

ANALYSIS OF ONTOGENETIC DEVELOPMENT OF THE SCHOOL POPULATION FROM THE PRIMARY SCHOOLS IN THE REPUBLIC N.MACEDONIA

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Abstract

The basic subject and purpose of the research is to analyze the ontogenetic development in pupils as they progress and develop year by year in the phase of their physical growth without training, when biological growth decreases, and to use the results as prediction for selection in sport. The anthropometric, motoric, and working abilities of the students from Skopje from the eight grade of primary school have been measured in order to analyze the changes in the children's organism i.e to determine the value of the differences on the manifestical anthropometric changes, motoric and working tests between the examines from both genders of the same age. The total result of this experiment is to proanalyze the development of the students and to see in which way and how much the biological forms change on their own natural way, to determine the interpersonal differences between males and females of the same age.

Key words: *anthropometric, motoric, genetic predisposition, kinesiology analyses.*

Introduction

The main subject of work of modern kinesiology is the modern development of the shovel which is divided into two basis stages. The first stage is phylogeny (embryonic development) and the second stage is ontogeny (from the moment of human birth). Which means individual development of physical abilities such as: strength, speed, coordination, endurance, precision, fitness, elasticity, balance, general working motor skills, and so on. That is, motor skills that are crucial for the performance of movement from birth to death¹. Motor ontogenesis can be conditionally divide into different biological stages from the development of the human personality. In our case, we are especially interested in the sixth and eighth school grades and their ontogenetic development, specifically in the students from sixth grade. What is their hereditary predisposition as a prediction for selection in sports, to monitor the effects of physical and health education classes, how much and how it is reflected in terms of student's ontogenetic development and the ability to find talents for the need of sports based on knowledge of achievements in genetic kinesiology.

Material and Methods

The experiment is conducted on a sample of 100 male and female 10 year old examines with an age difference of +/- 6 months. The examines are from the primary school of "Vlado Tasevski" from Skopje. The main target is to determine the value of the differences of the manifestic anthropometric changes, motoric and working tests between the examines from both genders of the same age. To determine the differences of the factor structure of the anthropometric, motoric and working changes especially of male/female students of the same age. Because of that, there were a total of 21 changes, 11 of which were anthropometric, 6 motoric and 4 of working stuff. All data from the measurements of the manifestic anthropometric measures, motoric and working tests are modified by the basic statistic parameters: arithmetic measurement – X, standard deviation – SD, minimal – MIN, and maximal – MAX result, test for asymetry of the results' distribution – SKEW, test for results' homogeneity – KURT and Kolmogorov-Smirnov test (K-S) test for normality testing of the distribution. For determination of the intergroup differences in the utilized manifestic unichanging and multichanging system of changes for every group is

used in analysis of the variance MANOVA, and the partial differences of every change is determined with the univariate analysis of the variance ANOVA, due to them an orthogonal VARIMAX rotation of the initial coordinate system is made from 11 manifestic variables, and thus to get a result as simple as possible, structure of the latent anthropometric, motoric and working stuff, a comparative analysis is made as well of the arithmetic measures of the anthropometric, motoric and working changes between the males and females from fifth grade.

Table 1. Main statistic signatures of the changes for the females from 6th grade

	X	MIN	MAX	SD	Skewness	Kurtosis	KS	KV
AVIS	1603.8	1480.0	1710.0	6.660	-.349	-.838	.13	0.415
ASHRA	33.8	30.5	39.6	1.717	.732	1.824	.10	5.079
ASKA	26.7	24.3	29.2	1.396	.104	-.821	.08	5.228
ATEZ	49.2	35.0	73.2	8.353	.461	.017	.10	16.977
ATDL	77.2	65.0	85.0	5.403	-.556	-.713	.17	6.998
ATDK	91.4	51.0	110.0	9.196	-1.409	6.487	.15	10.061
ASOG	77.3	66.0	86.0	4.657	-.530	-.188	.14	6.024
AOMLI	23.6	20.0	29.0	2.137	.328	-.135	.08	9.055
AONLS	25.6	22.0	36.5	2.295	2.284	10.198	.12	9.035
AOPL	21.2	18.0	24.0	1.316	.087	-.107	.15	6.207
AKFNL	10.0	0.8	14.0	3.484	-1.723	2.526	.23	34.84
MEST50	8.6	4.6	11.5	1.824	-.259	-1.155	.14	21.209
MESDM	144.0	110.0	178.0	15.626	.555	-.268	.19	10.851
MFDPK	26.6	22.0	37.0	4.823	-1.272	7.968	.19	18.131
MIVZ	9.4	2.3	50.3	7.305	3.620	19.773	.16	77.71
MSIK	35.5	13.7	82.3	17.846	1.160	.277	.17	50.270
MIPTM	23.7	10.0	71.0	11.366	2.043	5.707	.21	47.957
FSFDM	18.4	12.0	28.0	3.762	2.645	2.174	.24	20.445
FPVM	96.2	80.0	115.0	9.841	.231	-1.184	.16	10.229

Results and Discussion

The differences between the arithmetic measures of the anthropometrics, motorics and workings of the examined sample from male (TAB.1) and female gender (TAB.2) from sixth grade are tested using T-test. If the value of the test is 1.96 or bigger, it is statistically meaningful on the level of 0.05, and if it is 2.58 or bigger, it is statistically meaningful on the level of 0.01.

Analyzing the arithmetic measures of the **anthropometric changes** (TAB 3) and the given differences between them, it is noticeable that the students from 6th grade have higher results for the changes of: AVIS, ASHRA, ATDP, AONLS, AKFNL and ASOG, except the change in diameter per capita ATDK which shows higher results for the female examines. The given results are all statistical signatures of the level of 0.05. Almost the same results have: ATEG, ASHKA, AONLI and AONLS on the variables, where the taken differences are statistically insignificant.

Analyzing the arithmetic measures of the examined **motoric tests** and the taken differences between the arithmetic measure, it is noticeable that the students from the sixth grade have made higher results in the motoric tests: MEST50, MESDM, MIVZ and MPTM. The differences in the taken results are statistically significant on the level of 0.05. It may be considered that the sixth-grade students have bigger *explosive power, agility and fixed power*. Almost mutual results are taken on the tests for the students of fifth grade on the motoric tests: MFDPK and MISK, i.e. in the tests for marking the *balance and flexibility*.

The arithmetic measure for marking the **working tests** are statistically significant for the tests of inhaling frequency per minute and the blood pressure.

After performing the orthogonal varimax rotation from the **anthropometric** variables for **females** from sixth grade, the first factor took significant projection due to the changes for marking of the circular dimensionality, and according to the given dimension, the *volume and weight of the body* could be defined as a factor. The second factor took significant projections due to the variables for marking the underskin fat tissue, so conditionally it could be defined as a factor of *volume and body mass*. After the successful completion of the orthogonal varimax rotation of sixth motoric manifestic changes, there are no clear definitions of the factors. And the test which have very significant projections are impacted by the

mechanism for making the movements, i.e for sinergetic regulation of the muscular tone. After completing the orthogonal varimax rotation of the four given **working** tests there are two latent dimensions: factor of the pulse value and the vascular ability in calm mode and the factor of systolic and diastolic pressure in calm mode.

Table 2. Main statistic signatures of the changes for the males from 6th grade

	X	MIN	MAX	SD	Skewness	Kurtosis	KS	KV
AVIS	1572.4	1390.0	1750.0	84.360	.124	-.520	.12	5.365
ASHRA	36.1	32.8	43.5	2.176	.880	1.362	.12	6.027
ASKA	26.3	23.0	30.3	1.181	.195	-.744	.08	7.152
ATEZ	49.7	34.0	76.4	10.195	.676	.164	.10	20.51
ATDL	80.1	85.0	100.0	7.169	.875	.828	.18	8.950
ATDK	97.1	85.0	117.0	6.950	.962	.520	.20	7.157
ASOG	79.5	70.0	88.0	5.551	-.111	-1.197	.10	6.982
AOMLI	23.1	18.5	28.6	2.564	.344	-.800	.12	11.099
AONLS	25.3	21.5	30.0	2.112	.283	-.403	.10	8.347
AOPL	20.6	15.0	25.4	2.497	.064	3.757	.15	12.121
AKFNL	11.1	4.0	16.0	2.640	-.509	.390	.10	23.783
MEST50	8.1	5.4	11.4	1.211	.174	.602	.13	14.950
MESDM	160.1	130.0	180.0	12.409	-.394	-.165	.15	7.750
MFDPK	25.4	21.0	32.0	2.579	.339	-.496	.16	10.153
MIVZ	17.2	2.1	42.9	9.583	1.055	.484	.21	55.715
MSIK	30.1	15.1	45.7	7.717	-.211	-.491	.11	25.637
MIPTM	31.8	10.0	60.0	10.159	.284	.513	.19	31.946
FSFDM	16.9	4.0	20.0	2.577	-2.388	11.981	.32	15.248
FPVM	85.4	61.0	106.0	9.200	-.173	.744	.11	10.772
KPS	125.1	115.0	137.0	4.849	.189	.234	.16	3.845
KPD	82.4	65.0	93.0	5.455	-.872	1.700	.12	6.620

Table 3. Charts from the comparative analysis between the male and female students from the sixth grade

VARIJABLI	MALE	FEMALE	T-VALUE	P
AVIS	157.400*	1603.800*	-2.10089	.038217*
ASHRA	36.070*	33.758*	5.89866*	.000000*
ASKA	26.336	26.665	-1.00228	.318679
ATEZ	49.660	49.186	.25431	.799787
ATDL	80.100*	77.220*	2.26844*	.025496*
ATDK	97.100*	91.360	3.52131*	.000654*
ASOG	79.460*	77.290*	2.11772	.036730*
AONLI	23.066	23.610	-1.15236	.251978
AONLS	25.254	25.390	-.30833	.758482
AOPL	20.622	21.248	-1.56830	.120034
AKFNL	11.100	10.024	1.74043	.084922
MEST50	8.118	8.582	-1.50064	.136663
MESDM	160.060*	143.960*	5.70552*	.000000*
MFDPK	25.400	25.600	-.25855	.796524
MIVZ	17.204*	9.391*	4.58462*	.000013*
MSIK	30.096	35.513	-1.97011	.051648
MIPTM	31.820*	23.740*	3.74792*	.000302*
FSFDM	16.868*	18.360*	-2.31346*	.022787*
FPVM	85.380*	96.180*	-5.66864*	.000000*
KPS	126.140	127.060	-.93131	.353980
KPD	82.440	88.800*	-7.96953*	.000000*

After completed orthogonal varimax rotation from the anthropometric variables for *males* from the fifth grade, due to giving more simple structure of the latent anthropometrics, three latent dimensions are given: the first factor kept significant projections on the variables for marking of the longitudinal, transversal, circular dimensionality, accordingly there may be defined as a factor of the *skeletal complex*. Projections which are in the second and the third factor don't give clear definition because of their separated participation in both factors. Because of that, the given dimension could be *defined as a general complex of volumes*. After completed orthogonal varimax rotation of six manifestic changes, two latent dimensions are produced: the first is *a factor of energetic regulation of the movements*, and the second one is *a factor for central regulation of the movements*. After completed varimax rotation of four manifestic changes from the functional space, because of its structure, it could be defined as a factor of pulse value and the capacity of vascular ventilation, and the second factor can be defined as a factor of systolic and diastolic artery pressure.

Conclusion

The differential kinesiology determines the differences of the motoric ontogenesis which are noticeable on the male and female gender, the differences in the biological development in the different life phases between both genders, the social qualification, characteristic fluctuations and the general influence of the kinesiological activities of the systematic human.

The influence of the morphologic, motoric, working dimensions of the successful realized experiment of the partial physical activities and the taken differences of the completed manifestic and latent anthropometric, motoric and working dimensions, especially on male and female students, shows us that the need for differential approach for adding the contents on the subject of physical and health education which will be useful for the task and activity performance of the males and females of the tested period of age. These results may be used for programming and performing the tasks and activities which must be performed on the lessons of physical and health education on a higher level. All of this has its own influence for the healthy condition, gaining more quality working results, bigger assurance and security while working, and all of this makes the life better for living on a general level. This simplified syllabus for physical and health education could satisfy the needs of normal growth and psychobiological development of the person for the needs of a modern society which must have healthy generations in the future.

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