

# DEVELOPMENT OF PREMATURE TWINS WITH DISSIMILAR BIRTH WEIGHT

## I. Physical Development

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*The physical development of 20 premature same-sex twin pairs with dissimilar birth weight was observed, as compared to a control group of 17 pairs of premature same-sex twins born with similar weight. The comparison showed that greater differences in development occur between twin siblings born with dissimilar weight. The twins poorly grown in utero were at a disadvantage mainly in body weight. In the preschool or school age, twins poorly grown in utero twice as often had underheight. Underheight was found more frequently in boys. The degree of intrauterine dystrophy does not seem to be of great importance to the further development. Neither was any relationship found between the physical development of the dystrophic twin and the degree of prematurity, as defined by fetal age and birth weight of the larger twin.*

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The observation of the development of twins, one of which poorly grown in utero, is a contribution to studies on the consequences of intrauterine dystrophy for further development. The study of twins with different birth weight enables to establish, the degree of dystrophy with greater probability, that in the case of single fetuses, and it moreover enables to exclude such influences on intrauterine development as the mother's age, height, state of health, parity, and course of pregnancy. The duration of the intrauterine life of the pair of twins is the same and their further development occurs under similar environmental conditions.

In this study the authors strove to answer the following questions:

- (1) whether a retardation in intrauterine development affects the processes of growth in later years, and
- (2) whether intrauterine development has effects on mental development.

## MATERIAL AND METHODS

The investigation comprised 20 pairs of premature twins, the fetal development of one of which having been impaired with respect to the other. A difference in postnatal weight of not less than 20% of the birth-weight of the larger twin and a fetal life of not more than 37 weeks of pregnancy were the selection criteria.

The control group consisted of 17 pairs of same-sex premature twins of similar birth weight. Here, a difference of birth weight of not more than 10% of the postnatal weight of the larger twin and a fetal age of not more than 37 weeks of gestation were the criteria for selection.

Table 1. *The Twin Sample*

	Group A	Group B	Total
<i>Same-sex similar twins</i>			
Both < 2000 g	—	2	2
Both > 2000 g	2	4	6
One < 2000 g, the other > 2000 g	8	1	9
Total	10	7	17
<i>Same-sex dissimilar twins</i>			
Both < 2000 g	—	4	4
Both > 2000 g	4	4	8
One < 2000 g, the other > 2000 g	6	2	8
Total	10	10	20
Grand total	20	17	37

The course of pregnancies and of labors, and the order of birth of the twins in both groups were known for all pairs of twins. Twins with congenital malformations were excluded from the examinations. There were 8 pairs of girls and 12 pairs of boys in the group of twins with different birth-weight (group A). The control group of twins with a similar birth-weight (group B) included 8 pairs of girls and 9 pairs of boys. In group A the mean birth-weight of the smaller twin ( $A_1$ ) was 1572 g with a dispersion from 1120 to 1850 g, and the mean birth-weight of the larger twin ( $A_2$ ) was 2116 g, with a dispersion from 1600 to 2400 g. The percentage differences in birth weight in group A varied within the limits of 20 to 41% of the birth weight of the larger twin.

All twin pairs were under the care of the Premature Infants Outpatient Clinic. Their development was assessed at monthly intervals in the first year of life, at 3-month intervals in the second year of life, and subsequently at 6-month intervals. After the pairs of twins were at least two years old, their similarity was assessed by comparing the following traits: hair colour and thickness, iris colour, the shape of the nose, mouth, ears, and face oval. A comparison of similar (MZ) and dissimilar (DZ) twins with respect to postnatal weight is shown in Table 1. All pairs of twins estimated to be similar also had the same blood groups.

The processes of growth in infancy were followed up by plotting, for the twin siblings, curves of three physical development indices: body length and weight, and head circumference on grids worked out for Warsaw children by Witczak et al. (1970). The physical development of older children was followed up on Brzezinski and Kopczynska's centile grids (1967).

The physical development of twins in their first year of life and at the last control examination was evaluated in the present study. The development in twins of groups A and B was compared for one twin in relation to the other, and their development was assessed in comparison with the means for full-term infants. The statistical significance of the differences in physical development indices between the twin siblings of the two groups was calculated by Student's test.

Table 2. *Intrauterine Dystrophy and Body Length in the 12th Month of Life*

Degree of intrauterine dystrophy <sup>a</sup>	Group A		Group B			
	No. of pairs	Difference in body length between the twins		No. of pairs	Difference in body length between the twins	
		1 cm or less	1 $\sigma$ or more		1 cm or less	1 $\sigma$ or more
Over 29%	9	4	5	—	—	—
20-28%	11	6	5 (1) <sup>b</sup>	—	—	—
10% and less	—	—	—	17	13	4
Similar pairs	10	8	2	7	6	1
Dissimilar pairs	10	2	8 (1) <sup>b</sup>	10	7	3

<sup>a</sup> The degree of intrauterine dystrophy is expressed by the percentage of postnatal underweight of the smaller twin as compared to his cotwin.

<sup>b</sup> Number in brackets expresses difference in body length to the advantage of the smaller twin.

## RESULTS

### 1. Comparison of Development in Twin Siblings

#### *Body length*

In group A the mean figures of body length in the first year of life for smaller twins (group A<sub>1</sub>) were below the means of their cotwins (group A<sub>2</sub>), but a statistically significant difference was found only in the first three months of life (after birth,  $t = 6.1$ ; at the age of 3 months,  $t = 3.2$ ; for  $P = 0.01$ ).

In group B the mean values for differences in body length of the twin siblings were not statistically significant during the entire first year of life. In this group, out of 17 pairs of twins, concordant curves of body length in the first year of life were found for the twin siblings of 13 pairs.

Control examinations at preschool or school age assessed body length of 19 pairs of group A and 15 pairs of group B. In 10 pairs of group A dystrophic twins were of the same length or taller, whereas in 9 pairs they were shorter, as compared to their cotwins. In group B differences in body height were found in 7 out of the 15 pairs assessed.

#### *Body weight*

The comparison of mean body-weight values in the first year of life between group-A twin siblings showed that the mean values of A<sub>1</sub> twins were lower than those of A<sub>2</sub> twins, and the differences between the means showed statistical significance during the entire first year of life ( $t = 6.1$  after birth and  $t = 2.6$  in the 12 months of life, with  $P = 0.01$ ). In the control-group B no statistically significant differences were found between the means of body weight of twin siblings in the first year of life.

At the end of the first year of life differences exceeding 1000 g were found in 6 pairs of group A.

The assessment of body weight in comparison with body length in the 12th month of life showed that, among in utero poorly grown twins, underweight in no case exceeds 10% of the weight due with respect to body length.

In control examinations at preschool or school age, in group A, underweight exceeding this 10% was found in 5 pairs in both twins; in all pairs, then,  $A_1$  twins showed greater underweight. In group B, differences in body weight between the twin siblings at the age of 1 year exceeding 1000 g were found in 5 pairs; no greater differences in body underweight in relation to body length were found between the twin siblings.

### *Head circumference*

Significant differences in head circumference means, between  $A_1$  and  $A_2$  twin siblings, were found only in the 3rd month of life ( $t = 3.5$  at  $P = 0.01$ ). No statistically significant differences in head circumferences between  $B_1$  and  $B_2$  twin siblings were found. In group A, the individual curves of head circumference were concordant and overlapped in 9 pairs of twins; in 11 pairs the head circumference curve of twin  $A_1$  ran under the curve of twin  $A_2$  for the entire 1st year of life (a difference of at least 1 cm). In group B, concordant head circumference curves were found in 7 pairs.

## 2. Development in Twins as Compared to Singletons

Body length, weight, and head circumference of twins of both groups A and B were assessed in the 12th month of life in relation to means. A body length  $\pm 1\sigma$  was attained by 19 twins of group A (6 of group  $A_1$  and 13 of group  $A_2$ ). Deficiencies in body length in relation to age, exceeding  $-2\sigma$  were found in 4 twins of group  $A_1$  and 1 twin of group  $A_2$ . There was no case of deficiency in body length beyond  $2\sigma$  in group B.

In control examination in preschool and school age, body lengths and weights and head circumference were in the majority of cases within the limits of 25-75 centiles. Body length under 10 centiles was found only in 3 pairs of group A and 1 pair of group B. Body weight under  $2\sigma$  was found in 3 twins of group A (not belonging to the same pairs).

## DISCUSSION AND CONCLUSIONS

The comparison of the physical development in the first year of life of twins in the two groups, those born with unequal weight (group A) and those born with similar weight (group B), showed that greater differences in development occur between twin siblings of group A. The twins poorly grown in utero were at a disadvantage mainly with respect to body weight. There were statistically significant differences in body weight during the first year of life. These results are concordant with those obtained by Drillien (1964, 1970) and Babson et al. (1964).

Table 2 contains the relationship between the processes of growth in the first year of life with the traits of similarity and degree of intrauterine dystrophy. An increased rate of growth after intrauterine dystrophy was found more frequently in MZ pairs. This agrees with the results obtained by Naeye et al. (1966). Differences in body length were more frequently found in DZ pairs dissimilar in birth weight (8 out of 10 pairs). This

fact points to the genetic conditioning of the rate of growth in the first year of life. However, the effect of paragenetic factors dependent on the greater differences in intrauterine environment in pairs of DZ twins cannot be excluded.

The degree of intrauterine dystrophy does not seem, however, to be of great importance. Neither was any relationship found between the development course of the dystrophic twin and the degree of prematurity defined by fetal age and postnatal weight of the larger twin.

The sex of the child seems to be important for the development prognosis: the in utero poorly grown girls had a greater chance to increased growth rate after birth. There were 8 pairs of boys and 2 pairs of girls among 10 pairs of group A differing by body length in the first year of life. There were 6 pairs of girls and 4 pairs of boys among 10 pairs with imilar run of body-length curves. These data agree with Drillien's observations (1964 and 1970).

A faster rate of growth in the first six months of life was characteristic for twins with intrauterine dystrophy. In the next six months the increments of body weight and length were similar in both twins, the curves ran in parallel.

A comparison of the body height of group-A twins, measured at control examinations, with the body length in the 12th month of life, showed no clear-cut correlation. In the preschool or school age, twins with intrauterine dystrophy had underheight below  $-1\sigma$  twice as often than their twin siblings larger at birth. Underheight of more than  $2\sigma$  were found in 5 of 74 twins assessed of both groups, and all involved twins poorly grown in utero.

Underheight was found more frequently in boys: in 21 (50%) out of 42 boys (24 of group A and 18 of group B), and in 9 (28.1%) out of 32 girls (16 of group A and 16 of group B). No clear-cut effect of sex on premature-twin growth was found in the controls.