

## DEVELOPMENTAL PSYCHOLOGY

# Parent Responsiveness and its Role in Neurocognitive and Socioemotional Development of One-Year-Old Preterm Infants

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**Background.** It has been demonstrated that preterm birth negatively affects the neurocognitive and socioemotional development of a child. It is therefore important to identify the factors that can decrease potential risks for atypical development in preterm infants. The social environment which surrounds a child is considered to be one such factor. We hypothesize that parent responsiveness positively influences the development of a preterm child.

**Objective.** The purpose of this research is to reveal differences in the development of two one-year-old preterm children whose parents have exhibited opposite types of parent responsiveness.

**Design.** Based on the analysis of video recordings of child-parent interactions, we identified two children whose parents registered opposite patterns of responsiveness. Parent responsiveness was measured based on Parent Responsiveness Markers Protocol methodology. The Bayley-III was used to assess the children's cognitive and socioemotional development.

**Results.** We identified that the preterm child whose parent showed a high level of parental responsiveness had normative levels of neurocognitive development, socioemotional skills and adaptive behavior. The preterm child, whose parent showed a low level of parental responsiveness, scored lower on the Bayley-III.

**Conclusion.** Preterm birth not only affects infant development, but also has a psychological impact on parents, evoking fear and anxiety for their child. This affects parental behavior and their responsiveness towards their child. This study showed that parent responsiveness has a positive effect on the neurocognitive and socioemotional development of a preterm child. Further research should focus on assessing the role of parent responsiveness in child development using a larger sample.

### **Keywords:**

parent responsiveness, preterm child, early parent-child interaction, early socioemotional development, neurocognitive development, Bayley Scales III.

## **Introduction**

Social learning happens from birth itself and is driven by the child's orientation towards another human. While the course of such orientation depends on biological precursors, the caregivers' behavior and the quality of emotional contact that develops between a child and a caregiver play a more critical role (Mukhamedrakhimov, 2001; Kholmogorova, 2016). Research suggests that the brain has the potential to develop exponentially during the first years of life, a process that slows down towards adolescence (Boryeson et al., 2009). This potential could be maximized or constrained by a caregiver who facilitates important environmental inputs such as love, acceptance, understanding, and a recognition of the child's needs (Galasyuk & Shinina, 2007). The relationship between parental behavioral patterns and the neurocognitive and emotional development of both typically and atypically developing children are described in a range of research (Boryeson et al., 2009; Klain, 2010; Odinkova, 2015; Shpits, 2000; Skoblo, Belyanchikova, & Trushkina, 2005; Greenspan, & Wider, 2017; Call, 1984; Girolametto, 1999).

The term "parent-child interaction" refers in general to joint activity between a child and a parent (Andreeva, 2007), and is precisely defined behavior or a set of behaviors that can be observed and assessed (Mukhamedrakhimov, 2001).

In Russia, one of the most developed and in-depth methods standardized for the observation of adult communication and interaction with a child is the approach created in the School of Communication's ontogenesis by M.I. Lisina (Lisina, 2007), which, unlike other current, widely used international procedures involving the use of video recordings and observation scales, is standardized on a Russian sample.

One of the key characteristics of parent behavior is parent responsiveness that relates to the frequency, intensity, and type of parent reactions toward a child's needs. Parent responsiveness has the following key features: immediacy, urgency; suitability to situation and circumstances (contingent); positive emotions, affectively positive reactions; parent's ability to follow the current focus of a child's attention (Landry, Smith, & Swank, 2006). It has also been demonstrated that different aspects of parental responsiveness are associated with a child's future academic success (Fey et al., 2006), inquisitive behavior during playing, speech development, and the child's ability to cooperate (Landry, Smith, & Swank, 2006).

From birth, children exhibit a wide spectrum of signals to attract parental attention, including sensory, perceptual, and motor skills (Ovcharova, 2006). However, these signals are not always well-read by parents. Many reasons may explain a parent's inadequate reaction towards the typical behavior of a developing child. These include low communication competencies of a parent, inability to regulate one's own emotions, inability to adequately express emotions, the a heightened level of anxiety, depression, and low criticality (Karabanova, 1997; Maler et al., 2018; Ivanova, 2010).

A child's physical pathologies, genetic anomalies, and the preterm birth factor may create an inability in the mother to see the 'child's beauty' (Kalinina, 2014). In such cases, a mother might be unable to adequately perceive a child in line with her abilities.

Observational research studies identified some mother-child micro-interactions that could also negatively affect the emotional well-being of a child and increase the

risk of psychopathology. In psychoanalytic terminology, in such situations, a mother, due to a distorted maternal image, fails to be sensitive to the emotional needs of her child and so remains emotionally inaccessible (Kalinina, 2014).

This plays a critical role in our research which focusses on parent-child interactions specific to mother-preterm child, and aims to show that the mother's pattern of interaction with such a child may be a consequence of its preterm birth.

Situation-specific aspects of parenting preterm children, during the first year of life, include prolonged separation of a newborn from its mother, due to the child requiring intensive care. Such separation may negatively affect the psychological state of a parent: it is common for parents to experience fear of their child's potential death. It has been identified that this kind of parental anxiety further affects the neurocognitive and socioemotional development of a premature child (Hadfield et al., 2017). While parenting at home, any negative emotions experienced by the parents may be further aggravated by their realization that the child requires special care and protection, which in turn may cause parents to feel inadequate and result in a disadaptive attachment between the parents and the child. Frequently, parents perceive such a child as more vulnerable physically and emotionally, even without obvious reasons (Ivanova, 2010).

Finally, a child's age and periods of developmental crisis, postulated by Lev Vygotsky's and Pavel Blonsky's works, play an important role in parent responsiveness. Katerina Polivanova (2000) identified an important paradox in science. Periods of developmental crisis are commonly recognized, and yet there has been a dearth of theoretical and experimental research attempting to better understand this phenomenon.

Describing the crises that could affect a newborn, Lev Vygotsky (2018) identified particularities specific to preterm infants. He criticized Gezelle's conclusions drawn on the research of preterm infants which claim that their behavioral development follows an ontogenic process, regardless of the term of birth. Vygotsky pointed out that the first months of life are directly related to the last months of uterine development. The individual developmental trajectory of a nervous system of a preterm infant is likely to differ from that of a full-term infant. Recent research suggests, that based on the Bayley Scales of Infant and Toddler Development (3rd Edition), preterm infants that are considered healthy still have significant delays in development compared to full-term infants. Preterm infants are at-risk of communication and emotional problems (Ivanova, 2010).

One of the least studied periods of developmental crisis in early childhood is the first-year crisis. In describing this crisis, Lev Vygotsky (2018) identifies the development of autonomous speech, which is unclear to people around, and which provokes the symptoms of learning difficulties at this age. Learning difficulty is observed in hyperbolic reactions (heightened emotional reactions, during which a demanding child falls on the floor, cries, and stamps his feet). Polivanova (2010) doubts that such reactions of a child can solely be explained away as a parent's inability to understand a child's reactions and suggests that understanding the causes of this psychological process requires a wider context — one that takes into account all the emerging reactions of a child.

We believe that parent responsiveness to the communication signals of a child is one of the elements of such a comprehensive context. It is obvious that a child's

behavior reflects a combination of age-specific developmental characteristics and psychophysical particularities of a preterm infant. It becomes obvious that parental responsiveness should not remain static, but adapt to changes caused by the developmental crisis and immature brain development in preterm birth.

Sensitivity towards the emotional state and needs of a child is at the core of parent responsiveness. However, along with the developmental changes of a child, qualitative aspects of parent responsiveness should also change. The discrepancy in parent responsiveness is most pronounced during periods of developmental crisis.

### ***Research Questions and Hypotheses***

This research hypothesizes that there is a relationship between parent responsiveness and the neurocognitive and socioemotional development and adaptive behavior of a preterm infant during the first-year crisis.

### ***Participants***

Two preterm infants participated in this research. These infants were chosen from a sample of preterm infants who participated in a longitudinal study that was conducted by the Laboratory for Brain and Neurocognitive Development (Ural Federal University, Yekaterinburg).

#### ***Case 1***

Participants: Mother and child (boy M).

Child: Premature infant (gestation period is 26 weeks, adjusted age 11.8 months).

Family: Mother (30 years of age), father (32 years of age), older sister (10 years of age).

Education of both parents: Higher education.

#### ***Case 2***

Participants: Mother and child (boy E).

Child: Premature (gestation period is 32 weeks, adjusted age 11.7 months).

Family: Mother (36 years of age), father (36 years of age).

Education of both parents: Higher education.

Both sets of parents signed consent forms for the presentation of study results in scientific publications and meetings.

### **Methods**

#### ***Method of Parent Responsiveness Analysis ‘Evaluation of Child-Parent Interaction’ (ECPI)***

We video-recorded the child-parent interaction which consisted of two periods. The first period was five minutes of free interaction without toys. The second period was ten minutes of interaction with a set of toys (Lavrova, & Tokarskaya, 2018).

After the video recording, the parents completed a questionnaire that required information about the family’s daily schedule and the children’s and parents’ behavior at the time of the recording (typical/unusual behavior) (Tokarskaya et al., 2017).

The method of Parent Responsiveness Analysis ECPI (the “Markers of Parent Responsiveness” protocol) was used to code the video, making it possible to evaluate the following components of parent responsiveness: affective, physical, cognitive, and effective (Galasyuk, & Shinina, 2017).

*Affective component:* The evaluation of an affective background that the parent creates during a child-parent interaction:

- 1) non-verbal indicators (facial expressions, tone of voice, physical contact).
- 2) verbal behavioral indicators (the parent’s ability to express his own emotions, show sensitivity to the child’s emotional state, and an ability to describe the child’s inner world and his feelings).

*The physical component* allows us to track the speed, frequency, and duration of the parent’s response to the child’s signals on a physical level. We distinguish the following indicators of these components:

- 1) “mirroring” — the parent’s ability to be a “mirror” to the child, instantly reflecting back his non-verbal behavior (repetition of facial movements), verbal behavior (repetition of the child’s words and vocalizations by the parent), large and small motor movements.
- 2) “synchronism” — harmony, the complementarity of movements in the mother-child dyad (Condon, & Sander, 2015; Stern, 1971).

*The cognitive component* contains:

- 1) the ability of the parent to follow the child’s attention and to fix his attention on a general subject for a long period of time (“Joint attention” indicator);
- 2) the parent’s desire to understand where the child’s interest lies by stimulating his exploring activity (“support of exploration” indicator). This is the ability of the parent not only to fix attention on subjects that are interesting to the child, but also to support his active exploration of the surrounding world. A very important behavioral indicator is “pace of activity”, which describes the parent’s ability to provide the child a period of time to answer questions and to make inquiries during joint activities. According to the dialogue model, it is important to allow the child to “speak out” even if the child does not already speak. After all, the information which the child wants to convey to adults, can be expressed by a look and gestures, besides vocalization. The absence of such behavior interferes with a parent’s understanding of the child’s interests and needs.

*The effective component* includes:

- 1) the parent’s actions in response to the child’s signals about his needs (“response to the child’s needs” indicator); evaluation of the parent’s ability to respond to the needs of the child (sensitivity to physical needs, the need for love, affection, the need for activity, the need for new impressions).
- 2) verbal manifestations of engagement, positive attention, interest in the child’s activity, confidence in the child’s abilities, not a directive position, sincere encouragement (“communicative activity” indicator).

Each of the indicators of parental responsiveness can show up with both a positive (“positive” markers) and a negative (“negative” markers) value. We also estimated time intervals when indicators of parental responsiveness were absent in both negative and positive values (“neutral” marker).

The “spontaneous play” indicator is highlighted separately and reflects the parent’s ability to provide an opportunity for the child “to be in charge” and lead. Thanks to this, the parent can understand the meaning of a child’s actions which he puts into his activity. “Didactic play” acts in opposition to “spontaneous play”.

The computer program “The Observer XT” was used to track the frequency and duration of each indicator of parental responsiveness, the average of, and the total duration of the indicators.

### ***The Bayley Scales of Infant and Toddler Development — 3rd Edition (Bayley III)***

The Bayley Scales were used to assess neurocognitive development, socioemotional development, and adaptive behavior. Bayley III is widely used to assess children’s development from birth to 42 months of age. The method consists of two parts: direct testing conducted by an experimenter, which includes assessment of development based on five scales: cognitive, receptive communication, expressive communication, fine motor and gross motor; and indirect testing — a questionnaire filled out by the experimenter while interviewing parents, which allows him to assess the level of socioemotional development and adaptive behavior.

The Socioemotional and Adaptive Behavior Questionnaire allows us to determine the level of a child’s socioemotional development, the level at which sensory information is processed, and adaptive skills. “Communication”, “Health and Safety”, “Leisure”, “Self-Care”, “Self-Direction”, “Social”, “Motor”, “Community Use”, “Functional Pre-Academics,” and “Home Living” — each of these skills describe the models of behavior of a child at home, or in other contexts (Weiss, Oakland, & Aylward, 2010).

## **Results**

In this study, we examine the analysis of parent responsiveness indicators in the first case (boy M), during the first period of the recording. The results of the second period of this case were obtained with the Observer XT program. That interpretation is also presented. The results of the second case (boy D) were also obtained with the Observer XT program.

### ***Analysis of the Results: Case 1***

The results were analyzed in two ways:

- 1) The general impression of the expert on the interaction of the mother with the child, evaluated under the ECPI method.
- 2) Statistical data obtained with the Observer XT program.

In the questionnaire after the interaction, the mother confirmed that her behavior and that of her child’s fully corresponded to their typical play.

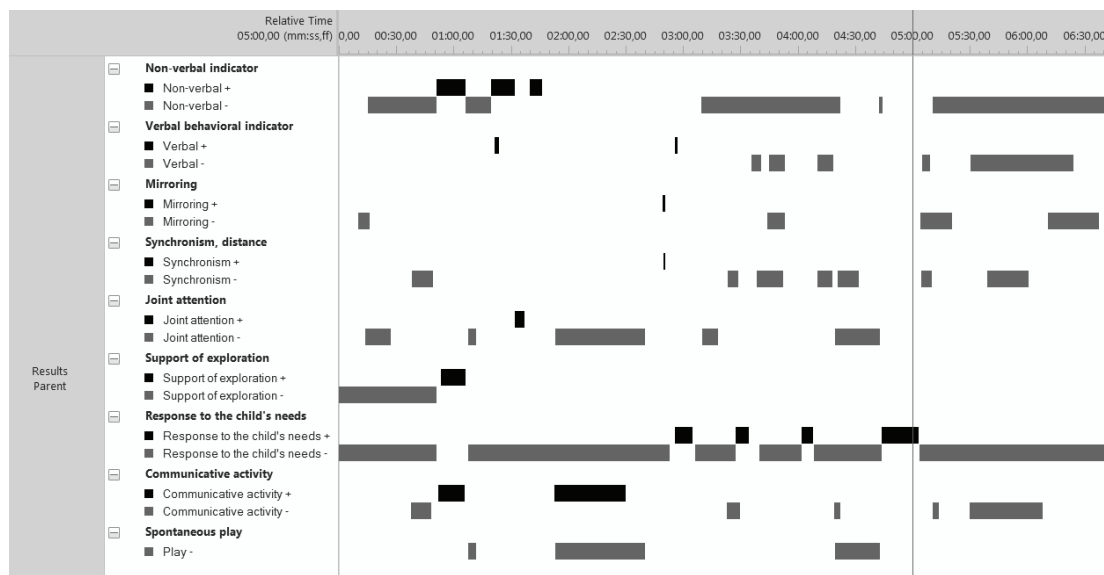
### *The General Impression of the Expert on the Interaction of the Mother with the Child*

The tone of the mother's voice was calm, her intonations were filled with joy, and she was constantly smiling and enthusiastically offered the child various activities. It was evident that the mother was trying to create a positive emotional background for the interaction. However, all activities of the child were strictly under the mother's control as if she had a fear of letting the child out of her sight. The general impression was that the mother demonstrated a high motivation to interact with the child "in the correct way".

The interaction with the child did not match his age: almost the entire time the parent held the child in her arms, limiting the movements and activity of the child. It seemed as if the parent "was fighting" to contain the child who was trying to "get free".

### *Results of the First Period of ECPI Investigation*

A general picture of the frequency and duration of a parent's behavior indicators of interaction with the child during the first period is shown in *Figure 1*.



*Figure 1.* Visualization of the frequency and duration of parents' behavior indicators of interacting with a child without toys

The mean, total duration of indicators and the frequency of each behavioral indicator are shown in *Table 1*.

An analysis of the positive markers of parental responsiveness demonstrates that the mother talked a lot to the child. At the same time, only two positive verbal markers were noted: the mother commenting on the state of the child ("You are pleased, pleased!", "Interesting? Yep, you are interested!").

The least expressed positive markers of parental responsiveness are "mirroring", "synchronicity", "joint attention," and "support of exploration". Each of them manifested only once.

Table 1

*Statistical data of parental responsiveness markers for the first period of interaction*

	Behavioral indicators	Mean duration	Total duration	Total number
Parent	Non-verbal +	00:11.42	00:34.25	3
	Verbal +	00:01.87	00:03.75	2
	Mirroring +	00:01.48	00:01.48	1
	Synchronism +	00:01.12	00:01.12	1
	Joint attention +	00:05.28	00:05.28	1
	Support of exploration +	00:12.58	00:12.58	1
	Response to the child's needs +	00:10.54	00:42.16	4
	Communicative activity +	00:25.49	00:50.98	2
	Non-verbal -	00:42.81	03:34.03	5
	Verbal -	00:15.84	01:19.19	5
	Mirroring -	00:14.68	00:58.71	4
	Synchronism -	00:10.89	01:16.23	7
	Joint attention -	00:19.36	01:36.78	5
	Support of exploration -	00:51.20	00:51.20	1
	Response to the child's needs -	00:55.45	05:32.72	6
	Communicative activity -	00:12.44	01:02.21	5
	Play -	00:24.90	01:14.71	3

Analysis of negative markers of parental responsiveness has shown that their frequency and duration are significantly higher than the same indicators of positive markers.

The negative markers of the “synchronicity” indicator were the most noticeable. They predominated the mother’s behavior (frequency — seven times, total duration — 1 minute 16 seconds). The mother restricted the child’s movements when he was trying to get off the rug or hugged the child tightly when he was breaking free from her embrace. She held him up — and the child verbally and non-verbally showed that he did not like it.

The negative markers of the “response to the child’s needs” indicator (frequency — six times, total duration — 5 minutes 32 seconds), and the indicator “communicative activity” (frequency — five times, duration — 1 minute 2 seconds) were also displayed. So was the indicator “mirroring”, presented when the parent smiled in response to the crying and tantrums of the child (frequency — four times, duration 58 seconds).

Also, in Case 1, the mother imposed games in which the child showed no interest. She chose “didactic” rather than the more “spontaneous” type of play.

We surmise that in the first period of interaction with the child, the mother’s interaction was dominated by the directive position — she insisted on certain types of play, and did not take into account the child’s need for motor activity and his desire to explore his surroundings (the room in which the study was being con-

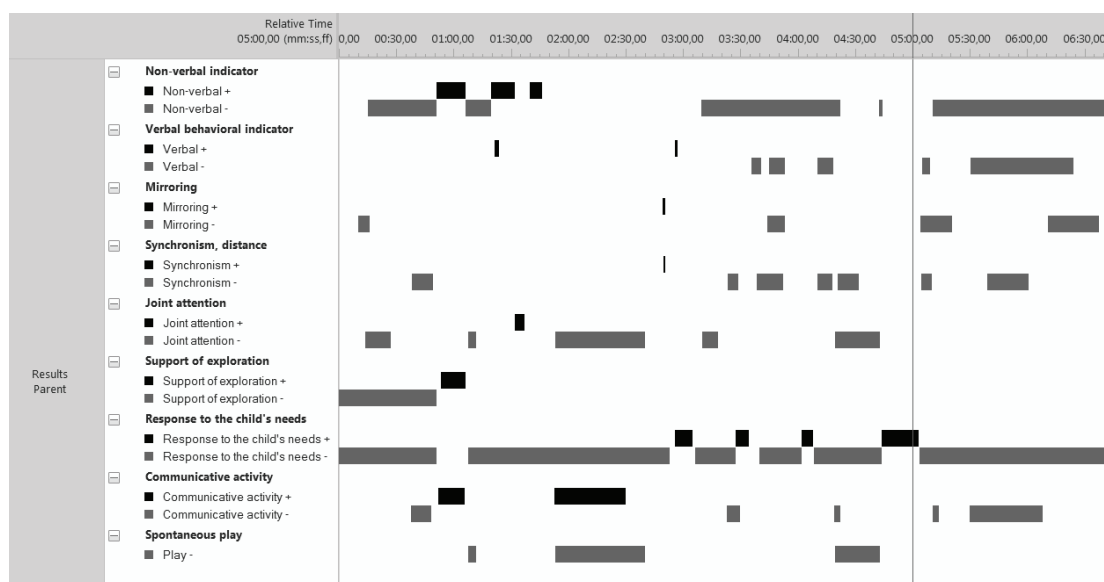


ducted). There was a prevalence of negative behavioral markers of parental responsiveness indicators. The mother tried to create a positive emotional background for the communication, but this superficial attempt corresponded to neither the mother's nor the child's real non-verbal and verbal manifestations.

We also concluded that the mother's interaction with the child was not based on the characteristics of an eleven-month-old child, but was more appropriate for an earlier period (five months). The mother did not take into account that the motor activity needs of the growing child had advanced (held the child in her arms, restricted his movements, suggested play that the child did not support, and did not follow the child's interests).

### Results of the Second Period of ECPI Investigation

In the second period lasting ten minutes, the parent was invited to interact with the child using a standard set of toys. The general picture of the frequency and duration of the parent's behavior indicators during the second period is shown in *Figure 2*.



*Figure 2.* Visualization of the frequency and duration of the parent's behavioral indicators while interacting with a child using toys

The mother's behavior revealed a prevalence of negative markers of parental responsiveness — especially for long durations under “joint attention” and “response to the child's needs”. The mother persisted in trying to direct the child's attention to an object that she considered useful to him and urged the child to spot the object, overlooking the fact that the child did not show any interest in it, and even opposed it. The parent not only did not notice the child's needs, but interfered with the realization of those needs and restricted the activity of the child.

In the second period, we observed the absence of a positive marker for “nonverbal reactions”, which indicates the absence of a positive emotional background for the mother-child interaction. The mother's face was tense, the tone of her voice was alert.

There was no “mirroring” with both positive and negative values, and also missing “synchronism” and “support of exploration” with positive values.

The duration and frequency of each behavioral indicator are presented in detail in Table 2.

Table 2

*The duration and frequency of each behavioral indicator is presented in detail*

	Behavioral indicators	Mean duration	Total duration	Total number
Parent	Verbal +	00:03.04	00:18.26	6
	Joint attention +	00:29.43	00:29.43	1
	Communicative activity +	00:03.57	00:07.13	2
	Non-verbal -	00:50.27	01:40.54	2
	Verbal -	00:26.97	00:26.97	1
	Synchronism -	00:08.57	00:08.57	1
	Joint attention -	02:04.81	04:09.62	2
	Support of exploration -	01:10.43	01:10.43	1
	Response to the child's needs -	02:03.31	04:06.62	2
	Communicative activity -	00:08.30	00:08.30	1
	Play -	00:47.89	02:23.66	3

A comparative analysis of the first and second periods of Case 1 is presented in Table 3.

Table 3

*A comparative analysis of the manifestations of parent responsiveness markers in the first and second periods of the study*

Parent Responsiveness' Components	Behavioral indicators of Parent Responsiveness	Total duration (positive, negative)		Frequency	
		1 period (+/-)	2 period (+/-)	1 period (+/-)	2 period (+/-)
Affective component	Non-verbal	0.34/3.34	0/1.41	3/5	0/2
	Verbal	0.04/1.19	0.18/0.27	2/5	6/1
Physical component	Mirroring	0.02/0.58	0/0	1/4	0/0
	Synchronism, distance	0.01/1.16	0/0.09	1/7	0/1
Cognitive component	Joint attention	0.05/1.37	0.29/4.10	1/5	1/2
	Support of exploration	0.13/0.51	0/1.10	1/1	0/1
Effective component	Response to the child's needs	0.42/5.33	0/4.07	4/6	0/2
	Communicative activity	0.51/1.02	0.07/0.08	2/5	2/1
The conditions of evaluation	Play	0/1.15	0/2.24	0/3	0/3

A comparison of the parent responsiveness indicators during the two periods of interaction, revealed that in the second period there was a decrease in the positive emotional background to the communication. However, the parent began to talk more to the child, and the verbal component with a positive value increased. Positive markers of the physical components of parental responsiveness were still not observed, but its negative values also decreased.

In the second period, there was a long-term absence of markers for “joint attention” and “support of exploration”. It seemed that the mother felt puzzled when it was necessary to organize a game with a child and took a few steps away from him, ignoring the interests of the child. In addition, there were negative indicators for spontaneous play, which indicates the desire of the mother to replace the “spontaneous” game with teaching.

Thus, an analysis of parental responsiveness in both periods of the study shows a predominance of negative behavioral indicators for all components of parent responsiveness. The parent took a more directive position rather than create conditions for cooperation and did not encourage the child. In the dyad there were no harmonious movements; the parent did not support the child’s desire to explore the environment and interacted with the child without taking into account his age.

#### *Results of Bayley-III assessment: Case 1*

Data on the neurocognitive development of child M is shown in *Table 4*.

Table 4

*Results of Bayley-III for the child M.*

Cognitive scale	Receptive communication scale	Expressive communication scale	Fine motor	Gross motor
7	7	8	8	6

Each scale is measured by a maximum of 19 points. A measure of 8-12 points is considered average. On the cognitive, receptive communication, and gross motor scales, child M has demonstrated scores in the below-average range.

In the trials within the cognitive scale, the child experienced difficulties in completing the tasks of attention distribution and manipulation with objects. We assessed the number of raw points gained by the child in accordance with his age equivalent. This method of measuring is used in cases where a low indicator is received on one scale or another, and it allows us to determine an approximate level of skill development. The child’s level of skill development on the cognitive scale conforms to 8-9 months.

While completing the trials within the receptive communication scale, the child experienced difficulties understanding forbidden words, participating in the play processes of other people, and demonstrating appropriate reactions to regular, domestic requests. The child’s level of skill development on the receptive communication scale conforms to 8 months.

On the gross motor scale, the child did not complete the following requests: hold weight for two seconds; get up and take a standing position (with support); move back and forth; walk with support; walk sideways with support. The child's level of skill development on the gross motor scale conforms to 9 months.

The child's results on the expressive communication and fine motor scales present on the lower end of average scores.

Child M's socioemotional development and adaptive behavior are shown in Table 5.

Table 5

Data on socioemotional development and adaptive behavior of the child M.

Level of social-emotional development	Communication	Health and Safety	Leisure	Self-Care	Self-Direction	Social	Motor
14	8	11	12	9	8	7	10

The child demonstrated "uneven" results for adaptive skills (according to the scale scores, the lowest is 7 points, while the highest is 13 points).

Child M also scored a low result on the measurement of "Social", which reflects behavior manifesting in daily social interaction, and includes sub-behaviors such as: "smiles when sees a parent", "babbling/laughs when happy or satisfied", "relaxes body when taken in one's arms (leans toward)", "raises hands when wants to be taken in one's arms", "demonstrates sense of humor", "demonstrates special bond with parents", etc. The child did not exhibit close contact (hugging and kissing parents and significant others) appropriate for his age. In the meantime, the skill "Leisure" (ability to play independently and with other children and adults, watch how others play, choose toys, ask to read a favorite book, etc.) met the average criteria. In other words, the child plays with toys, is fluent in subject activities (for his age), but lacks effective communication with others (for his age). In other words, despite having a high level of socioemotional development for his age, certain models of behavior have not yet sufficiently formed.

*General Conclusion: Case 1*

The study of parental responsiveness, under the ECPI method, showed the predominance of negative behavioral indicators for all components of parental responsiveness. On the Bayley-III developmental scale, the child's results showed below-average values on the cognitive scale, receptive communication, and large motor skills.

*Analysis of Results: Case 2*

*General impressions of the mother-child interaction in the ECPI study process.*

The child (child E), during the entire time of recording, was freely moving around the room and exploring the environment. The mother not only allowed the child to

explore the space but demonstrated interest and engagement in what the child was doing. Moreover, the parent “explored” the space herself, changed it, and enriched the play environment for the child. So, for example, the mother, without waiting for an offer of toys by the experimenter, found a box with toys, chose several of them, put them on the carpet, and let the child choose the most interesting for him.

The total duration of behavioral indicators for each of the parent responsiveness indicators in the two periods does not differ significantly (see *Table 6*).

Table 6

*A comparative analysis of manifestations of parental responsiveness markers in the first and second periods of the study*

Parent Responsiveness' Components	Behavioral indicators of Parent Responsiveness	Total duration (positive, negative)		Frequency	
		1 period (+/-)	2 period (+/-)	1 period (+/-)	2 period (+/-)
Affective component	Non-verbal	2.57/0	2.17/0	10/0	7/0
	Verbal	0.07/0	0.11/0	3/0	4/0
Physical component	Mirroring	0.04/0	0.02/0	3/0	1/0
	Synchronism, distance	2.47/0	3.06/0	2/0	3/0
Cognitive component	Joint attention	0.12/0	3.13/0.34	2/0	5/1
	Support of exploration	2.31/0	1.54/0	4/0	4/0
Effective component	Response to the child's needs	0.32/0,4	0.11/0	2/1	2/0
	Communicative activity	0.10/0	0,47/0	6/0	6/0
The conditions of evaluation	Play	0/0	0.48/0	0/0	2/0

The study of parental responsiveness under the ECPI method, showed the predominance of positive behavioral markers for all indicators of parental responsiveness in comparison with short-term and rare negative markers. There was a positive emotional background for communication. Long intervals of “synchronism” are fixed in the physical component of responsiveness. The mother showed interest in what the child was doing (“joint attention”) which was especially evident during the second period when the mother was playing with the child. We noted the longest duration of neutral indicators of verbal and communicative activity, at the same time, the lowest value of the total duration of them. In other words, the mother did not have enough time and often talked to the child (the total duration of positive verbal markers in the two periods is 1 minute 14 seconds out of ten minutes of interaction).

*Results of Bayley-III assessment: Case 2*

Data on neurocognitive development of child E is shown in *Table 7*.

Table 7

*Results of Bayley-III for the child E*

Cognitive scale	Receptive Communication scale	Expressive Communication scale	Fine Motor	Gross Motor
13	12	10	10	18

The child demonstrated average scores on receptive communication, expressive communication, and fine motor scales. The result on the cognitive scale was above average, while the result on the gross motor scale almost reached a maximum. Also, the child had a large passive vocabulary; he participated in games, made distinct sounds, had 4 pairs of consonants-vowels, used a minimum of two words, and used words to express his wishes.

The child demonstrated high results on all scales of neurocognitive development, with above-average scores on the cognitive and gross motor scales.

Results on the socioemotional development and adaptive behavior of child E are shown in *Table 8*.

Table 8

*Data on socioemotional development and adaptive behavior of child E*

Level of social-emotional development	Communication	Health and Safety	Leisure	Self-Care	Self-Direction	Social	Motor
14	11	8	10	8	10	11	12

The scores representing the adaptive skills of the child are quite even, the difference in the learning of the skills is small, and almost all of them meet the criteria of a “good” norm. The level of socioemotional development is high: it aligns with the level of solving social tasks and self-awareness; the child uses a series of interactive emotional signals/gestures for communication; one can observe shared play with the adult; the child could wait for the desired object if given an explanation; he could also express his state through gestures and facial expressions.

In comparison with other skills, yet still within normal range, “Self-Care” and “Health and Safety”, which reflect an ability to satisfy needs and self-serving skills (eat, sleep, dress, wash oneself, etc.), as well as the self-preservation skills and safe behavior (avoid contact with dangerous items, communicate injuries, stay calm during medical procedures), are the least formed.

*General conclusion: Case 2*

The analysis of parental behavior using the ECPI method showed the predominance of positive behavioral indicators for all markers of parent responsiveness. The child showed good results on all Bailey scales; some of the indicators were above average.

Research on the two premature infants showed that the child whose parent demonstrated predominantly positive indicators of responsiveness had a higher neurocognitive development level (Bayley III), in comparison with the child whose parent demonstrated predominantly negative responsiveness. It is important to emphasize that having positive examples of parental responsiveness observed in both mothers in our study, signifies that resources do exist to develop participants' parent responsiveness.

**Discussion**

Delays in premature children's neurocognitive development may be connected to the negative factor surrounding their premature birth (Feldman, & Eidelman, 2007; Milevski, Kachorovska-Braj, & Chaplevskaya, 2011; Chuhutova, 2014). Environmental factors also have an impact on premature children's psychological development and behavior in negative, as well as in positive ways (Erica et al., 2015). According to the "diathesis stress" model, premature children are more susceptible to the negative influence of the environment (Hadfield, Fearghal, & Gerow, 2017). The interaction of a child with a significant adult is the most important environmental factor during the first year of his life. Our research shows that positive indicators of parental responsiveness may weaken the negative effect of the prematurity factor. In our case, the premature child whose parent demonstrated a high level of parental responsiveness was noted to have normative levels of neurocognitive development, socioemotional skills, and adaptive behavior, based on nearly all scales of Bayley-III. At the same time, the child whose parent had a low level of parental responsiveness recorded lower results on indicators for neurocognitive development, socioemotional skills, and adaptive behavior. The results obtained are consistent with previous studies, where it was shown that a certain way of interacting with a premature child may promote the development of cognitive skills — speech, in particular (Kiselev, 2017).

A parent's non-verbal behavior, including mimicking one's child, tone of voice, and touch, not only helps a child to regulate his emotional and physical well-being but is also considered fundamental to teaching behavior for expressing one's emotional state (Gerhardt, 2017).

It is important to note that a low level of responsiveness may be linked, not only to a parent's personal characteristics, but also to the influence of the prematurity factor. For example, anxiety and fear for the child may significantly affect a parent's level of responsiveness. Under the limited scope of this research study, we cannot answer what the low level of responsiveness of child M's mother could be attributed to. In the future, we plan to conduct a comparative analysis of the level of parental responsiveness of parents who are raising premature and full-term babies, while considering other factors that may affect parental responsiveness.

In our research study, we described a link between parental responsiveness and a child's level of development at one year of age. We suggest that at this age parental responsiveness should have the strongest impact on the development of socioemotional and neurocognitive processes, due to the fact that the first two years of a child's life are characterized by the most active brain development, especially the so-called "social brain" development. However, it is imperative to investigate the impact of parental responsiveness during various periods of a child's life. Therefore, we plan to conduct a longitudinal study examining the influence of the child-parent interaction on the psychological development and behavior of children from three months onwards, until they are three years old.

## **Conclusion**

As the percentage of survival among premature babies increases (Skripnichenko, Baranov, & Tokova, 2014), this study gives specialists an opportunity to render comprehensive assistance. The closest social circle of a child plays a special role in this assistance (Ivanova, 2010). Research results allow us to state that a significant number of negative indicators of parental responsiveness, and the denial of a child's needs characterized by the one-year crisis, affects adaptive skills and cognitive development in a child. This is indicated through the child's low scores on cognitive and socioemotional development. The opposite is also true: the higher parental responsiveness is, the higher does the child score on adaptive skills and the cognitive index.

The cases provided here are the only two examples. However, results indicate that there is significant potential for further studies on "mother-premature baby" dyads. Considering all possible aspects (including genetic, neurological, etc.), we would like to emphasize complex and interdisciplinary assistance for families with small children. We believe that parental responsiveness is key to provide an "elusive ballet" (citing Stern) in the dialogue between a child and a parent. This will ensure not only the emotional-personal, but also communicative and cognitive development of a child.

The cases examined here, demonstrate the importance of designing a model for the development of premature children which account for the biological, social, and psychological characteristics of the child, as well as the parent, in a dynamic trajectory of development (considering various age crises).

## **Limitations**

This work represents a description of two cases, which limit to generalize the applicability of the obtained results of the obtained results.

The children from the provided cases differed in their gestational terms. In future research studies, we strive to even out the factors which significantly affect the neurocognitive and socioemotional development of premature babies, including gestational terms.

Further research can aim to:

1. Trace the dynamics of relationships in "mother-child" dyads, in a longitudinal study starting from three months of age to three years.



2. Compare the results with data on different groups of children (for instance, children who have a family risk of autism).
3. Determine the most critical aspects of the child-parent interaction which influence children's development during various stages of life.
4. Design and implement programs directed at improving parental responsiveness.

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