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INTELLECTUAL AND COGNITIVE FUNCTIONS OF PREMATURELY BORN CHILDREN AT TEN YEARS OF AGE

Mariola Bidzan[1], Katarzyna Guzińska[1], Karina Kulikowska-Ciecieląg[2]

[1] Institute of Psychology, University of Gdańsk, Poland
[2] Institute of Obstetrics, Medical University of Gdańsk, Poland

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SUMMARY

Background. *The purpose of our research was to investigate the intellectual and cognitive functions of premature babies at ten years of age.*

Material and methods. *35 children (15 preterm and 20 born at term) and their parents participated in the study. We used the Wechsler Intelligence Scale for Children-Revised (WISC-R) and a questionnaire containing demographic data and medical parameters.*

Results. *The premature children we studied did not differ significantly from the children born at term in terms of overall intelligence, and even showed a tendency to higher scores in the Information sub-scale, but their results were significantly lower in the Vocabulary and Block Design sub-scales. Premature children born to large families, with older parents, and weighing more at birth present a significantly lower level of visuo-motor intelligence in terms of visual analysis and synthesis, as measured by the Picture Completion sub-scale. Premature children with older fathers, born after a longer pregnancy, with a higher birth weight and a higher Apgar score showed a significantly higher level of motor intelligence in such skills as anticipating events, as measured by the Picture Arrangement sub-scale.*

Conclusions. *Our preterm children did not differ from children born at term in respect to general intelligence level, but they presented a significantly lower level of non-verbal intelligence in some domains than children born at term.*

INTRODUCTION

According to the World Health Organisation, a termination of pregnancy between the 22nd and 37th week is called a premature birth (Czajka, 2004). It is estimated that each year about 7 to 10% of pregnancies in Poland end before this deadline, which means that for each 17 children born at term 1 premature baby is born. This means that annually from 30,000 to 50,000 children are born prematurely (Norska-Borówka 1986; Kibalenko 1988; Ejmowska-Ambroziak & Kociszewska-Najman 2000; Helwich 2002). In Poland about 1.5% of children are born very prematurely, which means before the end of the 32nd week of pregnancy (Helwich 2002). As can be concluded from the research, in the case of prematurely born babies there are more problems connected with the immaturity of the subcortical centres of the brain regulating basic life functions, in comparison with children born at term. It is estimated that:

– about 2/3 of premature babies fall ill with various infections, more often than children born at term, and/or have trouble with breathing;
– 19% of premature babies die during the perinatal period;
– premature babies fall ill 10 times more often to poliomyelitis, compared to children born at term;
– premature babies are more prone to partial loss of sight, lung disease, and mental retardation.

In Poland alone about 4,000-5,000 premature babies require special medical treatment (Osuch-Janewska 1993; Anderson et al. 1996; Kapusta 1997).

Only a few studies have focused not only on the physical aspects related to premature birth, but also on the psychological problems (Lis & Janus-Kukulska 1974; Cohen 1986; Zdańska-Brinken & Kurniewicz-Witczakowa 1986; Gwiazda 1988; Lee & Barratt 1993; Torrioli et al. 2000; Chlebna-Sokół et al. 2003a, 2003b; Chrzan 2007; Chrzan-Dętkoś & Bogdanowicz 2007). In some studies it has been suggested that micro-damage to the central nervous system in the case of premature babies may lead to worse intellectual functioning. For this reason many parents of prematurely born children experience intense anxiety connected with the development of their intellectual and cognitive functioning. Nevertheless, the conclusions drawn from the available research are not unequivocal (Dilling-Ostrowska 1970; Ziemska & Ślusarska-Kowalewska 1973; Lis 1979; Zdańska-Brinken & Kurniewicz-Witczakowa 1986; Escobedo 1988; Kibalenko 1988; Chrzan 2007; Chrzan-Dętkoś & Bogdanowicz 2007). Some authors, e.g. Smedler et al. (1992), Hack et al. (1995), Korzon et al. (1998), Taylor et al. (2000), Bhutta et al. (2002), Schneider et al. (2004), Vasta et al. 2004, and Chrzan (2007), claim that in the case of prematurely born children, especially boys, more problems connected with behaviour (e.g. ADHD) and learning may occur in the long run. Some researchers, however, estimate that about 65% of premature babies catch up with their contemporaries in terms of physical, emotional and intel-

lectual development (Kibalenko 1988; Torrioli 2000; Vasta 2004). Moreover, it seems clear that the level of intelligence is also influenced by the home atmosphere, which is manifested by in, among other things, parental attitudes and the quality of the marital relationship (Ziemska 1973; Lis & Janus-Kukulska 1974; Lis 1975; Rembowski 1978; Rostowski 1986; Hack et al. 1995; Gwiazda 1998; Vasta et al. 2004; Moore et al. 2006).

The aim of our research was to investigate the intellectual and cognitive functions of premature babies at ten years of age. We wanted to ascertain the level of intellectual and cognitive functioning in prematurely born children in comparison to children born at term, with reference to chosen demographic and medical parameters. In particular, we asked the following questions:

1. Do children born prematurely differ in the level of verbal and nonverbal intelligence from children born at term?
2. Do any differences that may occur between children born prematurely and children born at term coexist with measurable demographic and medical parameters, such as:
   – length of pregnancy;
   – course of delivery;
   – weight at birth;
   – Apgar score;
   – age, education and material status of parents?

MATERIALS AND METHODS

Our research covered 35 children, all 4th grade students at a primary school. The experimental group (group E) was composed of 15 children 10 years of age, born prematurely (between the 28th and 36th week of pregnancy) at the Clinic of Obstetrics and Gynaecology of the Gdańsk Medical Academy. The control group (group C) included 20 children 10 years of age, born at term, attending a randomly chosen primary school in Gdańsk.

The research consisted of two stages. During the first stage an approximately 2-hour-long examination was conducted in the family environment. During the second phase the parents were acquainted with the results of the examination.

Both parents gave their consent in each case for their child to be examined.

The basic data concerning the examined children are presented in Tables 1 and 2.

When the data contained in Tables 1 and 2 concerning the length of pregnancy were examined, it turned out that all these premature babies were born between the 28th and 36th week of pregnancy, with an average duration of pregnancy of 33 weeks. The average birth weight of these premature children was 2191 g; the smallest one weighed 1150 g at birth, and the largest 3120 g. Four of the group E children had been in good clinical condition after birth, 10 were unstable, and 1 was critical. In group C the average weight at birth

was 3417 g; the smallest child weighed 2650 g, and the largest 4200 g. All the children in this group had been in good clinical condition after birth.

Both the average birth weight of the children (t = 6.455) and their Apgar scores (t=6.522) were significantly lower in group E than in group C (p = 0.0005).

It should be stressed that all the children from group C scored in the highest bracket on the Apgar scale (8-10); it is estimated that about 77% of children achieve this score after birth. On the other hand, only 4 children from group E made this range on the Apgar. Another 11 children scored between 3 and 7 points on the Apgar scale, a bracket that accounts for only 17% of all babies. No results between 0-2 were noted (Kennel & Marshall 1982).

Tables 3 and 4 present basic data concerning the parents of the examined children, while Table 5 gives the distribution of the parents' ages in both groups.

The data included in Tables 3-5 indicate that the groups E and C were homogenous in terms of their structure and components, and also the material conditions and education of the parents. Only the average age of the parents differed between groups. Both the mothers and the fathers of premature babies were on the average much older than the parents of children born

Table 1. Characteristics of premature babies (group E) with reference to duration of pregnancy, Apgar score, and birth weight

No.	Length of pregnancy	Apgar score	Birth weight
1	35	7	2360
2	33	8	2500
3	36	6	2800
4	35	7	2920
5	32	6	1800
6	35	5	2300
7	29	5	1370
8	36	8	2650
9	36	8	3120
10	34	7	2100
11	29	5	1200
12	36	8	3000
13	34	7	1700
14	28	3	1150
15	32	6	1890
mean	33	6	2191
SD	2.8	1.5	654.6

at term. The mothers of premature babies averaged 5 years older than the mothers of children born at term, and the fathers of premature babies averaged 7 years older. The differences between the two groups were statistically significant (p = 0.005). Such an age distribution is not surprising, since it can be concluded from studies by many authors that older women are more prone to deliver their babies prematurely (Chazanow 1983).

The following research tools were used:

– A questionnaire containing demographic data and medical parameters, including among other things the length of pregnancy, the course of delivery, the weight at birth, the Apgar score (which assesses the most important life processes: pulse, respiration, muscular tension, reaction to pain of

Table 2. Characteristics of children born at term (group C) with reference to Apgar score and birth weight

No.	Apgar score	Birth weight
1	8	3100
2	10	3200
3	8	2650
4	9	3170
5	8	3100
6	9	3880
7	8	3740
8	10	3550
9	9	3000
10	9	4200
11	8	4000
12	10	3500
13	9	3125
14	9	3800
15	8	3800
16	9	3150
17	10	3600
18	10	3920
19	9	2950
20	9	2900
mean	9	3417
SD	0.8	434.6

Table 3. Demographic characteristics of parents of premature babies (group E)

No.	Mother's age	Father's age	Mother's education	Father's education	Material conditions	No. of children
1	43	44	Secondary	Secondary	Average	2
2	50	57	Vocational	Vocational	Average	3
3	48	58	Vocational	Vocational	Good	2
4	45	46	Vocational	Vocational	Bad	5
5	42	46	Secondary	Vocational	Average	2
6	47	50	Secondary	Vocational	Good	2
7	34	35	Primary	Vocational	Good	2
8	44	56	Secondary	Secondary	Good	4
9	44	56	Secondary	Secondary	Good	4
10	41	54	Secondary	Higher	Average	2
11	35	37	Secondary	Vocational	Good	2
12	43	45	Secondary	Vocational	Good	2
13	34	36	Vocational	Vocational	Good	2
14	47	46	Secondary	Secondary	Average	2
15	41	42	Secondary	Higher	Good	3

medium intensity, skin colour), and the age, education and material status of the parents;

– the Wechsler Intelligence Scale for Children (WISC-R).

In order to analyze the data, we used the SPSS computer package licensed by the University of Gdańsk. In order to compare the means, the t-Student test for independent groups was used. In order to assess the existence of relations between the investigated variables, the r-Pearson correlation method was applied.

RESULTS

The premature children we studied did not differ significantly from the children born at term in terms of overall intelligence, though there was a tendency towards a somewhat lower level of intelligence in the case of premature babies. No statistically significant differences in verbal intelligence were observed. On the other hand, the level of nonverbal intelligence was different in the two groups: the children from group E scored lower in this domain. The mean non-verbal IQ for prematurely born babies was 104, while for the children born at term it was 112 ($p = 0.1$, n.s.). However, statistically significant differences were observed in the case of two sub-tests of the WISC-R, on which the children from group E achieved significantly lower results:

Table 4. Demographic characteristics of parents of children born at term (group C)

No.	Mother's age	Father's age	Mother's education	Father's education	Material conditions	No. of children
1	34	37	Secondary	Secondary	Good	2
2	39	40	Vocational	Vocational	Good	3
3	42	43	Secondary	Higher	Good	3
4	31	38	Secondary	Higher	Good	4
5	36	37	Secondary	Secondary	Average	4
6	38	36	Secondary	Secondary	Average	2
7	37	40	Secondary	Secondary	Average	5
8	36	38	Secondary	Secondary	Good	2
9	44	45	Vocational	Vocational	Bad	8
10	44	52	Vocational	Vocational	Average	4
11	38	38	Higher	Higher	Average	3
12	40	50	Secondary	Vocational	Average	2
13	33	34	Secondary	Secondary	Average	2
14	48	54	Secondary	Secondary	Good	3
15	40	40	Higher	Secondary	Good	2
16	31	35	Secondary	Secondary	Average	3
17	36	38	Higher	Higher	Good	4
18	36	40	Secondary	Vocational	Good	2
19	35	37	Vocational	Vocational	Good	2
20	35	37	Vocational	Vocational	Good	2

Table 5. Distribution of parental age in groups E and C

Group	Mothers				Fathers			
	mean	SD	min.	max.	mean	SD	min.	max.
E	43	5	34	50	47	7.8	35	58
C	38	4.4	31	48	40	5.6	34	54

X – age in years
SD – standard deviation

Test t (for mean age of mothers) = 3.06
Test t (for mean age of father) = 3.00

Table 6. Comparison of mean results achieved by groups E and C in the Wechsler Intelligence Scale for Children (WISC-R)

WISC – R	Group E		Group C		Test t
	mean	SD	mean	SD	
Full Scale	105.8	12.2	110.3	11.6	1.07
Verbal Scale	106.3	10.7	106.8	9.8	0.11
Performance Scale	104.3	13.9	112.3	13.5	1.65*
Information	11.1	2.8	10.5	1.9	-0.71
Similarities	12.1	2.6	11.5	2.4	-0.65
Arithmetic	9.8	2.3	10.4	2.8	0.68
Vocabulary	9.9	1.8	11.1	2.0	1.79**
Comprehension	12.3	2.2	12.2	2.3	-0.15
Digit Span	9.9	2.5	10.7	2.8	0.82
Picture Completion	10.2	2.8	11.0	2.5	0.86
Picture Arrangement	13.0	2.8	13.6	2.9	0.55
Block Design	10.7	2.6	11.7	2.7	0.99
Object Assembly	10.1	3.2	12.7	2.4	2.53***
Coding	8.7	3.2	9.7	3.8	0.75

Vocabulary ($p = 0.05$) and Object Assembly ($p = 0.01$, see Table 6).

Table 7 lists the subtests of the WISC-R that correlated significantly (r-Pearson) with one or more of the medical or demographic parameters for which we gathered data.

Children born prematurely in large families, with older parents and larger birth weight showed a significantly lower level of visuo-motor intelligence in respect to visual analysis and synthesis, as measured by the Picture Completion subtest. On the other hand, older fathers, longer pregnancy, a higher birth weight, and a higher Apgar score correlated with a higher level of motor intelligence among premature babies in terms of the ability to anticipate events, as measured by the Picture Arrangement subtest, in comparison to children born at term.

In the case of children born at term a correlation was observed between:

– the age of the parents and the results obtained in the Understanding subscale (the higher the age of the parents, the better developed the ability of the children born at term to understand social situations);
– the material status of the parents and the results in the Similarities subtest (the higher the material status of the parents, the better developed the capability of abstract thinking in children born at term);
– the father's education and the Apgar score, and the results in the Digit

Table 7. Significant correlation (r-Pearson) of results obtained from selected sub-tests of the Wechsler Intelligence Scale for Children (WISC - R) with demographic and clinical variables

WISC subscale	Variable	r-Pearson	p
Picture Completion	Weight	-0.64	0.01*
	Mother's age	-0.73	0.00*
	Father's age	-0.52	0.05*
	Number of children	-0.58	0.02*
Picture Arrangement	Weight	0.55	0.03*
	Apgar	0.59	0.02*
	Length of pregnancy	0.60	0.02*
	Father's age	0.59	0.02*
Understanding	Mother's age	0.54	0.01*
	Father's age	0.45	0.05*
Similarities	Material conditions	0.54	0.02*
Digit Span	Apgar	-0.54	0.02*
	Father's education	0.46	0.04*

Span subtest (the better the education of the father and the higher the Apgar score, the better the ability to concentrate and the stronger the working memory of the children born at term).

DISCUSSION

Our results suggest that the general level of intellectual development of premature babies at the age of 10 does not differ significantly from the level of children born at the same time, but at term. This conclusion is supported by, among other things, research on children prematurely born with a birth weight lower than 1500 g (Kennell & Marshall 1982; Korzon et al. 1998; Scherman & Schedin 2004; Chrzan-Dętkoś & Bogdanowicz 2007), which indicates that even in the case of an extremely low birth weight over 90% of premature babies are free from physical and mental impairments, if the children are brought up in supportive environmental conditions. It should be noted, however, that the average overall IQ in the experimental group was 5 points lower than in the control group, though this difference did not reach the level of statistical significance. This is generally consistent with other reports in the literature (e.g. Bowen et al. 2002; Bohm et al. 2002; Schneider et al. 2004; Chrzan 2007). The level of verbal intelligence of premature babies remains at the same level as in the case of children born at term. This is in accordance with the results of other studies, conducted e.g. by Korzon et al. (1998), which point out a tendency for the difference to diminish as the child's

age progresses. On the other hand, in the case of non-verbal intelligence, the prematurely born babies do not quite keep up with children born at term. Tasks requiring practical solutions are more difficult for them. This is especially clear in the case of the Object Assembly subtest, which measures visuo-motor coordination and the ability to create a whole by discovering the internal relations between the elements of the whole. Obvious delays in the development of the visuo-motor perception in premature babies have also been confirmed by the studies of Chlebna-Sokół et al. (2003).

The lower non-verbal IQ in our premature children remains consistent with the results of the studies of other authors (Davis 1951,cited by Lis 1979; Ronne – Jeppesen 1971, cited by Lis 1979; Vasta et al. 2004; Chrzan-Dętkoś & Bogdanowicz 2007). Davis (1951) and Ronne-Jeppesen (1971) also claimed that prematurely born children had greater problems with, among other things, the Picture Assembly subtest. The factor that could have the greatest influence on lowering the results in this scale, which has been pointed out by researchers (e.g. Krasowicz-Kupis & Wiejak 2006), is damage to the central nervous system in the case of these children, because no other factors that could lower the results in this scale have been discovered: e.g. motor skill disorders, which could negatively influence the manipulative skills, were not present in any of these children; vision impairments, which could affect the level at which the test tasks were performed, were corrected with the use of appropriate glasses (Lis 1979; Helwich 2002).

In our independent study a significantly lower result was obtained by the prematurely born children, in comparison to those born at term, in the Vocabulary sub-scale. This did not influence, however, the general result in the verbal scale, because this difference was counteracted by the results of three other sub-scales (Information, Similarities, Comprehension), in which the premature babies scored higher than the children born at term. The results obtained by the premature children in the Vocabulary sub-scale were, nevertheless, not consistent with those of some other studies (e.g. Lis 1979), but there exist studies confirming our position as well, which underline that premature babies, especially those with a lower birth weight compared to the foetal age, achieved worse results in the verbal tests (Wolke 1998; Wolke et al. 2001; Schneider et al. 2004). It seems clear that the lower result achieved in our research by the premature babies, like all performance scales, could be influenced by microlesions in the brain, which occur much more frequently in the case of these children. Many researchers agree that premature babies have generally less mature brain patterns (Helwich 2002). Usually lower results in this scale are explained by the fact that the child is in an inappropriate and unfriendly environment or has experienced early brain damage. The latter factor, present in the case of the children we investigated, is much more probable, because, as mentioned in the introduction, premature children are more prone to suffer from brain damage during delivery due to their immaturity, and apart from that the premature children taking part in our

research were brought up in environmental conditions that did not differ much from those of the children born at term.

Intra-group comparison of the results obtained in each of the WISC-R sub-tests revealed that children from both groups had problems with doing the same tasks (Coding, Arithmetic and Digit Span), which means that in the population of children we investigated disorders of the measured functions are not specific to those born prematurely. Premature children had problems only with Object Assembly and Vocabulary, while the children born at term encountered problems in the case of the Information sub-scale. The higher result achieved in this scale by the premature babies may be connected with their specific situation after birth. In many cases, the parent's fear and anxiety that their child's development will not be normal makes them stimulate the development of various functions in an enhanced way in early infancy (Wolke 1998; Zunyu et al. 2004; Moore et al. 2006, Pachalska et al. 2007). It is also worth noting that in similar WISC-R sub-tests children from both groups received the highest scores (Picture Arrangement, Comprehension, Similarities). Analogous studies were conducted in Poland by Lis (1979), and brought (apart from the result in the Coding sub-test) different results. These discrepancies were probably caused by the fact that the children we examined, unlike the children studied by Lis, had a good family situation and lived in a friendly home atmosphere, which undoubtedly influenced their development in a positive way and greatly enhanced their chances to achieve results similar to those achieved by children born at term. It may be concluded, therefore, that if premature children are provided with friendly development conditions, their intellectual level does not have to differ from that of children born at term. Minor differences may be visible only in those cognitive spheres that are heavily influenced by micro-lesions to the brain, or to vision impairments, which are frequently present in thsese children (Helwich 2002; Vicari et al. 2004).

The research conducted by Chlebna-Sokół et al. (2003) also brought different results. In the case of more than half of the children aged 4-7 they investigated, these researchers observed a delay in intellectual development and / or the impairment of numerous cognitive functions. Such a result may well have been caused, however, by a different way of establishing the group, which consisted of premature babies with both extremely low and very low birth weight. Our research did not include such children. The studies conducted so far indicate that a low birth weight and a deficit in the circumference of the head (which may be connected with that) may have a significant practical meaning as a prognostic indicator of disorders in the intellectual development of premature babies (Chlebna-Sokół et al. 2003a, 2003b). Premature birth that is not connected with low birth weight may not bring such negative results in further intellectual functioning.

In the group of premature children, a negative correlation was observed

between the result in the Picture completion sub-scale and the birth weight of the child, the age of both parents, and the number of children in the family.

The problem of the birth weight of prematurely born children has been an object of interest for many scientists (e.g. Chlebnicka-Sokół et al. 2003; Dezoete et al. 2003; Helwich 2002; Chrzan 2007; Chrzan-Dętkoś & Bogdanowicz 2007). These studies indicate that the birth weight of children has a significant impact on their intellectual development, especially motor functions. Nevertheless, although the existence of a positive correlation in this aspect is often stressed (e.g. Chlebnicka-Sokół et al. 2003), some authors (e.g. Dezoete et al. 2003) indicate that even in the case of children with a very low birth weight a negative correlation with the level of some cognitive functions is observed in development.

A higher age of the parents is also connected with a lower level of motor intelligence in the Picture completion sub-scale. On the basis of research conducted by developmental psychologists, it can be inferred that with age people exhibit a decreasing dynamic in their behaviour and lower psychomotor stamina. Their reduced abilities in terms of psycho-motor stamina, including perceptiveness, are transmitted in the children's behaviour on the basis of modelling.

One of the main reasons for a drastically lower level of visuo-motor intelligence in the spheres of visual synthesis and analysis in larger families may be the factor of time (the lack of it for stimulating the development of prematurely born children) and the delegating of caretaking to other children, who are often too small to play their roles well.

In the group of children born at term, different connections were observed, and therefore different factors influencing the level of intellectual and cognitive functioning. A higher birth weight, a greater number of points in the Apgar scale, a longer pregnancy and a higher age of fathers influenced the group of children born at term in terms of the level of functions measured in the Picture Arrangement sub-scale.

According to many scientists, a higher birth weight and a longer pregnancy have a crucial meaning for the level of intellectual and cognitive functions (Chlebna-Sokół 2003b), due to the greater maturity of the central nervous system at the moment of birth and onwards.

Researchers have also dealt with the relation between the Apgar score and intellectual development in early childhood. The results obtained have not been unequivocal, although some, e.g. Vasta et al. (2004), have discovered positive correlations in this sphere, as occurred in our research, also. It is stressed, however, that the methods used to assess infants are not unequivocal predictors of the final intellectual level, if they are considered in separation from other risk factors (Sameroff et al. 1993, after: Vasta et al. 2004).

The relation of the fathers' age with the child's level of intelligence may result from a usually stable professional and material situation, which can affect the possibility to devote more time to the child and provide stimulation in all spheres of development, together with exhibiting greater maturity as

a father. What is also worth noticing is the relation of the age of the parents of children born at term with the result achieved in the Comprehension Scale. A higher age seems to be often connected with a higher level of parental and social competencies, devoting more time to the child and giving appropriate stimulation in all spheres of development, which may result in achieving better results in understanding social situations.

In the case of children born at term, it was also the material status that influenced the development of abstract thinking in a positive way. The material conditions have an effect on satisfying the child's basic living needs, therefore concentrating on concrete material goods, which in turn is a trampoline to developing higher intellectual functions, e.g. abstract thinking. This may be connected on the one hand with what some authors call "enriching the environment", so with a background enhancing cognitive functions (e.g. books, computer programmes), and on the other hand with a smaller number of stressful situations, connected for example with financial problems, and a more frequent opportunity to use professional medical and psychological help, when it is needed (Dudley et al. 1993; Hack et al. 1995; Caharpak 2003).

This has also been confirmed by research conducted by other authors (Dudley et al. 1993; Vasta et al. 2004; Chrzan-Dętkoś & Bogdanowicz 2007).

CONCLUSIONS

Our results suggest the following conclusions:

- Premature children do not differ significantly in terms of overall intelligence from children born at term. What we observed was only a tendency towards somewhat lower global IQs in premature children.
- Premature babies do not differ significantly in terms of verbal intelligence from children born at term.
- Premature children present a significantly lower level of non-verbal intelligence than children born at term.
- Premature children, in comparison to children born at term, achieve significantly lower results in the Vocabulary and Block Designs subtests of the WISC-R, but also show a tendency towards higher scores in the Information sub-test.
- Premature children and children born at term achieved similar results in the Picture Arrangement, Comprehension, and Similarities sub-tests of the WISC-R.
- Premature babies, compared to children born at term, who are born in large families, to older parents, and had a higher birth weight, present a significantly lower level of motor intelligence in terms of visual analysis and synthesis, measured by the *Picture Completion* sub-scale.
- Premature children, compared to children born at term, with older fathers, longer pregnancy, a higher birth weight, and a higher Apgar score are characterized by a significantly higher level of visuo-motor intelligence in

respect to such skills as anticipating events, which is measured by the *Picture Arrangement* sub-scale.

– Children born at term are characterized by a mutual relation between the chronological age of their parents and their results in the Comprehension sub-test; this means that the higher the age of the parents, the better the child's ability to understand social situations; the material status of their parents, and the results achieved by them in the *Similarities* sub-scale; it means that the higher the material status of the parents, the better the capability of abstract thinking.
– Children born at term are characterized by a mutual relation among the father's education, the Apgar score, and the results from the Digit Span sub-test; this means that the better the father's education and the higher the Apgar score, the better the ability to concentrate attention and use working memory.

A premature birth is not a sufficient and unequivocal basis to predict the level of development of intellectual and cognitive functions. Non-intellectual factors also influence the development of intellectual and cognitive functions. What should be stressed here is a very optimistic message carried by our research: although we have little influence on whether our child will be born prematurely, or at term, we do have an impact on the family environment, which should be encouraged to provide the child with broadly conceived care and trust, given the possibility of irrevocable damage to the intellectual and cognitive abilities of children.

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Correspondence address:
Mariola Bidzan, Ph.D.
Institute of Psychology, University of Gdańsk
Pomorska 68, 80-343 Gdańsk
e-mail: psymbi@univ.gda.pl

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