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THE PSYCHOMOTOR DEVELOPMENT OF PRETERM CHILDREN BORN FROM MULTIPLE PREGNANCIES

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SUMMARY

The purpose of this article is to examine whether multiple preterm birth poses a risk to the child's normal psychomotor development. The first part of the article presents the results of cognitive development in two sets of triplets born preterm (32 and 33 hbd). The second part compares the psychomotor development of 24 four- and five-year-old twin children born preterm to that of 24 preterm singletons matched for week of gestation at birth, sex and birth weight. The third part compares these results with those obtained in a study done by the third author of the present study in the 1970s of 56 children born from multiple pregnancies. An analysis of the data suggests that preterm birth accompanied by low or very low birth weight has a stronger effect on the psychomotor development of children than multiple pregnancy. The preterm triplets, examined in the first and second year of life, showed a smaller degree of cognitive development than full-term singletons, but their results did not differ from those that would be expected for the corrected birth age. No difference was found between 4- and 5-year-old preterm twins and preterm singletons, although both these groups obtained lower scores than their full-term peers. The mothers of preterm twins reported more behavioral problems. On the CBCL 1.5 - 5 scale, the twins had a higher general score for reported problems, especially internalization, emotional reactivity and sleep disturbances. There is a strong statistical tendency towards complementary personalities among pairs of preterm twins due to the contrast effect.

PART I . THE PSYCHOMOTOR DEVELOPMENT OF PRETERM TRIPLET CHILDREN

Triplets are a fast growing population, not only in Poland, but also in other industrial countries. In 1990 there were 153 newborn children from triplet pregnancies in Poland; by 2005, there were 252. This growth can be explained in part by greater access to infertility treatment. A triplet pregnancy – as statistics show – often ends with preterm delivery, and prematurity is a risk condition for normal infant development. Premature infants, especially those born with very low birth weight, are at higher risk for morbidity and death, neurological impairments, cognitive delay, and behavior problems. Within the 2005 contingent of 252 triplets, 93 children were born weighing less than 2000 g, while 90 weighed less than 1500 g.

The few studies that have examined the cognitive development of triplets have produced contradictory results. According to Bogdanowicz (1974), the psychomotor development of triplets - because of the prematurity and associated medical risk - was comparable to the development of preterm singletons. Akerman (1995) reported similar results; he found differences in the cognitive functioning of 17 Swedish triplet sets ages 4 to 8 years. Triplets scored below average for the Swedish population; compared to premature singletons, however, they showed only a slight delay, especially among children born small for gestational age (SGA). Other researchers have found that triplets have significant delays at 5 months of age, but not at 20 months, which suggests that their development pathway matches that of preterm children generally (Bogdanowicz, 1974; Gutbrod et al., 2000; Feldman, 2005). Tymms and Preedy (1998), who examined the school readiness of singletons, twins, and triplets, found no significant differences among them. Feldman (2005), however, found that multiple birth is an additional risk factor for normal psychomotor development.

Triplet pregnancy, apart from medical risk factors, also poses a psychosocial risk for infant development: triplet birth may compromise the mother's ability to provide sensitive mothering to each infant (Booting, MacFarlane, Price, 1990, cited by Feldman, 2005). According to Greenspan (2002), infant cognitive competencies develop optimally when the mother carefully introduces new experiences, nurtures emerging skills, and provides opportunities for practice in developing capacities, in an atmosphere of warmth and joy. Mothers of triplets more frequently consider their children alike to each other, as though they were not distinct entities. This seems to be associated with difficulties in creating a unique, individual relationship with each child. With three preterm infants, often presenting special needs and causing high parenting stress and anxiety concerning their development, the caregiver's ability to focus on one infant's individual needs is likely to decrease, which poses another risk factor for optimal cognitive growth.

The purpose of part 1 of the present study is to describe the psychological development of two sets of preterm triplets in early infancy and elaborate the intervention program implemented to support their development.

METHOD

Participants. The participants included two sets of triplets (TI, TII), born preterm, with their families, and 6 full-term singletons, attending a day nursery in Gdańsk, Poland. The individuals in the control groups (CI, CII) were matched to the triplets according to sex and age. Demographic and clinical data for the triplets are given in Table 1.

Procedure. The psychological examination was based on medical documentation, data from clinical interviews with parents, observation of the child's interactions, and the results of a psychomotor workup. Two assessment instruments were used: the Brunet-Lezine test and the Psyche Cattell Intelligence Scale. The cognitive workup was conducted twice: at 11-12 months of age and again at 18-19 months, individually for each child.

Table 1. Demographic and clinical information

Groups	Triplet I			Triplet II		
Analyzed children	1*	2	3	4	5	6
Sex	M	K	M	K	K	K
Gestational age (weeks)	33	33	33	32	32	32
Birth weight (grams)	1300	1640	1000	1250	1230	1300
Apgar Score	7	10	6	7	7	7
Early medical risk	-	-	Respirator – 5 days	Respirator – 6 days,	Respiratory Distress Syndrome	Respirator – 6 days, IVH III/III, hydrocephalus, ROP II

* in the text of the article these numbers will be used to identify the children

RESULTS

The clinical evaluation gave interesting results, which are presented in the tables and figures below. Table 2 presents the mental age and corrected age of the children, who were assessed on four mental age scales:

- MAp – movement and posture;
- MAc – co-ordination;
- MAl – language;
- MAs – socialization.

The development quotient (DQ) and intelligence quotient (IQ) were also calculated.

Table 2. Comparison of the first clinical evaluation (psychomotor and cognitive development) of two triplet sets (TI and TII) and the corresponding control groups (CI and CII), examined at 11-12 months of age, using the Brunet-Lezine test and the Psyche Cattell Intelligence Scale

	Groups	Mental age – general	MAp	MAc	MAl	MAs	DQ/ Corrected DQ	IQ
1	T I	333 (-25)*	405 (+47)	312 (-46)	300 (-58)	330 (-28)	93/109	92
2		336 (-28)	360 (-4)	336 (-28)	300 (-64)	300 (-64)	92/108	96
3		309 (-58)	330 (-37)	300 (-67)	300 (-67)	300 (-67)	84/98	90
4	T II	264 (-69)	250 (-83)	270 (-63)	270 (-63)	270 (-63)	79/96	82
5		270 (-66)	250 (-86)	276 (-60)	270 (-66)	285 (-51)	80/97	87
6		210 (-130)	200 (-140)	210 (-130)	240 (-100)	210 (-130)	61/75	69
7	C I	381 (+32)	360 (+11)	396 (+47)	300 (-49)	450 (+101)	109	106
8		450 (+84)	405 (+39)	450 (+84)	495 (+129)	450 (+84)	122	127
9		432 (+80)	495 (+143)	396 (+44)	450 (+98)	450 (+98)	122	119
10	C II	330 (-16)	300 (-46)	348 (+2)	360 (+14)	300 (-46)	95	113
11		363 (+47)	360 (+44)	348 (+32)	360 (+44)	405 (+89)	114	128
12		387 (+62)	405 (+80)	378 (+53)	360 (+35)	405 (+80)	119	120

* the mental age (MA) is presented in days; below (-) or above (+) calendar age.

The psychomotor development of the triplets (TI and TII) during the first evaluation significantly differed from the results achieved by the full-term singletons (CI and CII). The developmental age of all the triplets was lower than their calendar age (Figure 1), whereas the full-term singletons obtained scores above average (one child – number 10 – had lower results, but within the range of measurement error). In the case of the triplets, retardation of development can be diagnosed when the results are lower than the corrected age, which means less than 314 days in set I and about 278 days in set II. The high results obtained by one girl from the first set (patient no. 2) may result from the absence of risk factors at birth. The significant psychomotor delay in one girl from the second set (patient no. 6) is due to early medical complications (e.g. IVH III, hydrocephalus). The results of cognitive and psychomotor assessment revealed the necessity for early intervention and stimulation in those domains where the results were the lowest.

The analysis of the results corrected for age give grounds for more optimism, however, concerning the children's development and the efficacy of the therapeutic program: all the quotients when calculated for the corrected age fell within the average range. The lowest result was below average, but

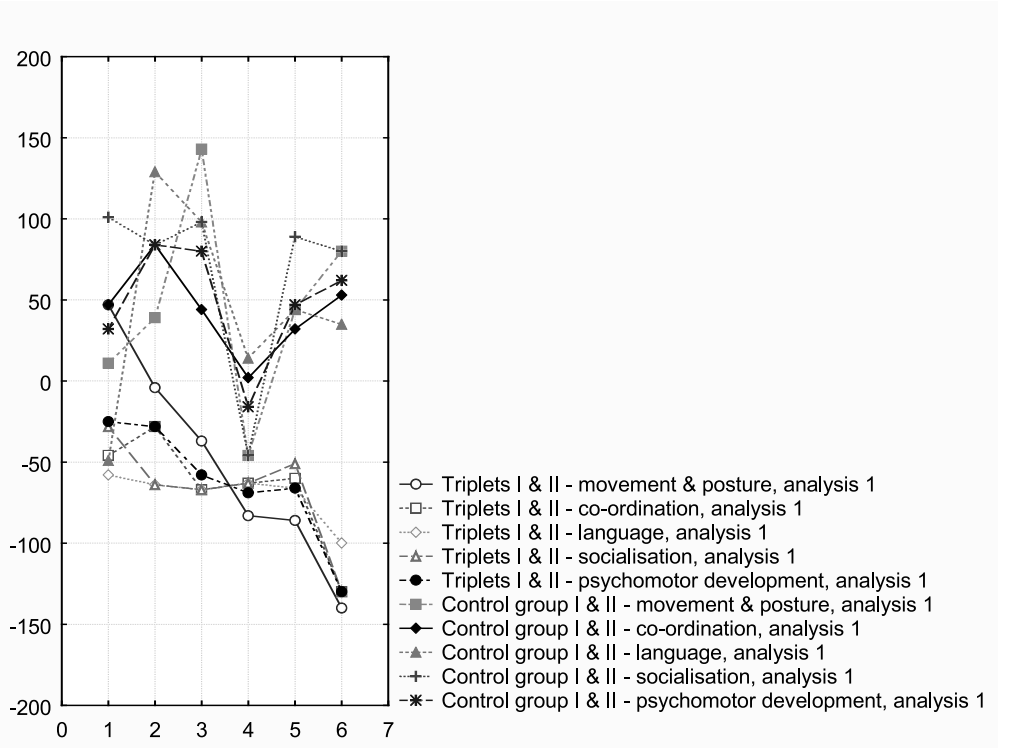

Figure 1.Results of the psychomotor assessment of two sets of triplets and two control groups at the age of 11-12 months, using the Brunet-Lezine test

Table 3. Comparison of the second clinical evaluation (psychomotor and cognitive development) of two triplet sets (TI and TII) and the corresponding control groups (CI and CII), examined at age 18-19 months, using the Brunet-Lezine test and the Psyche Cattell Intelligence Scale

		Mental Age	MAp	MAc	MAL	MAs	DQ	I.Q
1	T I	540 (-47)	540 (-47)	570 (-17)	540 (-47)	495 (-92)	91	102
2		540 (-41)	585 (+4)	540 (-41)	450 (-131)	585 (+4)	92	91
3		504 (-80)	540 (-44)	570 (-14)	360 (-224)	450 (-134)	86	85
4	T II	531 (-20)	585 (+34)	494 (-57)	540 (-11)	540 (-11)	96	102
5		495 (-56)	540 (-11)	450 (-101)	495 (-56)	540 (-11)	90	96
6		384 (-167)	360 (-191)	324 (-227)	495 (-56)	450 (-101)	69	75
7	C I	612 (+50)	585 (+23)	600 (+38)	630 (+68)	645 (+83)	108	109
8		765 (+179)	810 (+224)	696 (+110)	810 (+224)	720 (+134)	130	122
9		621 (+52)	630 (+61)	600 (+31)	630 (+61)	645 (+76)	109	109
10	C II	630 (+71)	630 (+71)	652 (+93)	600 (+41)	645 (+86)	112	110
11		684 (+148)	720 (+184)	652 (+116)	690 (+154)	720 (+184)	127	130
12		648 (+93)	630 (+75)	652 (+97)	660 (+105)	645 (+90)	117	120

* The developmental age is presented in days; below (-) or above (+) age.

could be considered within a broad norm. These results support the introduction of an early intervention program.

The corrected age is no longer used in the second year of life of preterm children, though there are differing opinions on this point (Kornacka, 2003). The results obtained by the triplet children in the second psychological evaluation (at 18-19 months of age) were thus significantly lower than in the control groups. Triplet Set I had a similar profile in both evaluations, with an intelligence quotient in the average range. These children have made progress in

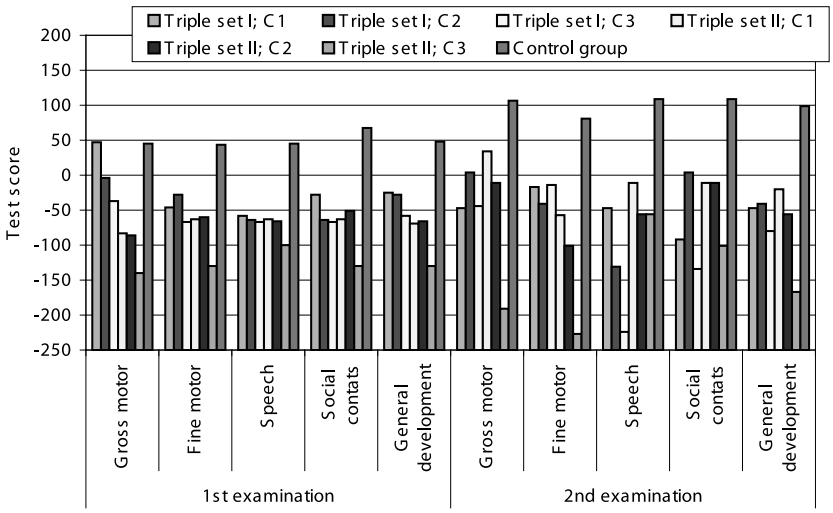

Figure 2. Dynamics of psychomotor development in the two sets of triplets and the corresponding control groups, in the first and second clinical evaluation, according to the Brunet-Lezine test

Table 4. Comparison of the dynamics of intelligence development based on two psychological evaluations (at 11-12 months and 18-19 months) of two sets of triplets and full-term singletons, using the Psyche Cattell Intelligence Scale

	Triplet Set I			Triplet Set II			Full term singletons I			Full term singletons II		
Subject ID	1	2	3	4	5	6	7	8	9	10	11	12
1st evaluation (IQ)	92	96	90	82	87	69	106	127	119	113	128	120
Intelligence*	ave.	ave.	ave.	< ave.	ave.	B - R	ave.	> ave.	> ave.	ave.	> ave.	> ave.
2nd evaluation (IQ)	102	91	85	102	96	75	109	122	109	110	130	120
Intelligence	ave.	ave.	ave.	ave.	ave.	< ave.	ave.	> ave.	ave.	ave.	> ave.	> ave.

*ave. - intelligence in the average range; < ave. – intelligence below average, but in the range of broad norms; > ave. – intelligence above average; B–R, on the border between the norm and mental retardation.

some domains of psychomotor development, but there are other aspects (language, coordination) where they require further intervention. During the second clinical evaluation, differences among the triplets were revealed: each of the children had her own individual trajectory of development and progress. The results revealed problems in language development, non-verbal communication, and socialization in the third individual (patient no. 3) from Triplet Set I. At present he is benefiting from an individual program of early intervention based on the mother-infant relationship. Two sisters

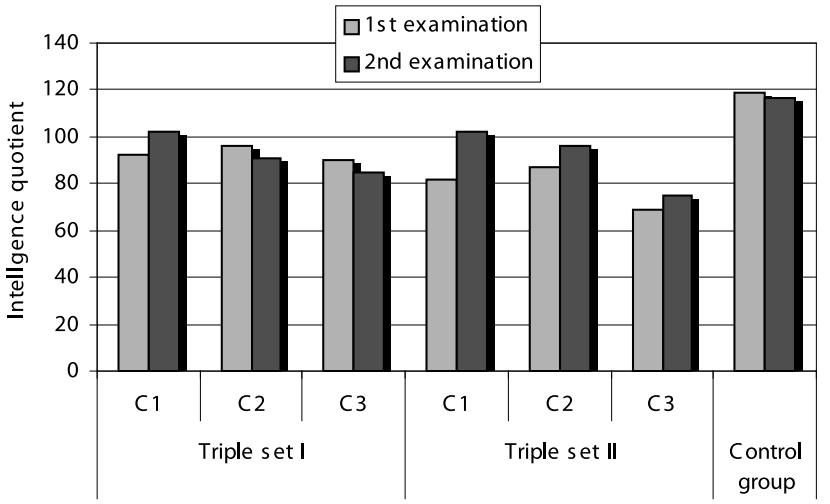

Figure 3. Intellectual development in two sets of triplets and six full-term singletons at the age of 18-19 months, according to the Psyche Cattell Intelligence Scale for Children.

(patients 4 and 5) from Triplet Set II have significantly progressed in their development, which was also visible in their intelligence quotients (Figure 3). The third sister, with the highest level of medical risk at birth, is significantly delayed compared to her sisters and to Triplet Set I. She is benefiting from an intensive rehabilitation program to facilitate her further development.

Table 4 presents the intelligence quotients, which should be treated as a no more than approximate measure of the child's potential capabilities. Due to the early age at assessment, the existence of compensation mechanisms, the developmental risk associated with prematurity, and the rather imprecise assessment tools available, the results must be interpreted carefully.

On the basis of these data it is clear that the children had equalized their delays in cognitive development: e.g two sisters (patients no. 4 and 6) progressed one category higher in the intelligence range. This seems an optimistic development, though, as stated above, the results can only be an approximation of the actual cognitive status and capacity.

Figure 2 illustrates the results of the second evaluation and points out the differences - still significant - between the triplets and the corresponding control groups: more than half the children from the latter group obtained scores above average, whereas none of the triplets reached this level. Further longitudinal, follow -up research is clearly warranted.

CONCLUSIONS

1. The dynamics of psychomotor development are dependent on the perinatal and early postnatal medical risks associated with prematurity. The developmental delays among the examined triplets are associated with

preterm birth, early neurological impairments (patient no. 6), and a psychosocial risk factor over and above prematurity itself: children from multiple births must share the attention and care of the caregivers (Feldman, 2005).

2. The results obtained in the present study are consistent with the available research on this topic. Zazzo (1984) and Feldman (2005) have described language delays in triplet sets, or the possibility of non-verbal communication among triplet siblings, which was also observed in our group of children. The creation of their own "secret" language decreases the children's motivation to communicate verbally with others.
3. The higher the early medical risk, the more stimulation and early rehabilitation the children need to realize the consecutive stages of their developmental potential. It seems important to emphasize that the Institute of Psychology at Gdańsk University offers an innovative program to support the development of high-risk children: students specializing in the psychology of child development regularly visit one set of triplets each and work individually with each child. Similar work is done with 2- and 3-year-old children with autism and kindergarten children diagnosed at risk for dyslexia.
4. An analysis of the psychological workup results enables the psychologist to develop an individual intervention program to stimulate the delayed domains for each child.
5. Our research shows that clinical evaluations in the high-risk infant population should be continued in the form of longitudinal research, and programs broadened with educational and therapeutic interventions.

PART II – THE PSYCHOMOTOR DEVELOPMENT OF PRETERM TWINS

INTRODUCTION

Statistics show that, in spite of the decreasing number of births in Poland, the number of multiple pregnancies, including twin pregnancies, is increasing. In 1990, 5,267 twin children were born alive; by 2005, there were 8,328. As mentioned in part I, multiple pregnancy is a risk factor for preterm delivery: in 2005, half the children from twin pregnancies had not reached the proper birth weight, including 2,711 twins born with low birth weight (less than 2500 g) and 1,768 with very low birth weight (less than 1500 g). In the first year of life, the preterm infant may need the care of a neonatologist and a rehabilitation specialist, as well as consultation with a developmental psychologist. The parents may also require psychological support, especially during the child's hospitalization in the NICU and in the first years of the child's growth and development. Research has found that the mothers of

twins show lower levels of affect attunement (Szjnbegr, Skrinjaric & Jeffers, 1990, cited by Feldman, 2005) and develop a preference for one child immediately after birth (Minde, Corter, Goldberg & Jeffers, 1990, cited by Feldman, 2005). These behaviors and attitudes become settled and develop over time.

Twins have always evoked interest and fantasies concerning their "double" nature. According to anthropologist Claude Levi-Strauss (1994), some primitive/aboriginal cultures emphasize the ideal homogeneity of twins, whereas others underline their antagonistic features, and this dilemma seems to persist to the present day. This can be observed not only in the tendency to dress twin children alike, but also in child-raising behavior. Zazzo (1984) and Cherro (1992) have suggested that the highly specific developmental context created by twinship may lead some parents to polarize the differences between the two children, so that they become two complementary halves of a single whole (Yin-Yang). Thus nullifies their individuality, which in turn influences their development. Zazzo (1984) analyzed the developmental course of 900 twin sets from infancy to adulthood. He pointed out some of their psychological particularities compared to singletons (the presence of a "secret language," introversion, intensification of socialization problems, the dominance of one child) and hypothesized the presence of a very strong bond among twins, a bond that separates these children from the outside world and inhibits their individuation in development.

Apart from emotional maturation, psychomotor and cognitive development have also been assessed. Lis (1974) found a significant influence of birth weight and short stature for gestational age (SGA) on the children's outcomes in this respect. Zazzo (1984) pointed to lower scores in psychological examinations among twin children, especially in the domain of verbal capacities.

The present study aims to:

(1) compare the developmental profile of preterm twins to that of preterm singletons;
(2) analyze the differences within twin sets.

METHOD

Participants. Three groups of kindergarten children were examined:

- preterm twins (group Cryt);
- preterm singletons (control group C1);
- full term singleton children (control group C2).

The mean gestational age of preterm twins was 31.73 hbd, the mean birth weight was 1555 g, and the mean age at examination was 59.36 months. The preterm singletons (C1) were matched for sex, age, gestational age and birth weight with the preterm twins; however, the preterm children from single pregnancies had a slightly higher birth weight (1834.93 ± 757.07 g) than the twins. The results from these two groups were compared to the results obtained from full-term singleton children (C2, n = 115).

The psychological evaluation of the twins was performed as part of a research program focused on preterm infant development, conducted by the Institute of Psychology at the University of Gdańsk, the NICU department at the Gdańsk-Zaspa Hospital, and the Obstetrics-Gynecology Clinic at the Medical University of Gdańsk. The families of 99 preterm children, including 12 sets of twins, took part in the psychological examination. The parents were informed of the possibility of taking part in this assessment by letters or telephone calls.

Procedure. The psychological examination was based on the Columbia Mental Maturity Scale and the Terman-Merrill Scale. These two tests are widely used in Poland to assess the cognitive development of kindergarten children. The Walet interpretation system was used to interpret the Terman-Merrill results. The results of each subscale were analyzed at the appropriate age level. Graphomotor efficiency (manual capacity and perceptual-motor coordination) was assessed on the basis of the revised Spionek test of copying geometrical figures and the Human Figure Drawing Test by F. L. Goodenough. Motor development was assessed on the basis of E. Schopler's PEP-R Test. The mothers filled out a questionnaire about development in early infancy and the child's medical background, and the Child Behavior Checklist for Ages 1.5-5 (CBCL 1.5-5) by Achenbach and Rescorla (2005) .

RESULTS

To calculate the results for the two groups of children we analyzed the components of variance in a mixed model for the fixed factor GROUP, described on two levels – (a) preterm twins and (b) preterm singletons – matched on the basis of two basic features that served as random variables: birth weight and gestational age. The analysis of the data suggested an answer to the question as to whether preterm twin children differ from preterm singletons in their intellectual, motor and speech development, and in the intensity of certain features and behavior.

The results shown in Table 5 do not reveal any statistically significant differences in cognitive development. These children did not differ in terms of IQ or the results from the Terman-Merrill subscales. The column "Expected scores for 54-60-month-old children" presents approximate scores expected from 54- and 60-month-old children, and facilitates the comparison of preterm children's scores to expectations for their age bracket. Preterm singletons and preterm twins differed significantly from their full-term peers (C2), whose results were significantly higher (108.94 ± 10.712). Preterm children (singletons as well as twins) obtained lower overall scores; single or multiple pregnancy was not found to be as significant a factor as the week of gestation and neurological maturity at the time of birth.

The motor development of these children was also analyzed; the data are

presented in Table 6.

Table 6 presents the mean scores on the scales used to evaluate motor development and graphomotor skills. The analysis did not reveal any significant differences: the preterm twins and preterm singletons had similar scores in the evaluated subclasses. Their scores are significantly lower, however, than those of the full-term control group. The control children had significantly higher results in all evaluated scales: graphomotor skills (12.51 ± 3.141), revised Spionek test of copying geometrical figures (11.03 ± 2.769), the Human Figure Drawing Test by F.L. Goodenough (1.47 ± 0.68), and in motor development as measured by the PEP-R (33.82 ± 0.615).

Apart from the evaluation of motor development, psychomotor development in early infancy was analyzed on the basis of a clinical interview with the parents. Once again, no differences were found in the age of acquiring the capacities of head control, sitting, or standing.

The comparison of development also involved language development. Information on this topic was gathered during clinical interviews with the parents (Table 7).

The results presented in table 7 show that the preterm twins did not differ from the preterm singletons. In the domain of language development, twin birth is not an additional risk factor in the group of preterm children.

Table 8 presents the results from the Child Behavior Checklist 1.5 - 5, which assesses behavioral and emotional problems in young children.

Table 5. Comparison of the cognitive development of preterm twins and singletons on the basis of the Columbia Mental Maturity Scale and the Terman – Merrill Scale (Walet interpretation).

Analyzed functions	Expected scores for 54-60 months of age	Twins		Singletons		Univariate F	P
		M	SD	M	SD		
Intelligence Quotient	-	93.29	17.82	91.86	22.93	0.03	0.98
Word comprehension	48	41.81	14.55	40.82	13.91	0.03	0.98
Coordination	48	43.19	17.13	42.86	12.79	0.00	1.00
Arithmetic	48	50.82	24.57	48.00	24.84	0.08	0.94
Memory and concentration	48	44.86	17.12	42.00	15.68	0.17	0.86
Dictionary and verbal fluency	48	47.14	16.79	45.68	16.03	0.05	0.96
Comprehension	48	42.19	15.44	42.09	15.16	0.00	1.00

Table 6. Comparison of the motor development of preterm twins and preterm singletons, as evaluated by the revised Spionek test of copying geometrical figures, the Human Figure Drawing Test by F. L. Goodenough, PEP-R, and parent interview concerning early infancy

Instruments	Twins		Singletons			
	M	SD	M	SD	Univariate F	p
Human Figure Drawing Test (1)	1.36	0.85	0.95	0.84	1.35	0.19
Revised Spionek test (2)	8.95	4.87	8.09	4.29	0.20	0.84
Graphomotor skills (1+2)*	10.32	5.61	9.05	4.76	0.34	0.73
Motor development (PEP-R)	31.86	6.31	31.18	7.24	0.06	0.95
Head control (weeks)** (interview)	6.54	5.36	5.09	3.99	0.54	0.59
Head control (interview)	7.92	6.81	6.75	6.44	0.18	0.86
Sitting (interview)	9.95	6.59	12.20	12.39	0.30	0.77
Standing (interview)	12.80	2.46	13.73	6.33	0.22	0.83

*Sum of the scores from the revised Spionek test of copying geometrical figures and the Human Figure Drawing Test by F.L. Goodenough

**The age of acquiring the capability of head control was coded in weeks, sitting and standing in months.

Table 7. Comparison of language development in preterm twins and preterm singletons on the basis of clinical interviews with parents

	Twins		Singletons		Univariate F	P
	M	SD	M	SD		
Cooing	7.07	3.84	5.82	1.72	1.01	0.32
Single words	13.12	5.64	13.69	5.79	0.06	0.95
Word connection	19.44	9.12	18.69	6.10	0.05	0.96
Basic sentences	22.60	8.63	25.17	9.82	0.44	0.66
Complex sentences	31.38	9.54	31.58	11.34	0.00	1.00

Table 8 presents the results from the CBCL 1.5 - 5 in both study groups. The preterm twins received significantly higher scores in the general CBCL measure (58.59 ± 36.36) than the preterm singletons (38.14 ± 17.09). The preterm twins (5.64 ± 4.42) and preterm singletons (2.86 ± 2.35) also differed in emotional reactivity. The results for the preterm twins on this subscale were also higher than the scores of full term singletons (3.25 ± 2.748). Emotional reactivity is a subscale of "internalizing problems," which was also higher in the preterm twins group (strong tendency). Internalizing problems are defined by over-control, withdrawal, and anxiety. Higher results in the emotional reactivity subscale correspond to behaviors revealing low tolerance for changes, quick mood shifts, panic attacks, and tics in certain situations. The twins differed from the singletons in the rate of sleep problems (4.86 ± 3.50) and other problems (15.68 ± 10.20). These results are consistent with those of Bogdanowicz (1984) and Zazzo (1984), who wrote about introversion and

Table 8. Intensity of behavioral and emotional problems in the twin and singleton groups

	Twins		Singletons		Univariate F	P
	M	SD	M	SD		
CBCL	58.59	36.36	38.14	17.09	2.98**	<0.01
Aggressive behavior	14.09	9.91	10.10	6.21	1.34	0.19
Attention problems	3.82	2.24	3.14	1.82	0.63	0.53
Externalizing problems*	17.86	11.50	13.24	6.87	1.37	0.18
Emotionally reactive.	5.64	4.42	2.86	2.35	3.54**	<0.01
Withdrawn	3.86	3.76	2.71	2.51	0.74	0.46
Somatic complaints	4.23	4.05	2.81	2.16	1.10	0.28
Anxious / depressed	5.27	3.63	4.05	2.97	0.78	0.44
Internalizing problems**	19.00	14.43	12.52	6.80	1.90	0.06
Sleep problems	4.86	3.50	2.67	1.88	3.52**	<0.01
Other problems	15.68	10.20	9.29	5.17	3.60**	<0.01

* The total score in externalizing problems consists of subscores in aggressive behavior and attention problems.

** The total score in internalizing problems consists of subscores in emotionally reactive, withdrawn, somatic complaints, and anxious / depressed.

Table 9. Correspondence profile of preterm twins and singletons

	Twins		Singletons		Univariate F	P
	M	SD	M	SD		
R-Spearman	0.81	0.12	0.94	0.05	5.19***	<0.01
V-Vangelis	0.59	0.22	0.51	0.21	0.41	0.69
R-Spearman	0.94	0.11	0.97	0.05	1.73A	0.10
V-Vangelis	0.90	0.10	0.75	0.31	2.35*	0.03

socialization problems in a group of multiple-birth children. Our group is too small, however, to generalize the results onto the general population.

Prematurity, along with low and very low birth weight, is a major risk factor in the preterm twin group. The results for preterm children, singletons as well as twins, pointed out the importance of early intervention programs, in early infancy and also in kindergarten. In conclusion, our analysis found no evidence supporting the conclusion that 4- and 5-year-old preterm twins and preterm singletons differ in the rate of development.

There is, however, another question concerning this group of children that can be raised at this point: are preterm twin siblings similar in their psychological functioning?

In order to obtain an answer to that question we performed a profile similarity analysis of the functioning of these children in particular aspects of development. The Spearman profile similarity coefficient was used (correlation between the results achieved by twin siblings in analogous scales) and the Vangelis profile convergence coefficient, understood as the average similarity of both profiles regarding the level of particular features (Barańska, 2003; Drwal, 1995). An analysis of the components of variance was also performed in a mixed model for the fixed variable of pregnancy (twin vs. singleton), the random variables of birth week, birth weight, and the child's current age, and profile similarity factors in the area of intellectual functioning as dependent variables (results of the Columbia and the TM), as well as raw data from the CBCL Questionnaire (Table 8).

The analysis presented in table 9 shows the main effect for the CBCL 1.5 - 5 in the compared groups. The effect of similarity variance is more significant in the twin group than in the control group. There exists among the twins, much more strongly than in the control group, a marked differentiation in respect to siblings, as indicated by the significantly higher variance in the result of the Spearman similarity factor for the CBCL in the group of twins.

Twins and singletons also differed (the difference is not great but nevertheless statistically significant) in terms of the similarity of their intellectual profiles. In the group of twins there is a relatively high similarity in intellectual profiles. The variance of results in the twin group is significant, which indi-

cates the significant number of complementary twins in the sets we studied. The particular characteristics of these twins - one child was blind (ROP V), one had cerebral palsy and significant neurological impairments - may have influenced the analysis, but the rate of cognitive development in the twin sets is more similar and homogeneous than the CBCL 1.5 - 5 profile. This may be a result of genetic factors, but environmental factors cannot be ruled out, especially in the situation of preterm birth.

CONCLUSION

1. No significant differences in cognitive and psychomotor development were found in the group of examined preterm twins and singletons.
2. The mean cognitive development of preterm children, twins as well as singletons, was significantly lower than in the full-term singletons group.
3. The analysis of behavioral and emotional problems in the group of preterm twins found a higher rate of internalization problems (associated with overcontrol, anxiety, withdrawal), sleep problems, and other problems than in the preterm singletons group. The study group was too small, however, to generalize these results onto the entire twin population.
4. A comparison of the profile of preterm twins and preterm singletons indicated higher variance in the results from the Child Behavior Checklist 1.5 - 5 in the twin sets, which can be explained theoretically in the light of complementary personalities and the contrast effect in the maternal representation of twin children.
5. Our results justify respecting the individual development trajectory and individuating child-rearing practices for each of the twins.

PART III – THE PSYCHOMOTOR DEVELOPMENT OF CHILDREN FROM MULTIPLE PREGNANCIES: A COMPARISON OF RESEARCH FROM THE 1970S AND THE CURRENT RESULTS

The present study constituted an expansion of previous work by M. Bogdanowicz (1974; Kamińska et al. 1973). In the earlier research, psychological examinations were conducted on 56 children born from multiple pregnancies (quintuplet, quadruplet, 18 sets of triplets) in the province of Gdańsk between 1957 and 1972. Of the 56 examined children, 32 were born preterm. In this group there were 27 children (ca. 63%), including quadruplets and a quintuplet, who showed normal motor development. However, in comparison with the general population, twice as many children from multiple pregnancies (triplets) showed delayed mental development (15 children, ca. 27%), while mental retardation was diagnosed in 6 children (11%). These figures represent four times the rate of occurrence in the general population. Out of

30 children attending school, half had difficulties in learning; of these, 4 had repeated a year and 1 had ceased to attend school. These results seemed to have been affected by socioeconomic factors, in that 39 children had difficult or even extremely difficult living conditions (they lived in rural communities, with parents who had a vocational education at best), which added another risk factor for normal mental development.

In the earlier study, the analysis of psychomotor development in the first 3 years found retardation in 19 cases, mainly in the domain of speech and motor development, which is consistent with the results found in the two sets of triplets described in part I above, and in preterms, multiples as well as singletons. Bogdanowicz (1974; Kamińska et al. 1973) found a higher rate of emotional and behavioral problems. In the group of 56 children, 11 displayed emotional reactivity, a tendency to aggressive behavior, and negativism. Emotional difficulties were found in 14 of the 56 children (25%), the most frequent manifestations being nocturnal enuresis, mutism reaction, anxiety, and night terrors. Similar results were obtained for the preterm twins described in part 2 above.

The conclusions reached by Bogdanowicz (1974; Kamińska et al. 1973) are supported by the current results:

1. The psychomotor development of children from multiple pregnancies does not differ as a general rule or across the board from that of singletons.
2. Children from multiple pregnancies are at risk for developmental problems because of prematurity; preterm delivery has a stronger effect on child development than multiple pregnancy.
3. It is essential to analyze the development of each child separately. The development of the children we examined is affected - apart from early medical conditions - by the level of environmental protection and the presence of risk factors, as well as by the individual history and the role in the family, which even in monozygotic twins may be different.
4. The development of medical technology and the popularization of early rehabilitation methods have created greater possibilities to help preterm children. Our research, both current and from the 1970s, has found that preterm infants require stimulation of psychomotor development in infancy, as well as in the preschool years.

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