

## Recent trends in stature of 14-year-old boys from Wrocław, Poland

*Halina Kołodziej, Sławomir Kozieł*

Institute of Anthropology, Polish Academy of Sciences, Kuźnicza 35,  
50-951 Wrocław, Poland; E-mail: halina.kolodziej@antro.pan.wroc.pl

**ABSTRACT** The aim of this study was to investigate the educational group-specific secular trends in stature of 14-year-old boys from Wrocław. The study was based on two cohorts of boys measured in 1987 and 1997. On the basis of mother and father education level divided into three categories, social sub-groups were selected. During the period 1987-97 the mean stature of 14-year-old boys has risen from 163.6 cm in 1987 to 165.6 cm in 1997. Growth trends were positive in all sub-groups selected on the basis of father education. The analysis of secular changes in body height within the separated social sub-groups showed that boys whose fathers had a university education were the tallest and boys whose fathers had basic vocational or elementary school education were the shortest. The greatest increment in body height (2.82 cm) took place in the sub-group of boys whose fathers had secondary school education. In all of the sub-groups selected on the basis of mother education the growth trends were positive. The boys from the sub-group where the mother had secondary school education experienced the largest increment in body height during the period 1987-97.

**KEY WORDS** secular trend, body height, social gradients

*Prz. Antropol. – Anthropol. Rev.* (2002), vol. 65, pp. 57-63, Fig. 1, Table 1. ISBN 83-86969-80-6, ISSN 0033-2003

The occurrence of long-term, inter-generational changes relying on a gradual increment in body size of youth has been observed in most of the industrialized countries. Simultaneously, the process of acceleration in physiological maturation of children and adolescents has been noted, and is especially well documented in the case of age of menarche [BRUNDTLAND *et al.* 1980, WYSHAK

and FRISCH 1982, BIELICKI *et al.* 1986, PAPADIMITRIOU *et al.* 1999]. This phenomenon is defined as a secular trend in growth and maturation.

Systematic monitoring of the secular trends in growth of youths can provide very interesting information about historical changes in economic well being of the community [BIELICKI 1986, TANNER 1990, BIELICKI *et al.* 1992,

LINDGREN and CERNERUD 1992]. This is due to the fact that the secular trends in growth (including possible reversals or cessations) are known to be predominantly a reflection of changes in living standards of the population rather than a reflection of some hypothetical genetic shifts [TANNER 1981, 1992]. An accurate analysis of the occurrence of the secular trends in growth relies upon examination of group-specific trends. In this case the trends are separately investigated within each of several social strata, socio-occupational or educational groups. This type of analysis allows documentation of changes in living standard of national or regional population as a whole and makes it possible to observe changes in magnitude of social inequalities within that population. A study of group-specific trends in growth allows monitoring the evolution of social stratification [BIELICKI and SZKLARSKA 1999].

In this study we investigate the educational group-specific secular trends in stature of 14-year-old boys from Wrocław during the period between 1987 and 1997.

### Materials and methods

The study was based on two cohorts of boys attending 7th or 8th grade of primary schools of the city of Wrocław. The samples were collected in 1987 and 1997. The first sample comprises 3120 14-year-old boys. In this study, the social information was derived from questionnaires filled out by parents and collected by teachers. Anthropometric measurements were taken by trained staff [HULANICKA *et al.* 1990]. The data

of the second sample of 14-year-old boys, comprising 1014 subjects, were obtained from health examinations carried out in the Lower Silesian Centre for Medical Diagnostic in Wrocław between Jan. and Dec. 1997. The body height of boys measured by the authors was recorded. The stature was measured to the nearest millimeter by the standard methods. The information about social background was gathered using questionnaires filled out by parents and verified by the authors.

Six social sub-groups were selected on the basis of mother and father education levels scored in three categories: (1) high level of education (university, college), (2) medium (secondary school), and (3) low (basic vocational school – this type of school in Poland is 2-3 years of above-elementary schooling in a specific craft – and/or elementary school). In Poland, the level of parent education is a good determinant of socio-economic situation of the family. It is well known that members of a social stratum tend to share characteristics of certain aspects of economic situation, ways of distributing family budget and some elements of lifestyles. The recent study shows that among occupationally active large-city dwellers in Poland, a person's educational status strongly influences his/hers economical situation and lifestyle [KOŁODZIEJ 1998]. We think these facts validate the level of parent education as a good criterion of social group selection.

The differences in body height between separate social sub-groups were calculated using the standard statistical procedure. The significance of the differences was assessed using the *t*-test.

## Results

The descriptive statistics of body height for the two samples and the means, standard deviations and secular gain in body height within the social sub-groups are shown in Table 1. As can be seen from these data, the mean stature of 14 year-old boys during the period 1987-1997 has risen from 163.6 cm in 1987 to 165.6 cm in 1997, which gives an average increase of 2.0 cm. The social group-specific trends are depicted in Figure 1. In all the sub-groups selected on the basis of father education, the growth trends in body height were positive and statistically significant. The analysis of the secular changes in body height within the separated social sub-

groups has shown that the boys whose fathers had a high level of education were the tallest, while the boys whose fathers had low level of education were the shortest. The rank order of the selected social groups on the statural scale remains identical throughout the considered period. The greatest and statistically significant increment in body height (2.82 cm;  $p < 0.000$ ) experienced the sub-group of boys whose fathers had medium level of education. The average stature of boys from this group approached the mean body height of boys from the highest social strata. The distance between groups 1 and 2 reduced from 1.75 cm ( $p < 0.000$ ) in 1987 to only 0.45 cm (insignificant) in 1997.

**Table 1.** Means (*M*) and standard deviations (*SD*) of body height across parental educational groups for 14-year-old boys from Wrocław, examined in 1987 and 1997, and the significance of differences between mean values (*p*)

Group/subgroup (level of education)	1987			1997			$M_{87}-M_{97}$	<i>p</i>
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>		
Total	3165	163.65	8.5	1014	165.56	8.6	1.91	0.000
Father's Education								
1. High	751	165.29	8.4	224	166.81	8.2	1.52	0.017
2. Medium	1011	163.54	8.3	348	166.36	8.5	2.82	0.000
3. Low	1207	162.81	8.5	382	164.43	9.0	1.62	0.001
Inter-group differences ( <i>p</i> )	1-2	0.000			0.531			
	1-3	0.000			0.001			
	2-3	0.042			0.003			
Mother's Education								
1. High	551	165.41	8.4	177	166.60	8.3	1.19	0.105
2. Medium	1465	164.01	8.4	523	166.42	8.5	2.41	0.000
3. Low	1104	162.36	8.4	265	163.53	9.1	1.17	0.045
Inter-group differences ( <i>p</i> )	1-2	0.001			0.807			
	1-3	0.000			0.000			
	2-2	0.000			0.000			

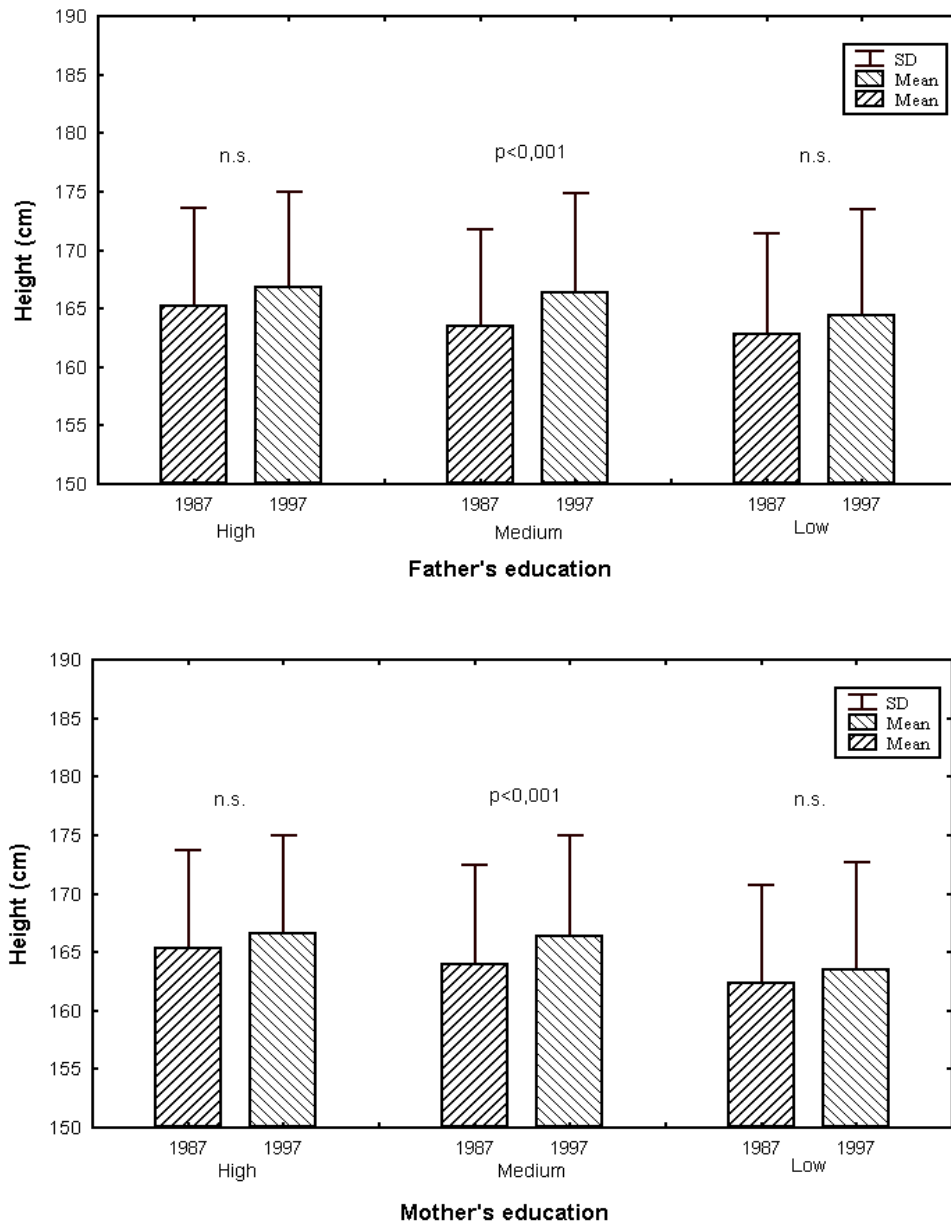


Fig. 1. Secular trends in stature of 14-year-old boys from Wrocław across parental educational groups.

The statural gap between groups 1 and 3 reduced from 2.48 cm ( $p < 0.000$ ) in 1987 to 2.38 cm ( $p < 0.001$ ) in 1997. The obtained results showed that differences between some social classes were slightly reduced in this period of time in Poland. These processes contributed to a dichotomization of social scale.

In all of the sub-groups selected on the basis of mother education, the growth trends were positive. The boys from the sub-group where mother had medium level of education experienced, similar to the boys whose fathers had medium level of education, the greatest increment in body height during this period (2.41 cm;  $p < 0.000$ ). The statural distance between groups 1 and 2 reduced from 1.40 cm ( $p < 0.001$ ) in 1987 to 0.18 cm (insignificant) in 1997. The statural gap between groups 1 and 3 remained almost constant (3.05 cm,  $p < 0.000$  and 3.07 cm,  $p < 0.000$  for the 1987 and 1997 samples, respectively).

## Discussion

In Poland, the positive trends in body height of 14-year-old boys have been observed in almost all of social sub-groups, which were selected on the basis of parents' level of education. It is noteworthy that the statural gaps among several social classes were slightly reduced in Poland between 1987 and 1997, but the differences still exist.

The study of secular trends in body height of Polish 19-year-old males showed that during the period 1965-1995 the social gradient of stature has been constant, although the group-specific trends have not been strictly parallel [BIELICKI and SZKLARSKA 1999]. In the same study, a tendency was

observed that groups of lowest social and statural level diminish their statural distance from the social elite, but that tendency for social gaps to narrow disappeared during the 1986-96 decade. Many authors suggested that a positive secular trend in growth is a reflection of positive changes in living conditions in a society, such as: nutritional, hygienic and health status [TANNER 1992]. For a better understanding of the results of this study, it is important to note that the economic situation in Poland from 1973 (year of birth of the boys in the first sample) to 1987 (year of the first sample's examination) and from 1983 (year of birth of the boys in the second sample) to 1997 (year of the second sample's examination) has considerably changed.

An economic crisis, which was characterized by food shortages, began in the late 1970s. After the imposition of martial law, the food shortages were even more dramatic. In the late 1980s and early 1990s, political and economic transformations occurred in Poland. These transformations brought about an increase in food prices and the unemployment rate. The deterioration of living conditions was present for almost the whole lifespan of the examined boys, and may thus have seriously affected their physical development. It is well known that the quality of living conditions in early childhood and adolescence strongly influences growth [TANNER 1986]. It would appear that the economical crisis that occurred in Poland had an effect on the physical development of Polish children. Indeed, ŁASKA-MIERZEJEWSKA and ŁUCZAK [1993] showed that between 1977-87 there was a slight increase in the age of men-

arche in girls from the non-agricultural and farmer-worker groups compared to the age of menarche in girls from rural agricultural families. In girls from the agricultural group, a slight acceleration in menarche was noted. Thus, the living conditions of the main food producers (rural agricultural families) were relatively better than in other social groups during the periods of food shortage.

The study of secular changes of body height of adolescents in the Bydgoszcz region in the period between 1935 and 1991 showed that between 1952 and 1971 the greatest average secular changes were observed. The 1970s were characterized by a slowdown in the changes, and in the period from 1979 through 1991 there was a set back in the secular trend of the stature. NOWICKI [2000] has suggested that it could be probably due to fluctuations in the standard of living of Polish society. BIELICKI and SZKLARSKA [1999] obtained somewhat different results. In a study of the national samples of 19-year-old men drawn at 10-year intervals, they showed that there was no trace of temporary slowdowns in the general secular trends in stature associated with periods of deterioration of Polish economic conditions. However, several social sub-groups (groups from the top of the social scale) experienced more dynamic secular changes than other groups. The results of our study show the same tendency. The following factors could have caused this phenomenon: (1) the compensating effect of catch-up growth, and (2) the protective effect of child-oriented handling of family budgets by parents in times of crisis. The latter could also be helpful in interpreting the differences in statural gaps between social sub-groups. It may

be that families from the highest social classes protected their children from disadvantages of the crisis better than families from lowest social classes. The partial dichotomization of social scale, observed in our study, could be a reflection of the division of Polish society as rich and poor.

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## Streszczenie

Porównywano wysokość ciała ponad 1014 chłopców w wieku 14 lat z Wrocławia, badanych w 1997 roku, z grupą 3120 14-latków z Wrocławia badanych w 1987 roku. Średnia wysokość ciała badanych chłopców z Wrocławia zwiększyła się z 163,6 cm w 1987 roku do 165,6 cm w 1997. Oznacza to przyrost przeciętnej wysokości ciała o 2,0 cm (tabela 1).

Analiza zmian sekularnych wysokości ciała w obrębie grup społecznych wyodrębnionych na podstawie wykształcenia ojca wykazała, że podobnie jak dziesięć lat wcześniej, w 1997 r. najwyżsi byli chłopcy, których ojcowie mieli wyższe wykształcenie, a najniżsi okazali się synowie ojców z wykształceniem zawodowym i podstawowym. Największy przyrost przeciętnej wysokości ciała (2,8 cm) stwierdzono w badanym okresie w grupie chłopców, których ojcowie mieli wykształcenie średnie, przez co grupa ta bardzo zbliżyła się pod względem wysokości ciała do grupy chłopców, których ojcowie mieli wykształcenie wyższe. W ciągu badanego okresu przeciętna wysokość ciała chłopców, których matki miały wykształcenie wyższe, średnie lub zawodowe wzrosła. Największy wzrost przeciętnej wysokości ciała odnotowano wśród synów matek z wykształceniem średnim, przez co grupa ta bardzo zbliżyła się do grupy chłopców, których matki miały wykształcenie wyższe (tab. 1 i rys. 1). Uzyskane wyniki wskazują zatem, że mamy do czynienia ze zmniejszaniem się różnic pomiędzy niektórymi grupami społecznymi wyodrębnionymi na podstawie wykształcenia rodziców, co prowadzi do pewnej dychotomizacji skali społecznej.