

MATURATION STATUS AND PSYCHOSOCIAL CHARACTERISTICS OF HUNGARIAN ADOLESCENTS

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Abstract: *We surveyed adolescent self-image, well-being and peer-group integration in relation to age and maturation status within the framework of the Health Behaviour in School-Aged Children Study (Currie 1998) to reveal differences between genders, resp. subgroups of early and late maturers.*

The nationally representative sample consisted of 2354 boys and 2518 girls aged between 11.5 and 17.5. Subjects were grouped by gender, age and maturation status. Body image, self-evaluation, well-being, friend relations, classmate relations and aggression were the factors studied. Independence of the predictor variables for each factor was tested by chi-square. To test differences between subgroup means of the weighted factor score totals post-hoc nonparametric tests and nested two-way ANOVA were used.

Differences for maturation status (mature denoting post-menarcheal girls, resp. post-spermatarcheal boys) were similar to those for age. Scores for body image were higher in the younger and in the non-mature female subgroups, while the corresponding males showed an opposite tendency. There were no significant differences in self-evaluation between the male subgroups for age and maturation status and no definite tendency in the female subgroups. The older and mature ones scored higher in friend relations, but lower in classmate relations and well-being than the younger and non-mature ones in both sexes. Differences between the groups of early and late maturers were slight both within and between sexes.

We regard these results as indicative of the fact that biological and psychosocial development are not independent from each other and that the relationships are very complex. The male and female maturation pattern appears to differ not only biologically, but also in terms of psychosocial development.

Keywords: *Biological maturation; Psycho-social development; Self-image; Well-being; Peer-integration.*

Introduction

Adolescence is perhaps the most dynamic period of human life with spectacular somatic changes and large amplitude of emotional and mood variability. Adolescence should be distinguished from puberty. The former is a longer period beginning at the age of 10-12 and ending somewhere between 18 and 21 during which time the child becomes an adult, while the latter takes place generally between the 10th and 16th year of age and it means mainly the rapid somatic and hormonal changes (WHO 1992). Adolescence involves profound biological, mental, emotional and social development. This period full of conflicts is nowadays even more problematic than it had been before, because the time gap between biological and social maturity has increased (Gáboros 1998).

Adolescence can be divided into three subperiods. Early adolescence starts with puberty. Teenagers devote full attention to these changes and most of them have worries about it. Body-image, self-image, self-esteem are perceivably unstable. This is also the time when the youngster begins to turn to the peers for authority rather than to the parents.

Pubertal growth spurt (Peak Height Velocity, PHV) takes place mostly in middle adolescence. Both menarche (first menstruation) and spermarche (first ejaculation) are related to PHV. This is the period of early sexual interest (and often the time of the first sexual experiences). Peer-group adherence becomes increasingly important accompanied by attempts to gain independence from the parents.

In the third period of adolescence the rate of growth decreases while secondary sex characteristics reach their nearly final stage. Intimate partnerships become more important in peer community. Developing independence from the family is more or less completed. (Kaplan and Mammel 1993, Aszmann et al. 1995, Gáboros 1998, Bodzsár 1999).

The process outlined above is a general scheme. Though chronological age, growth, physiological development (sexual maturation), mental, emotional and social development are known to proceed in parallel to some extent (Tanner 1961, Tanner-Lindgren 2001), it is known also that individual variability is enormous. The interactions between biological and psychosocial development are very complicated. The timing of maturation has a wide age range and this –naturally– affects, and interacts with, mental, emotional and social development. There are also gender differences in this respect: early maturation is usually preferred by the males, but female attitude is often contradictory (Litt 1995, Bodzsár 1994, 1981, 2000, Bodzsár and Pápai 1993).

The purpose of this study was to analyse adolescent self-evaluation, well-being and integration to the peer groups in relation to chronological age and maturation status. The problems we studied were:

- evidence for a tendency in these psychosocial characteristics related to age and maturation status;
- evidence for gender differences in the same when these were related to the timing of sexual maturation;
- the possibility of a distinction between the groups of early and late maturers by using these traits.

Material and Methods

The Health Behaviour in School-aged Children Study (HBSC) is a cross-national research study conducted in collaboration with the WHO. This research project aims to gain new insight into and increase understanding of health behaviour, lifestyles and their context in young people in Europe and North-America. Surveys of the 11-, 13- and 15-year-old children (in Hungary the 17 year-olds were also involved) have been conducted at four-year intervals in schools, based on an internationally agreed protocol (Currie et al. 2000). Data collection has been carried out by using a self-completion anonymous questionnaire. For further information about the HBSC study see Currie et al. (2001).

The Hungarian nationally representative sample of 2354 boys and 2518 girls (aged between 11.5 and 17.5 years) of the fourth 1987/88 survey was used for this analysis. Maturation status was assessed by the question: "Have you had ejaculation yet?" for the boys, resp. "Have you had menses (periods) yet?" for the girls. These questions do not

belong to HBSC, they only were used in Hungary. Median ages at menarche and spermarche were estimated by probit analysis (maximum likelihood estimation) to describe the general maturation status of this sample.

Separately for boys and girls, comparisons were performed across age-groups, between pre- and post-menarcheal, resp. pre- and post-spermarcheal groups, finally between mature and non-mature groups within the age-groups. The number of the still pre-menarcheal girls of 15 years and older was so small that a statistical analysis of differences between mature and non-mature ones was not feasible in this age range.

Relationships between the predictor variables of peer-relations, self-evaluation, well-being, resp. the covariates of age and maturation status were assessed by χ^2 -tests of independence ($p < 0.05$). On the basis of these results and earlier analyses of HBSC data six kinds of factor scores were created (Table 1). Each predictor variable was coded as a three-grade scale variable, code 0 meaning the least positive and code 2 meaning the most positive answer. For each factor the scores was summed, then the factors were weighted for comparability to have a 0 for minimum score and 72 for maximum score for all factors.

Table 1. Predictor variables for the factors used in assessing adolescent self-image, well-being and peer relations.

Index	Variable	Index	Variable
Body-image	Dieting to lose weight Body-shape (fat-thin) Looks (bad-good)	Friend relations	Being with friends after school (how often) Evenings spent with friends Number of close friends Making friends (easy-difficult) Talk to friends same sex (easy-difficult) Talk to friends opposite sex (easy-difficult)
Self-evaluation	Feeling confident Feeling helpless Being left out of things Self-esteem scale (Rosenberg 1965)	Classmate relations	Enjoying being together Being kind and helpful Accepting me
Well-being	Feeling happy General feeling Feeling lonely Feeling low Feeling nervous Feeling irritable Backache Being tired in the morning Depression scale (Kovacs 1981)	Aggression	Bullying Carrying weapon Aggression scale (Achenbach 1991)

Though the factors appeared to be of the quasi-interval type, the Kolmogorov-Smirnov tests for normality were significant in all cases. Therefore Kruskal-Wallis and Mann-Whitney u-tests were used to compare the age group as well as maturation status group centroids ($p < 0.05$). Though conditions disallowed to compare means statistically, these parameters demonstrate differences better than medians therefore means are reported.

In order to better illustrate the differences the scores obtained by the Rosenberg scale (1965) of self-esteem and by the Achenbach aggression scale (1991) are also reported.

Two-way nested ANOVA (hierarchical method) was used to explore the effects of sex and maturation status on these factors ($p < 0.05$).

Results

The response rates for the maturation status were 95.0% in the boys and 99.5% in the girls. Table 2 shows the percentage distribution of the responses. The median age at spermarche was 13.59 ± 0.15 yr. (95% CI = 13.27 – 13.90), that at menarche was 12.92 ± 0.09 (95% CI = 12.73 – 13.11).

Table 2. Distribution of mature and non-mature adolescents by age (%).

Age (year)	B o y s		G i r l s	
	Mature	Non-mature	Mature	Non-mature
11.5	17.4	82.6	14.6	85.4
12.5	20.9	79.1	32.1	67.9
13.5	46.9	53.1	63.9	36.1
14.5	72.3	27.7	86.8	13.2
15.5	85.0	15.0	98.2	1.8
16.5	93.1	6.9	99.3	0.7
17.5	94.5	5.5	99.1	0.9

Tables 3 and 4 show mean factor scores for the studied subgroups.

The Kruskal-Wallis tests across the age groups were not significant concerning the factor of self-evaluation in the boys. In general, male means were lower in the younger groups for body image, friend relations and aggression and in the older groups for classmate relations and well-being. Female means were lower in the younger groups for friend relations and aggression and in the older groups for body image, classmate relations and well-being. There was no definite tendency in self-evaluation, though the age groups of 16.5 and 17.5 years had the two highest means.

The Mann-Whitney u-tests between the two maturation groups were not significant for the factor of self-evaluation in the boys. Mature boys had higher means for body image, friend relations and aggression and lower ones for classmate relations and well-being. Mature girls had higher means for self-evaluation, friend relations and aggression and lower ones for body image, classmate relations and well-being.

Table 3. Factor score means for self-image, well-being and peer relations in the males.

Age (year)	Body image	Self-evaluation	Well-being	Classmate relations	Friend relations	Aggression
11.5	50.25	23.00	50.75	83.52	54.75	16.93
12.5	48.44	21.20	53.21	81.41	52.95	17.33
13.5	45.64	22.70	52.20	77.34	55.77	21.12
14.5	48.71	21.87	50.28	76.34	55.85	24.3
15.5	48.13	23.52	49.33	74.13	56.67	21.31
16.5	49.84	22.31	47.00	70.70	57.77	20.55
17.5	49.10	23.42	48.36	73.69	57.45	22.38
Non-mature	45.70	22.26	52.17	79.45	52.92	17.16
Mature	48.39	22.19	48.55	75.17	57.39	23.00

Table 4. Factor score means for self-image, well-being and peer relations in the females.

Age (year)	Body image	Self-evaluation	Well-being	Classmate relations	Friend relations	Aggression
11.5	42.18	26.73	48.12	80.33	48.91	9.76
12.5	42.00	23.41	50.00	80.59	49.63	9.03
13.5	43.18	25.42	47.55	79.37	52.89	11.32
14.5	40.52	23.12	46.31	76.01	52.92	12.32
15.5	37.51	25.80	41.29	74.25	55.75	13.15
16.5	37.17	27.46	41.46	71.68	53.87	12.73
17.5	37.45	27.26	39.17	70.97	54.23	12.76
Non-mature	44.06	25.71	50.40	80.41	49.90	9.78
Mature	37.45	27.35	43.18	72.44	53.81	12.16

The u-tests between the maturation subgroups within age groups were significant for the factor of friend relations in the boys aged 11.5 (mature ones having a higher mean), for aggression in the 12.5-year-old boys (mature ones having a higher mean), for friend and classmate relations and aggression in the 13.5-year-old boys (mature ones having a higher mean), for self-evaluation (mature ones having a lower mean) and aggression in the 14.5-year-old boys (mature ones having a higher mean), for aggression in the boys aged 15.5 (mature ones having a higher mean), and for friend relations and aggression in those aged 16.5 (mature ones having a higher mean). Body image and well-being differed significantly in the 12.5-year-old girls (mature ones having a lower mean), aggression in the 13.5-year-old girls (mature ones having a higher mean) and body-image in those aged 14.5 (mature ones having a lower mean). There were no significant differences in the age groups of 17.5 in the boys and 11.5 in the girls.

A summary of the results of two-way ANOVA is given in the Table 5.

Table 5. Summary results (significance of F) of the two-way ANOVAs for the factors of self-image, well-being and peer relations.

Factor	S o u r c e o f v a r i a t i o n			
	Combined	Sex	Maturation status	Sex by maturation status
Body image	**	**	**	**
Self-evaluation	**	**	—	*
Well-being	**	**	**	**
Classmate relations	**	—	**	—
Friend relations	**	**	**	—
Aggression	**	**	**	**

** : $p < 0.01$ * : $p < 0.05$ — : not significant

Discussion

Median ages at sexual maturation slightly differed from other reported values. The most recent national representative data for these medians were 14.11 for the boys and 12.79 for the girls (Eiben et al. 1991). Discrepancies can originate, on the one hand, from the fact that HBSC data were not entirely representative in respect of sexual maturation (the earliest maturers –especially girls– were not included in the sample because of the age limit). On the other hand, one has to consider possible secular changes in growth and development in Hungary (Bodzsár 1998) and the fact that the last nationally representative growth standards are from the early eighties, so the medians might have changed since then.

In general, the results of the comparisons performed corroborate the obvious fact that age and sexual maturation are related, since the age changes of the mean factor scores were similar to those with maturation status.

Typical gender differences were found in the change of the factor of body image: mean male scores increased while female scores decreased with age and maturation. Moreover male scores were higher than those of the females in all groups. This means that the boys perceived themselves as being leaner and better looking than girls did and this difference increased with the progress in maturation. The ANOVA results confirmed that two different tendencies exist in boys and girls, and that the effect of gender was more powerful than that of maturation. Behind these there are objective biological facts: body fat percentage is higher in females than in males at all ages, on the one hand and on the other, there is an absolute fat loss in boys during puberty while there is only a relative one in girls (Forbes 1978). Post-menarcheal girls have more relative body fat at all ages than their pre-menarcheal peers (Bodzsár 2001). In addition, subjective factors should not be neglected either: appearance has certain social value and fatness is considered unattractive nowadays, especially for females. Hence a maturing girl who moves off the slim ideal would look at her somatic changes with a negative attitude.

It is well known from previous studies that body image and self-evaluation are related (Blythe et al. 1981, Brack et al. 1988, Aszmann 1997). The present analysis did not show this connection that clearly. Significant differences were only found for the factor of self-

evaluation in the girls, but the tendency of the mean scores differed from that of body image. Nevertheless, the self-esteem scale of the self-evaluation factor (Figure 1) taken by itself showed that mature girls had a definitely more negative self-image than non-mature ones.

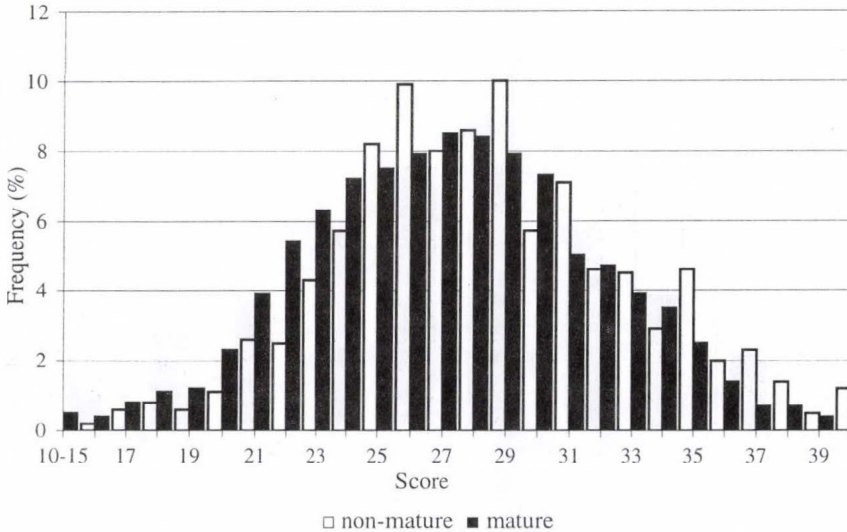


Figure 1: The distribution of the girls along the Self-esteem scale.

The significant interaction between sex and maturity also showed that the scores of this factor developed differently in relation to maturation for the boys and the girls.

The mean scores of well-being showed a similar, decreasing tendency with age and maturation in both sexes, but the same was more marked in the girls. The ANOVA test results demonstrated that the effect of maturation status was stronger than that of gender. Rapid somatic changes, unstable hormone levels and consequential emotional and mood fluctuations during puberty may result in a deranged satisfaction with life. Psychosomatic complaints and depressive symptoms develop more easily in girls whose attitude to pubertal changes is usually more negative than that of boys.

Peer integration plays an outstanding role in the socialization of adolescents (Aszmann 1995, Gádoros 1998), and our results corroborate this notion. Adherence to a peer group is very important in the teenager's life and this was reflected by the high mean scores of the factors of friend and classmate relations in both genders. While the extent of the change in the scores with age and maturation showed the same tendency, its direction was opposite for these factors. There was no significant interaction between sex and maturity in respect of these indices, and the role of maturation was more powerful than that of gender.

This opposite direction of factor change may suggest that separation from the first scene of socialization, namely the family, would start at school: teenagers turn with

increasing attention towards their class community (most friendships develop within the class). Later these friend relations (including relations outside the class) gradually become more intimate and more important. Concurrently with increasing age and progressing maturation, the class –that naturally does not comprise only friends– would become less important.

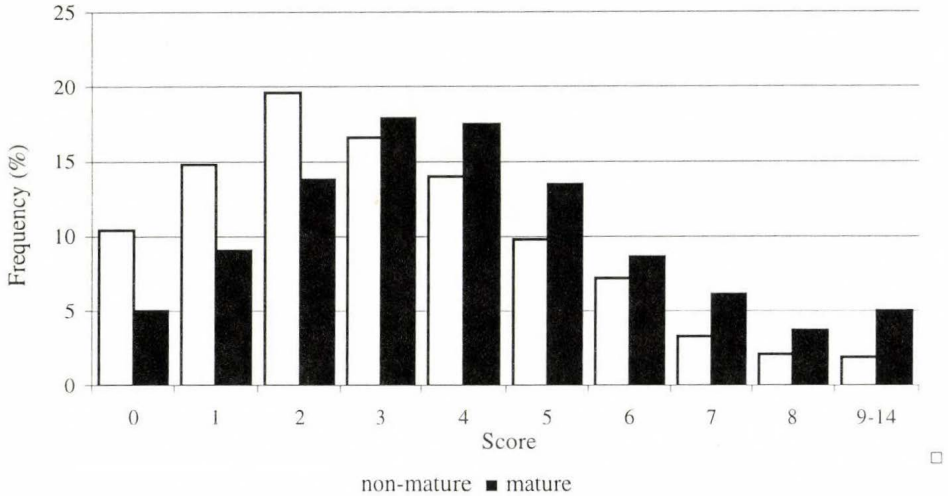


Figure 2: Distribution of the boys along the Aggression scale.

In respect of the factor of aggression the tendency was very similar for the boys and girls: mean scores increased with age and maturation, i.e. aggressive behaviour is likely to become more characteristic in older and more mature young people. Mean scores were lower in the girls in all groups. The interaction between gender and maturity was significant also for aggression and also the effect of maturation status was considerable. These results suggest that both gender and maturity are determining factors in this trait.

It is well known that blood testosterone level increases during sexual maturation but observations concerning a direct relationship between testosterone level and aggressive behaviour have been somewhat contradictory (Olweus et al. 1980, Susman et al. 1987, Inoff-Germain 1988). The lack of a clear connection, however, does not preclude that it exists: perhaps this connection is more complex than thought before. Anyway, our results corroborated first that sexual maturation and aggressive behaviour were related to some extent (in Figure 2 obvious differences can be seen between mature and non-mature boys), further that aggression was more characteristic of boys than girls.

Comparisons within age groups did not show clear differences in the timing of maturation. Among others, one reasons for this fact may be that the earliest maturers were not included in this sample because of the age limit of sampling, and the numbers of the adolescents in some subgroups were low. Peer integration differences between mature and non-mature subjects were more pronounced in the boys than in the girls. It is known that

in general early maturing boys are socially well integrated while late maturers are not (Gádoros 1998, Bodzsár 2001).

Effects of timing of sexual maturation on the girls' psychosocial development were more complex. The most commonly accepted idea has been that an average rate of maturation is the most preferable for girls (Litt 1995, Bodzsár 2000, 2001), but the present results failed to confirm that. Nevertheless it can be seen that body image had a more important role for the girls than for the boys, further that late-maturing girls considered themselves much thinner and more attractive than the girls of the other types of maturation. This observation did not surprise us, because late maturers have the lowest body fat percentage (Bodzsár 2001).

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