



**SELINUS UNIVERSITY**  
OF SCIENCES AND LITERATURE

**THE INFLUENCE OF MENTAL DEPRIVATION  
ON THE HIGHER MENTAL FUNCTIONS OF YOUNGER  
SCHOOLCHILDREN WITH MIXED SPECIFIC  
DISORDERS OF PSYCHOLOGICAL  
DEVELOPMENT-NEUROPSYCHOLOGICAL  
ANALYSIS**

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## ABSTRACT

The aim of the study was to study the effect of mental deprivation on the higher mental functions of younger schoolchildren with mixed specific disorders of psychological development.

A complete neuropsychological examination of younger schoolchildren with mixed specific disorders of psychological development was carried out, the features of disorders of higher mental functions characteristic of this group of disorders were determined and the relationship of deprivation with the frequency of manifestations of neuropsychological syndromes of deviant development was analyzed.

A neuropsychological syndrome analysis was carried out and for the first time the main syndromes of deviant development characteristic of younger schoolchildren with mixed specific disorders of psychological development, who were and were not exposed to mental deprivation, were identified.

It has been established that in children with specific disorders of psychological development, such syndromes of deviant development as functional deficiency of brain stem formations (dysgenetic syndrome), functional unformedness of the right hemisphere of the brain and functional unformedness of the left temporal region are most often diagnosed, and in a significant number of cases manifestations of several syndromes were detected simultaneously.

Functional deficiency of brain stem formations in children deprived of parental care is the dominant syndrome, determining the specifics of disorders in general. In children living with their parents, the main syndrome (unformed right hemisphere) does not have such a totally predominant character, forming a complex picture of a larger number of less pronounced disorders.

## TABLE OF CONTENTS

INTRODUCTION .....	5
1 THEORETICAL FOUNDATIONS OF THE STUDY .....	10
1.1 Mixed specific disorders of psychological development, clinical and psychological features of their manifestations in children of primary school age .....	10
1.2 Features of the formation of higher mental functions of children affected by mental deprivation .....	21
1.3 Neuropsychological syndromes of deviant development.....	29
2 RESEARCH PROGRAM .....	38
2.1 Organization of research .....	38
2.2 Sample characteristics .....	39
2.3 Comparison and selection of neuropsychological diagnostic methods.....	41
2.4. Research procedures and methods.....	44
2.5 Methods of mathematical data processing.....	47
3 RESEARCH RESULTS .....	48
3.1 Conducting neuropsychological diagnostics .....	48
3.1.1 The study of the interhemispheric organization of mental functions .....	48
3.1.2 The study of the general characteristics of mental functioning and the scope of general knowledge.....	48
3.1.3 The study of neurodynamic indicators of mental activity.....	50
3.1.4 The study of praxis.....	51
3.1.4 The study of Gnosis.....	55
3.1.5 The study of speech functions.....	59
3.1.6 Memory testing.....	65

3.1.7 Intelligence testing.....	68
3.2 Results of neuropsychological diagnostics.....	71
3.3 Establishing of neuropsychological syndromes of deviant development.....	76
3.4 Analysis of the combination of neuropsychological syndromes of deviant development.....	82
3.5 Comparison of the representation of the main neuropsychological syndromes of deviant development in the study groups.....	84
3.6 Targets of corrective action and approaches to formative learning.....	86
SUMMARY .....	88
CONCLUSION .....	90
REFERENCES .....	91

## INTRODUCTION

**Relevance of the study.** According to the Russian Center of Psychiatry and Narcology (report of 09.10.2015), 70-80% of Russian schoolchildren suffer from mental developmental anomalies, in addition, 30% have social maladaptation [77].

According to the clinical and statistical data of recent years, in the structure of mental pathology in children and adolescents, 44% are non-psychotic mental disorders, a significant part of which, according to the International Classification of Diseases of the 10th revision (hereinafter ICD-10), belongs to section F8 "Disorders of psychological development".

Among the disorders included in this section, "Mixed specific disorders of psychological development" (F83) are most often diagnosed in practice, so, when studying the anamnesis of younger schoolchildren studying in schools in the city of Magnitogorsk (Russia) according to the correctional curriculum, data were obtained that up to 57% of children in correctional classes have this diagnosis [8, 28, 78].

The results of studies of the psychological regularities of the parameters of mental dysontogenesis, characteristic of mixed specific disorders of psychological development, are few and contradictory. Even the ICD-10 classification emphasizes the lack of certainty and elaboration of this group of disorders, in which there is a mixture of specific disorders of speech development, school skills or motor functions, but there is no significant predominance of any of them to establish a primary diagnosis. At the same time, the requirements for improving the effectiveness of correctional measures with children with developmental disabilities actualize the need to answer the questions of which clinical syndromes are characteristic of this group of disorders, which causes and to what extent determine the specifics of disorders of higher mental functions [4, 56, 92].

The scale of the problem prevents an exhaustive study of the etiology and pathogenesis of mixed specific disorders of psychological development within the framework of this work, allowing for the possibility of studying individual psychogenic factors.

The prevailing point of view in modern literature on the causes of deviant development suggests dividing them into 2 groups: biomedical and socio-psychological, allowing for a possible complex combination of them. For mixed specific disorders of psychological development, such a complex combination seems likely, especially in the case of children whose deviant development is corrected in specialized institutions for orphans and children left without parental care [6, 8, 67].

In Russia, the total number of children in orphanages and boarding schools, according to data for 2014, is 252,596 [27].

According to scientific research, in children deprived of parental care or relatives, the medical and biological causes of disorders are inevitably influenced by mental deprivation, which can cause pathological changes in the formation of mental states [12, 81, 91, 101].

A comparison of the clinical patterns of mental disorders of children with mixed specific disorders of psychological development who were subjected to deprivation effects with the patterns of mental disorders of their peers with the same disorders who were not subjected to deprivation can reveal the role of deprivation as one of the potential pathogenic factors of dysontogenesis.

In psychological research, the most studied to date are the psychological and pedagogical aspects of child deprivation [15, 87].

Meanwhile, the multifactorial and multidisciplinary nature of the problem leads to an understanding of the need to use clinical and psychological diagnostic methods that make it possible to accurately and deeply assess the impact of individual factors on the immature structure of the child's psyche [2, 31].

When choosing diagnostic methods, the study took into account that the clinical picture of mixed specific disorders of psychological development looks quite polymorphic, often many additional symptoms are found behind the external manifestations of the disorder, diverse in their origin. A reliable tool for solving the problems of establishing primary pathogenetic mechanisms is a system-dynamic neuropsychological analysis [37, 66, 88].

**Research topic:** neuropsychological study of the influence of mental deprivation on the higher mental functions of younger schoolchildren with mixed specific disorders of psychological development.

**The object of the study:** features of the development of mental functions of younger schoolchildren diagnosed with F83 according to ICD-10.

**Subject of research:** the influence of the factor of mental deprivation on the neuropsychological features of younger schoolchildren with mixed specific disorders of psychological development.

**The purpose of the study:** to identify the specific features of neuropsychological disorders of 7-8-year-old primary school children diagnosed with F83, who were subjected to mental deprivation, compared with their peers who have the same diagnosis, but were not subjected to deprivation, in order to identify potential targets of correctional work.

**The hypothesis of the study:** the influence of the factor of mental deprivation on children with mixed specific disorders of psychological development leads to the formation of characteristic neuropsychological disorders in them, which differ from disorders that are specific to children who have not been subjected to deprivation.

**Research objectives:**

1. To conduct a neuropsychological examination of younger schoolchildren with a psychiatric diagnosis of F83 among groups of children who have been and have not been subjected to mental deprivation.

2. To perform a syndromic neuropsychological analysis of the disorders identified in the studied groups of children.

3. To systematize the results of the study to identify potential patterns of manifestation of neuropsychological syndromes in the study groups.

4. To identify and differentiate targets of corrective action by the studied groups.

### **Research methods and techniques:**

The methodological basis of the study was the theoretical and methodological concepts of psychology and neuropsychology developed by famous Russian scientists. These are, first of all, the modern doctrine of higher mental functions (L.S. Vygotsky, A.R. Luria, A.N. Leontiev), the doctrine of functional systems and their heterochronous development (P.K. Anokhin), ideas about the role of biological and social in child development, about the bilateral interaction of brain morphogenesis with the formation of the psyche (L.S. Vygotsky, A.R. Luria, A.N. Leontiev et al.), the concept of a system-activity approach to the study of the psyche (A.N. Leontiev, S.L. Rubinstein), the theory of systemic dynamic localization of higher mental functions and the principle of their syndrome analysis (A.R. Luria).

A complete neuropsychological study of children was carried out according to the method of J.M. Glozman and A.E. Soboleva, which is the method of A.R. Luria adapted for younger schoolchildren [24].

When evaluating the diagnostic results, the criteria of the syndromic neuropsychological analysis of children developed by A.V. Semenovich were used [66].

**Experimental base of the study:** the study was conducted on the basis of two correctional schools in the city of Magnitogorsk: boarding school No. 5 for orphans and children left without parental care, with disabilities and special correctional comprehensive school No. 24.

Two groups of subjects were taken as a sample of the study:

1. Younger schoolchildren aged 7-8 years with a diagnosis of F83, studying and living in a boarding school for orphans - 86 children.
2. Junior schoolchildren aged 7-8 years with a diagnosis of F83, studying at a correctional comprehensive school, living with their parents - 91 children.

**The reliability of the obtained results** was ensured by the validity of theoretical positions, the use of research methods adequate to its subject, goals and objectives, among which the neuropsychological



method of syndrome analysis based on the principles of systemic and dynamic localization of higher mental functions was the leading one.

The statistical reliability of the results was provided by the sample size  $n = 177$ , its representativeness, the use of descriptive statistics for data processing and the Pearson criterion<sup>22</sup> for statistical evaluation of the presence and strength of the relationship identified in the study.

**Scientific novelty and theoretical significance of the study:** for the first time, a comprehensive neuropsychological study of the state of mental activity in 7-8-year-old children with mixed specific disorders of psychological development who were and were not subjected to mental deprivation was carried out, neuropsychological syndromes of unformed higher mental functions characteristic of deprived and non-deprived children of this age and this form of mental disorder were identified for the first time.

The experimental data obtained in the work may be of some interest to the theory and methodology of psychology and neuropsychology, contribute to the solution of the following theoretical problems: biological and social in the child's psyche, the interaction of the brain and psyche, the complex relationship of the formation of higher mental functions with the heterochrony of brain development.

**The practical significance of the work** lies in the fact that the experimental material obtained makes it possible to develop for younger schoolchildren with mixed specific disorders of psychological development more effective programs of correctional, developmental and formative education, taking into account the presence or absence of a history of exposure to mental deprivation, which is especially important for the prevention and correction of various maladaptation behaviors caused by deprivation effects in orphans and children left without parental care.

**Approbation of research results:** the results of the study were presented at an International scientific and practical on-line conference on the topic: "Personality in the modern socio-cultural space" (Kostanay, 2015), the materials of the work are presented in an article published in an international collection.

## CHAPTER 1 THEORETICAL FOUNDATIONS OF THE STUDY

### **1.1 Mixed specific disorders of psychological development, clinical and psychological features of their manifestations in children of primary school age**

According to the ICD-10 classification, mixed specific disorders of psychological development are a poorly defined, insufficiently developed (but necessary) residual group of disorders in which there is a mixture of specific disorders of speech development, school skills and/or motor functions, but there is no significant predominance of any of them to establish a primary diagnosis. Common to these specific developmental disorders is a combination with some degree of general cognitive impairment, and this mixed category can only be used when there is a significant overlap of specific disorders..

According to the recommendations of ICD-10, this category should be used when there are dysfunctions that meet the criteria included in two or more of the following headings:

– Specific speech and language development disorders (F80) are disorders in which the normal nature of acquiring language skills suffers already in the early stages of development. These conditions are not directly correlated with disorders of neurological or speech mechanisms, sensory insufficiency, mental retardation or environmental factors.

– Specific learning Skills development disorders (F81) are disorders in which normal indicators of learning skills acquisition are disrupted, starting from the early stages of development. Such a violation is not simply a consequence of the lack of opportunity to study or solely the result of mental retardation and is not caused by an injury or a brain disease.

– Specific disorders of the development of motor function (F82) is a disorder whose main feature is a significant decrease in the development of motor coordination, and which cannot be explained solely by ordinary intellectual lag or any specific congenital or acquired neurological disorder [78].

Since no studies aimed at studying the F83 heading directly were found in the literature, materials from studies of clinical aspects of mental disorders of younger schoolchildren with mental retardation were used as sources of information on the studied problems.

Scientific studies have described forms of impaired development in which mental and physical infantilism were harmoniously combined. In the group of underachieving schoolchildren, "subnormal students" with "softened forms" of mental retardation were identified, the interpretations of which were different. L. Fairfield described a group of underachieving children with hereditarily conditioned delayed development, I.N. Borisov - "a group of children of weakly gifted with reduced general development", whom he distinguished from pedagogically neglected and mentally retarded students, N.I. Ozeretsky singled out a group of children with a "slow pace of development", emphasizing the qualitative difference in the structure of this disorder from intellectual disability in mental retardation.

In the studies of L. Bender, the clinical and psychological characteristics of children with insufficient learning abilities were described and the varying degree of severity of difficulties in the formation of students' learning skills in writing and mathematics lessons was emphasized. It was noted that children can reach different levels of mental development and therefore their success in learning will differ in significant variability. The reasons for difficulties in mastering the school curriculum are considered by various authors taking into account biological or social factors.

A number of researchers (F. Stoker, K. Ettlinger, L. Tarnopol) showed that the changes observed in children in the development of mental functions can occur against the background of the shortcomings of abstract logical thinking. Others, on the contrary, noted that these students have preserved verbal intelligence (X. Muklebast, A. Benton).

By quantifying intelligence, a group of children occupying an intermediate position between the norm and mild mental retardation was identified. Researchers have noted that they have a temporary character of mental retardation (M. Tramer, A. Drive) and the positive impact of timely pedagogical assistance.

In the concept of A. Strauss and L. Lehtinen, delays in mental development and difficulties in mastering school skills are interpreted as the result of slightly pronounced organic brain damage at the early stages of a child's ontogenesis. These authors called such children "children with minimal brain damage."

Later, R.S. Payne introduces the concept of minimal brain dysfunction, which includes not only organic but also functional brain disorders in the causes of developmental delays.

Subsequently, in the works of various authors, a critical opinion was expressed about the correctness of using the term "minimal brain dysfunction" when describing clinical variants of school failure, since it largely reflects the quantitative characteristics of mental retardation and does not contain differentiation by etiology and pathogenesis (K.S. Lebedinskaya).

When studying children with learning difficulties, searches were conducted for a term to denote the identified lag in intellectual development that causes learning problems. Since the beginning of the 1960s, a number of works have attempted to identify and describe "school learning disability" as an independent nosological unit. In Russia, this phenomenon has been studied mainly in clinical studies. According to their results, a hypothesis was put forward according to which learning difficulties were associated with forms of mental and psychophysical infantilism, cerebrastenic conditions, congenital visual, hearing, speech disorders, cerebral palsy.

A number of clinical variants of infantilism in the context of school failure were described in 1966 by M.S. Pevsner. The issues of etiology and pathogenesis of various forms of mental retardation were also considered, among which special importance was attached to the role of residual phenomena of organic damage to the central nervous system. To date, special psychology has a large number of studies devoted to the study of specific and non-specific features of the mental activity of children with learning difficulties (mental retardation). At the same time, they represent a combined group of conditions that differ in etiology, pathogenesis and clinical and psychological characteristics, formally united by an IQ range from 75 to 95.

Since the 1960s, many clinical papers in Russia have been devoted to mental retardation. The systematic and comprehensive study of the causes and mechanisms of "lagging" from the age norm in children was facilitated by studies of higher cortical functions, which show the presence of their deficiency. It is noted that in cerebral asthenia, psychopathic disorders, psychomotor disinhibition lead

to aggravation of insufficiency in cognitive activity (Yu.G. Demyanov, O.S. Nikolskaya, I.F. Markovskaya, V.V. Lebedinsky). In the studies of E.S. Ivanov's pathogenetic role in the occurrence of a lag in the pace of mental development is assigned to asthenia. The violation of higher cortical functions in the presence of cerebral organic pathology is explained by I.F. Markovskaya, in particular, by the weakness of mental tone.

In the clinical study of children with a history of mental retardation, the presence of a non-rough organic pathology of the nervous system is indicated in the anamnesis. From a number of reasons leading to a lag in mental development, different authors have noted: pathology of intrauterine development (severe toxicosis of pregnancy, infections, intoxication, trauma), prematurity, asphyxia and trauma during childbirth, infectious diseases or diseases accompanied by eating disorders (dyspepsia, flu, dysentery, rheumatism). There are indications of the role of hereditary burden in psychological terms in children with mental retardation: alcoholism of parents, mental retardation in close relatives, schizophrenia, genetic malformations and other mental illnesses.

Analysis of anamnestic data of children with mental retardation showed that the pathology of pregnancy, childbirth and diseases of the first year of life accounted for 67.3%. Researchers note the pathology of intrauterine development in 70% of children and in 30% — the consequences of birth injuries and injuries of the first year of life, the share of stress during pregnancy accounts for 14%. There are indications of mental retardation of genetic etiology.

In the study of the somatic state of children with mental retardation (Lebedinsky V.V., 2003), there is a general lag in motor skills, especially fine motor acts, signs of dysplasia. During neurological examination, various changes are observed: disorders of the central and autonomic nervous system, disorders of cranial innervation, vegetative-vascular disorders, thermoregulation disorders, sleep disorders. 75% of schoolchildren with delayed mental development of cerebral-organic genesis revealed slight facial asymmetry, awkwardness with tongue movements, slight coordination disorders, etc.

Persistent difficulties in teaching children with mental retardation, as a rule, are based on a variety of causes, including organic damage to the central nervous system. With certain violations of cognitive activity, students have not a total, but a partial violation of intellectual development.

Thus, clinical studies have made it possible to purposefully develop scientific approaches to the systematics of mental retardation in children.

In psychological and pedagogical research, when studying various aspects of cognitive activity of students with mental retardation, it is not the insufficiency of abstract thinking as such, but the deficiency of the "prerequisites" of intelligence.

Various studies of individual mental functions, features of the formation of knowledge, skills and abilities in older preschoolers and younger schoolchildren with mental retardation have been conducted. In the works of G Spiel and his collaborators, the reasons leading to the emergence of significant learning difficulties in children were analyzed. In their opinion, a number of unfavorable social factors are at the heart of the existing school problems. A combination of biological and social risk factors can even lead to mild mental retardation.

Arbitrary attention is a very important factor for the successful education of children in school. Among the characteristics of visual and auditory attention of students with mental retardation, instability, increased distractibility, switching and distribution deficiencies are indicated.

The study of the peculiarities of perception in children with mental retardation of cerebral-organic genesis has shown that their process of receiving and processing sensory information proceeds slowly and is characterized by a lower reaction rate in the conditions of choice compared with normally developing peers (L.I. Peresleni).

Experimental psychological studies of memory (T.V. Egorova, I.Y. Kulagina, T.D. Puskaeva, V.L. Podobed) revealed that semantic, logical memory suffers more in children with mental retardation than mechanical memory. There is a noticeable decrease in the productivity of arbitrary memory. This is due to the insufficient purposefulness of their mnestic activity, the inability to apply rational methods

of memorization, and the lack of formation of self-control processes. When grouping the material according to any formal criteria, it was found that the efficiency of memorizing information is worse than when memorizing by mechanical memorization.

In students with mental retardation of cerebral-organic genesis, there is a decrease in all indicators of involuntary memory necessary for this type of memorization. It is pointed out that they have insufficient effectiveness of involuntary memorization of information in comparison with the norm and an increase in its indicators in emotionally saturated gaming situations (N.L.Belopolskaya, 1976).

In the works on the study of the mental activity of children with mental retardation, attention is drawn to the insufficient level of formation of the basic mental operations: analysis, synthesis, comparison, generalization, classification, abstraction, and their greater productivity at the subject and visual-figurative level compared to verbal was noticeable.

The lag of preschool and primary school age children from the age norm in the development of logical thinking has been established, the features of its development in different social and psychological and pedagogical conditions have been revealed. Great potential opportunities in the formation of the ability of logical evidence in children with mental retardation in primary school age are shown.

In studies, there are indications of the predominance of gaming interests in first-graders with mental retardation. It is noted that in the evaluation situation they often have a state of anxiety. The nature of emotional reactions is indirectly influenced by such personal formations as self-esteem and the dominant motives of teaching. The failure of schoolchildren to master the school curriculum leads to various negative reactions, the emergence of feelings of inferiority and a rapid decrease in self-esteem.

In special psychology, the problem of communication of children with mental retardation is studied. At the age of six, these children are not only significantly behind in the development of various forms of communication, but they also have a qualitative peculiarity of the formation of communicative activity. In 80.6% of older preschoolers, communication has a situational and business

form. Only 19.4% of them show certain opportunities in mastering the non-situational and cognitive form of communication. The non-situational and personal form of communication, which children with normal development master by the age of 5-7, turns out to be inaccessible to their peers with mental retardation.

A lag in the formation of interpersonal relationships of schoolchildren with mental retardation with parents, teachers, and peers was found. The upbringing of a child with mental retardation in an incomplete disharmonious family, as well as the negative social practice of communication acquired in an educational institution, has a negative significance for the development of communicative abilities.

Thus, the analysis of clinical-physiological and psychological-pedagogical studies shows that already at the beginning of the XX century a special group of children with learning difficulties was identified. The heterogeneity of this category of students has been established, and attempts have been made to identify the causes of the existing lag in development. Knowledge of the peculiarities of the development of their individual mental functions, cognitive activity, speech and emotional-personal sphere is necessary for the development of methods and diagnostic techniques in order to identify the potential learning opportunities of these children and build individual programs for correction and development.

Currently, there is a tendency to increase the number of children with learning difficulties of various origins. For example, in the 1950s, among the underachieving students of secondary schools, they were allocated up to 10%, and according to the latest data of most authors, this number increased to 60%.

Despite the active use of the concept of "mental retardation", the term itself has largely lost its relevance in relation to clinical research, since the concept of mental retardation is largely psychological and pedagogical. Nevertheless, the term continues to be used even in medicine in relation to borderline forms of intellectual disability, which are characterized by a slow pace of mental development, personal immaturity, and non-severe cognitive impairment [29, 33].



Many studies have noted that mental retardation is one of the most common forms of mental pathology of childhood. It is more often detected with the beginning of a child's education in a kindergarten preparatory group or at school, especially at the age of 7-10 years, since this age period provides great diagnostic opportunities.

In most cases, mental retardation is characterized by a persistent, albeit weakly pronounced tendency to compensation and reversible development, possible only in conditions of special education and upbringing [10, 70].

Phenomenologically, mental retardation is characterized, first of all, by a slow pace of mental development, personal immaturity, non-severe cognitive impairment, structurally and quantitatively different from oligophrenia, with a tendency to compensation and reverse development [57, 71, 82].

The reasons for the lag, as a rule, are divided into 2 groups: biomedical and socio-psychological [18, 75].

Mental retardation manifests itself in several main clinical and psychological forms: constitutional origin, somatogenic origin, psychogenic origin and cerebral-organic genesis. Each of these forms has its own characteristics, dynamics, prognosis in the development of the child.

Mental retardation of constitutional origin – the state of delay is determined by the heredity of the family constitution, in its slow pace of development, the child, as it were, repeats the life scenario of the father and mother. By the time these children enter school, there is a discrepancy between their mental age and their passport age, in a seven-year-old child it can be correlated with children 4-5 years old. For children with constitutional delay, a favorable prognosis of development is characteristic, provided that there is a purposeful pedagogical influence (activities available to the child in a playful form, positive contact with the teacher). Such children are compensated by the age of 10-12.

Mental retardation of somatogenic origin – long-term chronic diseases, persistent asthenia (neuropsychiatric weakness of brain cells) lead to developmental disorders. Factors of heredity in the occurrence of disorders are not traced, developmental delay is a consequence of diseases suffered in early childhood: chronic infections, allergies, etc. Most children with this form of mental retardation

have pronounced asthenic symptoms in the form of headache, increased fatigue, decreased performance, attention, memory functions and the ability to maintain intellectual tension for a long time. The emotional-volitional sphere is characterized by immaturity with relatively preserved intelligence, difficulties in adapting to a new environment are noted.

Mental retardation of psychogenic origin – children of this group have normal physical development, functionally complete brain systems, are somatically healthy. The delay in mental development of psychogenic origin is associated with unfavorable conditions of upbringing, causing a violation of the formation of the child's personality. These conditions are neglect, often combined with cruelty on the part of parents, or overprotection, which is also an extremely unfavorable situation of upbringing in early childhood. Neglect leads to mental instability, impulsivity, explosiveness and, of course, lack of initiative, to a lag in intellectual development. Overprotection leads to the formation of a distorted, weakened personality, such children usually show egocentrism, lack of independence in activities, insufficient focus, inability to willpower, selfishness.

Mental retardation of cerebral-organic origin – the reason for the disruption of the rate of development of intelligence and personality are gross and persistent local destruction of maturation of brain structures (maturation of the cerebral cortex), toxicosis of a pregnant woman, viral diseases during pregnancy, influenza, hepatitis, rubella, alcoholism, drug addiction of the mother, prematurity, infection, oxygen starvation. In children of this group, the phenomenon of cerebral asthenia is noted, which leads to increased fatigue, intolerance to discomfort, decreased performance, poor concentration of attention, and memory loss. Mental operations in terms of productivity indicators are close to children with oligophrenia, knowledge is acquired in fragments. Persistent lag in the development of intellectual activity is combined in this group with the immaturity of the emotional-volitional sphere [21, 60, 79].

A number of authors attribute cerebral asthenia to the "axial" syndrome of mental retardation in children [11, 51].

Of interest is the variant proposed by N.E. Butorina for classifying psycho-organic states with mental retardation into asthenohyperdynamic and asthenohypodynamic.

The asthenohyperdynamic variant of disorders is characterized by the participation in the clinical picture of two leading symptom complexes: hyperdynamic and cerebrastenic with motor disinhibition and emotional-volitional disorders of a predominantly excitable nature, which are closely intertwined with the phenomena of cerebrastenia with a decrease in mental performance, fatigue, vegetative symptoms.

The astheno-hypodynamic variant is characterized by persistent asthenic symptoms in the form of lethargy, low activity, increased mental and physical exhaustion, affective lability with a tendency to reduced mood and dysphoric episodes [16].

Clinical manifestations of mental retardation in the proposed variants are characterized by the following age-dependent symptoms:

1. At the somatovegetative level, the common symptoms for both variants were: sleep disorders (85%), high sensitivity to external stimuli (96%), emotional instability, lability (87%), psychovegetative disorders (81%) and difficulty adapting to a new (88 %).

2. The following syndromes were detected at the psychomotor and affective levels:

– Syndromes of mental dysontogenesis and evolutionary pathological conditions. In the asthenohyperdynamic variant, hyperactivity disorder with attention deficit was significantly more often observed (56%); in the asthenohyperdynamic variant, psychomotor disorders (82%), speech development disorders (54.8%) and pathological habitual actions (48%) prevailed.

– Syndromes of neurotic and somatoform disorders specific to childhood. The asthenohypodynamic variant was significantly more often dominated by tic disorders (43%), somatoform disorders (37%), anxiety and depressive disorders (33 %).

– Personality and behavior disorders that begin in childhood. In the astheno-hyperdynamic variant, hyperkinetic behavior disorders (47%) and oppositional behavior disorders (40%) were significantly

more often detected. In the asthenohypodynamic variant, mixed behavioral and emotional disorders (51%) and family behavior disorders were mainly diagnosed (48 %).

In children with an asthenohyperdynamic variant, disorders of a predominantly excitable radical with pronounced disinhibition, lack of active attention, instability of behavior and mood came to the fore. Motor disinhibition, disorganization, impulsivity were combined with increased fatigue, irritable weakness. The beginning of school, coinciding with the age critical phase, was accompanied, first of all, by decompensation of cerebrastenic symptoms, which significantly reduced adaptive mechanisms. First of all, the hyperactivity inherent in these children worsened in maladaptive reactions. The maladaptation reaction was manifested by a behavior disorder with comorbid hyperkinetic syndrome.

In the asthenohypodynamic variant, signs of low activity, increased mental and physical exhaustion, affective lability with a tendency to a reduced mood prevailed. A combination of behavioral disorders and somatization of disorders was often noted [17].

According to pathopsychological studies, the presence of neuropathic symptoms (organic neuropathy) was observed in 100% of cases of mental retardation. Different forms of manifestation of these disorders correspond to a high percentage of the same type of signs, which can rightly be attributed to the basic indicators of the syndrome, that is, they are symptoms that determine the neuropathic syndrome itself. Such indicators can include sleep disorders, high sensitivity to any external stimuli, emotional instability, lability, a variety of psychovegetative disorders and difficulty adapting to everything new. The defining symptoms intensified with physical and mental stress, were accompanied by rapid exhaustion, capriciousness, tearfulness, disinhibition. Such a range of clinical manifestations indicated the inclusion of asthenic components in the symptoms.

The whole structure of the defining symptom complex acquired a distinct aesthetic structure with increased fatigue and exhaustion, intolerance to physical and mental stress, affective and vegetative lability, sleep disorders, headaches, and decreased intellectual productivity. The severity of the manifestations depended both on the influence of internal (biological) conditions and on external (environmental) ones. In any case, it became the main, core symptomatology, on the one hand

affecting the overall development of the child, determining the nature of his neuropsychiatric response, on the other - being a favorable ground for the development of another mental pathology. The defining asthenic symptom complex had a clear negative dysontogenetic character [22, 34].

A few studies of manifestations of mental retardation in the context of binding to the ICD-10 classification have shown the following frequency of distribution of clinical formations that do not belong to the group of mixed specific developmental disorders: in the first place among the studied clinical formations were psychomotor disorders (F82 – disorders of motor function development) with manifestations ranging from motor clumsiness and imperfections of fine motor coordination to learning difficulties caused by impaired performance of visual-spatial tasks. Attention deficit hyperactivity disorder (F90) came in second place in terms of prevalence. Next in terms of prevalence is a mild cognitive disorder (F06.7) with the main sign – a decrease in cognitive productivity, followed in descending order by mixed behavior and emotion disorders (F92.8), behavior disorders (F90.1) [30].

## **1.2 Features of the formation of higher mental functions of children affected by mental deprivation**

Mental deprivation is a mental state that has arisen as a result of such life situations where the subject is not given the opportunity to meet some of his basic (vital) mental needs sufficiently and for a sufficiently long time.

In the scientific literature, the concept of "deprivation" refers to the loss of something, deprivation due to insufficient satisfaction of an important need. At the same time, we are not talking about physical deprivation, but about insufficient satisfaction of mental needs [9].

J. Langmeyer and Z. Mateychek introduced the concept of deprivation into psychological practice and gave its definition: "Mental deprivation is a mental state that has arisen as a result of such life situations where the subject is not given the opportunity to meet some of his basic (vital) mental needs sufficiently and for a sufficiently long time" [46].

Such basic needs can be considered:

1. The need for a certain amount, variability and type (modality) of stimuli.
2. The need for basic conditions for effective teaching.
3. The need for primary social ties (especially with the mother), providing the possibility of basic integration of the individual.
4. The need for social self-realization, which provides the opportunity to master separate social roles and value goals.

The consequences of mental deprivation are manifested in the fact that an individual, as a result of long-term dissatisfaction with needs, is unable to adapt to situations that are common and desirable for a given society. [39, 80].

In J. Langmeyer's fundamental research, the following forms of mental deprivation are identified:

1. Stimulatory (sensory) deprivation: reduced number of sensory stimuli or their limited variability and modality.
2. Deprivation of values (cognitive): too changeable, chaotic structure of the external world without a clear ordering and meaning, which makes it impossible to understand, anticipate and regulate what is happening from the outside.
3. Deprivation of emotional attitude (emotional): insufficient opportunity to establish an intimate emotional relationship with any person or the rupture of such an emotional connection, if one has already been created.
4. Identity deprivation (social): limited opportunity for learning an autonomous social role [46].

First of all, the child needs an environment appropriately equipped with stimuli. Under normal circumstances, each child also strives for a certain optimal level of stimulation. Stimulus deficiency or stimulus overload have an impact on physiological processes. Sensory deprivation affects the level and fluctuation of skin resistance, respiratory rate and pulse, desynchronization of the electroencephalogram. Children deprived of sensory type are distinguished by neurological disorders characteristic of children with organic brain damage (hypotension, preservation of archaic reflexes, hyperkinetic syndrome).

The next mental need of the child is the need for a differentiated and relativistically constant structure of external stimuli. From the first months of life, the child shows the need to know the world and master it as a meaningful structure of the past and present, expected and realized. The stimulating situation is characterized by the nature of the appeal: the development of the child is stimulated by it primarily when it provides conditions for understanding the routine and gives confidence in the presence of active control of the ongoing processes.

As soon as the perceptual and cognitive abilities reach the level when the child becomes able to separate the mother's face from the rest of the faces and when he forms the concept of the persistence of the object, the need for emotional connection turns into one of the most pronounced: the further development of the child's personality largely depends on its satisfactory and continuous development [26].

A mentally deprived child often grows up in a hygienic model environment, with sufficient care and supervision, but his mental and, especially, emotional development is seriously impaired [13, 61, 83].

The child's mental needs are best met, undoubtedly, by his daily communication with the natural subject and, in particular, the social environment. If for any reason a child is prevented from such contact, if he is isolated from the stimulating environment, then he inevitably suffers from a lack of stimuli.

Such isolation may differ in varying degrees, but it goes through all social situations in which deprivation occurs. In institutions with constant collective care, the child is isolated from the stimuli brought by life in the family, and is exposed, in most cases, to a certain monotony of sensual as well as social stimuli. With partial collective care, this danger, although significantly reduced, is not eliminated [1, 68].

In cases with children in orphanages, one of the factors in the occurrence of mental deprivation is the insufficient supply of stimuli – social, sensory and sensory, which happens when a child lives in a situation of "social isolation".

Another important factor in the occurrence of mental deprivation is the termination of the already established connection between the child and his social environment.

Such a situation most likely arises when the child is separated from those persons who have been a source of emotional satisfaction for him until now [14].

According to scientific research, the long-term separation of a child from his mother or with another person taking her place in the first three to five years of life leads, as a rule, to a violation of the child's mental health, leaving consequences that can be constantly observed throughout the further development of his personality. The concept of separation was introduced into psychology as a pathogenic and extremely important circumstance.

Separation is defined as a situation in which a specific connection between a child and his social environment ceases.

The biological dependence of the child on the mother only during infancy turns into emotional dependence, and separation will pose the greatest danger for his further mental development during the period when this dependence has already fully developed [97].

At the same time, there is also a reverse development trend – the development of independence and a certain autonomy of the child. Such gradual separation is an obvious condition for his social maturation, his self-realization and mental health. Social separation is made dangerous and pathogenic by the disproportion in time-prematurity. If a school-age child is temporarily separated from his family, then this can strengthen his development to independence in a positive sense. It is dangerous if separation occurs at a time when the child is still heavily dependent on the mother or on anyone else, and if the separation activity does not come from him, but from life circumstances that lie beyond his understanding – if the child is internally "caught off guard" by this situation, and he is not prepared for it by his development [32].

Assumptions about the adverse effects of separation were tested later in several research papers, but their conclusions are not uniform.



So, in particular, it was found that children who were deprived of maternal care in the first five years of their lives were subjected to a persistent defeat in terms of their ability to establish an emotional connection with people [47].

At the same time, there were no more frequent cases of separation from parents in the anamnesis of the group of 80 offenders compared to the group of 80 persons without offenses who were correlated with them in pairs in the relevant aspects. [46].

Significant differences are found in the literature when summarizing the results of numerous, often contradictory studies on the impact of deprivation on the behavior and development of a child. According to the current level of knowledge, it can be concluded that the direct impact of the separation of a child from his parents is, under certain conditions of development and individual conditions, indisputable and depends on changes in family ties. In contrast, the evidence for the existence of long-term consequences of separation events for the development and mental state of the child is less convincing, as evidenced by the contradictory results of retrospective studies. It is likely, however, that the circumstances of the emotional ties preceding or resulting from this separation are of greater importance than the separation itself. Separation is only an external situation, the psychological impact of which in the short and long term can be very different [69].

The adverse effect of early detention in orphanages on the development of speech was proved in foreign studies, in which 18 pairs of children were compared – at the age of 8-11 and 14. Children from orphanages were much more likely to be immature at school age, they lagged behind in learning, there were twice as many poor readers among them than in the normal population, they showed a more serious degree of emotional disorders characterized by regressive symptoms or a desire to attract attention to themselves. However, more than 30% of the children were generally fit, which may indicate that not every stay in the institution should cause serious damage to the child.

The hereditary background is approximately similar in the whole group, and the mental lag of children brought up in orphanages from infancy cannot be explained only by the negative development of the population or insufficient initial educational assistance.

Since the medical and material maintenance of children in institutions for infants was favorable, there remains a third possibility, that is, the important participation of deprivation factors, namely the lack of sensory, and especially emotional stimulation of the child in extreme living conditions, which brings a permanent stay in an orphanage [48, 64].

It should be taken into account that children growing up in identical deprivation conditions may have both similar and different forms of deprivation consequences, which indicates that individual factors introduced by the child himself into the deprivation situation (constitutional properties, gender, age, pathological signs) should be seriously considered. What is the ratio of these basic individual prerequisites to certain deprivation conditions or constellations of conditions, remains a little-studied question [52, 86].

Although research works agree that under normal conditions existing in orphanages, children's development is delayed most of all in the field of speech (especially in its expressive component) and in social behavior, however, this does not apply to all cases; there are deviations both due to age and the possibility of learning. The possibility of regulation of lesions and developmental delays in the best conditions was confirmed, either spontaneously or after directed intervention [53,63, 94].

The same deprivation conditions affect "normal" children differently and children affected by any somatic or mental defect [19, 44].

It is debatable that in some extreme cases, organic damage can reduce the child's susceptibility to deprivation. With certain reservations, this can be assumed in children with serious brain damage, accompanied by severe dementia, idiocy or idioimbecility.

The reverse cases, when as a result of the defect, the child becomes more susceptible to deprivation influences, are more serious. If the defects of the sensory organs, motor or mental defects prevent the child from achieving the usual way of satisfying the basic mental needs in an environment that is otherwise appropriate, the child is forced either to completely abandon such efforts, or to be content with at least partial satisfaction, or to look for another, substitute way of satisfaction.

A special category among children with increased susceptibility to deprivation effects are children with early damage to the central nervous system, which usually results in more or less disharmonious development of mental functions, as well as a motley picture of bizarre or difficult behavior. A number of studies have drawn attention to the connection of deprivation with so-called mild childhood encephalopathies or minimal brain dysfunctions.

The increased paroxysmal readiness of a child with minimal brain dysfunctions may also become noticeable under deprivation influences, leading to delayed maturation to insufficiently active suppression, to the preservation of generalized reactions and stereotypical automatisms instead of developed forms of volitional reactions. All these connections are observed quite often in clinical practice.

Thus, based on a comparative study of 184 children from orphanages, 505 children with behavioral disorders as a result of an inappropriate environment and 273 children by random choice, it was concluded that in the studies conducted on the problem of deprivation, the proportion of mild brain lesions was underestimated and that the increased susceptibility of such children to pathogenic environmental influences should especially manifest itself in the situation of institutions [46, 65].

The two-fold interpretation of the conducted studies indicates that, on the one hand, many children with mild brain lesions could not significantly stand out from the general mass of children if there were no deprivation life situation. On the other hand, a deprivation situation of a minor degree, through which a healthy child would have passed without injury, represents a significant burden for an encephalopath.

The combination of minimal brain dysfunctions with deprivation, therefore, poses a very serious threat to the child; in addition, it can be concluded that this convergence is quite frequent [36, 99].

The results of clinical observations depend on many factors that vary from study to study and from one set to another, and under completely similar conditions, in such a way that it is not always possible to obtain uniform conclusions based on them. This indicates the need for an experimental approach to the problem to clarify the central issue of the pathogenesis of deprivation effects in children [35].

Deprivation captures, in fact, the individual components of the child's development, forming certain characteristic patterns according to the severity of the affecting conditions. In the classical picture of mental deprivation of children, there is usually a clear delay in the development of speech. In addition to the usual severe tongue-tied, noticeable especially in children from institutions, the first thing that catches the eye is the lag in the area of syntax and content. The vocabulary is relatively poor and gives the impression that children have been "trained" to use a certain number of words, and not at all that they have "learned to speak". Children are relatively good at naming objects in pictures, but much later and with great difficulty they will be able to describe what is happening and the meaning of the picture, which implies an understanding of the relationship between reality and its symbolic representation [3, 100].

Quite often there is a delay in the development of fine motor skills in deprived children (especially from orphanages and boarding schools), which is usually in contrast with the almost corresponding level of gross motor skills [20].

Studies of children with "minimal brain dysfunction" also revealed a very noticeable unevenness in mental productivity, a clearly low level of results in drawing tests, as well as efficiency, difficulties in practical orientation, motor skills and perception. A child with hereditary mental retardation shows lower overall results, but they are mostly uniform. The deprived child is characterized by obvious shortcomings in the tests of conceptual and knowledge in social awareness, as well as in practical judgments and assessments, with which children who have not been deprived do not experience significant difficulties [76].

A deprived child does not know how to work independently, he is scattered by side stimuli, however, he can carry out work training relatively quickly, he adapts to tasks and works fairly evenly under direct supervision – and there is no characteristic encephalopathic insufficiency.

Thus, the assessment of children from orphanages through verbal tests of the level of intelligence should inevitably distort the picture of their mental capabilities [54].

The problems of correctional effects on deprived children deserve special attention. To a significant number of researchers, deprivation disorders were predominantly presented as incorrigible with an almost hopeless prognosis. The consequences of prolonged mental deprivation at an early age are deep and permanent, they are practically unchangeable until adulthood. If a violation has occurred, placing the child in a more favorable environment no longer helps.

Adherents of the opposite point of view emphasize the success of preventive and therapeutic measures provided that the material and personnel equipment of children's institutions is perfect and that all the work of these institutions is subordinated to the idea that the personality of each individual child should be taken into account as much as possible [5, 96, 98].

Summing up some of the results of the information presented, the following patterns can be distinguished, noted by most researchers: severe and prolonged deprivation usually causes profound changes in the child's mental structure, which can be permanent. The younger the child and the longer the deprivation continues, the less hope there is for eliminating the consequences without a trace. Certain disorders, especially in the emotional area, remain there even in cases when the child has adapted normally in social and mental relations.

Even a short deprivation experience that passes without visible consequences leaves at least one hidden consequence, namely increased vulnerability in the event of a recurrence of such an experience or other unfavorable life situation.

### **1.3. Neuropsychological syndromes of deviant development**

The most important characteristic of neuropsychology is that it is not only an analytical, but also an integrative science, which is not limited to the study of either neuropsychological (brain and physiological), or psychological, or social layer of mental phenomena. She studies all three layers of any mental process, which are the levels of the hierarchical structure of the psyche.

The subject of neuropsychology is not an isolated study of any one level in the structure of higher mental functions, but the study of the integrative structure and disorders of higher mental functions of a person in the context of his personality and conscious activity [23].

Methods of neuropsychological diagnostic examination are not a set of isolated techniques or their battery, but a structural and dynamic system in which all methods are interconnected and each test aimed at investigating one higher mental function, if used correctly, can show the state of other higher mental functions systemically related to the investigated [42].

Many researchers believe that children with mental retardation are the most difficult group in diagnostic terms, and agree that the neuropsychological method of examination should be actively used in the examination of this group of children. The neuropsychological approach is especially important when solving the problem of identifying the causes and mechanism of lag in the development of a child, studying the lack of formation or delay in the development of higher mental functions and their structural inferiority, identifying the insufficiency of certain areas of the brain of functional or organic genesis. Neuropsychology makes it possible to correlate deviation or deficiency in the development of the child's psyche with delayed maturation of certain areas of the brain. Using specific methods of examination of children, the neuropsychology of childhood can determine the causes of children's failure in school, and outline ways to overcome these difficulties [58, 95].

In the development of a child, both types of mental development are represented – biological and historical, or biological and social. The mechanism of defects in children with developmental anomalies is characterized by divergence, mismatch, divergence of both development plans, the fusion of which is characteristic of the development of a normal child [59, 84].

Modern neuropsychology of childhood has determined the following sequence of stages of brain development in children:

1. Maturation of the block of deep brain structures responsible for activation processes, subcortical brain apparatuses mobilize innate and acquired reactions of various biological qualities, ascending

influences come from subcortical formations, impulses are either generalized or differentiated in different areas of the cerebral cortex.

2. Then the primary fields mature, which begin to function from the moment of birth and are formed by the end of the first year of life.

3. The maturation of secondary – associative – fields takes from 2 to 5 years, during this period modally specific functions develop.

4. Tertiary formations, overlapping several analyzer systems, mature later and are the basis for the formation, development and disruption of the most complex higher mental functions, so, the temporal-parietal-occipital zone (TPO zone) matures by the age of 8-12 and provides the development of a complex spatial and quasi-spatial function, which is included in the structure of many higher mental functions of a higher level (speech, writing, counting).

5. Last of all, the frontal lobes of the brain mature (from 8 to 14 years old), which regulate, program and control the flow of all higher mental functions, the formation of emotional and volitional processes and the personality of a person [72].

Age maturation and development of various brain structures are a necessary prerequisite for the development of higher mental functions, and vice versa, the development of higher mental functions has a stimulating effect on the maturation and development of certain brain structures and the brain as a whole. The development of higher mental forms of behavior requires a certain biological maturity, a certain structure as its prerequisite [74, 85].

One or another malfunction in the morphogenesis of the brain or a malfunction in the interaction of its individual levels or zones, in the interaction and interaction of the brain with the development of higher mental functions can lead to one or another abnormality in the development of mental functions in children. Dysfunctions on the part of the brain, as well as selective imbalance of the brain, psychological and social components of the ontogenesis of higher mental functions, underdevelopment of some of its zones or a delay in their development can lead to various kinds of unformed higher

mental functions, to a delay in their development, deviations or disorders of the mental development of the child [50, 89].

Based on these modern ideas about the connection of the psyche with the brain, its functional organs, a number of researchers have suggested a possible cause of unformed mental activity in children or a lack of mental development in the form of a problem in the development of functional systems. In some cases, it may be an incompleteness of the composition of the functional system – its structure does not include all the afferentations necessary for the realization of certain higher mental functions, or a delay in the consolidation of those parts of the brain whose joint work provides certain mental properties of the function, or the disintegration of a functional system, or a delay in the higher levels of integration of functional organs [49, 90].

Science has reliable facts that indicate the significant role of the social level in the development of mental activity and its interaction with other levels in the structure of higher mental functions. Each level makes its own specific contribution to the formation and development of higher mental functions in children, but they all work in unity at each age stage, at which the structure of the brain base, the structure of functional systems and the structure of higher mental functions change, and this change is mutually conditioned.

Neuropsychology has established the fact of interaction and mutual influence of the development of higher mental functions and the development of their brain substrate. With the help of methods developed in neuropsychology, a neuropsychological examination can determine the cause of a lag or deviation in the development of higher mental functions, or a delay in their development, or their violation. These reasons may lie both in the brain structures and in the socio-psychological sphere. The task of neuropsychology is to make an accurate diagnosis, to establish the cause of the deviation in the development of the child's mental activity [59].

Currently, the neuropsychology of childhood and the practice of pediatric neuropsychology use the concept of factor, developed by A. R. Luria. A number of researchers believe that the concept of factor existing in Russian neuropsychology, its definition and psychological content can be used in working



with children in order to make a topical diagnosis and nosology. In Russian neuropsychology, this position is considered debatable, and the point of view is also widespread that the features of a child's maturing brain make it possible to make, at best, a syndromic, functional, but not a topical diagnosis [43, 55].

The concept of factor formed the basis of the concept of "neuropsychological syndrome". Neuropsychological syndrome is a selective violation of one group of mental processes, which includes a disturbed factor, while preserving other higher mental functions, in the structure of which this factor is not included.

Neuropsychology of childhood has also come to a new understanding of the symptom. The symptom ceased to correlate directly with the lesion (dysfunction) of the brain. The symptom does not coincide with the localization of mental function, separate links of higher mental functions are localized, the entire mental function is localized as a system. A symptom is a violation of one or another higher mental function that has a certain mechanism.

The syndrome analysis of the state of higher mental functions is a qualitative neuropsychological analysis of the state of higher mental functions, indicating not just the problem of one or another system of VPF, but also the mechanism underlying the deviation or deficiency in the development of one or another form of mental activity [68].

In relation to childhood, the dysontogenetic picture often appears polymorphic, the occurrence and accumulation of characteristic phenomena in the child population is noted: a noticeable jump in the index of aggressiveness and substance abuse, hyperactivity and attention deficit, a sharp increase in cases of left-handedness, an increase in the number of children with signs of right-sided epigot, a general decrease in immune adaptation mechanisms and desynchronization of the functioning of various systems of the child's body.

These facts are just some of the manifestations, a much larger part of which is recorded by various specialists when describing the features of a child's development. At the same time, each of them emphasizes a certain pathophenomenon directly related to the sphere of his professional interests. In

this regard, the problem of interdisciplinary qualification of the nature and type of dysontogenesis acquires a practical, theoretical and methodological character.

Taking into account the above, A.V. Semenovich believes that the problem of deviant development can be solved only within the framework of the syndrome approach. The listed phenomena should be considered as components of a single structure, which is based on universal neurobiological and socio-cultural mechanisms of development [66].

Neuropsychological analysis of the problems identified in the dysontogenetic variant of development allows us to establish the primary pathogenetic mechanisms associated with the peculiarity of cerebral ontogenesis and to propose a syndromology of deviant development.

Each mental function and functional link has its own development program, including relative discreteness, heterochrony, phase dynamic characteristics of the formation processes.

Knowledge of the development scheme will contribute to a clearer understanding of the causes and location of the breakdown, i.e. a differentiated approach to deviant ontogenesis. To date, we can talk about a number of approaches within which this problem is being developed. On the one hand, failure in learning and communication is diagnosed as a mental development disorder and is defined by the terms "anomaly", "pathology", "minimal brain dysfunction", which is not always fair and, as a rule, uninformative from the point of view of pathogenesis, correction and prognosis.

An alternative point of view of a number of specialists attributes these difficulties to pedagogical neglect and explains their pathogenesis by socially determined factors. There are a number of explanatory models based on the analysis of the harmful effects of genetic, environmental and other similar causes [41, 73, 93].

The basic idea in the neuropsychology of childhood is that the neurobiological preparedness of a particular brain system:

1. It should be ahead of the development of a specific psychological factor.
2. To be in demand from the outside by this factor for a progressive increase in your weight and role.

3. To go through a period of retarding, retreating into the background as more highly organized cerebral systems mature, ready at this point in the child's development to take on the mediation of more complexly organized factors and their constellations.

The latter should be in demand by the outside world.

The role of social deprivation is particularly noted, which not only negatively affects mental development, but leads to "dystrophy" of cerebral systems. According to physiological studies at the neuronal level in conditions of social deprivation, the growth of dendritic networks stops [59].

The neuropsychological method is an actual and valid apparatus for evaluating and describing the system analysis of the interaction of the brain and the psyche as an interdependent unity. Neuropsychology almost uniquely solves the differential diagnostic problem: as a result of the examination, the basic pathogenic factors are revealed, and not the actual level of knowledge and skills. Neuropsychological analysis can reveal the mechanisms underlying the child's maladaptation and assess the state of the functional links of his mental activity as "unformed", "anomaly" or "atypia" and approach the development of specific corrective measures [40, 72].

Outside of the application of the complex of neuropsychological research, the reliability of information regarding the formation and automation of a number of operational and regulatory aspects of the course of mental processes is significantly reduced. The part of the cognitive deficit that is associated with the insufficiency of interhemispheric and subcortical-cortical relations is masked, the "facade" and the core of the syndrome in such cases turn out to be contradictory.

A syndromic neuropsychological analysis of the state of mental functions in children attending mass children's educational institutions and discovering learning difficulties revealed in each case a specific picture due to the influence of specific pathogenic factors. And these factors are a reflection of the insolvency of certain links of mental activity due to their lack of formation [38, 74].

Under the leadership of A.V. Semenovich, a large-scale neuropsychological study of more than 2,500 children aged 4-10 years was conducted with thorough clinical verification in the form of a comprehensive neurological examination in combination with a number of psychophysiological

methods. As a result, 6 main syndromes of deviant development in right-handed children were described:

1. Functional unformed prefrontal (frontal) brain regions.
2. Functional lack of formation of the left temporal region.
3. Functional unformed interhemispheric interactions of the transcortical level (corpus callosum).
4. Functional lack of formation of the right hemisphere of the brain.
5. Functional deficiency of subcortical formations (basal nuclei) of the brain.
6. Functional deficiency of brain stem formations (dysgenetic syndrome).

The division into "unformed syndromes" and "deficiency syndromes" is methodologically related to the fact that subcortical formations practically complete their structural and morphological development by the end of the first year of a child's life. Starting from this age, their condition can be designated as "prepathological", "subpathological", and not "unformed". From the point of view of the neuropsychological language of description, "functional lack of formation" can take place only where the morphogenesis of a particular brain structure continues [66].

The syndromes of deviant development identified by A.V. Semenovich suggest the need for neuropsychological diagnostics not only to establish and qualify the actual mental status of the child, but also to correlate the current situation with age standards for choosing the type, hierarchy and stages of correctional programs isomorphic to the nature of ontogenesis.

The conducted review of the literature on the topic being developed in the study substantiates the following intermediate conclusions:

– the available research data on the clinical aspects of the manifestation of various forms of mental retardation are quite extensive, but have not been developed in terms of compliance with the modern classification;

– the effect of deprivation on the mental state of children with various types of deviant development has been studied mainly from the standpoint of socio-pedagogical phenomenology and requires additional clinical studies;

– the neuropsychological approach to the study of clinical aspects of deprivation is adequate to the problem and has significant heuristic and research potential.

Thus, the study of the literature suggests the expediency of using a syndromic neuropsychological approach to study the peculiarities of the influence of mental deprivation on the development of higher mental functions of younger schoolchildren with mixed specific developmental disorders.

## CHAPTER 2 RESEARCH PROGRAM

### 2.1 Organization of research

The neuropsychological study of the influence of mental deprivation on the features of higher mental functions of younger schoolchildren with mixed specific disorders of mental development was carried out in three stages.

At the first stage, a theoretical analysis of the scientific literature on the research problem was carried out, the methods and methodology of the study were determined, and a research sample was formed.

At the second stage, a neuropsychological examination of younger schoolchildren with mixed specific disorders of mental development, who were and were not subjected to mental deprivation, was carried out; the obtained data were subjected to primary statistical processing.

At the third stage, based on the data obtained, a syndromic neuropsychological analysis of the subjects was carried out, the results obtained were systematized, and the general conclusions of the study were formulated.

The purpose of the study: to identify the specific features of neuropsychological disorders of younger schoolchildren 7-8 years old with a diagnosis of F83, who were subjected to mental deprivation, compared with their peers who have the same diagnosis, but were not subjected to deprivation, to identify potential targets of correctional work.

The object of the study: features of the development of mental functions of younger schoolchildren diagnosed with F83 according to ICD-10.

Subject of the study: the influence of the factor of mental deprivation on the neuropsychological features of younger schoolchildren with mixed specific developmental disorders.

The hypothesis of the study: the influence of the factor of mental deprivation on children with mixed specific developmental disorders leads to the formation of neuropsychological disorders in them that differ from disorders that are specific to children who have not been subjected to deprivation.

Research objectives:

1. To conduct a neuropsychological examination of younger schoolchildren with a psychiatric diagnosis of F83 among groups of children who have been and have not been subjected to mental deprivation.
2. To perform a syndromic neuropsychological analysis of the disorders identified in the studied groups of children.
3. Systematize the results of the study to identify potential patterns of manifestation of neuropsychological syndromes in the study groups.
4. To identify and differentiate targets of corrective action by the studied groups.

Experimental base of the study: the study was conducted on the basis of two correctional schools in Magnitogorsk (Russia): boarding school No. 5 for orphans and children left without parental care, with disabilities and special correctional secondary school No. 24.

## **2.2 Sample characteristics**

The sample of subjects for the study consists of two groups. The first group includes junior schoolchildren aged 7-8 years with a psychiatric diagnosis of F83, permanently residing in a specialized correctional boarding school for orphans and children left without parental care (86 children). It is further designated in the study as "Group 1". The second group consists of children of the same age with the same psychiatric diagnosis living with their parents (91 children). It is further designated in the study as "Group 2".

All children are trained according to a special correctional curriculum, the available speech therapy conclusions state a general underdevelopment of speech of the III level in 46% of children of Group 1 and 52% of the subjects of Group 2 and insufficient formation of language means with a predominance of underdevelopment of the semantic side of speech or lack of formation of language means in all remaining cases in both groups.

The composition of the groups: Group 1 consists of 28 girls and 58 boys (33 and 77%), in Group 2 boys are also the majority, but the ratio is somewhat different – 35 girls and 56 boys (39 and 61%). The alignment of groups by gender was not carried out because during the preliminary processing of the diagnostic results of Group 1, which was studied first, no statistically significant relationship between the sex of children and the results of neuropsychological tests was revealed.

Since no left-handed children were represented in the sample during the study of Group 1 subjects, only children with a dominant right hand were selected during the formation of Group 2. This approach is explained by the presence in the literature of numerous data on the significant influence of the left-handedness factor on cerebral and mental ontogenesis, the presence of "left-handed" children in Group 2 could significantly affect the results of the study, reducing their reliability.

Anamnesis study showed a significant level of exogenous diseases in both groups. According to medical documentation, in childhood, the following diseases were mainly observed in the examined children: various lung diseases - in 31% of children of Group 1 (27 children) and 36% of children of Group 2 (33 children), intestinal infections - 26% of children of Group 1 and 22% of children of Group 2, meningoencephalitis – 11% of children of Group 1 and 9% of children of Group 2. Traumatic brain injuries were noted in 22% of children of Group 1 and 16% of children of Group 2. Neurological reports indicated signs of mild and moderate central nervous system damage in 87% of Group 1 children and 81% of Group 2 children.

Anamnesis study showed a significant level of diseases, including exogenous, in both groups. The most common diseases of the examined children, according to the available medical documentation, are presented in Table 2.1

The presented data, especially those obtained from neurological conclusions, may indicate a significant influence of biomedical factors on the pathogenesis of specific disorders of psychological development in the study sample.



Table 2.1 – Diseases most common in the study

Diseases	Percentage of children (%) who had diseases	
	Group 1	Group 2
Lung diseases	31	36
Intestinal infections	26	22
Meningoencephalitis	11	9
Traumatic brain injuries	22	16
Damage to the central nervous system of mild and moderate degree	87	81

### 2.3 Comparison and selection of neuropsychological diagnostic methods

The Russian approach to the neuropsychology of childhood is primarily associated with the research of A.R. Luria. It is based on a syndrome analysis, during which various functional disorders (symptoms) are correlated with neuropsychological syndromes and with the neurological foundations that define them. During the diagnosis, the patient either performs or does not perform tests, which are elementary tasks designed to identify the symptom. One of the problems that arises with this type of diagnosis is that there is no clear criterion characterizing the continuum of representations between pathological and normal symptoms.

The tactics of conducting an examination is associated with the detection of valid and easily detectable symptoms as indicators of impaired function and can be constructed differently depending on this in each specific case. To perform this type of neuropsychological diagnosis requires a sufficiently high level of professional skills development.

Modern Russian neuropsychology of childhood is largely connected with this tradition of neuropsychological diagnostics.

As a rule, all modern methods of examination represent one or another modification of the methodology developed by A.R. Luria [23].

Foreign neuropsychology of childhood is largely based on empirical and theoretical work within the framework of cognitive and child psychology, which is manifested both in the construction of tests and in the interpretation of results. Within the framework of this approach, special attention is paid to the ecological validity of neuropsychological tests. Evaluation of individual cognitive components of attention, memory or speech allows us to recommend more specific methods of correction.

In the leading methods of modern pediatric neuropsychology in the United States, the emphasis is not on identifying brain lesions, but on carrying out functional diagnostics of the child from the point of view of a comprehensive biopsychosocial approach, which makes it possible to better determine the goals and methods of influence. According to the approach adopted in the USA, a neuropsychological examination of a child necessarily includes a detailed examination of each of the following mental functions:

- general intelligence;
- school performance;
- speech processes;
- visual-spatial functions;
- sensorimotor gnosis;
- praxis;
- attention;
- memory;
- learning;
- abstract thinking.

In addition, the psychosocial living conditions of the child are evaluated. In Luriev's neuropsychological approach, the focus of the study is to identify the factors underlying the disorder, and the selection of methods is determined by the specific task of the study and the characteristics of the disorders in each particular child. In contrast, in American psychology, statistical indicators and rather extensive and rigid sets of methods and test batteries are widely used in most cases.

Fixed batteries of neuropsychological tests are focused on the assessment of brain functions through the use of an invariant set of techniques for which valid norms exist. The set of tests used is not tied either to the characteristics of a particular patient or to a specific clinical hypothesis. The peculiarity of the methods is to conduct as many tests as possible with each individual patient. At the same time, the existing standardized databases allow us to identify and compare different nosological groups.

The most common examples of this approach aimed at the study of children are HRNB (Halsted Reitan Neuropsychological Battery) and Luria Nebraska Neuropsychological Battery – Children's Revision (LNNB-CR).

Although the results of examinations obtained using HRNB make it possible to diagnose the presence of brain pathology, attempts to localize the lesion using these methods are difficult. One of the main limitations of the battery, in addition, is the lack of a detailed analysis of speech and mnemonic processes.

The children's version of the Luria-Nebraska Neuropsychological Test Battery (LNNB CR) was developed for testing children 8-12 years old. The battery includes 149 subtests distributed over 11 scales (motor, rhythmic, tactile and visual scales, speech perception scale, expressive speech scales, writing, reading, arithmetic, memory and intellectual processes). Three additional scales: pathognomonic, as well as left and right sensorimotor allow differentiating norm and pathology. The presence of high (compared to standardized averages) indicators on two of the three scales is interpreted as an indicator of brain damage. The tests that make up the battery are simple and aimed at

evaluating individual components of complex mental functions, which is borrowed from the Luria approach.

A comparative analysis of the survey results using these batteries showed their comparability and consistency in identifying neuropsychological deficits. At the same time, diagnosis by LNNB takes two times less time than by HRNB. A significant disadvantage of LNNB is the lack of tests aimed at assessing the functions of the frontal lobes [55].

Taking into account the listed advantages and disadvantages of domestic and foreign methods of neuropsychological diagnostics of children, it was decided to use the method of A.R. Luria adapted for children in the study.

#### 2.4. Research procedures and methods

The survey was conducted according to the method of A.R. Luria, adapted by J.M. Glozman and A.E. Soboleva for primary school children [24].

The choice of the methodology was determined by the presence of a developed system of examination protocols and qualitative analysis of the results, differentiated by the age groups of the examined 7 and 8 years. The incentive material proposed by the methodology also met the requirements for its accessibility (complexity), fame, attractiveness, visibility and entertainment for the appropriate age groups.

The neuropsychological tests used in the study are listed in the table 2.2

Table 2.2- Conducted neuropsychological tests

The tested mental sphere	Conducted tests
Hemispheric asymmetry	determination of the leading arm, eye, ear, leg
General characteristics of the child (orientation in place, time, personal data, criticality and adequacy of behavior and emotional reactions)	orientation (in place, time and personal data), criticality, adequacy of behavior and emotional reactions
Neurodynamic indicators	Schulte test or proof-reading test
Praxis	reciprocal coordination, oral praxis, finger pose praxis, dynamic praxis, image copying, conflict test for choice reaction, rhythm reproduction

The tested mental sphere	Conducted tests
Gnosis	objective, acoustic, spatial gnosis, identification of emotions, facial, letter gnosis, stereognosis, tactile gnosis
Speech functions	assessment of spontaneous speech, automated ordinary speech, tests for naming subject images and low-frequency words, research of phonemic hearing, tests for understanding subject-related words, research of the process of reading words, phrases and text, research of written speech, understanding of logical and grammatical constructions
Memory	memorization of 10 words, memorization of logically related information (short story), test for motor memory, visual memory, delayed reproduction (after heterogeneous interference)
Mind	understanding the meaning of the story and plot pictures, drawing analogies, generalization and exclusion of concepts, serial counting, problem solving

The peculiarity of the technique is the presence of a well-defined scoring system, both for individual samples and for a number of higher mental functions as a whole (according to the principle of penalty points from 0 to 3 in increments of 0.5 points, where 0 points is an error-free performance of

the test, or full compliance with age standards, and 3 points – the complete impossibility of performing the test or a pronounced discrepancy between the result and the normative characteristics), combined with an expanded scale of fixation of qualitative diagnostic results, which simply assumes a mark on the presence (absence) of the observed sign without assessing the degree of its severity.

During the examination according to the chosen method, only 33 neuropsychological tests were performed with each child (in cases when all of them were available to the examinee), 152 psychodiagnostic indicators were taken into account and recorded in the protocols when performing the tests, 36 of which were evaluated with points, the presence/absence of the rest was noted in the protocols of qualitative analysis on the principle of "yes-no".

When choosing methods for interpreting the results of neuropsychological diagnostics, the most common options in domestic practice were considered, proposed by Y.V. Mikadze, J.M. Glozman, A.V. Semenovich, L.S. Tsvetkova, N.M. Pylaeva and T.V. Akhutina. The most developed is the proposed A.V. Semenovich system of classification of syndromes of deviant development, based on data from a large-scale neuropsychological study of 2,500 children with subsequent hardware and neurological verification of the results obtained, the peculiarity of the technique is the presence of a clearly defined system of scores, both individual samples and a number of higher mental functions as a whole (on the principle of penalty points from 0 to 3 in increments of 0.5 points), combined with a detailed scale of fixation of qualitative diagnostic results, assuming just a note about the presence (absence) of the observed feature without assessing the degree of its severity.

## **2.5 Methods of mathematical data processing**

The results of the study were analyzed using descriptive statistics: the values of the arithmetic mean penalty points for each of the conducted samples and the frequency of occurrence of each violation in the study group were determined. In the work, the Pearson criterion  $\chi^2$  was used to determine the presence and strength of the relationships studied in the study.

Mathematical and statistical calculations of the data obtained during the study were carried out using the standard Excel application to the Microsoft Office software system and the SPSS Statistics statistical software package (version 17.0).

## CHAPTER 3 RESEARCH RESULTS

### 3.1 Conducting neuropsychological diagnostics

#### 3.1.1 The study of the interhemispheric organization of mental functions

The conducted tests for the determination of sensorimotor dominance revealed the following features of the interhemispheric organization of children's mental functions:

1. When determining the leading hand, in no case in two groups was there a preference for the left hand in the tests for the use of a pencil, spoon, comb and toothbrush, which allows us to make an assumption about the absence of ambidexters in the sample.

2. Two additional tests to determine the leading hand: the intersection of the fingers and the intersection of the forearms showed the following results:

– in 21 % of children of Group 1 and 24 % of children of Group 2, the right hand was determined by these two samples of the leader;

– in 21 % of the subjects of Group 1 and 19 % of the subjects of Group 2, the left hand was determined by the two samples of the leader;

– in 58% of the subjects, the right hand was determined by one of the samples, and the left hand was determined by the other, in approximately equal proportions for both groups;

3. The leading left eye was detected in 28% of Group 1 children and 31% of Group 2 children. No characteristic features of the distribution of asymmetry in the leading eye, depending on the gender and age of the subjects, were revealed, nor was there a significant relationship with the results of other diagnostic tests.

#### 3.1.2 The study of the general characteristics of mental functioning and the scope of general knowledge

In the course of a standardized conversation with children and based on the results of observing the characteristics of children's behavior during the entire survey the state of three areas of mental functioning was assessed quantitatively and qualitatively:



1. Orientation in place, time and personal data.
2. Criticality.
3. Adequacy of behavior and emotional reactions in the examination situation.

In accordance with the evaluation system used, the average score for the general characteristics of children for Group 1 subjects is 0.65, while 54% of children had a penalty score not exceeding 0.5 (characterizing single non-rough disorders), 46% of the sample had a penalty score distributed in the range of 0.67-1.67, without reaching the maximum value in any case. The representatives of Group 2 showed comparable, but somewhat worse results with an average score of 0.71.

It can be noted that as part of the assessment of the general characteristics of children in both groups, the smallest number of disorders were noted in the area of criticality (the average score is 0.27), all children without exception were interested in the results of the survey and only in 2 cases the subjects of Group 1 noted the absence of active complaints in children with learning difficulties.

The adequacy assessment showed a greater number of disorders in this area (the average score in Group 1 is 0.73, in Group 2 - 0.92), distributed relatively unevenly across the group of subjects: 50% of children in Group 1 and 42% of children in Group 2 had no disorders at all, while the remaining part of children in both groups had a score in the range from 1 to 2 points.

The most characteristic disorders in assessing the adequacy of the two groups of subjects were the lack of a sense of distance and emotional dullness of the subjects (both disorders were recorded in 23% of children of Group 1 and 28% of children of Group 2).

A higher average penalty score was set for both groups when assessing the scope of general knowledge, including orientation in place and time. Ignorance, or uncertain knowledge of the day of the week, the date of the survey, the current month, in some cases, and the time of the year was noted in 65% of children in Group 1 (average score in group 0.94) and in 71% of children in Group 2 (average score in group 1.05), with insufficient general knowledge (country, city, street, birthday, etc.) - in 57% of subjects in Group 1 and 62% of subjects in Group 2.

### 3.1.3 The study of neurodynamic indicators of mental activity

Mental performance and concentration of attention were studied using a proof-reading test for children 7 years old and a test for finding numbers in Schulte tables for children 8 years old. For Group 1, the average score for the sample is 1.85, 12% of children met the standard indicators, 23% of children exceeded the age standards by less than a quarter, 27% of the group exceeded the standard by half, 35% of the indicators were assessed with the maximum penalty point. Group 2 has an average score of 2, and the results are slightly worse. The results of the tests allow us to state the presence of significant neurodynamic disorders in the majority (88-90%) of the subjects in both groups. The results of the test are presented in the table 1.

Table 1 - Results of the study of neurodynamic indicators of mental activity

Detected defects	The number of subjects in the groups (%) who had detectable defects	
	Group 1	Group 2
Low mental performance and concentration of attention	88	90
Fluctuations in mental performance	19	26
Depletion	6	26
Unformed selectivity of attention	13	6
Distractions from the task	11	26
General inhibition and spontaneity	7	0
Chaotic sample execution strategy	42	23

### 3.1.4 Study of movements and actions (praxis)

The study of motor functions in the sample was carried out using the following traditional tests for pediatric neuropsychology:

- a test for reciprocal coordination;
- oral praxis research;
- finger pose praxis test;
- tests for dynamic praxis – in the form of a motor program "fist-rib-palm" and a graphic version - "fence";
- copying a three-dimensional image - children were asked to perform several drawing tests: copying, drawing from memory and according to the instructions of three objects (house, cube and table);
- a conflict test for the reaction of choice;
- reproduction of rhythms - children were asked to consistently reproduce groups of rhythmic structures according to the pattern and instructions.

The quantitative and qualitative results of the samples are presented in the table 2.

Table 2 - Results of the study of movements and actions

Conducted tests and detected defects	The number of subjects in the groups (%) who had detectable defects, average scores for the samples	
	Group 1	Group 2
Reciprocal coordination test (average score)	1,33	1,20
Difficulties entering the task	39	23
Incomplete palm compression	20	32
Stressful, slow execution	77	87

Conducted tests and detected defects	The number of subjects in the groups (%) who had detectable defects, average scores for the samples	
	Group 1	Group 2
Compensatory hand dilution	42	19
One hand lag	65	48
Symmetrical execution (assimilation)	54	42
Oral praxis (average score)	0,19	0,03
errors of oral praxis	16	6
Finger pose praxis (average score)	1,0	1,08
Kinesthetic defects (search, replacement)	81	64
Spatial search, errors	77	55
The presence of synkinesia	73	42
Dynamic Praxis test (average score)	1,63	1,42
Simplification of the motor program	77	68
Stereotype (vertical fist)	92	81
Inertia	81	55
Chanting, tension, disautomatization of movements	96	87
Micrography in a graphic sample	13	20
Micrography in a graphic sample	35	26

Conducted tests and detected defects	The number of subjects in the groups (%) who had detectable defects, average scores for the samples	
	Group 1	Group 2
Spatial search, spatial errors	67	55
System perseverations	0	10
General motor awkwardness	4	16
Impulsivity, self-correcting	26	10
Impulsivity corrected after pointing out an error	20	23
Drawing a three-dimensional image (average score)	1,54	1,18
Spatial search, errors	61	71
Carelessness in drawing, omission, simplification, schematization of details	52	45
Conflict test for the reaction of choice (average score)	0,65	0,97
Self-correcting echopraxia	58	68
Echopraxia corrected after pointing out an error	4	23
Reproduction of rhythmic structures (average score)	1,0	0,58
Extra impulses when playing rhythms	50	32

Conducted tests and detected defects	The number of subjects in the groups (%) who had detectable defects, average scores for the samples	
	Group 1	Group 2
Difficulties in speech regulation of movements – difficulties in reproducing rhythmic structures according to speech instructions with good copying according to an acoustic sample	38	32
The final average score for the study of the motor sphere	1,07	0,94

With close average quantitative indicators for most samples, attention is drawn to a more prosperous picture of Group 2 based on the results of tests for drawing and reproducing rhythms and a significantly smaller number of synkenesias observed in the subjects in the finger pose praxis test.

A visual comparison of the results of the study of movements and actions in two groups is shown in the figure 1.

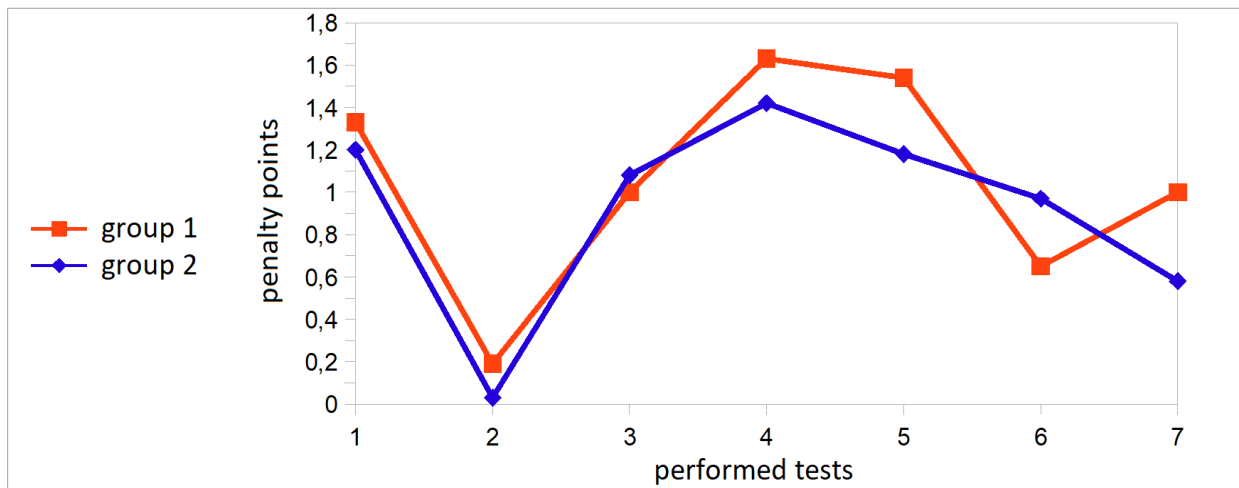


Figure 1 – Results of a study of movements and actions for deprived (Group 1) and non-deprived (Group 2) children:

1. A test for reciprocal coordination.
2. Oral Praxis Test.
3. Finger pose praxis test.
4. A test for dynamic praxis.
5. Drawing a three-dimensional image.
6. A conflict test for the reaction of choice
7. Reproduction of rhythmic structures.

### 3.1.4 The study of gnosia

Gnostic functions were studied in the following samples:

- tests for subject gnosia – recognition of realistic, crossed-out and superimposed images;
- acoustic gnosia – evaluation and reproduction of rhythmic structures based on an auditory pattern;
- spatial gnosia – Benton's test was used to isolate a spatially oriented component from a multicomponent figure;

– emotion identification test – recognition of the emotional state of the depicted people and animals;

– facial gnosia test – recognition of portraits of actors, writers, and politicians familiar to children;

– letter gnosia test – recognition of letters from various fonts, as well as noisy and superimposed letters;

– tactile gnosia test – recognition with closed eyes (showing with the other hand) localization of pencil touches to the back of the brush;

– stereognosia test – recognition by touch with closed eyes of small objects (key, coin, ring, eraser, paper clip), alternately placed in each hand.

The quantitative and qualitative results of the samples are presented in the table 3.

Table 3 – Results of the study of gnostic functions

Conducted tests and detected defects	The number of subjects in the groups (%) who had detectable defects, average scores for the samples	
	Group 1	Group 2
Test for subject gnosia (average score)	0,54	0,77
Incomplete formation of the subject gnosia (stability of the visual image of the object and the possibility of its isolation from the background)	20	33
Impulsivity in subject gnosia	16	46
Fragmentary perception, perception of an element as a whole image	7	23
Difficulties of simultaneous synthesis (integrity) in perception	2	34



Conducted tests and detected defects	The number of subjects in the groups (%) who had detectable defects, average scores for the samples	
	Group 1	Group 2
Pseudoagnosia (difficulties of control, selectivity and purposefulness in perception, corrected in the organization of the child's attention)	13	10
Ignoring, reducing attention to one half of the visual field	0	0
Inactivity (perseverance) in perception	0	10
Acoustic gnosis tests (average score)	0,98	0,73
Defects of acoustic gnosis – underestimation	11	16
Defects of acoustic gnosis – extra estimates	46	32
Defects of acoustic attention – (requests to repeat the rhythm with the correct reproduction of the reproduced sample)	50	29
Spatial Gnosis test (average score)	1,08	1,14
Emotion identification test (average score)	0,27	0,61
Errors in identifying emotions by sign	8	21
Errors in identifying emotions by quality	20	42

Conducted tests and detected defects	The number of subjects in the groups (%) who had detectable defects, average scores for the samples	
	Group 1	Group 2
Facial gnosis test (average score)	0	0,44
Letter Gnosis test (average score)	0,23	0
Errors in letter gnosis	16	0
Tactile gnosis test (average score)	0,77	0,42
Defects of tactile gnosis – a discrepancy of more than 1 cm in the localization of touch	35	29
Ignoring touches on one hand with two-handed touches	2	0
Stereognosis test (average score)	0,15	0,02
Difficulties in recognizing objects by touch	11	0
Inactivity of feeling	4	3
The final average score for the study of the Gnostic sphere	0,54	0,51

In general, the Gnostic sphere in both groups can be considered relatively safe. There is a noticeable difference (with greater well-being in Group 2) in the tactile gnosis tests, but at the same time, in Group 2, children were significantly more likely to experience difficulties identifying emotions.

A visual comparison of the results of the study of gnostic functions in two groups is shown in the figure 2.

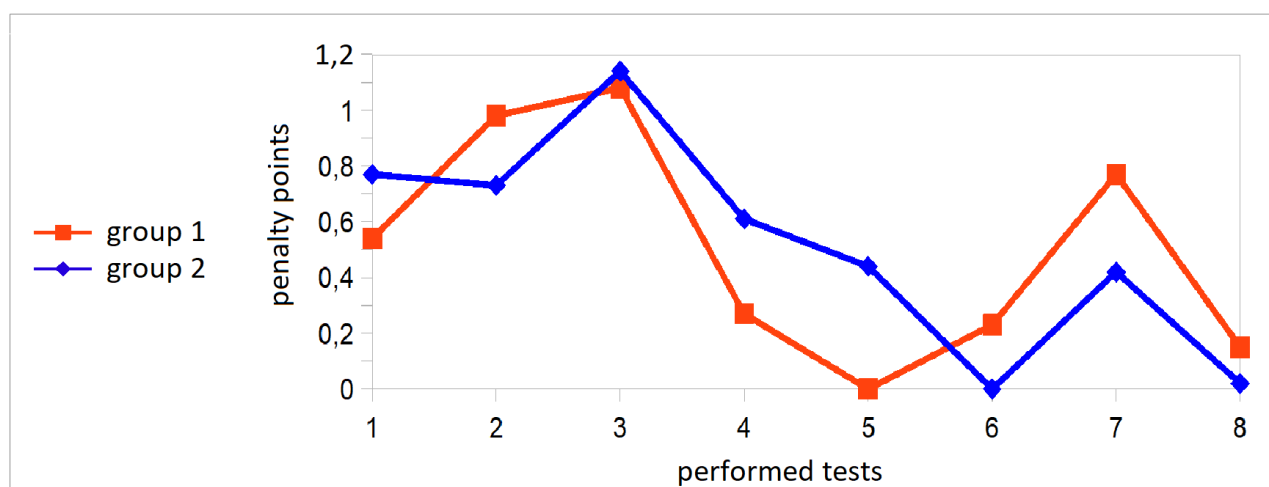


Figure 2 – Results of a study of gnostic functions for deprived (Group 1) and non-deprived (Group 2) children diagnosed with F83:

1. Test for subject gnosis.
2. Acoustic gnosis tests.
3. Spatial Gnosis test.
4. Emotion identification test.
5. Test for facial gnosis.
6. Test for letter gnosis.
7. Tactile Gnosis test.
8. Stereognosis test.

### 3.1.5 The study of speech functions

The study included:

- evaluation of spontaneous speech in dialogue and when describing images;
- research of automated ordinary speech – ordinal counting from 1 to 10 in forward and reverse order, enumeration of days of the week and months;

- tests for naming subject images and low-frequency words;
- phonemic hearing research – correlation of phonemically close words with pictures;
- tests for understanding subject-related words;
- tests for understanding logical-grammatical constructions – correlation with the picture of direct active reversible constructions and passive reversible constructions, understanding of constructions with spatial prepositions;
- the study of written speech was conducted with children over 7 years old;
- the study of the process of reading words, phrases and text was also conducted with children at least 8 years old.

The quantitative and qualitative results of the samples are presented in the table 4.

Table 4 - Results of the study of speech functions

Conducted tests and detected defects	The number of subjects in the groups (%) who had detectable defects, average scores for the samples	
	Group 1	Group 2
Assessment of spontaneous speech (average score)	1,27	0,58
Prosodic defects (smudginess, nasal twang, stuttering, monotony)	42	35
Dysphonia (quiet voice)	30	19
Chanting of speech	15	2
Poverty, non-expansion of expressive speech	81	29
Verbal and literal paraphasies, word search in spontaneous speech	69	32
Defects in the grammatical design of the utterance	58	29

Conducted tests and detected defects	The number of subjects in the groups (%) who had detectable defects, average scores for the samples	
	Group 1	Group 2
Echolalia	9	10
Speech spontaneity, difficulties of inclusion in speech	7	10
Impulsivity in speech tests	7	6
Reasonableness, pretentiousness of speech	0	0
Poor dictionary	77	23
Assessment of ordinary speech (average score)	0,16	0,19
The lack of formation of ordinary speech – a digital series in direct order	2	0
The lack of formation of ordinary speech is a digital series in reverse order	7	10
Naming tests (average score)	0,77	0,66
Search for nominations, paraphasias in naming	72	65
Inertia (perseverance) when naming, correlating a word with a picture in spontaneous speech	9	16
Phonemic hearing assessment (average score)	0,17	0

Conducted tests and detected defects	The number of subjects in the groups (%) who had detectable defects, average scores for the samples	
	Group 1	Group 2
Understanding of subject-related words (average score)	0,54	0,29
Difficulties in understanding reversed speech, alienation of the meaning of words	41	29
Narrowing the volume of acoustic perception	9	10
Tests for understanding logical-grammatical relations (average score)	1,41	1,08
Difficulties in understanding logical-grammatical relations	93	88
Study of written speech (average score)	1,86	1,13
Kinesthetic substitutions of consonants and vowels in writing	49	26
Not separating the beginning of a phrase (period, capital letter)	26	35
Non-articulation of a word when writing is a preposition fused with a word or a prefix separately	39	8

Conducted tests and detected defects	The number of subjects in the groups (%) who had detectable defects, average scores for the samples	
	Group 1	Group 2
Non-articulation of a word when writing is a preposition fused with a word or a prefix separately	39	8
"Stupid mistakes", regulatory defects with knowledge of spelling rules	2	30
Ignorance of spelling rules	88	57
Micrography in writing	7	0
Macrography in writing	5	17
Uneven handwriting	23	8
Increased muscle tone when writing	42	8
Carelessness of writing, unreadable handwriting	14	8
Non-retention of a line when writing	35	8
Reading study (average score)	1,79	1,65
Unformed holistic reading (syllabic reading)	70	52
Low reading rate	88	83
Guessing reading	65	57
Monotonous, unintoned reading	88	74
Kinesthetic substitutions of consonants and vowels when reading	42	4
Final average score for the study of speech functions	1,02	0,70

Pronounced disorders of speech functions are noted in both groups, but the total penalty score of the studied Group 1 is almost one and a half times higher than the score of Group 2. There is a significant heterogeneity of the group indicators for the following samples:

– more than a twofold difference in the degree of severity of spontaneous speech disorders with a significant gap in groups by the number of subjects with defects of "poverty, non-expansion of expressive speech", "defects in grammatical design of utterance" and "poverty of vocabulary";

– in the study of written speech, the subjects of Group 1 also showed significantly worse results, while this difference was characteristically manifested in a significantly larger number of children with kinesthetic substitutions of consonants and vowels when writing, non-articulation of a word when writing, increased muscle tone and incontinence of a line when writing;

– in the study of reading, a significantly larger relative number of Group 1 subjects who allowed kinesthetic substitutions of consonants and vowels when reading was noted; in Group 2, such disorders were isolated.

A visual comparison of the results of the study of speech functions in two groups is shown in Figure 3.



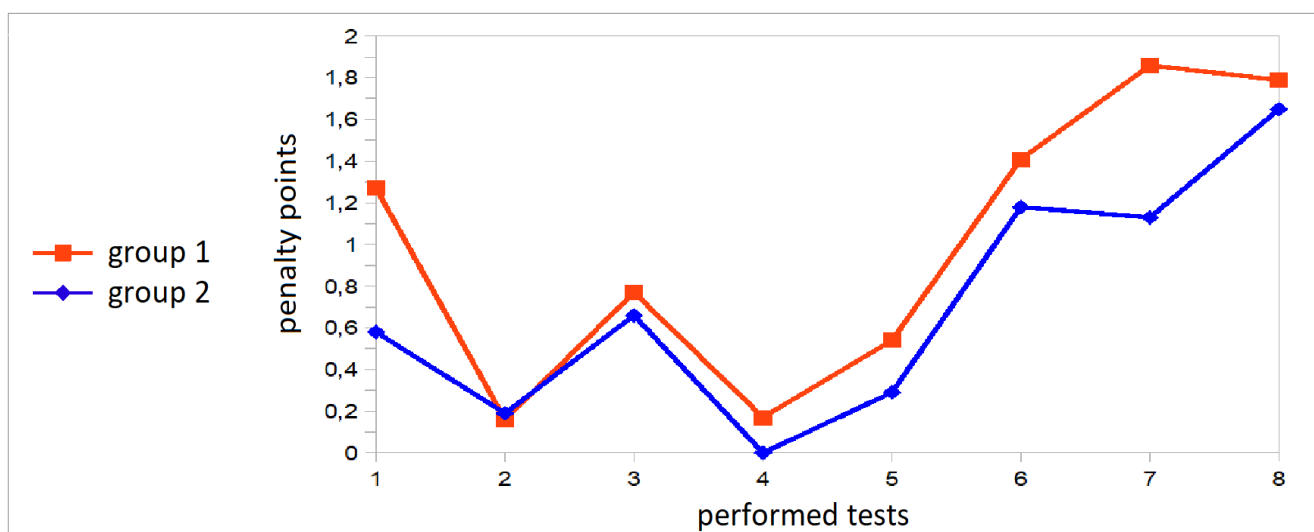


Figure 3 – Comparison of the features of the results of the study of speech functions for deprived (Group 1) and non-deprived (Group 2) primary school children with a diagnosis of F83:

1. Assessment of spontaneous speech.
2. Evaluation of ordinary speech.
3. Naming tests.
4. Assessment of phonemic hearing.
5. Understanding of subject-related words.
6. Tests for understanding logical-grammatical relations.
7. Research of written speech.
8. Reading Research.

### 3.1.6 Memory testing

Mnemonic functions were evaluated by several tests:

- memorizing 10 unrelated words;
- delayed reproduction after heterogeneous interference;
- the test for motor memory was carried out as a task for memorizing and reproducing two series of three hand movements;
- visual memory was studied using a test for memorization and recognition of two groups of three images of real and geometric objects;
- memorizing logically related information (short story).

The quantitative and qualitative results of the samples are presented in the table 5.

Table 5 – Results of the study of mnestic functions

Conducted tests and detected defects	The number of subjects in the groups (%) who had detectable defects, average scores for the samples	
	Group 1	Group 2
Memorization of unrelated words (average score)	1,63	0,79
Low productivity of memorization in the process of memorization	58	32
Fluctuations in the volume of mnestic activity	69	41
Inactivity of memorization (plateau)	42	16
Difficulties of inclusion - less than 5 words at the first presentation	62	54
Confabulations (interweaving of non-presented elements)	62	52
Perseverations (interweaving of stimuli from another group)	13	23
Difficulties in maintaining a sequence of stimuli	82	76
Sound substitutions (with a similar-sounding word)	17	6

Conducted tests and detected defects	The number of subjects in the groups (%) who had detectable defects, average scores for the samples	
	Group 1	Group 2
Semantic substitutions (with a word close in meaning)	52	61
Memorization strength (average score)	1,19	0,43
Motor memory (average score)	1,60	1,01
Difficulties in mastering the motor program (the need for pronouncing or conjugated execution)	70	58
Difficulties in reproducing the motor program	85	25
Visual memory (average score)	1,23	0,74
Memorizing text (average score)	1,42	0,71
The final average score for the study of mnestic functions	1,45	0,74

The study of memory revealed a significant difference in the results of the survey of groups with a twofold excess of the penalty points of Group 1 compared to Group 2, both in terms of the total for the entire study of memory, and in memorization of text, visual memory, memorization strength and memorization of individual words. At the same time, it can also be noted that there is a significantly higher frequency in Group 1 of such disorders as difficulties in reproducing the motor program and plateaus when memorizing individual words.

A visual comparison of the results of the study of mnemonic functions in two groups is shown in the figure 4.

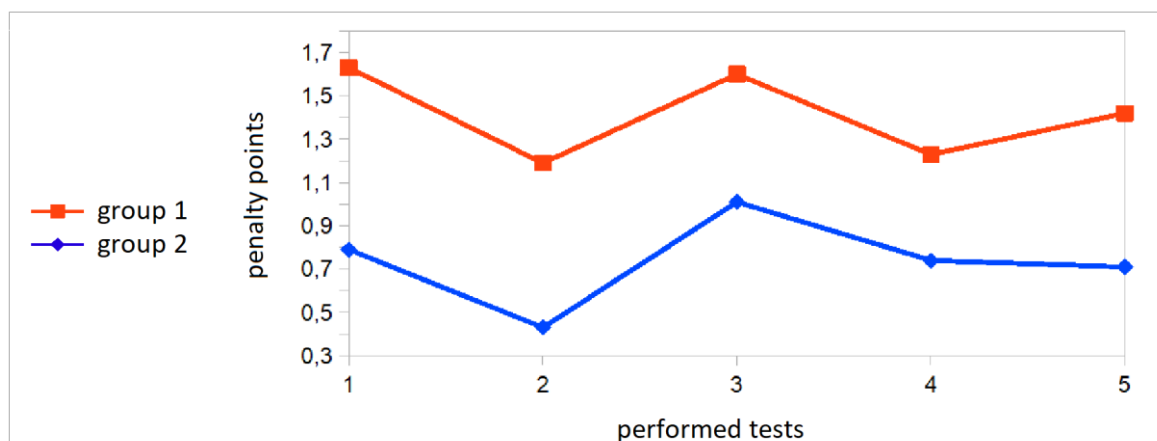


Figure 4 – Comparison of the features of the results of the study of mnemonic functions for deprived (Group 1) and non-deprived (Group 2) primary school children with a diagnosis of F83:

1. Memorizing unrelated words.
2. The strength of memorization.
3. Motor memory.
4. Visual memory.
5. Memorizing text.

### 3.1.7 Intelligence testing

The development of generalization and logical reasoning abilities was assessed by performing the following tests:

- a test to understand the meaning of the story and the plot picture;
- a test for the derivation of analogies and a test for generalization and exclusion of concepts (the fourth and fifth superfluous);
- serial calculations tests (conducted with children over 7 years old);
- tests for solving mathematical problems.

The results of the tests are presented in the table 6.

Table 6 – Intelligence Research Results

Conducted tests and detected defects	The number of subjects in the groups (%) who had detectable defects, average scores for the samples	
	Group 1	Group 2
Tests for understanding the meaning of stories and plot pictures (average score)	1,69	1,26
Inability to understand the meaning of a story picture or story	54	23
Slow comprehension with a hint	85	61
Impulsivity when analyzing a picture or a story	37	42
Spontaneity in intellectual activity, the need for constant stimulation	7	10
Tests for the derivation of analogies and the exclusion of concepts (average score)	1,35	0,97
Inertia in solving generalization and analogy problems	42	45
Impulsive solution of problems for generalization or derivation of analogies (identification of non-essential features with self-correction)	62	52
Difficulties in verbalization (categorization) of the identified essential links	54	29

Conducted tests and detected defects	The number of subjects in the groups (%) who had detectable defects, average scores for the samples	
	Group 1	Group 2
The lack of formation of the processes of generalization and deduction of logical connections	39	55
Generalization on a situational, not categorical basis	62	32
Serial calculations tests (average score)	2,15	1,91
The unformed bitness of the number	69	74
Slowness (disautomatization) of the calculations	81	83
Forgetting the intermediate result when counting	38	65
Perseverations when counting	27	48
Solving mathematical problems (average score)	2,65	1,6
Final average score for intelligence research	2,03	1,18

The study of intelligence also revealed a significant difference in indicators for groups with a large number and degree of disorders in Group 1. A particularly significant difference was manifested in tests for solving mathematical problems, drawing analogies and understanding the meaning of stories and plot pictures. The analysis of the qualitative results of the tests shows a significant predominance of the frequency of such disorders in Group 1, as the inability to understand the meaning of a plot picture or story, difficulties in verbalizing the identified significant connections, generalization by

situational rather than categorical criteria. At the same time, the subjects of Group 2 were much more likely to demonstrate the lack of formation of the processes of generalization and deduction of logical connections, forgetting the intermediate result and perseverance when counting.

A comparison of the results of the intelligence study is shown in the figure 5.

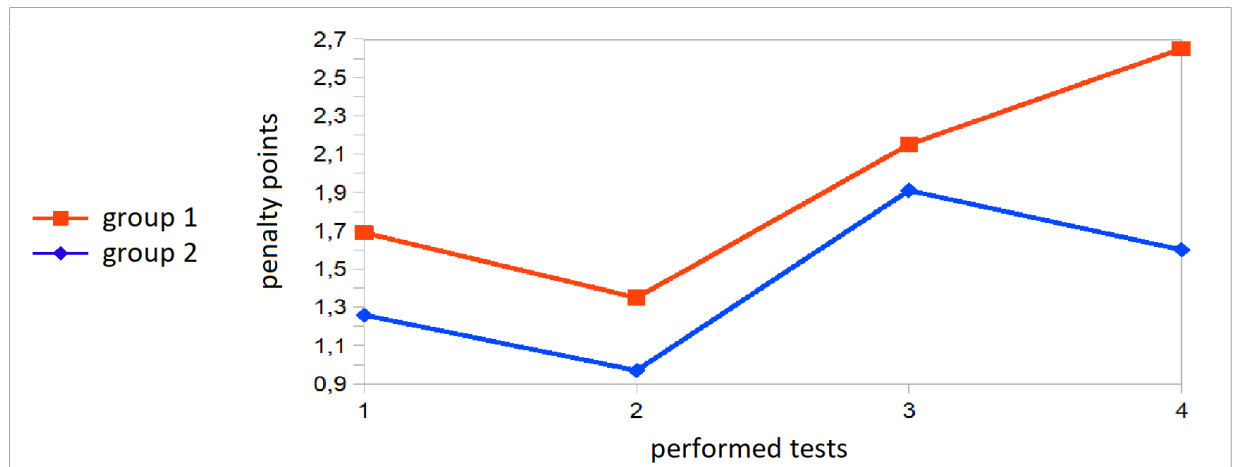


Figure 5 – Comparison of the features of the results of the intelligence study for deprived (Group 1) and non-deprived (Group 2) primary school children diagnosed with F83:

1. Understanding the meaning of stories and plot pictures.
2. Derivation of analogies and exclusion of concepts.
3. Serial calculations.
4. Mathematical problem solving.

### 3.2 Results of neuropsychological diagnostics

A comparison of the data obtained in the study in relation to seven traditional areas of neuropsychological examination revealed a noticeable difference in the severity of disorders of higher mental functions of younger schoolchildren in the two study groups.

The final quantitative results of the study for two groups in descending order of penalty points for each of the groups are presented in the table 7.

The most significant difference in the final scores for the compared groups was recorded according to the study of intelligence, memory and speech.

The common features of the two groups, obviously, are the maximum disadvantage in the field of neurodynamics and intelligence with the relative preservation of the Gnostic sphere.

Table 7 – Final penalty points of neuropsychological research

Group 1		Group 2	
Investigated functions	Penalty point	Investigated functions	Penalty point
Intellectual activity	2,03	Neurodynamics of mental activity	2,0
Neurodynamics of mental activity	1,85	Intellectual activity	1,18
Mnestic functions	1,45	Motor sphere	0,94
Motor sphere	1,07	Mnestic functions	0,74
Speech functions	1,02	General characteristics of the psyche and the scope of general knowledge	0,71
General characteristics of the psyche and the scope of general knowledge	0,65	Speech functions	0,70
Gnostic Sphere	0,54	Gnostic Sphere	0,51
Final score for the examination	1,23		0,97



The features of neuropsychological disorders in two groups are presented in the figure 6.

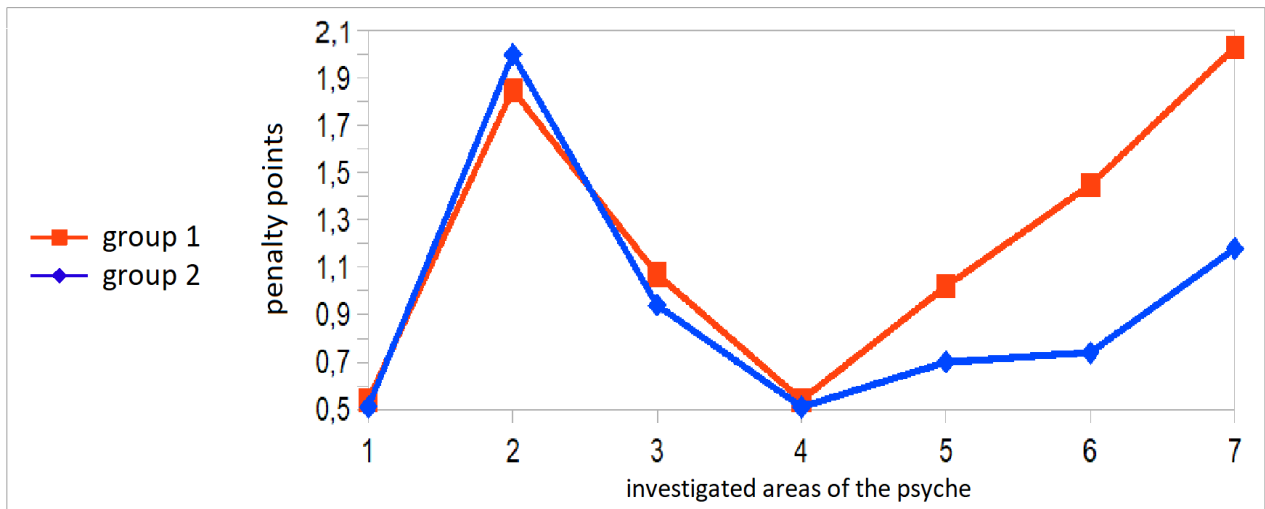


Figure 6 – Comparison of the features of neuropsychological disorders characteristic of deprived (Group 1) and non-deprived (Group 2) primary school children with a diagnosis of F83:

1. General characteristics of the child (orientation criticality and adequacy).
2. Neurodynamic indicators of mental activity.
3. The study of movements and actions (praxis).
4. The study of gnosis.
5. The study of speech functions.
6. Memory testing.
7. Intelligence testing.

Table 8 presents a comparison of the distribution by groups of the most pronounced disorders of higher mental functions detected during individual tests (in descending order of penalty points) and the percentage of subjects who had significant disorders as a result of these tests.

Table 8 – The list of neuropsychological tests, the performance of which caused the greatest number of difficulties in the subjects

Type of neuropsychological test	Group 1		Group 2	
	Penalty point	Severity of disorders in the sample, %	Penalty point	Severity of disorders in the sample, %
Mathematical problem solving	2,65	100	1,6	86
Serial calculations	2,15	96	1,91	82
Written speech	1,86	96	1,13	81
Schulte test (proof-reading test)	1,85	88	2,0	90
Reading testing	1,79	96	1,65	88
Understanding the meaning of stories and plot pictures	1,69	88	1,26	87
Dynamic praxis	1,63	96	1,42	87
Memorizing 10 words	1,63	96	0,79	61
motor memory test	1,60	96	1,01	90
Copying a three-dimensional object	1,54	92	1,18	71
Understanding logical-grammatical relations	1,41	92	1,08	88
Memorizing text	1,42	77	0,71	42

Derivation of analogies and exclusion of concepts	1,35	73	0,97	65
A test for reciprocal coordination	1,33	88	1,2	74
The study of spontaneous speech	1,27	96	0,58	39
Visual memory test	1,23	88	0,74	65
Memorization strength after heterogeneous interference	1,19	85	0,43	32
Benton's Spatial Gnosis Test	1,08	81	1,54	78
Finger pose praxis test	1,00	77	1,08	74
A test for the reproduction of rhythmic structures	1,00	73	0,58	39
Acoustic gnosis test	0,98	62	0,73	42
The study of orientation in place and time	0,94	65	1,05	71
Tests for naming subject images	0,77	62	0,66	39
The study of tactile gnosis	0,77	38	0,42	32
The study of the adequacy of behavior	0,73	50	0,92	58
A conflict test for the reaction of choice	0,65	58	0,97	55
Tests for subject gnosis	0,54	31	0,77	51
A test for understanding the subject related words	0,54	42	0,29	23

The results of individual samples demonstrate in some cases a picture of close coincidences in two groups of frequency and severity of certain disorders (reading, serial calculations, a test for neurodynamics and posture practice); a significant number of samples with a similar frequency of violations significantly differ in their degree (solving mathematical problems, choice reaction, tactile gnosis, motor memory, spatial gnosis); the results of performing a noticeable number of tests vary both in frequency and degree of severity (memorization of words and memorization of text, memorization strength, study of spontaneous speech, a test for the reproduction of rhythms).

The obtained results allow us to make a preliminary conclusion that the hypothesis about the possible effect of deprivation on the neuropsychological characteristics of children has a factual basis: the results of the study of deprived and non-deprived children demonstrate a picture of the different specifics of disorders in the studied groups.

### **3.3 Establishing neuropsychological syndromes of deviant development**

The severity of each of the six syndromes under consideration was assessed in accordance with the criteria proposed by A.V. Semenovich, according to the cumulative presence of the most characteristic neuropsychological symptoms and signs for each syndrome, the number of which varies from 16 – for the syndrome of functional deficiency of brain stem formations – to 9 – for the syndromes of functional non-formation of interhemispheric interactions of the transcortical level and non-formation of the right hemisphere of the brain.

Quantitative and qualitative results of neuropsychological research were grouped to simultaneously determine the list of symptoms and neuropsychological characteristics typical of the studied syndrome in the subjects. The syndrome was taken to be pronounced if the subject had half or more of the symptoms and signs that define the syndrome under study; without fail, the symptoms described as pathognomonic for this syndrome should be included in the number of existing symptoms. Since the methodology of the conducted neuropsychological study assumed both a quantitative assessment of the results of a number of tests and their qualitative description, in the case

of a syndrome analysis, a symptom or characteristic whose severity was previously assessed according to the penalty points system was taken as pronounced if they were assigned a score of 1 or more.

The possible presence of the syndrome of functional unformed prefrontal (frontal) brain regions in the subjects was determined by the combined presence of the following symptoms and neuropsychological characteristics:

- increased distraction during the examination;
- the severity of the elements of chaotic behavior;
- increased inertia of mental processes;
- apathy;
- manifestation of perseverance (pathognomonic symptom);
- inability to hold the correct execution of a given program;
- increased impulsivity;
- echolalia;
- impoverished speech;
- absence of pronounced disorders of praxis;
- absence of pronounced gnosis disorders;
- absence of pronounced disorders of mnestic activity;
- reduced ability to retell the text independently while maintaining the ability to retell when answering leading questions;
- reduced generalization ability.

A comparison of all the symptoms and signs of a possible manifestation of the syndrome of unformed frontal brain revealed the presence of pronounced signs of this syndrome (from 8 to 11 signs out of 14) in 12% of the subjects of Group 1 and in 9% of the subjects of Group 2.

The definition of the syndrome of functional non-formation of the left temporal region of the brain was carried out based on the observation of the following symptoms:

- phonemic hearing disorder (pathognomonic symptom);
- disorder of the understanding of the meaning of words;
- paraphasias in oral speech;
- letter replacements when writing;
- sound softness/hardness errors;
- skipping letters when writing;
- unformed word boundaries;
- disorder of nominative functions of speech;
- disorder of generalization processes;
- contamination on memory traces.

A comparison of all the symptoms and signs of a possible manifestation of the syndrome of unformed left temporal region of the brain revealed the presence of pronounced signs of this syndrome (from 6 to 10 signs out of 10) in 52% of the subjects of Group 1 and 41% of the subjects of Group 2.

The possible presence of the syndrome of functional unformed interhemispheric interactions of the transcortical level (corpus callosum) in the subjects was determined by the combined presence of the following symptoms and neuropsychological characteristics:

- disorder of reciprocal coordination (pathognomonic symptom);
- pronounced differences in performing graphical tests with the right and left hand;
- «mirroring letters when writing;
- ignoring the left side of the field of view;
- phonemic hearing defects;
- "edge" effects in the study of memory (first of all, the first and last reference is reproduced);
- errors in motor memory when transferring a series of movements to the other hand;
- symptoms of guessing reading;
- when performing tests for classification and exclusion of concepts, the use of reliance on hidden or insignificant signs simultaneously with the normative strategy.

A comparison of all the symptoms and signs of a possible manifestation of the syndrome of unformed corpus callosum revealed the presence of pronounced signs of this syndrome (from 5 to 8 signs out of 9) in 9% of the subjects of Group 1 and in 21% of the subjects of Group 2.

The definition of the syndrome of functional unformedness of the right hemisphere of the brain was carried out based on the observation of the following symptoms:

- spatial search, errors in posture praxis;
- spatial search, errors in the drawing;
- defects of spatial gnosis (pathognomonic symptom);
- understanding logical-grammatical relations;
- subject paragnosities;
- disorder of facial gnosis;
- disorder of the identification of emotions;
- disorder of the order of reproduction of stimuli when updating memory traces;
- the presence of side associations when updating memory traces.

A comparison of all the symptoms and signs of a possible manifestation of the syndrome of unformed right hemisphere of the brain revealed the presence of pronounced signs of this syndrome (from 5 to 9 signs out of 9) in 31% of the subjects of Group 1 and 48% of the subjects of Group 2.

The possible presence of functional deficiency syndrome of subcortical formations (basal nuclei) of the brain in the subjects was determined by the combined presence of the following symptoms and neuropsychological characteristics:

- emotional lability;
- inappropriate behavior;
- increased depletion of nervous processes;
- the presence of synkinesia (pathognomonic symptom)
- carelessness of writing, unreadable handwriting;
- micro or macro graphs on the letter;

- pretentiousness of speech;
- dysarthria, monotony of speech;
- preservation of the main mnestic processes;
- disorder of kinesthetic praxis.

A comparison of all the symptoms and signs of a possible manifestation of the functional deficiency syndrome of subcortical brain formations did not reveal the presence of pronounced signs of this syndrome in any of the subjects of Group 1 and revealed in 14 % of the subjects of Group 2 (from 5 to 8 signs out of 10).

The possible presence of functional deficiency syndrome of brain stem formations (dysgenetic syndrome) in the subjects was determined by the combined presence of the following symptoms and neuropsychological characteristics:

- increased distraction from classes;
- the presence of external dysembriogenetic stigmas;
- the presence of two or more signs of left-sided dominance in a child with a leading right hand;
- the severity of the elements of chaotic behavior;
- stereotype in dynamic praxis;
- inertia in dynamic praxis;
- confabulations in mnestic tests;
- impulsivity when analyzing a story or a picture;
- the lack of formation of the processes of generalization and deduction of logical connections;
- the presence of signs of violation of reciprocal coordination;
- poverty non-expansion of expressive speech;
- spatial search, errors in posture praxis;
- spatial search, errors in the drawing;
- defects of spatial gnosis;



- simplification of the motor program in dynamic praxis;
- chanting, tension, disautomatization of movements in dynamic praxis.

The analysis revealed the presence of pronounced signs of dysgenetic syndrome (from 9 to 15 signs out of 16) in 71% of the subjects of Group 1 and in 38% of the subjects of Group 2.

A comparison of the frequency of representation of the main neuropsychological syndromes of deviant development in the two groups is presented in the table 9.

Table 9 – Comparison of the representation of the main syndromes in the studied groups

Neuropsychological syndrome	Prevalence of the syndrome in the Group 1, %	Prevalence of the syndrome in the Group 2, %
Lack of formation of the frontal parts of the brain	12	9
Unformed left temporal region	52	41
Unformed corpus callosum	9	21
Unformed right hemisphere	31	48
Deficiency of the basal nuclei of the brain	0	14
Dysgenetic syndrome	71	38

The visual representation of the main syndromes of deviant development in the studied groups is shown in the figure 7.

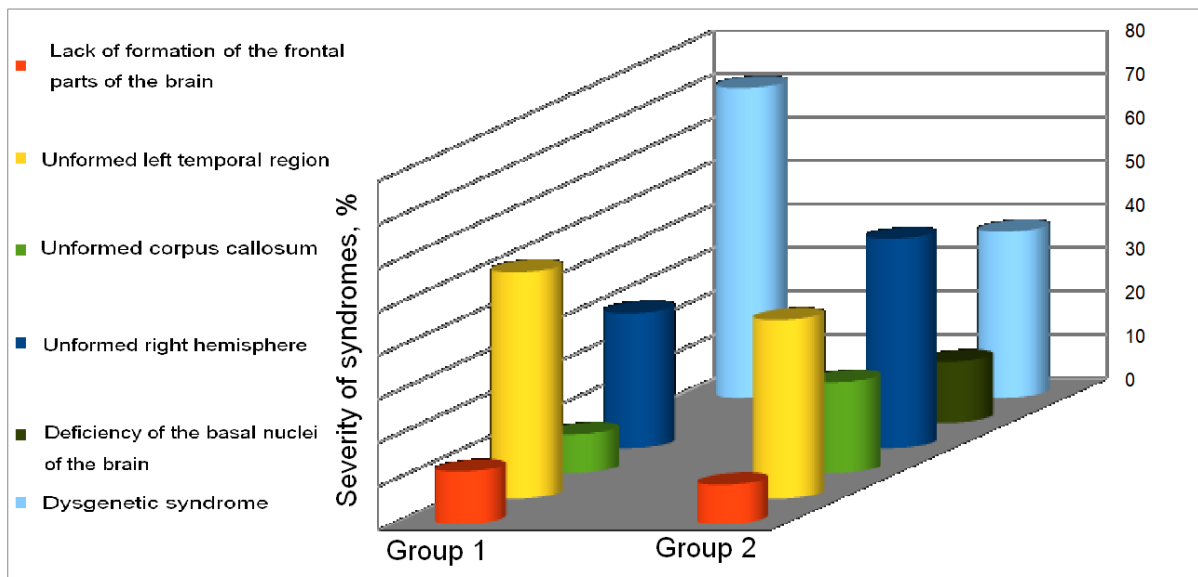


Figure 7 – Comparison of the representation of the main syndromes of deviant development for deprived (Group 1) and non-deprived (Group 2) primary school children diagnosed with F83

### 3.4 Analysis of the combination of neuropsychological syndromes of deviant development

Since many representatives of the sample included in both groups, in the course of the syndrome neuropsychological analysis, several syndromes were found to be present at the same time, the analysis of the combination of the identified syndromes for all subjects is presented below:

1. Combination of neuropsychological syndromes of deviant development in children with mixed specific disorder of psychological development exposed to deprivation (results of the Group 1 study):

- none of the 6 classified syndromes is clearly expressed in 4 % of the sample;
- in 29% of the subjects, the manifestation of only one syndrome out of 6 is expressed, in 19% of cases it is a dysgenetic syndrome and in 10% – a syndrome of functional non-formation of the left temporal region of the brain;
- 2 out of 6 syndromes were simultaneously diagnosed in 43% of Group 1 children (the most frequent combination), including a combination of dysgenetic syndrome and unformed left temporal

region of the brain in 19% of subjects, a combination of dysgenetic syndrome and unformed right hemisphere in 14%, a combination of dysgenetic syndrome and unformed prefrontal (frontal) brain regions, as well as a combination of unformed left temporal region with unformed right hemisphere in 5% of subjects in each of the cases;

- 3 out of 6 syndromes were diagnosed simultaneously in 10% of children, this is a combination of dysgenetic syndrome with unformed left temporal region and frontal divisions;

- simultaneous combination of 4 out of 6 syndromes was also observed in 10% of Group 1 children (in descending order, these are syndromes of unformed corpus callosum, left temporal region, right hemisphere and dysgenetic syndrome);

- the number of Group 1 subjects who have the severity of one syndrome or two at the same time is 71%, one, two or three syndromes at the same time is 81%. In the vast majority of cases, the severity of dysgenetic syndrome is noted, more often in combination with temporal syndrome on the left (in half of cases), and/or with the syndrome of unformed right hemisphere (31%).

2. Combination of neuropsychological syndromes of deviant development in children with a mixed specific disorder of psychological development who were not exposed to deprivation (results of the Group 2 study):

- none of the 6 classified syndromes is clearly expressed in 3 % of the sample;

- 27% of the subjects expressed the manifestation of only one syndrome out of 6, in 15% of cases it is the syndrome of unformed right hemisphere and in 12% - the syndrome of functional unformed left temporal region of the brain;

- 2 out of 6 syndromes were simultaneously diagnosed in 33% of Group 2 children, the most common was a combination of unformed right hemisphere and unformed left temporal region of the brain (17% of subjects), a combination of dysgenetic syndrome and unformed right hemisphere was found in 11% of the sample;

- 3 out of 6 syndromes were simultaneously diagnosed in 12% of children, this is a combination of right hemisphere, dysgenetic and left temporal region malformation syndrome;

– a simultaneous combination of 4 out of 6 syndromes was noted in 14% of Group 2 children (according to the degree of severity in descending order, these are the syndromes of unformed right hemisphere, left temporal region syndrome of unformed basal nuclei of the brain);

– mainly in Group 2, the severity of the syndrome of unformed right hemisphere is noted, more often in combination with temporal syndrome on the left, and/or with dysgenetic syndrome.

### **3.5 Comparison of the representation of disorders of higher mental functions and the main neuropsychological syndromes of deviant development in the study groups**

A comparison of the results of the syndrome neuropsychological analysis carried out in two groups revealed the following features of disorders of higher mental functions characteristic of the studied children with a diagnosis of F83:

– the majority of children in the entire sample have complex disorders of the main higher mental functions, phenomenologically manifested mainly in lagging behind the age standards of development in intellectual activity (mathematical counting, solving mathematical problems), neurodynamic indicators of brain activity (a decrease in the level of voluntary attention), individual characteristics of the motor sphere (reciprocal coordination, dynamic praxis, drawing three-dimensional images) with relative preservation of the gnostic sphere;

– at the same time, the disorders of mnemonic functions is much more pronounced in the group of deprived children (a twofold difference in the final penalty points), a significant difference in groups is also noted in the degree of disorders of speech functions – with the general disadvantage of this area in both groups, the penalty points of deprived children are one and a half times higher, the same difference is observed in the degree of disorders of the intellectual sphere.

The results obtained represent for both groups a complex picture of diverse disorders, obviously characteristic in general for such a diagnosis as mixed specific disorders of psychological development.

At the same time, the structure and severity of disorders of the group of deprived children in a number of parameters significantly differs from the disorders of their peers with the same diagnosis, brought up in families with parents.

This difference is especially clearly revealed in the results of the syndrome neuropsychological analysis: the two groups are characterized by a complex combination of dysgenetic syndrome in children with right hemisphere and left temporal region unformed syndromes, but at the same time, the frequency of dysgenetic syndrome in Group 1 is almost twice as high as in Group 2 with a much smaller difference in the severity of right hemisphere and left temporal syndromes. Dysgenetic syndrome in deprived children is clearly dominant, determining the specifics of disorders in general. In non-vaccinated children, the main syndrome is the lack of formation of the right hemisphere, but this syndrome does not have such a totally predominant character, forming a complex picture of a larger number of less pronounced disorders in Group 2 as a whole.

The results of statistical processing of the obtained data according to the Pearson criterion  $\chi^2$  revealed the presence of a relationship between the severity of dysgenetic syndrome in the sample and the presence of a factor of mental deprivation. The calculated value of the Pearson criterion  $\chi^2$  is equal to 8,319, which, when compared with the critical value (6,635), gives grounds to consider the existing relationship statistically significant ( $p < 0.01$ ), while the normative value of the Pearson coefficient (C') has a value of 0.442, which allows us to interpret the revealed relationship as relatively strong

For the rest of the identified syndromes, their relationship with the presence of a history of deprivation factor is not clearly expressed.

The data obtained are consistent with the information available in the literature on the possible causal relationship of the deprivation factor with the manifestations of functional deficiency of brain stem structures in children [66].

Thus, the results of the syndrome analysis suggest that children with mixed specific developmental disorders who have experienced the effects of deprivation are significantly more likely to show a pronounced deficiency of brain stem formations compared with children with a similar diagnosis who have not experienced the effects of deprivation.

### **3.6 Targets of corrective action and approaches to formative learning**

Of the syndromes of deviant development identified as a result of the neuropsychological diagnosis, the most characteristic for children with mixed specific disorders of psychological development are functional unformedness of the right hemisphere of the brain, functional unformedness of the left temporal region and functional deficiency of brain stem formations (dysgenetic syndrome).

The manifestation of the syndrome of functional unformed right hemisphere in a child implies a violation of the formation of the processes of figurative and symbolic thinking, and it is the development of this process that should be focused on when drawing up a program of psychological correction of children. The system of methods of psychological support for children with such disorders was developed, in particular, by L.S. Tsvetkova and showed high practical value. The system includes a methodology for the formation of sensory standards, which implies the use of preserved tactile analyzers and vision for the formation of reference images-symbols of perception in a child in order to integrate various analyzer systems into a single polymodal activity. [74].

A distinctive feature of the syndrome of functional non-formation of the left temporal region are isolated difficulties of speech sound differentiation (violation of the factor of phonemic analysis and synthesis). The main way of correctional work with children with similar disorders is to work on materialized external supports, bringing the program of action "outside", with a gradual transition from a joint expanded element-by-element action with the teacher to independent collapsed internal actions. The purpose of the correction in this case will be a detailed study of the sound analysis with external

supports when using strong preserved links. When correcting such children, it is not recommended to limit yourself only to writing and reading, it is necessary to develop their vocabulary and auditory-speech memory [44, 23].

When examining the pupils of the boarding school for orphans, dysgenetic syndrome was diagnosed in 71% of 7-8-year-olds, which creates a prerequisite for recommending the mass introduction of a specialized correctional program into the practice of psychological and pedagogical work with this category of children. Adequate in this case is the method of substitution ontogenesis, developed by A.V. Semenovich. The main corrective target is the formation of axial (bodily, organ, optical-spatial) vertical and horizontal interactions in the child. To do this, a comprehensive method of psychomotor correction is used, including body-oriented, ethological, art therapy and respiratory psychotechnics. The method allows, if necessary, to integrate neuropsychological and speech therapy correction of cognitive processes into it, which is especially important for children who, in combination with dysgenetic, have been diagnosed with any other syndrome of deviant development [25, 66].

## SUMMARY

1. In the course of the study, a neuropsychological examination of 7-8-year-old primary school children with a psychiatric diagnosis of F83 was conducted among groups of children who were and were not subjected to mental deprivation. The survey results revealed both general patterns of disorders of higher mental functions characteristic of the majority of the sample, and a number of significant differences in the degree of neuropsychological disorders and their prevalence in the study groups, which may indicate a specific effect of mental deprivation on the higher mental functions of younger schoolchildren with mixed specific developmental disorders.

2. The conducted syndromic neuropsychological analysis found that in the group of children subjected to deprivation, a number of syndromes of deviant development were expressed, in a significant number of cases, the examined children were diagnosed with manifestations of several syndromes simultaneously: 71% of the subjects had dysgenetic syndrome, 52% had left temporal region unformed syndrome, 32% had right hemisphere unformed syndrome, 12% had frontal brain unformed syndrome and 9% had corpus callosum unformed syndrome. bodies; in the group of children who were not subjected to deprivation, the following syndromes of deviant development were revealed, also manifested both in isolation and in a complex: 48% of the subjects expressed the syndrome of unformed right hemisphere, 41% – the syndrome of unformed left temporal region, 38% – dysgenetic syndrome, 21% – the syndrome of unformed corpus callosum, 9% – the syndrome of deficiency of the basal nuclei of the brain, and 9% – the syndrome of unformed frontal brain.

3. The two groups studied are characterized by a complex combination of dysgenetic syndrome in children with syndromes of unformed right hemisphere and left temporal region, while in subjects who were exposed to deprivation, the frequency of manifestation of dysgenetic syndrome is significantly higher than in subjects who were not affected by deprivation, with a much smaller difference in the severity of right hemisphere and left temporal syndromes. Dysgenetic syndrome in deprived children is clearly dominant, determining the specifics of disorders in general. A statistically significant relatively strong relationship has been established between the presence of the effects of mental deprivation in



the child's anamnesis and the frequency of manifestation of dysgenetic syndrome. In non-vaccinated children, the main syndrome is the lack of formation of the right hemisphere, but this syndrome does not have such a totally predominant character, forming a complex picture of a larger number of less pronounced disorders.

4. Since children with mixed specific disorders of psychological development are most often diagnosed with such syndromes of deviant development as functional deficiency of brain stem formations (dysgenetic syndrome), functional unformedness of the right hemisphere of the brain and functional unformedness of the left temporal region, the targets of corrective work in these cases should be the formation of axial (bodily, organ, optical-spatial) vertical and horizontal interactions in the child, as well as the formation of the processes of figurative and symbolic thinking and sound analysis. At the same time, for children who have been exposed to deprivation, due to the high frequency of manifestations of dysgenetic syndrome in them, it will be advisable to massively apply a comprehensive method of psychomotor correction using the method of substitution ontogenesis.

## CONCLUSION

As a result of the work carried out in its theoretical part, effective methods for identifying the features of disorders of higher mental functions of younger schoolchildren with mixed specific disorders of psychological development have been identified. After performing a complete neuropsychological examination of 177 children, an analysis of neuropsychological disorders in 7-8-year-old children with a psychiatric diagnosis of F83 who were subjected to mental deprivation was carried out in comparison with disorders of their peers who had the same diagnosis, but were not subjected to deprivation.

The main features of disorders of higher mental functions characteristic of children with mixed specific disorders of psychological development in general are determined and the specificity of disorders in a group of orphaned children in comparison with children living with their parents is revealed. Conducting a syndromic neuropsychological analysis made it possible to identify the main syndromes of deviant development characteristic of children of this age and this diagnosis. The analysis of the frequency of diagnosed syndromes in groups of deprived and non-deprived children made it possible to assess the influence of the factor of mental deprivation on the neuropsychological features of younger schoolchildren with mixed specific disorders of psychological development.

The identification of neuropsychological syndromes of deviant development, characteristic of both deprived and non-deprived children with a diagnosis of F83, made it possible to determine the targets of psychological impact, which makes it possible to more effectively select corrective methods taking into account the presence or absence of a deprivation factor in the child's history.

Thus, the goal of the work has been achieved, the tasks have been solved.

The results of the work are recommended to be used to select existing and compile new individual and group programs of neuropsychological correctional classes with younger schoolchildren with mixed specific disorders of psychological development, including children in specialized institutions for orphans and children left without parental care.

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