9
Ectomorphy	2.4	0.3	1.1	0.2	0.8	4.4	45.3

Table 5. Basic statistics for anthropometric measurements for students with dominance in mesomorphy.

Parameters	M	SE_M	SD	SE_{SD}	V_{min}	V_{max}	KV
Age (years)	20.7	0.5	1.8	0.3	18.7	24.7	8.9
Height (cm)	175.7	1.9	7.2	1.4	160.5	192.0	4.1
Weight (kg)	72.5	2.1	7.9	1.5	62.6	88.2	10.9
Flexed upper arm girth (cm)	31.9	0.7	2.5	0.5	28.0	35.0	7.7
Max. calf girth (cm)	38.5	0.6	2.1	0.4	35.5	43.5	5.4
Triceps skinfold (mm)	11.3	1.3	4.7	0.9	5.5	24.3	42.0
Subscapular skinfold (mm)	14.9	1.3	4.8	0.9	9.4	25.0	32.3
Supraspinal skinfold (mm)	13.1	1.6	6.2	1.2	5.1	26.1	47.1
Medial calf skinfold (mm)	8.8	0.7	2.7	0.5	5.6	14.0	30.3
Biepicondylar humerus (cm)	7.0	0.1	0.4	0.1	6.4	8.0	6.2
Biepicondylar femur (cm)	9.7	0.1	0.5	0.1	9.0	10.7	4.8
Fat (kg)	9.3	1.0	5.2	1.0	0.8	17.9	56.5
Fat (%)	12.4	1.2	6.3	1.2	1.1	23.5	50.5
Endomorphy	3.8	0.4	1.3	0.3	2.0	5.8	35.2
Mesomorphy	5.2	0.2	0.9	0.2	3.9	6.5	16.6
Ectomorphy	2.3	0.3	1.0	0.2	0.9	3.6	44.5

Table 6. Basic statistics for anthropometric measurements for students with dominance in ectomorphy.

Parameters	M	SE_M	SD	SE_{SD}	V_{min}	V_{max}	KV
Age (years)	20.8	0.5	1.7	0.4	19.1	23.7	8.1
Height (cm)	184.4	2.3	7.5	1.6	169.5	193.2	4.1
Weight (kg)	64.4	2.4	8.1	1.7	53.2	75.8	12.6
Flexed upper arm girth (cm)	27.6	0.6	1.9	0.4	24.5	30.2	6.8
Max. calf girth (cm)	34.9	0.5	1.6	0.3	33.0	38.0	4.5
Triceps skinfold (mm)	7.8	0.6	2.1	0.4	3.8	10.1	26.9
Subscapular skinfold (mm)	10.8	0.7	2.4	0.5	6.5	14.9	22.4
Supraspinal skinfold (mm)	8.6	0.7	2.3	0.5	4.2	13.4	26.5
Medial calf skinfold (mm)	6.4	0.7	2.3	0.5	2.3	11.7	36.7
Biepicondylar humerus (cm)	6.8	0.1	0.4	0.1	6.2	7.5	5.6
Biepicondylar femur (cm)	90.4	0.1	0.4	0.1	9.0	10.0	4.0
Fat (kg)	7.1	1.0	3.2	0.7	2.2	12.3	44.9
Fat (%)	10.8	1.3	4.3	0.9	4.2	18.8	39.6
Endomorphy	2.6	0.2	0.7	0.1	1.2	3.5	26.3
Mesomorphy	2.8	0.2	0.6	0.1	1.6	3.6	20.6
Ectomorphy	4.6	0.2	0.7	0.2	3.6	6.0	16.0

Students in the group with dominance of endomorphy have the highest mean values in weight, all four skinfolds and amount of fat. The highest values for height are in the group with dominance in ectomorphic components. There is no significant difference in the parameters of elbow and knee diameters between three groups.

Evaluation of degree of connections between anthropometrical somatotype and personality dimensions

Somatotype component endomorphy is significantly and positively related to personality dimensions Energy and Conscientiousness. The correlation between mesomorphy and Energy is close to the level of statistical significance with the alpha set at 0.05 (Two-tailed test), and ectomorphy is negatively associated with Energy (Table 7).

Table 7. Correlation values for personality dimensions and somatotype components.

	Endomorphy	Mesomorphy	Ectomorphy
Energy	0.32*	0.26	-0.30
Agreeableness	-0.04	-0.08	0.08
Conscientiousness	0.27	0.12	-0.14
Emotional Stability	0.10	0.10	-0.18
Openness	0.35*	0.15	-0.17

*: significant correlation

Somatotype component endomorphy is significantly and positively linked to the personality facets of Dominance and Preciseness (Table 8). In addition, the correlations between endomorphy and Openness to experience as well as to Openness to culture are on the border of statistical significance (positive relation at 0.05 level). Somatotype component mesomorphy is significantly and positively related to Dominance, which is also negatively linked to ectomorphy (Table 8).

Table 8. Correlation values for personality facets and somatotype components.

	Endomorphy	Mesomorphy	Ectomorphy
Activity	0.21	0.12	-0.19
Dominance	0.35*	0.34	-0.34*
Cooperation	-0.13	-0.23	0.26
Kindness	0.06	0.10	-0.11
Preciseness	0.35*	0.12	-0.17
Persistence	0.10	0.07	-0.06
Emotion control	0.07	0.05	-0.13
Impulse control	0.12	0.16	-0.23
Openness to experience	0.29	0.05	0.06
Openness to culture	0.29	0.20	-0.22

*: significant correlation

Personality dimensions

Basic statistics for the five personality dimensional scores and the ten facets are presented in Table 9 and Table 10, respectively. Comparative data scored on the biology student sample and the general male population are presented in Table 11.

The mean scores for the five personality dimensions obtained with the sample of male biology students were, in comparison to the Slovenian male population of corresponding age, similar with respect to Agreeableness and Openness. The students scored above the population mean for Energy, Conscientiousness and Emotional Stability. At the facet level, the students scored higher for Activity, Dominance, Persistence, Emotional Control

and Openness to Culture than did the Slovenian male population, while the students did not deviate from the population means for Cooperation, Kindness, Preciseness, Impulse Control and Openness to Experience. The variability of the scores around the mean was higher for the student sample with respect to the majority of traits (broad-band and more specific ones) than was the variability in the population.

Table 9. Basic statistics for personality dimensions.

Dimension	n	M	SE_M	SD	SE_{SD}	V_{min}	V_{max}	Asim.	Kurt.	KV
Energy	40	71.8	1.5	9.5	1.1	55.0	95.0	-0.2	0.4	13
Agreeableness	40	81.3	1.4	8.6	1.0	59.0	99.0	-0.1	-0.3	11
Conscientiousness	40	81.3	1.8	11.3	1.3	61.0	105.0	0.6	0.3	14
Emotional stability	40	74.7	2.0	12.6	1.4	41.0	104.0	0.6	-0.5	17
Openness	40	89.0	1.2	7.6	0.9	78.0	109.0	0.6	1.0	9

Table 10. Basic statistics for personality facets.

Facets	n	M	SE_M	SD	SE_{SD}	V_{min}	V_{max}	Asim.	Kurt.	KV
Activity	40	36.5	0.9	5.7	0.6	24.0	47.0	-0.5	-0.1	16
Dominance	40	35.4	0.8	5.3	0.6	26.0	48.0	0.0	0.5	15
Cooperation	40	43.0	0.8	5.0	0.6	31.0	56.0	0.7	0.1	12
Kindness	40	38.3	0.8	5.0	0.6	28.0	48.0	-0.7	-0.1	13
Preciseness	40	38.8	1.1	6.9	0.8	24.0	54.0	-0.1	0.3	18
Persistence	40	42.4	1.0	6.5	0.7	26.0	57.0	0.0	0.0	15
Emotion control	40	38.6	1.2	7.7	0.9	18.0	55.0	0.2	-0.6	20
Impulse control	40	36.2	0.9	5.7	0.6	17.0	49.0	2.2	-0.7	16
Open-s.to experience	40	43.6	0.7	4.7	0.5	32.0	53.0	-0.1	0.1	11
Openness to culture	40	31.6	1.0	6.2	0.7	17.0	43.0	-0.2	-0.4	20

Table 11. Comparisons of personality dimensions and facets between students (n= 40) and general population (n=628, Caprara et al. 1997).

	Students		Gen. pop.	
Dimension/Facets	M	SD	M	SD
Energy	81.30	11.76	71.80	8.32
Agreeableness	82.86	9.53	81.28	9.20
Conscientiousness	85.56	12.34	81.25	9.58
Emotional stability	79.47	12.52	74.73	10.20
Openness	88.43	11.35	88.98	7.15
Lie scale	33.32	7.36	31.58	6.19
Activity	41.41	6.25	36.45	5.66
Dominance	39.90	6.95	35.35	5.26
Cooperation	43.26	5.43	43.00	4.97
Kindness	39.60	5.47	38.28	4.97
Preciseness	40.03	7.22	38.83	6.95
Persistence	45.53	6.83	42.43	6.53
Emotion control	41.85	7.35	38.58	7.68
Impulse control	37.62	6.45	36.15	5.68
Openness to experience	44.33	6.72	43.55	4.70
Openness to culture	44.09	5.99	31.58	6.19

Discussion

In Slovenia there were no published works analysing the connections between somatotype and psychological dimensions of persons. But there were several anthropometrical and somatotype analyses done with young and student populations.

Among the anthropometrical measurements the highest variability is observed in skinfolds and body fat. Brodar with the help of factor analysis on data from the students series in Slovenia found that skinfolds are the best indicator for sex difference of morphological structure. Subscapular skinfold has the highest correlation with weight and body fat. Skinfolds on the triceps and abdomen are in negative correlation with weight and in positive correlation with body fat. The lowest variability is found in the suprailiacal skinfold (Brodar 1981, 1988, 1991). Pogačnik and coworkers found in the series of students of the University of Ljubljana the dominance of eurisomatic constitutional type and after Škerlj (1959) the dominance of normoplastic type. In male students superior type of distribution of subcutaneous fat and in female series inferior type prevail. Tomazo-Ravnik and coworkers publish in 1988 the results of analyses of Heath-Carter anthropometrical somatotypes of athletes and nonathletes in adolescence period. There were some statisticaly significan differences.(Tomazo-Ravnik et al. 1988). Tomazo-Ravnik found in student series high variability in stature, weight, skinfolds and body fat (Tomazo-Ravnik 1996).

From the group of students in the study measured in 1988 (Tomazo-Ravnik 1994) we chose students of biology. Their number is 64 and mean age 20.0 years (Table 12).

Table 12. Anthropometrical measurements and somatotype components of two groups of students.

Parameters	1988		2001		sign.
	M	SD	M	SD	
Height (cm)	179.9	3.7	179.0	7.7	–
Weight (kg)	75.7	8.2	72.4	9.6	–
Flexed upper arm girth (cm)	31.9	2.2	30.6	2.8	*
Max. calf girth (cm)	38.0	2.3	37.4	2.5	–
Triceps skinfold (mm)	10.1	3.6	12.4	5.6	*
Subscapular skinfold (mm)	11.9	3.7	15.2	4.8	*
Supraspinal skinfold (mm)	8.0	3.3	14.5	6.6	*
Medial calf skinfold (mm)	9.6	3.0	9.4	3.8	–
Biepicondylar humerus (cm)	7.1	0.4	7.0	0.4	–
Biepicondylar femur (cm)	9.8	0.5	9.5	0.4	*
Endomorphy	2.8	1.0	4.0	1.5	*
Mesomorphy	4.7	1.2	4.2	1.3	*
Ectomorphy	2.6	1.2	3.0	1.4	–

*: significant difference

There is a 14-year period difference between the two groups, and statistically higher (p=0.05) are values in the triceps, subscapular and supraspinal skinfolds and endomorphy, and lower in flexed upper arm girth, biepicondylar femur and mesomorphy.

The mean somatotype in our group of students is mesomorph endomorph, in the group from 1988 the mean somatotype was balanced mesomorph. There are no significant

differences in body mass but in our group the amount of fat is higher and amount of muscle mass lower.

Tomazo-Ravnik (1991) analysed the measurements of two student series measured in 1927 and 1987/89. The 60-year difference shows a positive secular trend, greater on the extremities than on the trunk (Tomazo-Ravnik and Blejec 1991). In a study of four male and female student generations (1920/21, 1934/35, 1944/45 and 1967/68) Štefančič (2000) wrote that statistically significant increases were continuing in height in both sexes. The accelerational tendencies of body weight and biacromial breadth were significant only in males. The negative accelerational tendencies and gradual gracilisation of the hip region is evident in both sexes, statistically significant only in females.

The understanding of the stability of somatotype and personality traits is important. Do the extreme changes in somatotype contribute to changes in personality? Are there any relations between the personality type (as derived from the person-centered approach) and somatotype? Based on extensive analyses, Tucker (1982) concludes that the researchers did not find sufficient evidence to reliably predict personality traits from somatotype measures.

Hošek and Momirović (1992) analysed the sample of 836 males aged from 19 to 27 years. The canonical relation between seven morphological characteristics and six tests for evaluation of personality characteristics was chosen in such a way that they provide the estimation of skeletal, muscular and fat mass. The authors found a low, but significant canonical correlation which could be ascribed to the tendency that males of massive body composition have a better regulation of all conative functions and slightly increased primary aggressiveness. Their results confirm the possitive correlation between anthropological characteristics and conative and cognitive functions. Heath and Carter (1990) suggest that some significant links between somatotypes and temperament/personality might exist, but currently, no clear evidence to support eventual causal relations between the two variables has yet been provided.

Conclusions

The mean anthropometrical somatotype of male students of biology is 4.0–4.2–3.0. This is mesomorph-endomorph. Intergenerational comparison shows that the younger generation has become more fat and less musculous.

Mean values for personality dimensions Energy, Conscientiousness and Emotional stability are lower in comparison with the general Slovene population. Mean values for dimensions Openness and Agreeableness are similar, mean values for personality facets Activity, Dominance, Persistence, Emotion control, Openness to culture are lower in comparison to the general population; and mean values for personality facets Cooperation, Kindness, Preciseness, Impulse control and Openness to experience are similar.

Some statistically significant correlations were obtained between the somatotype and personality characteristics of male biology students. However, these associations were low in size. Endomorphy was positively linked to Energy and Openness. Endomorphic students tended to be somewhat more extraverted and open. More specifically, endomorphs were also more likely to be dominant and precise. Endomorphs also tend to be somewhat more open to both, i.e. to experience and to culture. The relations between mesomorphy and personality traits did not exceed chance levels with respect to any of the

personality traits under investigation. The negative relations between ectomorphy and Energy, and its facet Dominance, which approach statistical significance indicate that the ectomorphs tend to appear less energetic and less dominant than other somatotypes.

On the basis of the studies presented, we wish to carry out comparable research on a sample which would be numericaly larger and more heterogeneous. Consequently, the variability between the personality dimensions would be increased, and most probably in this case the differences between individual groups would be greater; likewise, the links between personality dimensions and the groups with prevailing somatotype component would be stronger.

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