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Behavioural Characteristics of Children with Developmental Disorder Risks

Maria Lavrova, Ekaterina Suleymanova, Olga Lvova, and Anastasia Solominova

Ural Federal University named after the first President of Russia B. N. Yeltsin (RUSSIA, Yekaterinburg)

Abstract

The article is devoted to the study of the temperament and behaviour of children with developmental disorder risks. Early age is most significant in terms of early identifying deviant development markers for implementing effective programmes for early intervention. The article deals with the peculiarities of using the Infant Behaviour Questionnaire - Revised (IBQ-R) and its application in scientific research; the results of domestic and foreign research into temperament as a marker/predictor of deviant behaviour are presented. The paper describes the results of a pilot study of differences in behaviour in a sample of 49 children aged 5.6 months. The research involved two groups of test children, a reference group (typically developing children) and the children of developmental risk groups (which included prematurity, family risk of autism spectrum disorders (ASD)/attention deficit and hyperactivity disorder (ADHD), paediatric arterial ischemic stroke). The significant impact of developmental disorder risks on the Perceptual Sensitivity Scale (IBQ-R) as well as the effect of sex and risks on the Approach, Vocal Reactivity (IBQ-R) scale were discovered. There are suggestions that prematurity may have a negative impact on the development of temperament in children aged 6 months. However, in comparison with such factors as the genetic predisposition to atypical development or local brain damage due to paediatric arterial ischemic stroke, prematurity (excluding extremely premature) probably has less influence on the development of temperament and behavioural characteristics. There is a significant heterotypic continuity of individual differences in temperament indicators at an early age, which highlights the need for further research into the issue and the formation of large cohorts of children.

Keywords: deviant development markers, behaviour, IBQ-R questionnaire.

Corresponding Author:
Maria Lavrova
ml2002@yandex.ru

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1. Introduction

At present, the number of children with atypical development risks is increasing, and one of the most important challenges is to search for deviant development markers with the aim of timely intervention, prevention, and correction.

The markers can be found at various levels, e.g. genetic, biochemical, physiological, behavioural. Certain manifestations of temperament in the behaviour of children of the tender age can also be a sign of deviant development [8]. Thus, positive emotionality/extraversion along with low regulatory capacity is associated with the development of behavioural problems. According to other studies, fear is associated with the later development of empathy, the feelings of guilt and shame [19;16]. The regulative ability in infancy and arbitrary control in early childhood are associated with conscientiousness, largely due to the contribution of an early temperament such as the low-level pleasure [7;21].

It is early childhood that is a critical period in which you can directly observe the manifestation of temperament in behaviour [17].

Of particular interest is the mechanism of the formation of temperament, the definition of the role of heredity, the social environment and education.

One of the leading theories of temperament is the psychobiological model developed by M. Rothbart and D. Derryberry [1;2;21] defining temperament as the constitutionally conditioned features of reactivity and self-regulation formed under the influence of heredity and environment. In this context, reactivity is understood as the result of activation and is manifested in the motor, emotional and indicative responses to external and internal stimuli. Self-regulation covers individual behavioural features, modulating reactivity including cuddliness, voluntary attention, activation control and inhibitor control. A significant increase or decrease in the above-described features of temperament can be seen as an unfavourable prerequisite for the development of a child's personality and the manifestation of deviant behaviour. According to this model, the development of temperament is a dynamic process that takes place during ontogenesis.

A psychobiological model is taken as a basis in the development of a number of questionnaires for assessing the properties of temperament. In particular, in 1982, Rothbart et al. developed a questionnaire for assessing children's temperament and behaviour based on the parents' Infant Behavior Questionnaire (IBQ) and is intended for ages 3 to 12 months. Later it was modified and reworked in IBQ-R (Infant Behaviour Questionnaire - Revised) [1;9;19;16], which is currently one of the most widely used.

The technique exposes the distinct manifestation of a number of features of the children's temperament, which are combined into overarching temperament dimensions and allows them to be considered in the development process.

In addition to IBQ, questionnaires were developed for various ages taking into account the qualitative specifics of each period: early childhood (1-3 years) – ESBQ (Jones, Gartstein, Rothbart, & Chasman, 1999), pre-school age (3-7 years) – CBQ (Goldsmith & Rothbart, 1991; Rothbart, Ahadi, Hershey, & Fisher, 1997), primary school age (7-10 years) – TMCQ, juvenile age (10-15 years) – EAYQ-R (Capaldi & Rothbart, 1992) and adult stage - ATQ (Derryberry & Rothbart, 1988; Evans & Rothbart, 1999)[3;4;5;6;14;15;18].

The availability of such a battery of questionnaires is due to the rapid physiological, psychological and social development of a child as well as the fact that various temperament properties have different manifestations at different ages, or do not manifest at all.

As mentioned above, the early age is most interesting for studying the manifestation of temperament in behaviour in order to identify early markers of the deviant development. Among the available methods for assessing temperament in infancy, the IBQ-R questionnaire has the highest reliability indicators. Consequently, it is often used in studies, the purpose of which is to measure temperament and to identify behavioural characteristics in children, also as a result of the influence of some factors (e.g., mother's depression [11], perinatal environmental factors) [10;20].

The questionnaire was translated into Russian and adapted by Slobodskaya et al. [1].

In the Laboratory of Brain and Neurocognitive Development of Ural Federal University (Yekaterinburg, Russia), a longitudinal study devoted to the detection of early markers of deviant development in young children is carried out. Within the framework of the project, a pilot study of the temperament of young children was carried out by using the IBQ-R questionnaire. We hypothesized that individual features of temperament in infancy in children from groups with developmental risks may differ from such indicators in the reference group

2. Methodology

The research was based on a sub-sample of a longitudinal design and aimed to identify early markers of atypical development. The total number of participants was 49 children (16 boys, the average age is 5.6 months). The reference group (c) comprised

18 children (9 boys); prematurely-born (p): 7 children (1 boy); children with the family risk of ASD/ADHD (r): 8 children (3 boys); and children with early debut of paediatric arterial stroke (PAIS) (i): 6 children (3 boys).

The criteria for selection in groups: reference groups - healthy children who were born on time; prematurely-born - gestation period 28-36 weeks, weight more than 1 kg; children with the family risk of ASD/ADHD: infants who have an elder brother or sister with a confirmed diagnosis of ASD/ADHD; children who have suffered an early paediatric arterial ischemic stroke - children with this diagnosis, confirmed by MRT. A common criterion for all groups was the absence of congenital malformations of internal organs or the central nervous system, intracerebral hemorrhage or chromosomal abnormalities. Informed consent form was signed by all parents of all children. The study was conducted according to the Helsinki Declaration of 1975, as revised in 1983 and was approved by the local ethics committees of Ural Federal University and Ural State Medical University (Yekaterinburg, Russia). The structure of the IBQ-R questionnaire includes 191 questions for parents which, after processing, fall into 14 scales [3]: Activity Level; Distress to Limitations; Fear; Duration of Orienting; Smiling and Laughter; High Intensity Pleasure; Low Intensity Pleasure; Soothability; Falling Reactivity; Cuddliness; Perceptual Sensitivity; Sadness; Approach; Vocal Reactivity. A parent must read each statement and indicate how often the child has done this for the past week, for some questions - two weeks. Ranking consists of 8 points: never (1), very rarely (2), less than half the time (3), about half the time (4), more than half the time (5), almost always (6), always (7), not applicable (x). Data analysis was carried out using the statistical programme SPSS Statistics. Two-way ANOVA was carried out using the variables 'gender' and 'group' as independent variables (factors), the variable 'age' as a reference variable (covariance) and variables (scale) as a dependent variable.

3. Results

The significant influence of the Group variable was revealed on the scale Perceptual Sensitivity ($F= 3.413$ $p=.030$) (Figure 1, Table 1)

That means, the children of the family risk group ASD/ADHD significantly higher on the scale Perceptual Sensitivity (IBQ-R) than the children from PAIS group.

The Perceptual Sensitivity scale includes such questions as 'How often did the child pay attention to lumps in food during meals?', 'How often did the child look up, break away from the game, when the phone rang/heard voices in the next room?'; 'Did he/she look as if he/she listened even to very quiet sounds?' and others.

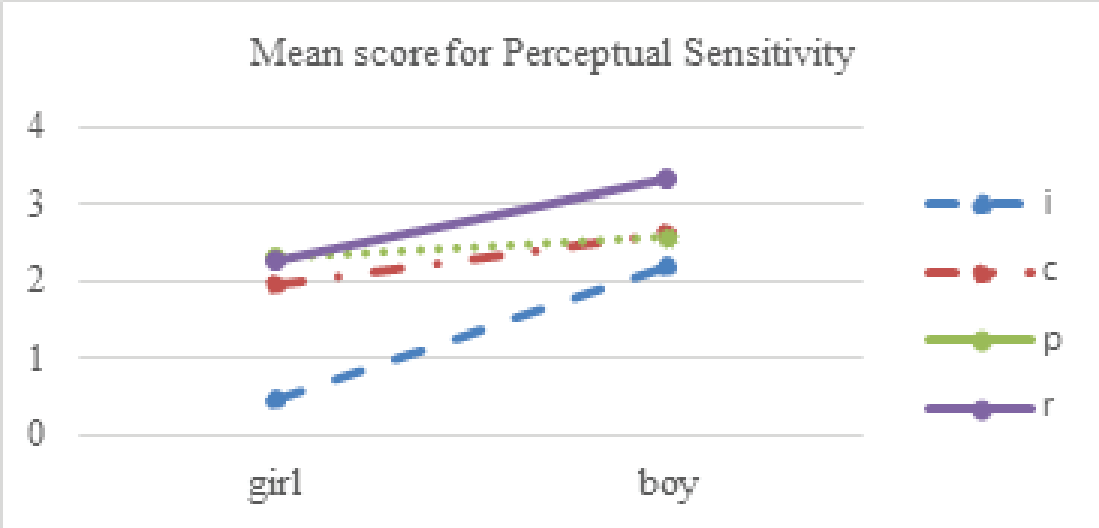

Figure 1: Group/ Perceptual Sensitivity.

Table 1: Group/ Perceptual Sensitivity.

Perceptual Sensitivity	i	Sex	mean	σ	n
		0	.44	.24	3
		1	2.19	.87	3
		Total	1.32	1.11	6
	c	0	1.96	1.08	9
		1	2.62	.75	9
		Total	2.29	.96	18
	p	0	2.29	.49	6
		1	2.58	.	1
		Total	2.33	.46	7
	r	0	2.26	.84	5
		1	3.30	.82	3
		Total	2.65	.94	8
	Total	0	1.91	.99	23
		1	2.67	.79	16
		Total	2.23	.98	39

It was also found that the interaction of gender and group factors affected Approach (F = 3.432 p =. 029) and Vocal Reactivity (F = 3.034 p =. 044). The data are shown in graph 2, Table 2 and graph 3, Table 3, respectively.

That means the boys at the ASD/ADHD risk group had higher Approach scale scores than the boys of the PAIS group, and the girls of the PAIS group were higher than the girls at the ASD/ADHD risk group.

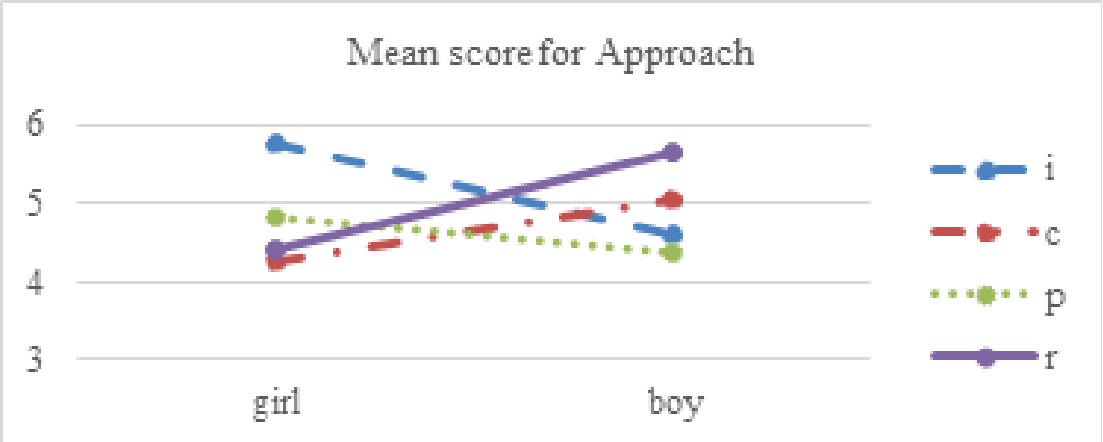

Figure 2: Group/ Approach.

Table 2: Group/ Approach.

Approach	i	Sex	mean	σ	n
		0	5.76	.42	3
		1	4.60	.24	3
		Total	5.18	.70	6
	c	0	4.26	.91	9
		1	5.05	.43	9
		Total	4.65	.80	18
	p	0	4.81	.57	6
		1	4.37	.	1
		Total	4.74	.54	7
	r	0	4.40	1.41	5
		1	5.63	.08	3
		Total	4.86	1.24	8
	Total	0	4.63	.99	23
		1	5.03	.50	16
		Total	4.79	.85	39

The PAIS boys had higher Vocal Reactivity scores than the boys of the ASD/ADHD risk group, and the girls of the ASD/ADHD group had higher scores on the Vocal Reactivity scale than the PAIS girls.

The Approach scale contains questions, 'When the child saw a toy that he/she really wanted, how often was he/she excited willing to get it?', 'How quickly did he/she forge ahead towards it?', 'How often during the last week did the child quickly move to new objects?', 'Did he/she show a strong desire for what he/she wanted?', 'Did he/she seem excited when others showed excitement?', 'Was he/she actively moving to explore the new situation?'.

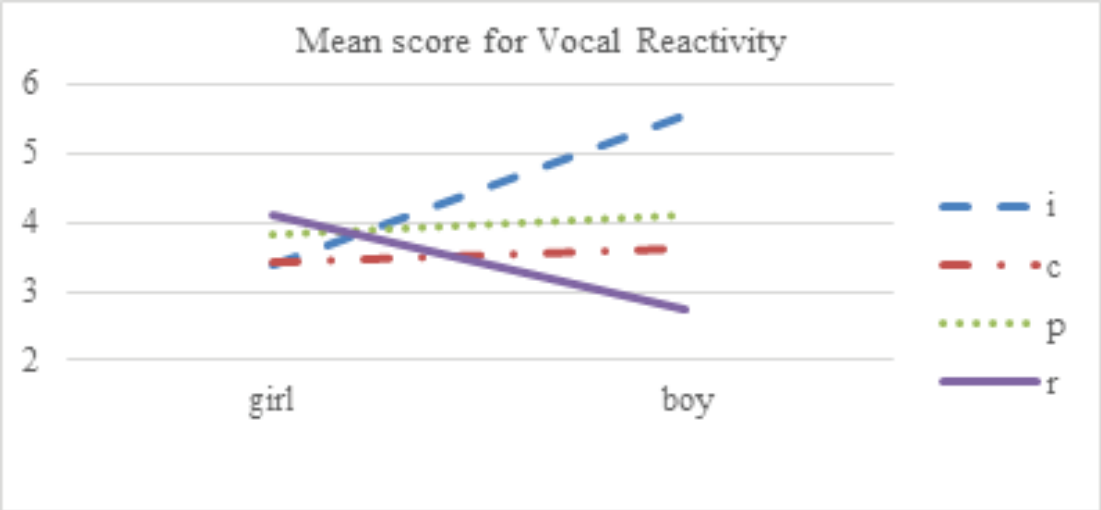

Figure 3: Group/ Vocal Reactivity.

Table 3: Group/ Vocal Reactivity.

Vocal Reactivity	i	Sex	mean	σ	n
		0	3.37	1.41	3
		1	5.53	1.04	3
		Total	4.45	1.62	6
	c	0	3.41	.65	9
		1	3.62	1.34	9
		Total	3.52	1.03	18
	p	0	3.84	.66	6
		1	4.09	.	1
		Total	3.87	.61	7
	r	0	4.09	1.35	5
		1	2.74	.65	3
		Total	3.59	1.28	8
	Total	0	3.66	.92	23
		1	3.84	1.42	16
		Total	3.74	1.14	39

The Vocal Reactivity scale includes questions like 'How often did the child make sounds similar to the conversation while waiting for food, when he/she wanted to eat more, when he/she was full?', 'When the child was dressed/undressed during the last week, how often did he/she babble and make sounds?', 'How often did he/she repeat the same sounds over and over again? Screeched and shouted when he/she was excited? 'Did he/she imitate the sounds that you made?'.

4. Discussion

As a result of the research, it was found that children at risk of ASD/ADHD showed higher scores on the Perceptual Sensitivity scale compared to the PAIS children group. The differences were not significant between the other groups.

Children from the ASD/ADHD risk group may theoretically have the features of the Broad Autism Phenotype which is a set of behavioural characteristics and language skills demonstrating the phenotypic expression of the genetic predisposition to ASD [13]. These features are less pronounced but qualitatively similar to the main clinical characteristics of ASD. One of the non-specific manifestations of ASD may be Sensory-perceptual abnormalities [4].

PAIS boys have higher scores on the Vocal Reactivity scale compared to boys at the risk of ASD/ADHD. It should be noted that at such an early age, vocalisation is mainly provided by subcortical structures. Atypical vocalisations are non-specific markers of ASD and Broad Autism Phenotype. The interpretation of the data obtained requires further detailed research.

Also in the PAIS children's group, the effect of gender on the Approach scale was found (PAIS girls showed higher scores than boys). It is likely that girls who have undergone PAIS will have a greater risk of impaired behaviour but these data also require meticulous and attentive longitudinal research.

It seems extremely interesting to us that all three scales of Perceptual Sensitivity, Vocal Reactivity and Approach are a part of one of the three so-called depth factors of the Positive Affectivity/Surgency temperament. The high indices of this deep factor within the framework of the IBQ-R method in a number of publications are presented as a prognostic sign of the emergence of behavioural problems at the older age [16;19].

The fact that there are no significant differences between the prematurity group and the control group is probably due to the fact that prematurity (excluding the extremely premature IV degree of body weight to 1000 g) is considered as immaturity of the body, which in itself is not a high risk of dysontogenesis in comparison with the children-members of PAIS or the ASD/ADHD risk groups.

Thus, we can assume that prematurity, of course, can have a negative effect on the development of temperament in 6 months. But compared to such factors as genetic predisposition to atypical development or local brain damage due to PAIS, prematurity (excluding extremely premature) probably has less impact on the development of temperament and behavioural characteristics.

E. Slobodskaya in her studies notes the considerable heterotypic continuity of individual differences in temperament indicators in early childhood [21] which indicates the need for further research into the issue and the formation of large samples for research.

5. Conclusions

Although the IBQ-R questionnaire is highly reliable, it is important to pay attention to the fact that IBQ-R is the parent report, i.e. the subjective assessment of the child's behaviour. Therefore, the parents of children with family risk of ASD/ADHD, due to their awareness and high alertness to behavioural disorders, may be inclined to emphasize the peculiarities of the children's behaviour, in particular, the atypical perceptual sensitivity. That means we can obtain higher scores on some scales of the IBQ-R questionnaire. Thus, it is very important to apply a set of techniques that allow an objective assessment of the child's temperament.

Our research is of a pilot nature and requires further accumulation of data. The data obtained do not contradict the literature but allow to create a new look at the possibilities of the IBQ-R questionnaire as well as the search for the behavioural markers of dysontogenesis.

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