

## MODELING OF THE STRUCTURE OF A RATING PHYSICAL TRAINING OF THE TEENAGER'S 12-15 YEARS.

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Article is devoted to a problem to a normative rating physical level of the teenager's 12-15 years old. The structural program of a rating by their physical training is submitted on the basis of elements of mathematical statistics and modeling.

## THE LEVEL OF PHYSICAL DEVELOPMENT AMONG CHILDREN AND YOUTH CHARACTERISTIC OF VARIED HANDGRIP STRENGTH FROM EASTERN REGIONS OF POLAND

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### Introduction

Advancement of motorial abilities among children and youth is closely related to biological maturity of an organism. Each and every basic feature of physical fitness is characteristic of its own tempo and duration of development. While analyzing the process of shaping of motorial features among children and youth, the most frequent approach is to find their relations with some somatic features, particularly with height and body mass. These features are basic and simultaneously, the most available criterion of biological maturity advancement. Yet, many researchers present dependences between the development of physical fitness and other somatic parameters e.g. fatty tissue, slim body mass, Rohrer's indicator, slimness, upper and lower limbs length indicators, etc (Moravec et. Al. 1996, Przewęda 1985, Żak 1991).

The objective of this research was to define dependences between somatic parameters and the handgrip strength among the rural children and youth from eastern parts of Poland.

### Material and research methods

The research was conducted in 1998–1999 at primary and secondary schools of eastern Poland. It comprised rural children and youth, in the number of 1766, aged 11-19, included 884 girls and 882 boys. Basic somatic feature measurements, as well as, evaluation of physical fitness parameters were made. Physical fitness was measured by Eurofit test (1988) and somatic measures were taken according to Martin's technique (Martin, Saller 1957). The following features were assessed: height, body mass, shank circumference, knee width, skinfolds thickness in millimeters measured on a biceps triceps muscles, below the scapular bone, on the abdomen, above the iliac spine and on the calf muscle. The measurements of skinfolds made it possible to calculate the level of a fatty tissue in percentages by application of Slaughter's method (Slaughter et al. 1988). Both boys and girls were qualified to appropriate age groups on the

grounds of their calendar age as defined by International Biological Programme (1967). Depending on the strength of a handgrip, both girls and boys in different age groups were divided into three sub- groups : high, average and low handgrip static strength. The criterion of the division was based on an arithmetic mean  $\pm$  SD. In each group arithmetic means were calculated, as well as, standard deviations of particular somatic features. It should be remembered that the sub- group of the average level was the starting point of analysis in relation to extreme sub- groups (low and high fitness).

### Findings

Average arithmetic means of boys' and girls' handgrip strength divided into three groups (high, average, low handgrip strength) are presented in chart 1. While analyzing the motorial data among those at the age of 11- 19, it was noticed that at the age of 11 –13 the tempo of a handgrip increase among boys and girls was approximate. Starting from the age of 14 the increase was higher among boys than girls, which is a result of such high differences between both sexes reaching the level of 20,98 kG at the age of 17 and 20,91 kG at the age of 19 (chart 1)

In boys' and girls' groups made up on the grounds of the level of handgrip strength there were noticed the highest values of height, body mass, knee width, shank circumference and percentage of fatty tissue among the participants of the highest level of physical fitness. The lowest values of these features, on the contrary, were observed among participants characteristic of low fitness level. The only exception concerns the fatty tissue among boys, where the above described dependence was present among the 11- 12 year old boys. In other age groups there were not present any dependences between the handgrip strength and the percentage of fatty tissue (Fig 1-8)

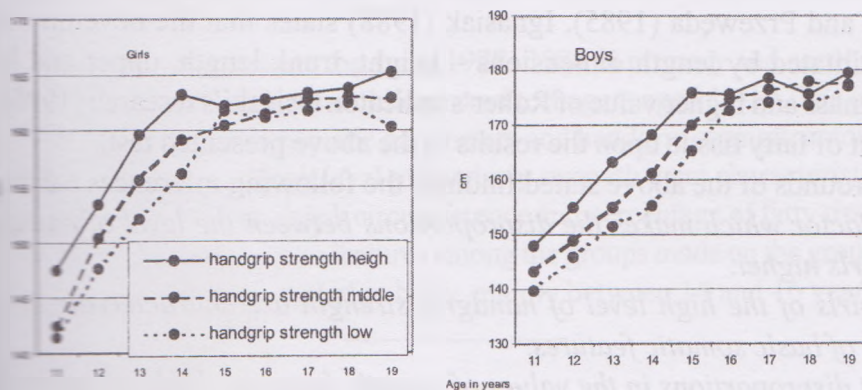


Fig. 1. Height of the girls and boys depending on the level of their handgrip strength

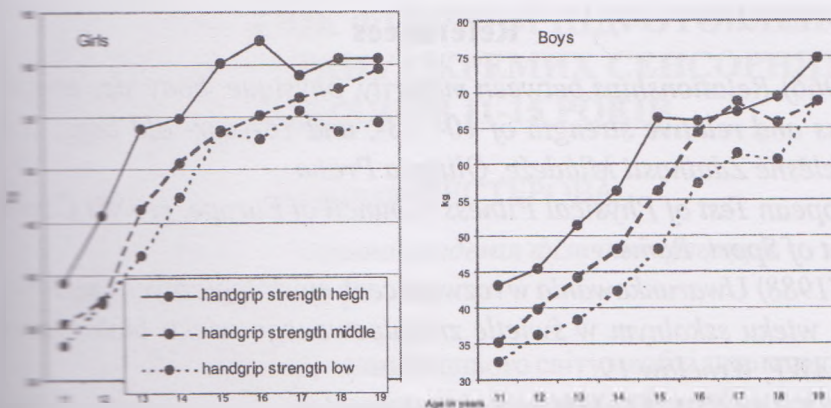


Fig. 2. Body mass of the girls and boys depending on the level of their handgrip strength



The highest differentiation in the values of somatic features among both boys and girls at the average handgrip strength in relation to two extreme groups were observed in the age groups 14-16. For example, girls at the age of 14 of a high handgrip differed from those of average handgrip by 4,05 cm in height, 4,19 kg in body mass, 1,39 cm in knee width, 1,54 cm in shank circumference, 1,96% in percentage of fatty tissue. While comparing the girls of a low level of a hand grip to those of average values the difference were lower and presented respectively: 3,12 cm, 3,34kg, 0,57mm, 0,79cm, 1,65%. Among the boys at the age of 14 the analyzed somatic features revealed higher differences than among the girls. The differences between the high and the average handgrip strength groups were the following : 7,05 cm in height, 8,23 kg in body mass, 1,88mm in knee width, 2,12 cm in shank circumference; higher values are characteristic for the high handgrip strength group. In case of fatty tissue the groups of the average handgrip strength had higher values i.e. 0,90% than the groups of high handgrip strength. The differences between the low and the average handgrip strength are the following , respectively : 6,07cm, 5,73kg, 2,91 mm, 1,66 cm with the higher values for the average group, and the 0,77% higher for the lower groups of this motorial test.

### Summary and conclusions

Tracing the dependences between the handgrip and somatic features it was revealed that there are present positive relations between the handgrip and height, body mass, knee width, shank circumference and fatty tissue level. It means that persons characteristic of the high level of handgrip strength present high level of the analyzed somatic features, on the contrary those of low performance of the motorial test present low level of physical development. Positive correlations between handgrip strength and height and body mass were confirmed by Borms (1966) and Przewęda (1985). Ignasiak (1988) states that the development of static strength is facilitated by length dimensions – height, trunk length, upper and lower limb length, higher mass and higher value of Roher's indicator. Osiński's research (1996) confirmed positive impact of fatty tissue upon the results in the above presented test.

On the grounds of the above stated findings the following inferences can be made:

1. Age is the factor which makes the disproportions between the level of handgrip among boys and girls higher.
2. Boys and girls of the high level of handgrip strength are characteristic of the higher parameters of basic somatic features.
3. The highest disproportions in the values of somatic features , both among girls and boys divided into groups depending upon the level of handgrip strength, were present at the age of puberty, mainly between 14-16 year of life.

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The research was conducted in the years 1998- 1999 in primary and secondary schools of rural areas. It comprised 1766 rural children and teenagers aged 11-19. The objective was to investigate the relationship between basic somatic parameters and handgrip strength among this group. It was found that boys and girls of high level of handgrip strength were characteristic of high level of body mass, knee width, shank circumference and percentage of fatty tissue. The highest correlations in the values of somatic features among the groups made on the grounds of handgrip strength were present at the age of puberty, mainly between 14 and 16 year of life.

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## ВЗАЄМОЗВ'ЯЗОК ФІЗИЧНОЇ ПІДГОТОВЛЕНОСТІ І ФУНКЦІОНАЛЬНОГО СТАНУ ОКРЕМИХ СЕНСОРНИХ СИСТЕМ У ШКОЛЯРІВ 11-15 РОКІВ

Людмила ШЕСТЕРОВА

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Для вивчення зв'язку між станом навколишнього світу необхідна погоджена діяльність різних систем організму. Знання функціонального стану чи порушення роботи одного з них здатні допомогти у вивченні зв'язку. [3] Вперше цей взаємозв'язок був продемонстрований П.П.