

DEFINING AND COMPARING THE ANTHROPOMETRIC STRUCTURE WHIT MALE AND FEMALE STUDENTS AT THE AGE OF 11 YEARS WITH DIFFERENT METHODOLOGICAL AND STATISTIC APPROACHES

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Abstract

The research is realised on a simple of 400 entitiens from Skopje, at age of 11 years. The sample was divided into two sub-samples: 200 male and 200 female entitiens. 11 anthropometric measures were applied on the sub-samples. The results from the antrhopometric measures worked by the basic statistic parametars (mean, standard deviation, minimum and maximum results, skewness, kurtozis and normality of distribution was checked by the Kolmogorov-Smirnov approach). Then the following statistic approaches were applied: multivariate, discriminative, component and factor analyse (varimax and oblimin rotations). The oblimin rotations were defined as parallel (patern matrix) and orthogonal proections (structur matrix). The work was held whit regressive analyse (in manifest, combinet and latent space), as well as whit canonicalcorrelation analyse. The data obtained from all statistic procedures was compared with the suitable relations. Comparison showed that males and females differ to a great extend in their manifest and latent anthropometric structure, but sume relations have significant similarity. The application of different statistic procedure of the data with same antropometric characteristics, whit male and female, showed that completely identical results are not recognized. That is why, by reason of greater exactness and generalization of the obtained data, different statistic methods are necessary.

Key words: anthropometric measures, latent dimensions, male students, female students,

Introduction

To determine the legalities of transformation processes in kinesiological activities, knowledge of the anthropological characteristics of entities of different sexes is needed, in which they take a significant place from the anthropometric space. Guided by the knowledge of previous research that the differences in anthropometric space between male and female are different, to achieve a greater degree of forecasting and more existential generalization, this research has been taken in which various methodological and statistical procedures are applied in the processing of data.

Methods

The study was conducted on a sample of 400 respondents, of male and female. The sample was divided into two subsamples, 200 each gender. The samples were extracted from the population of primary school students from Skopje, aged 11. The sample was defined as group. The students in the sample were psychophysically healthy and regularly visited physical and health education classes.

Sample of applied tests

To conduct the study, 11 tests were applied in both subsamples to assess anthropometric characteristics.

To assess the longitudinal dimensionality of the body:

1. Height ATV
2. Arm length ADR

To assess the transverse dimensionality of the body:

1. Biachromyal width-ABS
2. Wrist diameter- ADRZ

To assess body volume and body mass:

1. Forearm volume- AOPL

2. Forearm volume- AONL
3. Volume of the underknee-ANPK
4. Body weight- ATT

For the assessment of skin fat:

1. Leather upper arm-ANN
2. Forearm leather set-ANPK
3. Leather abdominal fold-ATT

Results and discussion

Table 1 Basic statistical parameters for anthropometric measures applied in 11-year-old students

Measures	X	SD	Min	Max	Skew	Kurt	KS
ATV	148.49	7.32	129.0	167.9	.11	-.35	.84
ADR	63.48	3.81	52.9	74.0	.02	-.10	.97
ADSH	31.57	1.91	25.5	37.1	.00	.39	.76
ADRZ	4.54	.41	3.1	5.8	-.25	.74	.07
AOPL	20.54	2.22	16.2	31.6	1.32	3.62	.00
AONL	21.35	2.89	15.0	39.4	.91	1.39	.04
AOPK	30.78	2.96	22.9	38.0	.02	-.35	.83
ATT	39.90	8.23	24.0	67.0	.73	.66	.05
ANN	14.06	6.69	2	36	.99	.76	.00
ANPK	18.03	8.45	5	40	.90	.06	.00
ANS	13.55	8.14	3	40	1.13	.85	.00

Table 2 Multivariate analysis of the variance of anthropometric measures—comparing anthropometric characteristics between s 11 year old students.

Measures	Groups	X	S	F	Q
ATV	Men Female	146.34	7.25	8.71	.00
.ADR	Men Female	63.04 63.48	3.39 3.81	1.50	.22
ADSH	Men Female	31.58 31.57	1.84 1.91	.00	.97
ADRZ	Men Female	4.58 4.54	.41 .41	1.07	.30
AOPL	Men Female	20.80 20.53	2.28 2.22	1.38	.24
AONL	Men Female	21.57 21.35	3.13 2.89	.52	.47
AOPK	Men Female	30.63 30.78	3.60 2.96	.22	.64
ATT	Men Female	40.54 39.90	9.10 8.23	.54	.46
ANN	Men Female	13.57 14.06	7.16 6.69	.49	.48
ANPK	Men Female	15.84 18.03	8.99 8.45	6.29	0.01
ANS	Men Female	13.51 13.55	9.83 8.14	.00	.97
Wilks Lambda=.87		Rao's R=5.19	DF1=11	DF2=388	Q=.00

Table 3 Factor anthropometric structure in 11-year-old schoolgirls results.

Measures	H1	H2	h2	V1	V2
ATV	.61	.68	.84	.05	.91
ADR	.62	.65	.80	.08	.89
ADSH	.70	.44	.68	.28	.78
ADRZ	.50	.34	.37	.18	.56
AOPL	.82	-.05	.68	.67	.48
AONL	.82	-.23	.72	.78	.33
AOPK	.89	-.02	.80	.71	.54
ATT	.94	.06	.89	.70	.63
ANN	.69	-.56	.79	.89	.00
ANPK	.77	-.47	.80	.89	.11
ANS	.76	-.48	.81	.90	.10
Lambda	6.18	2.01	Lambda	4.56	3.63
%	56.17	18.27	%	41.45	32.99

Table 4 Factor structure of anthropometric measures in 11 year old males

Measures	H1	H2	h2	V1	V2
ATV	.71	.58	.84	.19	.90
ADR	.66	.60	.80	.13	.89
ADSH	.74	.41	.71	.32	.78
ADRZ	.58	.37	.48	.22	.66
AOPL	.81	-.01	.65	.64	.50
AONL	.89	-.20	.83	.82	.40
AOPK	.89	-.09	.80	.75	.49
ATT	.82	.01	.68	.64	.52
ANN	.73	-.52	.81	.90	.06
ANPK	.84	-.40	.86	.90	.22
ANS	.81	-.43	.84	.90	.18
Lambda	6.54	1.67	Lambda	4.68	3.63
%	60.36	15.16	%	42.50	33.02

Table 5 Intercorrelation of oblimine factors (FS) in males

Factors	FS1	FS2
FS1	1.00	
FS2	.48	1.00

Table 6 Factor structure of anthropometric measures in females, in volume rotation, matrix of parallel projections (FP) and matrix of orthogonal projections (FS)

Measures	FP1	FP2	FS1	FS2
ATV	-.12	.95	.24	.91
ADR	-.09	.93	.26	.89
ADSH	.14	.76	.43	.82
ADRZ	.07	.58	.29	.60
AOPL	.62	.35	.76	.59
AONL	.76	.18	.83	.47
AOPK	.65	.41	.81	.66
ATT	.62	.52	.81	.75
ANN	.94	-.20	.87	.16
ANPK	.92	-.08	.89	.27
ANS	.93	-.09	.90	.26

Table 7 Intercorrelation of oblimin factors in schoolgirls

Factors	FS1	FS2
FS1	1.00	
FS2	.38	1.00

Table 8 Factor structure of anthropometric measures in males, in volume rotation, matrix of parallel projections (FP) and matrix of orthogonal projections (FS)

Measures	FP1	FP2	FS1	FS2
ATV	-.03	.93	.42	.91
ADR	-.09	.94	.36	.89
ADSH	.14	.77	.51	.83
ADRZ	.06	.66	.38	.69
AOPL	.57	.36	.75	.63
AONL	.80	.20	.90	.59
AOPK	.69	.32	.85	.66
ATT	.56	.38	.75	.66
ANN	.98	-.21	.88	.27
ANPK	.94	-.03	.93	.43
ANS	.95	-.08	.92	.39

Table 9 Intercorrelation of oblimine factors (FS) in males

Factors	FS1	FS2
FS1	1.00	
FS2	.48	1.00

The results from the Kolmogorov-Smirnoff procedure indicate that in boys up to 11 years of age, statistically there is no deviation from the normal distribution from the treated measurements. The value of the results obtained with girls, indicate low values of the standard deviation. The homogeneity of the results is higher. The Kolmogorov-Smirnoff procedure indicates that in girls there are also no significant deviations from the normal distribution. The comparison of the two treated populations included in the research indicates differences and deviations in the anthropometric measurements for assessment of patty tissue.

The applied multivariate analysis indicates differences in the anthropometric area of the tested two populations included in the research, namely in the anthropometric measurements - body height and skin raphe/wrinkle of the body, in favour of the female population.

The applied anthropometric factor structure indicated similarities between male and female population. Two identical anthropometric factors were isolated in the two tested populations, defined by different anthropometric measurements, i.e. the body volume and fatty tissue and the longitudinal-transverse dimensioning of the body.

The anthropometric features in the discriminatory area differ in the tested groups. In the discriminatory area, the females show more pronounced anthropometric development.

The tested canonical area differs between males and females. Two pairs of canonical factors have been isolated in the males, and one pair in the females.

By applying different statistical procedures on the same anthropometrical features manifested, fully identical and different results have not been obtained separately in boys and in girls. This has been determined by applying multivariate analysis –DISCRA, component analysis and varimax rotations, varimax and oblimin rotations, parallel and orthogonal rotations of the oblimin factors, regressive analysis and canonical analysis.

More pronounced dissimilarities in the obtained results have been determined between the application of the comparative analysis and the varimax rotations, as well as between the varimax and the oblimin rotations. These dissimilarities are less pronounced between the application of parallel and orthogonal

rotations. The dissimilarities between the results obtained by applying the regressive and the canonical correlation analysis are quite noticeable.

In order to obtain more exact results while defining, finding the connection and the mutual impact in the anthropometrical area between the two tested groups, we have come to the conclusion that various different and appropriate statistical procedures should be used. This particularly applies during analysis of the latent anthropometrical features, while in the future also of the latent motor/movement area, especially when the intention is generalization of the obtained.

Conclus

By applying different statistical procedures to the same manifest anthropometric characteristics, especially how females and male subjects are not obtained completely identical or different results. This is determined between the application of Manovamultivariate analysis and discriminatory DISCRA, component analysis and varimax and oblimine, parallel and orthogonal rotations of oblimine factors. More pronounced differences in the results obtained are determined between the application of component analysis and varimax rotations, as well as between varimax and form rotations. Among the application of parallel and orthogonal rotations, differences are less pronounced. To obtain more exact results in definition and connectivity, the mutual influence of anthropometric characteristics in males and females from the age of 11, several different and appropriate statistical procedures need to be used. This is especially true in the analysis of anthropometric latent characteristics, especially when its intensity is aimed at generalizing the results obtained.

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