

## **SOCIAL DETERMINANTS OF PHYSICAL DEVELOPMENT STATUS IN BOYS IN THE PUBERTY PERIOD**

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### **Keywords:**

- Maturation rate,
- Pupils,
- Social determinants.

### **Abstract:**

The study was aimed at determining the effect of social determinants on the physical development of boys in the puberty period. It covered 1706 pupils at the age of 13-15 years. Advancement in their physiological development – defined as the advancement in the sexual maturation – was determined based on the appearance of facial hair and its characteristics. Data were additionally collected on the educational level of parents. The evaluation of maturation rate showed greater advancement of physiological development in the boys originating from the upper [U] and middle [M] educational stratum as compared to those originating from the lower stratum [L]. Results obtained in the study point to still existing differences in the somatic development of children between social strata.

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## **INTRODUCTION**

In contemporary anthropological studies, issues referring to the impact of social structure on differences in the physical development of individuals and overall biological status of a population have been of great significance. It has been reflected in scientific research and ample manuscripts emphasizing the fact that social variables (educational and social status of parents) differentiate both maturation rate of children and adolescents [Charzewski, Bielicki 1990: 1:3-20; Charzewski, Piechaczek 2001:4; Charzewski i wsp. 2003; Łaska-Mierzejewska, Olszewska 2003; Netter i wsp.1990; Syta 2005, Dencikowska 2009, Lewandowska, Pastuszak 2011, Cichocka i wsp. 2011, Koziół 2011, Pastuszak i wsp.2014]. That regularity is manifested especially in the puberty period, i.e. at the age of 13-15 years in boys and at the age of 11-13 years in girls [Charzewski 1984; Hulanicka 1990:111: 21-45; Kołodziej, Koziół 1998:55-63, Charzewska, Chabros 2011, Chrzanowska i wsp. 2013]. Attention should also be paid to a significant contrast in the physical development of children living in cities and in the countryside. The level of biological development is higher in the urban areas as compared to the rural ones [Burdukiewicz, Janusz 1997: 51: 252-277; Przewęda, Dobosz 2003:98; Wilczewski 2005]. Results of investigations carried out so far in Poland confirm the great impact of socio-economic factors in the course and rate of growth of children and adolescents [Lewandowska i wsp. 2006, Gołąb, Brudecki 2007]. Those environmental differences are a phenomenon commonly recognized and confirmed by

anthropologists in a number of countries [Eveleth,Tanner 1976, Datar i wsp.2004:12:58-68; Desai 1998: 35:71-81; Eiben,Mascie-Taylor 2003].

The objective of the presented study was to investigate the effect of social determinants on the physical development of boys in the puberty period.

### Study material and research methods

The experimental material were data referring to boys attending to primary schools and gymnasium in the city of Rzeszów. In 2001, the study covered 1706 subjects at the age of 13-15 years. Detailed numbers of subjects in particular age categories were presented in Table 1.

Table 1. Detailed numbers of subjects in particular age categories

Age	Detailed numbers	Percent
13	654	38,3
14	857	50,3
15	195	11,4
Whole	1706	100

**The biological maturity** of the boys was assessed with the method postulated by Charzewski and Bielicki (1990) which consists in the evaluation of the development of facial hair in a 3-stage scale (1 – lack of hair, 2 – incipient facial hair, the so-called “fuzz”, 3 – adult facial hair). Next, calculations were made for the following percentage indicator of facial hair: the number of boys with adult facial hair (3rd stage) to the number of the other boys.

**Information on the educational status** of both parents enabled social stratification of the boys. It was defined by means of combined levels of education of both parents, i.e. primary education of both parents or primary education of one of the parents and vocational education of the other were determined as the **low stratum [L]**, secondary education of both parents was defined as the **middle stratum [M]**, higher education of both parents or higher education of one of them and secondary education of the other were defined as the **upper stratum [U]**, whereas higher education of one of the parents and primary or vocational education of the other was defined as the **mixed stratum [Mx]**.

In turn, differences in facial hair advancement between the groups were compared by means of **the non-parametric Kruskal-Wallis test** [Siegel, Castellan 1988]. Calculations were performed in Stata 7.0 software [Stata Statistical Software].

## **Results**

### **Educational status of parents vs. physiological maturity of boys**

Values of the somatic traits, body height in particular, appeared to be affected by the social determinants analyzed. It is common knowledge that body sizes are connected with the advancement of physiological development, thus it should be expected that also measures of physiological development evaluation will be significantly determined by the level of social characteristics.

The advancement in physiological development – defined as the advancement in sexual maturation – was determined based on the appearance of facial hair in boys and its characteristics.

Based on analyses of data presented in Table 2, it was observed that in the whole population of boys, irrespective of age categories, statistically significant differences occurred with the educational status of both father and mother ( $p < 0.0001$ ), and those dependencies displayed a linear trend, i.e. along with the increasing educational status of father or mother the mean percentage indicator of facial hair of the boys was also observed to increase in the whole population from 2.1 % to 8.7 % (Fig.1,2). In comparison of the distribution of that trait in the whole population and in the 14-year-old boys, significantly higher indicators of facial hair were reported for the sons of fathers and mothers with higher and secondary education than for their peers whose parents had achieved lower educational levels. In turn, in the oldest age category examined (15-year-old boys), the lowest value of facial hair indicator was recorded in the boys whose fathers (Fig.1) and mothers (Fig.2) had primary education, as compared to their peers from the other social strata.

The observed correlations between the physiological maturity of the boys and educational status of their fathers and mothers turned out to be linear in the whole population examined and in the 14-year-old boys ( $p < 0.0001$ ).

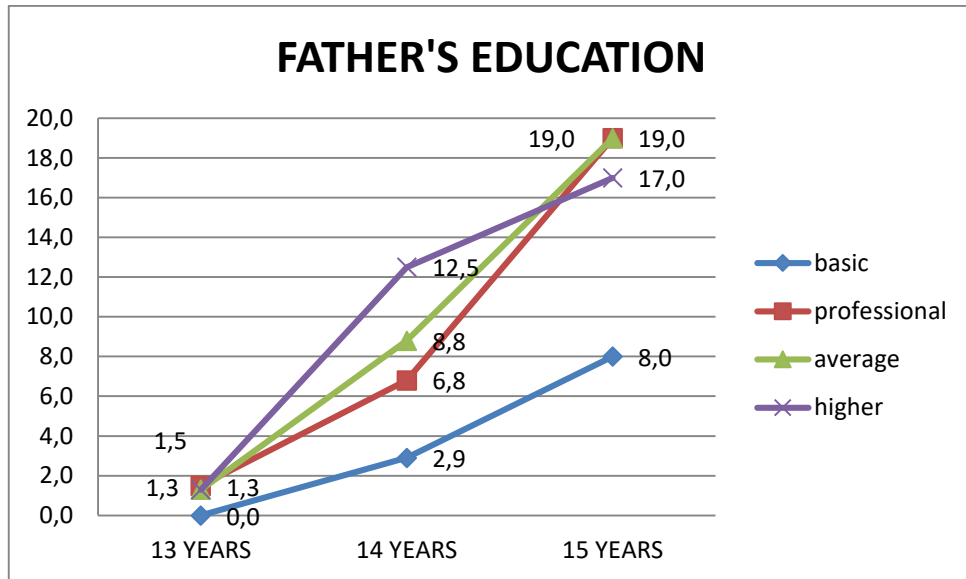


Figure 1. Average values of the proportional coefficient of the boys physiological maturation in dependence from the level of the father education.

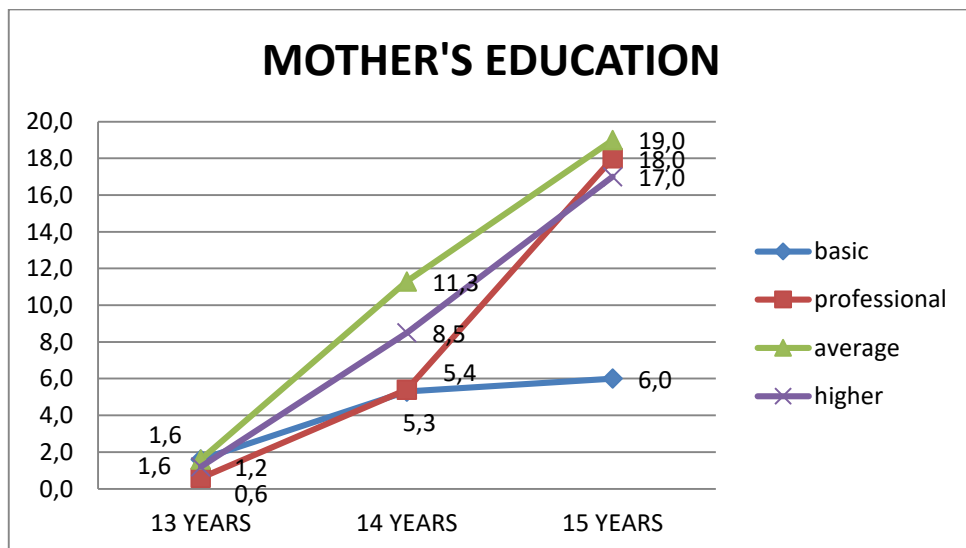


Figure 2. Average values of the proportional coefficient of the boys physiological maturation in dependence from the level of the mother education.

Table 2. Relationship of the proportional coefficient of boys biological maturity with the total level of the father and mother education.

p	Whole	13 years	14 years	15 years
<b>Father's education</b>	<b>0.0001</b>	0.75	<b>0.0001</b>	0.98
basic vs. principal professional	<b>0.02</b>	ns	<b>0.012</b>	ns
basic vs. average	<b>0.001</b>	ns	<b>0.0006</b>	ns
basic vs. higher	<b>0.0001</b>	ns	<b>0.0001</b>	ns
principal professional vs. average	0.09	ns	<b>0.047</b>	ns
principal professional vs. higher	<b>0.002</b>	ns	<b>0.0001</b>	ns

average vs. higher	0.16	ns	0.02	Ns
The test on the linear trend	<0.0001	0.58	<0.0001	0.88
<b>Mother's education</b>	<b>0.0001</b>	0.41	<b>0.0001</b>	0.91
basic vs. principal professional	0.21	ns	0.14	ns
basic vs. average	0.0004	ns	0.0006	ns
basic vs. higher	0.0001	ns	0.0001	ns
principal professional vs. average	0.0009	ns	0.0019	ns
principal professional vs. higher	0.0003	ns	0.0004	ns
average vs. higher	0.64	ns	0.59	ns
The test on the linear trend	<0.0001	0.12	<0.0001	0.59

Received the horizontal significance:  $p < 0.05$ ; the level of significance was lowered in comparisons between two groups to the Bonferroni to 0.01 according.

### Combined effect of the educational levels of father and mother vs. physiological maturity of boys

In Table 2 an attempt was undertaken to evaluate the combined effect of the educational level of both father and mother on the indicator of the physiological maturation of the boys examined. Data presented in the table demonstrate that a significant linear trend occurred in the case of the postulated social stratification, which indicates that while moving from the lowest [L] to the higher social strata: [M] and [U], the indicator of the physiological maturation displays an ascending trend in the whole population ( $p < 0.0001$ ) and in the medium group of 14-year-old boys investigated in this study.

The relationships observed were manifested in differences between mean values of the indicator of the physiological maturation of the boys in particular social strata. It means that the percentage of boys with adult facial hair was increasing from 4.39 to 9.49 % in the whole population and from 4.7 % to 11.4% in the group of 14-year-old boys (Fig. 3).

In evaluating the rate of maturation, greater advancement in the physiological maturation was observed in the boys originating from the upper [U] and middle [M] educational strata as compared to those from the lower stratum [L].

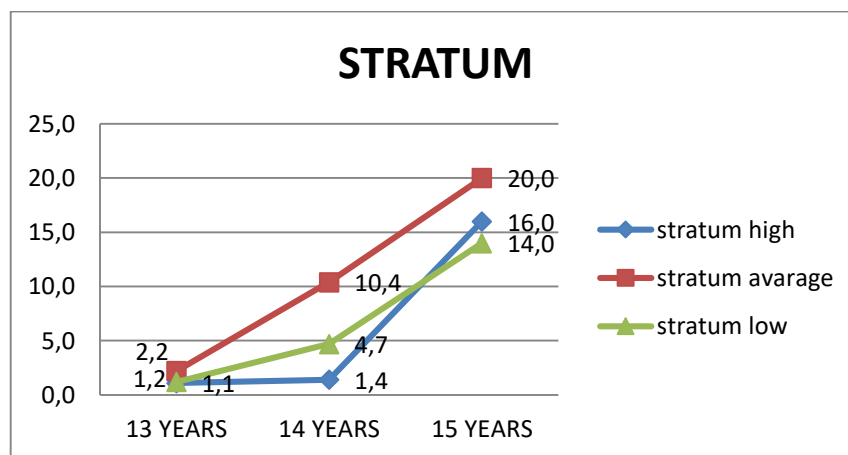


Figure 3. Average values of the mass of boys body in dependence from the total level of the father and mother education.

Table 3. Relationship of the proportional coefficient of boys biological maturity with the total level of the father and mother education.

p	Whole	13 years	14 years	15 years
The social stratum	0.0001	0.67	0.0001	0.91
higher vs. average	0.35	ns	0.11	ns
higher vs low	0.0001	ns	0.0001	ns
higher vs mixed	0.005	ns	0.0028	ns
average vs low	0.002	ns	0.0019	ns
average vs mixed	0.13	ns	0.25	ns
low vs mixed	0.09	ns	0.042	ns
The test on the linear trend	<0.0001	0.23	<0.0001	0.94

Received the horizontal significance:  $p < 0.05$ ; the level of significance was lowered in comparisons between two groups to the Bonferroni to 0.01 according.

## Summary

Analyses conducted in the reported study were focused on the biological effects of social stratification in boys at the age of 13 to 15 years. Educational status of father and mother, affiliation to a respective social stratum, were adopted as factors stratifying the population examined. In addition, detailed description was provided for the social determinants of a few biological characteristics analyzed (somatic traits, physiological maturation).

The analyses enabled explicit documentation of a strong dependency between the educational status of father and mother and the development of somatic traits as well as advancement of physiological development of their sons.

In summary, worthy of noticing are the following results reported in the group of boys from Rzeszów being in the pubescence period:

Summarizing analysis of the selected somatic traits as affected by the combined effect of the educational status of father and mother, in respect of their individual impacts, worthy of noticing are the following facts:

- higher physiological maturity of boys from upper [U] or average [M] education stratum, compared to the lower stratum [L]. Significant relationships occurred only at the age of 14, probably when the boys reached the highest stages of 2 and 3-line sexual characteristics.
- practical lack of differences in maturation between upper [U] and medium [M] stratum.
- in the case of the physiological maturation, a significant linear trend occurred both as affected by the educational status of one of the parents and by that of both father and mother together.

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