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## Somatic and motor development of urban and rural children aged 14-15 years in the selected schools

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### Summary

The purpose of the study was to compare the development of somatic and motor indicators of children in rural and urban areas. Motor skills was determined by using the International Physical Fitness Test.

The study included 50 girls aged 14-15 years. The study was based on method of observing learning. By researching were used assessment of physical development and physical fitness. Basic statistical methods were also used.

The study had not found significant difference in physical development and physical development of girls aged 14-15 years.

**Keywords: somatic development, physical development, comparing.**

### Introduction

Physical fitness is the essence of physical health (Williams 1997, Kemper, Mechelen 1996) which shows the position and role in the ongoing life of the people. It is related to their work, relations between them, determines their conditions making the aging process (known as involution) slower (Migasiewicz 1999). Due to the fact that there is wide the knowledge about human but is still incomplete and insufficient, constantly testing is being undertaken by experts from different branch of knowledge. Among these professionals (biologists, physiologists, psychologists, educators, and others), exist more and more often physical education theorists for whom the issue of physical human is essential (Trześniowski 1961).

Learning on the physical fitness of children and adolescents are very popular among the still increasing number of professionals (Przewęda 1973 , Trzeźniowski 1961 and others) . By researching we use achievements of physical education and sport sciences in which anthropometric measurements are made (Drozdowski 1998) . By making measurements in precisely way we discover condition of somatic and motor development of children and adolescents. Physical education teacher on the basis of knowledge about physical fitness may determine the appropriate educational requirements and rules of learning process and determine appropriate needs (Trzeźniowski 1961). Every person has a different condition of physical fitness, which has a very large impact on his physical activity. Other physical activity is reached by young people, and one by much more weaker the elderly persons, especially out of possibility of physical activity. Lack of physical activity substantially reduces our health, and its impact on the flow of its significant improvement.

The fundamental task of the physical education teacher is to encourage their pupils to regular working out (present and future) at various forms of physical activity - improving overall physical fitness development of motor skills and development of motivation in physical education (Badora, Botwiński, Denysiuk 1980). In order to achieve these objectives in an efficient way , it is necessary to make research which will support the proper way of the process of physical education ,which will allow to make rational choice of means and methods suitable to the mental and physical conditions of each of students (Napierała 2008). Therefore, the teacher should check the results of national tests and make control tests, which activities allow to assess overall physical fitness allowing to remark each of features of pupils. Such control in which a fundamental physical aspects of motor skills Mleczko (1992), Osinski (2003) and Wolański (2006) are understood as the strength, speed, agility and endurance, it seems nowadays to be very necessary, because the physical education lessons are for the majority of young people in Poland, the only form of organized and systematic physical working out (Berger, Maluchnik 1996). Specialists in physical education discuss about unsatisfying daily physical activity of children and young people and observe still decrease of their physical fitness.

### **The purpose of the study**

The purpose of the study was to compare the development of somatic and motor indicators of children in rural and urban areas.

**Materials and methods.** The study included 50 female students aged 14-15 years, including the 25 girls in every school. Tested individuals were students of the second and third class of Gymnasium in Cierpice Gymnasium No. 24 in Torun. The girls at the school made a program of physical education (4 hours of instruction per week including development of overall physical fitness).

To perform the research problem was used method of teacher's observing.

The tests included an assessment of physical development and physical fitness successive age groups.

In order to demonstrate the somatic features were used the measurements of height and weight. Body height was measured with an altimeter, body weight with medical scales. The study was performed in a doctor's office.

To determine the body slenderness was used ratio test Rohrer calculated according to the formula:

$$\textit{body weight in grams} \times 100$$

(body height in centimeters)<sup>3</sup>

Using Kretschmer's typology according to the scale given by E. Curtius assuming that individuals are characterized by a structure based on the ratio:

- X - 1.28 represents the type of leptosomatic,
- 1.29 - 1.48 represents the type of athletic,
- 1.49 - X represents the type of picnic.

Motor skills were determined using the International Physical Fitness Test (ICSPFT) (Fuljanty, Kozar 1997) consisting of eight trials.

- 1) Running for 50 meters - an attempt of running speed.
- 2) The long jump from standstill- an attempt by leg strength.
- 3) Endurance run - cross-country endurance test, 800 for girls.
- 4) Hand-held dynamometry.
- 5) Hanging on a bar - an attempt to force the arms and shoulder girdle.
- 6) Agility run - 4x10m the pads.
- 7) Forward bend while lying down for 30 seconds - an attempt to force the abdominal muscles.
- 8) forward trunk bending - trying flexibility of the spine.

Individual trials were conducted as a part of physical education classes. The tests were conducted during two days. Tests 1, 2, 3 were made during the first day, while the 4, 5, 6, 7, 8 - during other day. Before performing the prepared samples examined carefully informed about how their course, and the teacher conducted a fifteen-minute warm-up. During the test force sports outfit. Tests were carried out in the gym and the treadmill. Before testing by the school nurse, all of the children has been found to be healthy.

Research material collected was statistically analyzed in detail, taking into account the minimum, maximum, mean ( $\bar{x}$ ), the average standard deviation ( $\sigma$ ) and differences in average (D) and the significance of differences in the parameters. Differences with a significance level of  $p \leq 0.05$  was considered statistically significant.

## Results

Visible aspect of human biological development is the construction of the body, which contributes to the implementation of adequate physical activity.

Analysis of the results of girls aged 14 years from rural schools indicated that their body height ranges from 144-172 centimeters (SI), with the arithmetic mean of 160 cm. The city school ranges from 147 to 170 cm, with the arithmetic mean of 168 cm. The measurements of body height of girls aged 15 years from rural schools are at a level between 140 to 173 cm (SI), with the arithmetic mean between 158 cm (SI). In school transportation are in the range from 138 to 173 cm(SI), 162 cm(SI) arithmetic mean. The calculated values indicate that the difference between the body of girls aged 14 years is statistically significant in favor of students from urban schools, while girls at the age of 15 years is not statistically significant (Table 1).

Table 1. Comparison of body height girls

		N	Min.	Max.	X	$\delta$	D	u
Height of body (centimeters)	village	25	144	172	160	6,19	8	3,96**
	city	25	147	170	168	8,02		
	village	25	140	173	158	8,04	4	1,98
	city	25	138	173	162	6,16		

\* P <0.05, \*\* p <0.01,  $t^{\wedge} = 0.05$ ,  $df = \text{pr} = 2.00$ ,  $t^{\wedge} = 0.01$ ,  $df = \text{pr} = 2.67$

The analysis of body weight girls aged 14 and 15 years learning in urban and rural schools revealed that students body weight at age 14 from rural schools ranges from 40 to 70 kg (SI), the arithmetic average of 50 kg (SI). In school transportation is in the range from 41 to 81 kg (SI), with the arithmetic mean of 53 kg (SI). The measurements of body weight girls aged 15 rural school fluctuates between 34-73 kg (SI), with the arithmetic mean 53 cm (SI). The city school ranges from 38 to 77 kg (SI), the arithmetic mean of 54 kg (SI). The difference in body weight of girls aged 14-15 years between urban and rural schools is negligible. Calculated for urban and rural schools are not statistically significant (Table 2).

Table 2. Comparison of body weight girls

		The age of respondents (years)	N	Min.	Max.	X	$\delta$	D	u
Body weight in kilograms (SI)	village	14	25	40	70	50	7,46	3	1,06
	city		25	41	81	53	11,92		
	village	15	25	34	73	53	10,30	1	0,33
	city		25	38	77	54	10,88		

\*p <0.05, \*\* p <0.01,  $t^{\wedge} = 0.05$ ,  $df = \text{pr} = 2.00$ ,  $t^{\wedge} = 0.01$ ,  $df = \text{pr} = 2.67$

Comparing to these data with studies that conducted Napierała (2008) kujawsko- pomorskie on girls at the same age from it can be seen that 14 year old girls from villages and cities are higher and the girls from the city have a higher body weight than their peers from village (Napierała: 14.5 years, respectively 159.6 cm; 163.56 and 52.01 kg). Whereas 15 years of urban and rural lower and also have a lower body weight than girls studied Napierała (2008), (Napierała: 15.5 years girls from urban and rural weight - 53.14 kg and 54.23 kg girls from the city).

The results made it possible to present the classification of the type of construction of individual students according to the system provided by using a scale Kretschmer E. Curtius. It is assumed that individuals with the indicator:

- X - 1.28 represents the type of leptosomatic;
- 1.29 - 1.48 represents the type of athletic;
- 1.49 - X represents the type of picnic.

Characteristics of numeric types of somatic surveyed students aged 14 and 15 years of urban and rural schools are shown in Table 3 It shows that girls have:

- *Type leptosomatic*

Rural School - 15 at the age of 14 years, 17 at the age of 15 years.

School City - 16 at the age of 14 years, 18 at the age of 15 years.

- *Type athletic*

Rural School - 6 at the age of 14 years, 4 at the age of 15 years.

School City - 5 at the age of 14 years, 4 at the age of 15 years.

- *Type picnic*

Rural School - 4 at the age of 14 years, 4 at the age of 15 years.

School City - 4 at the age of 14 years, 3 at the age of 15 years.

Table 3. Characteristics of numeric types of somatic girls from Rohrer index

	Examined population	quantity	Leptosomatic type		Athletic type		Picnic type	
			N	%	N	%	N	%
village	Girls, 14 years	25	15	60	6	24	4	16
city		25	16	64	5	20	4	16
city	Girls, 15 years	25	17	68	4	16	4	16
village		25	18	72	4	16	3	12

The concept of motor skills by Osinski (2000), the whole movement of human capabilities both in terms of quantity and quality , and relates primarily to human movement in space due to changes in body position or its parts .

Research includes the characteristics of motor skills, a group of girls aged 14-15 years using the International Physical Fitness Test .

Analysis of the results of the long jump with girls between the age of 14-15 years studying in High School and Middle School No. 24 in Cierpice showed that the achievement of 14 -year-old from rural schools range from 134 to 208 cm, with the arithmetic mean of 171 cm, while the school transportation are present in the range between 138 to 200 cm (172 cm arithmetic mean ) . The results of the athletes at the age of 15 years from rural schools are in the range from 147 to 200 cm, with the arithmetic mean of 169 cm. The city school range from 145 to 201 cm, with the arithmetic mean of 166 cm. The calculated values indicate that the difference between jumping into the distance from the place of girls between the ages of 14 and 15 from urban and rural schools is not statistically significant (Table 4).

Table 4. Comparison of long jump from standstill

		The age of respondents (years)	N	Min.	Max.	X	$\delta$	D	U
Long	village	14	25	134	208	171	19,62	1	0,18

jump with space (inches)	city		25	138	200	172	19,47		
	village	15	25	147	200	169	15,81	3	0,70
	city		25	145	201	166	14,50		

\* P <0.05, \*\* p <0.01,  $t^{\wedge} = 0.05$ ,  $df = \text{vsh} = 2.00$ ,  $t^{\wedge} = 0.01$ ,  $df = \text{vsh} = 2.67$

Results overhang on the stick study groups are presented in Table 5 The results of this test, girls aged 14 years with rural schools range from 0 to 19.18 s equal to the arithmetic average of 6.19 s in urban schools and from 0 to 20.15 s and the arithmetic mean of the results were 5, 72 pp. the results of pupils at the age of 15 years from rural schools are at a level 0 - 21.11 which is equal to the arithmetic average- 5.98 s in urban schools are in the range 0 - 19.12 s the arithmetic mean of 4.99 s calculated values indicate that the difference between the overhang on the stick girls aged 14 and 15 from urban and rural schools is not statistically significant.

Table 5. Comparison of hanging on a bar girls

		The age of respondent s (years)	N	Min.	Max.	X	$\delta$	D	U
Overhang with bent arms (s)	village	14	25	0	19,18	6,19	6,46	0,47	0,25
	city		25	0	20,15	5,72	6,68		
	village	15	25	0	21,11	5,98	6,61	0,99	0,55
	city		25	0	19,12	4,99	6,17		

\* p <0.05, \*\* p <0.01,  $t^{\wedge} = 0.05$ ,  $df = \text{vsh} = 2.00$ ,  $t^{\wedge} = 0.01$ ,  $df = \text{vsh} = 2.67$

Analyzing of the results neighbors of lying back girls from the town and the village at the age of 14-15 years showed that the results of the girls at the age of 14 years from rural schools are in the range of 17 to 33 repetitions (arithmetic mean 24.36). The school and the city range from 17 to 35, the arithmetic mean of 25.04. The achievement of girls at the age of 15 years from rural schools range from 18 to 34 repetitions, the arithmetic average of 25.80. In school transportation are in the range from 12 to 33, and the arithmetic mean was 25.80. The calculated values indicate that the difference between the neighbors of lying back girls aged 14 and 15 from urban and rural schools is not statistically significant (Table 6).

Table 6. Comparison of lying back neighbors girls.

		The age of respondent s (years)	N	Min.	Max.	X	$\delta$	D	U
Traces of lying back	village	14	25	17	33	24,36	4,32	0,68	0,52
	city		25	17	35	25,04	4,89		

(number)	village	15	25	18	34	25,80	4,59	0	0
	city		25	12	33	25,80	5,37		

\* P <0.05, \*\* p <0.01, t ^ = 0.05, df = 2.00, t ^ = 0.01, df = 2.67

Table 7 presents the comparison between the results of running the 50 meter girls aged 14-15 years, which show that the results of running the 50 meter girls at the age of 14 years from rural schools are in the range of 8.72 to 11.74 s, the arithmetic mean of 9.92 s in urban schools range from 8.54 to 12.25 s where the arithmetic mean was 9.97 s the results of the girls at the age of 15 years from rural schools are at level of 8.09 to 11.24 s, the arithmetic mean of 9.28 s in the range of urban school from 7.96 to 11.24 s, 9.29 s arithmetic mean calculated values indicate that the difference between the course in the 50 girls between the ages of 14 and 15 from urban and rural schools is not statistically significant.

Table 7. Comparison of the results of running the 50 meter girls

		The age of respondent s (years)	N	Min.	Max.	X	$\delta$	D	U
run 50 meters (s)	village	14	25	8,72	11,74	9,92	0,86	0,05	0,22
	city		25	8,54	12,25	9,97	0,92		
	village	15	25	8,09	11,24	9,28	0,74	0,01	0,05
	city		25	7,96	11,24	9,29	0,72		

\* P <0.05, \*\* p <0.01, t ^ = 0.05, df = 2.00, t ^ = 0.01, df = 2.67

The analysis of the results of the 800 meters girls aged 14-15 years showed that girls aged 14 years with rural schools achieve scores range between 200 - 272 s with the arithmetic mean of 232 s. The city school range between 205 - 266 s (arithmetic mean 232 s). The results of pupils at the age of 15 years from rural schools range from 196 to 262 s, 233 s arithmetic mean of transport are at school level between 196 -267 s, which is the arithmetic mean of 233 s calculated values indicate that the difference between the course of the 800m girls aged 14 and 15 from urban and rural schools is not statistically significant (Table 8).

Table 8. Comparison of the results of the 800 meters girls

		The age of respondent s (years)	N	Min.	Max.	X	$\delta$	D	U
run 800 Meter (s)	village	14	25	200	272	232	19,08	0	0
	city		25	205	266	232	19,08		
	village	15	25	196	262	233	24,54	0	0
	city		25	196	267	233	24,49		

\*  $p < 0.05$ , \*\*  $p < 0.01$ ,  $t^{\wedge} = 0.05$ ,  $df = \varpi = 2.00$ ,  $t^{\wedge} = 0.01$ ,  $df = \varpi = 2.67$

Analysis of the results of running 4 x 10m girls aged 14-15 years presented that the results of running 4 x 10 m girls aged 14 years from rural schools are between 11.43 - 14.96 s on the arithmetic mean of 13.16 s the school transport from 11.54 to 15.90 s on the arithmetic mean of 13.59 s the results of the girls at the age of 15 years from rural schools are in the range of 11.28 to 16.48 s, the arithmetic average of 12 , 82 pp. the city school range between 11.26 - 16.88 s, 13.09 s arithmetic mean calculated values indicate that the difference between the course of 4 x 10m girls aged 14 and 15 from urban and rural schools do not is statistically significant (Table 9).

Table 9. Comparison of running 4 x 10 m girls

		The age of respondent s (years)	N	Min.	Max.	X	$\delta$	D	U
run swinging 4 x 10 m (s)	village	14	25	11,43	14,96	13,16	1,13	0,43	1,43
	city		25	11,54	15,90	13,59	1,10		
	village	15	25	11,28	16,48	12,82	1,17	0,27	0,72
	city		25	11,26	16,88	13,09	1,53		

\*  $p < 0.05$ , \*\*  $p < 0.01$ ,  $t^{\wedge} = 0.05$ ,  $df = \varpi = 2.00$ ,  $t^{\wedge} = 0.01$ ,  $df = \varpi = 2.67$

The analysis of the results of the trunk in the front slope of girls aged 14-15 years demonstrated that the performance of girls at the age of 14 years from rural schools vary in the range between 0 -24, equal to the arithmetic average of 10.22. The city school are at level of 2 to 23, the arithmetic average of 10.94. The results of the pupils at the age of 15 years out of school rural oscillate from one to 22, equal to the arithmetic average of 9.52. The city school range from 1 to 21, with the arithmetic mean of 9.22. The calculated values indicate that the difference between the slope trunk in front of girls aged 14 and 15 from urban and rural schools is not statistically significant (Table 10).

Table 10. Characteristics of the forward trunk bending of the girls body

		age	N	Min.	Max.	X	$\delta$	D	U
Standing forward bend forward (centimeters )	village	14	25	0	24	10,22	7,01	0,72	0,41
	city		25	2	23	10,94	5,27		
	village	15	25	1	22	9,52	5,03	0,30	0,21
	city		25	1	21	9,22	5,01		

\*  $p < 0.05$ , \*\*  $p < 0.01$ ,  $t^{\wedge} = 0.05$ ,  $df = \varpi = 2.00$ ,  $t^{\wedge} = 0.01$ ,  $df = \varpi = 2.67$

## Summarization

Morphofunctional study on the factors affecting the strength of girls and somatic determinants of children and young people work with J. Drabik (1990, 1991, 1992), and R. Przewęda and R. Trzeźniowski (1996). The development of motor and physical children and adolescents outside Polish borders may be traced in publications such as J. Bergier (1992) and Bergier and Cash (1994).



Research on the development of physical fitness and motor in rural and urban led , among others Gołębiowska (1995), Hulanicka, Brajczewski, Jedlińska (1990), Napierała (1999b, 2005, 2008), Strzelczyk (1990). Specialists on the basis put forward various proposals such as Napierała (2000) in their study showed that, " children were out of the city characterized by greater height and weight than their peers living in the countryside , just in motor performance in most of the samples obtained better results than children living in the city.

The analysis of the study of this paper shows that there is no essential difference between the physical and motor development of children from the rural and urban study age group.

## Conclusions

Girls 14 years from the School of Urban and Rural.

- Comparing the arithmetic mean height and weight found that girls from urban schools are higher by 8 centimeters and are about 3 kg more weight.
- Found that comparing height and weight of respondents girls with test data which it has conducted Napierała (2008) kujawsko-pomorskie on girls of the same age, the 14 year old girls from villages and cities are higher and the girls from the city have a greater weight than their peers (Napierała: 14.5 years, respectively, 159.6 cm; 163.56 and 52.01 kg ) and 15 years of urban and rural lower and also have a lower body weight than girls Napierała which was subject of (2008), (Napierała: 15.5 years girls from urban and rural weight - 53.14 kg and 54.23 kg girls from the city).
- The highest percentage of girls from town school (64%) and rural (60%) has the structure leptosomatic. Athletic type has 24 % of girls from rural schools and 20 % of urban schools. The smallest percentage of students have a picnic type (both students from rural and urban school have 16 %).

In motor skills studies were slight differences in the results girls eg.:

- \* In the 50 meters better result (0.05 sec) had the girls from the village (attempt to force).
- \* In the 800 meters the results were identical (endurance test).
- \* In the waist bend better result (about 0.72 cm) had girls in town (attempt of flexibility).
- \* In the long jump from standstill better result (about 1 cm ) reach the girls from town (attempt to force).

Girls 15 years from the School of Urban and Rural.

- It was found out that girls from urban schools are higher (about 4 inches) and have a higher body weight ( about 1 kg ) of students from rural schools .
  - The highest percentage of girls from town school ( 72%) and rural (68%) has the structure leptosomatic. Athletic type with 16 % of girls from rural and urban schools . Type picnic, with 16 % of girls from rural schools and 12 % of the city.
  - In studies of motor abilities were ascertain slight differences in the results of girls, slightly better or the same results obtained girls from the village eg.:
  - \* In the 50 meters better result (about 0.01 sec) acquired girls from rural areas (attempt of rapidly).
  - \* In the 800 meters the results were the same (strength test).
  - \* In the waist bend better result ( about 0.30 cm ) had the girls from the village (attempt of flexibility).
  - \* In the sitting position of lying back the results were identical (attempt of power).
  - \* The hanging on a bar better result ( about 0.99 s ) to reach girls from rural areas (test power ) .

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