

## Analysis of the body harmony indexes of the female students of the University of Pitesti

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### Abstract:

The hereby paper represents the beginning of a research on the parameters of the harmonious physical development of female students from different faculties of the University of Pitesti. By the help of the undertaken research and measurements, we would like to highlight the general and specific aspects of the development of the female organism in ontogenesis, but also in the special process of acting throughout the classes of university physical education. In university physical education lessons, the student, the person with a personality in course of formation, exposed to education, is the subject of a careful study of the teaching staff. The physical education activity has a major contribution to the development of students, aiming to acquire specific individual or micro group techniques and also to apply them in life or in special competitive situations as habits.

**Keywords:** body harmony, physical education, female students.

### Introduction

In all European countries, there is a unanimous view of individual goals and of social finalities which are pursued through higher education. There are many similarities and differences in the content of physical education syllabuses and in the concepts of general pedagogy. Yet, in practice, we have great differences from one country to another, depending on the available equipment, as well as on the way the information are received and processed by the subjects.

Establishing competences in physical education at higher levels of learning brings about a new vision for teachers and subjects in comparison to what students need to acknowledge or already know, in other words, the goals of physical education. Among **the general and specific objectives of physical education at the level of university education, there are some with strict reference to the topic of our research:** students should be able to evaluate their own evolution of physical development; stimulating and constantly maintaining interest in practicing independently physical exercise and sport; forming groups of friends who are interested in these goals that maintain a harmonious lifestyle and attracting as many young people as possible towards this lifestyle.

### Debated issues

Physical development represents the somatic and functional ensemble of a human being, as a cumulative result of hereditary and natural and social environmental factors, where physical exercise plays an important role. The ontogenetic evolution of the human organism is characterized by growth and development processes. Growth is the quantitative process of cellular multiplication that has the effect of increasing body size, volume, and weight while development is the qualitative process of cellular differentiation, expressed through adaptive functional changes. These two processes are conditioned by a series of internal factors (genetic inheritance, neuro-endocrine mechanisms, etc.) and external factors (normal evolution of the burden, geographical and climatic factors, nutrition, pollution, hygienic conditions, materials and activity, etc.).

Among the external factors, an important role is played by motor activity, in general, and by exercise in particular. The level of physical development is expressed in development indices, indices which are divided into:

- somatic - waist, weight, length (arms length), height of the bust, perimeter (abdominal, thoracic, thighs, etc.), diameters (biacromial, bitrohanterian, etc);
- functional - values of blood pressure and heart rate at rest, elino- and orthostatic, after exercise and during the recovery; respiratory rate at rest, in effort afterwards; oxygen consumption, etc.

Taking into account these indices, a harmonious physical development implies the proportionality between the somatic indices, proportionality between the functional indices and the harmony between the somatic and functional indices.

The body modeling process is one of the objectives of the physical education discipline with certain physical, intellectual, psychic and aesthetic, social implications. All body systems, devices, and functions are involved in the self-modeling process (self-plasty). "Modeling the muscular profile, the right body posture, ensuring the optimal weight of the body are achieved by physical exercise and by the contribution of the associated factors that exert profound influences on the functions of the body as a whole (physiological, psychological, behavioral)" (Zeigler, 1982).

Throughout history, physical education received a lot of attention and appreciation, preserving the well-known precepts "Kalos Kai agatos" and "Mens sana in corpore sano", in the content of which are synthesized the valuable ideas about the educational ideal, suggestively referred as the close unity between the physical and the psychic, their multiple and complex interconditioning (Enache, 2011).

We consider that the determinants of body harmony can be systematized as such, according to Enache C, 2011:

- social - education, social relations (group of friends, family), culture of belonging;
- physical – health condition;
- psychic - self-image, self-awareness, behavior, dynamic character;
- heredity - predisposition for movement.

In order to study and evaluate the process of achieving a bodily harmony and at the same time obtaining this result, we must take into account that it also has a *quantitative component* (the means, methods, the process itself) and a *qualitative component* related to culture, which underlies the successful development of the process. The two aspects are dependent on each other and are constantly working together. Body harmony is included and is directly related to the category of terms: *quality of life - lifestyle - body harmony, physical condition, growth and development, health, sedentary, obesity, longevity, self-awareness, self-image*.

In modern society a certain female model was imposed. Adolescents, women in course of formation, strive to lose weight, generating serious illnesses such as anemia, anorexia, and even psychic complexes that are hard to heal. Moreover, it is important to look for a balance in our physical constitution.

**Research hypothesis.**

1. *We conjecture that by making an initial assessment of the body harmony indexes of the female students of the University of Pitesti, we will be able to develop means of action which will effectively lead to the improvement of the deficient indices.*

2. *We assume that systematic and continuous action in university physical education lessons will produce effects on muscle tonicity and trophicity and therefore on bodily strength, mobility and stability of the joints, prevent the growth of adipose tissue and increase the active muscle mass.*

**The purpose of the research.**

*The research aims at highlighting the present level of the body harmony indexes of 1<sup>st</sup> year students from the University of Pitesti, as well as the optimization of these indices during the practical classes in the physical education discipline, by applying certain exercises, carefully selected and dosed.*

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No crt	Surname and first name	Faculty	Year	Age	Weight kg	Height cm	Bust cm	IMC	Report T-100/G	Amar Index IA= B/T	Acrom diameter cm	Bitrohan diameter cm	DA-DBT difference	Thoracic P				Erissmann Index IE=PT-T/2 cm	Quetlet Index IQ=Ggr/Tem gr/cm
														Elasticity p. cm	PT R cm	PTI cm	PTE cm		
1.	I. A. R	Psycho	II	20	60,7	158,5	83	24,2	0,96	52,36	38	34	4	7	95	97	90	15,75	383
2.	S. A.	Psycho	II	20	46,3	156	84	19,0	1,20	53,84	34	28	6	7	84	85	78	6	297
3.	P. D	Psycho	II	20	54	167	89	19,4	1,24	53,29	38	32	6	10	87	91	81	3,5	323
4.	C.C	Psycho	II	21	63,6	170	90	22,0	1,10	52,94	39	34	5	9	90	94	85	5	371
5.	A.M.	Psycho	II	20	63,4	171,5	89	21,5	1,12	51,89	39	33	6	12	90	95	83	4,25	370
6.	B.C.E.	Biology	II	22	58	168	94	20,5	0,72	55,95	40	34	6	3	87	90	87	3	345
7.	A.A.	ETN	I	19	44,2	162	83	16,8	1,40	51,23	37	32	5	8	82	84	76	1	273
8.	A.N.	ETN	I	19	54,1	163,5	86	20,3	1,17	52,59	36	29	7	7	85	91	84	3,25	331
9.	V.A.	ETN	I	24	112,5	176	93	42,1	0,67	52,84	41	40	1	6	120	122	116	32	639
10.	O.A.	ETN	I	20	57,4	162	84	21,7	1,08	51,85	39	31	2	8	86	89	81	5	354
11.	F.T	ETN	I	19	101	162	85	38,5	0,61	52,46	41	40	1	5	127	128	123	46	623
12.	A.A.	Psycho	II	19	53	160	84	20,7	1,13	52,5	38	31	7	6	84	89	83	4	331
13.	P.B.E.	Psycho	II	19	47,9	161	84	18,5	1,27	52,17	36	31	5	9	82	86	77	1,5	298
14.	D.O.	Psycho	II	20	54,1	162	85	20,6	1,14	52,46	38	31	7	9	85	90	81	4	334
15.	S.A.	Psycho	II	19	57	171	91	19,5	1,24	53,21	37	32	5	8	89	93	85	3,5	333
16.	B.A.	Psycho	II	20	84,1	177,5	96	26,8	0,92	54,08	39	36	3	9	99	102	93	10,25	474
17.	D.A.	Psycho	II	20	48	161,5	85	18,3	1,28	52,63	37	29	8	9	86	89	80	5,25	297
18.	C.F.A.	Biology	II	21	49,3	152	86	20,9	0,71	56,57	36	30	6	5	89	90	85	13	324
19.	D.A.M.	Biology	II	21	63	145	86	30	0,71	59,31	40	35	5	3	95	97	94	22,5	434
20.	G.A.	Psycho	II	20	57,9	161	86	22,4	1,05	53,41	36	32	4	10	84	88	78	3,5	360
21.	E.N.	Psycho	II	20	47	164	85	17,5	1,36	51,82	38	32	6	6	84	85	79	2	287
22.	V.V.	Psycho	II	21	56,7	155,5	85	23,4	0,97	54,76	37	33	4	7	86	91	84	8,25	365
23.	D.D.	Psycho	II	20	55,8	160	83	21,9	1,07	51,87	36	32	4	7	85	89	82	5	349
24.	D.A.C.	Biology	II	21	44,7	160	88	17,2	1,34	55	36	30	6	4	80	84	80	0	279
25.	D.A.	Psycho	II	21	56	167	85	20,1	1,19	50,89	36	33	3	7	86	90	83	2,5	335
26.	S.L.	Biology	II	20	53,5	162	87	20,2	1,15	53,70	37	33	4	4	85	90	86	4	330
27.	D.D.G.	Psycho	II	23	57,4	170	84	19,7	1,21	49,41	39	31	8	7	84	88	81	1	338
28.	M.A.D.	Biology	II	20	68	172	97	21	1,06	56,39	39	32	6	5	96	100	95	10	395
29.	B.M.E	AML	I	19	50,4	162	84	19,1	1,23	51,85	38	33	5	6	85	89	83	3	311
30.	R.V.	Psycho	II	22	56,8	161	84	22,0	1,07	52,17	37	34	3	5	85	87	82	4,5	353
31.	A.C.	Psycho	II	20	70	168	89	24,8	0,97	52,97	39	33	6	4	94	95	91	10	417
32.	A.H.	AML	II	20	68,8	171	91	22,9	1,03	53,21	40	33	7	5	97	99	94	11,5	402
33.	U.M.	AML	II	19	56,7	167	86	20,4	1,18	51,49	38	32	6	9	86	89	80	2,5	340
34.	A.M.	AML	II	20	52,4	154	78	21,9	1,03	50,64	37	31	6	7	86	91	84	9	340
35.	U.N.	AML	II	20	59,8	160	85	23,4	1	53,12	40	31	9	5	90	92	87	10	330
36.	N.R.	AML	II	19	85,4	160	86	33,2	0,70	53,75	41	38	3	3	112	113	110	32	534
37.	A.F.A.	AML	II	20	67,3	171	89	22,9	1,05	52,04	36	34	2	5	89	91	86	3,5	394
38.	S.L.	AML	II	20	64,6	160	81	25,0	0,92	50,62	39	32	7	5	92	93	88	12	404
39.	M.A.	AML	II	20	66,6	160	86	25,8	0,90	53,75	37	34	3	4	99	101	97	19	416
40.	G.V.	Biology	I	19	81,8	160	90	31,6	0,73	56,25	40	39	1	6	104	108	102	10	511
41.	B.A.	Biology	I	19	81,3	166	91	29,4	0,81	54,81	39	34	5	4	112	114	110	8	490
42.	R.C.	Biology	I	19	52,9	156	85	21,8	1,05	54,48	37	30	7	5	87	90	85	7	339
43.	P.M.	Biology	I	19	45,5	161	87	17,4	1,34	54,03	35	31	4	6	83	86	80	6,5	283
44.	R.M.	Biology	I	19	55	170	84	19,0	1,27	49,41	35	33	2	3	88	90	87	1	324
45.	P.O.	Biology	I	18	43,1	157	81	17,4	1,32	51,59	37	31	6	6	79	82	76	2,5	275
46.	G.A.	Biology	I	19	71,8	153	83	30,3	0,73	54,25	38	35	3	2	99	100	98	6,5	469
47.	L.D.	Biology	I	19	47,1	162	87	17,9	1,31	53,70	36	29	7	5	81	83	78	6	291
48.	C.E.A	AML	I	19	44,2	153,5	84	18,8	1,21	54,72	35	30	5	6	76	80	74	7,25	288
49.	C.G.	Biology	I	19	102,1	166	95	37,0	0,64	57,22	41	39	2	2	113	114	112	12	615
50.	B.I.	Biology	I	19	54,2	163	86	20,3	1,16	52,76	36	31	5	7	82	83	76	4,5	333
51.	W.D.	Biology	I	20	76,8	180	90	23,5	1,47	50	41	37	4	2	97	98	96	0	427
52.	I.M.	Biology	I	19	51,2	154	87	21,5	1,05	56,49	36	31	5	3	81	82	79	10	332
53.	V.L.	Biology	I	19	53,4	160	86	20,7	1,12	53,75	37	30	7	4	87	89	85	6	334
54.	P.D.A.	Biology	I	18	52,8	168	88	18,8	1,28	52,38	36	30	6	4	81	83	79	4	308
55.	B.A.	Biology	I	19	43,7	142	75	21,3	0,96	52,81	34	28	6	7	85	86	79	4	308
56.	E.C.	Biology	I	19	51	160	86	19,9	1,17	53,75	36	30	6	3	81	83	80	6	319

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57.	M.A.B.	Biology	I	19	59,9	167	89	21,5	1,11	53,29	38	32	6	4	88	90	86	5,5	359
58.	O.A.	Biology	I	18	62	163	86	23,3	1,01	52,86	36	32	4	4	94	96	92	4,5	380
59.	A.C.	Biology	II	20	70	168	89	24,8	0,97	52,97	39	33	6	4	94	95	91	10	417
60.	R.V.	Biology	II	22	56,8	161	84	21,6	1,07	52,17	37	34	3	5	85	87	82	4,5	353
61.	A.C.F.	AA	I	20	66	170	88	22,8	1,06	51,76	36	32	4	11	95	100	89	3	388
62.	BBD	AA	I	18	63	162	85	24,0	0,98	52,46	41	33	8	9	91	97	88	4	388
63.	CCD	AA	I	19	73	161	82	28,2	0,83	50,93	40	40	0	5	105	108	103	1,5	453
64.	CPS	AA	I	20	75	160	87	29,3	0,8	54,37	44	36	8	2	109	109	107	7	469
65.	CAM	AA	I	19	55	151	80	24,1	0,92	52,98	35	31	4	7	85	88	81	4,5	364
66.	DMC	AA	I	19	65	163	88	24,5	0,96	53,98	37	35	2	4	91	93	89	6,5	399
67.	HMA	AA	I	19	70	166	89	25,4	0,94	53,61	37	33	4	7	100	102	95	6	422
68.	MA	AA	I	19	57	170	90	19,7	1,22	52,94	38	32	6	8	83	88	80	5	335
69.	RLI	AA	I	19	46	163	86	17,3	1,36	52,76	36	31	5	8	81	85	78	4,5	282
70.	SCD	AA	I	19	50	159	89	19,8	1,18	55,97	35	31	4	6	86	87	81	9,5	314
71.	SAI	AA	I	19	47	168	85	16,7	1,44	50,59	37	29	8	9	78	83	74	1	280
72.	TAG	AA	I	19	49	159	80	19,4	1,20	50,31	35	31	4	8	86	91	83	0,5	308
73.	TEM	AA	I	19	54	167	80	19,4	1,24	47,90	37	35	2	7	82	85	78	3,5	323
74.	VDF	AA	I	20	67	167	86	24,0	1	51,49	39	35	4	7	97	98	91	2,5	401
75.	G.L.I.	BF	II	20	68	165	88	25,0	0,95	53,33	40	35	5	6	98	103	97	5,5	412
76.	G.A.A	BF	II	20	60,2	175	97	19,6	1,24	55,42	38	32	6	6	89	93	87	9,5	344
77.	T.A.M	BF	II	20	57,6	161	90	22	1,06	55,90	40	33	7	5	89	94	89	9,5	355
78.	Ş.E.A	BF	II	19	54,3	170	90	18,7	1,28	52,94	37	33	4	5	86	89	84	5	319
79.	T.D.C	BF	II	19	40,4	153	82	17,1	1,31	53,59	34	29	5	4	82	85	81	5,5	264
80.	S.I.F	BF	II	20	71,1	165	92	26,1	0,91	55,75	42	38	4	4	100	101	97	10	431
81.	G.A	BF	II	20	46,6	158	85	18,4	1,24	53,79	36	32	4	6	86	88	82	6	295
82.	G.R.F	BF	II	20	49,7	159	86	19,4	1,18	54,08	38	31	7	6	89	93	87	6,5	313
83.	D.G.R	BF	II	20	62,2	169	90	21,7	1,11	53,25	37	34	3	5	88	91	86	5,5	368
84.	M.E.R	BF	II	20	58,2	159	84	22,9	1,01	52,83	39	33	6	4	96	99	95	4,5	366
85.	V.M.D	BF	II	20	58,2	150	85	25,8	0,85	56,66	41	34	7	5	98	101	96	10	388
86.	R.N.G	BF	II	20	72,7	173	92	24,1	1	53,17	40	37	4	9	89	92	83	5,5	420
87.	R.C.A	BF	II	20	69,7	167	91	24,7	0,96	54,49	40	35	5	3	94	97	94	7,5	417
88.	P.P.	AML	I	18	53,4	165,5	91	19,5	1,23	54,98	38	34	4	4	90	92	88	8,25	323
89.	L.C.M	AML	I	18	51,2	178	101	16,1	1,52	56,74	39	33	6	5	81	82	77	12	288
90.	S.C.A.	AML	I	19	67,3	162	94	25,5	0,92	58,02	39	35	4	4	95	98	92	13	415
91.	N.D.M.	AML	I	19	51,7	165	88	18,7	1,26	53,33	37	33	4	5	86	89	84	5,5	313
92.	I.M.M.	AML	I	21	49,3	163	90	18,4 S	1,28	55,21	38	34	4	3	83	85	82	8,5	302
93.	N.M.M.	AML	I	19	45,8	158,5	91	18,0	1,28	57,41	37	30	7	6	86	89	83	11,75	289
94.	C.E.R.	AML	I	20	71,2	168,5	94	25,2	0,96	55,78	40	35	5	5	97	100	95	9,75	430
95.	S.M.I.	AML	I	19	52,8	167	87	18,6	1,27	51,78	38	35	3	6	84	87	81	3,5	316
96.	A.G.	AML	I	19	57,6	154	90	24,0	0,93	58,44	39	34	5	4	88	92	88	13	374
97.	N.A.M	AML	I	19	59,8	168	90	20,9	1,13	53,57	39	33	6	4	91	95	91	6	356
98.	B.G.E	AML	I	19	53,1	175	95	17,3	1,41	54,28	39	34	5	8	84	89	81	7,5	303
99.	B.D.	AML	I	20	53,9	164	90	19,7	1,18	54,87	36	33	3	5	87	91	86	8	329
100.	E.I.A	AML	I	19	69,1	169	94	24,2	0,99	55,62	40	35	5	5	100	103	98	9,5	407
<b>AVERAGE</b>				<b>19,63</b>	<b>59,661</b>	<b>163,3</b>	<b>87,31</b>	<b>22,298</b>	<b>1,085</b>	<b>0,53</b>	<b>37,86</b>	<b>32,92</b>	<b>4,88</b>	<b>5,77</b>	<b>90,09</b>	<b>92,98</b>	<b>87,2</b>	<b>7,335</b>	<b>364,31</b>
<b>STANDARD DEVIATION</b>				<b>0,991</b>	<b>12,654</b>	<b>6,764</b>	<b>4,298</b>	<b>4,591</b>	<b>0,197</b>	<b>2,013</b>	<b>1,938</b>	<b>2,576</b>	<b>1,793</b>	<b>2,107</b>	<b>8,937</b>	<b>8,598</b>	<b>9,247</b>	<b>6,597</b>	<b>72,807</b>
<b>VARIABILITY COEFFICIENT %</b>				<b>5,04</b>	<b>21,209</b>	<b>4,412</b>	<b>4,922</b>	<b>20,589</b>	<b>18,156</b>	<b>3,764</b>	<b>5,118</b>	<b>7,825</b>	<b>36,74</b>	<b>36,51</b>	<b>9,920</b>	<b>9,247</b>	<b>10,604</b>	<b>89,938</b>	<b>19,984</b>

### Analysis and interpretation of the results

Somatic measurements performed: weight, height, height of the bust, biacromial diameter and bitrohanterian diameter and thoracic perimeter. Based on these measurements, we calculated the following indices: BMI - Body Mass Index, T / G Report, Amar Index, Erissmann Index, and Quetlet Index. Therefore:

- the average age of the students in the research is 19.63 years, in the beginning of the research (15.10.2018); the calculated arithmetic average mean of Body Weight is 59.66Kg, a value which classifies the experimental group at the maximum recommended limit for the 163 cm Waist (recommended values: 49 Kg - 59.9 Kg); the arithmetic average of the Waist is 163.3 cm, a value that places our group into the average Waist category (154.5 - 168.4); the calculated average arithmetic mean of the Bust is 87.31 cm used to calculate the Amar Index; the Biacromial diameter - arithmetic mean is 37.86 cm; the Bitrohanterian diameter - the arithmetic mean is 32.92 cm.

The development of the thorax and pelvis, scapular and pelvic belts was assessed by calculating the difference between the biacromial diameter and the bitrohanterian diameter. The results of the measurements showed a value of 4.88 cm, which can be said to successfully fit in the recommendations of the specialists.

The formula  $T-100 / G$  was used for one of the body harmony calculations. The result 1.085 is above the recommended values of researchers in the young category (1.01 – 1.04). In order to obtain information on the ratio between the lower limbs and the body height, as well as the ratio of the length of the bust and the lower limbs, we used the Amar Index, the arithmetic mean of the experimental group being 0.53 cm. The recommended normal value for girls is 0.54 cm, which shows that the measured length of the lower limbs is smaller than the length of the bust. Based on the measurement of the resting thoracic perimeter - 90.09 cm, in forced inspiration - 92.98 cm and in forced inspiration - 87.2 cm, we calculated the pulmonary elasticity, an index that represents a predictive indicator of the required effort in lesson, criterion which was also included in the tests. The minimum normal value is 4-5 cm, the average of the results of the research group is 5.77cm. The value obtained is superior to those recommended by specialists, which demonstrates a very good pulmonary elasticity with the possibility of providing the oxygen supply necessary for the effort required in the academic physical education lessons. Another used indicator was the Erismann harmony Index, which appreciates the global development of the thorax in relation to the waist, and is about 4 cm for women. The value obtained in our research was 7.33 cm, a high positive value that can be explained by the presence of excess fat deposits on the trunk.. The Quetlet index - this index is calculated according to the formula:  $IQ = Ggr / Tcm$  (g / cm) and is related to the nutritive or corporeal condition, which must correspond to the values of 330 - 350g / cm. The group's value was 364.31 g / cm, indicating a slightly increased body weight, therefore with an inadequate state of nutrition, in comparison to the optimal ratio between necessity and consumption. The body mass index of 22.29kg / m<sup>2</sup> shows a grouping of the experimental group in the normal values given by specialists (18.5 - 24.9 Kg / m<sup>2</sup>). However, there are some deviations from the average of the group with: 19 students under normal values, 7 students with obesity grade I and II, a case of morbid obesity.

### Conclusions

Following the initial assessment and the calculation of the five body harmony indices (BMI - Body Mass Index, T / G Report, Amar Index, Erissmann Index and Quetlet Index), we concluded: in terms of pulmonary elasticity, a guarantee of the ability to support aerobic efforts, the values obtained were satisfactory. This allows us the use of specific, medium intensity exercises and increased intensity actions during physical education lessons. The calculated Erismann index, showing excess adipose tissue in 7th case and one student, permits dietary recommendations (a set of nutrition rules), adherence to a healthy lifestyle. The results of the measurements (weight, height, height of the bust, biacromial diameter and bitrohanterian diameter) showed a value of 4.88 cm, which fits into the recommendations of the specialists, allowing us to use various, complex, demanding means in terms of volume, intensity, complexity of effort. By pointing out that, on the whole, this research reveals positive data regarding the somatic sphere, we can say that the "mirror effect" and the spiritual sphere will be positively influenced. We have prerequisites favorable for the adaption of the assessed students to future socio-professional rigors.

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