

THE PHYSIQUE OF URBAN GIRLS

Júlia Pápai and T. Szabó

Central Sport School, Budapest, Hungary

Abstract: Changes in stature, body mass and somatotype of urban girls was observed in a longitudinal study. The 85 girls were divided into subgroups according to the time of their menarche. The individual somatotypes were estimated by the Heath-Carter anthropometric method, the somatotype components were obtained by using regression formulae.

The differences in stature and weight between early and late maturers were found to diminish in the studied age-interval. There were differences in the somatotype and in the pattern of somatotype migration. Endomorphy was more evident in the early maturers and ectomorphy in the late ones. The somatochart shows the early maturers moving towards the endomorphic field while retaining their mesomorphic level, and the late maturers demonstrated a reduction of the second component.

Key words: Body mass, Stature, Somatotype, Maturation

Introduction

There are several studies dealing with the body dimensions of girls maturing early or late (Bodzsár 1975, Prokopec 1982, Tanner 1961, 1962, Tanner et al. 1966). There are only a few available reports on the change or variation of the somatotype during maturation (Acheson–Dupertuis 1957, Bodzsár 1980, 1984, Hunt et al. 1958).

Accordingly, the first purpose of the present study was to report on the age-dependent changes that occurred in the stature, body mass and somatotype in a group of urban girls during pubescence. The second aim was to discover whether differences existed between the subgroups of these girls classified according to the time of their menarche.

Material and Methods

All the 85 girls reported here were born in the first half of the year and belonged to a sample of children observed longitudinally in Jászberény, an average-sized town in the middle of Hungary, central to the region called Jászság.

A prospective method of collecting menarcheal age data was used, as this yielded accurate dates for every girl, and enabled us to classify them into groups of half a year.

Of the body dimensions measured at yearly intervals between 1979 and 1982, stature and body mass will be discussed.

Individual somatotypes were estimated by the Heath–Carter anthropometric method (Carter 1975), somatotype components were obtained by using regression formulae (Szmodis 1977). Stature, body mass and somatotype of successive age groups were tested for significant differences by t-tests for dependent samples. Parameters of the respective menarcheal age subgroups were compared by t-tests for independent samples.

Results

Figure 1 shows the successive means for stature in the whole sample. The menarcheal subgroups are designated by letters. It can be clearly seen that at the age of 10.5 the girls who would mature early, were the tallest. At a later age, however, the intergroup differences tended to diminish. These findings agree with other reports which have found no difference in the final stature between groups maturing early and late (Malinowski–Pawlaczký 1967–68). The curves also illustrate that the rate of growth began to decrease after

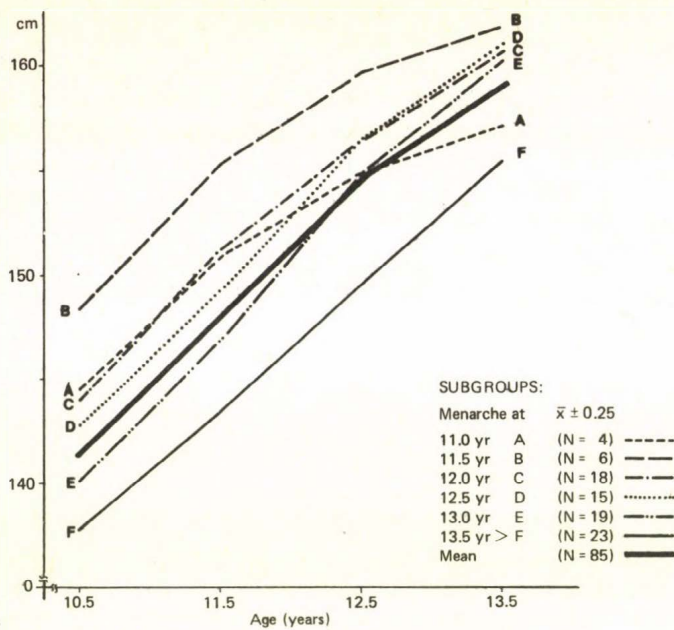


Fig. 1: The stature of Jászberény girls

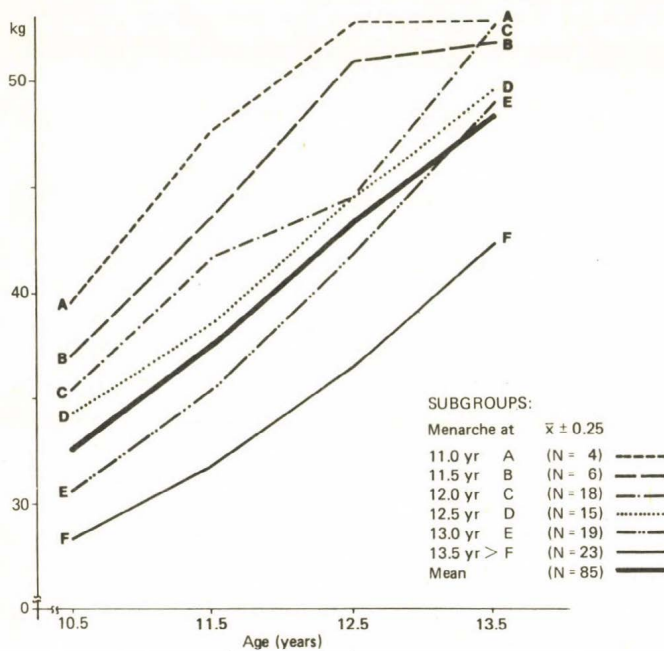


Fig. 2: The body mass of Jászberény girls

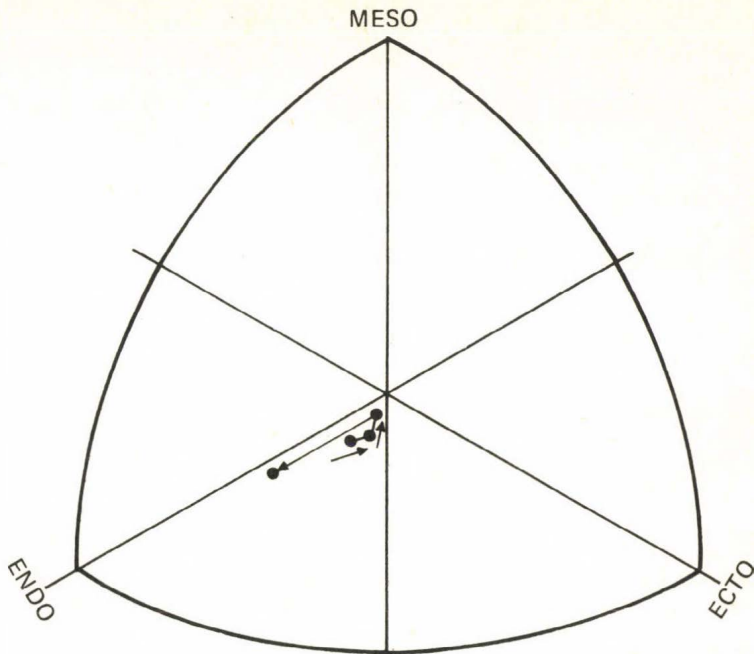


Fig. 3: Somatotype migration of the total group

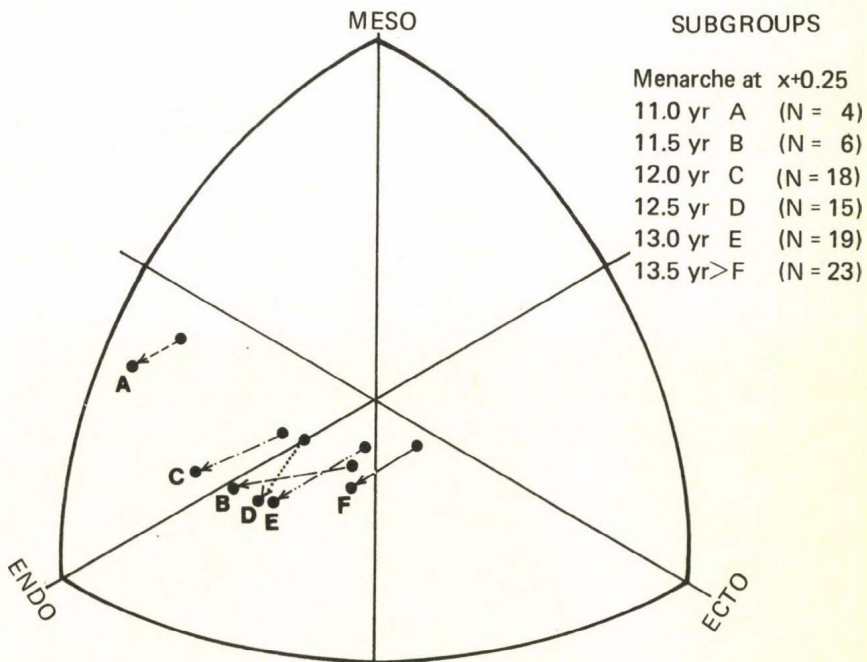


Fig. 4: Somatotype migration between 10.5 and 13.5 years

menarche had set in. The diversity in the body mass of the menarcheal subgroups also decreased with age (Fig. 2). At 13.5 years, the girls who had qualified as mature had nearly the same weight.

In summarising the means and standard deviations of the somatotype components, the Table 1 displays a tendency common to all the three components: a constancy with age. In endomorphy, however, this constancy was replaced by a marked rise after 12.5 years of age. When plotted on the somatochart (Fig. 1, 3), the first three somatopoints of the whole sample were found to reside in the central hexagon. Then, between 12.5 and 13.5 years of age, the mean was abruptly moved to the field of balanced endomorphy.

Table 1. Statistical parameters of somatotype in Jászberény girls

Age (year)	Endomorphy			Mesomorphy			Ectomorphy		
	\bar{x}	$s_{\bar{x}}$	s	\bar{x}	$s_{\bar{x}}$	s	\bar{x}	$s_{\bar{x}}$	s
10.5	4.63 ± 0.22		2.00	3.62 ± 0.11		1.06	4.06 ± 0.16		1.45
11.5	4.40 ± 0.19		1.76	3.54 ± 0.12		1.11	4.04 ± 0.17		1.60
12.5	3.92 ± 0.19		1.75	3.45 ± 0.13		1.22	3.82 ± 0.17		1.61
13.5	5.58 ± 0.16		1.45	3.12 ± 0.14		1.26	3.52 ± 0.16		1.45

In comparison with the very gradual decrease of endomorphy in the first two years, the last year of the observation showed a quite considerable change in fatness which was not at all apparent in the curve of body mass. Considering the not very high level of standard deviations in the table shown earlier and the apparently simple pattern of somatotype migration of the whole sample, the complexity of the second somatochart is striking (Fig. 4). These are the migration traces of the menarcheal age subgroups, but only the start and end points are shown, from 10.5 to 13.5 years of age. Group A, those mature at the age of 11, can be found in the field of mesomorphic endomorphy, distinctly separated from the rest other groups with little change. The girls with an average age at menarche start and finish as balanced endomorphs. Only the endpoint of the girls with menarche at age at 13 is shown because they start from the central field. The starting point of those who failed to reach menarche until the end of the observation period was within the balanced ectomorphy field and they ended up as endomorphic ectomorphs. Thus, endomorphy was dominant in all the girls who matured early, and ectomorphy was dominant in the relatively belated ones. Group B, a relatively early group, was interesting in that they retained their level of mesomorphy while moving towards endomorphy. All the other groups showed a further reduction of the second component.

Late maturation is a kind of younger biological age. The somatotype pattern of the menarche groups extending from ectomorphy to mesoendomorphy raises the question whether the groups would retain or change their direction of migration. If the course of development is regular, the late ones also would move towards increasing mesoendomorphy, as exemplified by groups C, B and A.

When, however, every subgroup retains its former direction of migration, this would mean that basically dissimilar patterns of growth and development can exist for the early and late maturers.

This point could not be settled from the present material and is worth pursuing.

References

- ACHESON, R. M. - DUPERTUIS, C. W. (1957): The relationship between physique and rate of skeletal maturation in boys. - *Human Biol.* 29: 167-193.
 BODZSÁR, É. (1975): *Data to Puberty of Girls.* - *Humanbiol.* Budapest, 3.

- BODZSÁR, É. (1980): Physique and sexual maturation. — *Anthrop. Közl.* 24; 23–30.
- BODZSÁR, É. (1984): Gyermekek szomato-konstitúciója és ökológiai összefüggéseik közép-dunántúli falvakban. — Kandidátusi értekezés. Budapest.
- CARTER, J. E. L. (1975): *The Heath – Carter Somatotype Method*. — San Diego State University, San Diego, California.
- HUNT, E. E. — COCKE, G. — GALLANGHER, J. R. (1958): Somatotype and Sexual Maturation in Boys: a Method of Developmental Analysis. — *Human Biol.* 30; 73–91.
- MALINOWSKI, A. — PAWLACZYK, J. (1967–68): La structure du corps des jeunes filles en fonction de l'apparition de la première menstruation. — *Glasnik A. D. J.* 4–5; 5–14.
- PROKOPEC, M. (1982): Early and late maturers. — *Anthrop. Közl.* 26; 13–24.
- SZMODIS, I. (1977): Physique and growth estimated by Conrad's and Heath–Carter's somatocharts in athletic children. — *in*: EIBEN, O. G. (ed.): *Growth and Development; Physique*. Symp. Biol. Hung. 20; 407–415. — Akadémiai Kiadó, Budapest.
- TANNER, J. M. (1961): *Education and Physical Growth*. — University of London, London.
- TANNER, J. M. (1962): *Growth at Adolescence*. — Blackwell, Oxford.
- TANNER, J. M. — WHITEHOUSE, R. H. — TAKAISHI, M. (1966): Standards from Birth to Maturity for Height, Weight, Height Velocity and Weight Velocity: British Children, 1965. — *Arch. Dis. Childh.* 41; 454–471. and 613–635.

Mailing address: Dr. Júlia Pápai
 Központi Sport Iskola
 Istvánmezei út 3. H–1146 Budapest, Hungary

