

VII International Forum on Teacher Education

# Evaluation of Speech Skills and Social Interaction in Preschool Age Children With ASD in the Conditions of Psychological and Pedagogical Support of Kindergarten

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## Abstract

The predictors of successful socialization of children with autism spectrum disorders (ASD) are a high degree of development of verbal and social interaction skills. The existing system of psychological and pedagogical support from the preschool period should aim at effectively overcoming the above difficulties.

The research presents the results of a two-year study of 52 organized preschoolers aged 3 to 8 years with ASD under the VB-MAPP Skills and Social Interaction Assessment Program. The results showed insignificant dynamics in the development of verbal and social interaction skills in preschoolers with ASD attending kindergartens. Questioning of caregivers who raise children with ASD confirmed their dissatisfaction with the existing system of support of preschoolers with ASD in the region.

The results indicate the insufficient effectiveness of the existing system of psychological and pedagogical support of children in preschool educational institutions and actualize the issue of implementing the system of comprehensive support of children with ASD for their successful socialization.

*Keywords:* autism spectrum disorders, VB-MAPP, organized preschoolers, comprehensive support.

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Published by Kazan federal university and peer-reviewed under responsibility of IFTE-2021 (VII International Forum on Teacher Education)

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## **Introduction**

Autism spectrum disorder (ASD) is a complex neurodevelopmental condition that develops in early childhood and is characterized by deficit in social interaction and communication, as well as by a restricted stereotyped repetitive repertoire of interests and activities (WHO Meeting Report, Geneva 2013). Difficulties with successful socialization of children with ASD are associated with impairments in establishing, maintaining, and understanding social relationships – ranging from difficulties with adjusting behavior to different social contexts, engaging in imaginative games, making friends, to a obvious lack of interest in peers (Miranda et al., 2020; Schall & McDonough, 2010; Wolstencroft et al., 2018). Excessive need for invariability, inflexible adherence to rules or patterns of behavior, extremely limited and fixed interests that seem abnormal in terms of intensity or direction cause clinically significant impairment in the social sphere of daily functioning in children with ASD (Schlosser et al., 2014). These impairments lead to both difficulties in teaching such children and to difficulties in their successful socialization.

Despite the large number of scientific publications, many aspects of organizational and methodological problems of complex support of children with ASD remain unsolved; there is a certain lack of well-developed models of successful socialization of children with ASD in society. Organization of comprehensive support of children with ASD is also very complex due to the heterogeneity of the disorder (Hassan & Mokhtar, 2019; Howes et al., 2018). The foregoing actualizes the problem of specially organized complex (medical-psychological-pedagogical) support that contributes to the formation and development of social communication as a predictor of successful socialization of children with ASD, including preschool educational institutions.

## **Purpose and objectives of the study**

The purpose of this study is to assess the dynamics of verbal and social interaction skills development in organized preschoolers with ASD as predictors of successful socialization, and to identify the effectiveness of the existing system of psychological and pedagogical support in the region.

## **Literature review**

Most researchers note that the lack of verbal and non-verbal means and methods of communication, which is characteristic of all forms of autistic disorders having a neurobiological basis, hinders the successful socialization of children with ASD (Koegel et al., 2019; Roid & Koch, 2017).

Therefore, it is precisely disorders in the development of communication means and social skills that are considered as the main “target” of comprehensive support aimed at successful socialization of children with ASD (Bozhkova et al., 2020; Dekker et al., 2019). There are various approaches to the development of social communication of children with ASD: behavioral therapy (operant approach); the TEACCH approach; PACT intervention, emotional-level approach, etc. (Matson et al., 2012; Pickles et al., 2016; Virues-Ortega et al., 2013). However, efforts aimed at successful socialization of children with ASD can only be effective if they are implemented by a multidisciplinary team of specialists whose combined knowledge and competencies are able to create optimal conditions for successful development of children, their adaptation and socialization in society (Howes et al., 2018; Nesterova et al., 2016).

## **Methodology**

Participants are represented by two samples. The first sample included 100 parents raising children with ASD. They were invited via social media, community services and foundations, as well as by the specialists. Given the high variability of the existing clinical diagnoses of ASD, no specific conditions and criteria for parental involvement have been set. The questionnaire was prepared in a Google form and presented on the website of the Kazan (Volga Region) Federal University (Questionnaire for parents “Psychological and pedagogical support of children with ASD”, 2020).

The second sample consisted of 52 preschoolers aged 3 to 8 years attending special groups for children with ASD in kindergartens of a combined type in the city of Kazan (Russia). After medical and social examination 55% of the children under study were diagnosed with autism (20%, F84.0) and atypical autism (35%, F84.1), and 45% of children had an unspecified ASD. Psychological and pedagogical support in these kindergartens included individual and group work with children provided by speech therapists-defectologists lasting at least 2 hours a week. 26 (50%) of the studied children were aged 5-6 years, 7 children (13%) were 3-4 years old, and 19 children (37%) were 7-8 years of age. The gender sample included 6 (11%) girls and 46 (89%) boys.

The experiment was carried out by questioning the caregivers of the preschoolers with ASD. The questionnaire for parents called "Psychological and pedagogical support of children with ASD" was developed by teachers of the Department of Psychology and Pedagogy of Special Education of the Institute of Psychology and Education, Kazan Federal University (2020).

Speaking and social interaction skills of preschoolers with ASD were tested using the VB-MAPP program (Sundberg, 2008). VB-MAPP combines ABA teaching procedures and methodologies based on Skinner's analysis of verbal behavior.

The advantage of this type of testing was that each of the parameters for assessing the stages of development was considered separately, which made it possible to determine the baseline level of each of the participants in the experiment. Unlike most diagnostic techniques, VB-MAPP provides functional assessment of children's social skills. In addition, it is convenient to use VB-MAPP for tracking the dynamics of the development of children's skills, and it also contains tools for composing a program of correctional work. Its main purpose is to determine the baseline level of a child's skills in comparison with neurotypical individuals.

The experiment consisted of two stages. The first stage involved a study that included a questioning of 100 caregivers raising children with ASD. In the questionnaire, parents were asked to answer 14 questions concerning the variability of clinical diagnoses of children with ASD; effectiveness of state aid provision; options for educational organizations attended by a child with ASD; forms and quality of educational services provided; types of interventions preferred by parents. The questionnaire included questions requiring both a detailed answer and questions that implied a monosyllabic answer with multiple answer options. One of the answer options provided an opportunity for respondents to express their opinion.

The second stage involved a study of children with ASD who attend kindergartens. The experiment took two years (2018-2019) and was carried out on the basis of 4 state preschool educational organizations in the city of Kazan (Russia) with full-day groups for children with ASD. The researchers got written consent from the management of preschool educational organizations and caregivers of children participating in the experiment. During the testing, the researchers assessed the current level of pre-verbal, verbal, social and cognitive skills of the respondents according to 170 parameters, which were distributed in three age groups and corresponded to the level of normal development of children aged from 0 to 18 months, from 18 to 30 months and from 30 to 48 months. The following skills were tested: requesting skill (mand), the skill of labeling objects (tact); speech perception skill (listener skill); the ability to imitate movements (motor imitation); features of auditory perception and sound imitation (echo reaction); playing skills; social skills; visual perception; features of speech development (linguistic structure of speech); the ability to generalize and differentiate (the skill of distinguishing by functions, characteristics and categories); the ability to engage into verbal contact (intraverbal skills); social behavior skills (group behavior skills) and academic skills (reading, math, writing). Each skill was assessed using four techniques: formal testing, observation, combination of formal testing and observation, and time-limited observation. The results were evaluated in points. Depending on the correspondence of the development of a skill to a certain level, the skills were assessed from 0-5 points, 0-10 and 0-15 points. The features of auditory perception and sound imitation (echo response) were rated from 0 to 100 points. Echo skills were assessed in several stages. At the first stage, the researchers assessed the pronunciation of simple and paired syllables, at the second - two-syllable combinations, at the third - three-syllable combinations.

At the fourth stage, researchers assessed prosodic components (phrases with a given intonation stress, pitch, loudness, duration of pronunciation). Correct pronunciation was awarded with 1 point, recognizable (approximate) reaction – with 0.5 points, and the absence of an answer gave 0 points.

All statistics were calculated using Origin 7.0 SR0 Software (OriginLab, USA). Data are presented as mean±standard deviation (SD). Student's t-test was used to confirm the reliability of the results.

## Results

The first stage: the results of the questioning of caregivers of children with ASD.

The results of the analysis of respondents' answers to the questions about clinical diagnoses of children with ASD showed that the diagnoses in the medical documentation of children are widely variable: infantile autism, atypical autism, ASD, ASD with additional diagnoses (mental retardation, severe speech disorders, general speech underdevelopment) (Fig. 1A).

Out of all parents surveyed: 6% of respondents indicate that they visited only doctors (psychiatrist, neuropsychiatrist or neurologist), children were given clinical diagnosis and they did not pass psychological, medical and pedagogical commission (PMPC) and, accordingly, they were not sent to an educational organization. 88% of the respondents answered that their children have a disability; they receive rehabilitation aid in accordance with their individual development programs. 12% of surveyed caregivers answered that their children do not have disabilities and starting from 4 years old they are not able to visit rehabilitation centres for free.

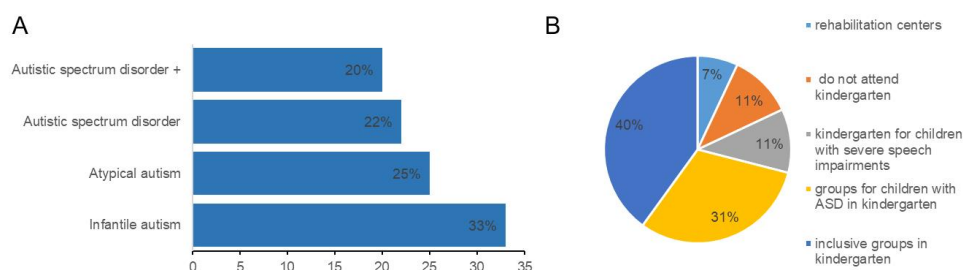


Figure: 1. (A) Diagnoses of children based on medical examinations which parents indicated during the questionnaire (in percent). (B) Attendance of rehabilitation centres or preschool educational institutions by children with ASD.

81% of the respondents noted that they need consulting and diagnostic support. The same number of respondents considers the existing system of state support of children with ASD insufficient, and organization of psychological and pedagogical support – ineffective. The results of the questioning showed that 82% of respondents have children attending public preschool educational institutions (Fig. 1B). Among them, 11% of children are brought up in compensatory kindergartens for children with severe speech disorders, 40% of children attend groups for children with ASD in compensatory kindergartens for children with intellectual disabilities, and 31% of children attend inclusive groups in combined kindergartens (Fig. 1B). 51% of these respondents prefer the system of special education and 31% prefer inclusive education. Psychological and pedagogical support is organized in all educational organizations.

The results of the assessment of parents' answers to questions regarding the goals of visiting rehabilitation centres and educational organizations by their children with ASD showed that 90% of parents consider these visits of children to organizations a necessary condition for the successful socialization of their children. According to the parents, successful socialization, effective communication, and high quality of life require that their children must learn to communicate with other children, speak better, learn to understand and observe social norms, become more independent (to get dressed, eat and go to the toilet without assistance etc.), learn to play with peers, attend developmental classes, have the opportunity to study at school with further career guidance. 70% of parents believe that all of the things above will be better taught in an educational organization with full-day groups (where the time of stay is 8 hours a day), rather than with short-stay groups (4 hours a day) or groups where children are taught together with parents.

Second stage: results of the study of verbal and social interaction skills in preschoolers with ASD attending kindergartens.

The mean values of the development of verbal and social interaction skills collected in the course of the research are presented in figure 2. The lowest results in both the first and the second year of the study were found for the following skills: making requests ( $1.78 \pm 2.63$  [2018] vs  $1.79 \pm 2.5$  [2019]), social skills ( $1.69 \pm 1.55$  [2018] vs  $1.81 \pm 2.28$  [2019]), forms, characteristics, categories of speech ( $1.41 \pm 2$  [2018] vs  $1.43 \pm 1.88$  [2019]), intraverbal properties ( $1.21 \pm 2.12$  [2018] vs  $1.23 \pm 2.04$  [2019]), writing skills ( $1.23 \pm 1.81$  [2018] vs  $1.23 \pm 1.81$  [2019]) and reading ( $1.4 \pm 1.67$  [2018] vs  $1.74 \pm 1.84$  [2019]).

A comparative study on verbal and social interaction skills carried out among organized preschoolers with ASD with an interval of 1 year did not reveal significant differences in the results. Nevertheless, there was a tendency for an increase in indicators related to socialization of children with ASD: group behavior skills and social skills.

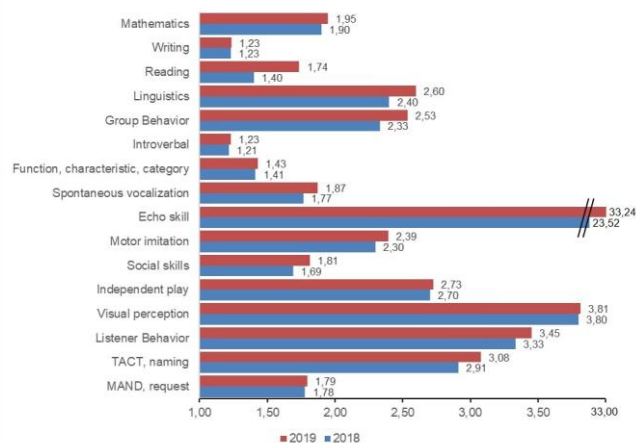


Figure: 2. Mean indicators of the development of verbal skills and social interaction of organized preschoolers with ASD, assessed during the initial (2018) and secondary (2019) diagnostics.

It should be noted that changes in children in the form of insignificant improvements ( $\pm 0.5$ -1.5 points to the initial value at the initial diagnosis) occurred individually according to individual parameters, which almost did not affect the mean values of the sample, but was important for planning further individual correctional work.

During the analysis of the results of the research, we additionally carried out a comparative analysis of the peculiarities of the development of verbal and social interaction skills in organized preschoolers with ASD according to the age criterion, since the success of socialization may be associated with age-related changes (Table 1).

Table 1. Results of the assessment of the development of verbal and social interaction skills in organized preschoolers with ASD adjusted for age (2019, in points) \*

Verbal and social interaction skills	3-4 years old	5-6 years old	7-8 years old
MAND, request	1,68 $\pm$ 1,13	1,44 $\pm$ 1,62	2,25 $\pm$ 3,70

<b>TACT, naming</b>	<b>3,38±3,36</b>	2,96±4,18	2,92±3,87
<b>Listener Behavior</b>	<b>3,59±2,58</b>	3,40±3,18	3,36±3,85
<b>Visual perception</b>	3,43±0,79	3,67±3,04	<b>4,35±3,69</b>
<b>Independent play</b>	1,43±0,61	2,85±2,94	<b>3,92±3,71</b>
<b>Social skills</b>	1,57±1,10	1,75±1,70	<b>2,12±3,26</b>
<b>Motor imitation</b>	<b>2,5±1,57</b>	2,46±2,02	2,22±2,37
<b>Echo skill</b>	<b>40,12±23,33</b>	30,63±13,74	29,33±3,35
<b>Spontaneous vocalization</b>	1,98±1,10	1,62±1,50	<b>2,03±1,48</b>
<b>Function, characteristic, category</b>	1,5±1,48	<b>1,52±2,27</b>	1,28±1,35
<b>Introverbal</b>	1,2±1,86	1,17±2,25	<b>1,33±1,97</b>
<b>Group Behavior</b>	1,75±1,51	<b>2,97±2,47</b>	2,89±3,12
<b>Linguistics</b>	<b>2,92±1,99</b>	2,31±2,17	2,57±2,35



<b>Reading</b>	1±0,00	1,20±1,82	<b>3,03±2,17</b>
<b>Writing</b>	0,00±0,00	1,18±1,64	<b>2,53±2,46</b>
<b>Mathematics</b>	1±0,71	<b>2,45±2,00</b>	2,4±2,15

\*In bold are the highest mean values for each skill when comparing 3 age groups with each other.

It was found that the youngest children (3-4 years old) from the studied sample had the largest mean values for the following skills in comparison with other age groups: TACT (naming), listener behavior, motor imitation, echo skill and linguistics. 4-5 year old children showed high results in the skills of behavior in the group, in mathematics and function, characteristic, category in comparison with other age groups. 7-8 year old preschoolers with ASD showed higher results in comparison with younger preschoolers in the formation of visual perception skills, independent play, social skills, having showed the ability to interact, read and write. However, it should be noted that the dynamics of the development of these skills is insignificant. Reading often comes without reading comprehension, verbalization – without mutual understanding, and sociability – without interaction.

In the course of the research, we have also analyzed the data by gender (Fig. 3). Differences were found in the development of certain verbal and social interaction skills in boys and girls. At the start of the examination, girls more often named the proposed items ( $3.71 \pm 1.23$  [girls] vs  $2.45 \pm 1.85$  [boys]), showing the behavior of a listener ( $4.33 \pm 1.03$  [girls] vs  $2.57 \pm 0.55$  [boys],  $P < 0.05$ ), i.e. they turned around and paid attention to the speaker's voice with fairly high echo skills results ( $45.5 \pm 12.55$  [girls] vs  $32.75 \pm 10.82$  [boys]) and using linguistic means ( $3.2 \pm 2.05$  [girls] vs  $2 \pm 1.55$  [boys]). Requests were addressed to adults, and peers. Girls more often pulled the adult by the hand and pointed to the desired item. But at the same time, girls showed low results in terms of independent playing skills ( $1.41 \pm 1.16$  [girls] vs  $4.05 \pm 2.8$  [boys]) and socialization ( $1.46 \pm 2.2$  [girls] vs  $2, 16 \pm 1.32$  [boys]), reading skills ( $1 \pm 0.55$  [girls] vs  $2.48 \pm 2.12$  [boys]) and mathematics ( $1.5 \pm 1.25$  [girls] vs  $2.4 \pm 2.2$  [boys]). And not a single girl has mastered writing skills, even by the age of 8.

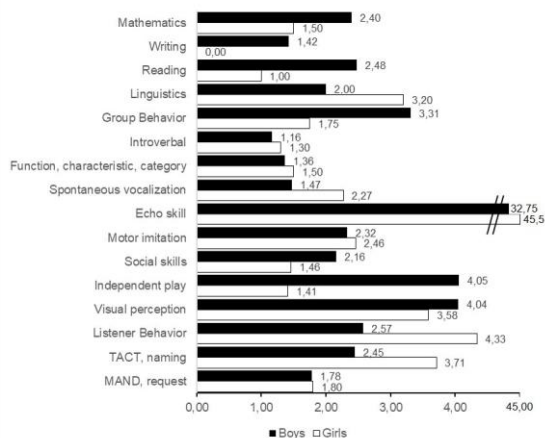


Figure: 3. Comparative analysis of the indicators of verbal and social interaction skills in organized boys and girls of a preschool age with ASD assessed by secondary diagnosis.

Boys showed high results in visual perception skills ( $4.04 \pm 3.2$  [boys] vs  $3.58 \pm 2.8$  [girls]) and group behavior ( $3.31 \pm 2.98$  [boys] vs  $1.75 \pm 1.85$  [girls]). It should be noted that 43% of boys could study in a small group of 3 or more children for more than 5 minutes without unwanted behavior and attempts to run away and leave the class.

## Discussions

This research was aimed at: (1) studying the dynamics of the development of verbal and social interaction skills in preschoolers with ASD who attend kindergartens with full-day groups for children with this disorder; (2) assessing the level of effectiveness of the existing system of psychological and pedagogical support, including caregivers' opinion on this account.

In the course of the first part of the research, we revealed a wide variability of existing diagnoses reflected in the medical records of children. In our opinion, this fact may indicate: (1) the lack of knowledge regarding the diagnostic criteria for ASD and (2) the lack of their common understanding and understanding of the very essence of the disorder in the medical community of Russia. In July 2020, the Ministry of Health of the Russian Federation approved new clinical guidelines for caring for children with ASD which reflect modern evidence-based approaches to the treatment and rehabilitation of this category of patients. Familiarization of doctors with these recommendations and their application in practice should improve the quality of care for children with ASD.

Our research revealed a low coverage of children by psychological and pedagogical support and insufficient forethought of the existing system of support of children with ASD in the region. Behavioral, educational, and psychological interventions, as the main methods for overcoming key deficits associated with ASD (Dawson & Burner, 2011; Matson et al., 2012; Smith & Iadarola, 2015), appear to be not available for most children with ASD. The caregivers questioning confirmed the relevance and urgent need for: development of integrated intervention programs for children with ASD based on modern scientific evidence; organization of the system of early support for children and families in general; education of parents for their inclusion in the habilitation of children; provision of substantiated information to parents about existing effective methods and forms of assistance.

The research results indicate an insignificant dynamic in the development of verbal and social interaction skills in organized preschoolers with ASD, which confirms insufficient effectiveness of the existing system of support of preschoolers with ASD in the region. In addition, our research revealed a rather acute problem – the formation of groups for children with ASD in kindergartens. Getting into the group for children with ASD in kindergarten, at least 45% of children remain not fully diagnosed. We believe that this circumstance led us to the identification of significant differences in the level of development of verbal skills and social interaction (both basic and those tracked in dynamics) among organized children of this group.

It is worth to mention that the recommended comprehensive intervention program based on the principles of applied behavior analysis for the studied group of preschoolers (Makrygianni et al., 2018; Reichow et al., 2012) is not used in kindergartens and often remains unavailable. This circumstance undoubtedly affects the dynamics of the development of verbal skills and social interaction in preschoolers with ASD, which is confirmed by our research.

The above facts make the issue of introducing a program of comprehensive support for children with ASD in preschool educational institutions more urgent. We believe that the impossibility of implementing this program or its low quality is associated with the lack of (1) the necessary competencies of the teaching staff, (2) special educational conditions (environmental, organizational), as well as methodological and expert support for the activities of preschool organizations with groups for children with ASD. **Limitations**

Several limitations should be mentioned. Only parents of children with ASD involved in online survey. In further research, it is necessary to conduct the survey among specialists – both of medical and psychopedagogical profile – who work with children with ASD in order to collect summary data on their awareness of autism / ASD and the main problems of diagnosis and support of such children.

In this research, we assessed verbal and social interaction skills using the VB-MAPP method.

Further research should be expanded methodologically – for example, by adding the assessment of adherence to rules or patterns of behavior required to develop complex social skills. Future work may be aimed at conducting research on the features of generalization of social skills for all studied parameters, which will be important for ensuring the generalization of the skills of successful socialization formed in children with ASD.

In this research, we assessed the dynamics of the formation of verbal and social interaction skills only in organized children with ASD. Additional research devoted to the dynamic assessment of these skills in children with ASD who study exclusively at home, attend rehabilitation centers, or study among normotypical peers can enrich and expand scientific and applied knowledge about the effectiveness of psycho-pedagogical support of children with ASD in the region.

### **Conclusion**

The results of the research let us conclude that it is necessary to develop and implement programs of comprehensive support for the development of cognitive, verbal skills and adaptive behavior (including social skills, communication skills and life skills) for preschoolers with ASD. These findings have both theoretical and practical significance.

The findings confirm and expand on previous research on the use of the VB-MAPP program for children with ASD as an easily accessible tool for professionals involved in the study, detailed assessment and monitoring of the development of complex social skills in children.

The research has shown that the skills of verbal and social interaction in children with ASD attending kindergartens: (1) are not formed at all or stay at a low level; (2) not so much depend on age as on the complexity of the disorder. The use of individual correctional methods by kindergarten specialists does not lead to successful socialization of children with ASD, as evidenced by the insignificant dynamics of the development of verbal and social interaction skills over two years. The need to use an integrated approach in the work of specialists both in making a diagnosis and in the selection of unified methods of intervention with evidence-based effectiveness are evidenced by: (1) a wide variability of existing diagnoses reflected in medical documentation of children; (2) a variety of approaches to the structure and content of individual development programs for children with ASD offered by psychological, medical and pedagogical institutes; (3) a wide range of applied methods and forms of both rehabilitation and educational state aid.

## Acknowledgements

This paper has been supported by the Kazan Federal University Strategic Academic Leadership Program.

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