

ATTAINED HEIGHT OF BOYS AT PUBERTY AS A REFLECTION OF SOCIAL DIFFERENCES

B. Hulanicka

Institute of Anthropology, Polish Academy of Sciences, Wrocław, Poland

Abstract: Attained height at puberty has been used as a measure of growth status of boys in two cities; Warsaw and Wrocław. Important source of variation in growth has turned out to be social factors such as parental education and occupation, the origin of parents, number of children per family etc. The distance in height of the groups of boys from extreme social categories has appeared to be the same in Warsaw and in Wrocław.

Key words: Boys' puberty; Socio-economic status; Wrocław boys

Introduction

This is to report on a study performed in Wrocław as a parallel investigation to the one carried out by Bielicki and Charzewski in Warsaw. The aim of the work is to assess the development of boys during the period of the most variable phase of their growth in relation to the socio-economic situation of their families.

Many conclusions of our work agree with the ones known from the literature (Bielicki 1986, Bielicki et al. 1986, Brzezinski 1964, Charzewski 1981, Chrzastek-Spruch et al. 1984, Goldstein 1971, Mascie-Taylor and Boldsen 1985, Milicer 1968, Piasecki and Panek 1982, Tanner 1989, Waliszko 1988), though some are new.

In studying the secular trend of human growth one of the mostly used traits is the age of girls at menarche. The lack of such a precise sign of maturation in boys causes that the data for boys are usually taken during their physical examination connected with the military service. The gap of about 8 years of age between boys and girls at the moment when the data are collected may bias the results inferred. Changing socio-economic conditions of families of similar characteristics at the time of the birth of a child might be significant enough to obscure the picture. If a study like ours would be repeated in some eight years, this point could be clarified and so it would also contribute toward a better estimation of the magnitude of the secular trend in children maturation in boys and in girls.

Material

All boys from the last two grades from all elementary schools in Wrocław, 6969 in number, have been asked to fill up a questionnaire concerning their families socio-economic conditions (cf. table 2)

Upon collecting the filled up questionnaires 6689 boys were measured by an anthropologist, the remaining 280 boys were absent. The data concerning their height, weight, eye color, facial hair and voice development were taken. The height was measured by means of an anthropometer up to the nearest 0.1 cm.

From the group of 6689 boys whose measurements have been collected, 742 boys of divorced parents, of single parents and orphans as well as 460 boys either younger than 13.30 (the ones who have started school earlier) or older than 15.29 (the ones who have repeated a class) have been eliminated from further study.

Table 1. Mean height of boys (cm) aged 13.30–15.29 attendig Wrocław schools in 1987

| Age | N | M | SD |
|---------------|------|--------|------|
| 13.30 – 13.79 | 1319 | 160.85 | 8.40 |
| 13.80 – 14.29 | 1470 | 163.99 | 8.46 |
| 14.30 – 14.79 | 1396 | 167.13 | 7.94 |
| 14.80 – 15.29 | 1302 | 170.24 | 7.57 |
| 13.30 – 15.29 | 5487 | 165.59 | 8.82 |

Table 2. Categories of socio-economic status characteristics

| | |
|---|---|
| Education of father or mother | <ol style="list-style-type: none"> 1. University 2. High school 3. Vocational 4. Elementary |
| Number of children | <ol style="list-style-type: none"> 1. The only child 2. 1 sib 3. 2 siblings 4. 3 + siblings |
| Dwelling conditions | <ol style="list-style-type: none"> 1. $x-1.0$ person per room 2. 1.1–1.5 person per room 3. 1.6–2.5 person per room 4. 2.6–x person per room |
| Consumer goods possessed by a family out of six enumerated | <ol style="list-style-type: none"> 1. Washing machine 2. Colour TV 3. Deep freeze 4. Video 5. Car 6. Summer cottage |
| Origin of father or mother | <ol style="list-style-type: none"> 1. City 2. Town 3. Village |
| Grandfathers occupation | <ol style="list-style-type: none"> 1. White collar 2. Blue collar 3. Farmer |
| Occupation of parents, father & mother (if occupation of mother is not specified it means that mother was considered independent of her occupation) | <ol style="list-style-type: none"> 1. Manager 2. Professional & professional 3. Engineer & professional 4. Professional & technician 5. Technician & technician 6. Army or police officer 7. Soldier or policeman 8. Worker & technician 9. Worker & worker or housewife 10. Worker 11. Unskilled worker 12. Small businessman 13. Father disabled or on pension |

Method

In the present study we are concerned only with the height of the boys, leaving aside all other measurements. For details concerning other measurements see Hulanicka (1990). The boys are divided into four groups with respect to age (*Table 1*). The groups are almost equal in size. The mean height computed for each group increases linearly with age, the standard deviation being quite high, and only slightly smaller in the group of eldest boys. This shows, as expected, the diversity of the heights of the boys in the age bracket considered. On the other hand, the socio-economical status of the boy's family has generally remained the same during the period of two years. Thus comparing the mean height of boys with one socio-economic characteristic in one of the four groups leads to the same results as doing the same for the mean of the whole sample (*Table 2*).

As a matter of fact, what we did is this: first we have compared the means in each of the four groups, and then we have computed the mean of the means: this is why in the last column *M* is the mean of the means in groups. The choice of this procedure has been also induced by the fact that such a procedure had been applied by Charzewski and Bielicki (1990).

Results and Discussion

Dependence of the mean height of boys grouped according to a single factor such as parents' education, number of children in a family, dwelling conditions, number of consumer goods owned by a family, occupation of parents, occupation of both grandparents is shown in *tables 3–8*.

Table 3. Mean height of boys (cm) aged 13.30–15.29 years by father's and mother's education

| | Education | N | Height | Mean age |
|----------|-------------|------|--------|----------|
| Father's | University | 1324 | 166.74 | 14.24 |
| | High school | 1857 | 165.77 | 14.28 |
| | Vocational | 1715 | 164.81 | 14.33 |
| | Elementary | 548 | 164.22 | 14.33 |
| Mother's | University | 933 | 167.21 | 14.22 |
| | High school | 2516 | 165.85 | 14.28 |
| | Vocational | 1299 | 164.85 | 14.33 |
| | Elementary | 700 | 163.62 | 14.33 |

Table 4. Mean height of boys (cm) aged 13.30–15.29 years by the number of children in family

| Number of children | N | Height | Mean age |
|--------------------|------|--------|----------|
| 1 | 934 | 166.33 | 14.26 |
| 2 | 3188 | 165.69 | 14.27 |
| 3 | 959 | 164.86 | 14.34 |
| 4+ | 371 | 164.16 | 14.38 |

**Table 5. Mean height of boys (cm) aged 13.30–15.29 years
by dwelling conditions of family**

| Dwelling conditions | N | Height | Mean age |
|---------------------|------|--------|----------|
| 1 | 1174 | 166.30 | 14.27 |
| 2 | 2275 | 165.65 | 14.29 |
| 3 | 1658 | 165.17 | 14.29 |
| 4 | 365 | 164.13 | 14.31 |

**Table 6. Mean height of boys (cm) aged 13.30–15.29 years
by the number of consumer goods owned by a family**

| Number of goods | N | Height | Mean age |
|-----------------|------|--------|----------|
| 6 | 556 | 167.45 | 14.39 |
| 5 | 233 | 166.67 | 14.28 |
| 4 | 1161 | 166.22 | 14.25 |
| 3 | 1331 | 165.88 | 14.29 |
| 2 | 1277 | 165.30 | 14.31 |
| 1 | 893 | 164.71 | 14.27 |

**Table 7. Mean height of boys (cm) from Wrocław aged 13.30–15.29
by occupation of parents**

| Parental occupation | N | Height |
|-------------------------------|------|--------|
| Manager | 135 | 168.4 |
| Professional & professional | 237 | 168.4 |
| Engineer & professional | 246 | 168.8 |
| Professional & technician | 349 | 167.0 |
| Technician & technician | 560 | 166.9 |
| Army or police officer | 139 | 167.9 |
| Solider or policeman | 228 | 166.2 |
| Worker & technician | 574 | 167.3 |
| Worker & worker or husewife | 823 | 165.4 |
| Worker | 2348 | 166.0 |
| Worker unskilled | 622 | 166.8 |
| Father disabled or on pension | 380 | 165.9 |

**Table 8. Mean height of boys (cm) aged 13.30–15.29 years
by occupation of their grandfathers (mother's father and father's father)**

| Both grandfathers | N | Height | Mean age |
|-------------------|------|--------|----------|
| White collar | 495 | 167.00 | 14.25 |
| Blue collar | 1341 | 165.08 | 14.29 |
| Farmers | 741 | 164.67 | 14.33 |

Table 9 presents the relation of the height of the boys to the length of time after migration of the mother from a rural area to town. The percentage of women who moved from a village to Wrocław is high: around 33% in our sample. We see that the average height of the boys increases linearly with the number of years that the mothers have lived in the city. No dependence of the average height of the boys on the time of the migration of fathers to city and has been revealed.

Table 9. Mean height of boys (cm) aged 13.30–15.29 years according to the years prior to migration of their mothers from rural areas to Wrocław (years prior to migration = birth year of examined boy–calendar year of immigration of mother)

| Years prior immigration of mother | N | Height | Mean age |
|-----------------------------------|-----|--------|----------|
| $x - 15.00$ | 175 | 166.41 | 14.35 |
| 14.99 – 10.00 | 308 | 165.79 | 14.33 |
| 9.99 – 5.00 | 425 | 165.74 | 14.34 |
| 4.99 – 0.01 | 549 | 164.94 | 14.35 |
| 0 – x | 357 | 164.74 | 14.32 |

Table 10 relates the average height of the boys to two factors: affluence of the family and education of the parents. By our definition, an *affluent* family is one with at most two children and which possesses at least three of the six consumer items shown in table 2, in a *poor* family there are at least three children and no more than two consumer items listed. We see that affluence of a family is a negligible factor in comparison with education of the parents.

Table 10. Mean height of boys (cm) aged 13.30–15.29 years from "poor" and "affluent" families by parental education

| Parental education | Height | | | | | |
|--------------------|-------------------|--------|-------|---------------|--------|-------|
| | Affluent families | | | Poor families | | |
| | N | M | Age | N | M | Age |
| University | 472 | 167.12 | 14.20 | 43 | 167.44 | 14.23 |
| High school | 608 | 165.93 | 14.28 | 96 | 165.09 | 14.40 |
| Vocational | 249 | 165.86 | 14.43 | 116 | 165.34 | 14.53 |
| Elementary | 37 | 163.16 | 14.35 | 90 | 164.61 | 14.58 |

Due to technical reasons only the average height of boys of age 13.50–14.49 from Wrocław and Warsaw has been compared. Table 11 presents the comparison with respect to education of the parents as table 12 present this comparison in relation to occupation of the parents. In every group the boys from Warsaw are taller.

Table 11. Mean height of boys (cm) aged 13.50–14.49 living in Wrocław and in Warsaw by parental education (data on boys from Warsaw from Charzewski and Bielicki, 1990)

| Parental education category | Wrocław | | Warszawa | | |
|---|---------|-------|----------|-------|-------|
| | N | M | N | M | d |
| University | 393 | 165.9 | 771 | 166.5 | + 0.6 |
| High school | 426 | 164.0 | 1050 | 165.1 | + 1.1 |
| Vocational | 391 | 162.6 | 345 | 163.9 | + 1.3 |
| Elementary | 178 | 161.9 | 126 | 162.5 | + 0.6 |
| Difference between categories University and Elementary | | | 4.0 | 4.0 | |

Table 12. Mean height of boys (cm) aged 13.50–14.49 years by occupation of parents (data on boys from Warsaw from Charzewski and Bielicki, 1990)

| Parental category | Wrocław | | Warszawa | | |
|-------------------------------|---------|-------|----------|-------|-------|
| | N | M | N | M | d |
| Manager | 67 | 165.2 | 60 | 167.5 | + 2.3 |
| Professional & professional | 115 | 165.5 | 235 | 166.2 | + 0.7 |
| Engineer & professional | 130 | 166.1 | 247 | 166.4 | + 0.6 |
| Professional & technician | 172 | 165.1 | 238 | 165.7 | + 0.6 |
| Technician & technician | 263 | 163.7 | 308 | 165.4 | + 1.7 |
| Army or police officer | 69 | 164.2 | 137 | 166.8 | + 2.6 |
| Solider or policeman | 126 | 163.0 | 106 | 164.6 | + 1.6 |
| Worker & technician | 270 | 164.5 | 323 | 165.6 | + 1.1 |
| Worker worker or housewife | 338 | 161.9 | 451 | 163.7 | + 1.8 |
| Worker | 1109 | 162.9 | 1347 | 164.3 | + 1.4 |
| Unskilled worker | 291 | 162.9 | 334 | 164.1 | + 1.2 |
| Small businessman | 166 | 163.4 | 232 | 164.6 | + 1.2 |
| Father disabled or on pension | 152 | 163.1 | 99 | 164.0 | + 0.9 |

Notice that the difference is the smallest in the groups of boys whose parents are highly trained professionals.

As mentioned above, the results are quite as expected: boys of affluent, well educated parents are significantly taller than those of poor, badly educated parents. However, education of the parents seems to be a much stronger factor influencing the height of a boy than the standard of living of the family. The "family tradition" seems to be of importance: better educated grandfather has usually a taller grandson, also the time of the migration of the mother from a rural area to the city is significantly related to the height of her son while no such relation to the time of the migration of the father to the city and the height of his son has been detected.

The results of Charzewski and Bielicki (1990), in the extent as they can be compared with ours, stress the influence of urbanization. The boys in Warsaw are taller than the ones of the same age in Wrocław, the population in Warsaw having stronger urban tradition.

*

References

- Bielicki T (1986) Physical growth as a measure of the economic wellbeing of populations. The twentieth century. — in Falkner F & Tanner JM (Eds.) *Human Growth* (2nd ed., volume 3; 283—305. — Plenum Press, New York.
- Bielicki T, Waliszko A, Hulanicka B, Kotlarz K (1986) Social class gradients in menarcheal age in Poland. — *Annals of Human Biology*, 13; 1, 1—11.
- Brzezinski Z (1964) Warunki społeczno bytowe a rozwój somatyczny chłopców. — *Materiały i Prace Antropologiczne*, 68; 7—62.
- Charzewski J (1981) Społeczne uwarunkowania rozwoju fizycznego dzieci warszawskich. — *Studia i Monografie AWF*. Warszawa
- Charzewski J, Bielicki T (1990) Uwarstwienie społeczne ludności Warszawy; Analiza wysokości ciała i tempa dojrzewania chłopców 13—14 letnich. — *Wychowanie Fizyczne i Sport*, 34/1; 3—20.
- Chrzastek-Spruch H, Wolanski N, Wrebiakowski H (1984) Socio-economic and endogenous factors in growth of 11 year old children from Lublin. — *Collegium Antropologicum*, 8; 57—66.
- Goldstein H (1971) Factors influencing the height of seven year old children—Results of National Child Development Study. — *Human Biology*, 43; 92—111.
- Hulanicka B (1990) Stan rozwoju chłopców w okresie pokwitania jako odbicie różnic społecznych wśród ludności Wrocławia. — *Materiały i Prace Antropologiczne*, 111; 21—45.
- Mascie-Taylor CGN, Boldsen JL (1985) Regional and social analysis of height variation in a contemporary British sample. — *Annals of Human Biology*, 12; 315—324.
- Milicer H (1968) Wiek menarchy dziewcząt wrocławskich w 1966 roku w świetle czynników środowiska społecznego. — *Materiały i Prace Antropologiczne*, 76; 25—52.
- Piasecki E, Panek S (1982) Czynniki różnicujące rozwój młodzieży nowohuckiej. — *Materiały i Prace Antropologiczne*, 102; 115—182.
- Tanner JM (1989) *Foetus into Man* (2nd ed.) Castlemead Publication, Ware.
- Waliszko A (1988) The evolution of social gradients in menarcheal age in Wrocław between 1966 and 1976. — *Studies in Physical Anthropology*, 9; 3—15.

Mailing address: Dr Barbara Hulanicka
Institute of Anthropology PAN
Kuznicza 35.
50-951 Wrocław
Poland

