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END OF THE SECULAR TRENDS IN HEIGHT AND MATURATIONAL RATE OF SWEDISH YOUTH?

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Abstract: *Comparable samples of Swedish urban school children born in 1955 and 1967 were studied regarding their average heights and weights from 10–15 years. The main findings were that both boys and girls born in 1967 had been gaining more weight than height, especially around the ages at which peak height velocity generally occurs. The advantage in height of children born in 1967 gradually diminished after age at peak height velocity indicating an earlier maturation but not a taller adult height.*

In March–April 1990 a study on menarcheal age was conducted concerning a sample of Stockholm school girls born in 1971–80. For these girls mean menarcheal age by the status-quo-method was 13.19 years (SD = 1.08). Compared to that result the mean menarcheal age was 13.09 years (SD = 1.10) for a sample of Stockholm girls born in 1951–57.

From these results it was hypothesized that the secular trends in height and maturational rate of Swedish youth made a halt from the end of 1970 to about 1985; first in height and then in maturational rate.

The representativeness of the different samples as well as possible reasons for the halt of the trends were discussed.

Key words: *Secular trends; Height; Maturational rate; Menarche.*

Introduction

Secular growth changes in height, weight and maturational rate of Swedish youth have been studied regarding the period from about 1880 up to present days, showing that Swedish school children successively have become taller as well as having been maturing earlier during the last hundred years (Lindgren, 1988).

However, results from recent and current growth studies on Swedish youth indicate that these trends lately have been slowing down. Thus the purpose of the present paper is – by means of these results – to try to answer the question: Are the secular trends in height and maturational rate of Swedish youth still going on?

Materials and Methods

Results were obtained from different growth studies. Regarding average heights and weights at the ages 10–15 years samples of Swedish schoolchildren – mainly from urban areas – born in 1955 and 1967 were compared. The average growth patterns in each sample were obtained by fitting Preece Baines model 1 to the respective yearly mean values. This comparative study has been reported more in detail by Lindgren & Hauspie (1989).

In another growth study of Stockholm schoolchildren born in 1933, 1943, 1953 and 1963 average heights and weights at the ages 7, 10 and 13 years were analyzed concerning secular growth changes as well as socio-economic differences. This Stockholm study has been reported in detail by Cernerud & Lindgren (1991) and Lindgren & Cernerud (1992).

In March–April 1990 a study on menarcheal age was conducted concerning a sample of Stockholm school girls born in 1971–80 using the status-quo-method. For a smaller group of girls born in 1971–75 within this sample, mean menarcheal age was estimated also by the recollective method. This study was reported more in detail by Lindgren et al. (1991).

Summary of Results

Heights and weights of Swedish school children born in 1955 and 1967 (Lindgren & Hauspie, 1989)

The results indicated that for girls there was a slight positive secular trend in the mean height in the age range 10–15 years between the 1955 and 1967 samples. This trend was more marked for boys (*Fig. 1*). However, for average weight, the trend was quite pronounced for both boys and girls, giving higher values of the Body Mass Index for the 1967 sample and especially so for girls in the age range 13–15 years.

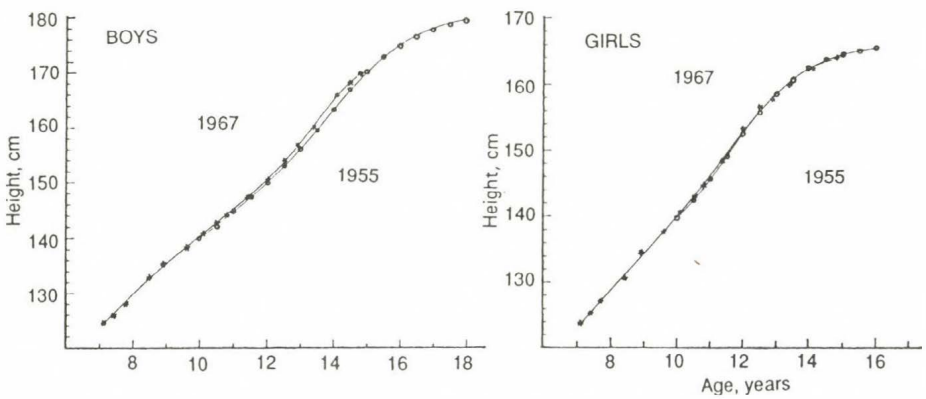

Fig. 1: Average height for boys and girls born in 1955 and 1967 (from Lindgren & Hauspie, 1989)

About the maturational rate expressed as age of maximal increment in height and weight respectively during puberty, it seemed that the trend in height and weight for boys was partly, if not wholly, attributable to an earlier maturation of the boys in the 1967 sample. For the girls this seemed to be of a lesser degree.

Secular growth changes and socio-economic differences of Stockholm schoolchildren born in 1933–1963 (Cernerud & Lindgren, 1991; Lindgren & Cernerud, 1992)

Heights and weights at the ages 7, 10 and 13 years were compared for Stockholm schoolchildren born in 1933, 1943, 1953 and 1963. The increase in height and weight at these ages was more marked between the children born in 1933 and 1943 than later, except for the girls aged 7 years, who had no increase in height. The increase in height between the later samples was at age 7 years practically none, at the age of 10 years about 1 cm/decade and at the age of 13 years 1–2 cm/decade (*Fig. 2*).

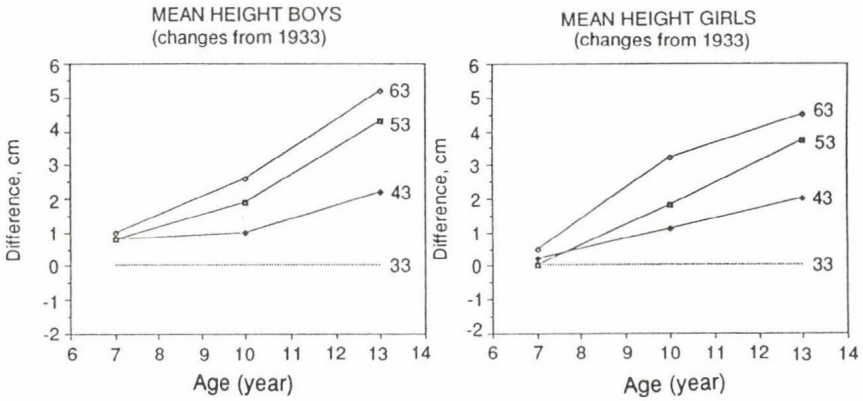

Fig. 2: Growth changes in average height at the ages 7, 10 and 13 years of Stockholm schoolchildren born in 1933, 1943, 1953 and 1963 (from Cernerud & Lindgren, 1991)

In height there were significant socio-economic differences for boys and girls born in 1933 and 1943 at the ages of 7 and 10 years; children from the lowest socio-economic group were smaller. For the cohort born in 1953 there were, however, no socio-economic differences in height – neither for boys nor for girls. For children born in 1963, socio-economic differences in height appeared again, but mainly for the boys; boys in the lowest socio-economic group were smaller (*Fig. 3*).

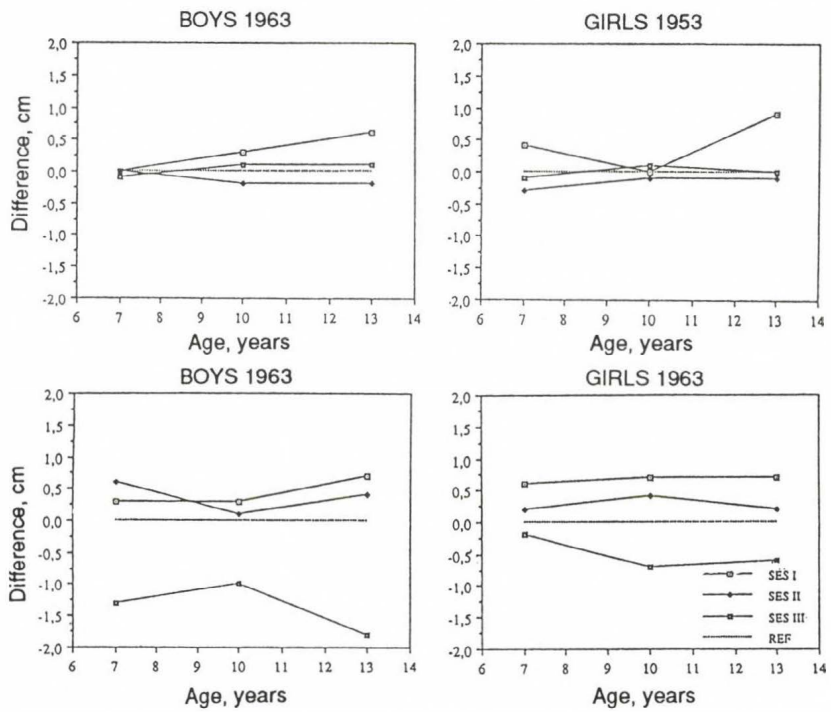

Fig. 3: Differences in mean height (cm) at the ages 7, 10 and 13 years between socio-economic groups I, II and III of Stockholm schoolchildren born in 1953 and 1963 (from Lindgren & Cernerud, 1992)

Significant weight differences between socio-economic groups were for the boys found only in cohorts born in 1943 and in 1963 and for the girls born in 1933, 1943 and 1953.

Socio-economic differences in BMI were found for boys born in 1943, when the middle socio-economic group had the lowest index and for boys born in 1963 when the highest socio-economic group had the highest index. For girls socio-economic differences in BMI were only found for girls born in 1953 when the lowest group had the highest BMI.

The main conclusions from this study were: socio-economic differences in height formerly present in Stockholm schoolchildren born in 1933 and 1943 were levelled out for the children born in 1953, but reappeared again for children born in 1963 – mainly for the boys; these socio-economic height differences for the 1963 cohort were of about the same magnitudes as those for the cohort born in 1943 during the Second World War. The influence of socio-economic background on the BMI of Stockholm schoolchildren born 1933–1963 was not so marked.

Menarche 1990 in Stockholm schoolgirls (Lindgren et al., 1991)

By the status quo-method and according to probit-analysis mean menarcheal age was 13.19 years (SD = 1.08) for girls born in 1971–80.

For the group of 205 girls born in 1971–75, thus aged 15–19 years who could recollect their menarcheal age, mean menarcheal age was 12.80 years (SD = 1.08) ranging from 9.8 years to 16.6 years (*Fig. 4*).

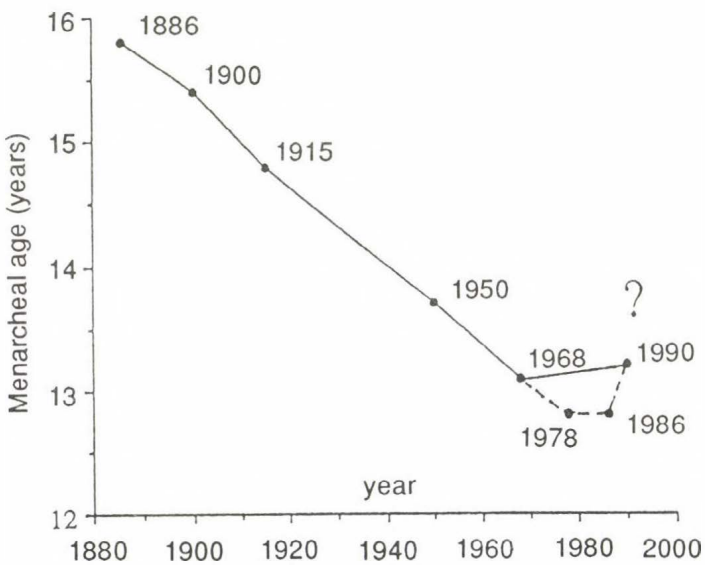

Fig. 4: Secular growth changes in menarcheal age of Swedish girls

Discussion

Secular growth changes in height and maturational rate of Swedish youth have been observed during the last hundred years. Even if the samples used for these observations have not always been strictly comparable regarding regional areas, socio-economic distributions and methods used, the overall impression has been that the secular trends have been going on since 1880 in Sweden. The results from the different growth studies referred to in this paper, however, rather clearly show that the trends in height and maturational rate of Swedish youth obviously made a halt from the end of 1970 to about 1985; it seems first in height per se and then in maturational rate, at least concerning menarcheal age.

The small but noticeable positive trend in height for Swedish schoolchildren born in 1967, compared to children born in 1955, merely seemed to be the effect of their slightly earlier maximal increment in height during puberty or PHV-age. Regarding differences in their adult height, however, it seemed that the children born in 1967 would end up somewhat shorter, although this difference was not large and one might speculate about that. The 1967 sample consisted of about 10% immigrant children compared to about 2% for the 1955 sample and immigrant children in Sweden are often shorter than Swedish children. Whether this might have had an effect on the results for the 1967 sample needs further investigations. As regards the difference in height of Swedish conscripts, those born in 1955 were on average 178.7 cm compared to those born in 1968 who were 179.1 cm. The difference was rather small and might be explained by the fact that most male immigrants were not enrolled in the Swedish army. Hence, Swedish youth born in 1967 did not seem to have become taller compared to those born in 1955. They were, however, maturing earlier as regarded their PHV-ages and they were considerably heavier.

Concerning the results for the Stockholm children born in 1933, 1943, 1953 and 1963, they indicate that the secular trend in height had continued but was slowing down. Preliminary results for Stockholm schoolchildren born in 1973 and 1983 indicate that the positive trend in height made a halt when comparing these samples to the sample born in 1963 although the positive trend in weight was still continuing like for the whole of Sweden.

Regarding Stockholm girls born in 1971–80 their mean menarcheal age by the status-quo-method was 13.19 years. Compared to this result the mean menarcheal age likewise by the status-quo-method was 13.09 years for a sample of Stockholm suburban girls born in 1951–57, indicating that the positive trend in maturational rate defined by menarcheal age had made a halt some time between 1965–85, at least for Stockholm girls. When comparing menarcheal data obtained by the recollective method the mean menarcheal age of 12.80 years for the Stockholm girls born in 1971–75 does not differ from the mean menarcheal age of 12.76 years reported in 1978 for a group of suburban Stockholm schoolgirls born in the early 1960s. Thus comparing these results derived by the recollective method the secular trend in menarche for Stockholm girls seems to have continued up to about 1978 but at this point made a halt. The somewhat different results obtained by the status-quo-method on one hand and the recollective method on the other might be an effect of girls being born in 1971–75 in the recollective study and girls

being born in 1971–1980 in the status-quo-study. In conclusion it seems that the secular trend in menarche came to a halt from 1978 to about 1985.

Unfortunately the studies referred to in this paper are not representative for the whole Swedish nation. Regarding height and weight the results are representing mainly urban areas, whereas rural areas are scarcely represented. The results for the Stockholm children, however, follow – at least during the period studied here – a similar pattern regarding height and weight. The results regarding menarche represent only Stockholm, of course, but it could be hypothesized that these resuts are mirroring the trend of urban areas in Sweden.

Reasons for a halt in the secular trends in height and maturational rate of Swedish youth could be that the optimal state of the population has been reached, the demographic changes of the population or a worsening of the socio-economic conditions, in general or in different regional areas, for instance in Stockholm. Thus the hypothesis could be stated that a hundred years of ongoing positive secular trends in height and maturational rate of Swedish youth made a halt at the end of this century, although a nationwide study should be conducted taking into account different regional areas as well as the distributions of socio-economic groups and immigrants within these areas.

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