

# Optimization of social functioning quality of preschool children with cerebral palsy

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**Abstract.** Among the children with violation of supporting-motor apparatus, the largest group is comprised of those with cerebral palsy (CP). The lack of diagnostic toolkit adequate to pedagogical tasks does not allow to examine such children from the point of view of educational capabilities and socialization. The aim of research is development and scientific substantiation of innovative technology of pedagogical examination of preschool children with CP, aimed at differential evaluation of their educational capabilities and determination of specificity of educational demands. Analysis of the experimental results has allowed to formulate a set of conclusions determining scientific novelty of the research: educational potential of preschool children with CP is characterized by indicators of different levels, which stipulates variability and specificity of demands of psychological and pedagogical support; educational capabilities of preschool children with CP can be manifested at optimum, medium, low, critical levels, each of which is characterized by similar patterns irrespective of age; during the research no direct correlation between the manifestation rate of motor disorders of preschool children with CP and the level of their educational capabilities has been revealed; the educational potential of preschool children with CP significantly depends on the manifestation rate of intellectual disabilities stipulating features of mental development and is not correlated with the severity of motor impairment; the obtained experimental results have allowed to reveal peculiarities of educational capabilities of preschool children with CP, which is the key point in development of individual remedial programs; differentiation of preschool children with CP on the basis of level-driven approach allows to optimize the content of psychological and pedagogical assistance and the selection of remedial actions.

**Keywords:** preschool children with motor pathology, pedagogical examination, level of educational capabilities.

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## 1 Introduction

Among the children with health limitations, the children with violation of supporting-motor apparatus occupy peculiar position and their largest group is comprised of those with cerebral palsy (CP) [1-3].

For several decades doctors, psychologists, and teachers have developed approaches to diagnostic and remedial work with such children. Motor sphere of children with CP was investigated by the following Russian researchers: L.O. Badalyan, K.A. Semenova, T.N. Simonova, and others [4]. Mental development of such children was described by I.Yu. Levchenko [5, 6], I.I. Mamaychuk [7, 8] and others. The specificity of speech development was discussed by Ye.F. Arkhipova, M.V. Ippolitova, E.M. Mastjukova, I.I. Panchenko, O.G. Prikhodko, and others [9].

At present, the issues of education and raising of children with CP of various ages are actively analysed [10-18].

Despite the active interest to the features of development of children with CP, the educational capabilities of preschool children of this category were not included in the areas of special studies. The lack of diagnostic toolkit adequate to pedagogical tasks does not allow to examine such children from the point of view of educational capabilities and socialization.

In this regard, it is important to improve diagnostics regarding pedagogical examination of development of preschool children with CP.

The aim of the research is to develop and scientifically substantiate the innovative technology of pedagogical examination of preschool children with CP, aimed at differential evaluation of their educational capabilities and determination of specificity of educational demands.

The research hypothesis is the assumption that the efficiency of psychological and pedagogical examination of preschool children with CP can be provided by improvement of diagnostic toolkit based on level-driven approach allowing to differentiate children with consideration for their educational potential determining specific demands of psychological and pedagogical assistance.

Studying special publications on the considered problem allowed to determine the most important theoretical approaches to development of technology of pedagogical examination of preschool children with CP. At first, methodological recommendations provided in the modified methods by I.Yu. Levchenko, T.N. Volkovskaya, S.Ye. Kiselyova [5] were accounted for, which allowed to objectively evaluate the pedagogical status of such children.

In addition, while developing the diagnostic technology, the concepts reflected in Functional Independence Measure (FIM) were used.

The main aim of the innovative technology of pedagogical examination of preschool children with CP is the possibility of differentiated level-driven evaluation of such features of development, which characterize their educational potential and allow to determine specific educational demands.

## 2 Methods

The developed diagnostic system included several blocks of assignments aimed at analysis of features of psychomotor development, social anamnesis, formation of skills of self-service, speech development, spatial and time representations, game activity.

Taking into account that the age of tested persons was in the range of 3 to 6 years, each block was comprised of assignments of various difficulty (for children of the age of 3–4 and 5–6 years).

The experiment was performed on the premises of Federal State Budgetary Institution “Russian rehabilitation center Detstvo” of the Ministry of Healthcare of the Russian

Federation. Forty preschool children of 3 to 6 years old and various forms of CP (spastic diplegia, atonic-astatic form, hemiparetic form, double hemiplegia) participated in the experiment. All children needed special medical, and psychological and pedagogical assistance.

The level of educational capabilities was evaluated on the basis cumulative quantitative and qualitative five-point indicators, which allowed to reveal four levels of educational capabilities of preschool children with CP:

*1 (critical) level* was determined by the lowest indicators of development manifested by rough intellectual underdevelopment in combination with other disabilities; regarding motion sphere, such children were able to act only with somebody's assistance.

Peculiar feature of *2 (low) level* was the presence of intellectual developmental disorders in combination with low regulation of behavior; underdevelopment of speech of systemic nature; underdevelopment of components of motor development.

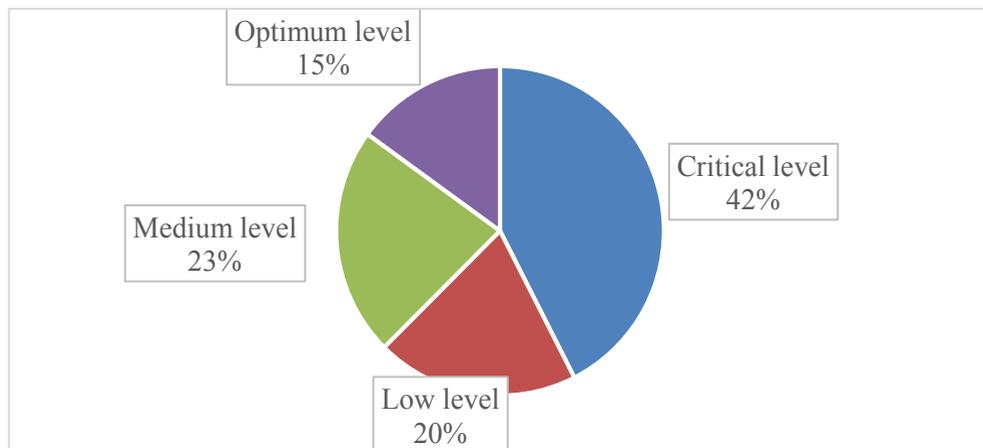
*3 (medium) level* was characterized by underdevelopment of complex forms of cognitive activity; moderate speech disorders; the motor resource was restricted by capability of independent motion by defect walking at limited distances.

*4 (optimum) level* was characterized by the lack of intellectual disorders; speech intelligibility in total was not violated; motor abilities allowed to walk independently for significant distances; complete scope of motions, but slight motor discomfort was possible.

### 3 Results and discussion

During the experiment the following results have been obtained.

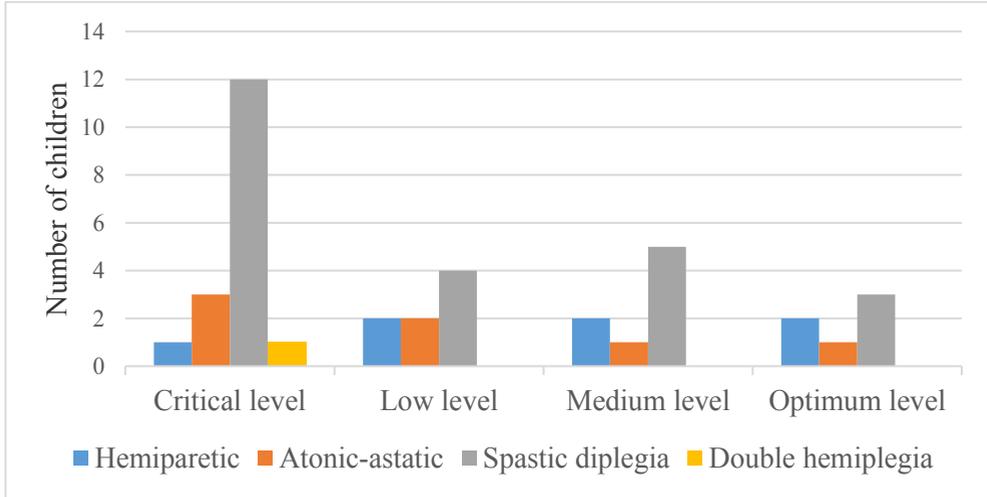
The highest number of children (17 children or 42%) from the sampling was referred to critical level, low level was demonstrated by 8 children (20%), 9 children (23%) demonstrated medium level, the lowest number of preschool children with CP (6 children or 15%) was referred to optimum level.



**Fig. 1.** Diagnostics in terms of level of educational capacities.

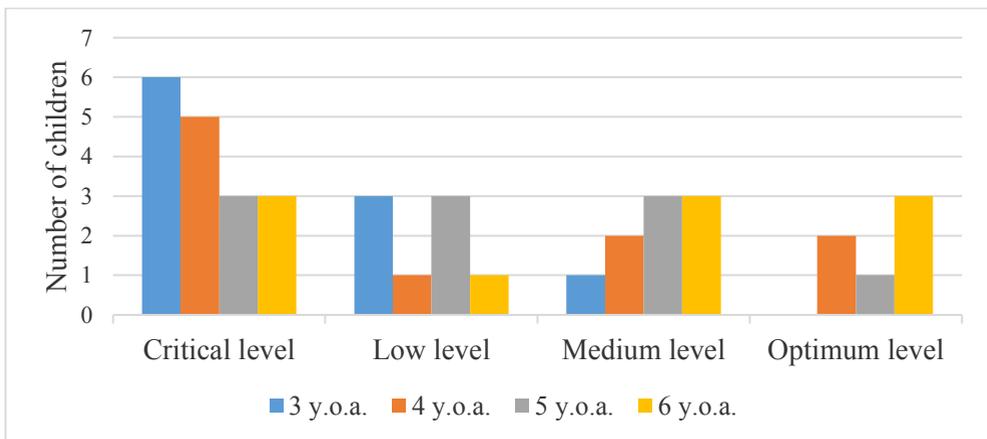
During the analysis it has been detected that the level of educational capabilities of children with CP was not correlated with the severity of CP but depended on the level of development of cognitive sphere of these children. The data in Figure 2 demonstrate that the children with underdevelopment of cognitive sphere manifested low or critical level, and the preschool children with high cognitive activity showed medium and optimum level.

Distribution of preschool children with CP in terms of level in the frames of various forms of motor disorders was characterized by scatter. Thus, the children with hemiparetic form of CP could be observed at all levels, which was determined by localization and severity of development. Severity of motor, mental and speech disorders for children with spastic diplegia also varied in wide ranges; however, this form was observed more often in the frames of critical level of educational capabilities. Preschool children with atonic-astatic form of CP demonstrated more often critical and low level of educational capabilities.



**Fig. 2.** Diagnostics in terms of CP form.

Direct correlation between the age and educational capabilities of preschool children with CP was not revealed (Fig. 3). The children in the age of 3-4 years with more secure intelligence demonstrated medium and optimum level of educational capabilities together with the children in the age of 5-6 years. In addition, in the range of critical level there was sufficient number of children in the age of 5-6 years with low intellectual potential.



**Fig. 3.** Diagnostic results by age of tested persons.

## 4 Conclusion

Analysis of the experimental results has allowed to formulate a set of conclusions determining scientific novelty of the research:

- educational potential of preschool children with CP is characterized by indicators of different levels, which stipulates variability and specificity of demands of psychological and pedagogical support,
- educational capabilities of preschool children with CP can be manifested at optimum, medium, low, critical levels, each of which is characterized by similar patterns irrespective of age,
- during the studies no direct correlation was revealed between the manifestation rate of motor disorders of preschool children with CP and the level of their educational capabilities,
- the educational potential of preschool children with CP significantly depends on the manifestation rate of intellectual disabilities stipulating features of mental development and is not correlated with the severity of motor impairment,
- the obtained experimental results have allowed to reveal peculiarities of educational capabilities of preschool children with CP, which is the key point in development of individual remedial programs,
- differentiation of preschool children with CP on the basis of level-driven approach allows to optimize the content of psychological and pedagogical assistance and the selection of remedial actions.

## References

1. V.D. Levchenkova T.T. Batysheva, N.Yu. Titarenko, *Detskaya i podrostkovaya reabilitatsiya*, **2(25)**, 16–24 (2015)
2. V.D. Levchenkova, T.T. Batysheva, N.S. Slobodchikova, N.Yu. Titarenko, *Detskaya i podrostkovaya reabilitatsiya*, **2(38)**, 16–21 (2019)
3. E.A. Boiko, E.V. Ivanchuk, M.M. Gunchenko, T.T. Batysheva, *Neuroscience and Behavioral Physiology*, **47(5)**, 570–572 (2017). <https://doi.org/10.1007/s11055-017-0437-8>
4. T.N. Simonova, *Development potential of preschool children with severe motor impairments, Voprosy psikhicheskogo zdorovya detey i podrostkov*, **15(1)**, 96–100 (2015)
5. I.Yu. Levchenko, T.N. Volkovskaya, S.Ye. Kiselyova, *Detskaya i podrostkovaya reabilitatsiya*, **4(36)**, 48–52 (2018)
6. I.Yu. Levchenko, V.Ye. Agaeva, *Pediatrics. Journal named after G.N. Speransky*, **96(5)**, 217–221 (2017). <https://doi.org/10.24110/0031-403X-2017-96-5-217-221>
7. G.V. Pyatakova, I.I. Mamaychuk, V.V. Umnov, *Pediatric traumatology, orthopedics and reconstructive surgery*, **5(3)**, 58–67 (2017). <https://doi.org/10.17816/PTORS5358-67>
8. S.V. Kraynyukov, I.I. Mamaychuk, *Pediatric Traumatology, Orthopedics and Reconstructive Surgery*, **7(3)**, 71–78 (2019). <https://doi.org/10.17816/PTORS7371-78>
9. Ye.F. Arkhipova, *Modern preschool education*, **1(73)**, 34–39 (2017)
10. A.Ya. Abkovich, *Special Education*, **3(43)**, 5–12 (2016)
11. A.Ya. Abkovich, *Almanac of the Institute of Correctional Pedagogy*, **34**, 45–63 (2018)
12. A.A. Guseynova, *Humanitarian sciences*, **2(38)**, 142–149 (2017)

13. A.A. Guseynova, Doshkolnik. Metodika i praktika vospitaniya i obucheniya, **4**, 30–35 (2018)
14. A.V. Krotkova, Vospitaniye i obucheniye detey s narusheniyami razvitiya, **2**, 33–42 (2015)
15. A.V. Krotkova, Vospitaniye i obucheniye detey s narusheniyami razvitiya, **3**, 10–17 (2015)
16. O.V. Bykova, I.A. Nankina, O.V. Kvasova, T.T. Batysheva, A.N. Boiko, I.M. Drozdova, Neuroscience and Behavioral Physiology, **47(5)**, 544–552 (2017).  
<https://doi.org/10.1007/s11055-017-0433-z>
17. A.A. Kozina, V.V. Ilinsky, E.G. Okuneva, N.V. Baryshnikova, A.Y. Krasnenko, K.Y. Tsukanov, O.I. Klimchuk, E.I. Surkova, P.A. Shatalov, O.B. Kondakova, A.N. Larionova, T.T. Batysheva, BMC Medical Genetics, **19(1)**, 151 (2018).  
<https://doi.org/10.1186/s12881-018-0669-7>
18. O.B. Kondakova, T.T. Batysheva, A.Yu. Krasnenko., K.Yu. Tsukanov, O.I Klimchuk., K.D. Olegovich, D.O. Korostin, P.A. Shatalov, V.V. Ilinsky, A.I. Davidova, N.V. Zhurkova, BMC Pediatrics, **19(1)**, 98 (2019). <https://doi.org/10.1186/s12887-019-1470-2>