

**Predictive factors of social skills development
in children with ASD**

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Abstract

One of the core symptoms of autism spectrum disorder (ASD) is the deficit in social functioning. This deficit includes difficulties in initiating or joining social activities, difficulties in understanding others' viewpoints, engaging in inappropriate behaviors, lack of eye contact, distance from people, non-functional use of language, and a lack of communicative gestures and others. The purpose of our research is to highlight the factors that influence the development of social skills of students with ASD. Thus, we have demonstrated that personal factors such as: anxiety, withdrawal, functional communication, behavioral rigidity, stereotyped behavior, atypical language, unusual behavior and social reciprocity behavior, both from the perspective of parents and from the perspective of teachers have a statistically significant influence on the development of communication and social adaptation skills of children diagnosed with ASD. Our results can be used as the basis for future complex personalized intervention programs.

Keywords: ASD, child, educational support, school environment, social skills

Introducere

Social skills in children with Autism Spectrum Disorder (ASD) are marked by difficulties in initiating interactions, maintaining eye contact, understanding non-verbal cues, and engaging in reciprocal conversations. These challenges can lead to difficulties forming relationships and may be associated with negative outcomes like anxiety or social rejection (Bent et al., 2017; Budisteanu et al.,

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2022; Kvetenska & Myska, 2017; Lincă, 2016; Linca et al., 2022; Lincă & Matei, 2023; Rad et al., 2022; Stanciu et al., 2021). To support these children, parents and educators can implement strategies such as explicit teaching of social concepts, using social stories, incorporating role-playing and adaptive play, and providing consistent opportunities for practice and positive reinforcement in both structured and everyday settings (Apple et al., 2005; Lincă, 2019).

Children with ASD often exhibit a range of social skill deficits, including:

- Difficulty initiating and maintaining social interactions: and conversations.
- Challenges with eye contact: and other forms of non-verbal communication.
- Struggles to interpret non-verbal cues, such as body language and facial expressions.
- Limited interest in social interactions: or engaging with peers.
- Challenges with empathy: and understanding others' perspectives or emotions.
- Difficulty with joint attention, a fundamental skill involving sharing experiences by pointing or showing (Ea et al., 2012; Fatta et al., 2024).

Many authorities associate appropriate social behavior with the accuracy of facial emotion recognition (Ck et al., 2016; Ct & Ea, 2020; Lincă & Matei, 2024; Lozier et al., 2014), the ability to consciously identify or label inappropriate social behavior (Bottema-Beutel et al., 2019; Kaland et al., 2011), the appropriate interpretation of socio-emotional information through associations made between information, motivation, empathy and cognition (Keifer et al., 2020; Pedreño et al., 2017; Zalla et al., 2009), social creativity – the ability to generate new behaviors depending on the social context, behavioral flexibility (Lerner et al., 2013; Mouchiroud & Lubart, 2002).

Therefore, a study is needed in which we target the association caused between personal factors such as: social communication difficulties, behavioral rigidity, stereotyped behavior, unusual behavior, atypical language, anxiety, withdrawal, functional

communication and social skills in children with ASD. At the same time, our holistic perspective comes to fill the gaps in the literature where, as I have explained above, one aspect of social skills was treated.

Research methodology

The purpose of our research is to highlight the factors that influence the development of social skills of students with ASD.

Research objectives

O1. Investigating causal relationships between the communication and social adaptation skills of children diagnosed with ASD and personal factors such as: anxiety, withdrawal, functional communication, behavioral rigidity, stereotypes, atypical language, unusual behavior, self-regulation and social reciprocity.

Research hypotheses

H1 It is assumed that personal factors such as: anxiety, withdrawal, functional communication, behavioral rigidity, stereotyped behavior, atypical language, unusual behavior and social reciprocity behavior, both from the perspective of parents and from the perspective of teachers have a statistically significant influence on the development of communication and social adaptation skills of children diagnosed with ASD.

Materials and methods

The methods used are:

- a) Scientific methods for:
 - determining the diagnosis and severity of the subjects' impairment;
 - determining as accurately as possible the way the subject communicates;
 - evaluating non-verbal language and verbal behavior; - collecting data;
- b) Empirical methods: direct observation, case studies, conversation and structured/open interview, anamnesis, testing
- c) Experimental methods
- d) Statistical and mathematical methods.

The tools used are:

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- Multi-perspective psychological tests for establishing and planning treatment for people with ASD – Autism Spectrum Rating Scales – developed by Sam Goldstein and Naglieri Jack in 2013 and calibrated on the Romanian population by Nicoleta Burlacu, Camelia Ionescu and Dragoș Iliescu;
- BASC 2 - Multidimensional and multimethodical psychological tests for assessing student behavior – Behavior Assessment System for Children 2 – assessment system developed by Cecil Reynolds and Randy Kamphaus in 2011 and adapted in Romania by Nicolae Mitrofan, Andrei Ion and Dragoș Iliescu;
- ABAS 2 - Adaptive Behavior Assessment System™ - II (Oakland, Harisson adapted in Romania in 2012 by Dragoș Iliescu) – is a behavioral assessment system focused on broadband measurement of adaptability.

The research took place during the 2024-2025 school year and was organized following certain important moments in the planning of the experimental approach:

1. Establishment of research groups, having as a criterion the classification in the diagnosis of Autism Spectrum Disorder, according to the Diagnostic and Statistical Manual of Mental Disorders of the American Psychiatric Association, fourth revised edition;
2. Analysis of materials from the specialized literature that address the factors that predict the development of social skills of students with autism;
3. Complex evaluation of socialization skills, functional and context-adapted communication, unusual/stereotypical/rigid behaviors, as well as other aspects related to the developmental peculiarities of the students who took part in the research, both from the perspective of parents and teachers;
4. Analysis and interpretation of the research results;
5. Establishing the research conclusions.

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Participants

The study involved 100 children with ASD from inclusive centers and special schools in Constanța, 22 girls and 78 boys aged between 6 and 10 years, with a mean $M=7.68$ and a standard deviation $SD=1.37$.

We note that the chronological age criterion will be taken into account, not the mental age criterion. The selected participants, who expressed their agreement to participate in the research, were distributed according to the score recorded following the parents' responses to the initial assessment using the Socialization-Communication scale of the Autism Spectrum Rating Scales (ASRS) test. Students with a very high score on this test were included.

Also, the chronological age criterion was established for the tiebreaker because the early school age period represents the opportune time for the acquisition and processing of new information.

Thus, the group was made up of 100 children, as follows: 26 students aged 6; 23 students aged 7; 21 students aged 8; 17 students aged 9; 13 students aged 10.

At the initial assessment, all children were classified in the severity category "Very high", according to the parents' and teachers' assessments on the ASRS Socialization-Communication scale.

Regarding the type of schooling, the sample included children from both special education and inclusive centers. Their proportion is as follows: 50 students from special school and 50 students from inclusive centers

Analysis and interpretation of the research data

In our study, we tested hypothesis I1, which assumes that personal factors such as: anxiety, withdrawal, functional communication, behavioral rigidity, stereotyped behavior, atypical language, unusual behavior and social reciprocity behavior, both from the perspective of parents and from the perspective of teachers, have a statistically significant influence on the development of communication and social adaptation skills of children diagnosed with ASD.

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Before testing the influence of predictive factors on the dependent variable social skills measured by the Social/Communication Scale from the ASRS, we checked whether there are simple relationships between these variables. Thus, we identified that there are medium and high relationships between the studied variables, r has values between 0.253 and 0.798, $p < 0.05$ from the perspective of parents and medium and high correlations from the perspective of teachers, r with values between 0.291 and 0.831, $p < 0.05$.

Next, we applied the Multinomial Logistic Regression Model. To achieve this, we transformed the social competence/social communication variable from a continuous variable into a categorical variable, with values 1 below average, 2 at average and 3 above average.

In Table 1 and 2, both from the perspective of parents and from the perspective of teachers, we can see that the Multinomial Logistic Regression Model is statistically significant from the perspective of parents, $R^2_{McF} = 0.779$, $p < 0.001$, respectively $R^2_{McF} = 0.552$, $p < 0.001$.

Table 1. Multinomial Logistic Regression Model - parents

Model	Deviance	AIC	R^2_{McF}	Overall Model Test		
				χ^2	df	p
1	45.8	89.8	0.779	162	20	<.001

Note. Models estimated using sample size of $N=100$

Table 2. Model Fit – teachers

Model	Deviance	AIC	R^2_{McF}	Overall Model Test		
				χ^2	df	p
1	49.7	97.7	0.552	61.1	22	<.001

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Note. Models estimated using sample size of N=100

Going further with the analysis, in Table 3 we can see that robust predictors for the social competences of students diagnosed with ASD from the perspective of parents, for high values are: Unusual behaviors, Social reciprocity, Atypical language, Sensory sensitivity, Functional communication, GAC, $p < 0.05$. Regarding the low values of the predictors, statistical significance was met for: Unusual Behaviors, Social Reciprocity, Atypical Language, Withdrawal, GAC, $p < 0.05$.

Table 3 Coefficients - parents

social.parinti	Predictor	Estimate	SE	Z	p
3-2	Intercept	1.056.181	15.959	6.618	<.001
	Unusual Behaviors	-0.6509	0.215	-3.028	0.002
	Social Reciprocity	-13.462	0.317	-4.247	<.001
	Atypical Language	13.531	0.297	4.553	<.001
	Stereotypes	-0.3961	0.447	-0.887	0.375
	Behavioral Rigidity	-0.1714	0.211	-0.813	0.416
	Sensory Sensitivity	0.4675	0.246	1.903	0.037
	Anxiety	0.0200	0.143	0.140	0.889
	Functional Communication	0.5372	0.229	2.350	0.019
	Withdrawal	-0.0758	0.133	-0.570	0.568
	GAC	-0.4267	0.113	-3.770	<.001
2-1	Intercept	1.769.467	11.635	15.208	<.001
	Unusual Behaviors	-12.196	0.317	-3.846	<.001
	Social Reciprocity	-15.500	0.292	-5.302	<.001
	Atypical Language	12.178	0.415	2.933	0.003
	Stereotypes	-0.4737	0.644	-0.736	0.462
	Behavioral Rigidity	-0.1459	0.314	-0.464	0.643
	Sensory Sensitivity	0.5000	0.392	1.277	0.202

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Anxiety	0.0465	0.183	0.254	0.799
Functional Communication	-0.0609	0.338	-0.180	0.857
Withdrawal	-10.121	0.414	-2.445	0.014
GAC	-0.5325	0.195	-2.732	0.006

At the same time, in Table 4 we can see that robust predictors for the social skills of students with ASD from the teachers' perspective, for high values are all the variables introduced in the model, $p < 0.001$. Regarding the low values of the predictors, statistical significance was met for: Social Reciprocity, Stereotypes, Sensory Sensitivity and Functional Communication, $p < 0.05$.

Table 4. Coefficients – teachers

social.profes ori	Predictor	Estimate	SE	Z	p
1 - 2	Intercept	16.718 31	7.403 4	2.2582	0.02 4
	Unusual behaviors	- 0.0228 7	0.091 4	-0.2504	0.80 2
	Self- regulation	- 0.0594 5	0.060 6	-0.9818	0.32 6
	Social reciprocity	- 0.3956 2	0.124 2	-3.1851	0.00 1
	Atypical language	0.1596 1	0.132 2	1.2078	0.22 7
	Stereotypes	0.3408 5	0.154 4	2.2069	0.02 7
	Behavioral rigidity	- 0.1471 6	0.124 3	-1.1837	0.23 7

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3 - 2	Sensory sensitivity	0.4068 4	0.178 4	2.2801	0.02 3
	Anxiety	0.0492 3	0.091 5	0.5380	0.59 1
	Functional communication	- 0.1564 0	0.075 2	-2.0787	0.03 8
	Withdrawal	0.0725 5	0.087 7	0.8272	0.40 8
	GAC	- 0.0018 0	0.054 2	-0.0332	0.97 4
	Intercept	- 13.698 97	1.27e -9	-1.08e-10	<.00 1
	Unusual behaviors	- 0.2816 0	6.67e -8	-4.22e0-6	<.00 1
	Self-regulation	0.0298 7	1.86e -7	160797.86 31	<.00 1
	Social reciprocity	2.3611 3	1.41e -7	1.67e0+7	<.00 1
	Atypical language	10.519 54	2.98e -8	3.53e0+8	<.00 1
	Stereotypes	- 10.989 14	5.02e -8	-2.19e0-8	<.00 1
	Behavioral rigidity	0.1255 2	2.03e -8	6.17e0+6	<.00 1
	Sensory sensitivity	- 9.1742 9	8.00e -8	-1.15e0-8	<.00 1
	Anxiety	- 3.1244 0	1.03e -7	-3.02e0-7	<.00 1

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Functional communication	-5.40430	4.61e-8	-1.17e0-8	<.001
Withdrawal	1.94692	1.66e-7	1.17e0+7	<.001
GAC	-0.99477	7.82e-8	-1.27e0-7	<.001

We can thus conclude that hypothesis 2 is supported by the collected data.

Conclusions and discussions

Difficulties in social communication and interaction behaviors are pathognomonic among people with autism spectrum disorders (ASD) and an essential part of the diagnostic criteria for this disorder. Such difficulties may arise from the interaction between personal factors such as specific traits of the child with ASD and the environment, which very often does not understand him.

The purpose of this study was to identify predictive factors of the development of social skills in children with ASD of early school age. Thus, we illustrated that robust predictors such as unusual behaviors, stereotyped behavior, atypical language, social reciprocity, sensory sensitivity, anxiety, withdrawal, low level of functional communication, but also low level of adaptive behavioral skills expressed by the GAC index have a negative impact on the development of social skills of children with ASD.

This study is actually the basis of another study that will aim to develop a complex intervention program for these children.

The originality of this study lies primarily in the holistic approach to children with ASD, the complexity of the assessment and the highlighting of predictive factors of an important, crucial problem of young school children diagnosed with ASD.

A limitation of this study is the relatively small number of participants. Speaking of a vulnerable population, the parents of these children are skeptical about collaborating. For this reason, it would be necessary to conduct studies in the future that take into account information campaigns, both for parents and for school personnel, regarding effective types of intervention, with scientific evidence in the field, but especially, to conduct studies that consider psychoeducation for all actors involved in working with children with ASD.

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