

Effectiveness of Art-Therapy-Based Intervention Programmes for Improving Social Communication in Children with Rett Syndrome

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Abstract: The research into effective art-therapy-based interventions for improving the social communication skills of children with Rett syndrome is important for the adaptation of this group of children. This study aims to evaluate the effect of a 6-month art-therapy-based intervention program based on art therapy on improving social communication in children with Rett syndrome. The research employed a quasi-experimental method, direct (unstructured) observation, a standardized Social Responsiveness Scale, and mathematical and statistical data processing methods (Levene test, paired sample t-test). The results showed a significant improvement in social communication in the experimental group (EG) after the intervention, as evidenced by paired and independent sample t-tests. This indicates statistically significant differences between pre-and post-test scores in the EG (mean difference 14.525 with a standard deviation of 22.592). The standard error for this group was 3.572, and the 95% confidence interval for the mean difference ranged from 7.300 to 21.750. The Student's t-test reached 4.066 with 39 degrees of freedom, resulting in a two-tailed p-value of less than 0.001. It has been found that art therapy can significantly improve social communication and emotional regulation subscales in children with Rett syndrome. The obtained data indicate the need to include therapeutic strategies based on art therapy in intervention programs for children with Rett syndrome. Prospects for further research are based on studying the impact of art therapy and other interventions not only on social communication but also on the cognitive development of children with Rett syndrome.

Keywords: Children with special educational needs, special education, children with intellectual disabilities, Rett syndrome, communication skills, social interaction, socialization, early development.

1. INTRODUCTION

The growing attention to the problems of children with Rett syndrome determines the need to find effective methods of improving their social communication. Rett syndrome is a rare genetic disorder that predominantly affects girls and is characterized by severe motor and cognitive impairments, including significant communication difficulties [1]. This disorder is characterized by normal early development and a loss of acquired motor and cognitive functions. The main cause of Rett syndrome is mutations in the MECP2 gene located on the X chromosome [2]. Because of this, the disease almost exclusively manifests itself in girls, as in boys, the presence of one X chromosome with a mutated gene is usually incompatible with life [3].

Rett syndrome is manifested by various severe impairments covering motor, cognitive, and behavioral aspects. Major symptoms include loss of acquired speech and motor skills after an initial period of normal development [4].

This usually occurs between the ages of 6 and 18 months, when a child begins to lose the ability to talk,

walk, and use their hands for purposeful actions. Instead, stereotyped hand movements such as waving, squeezing, or rubbing appear.

These movements are often repeated and are characteristic of Rett syndrome.

Children with this condition also experience loss of coordination and balance, resulting in difficulty walking and maintaining stability [5]. Epileptic seizures occur in many cases and can significantly affect the quality of life [6]. Respiratory disturbances, including hyperventilation, sleep apnea, and irregular breathing while awake, are also common symptoms [7]. Besides, there are difficulties with swallowing and digestion, which can lead to malnutrition and weight loss.

Rett syndrome is often accompanied by cognitive impairment, which includes significant difficulties in learning and performing tasks that require concentration. Most children have problems with communication and interaction with other people [8]. Social interaction may be limited because of difficulties in understanding and expressing emotions [9]. Therefore, one of the most important aspects of supporting children with Rett syndrome is developing and implementing intervention programs to improve their social skills and interaction with the environment.

Despite the large number of studies, there are still several unanswered questions about ways to improve

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the social and communication skills of children with Rett syndrome.

The study aims to evaluate the effectiveness of a structured 6-month art-therapy-based intervention program based on art therapy in increasing social communication and emotional regulation in children with Rett syndrome.

Research objectives:

1. Compare the social communication of the participants of the EG and control group (CG).
2. Assess changes in social communication in and between the EG and CG.
3. Determine the effectiveness of the art-therapy-based intervention program based on art therapy in increasing the socialization of children with Rett syndrome.

2. LITERATURE REVIEW

The peculiarities of Rett syndrome were studied by researchers from different countries in order to find effective interventions to improve the general well-being of children and to improve their adaptation to society. Children with Rett syndrome often experience regression in speech, which may begin with normal development but gradually lead to a loss of the ability to speak [10]. Loss of speech skills makes communication difficult, so children begin to use other methods, such as gestures or sounds [11]. However, these methods may not be sufficient for effective communication. Problems with social interaction are also often characteristic of this syndrome [12]. Children have difficulty maintaining social contact, which is manifested in the form of limited eye contact and difficulties in interacting with others.

Furthermore, children with Rett syndrome commonly exhibit aggression or anxiety as a way of expressing their needs or frustration due to communication difficulties [13]. Emotional regulation is also problematic [14]. Children may experience emotional lability and show frequent mood swings and sudden outbursts of aggression or crying. Difficulties with expressing and understanding emotions lead to intense or inadequate reactions to stressful situations.

Various therapies are used to support children with Rett syndrome, such as psychological and occupational therapy methods, which help to develop alternative ways of communicating and improving

emotional regulation. Therefore, the researcher [15] studied the effectiveness of music therapy in alleviating the symptoms of Rett syndrome. As a result, they proved that music therapy improved verbal and non-verbal communication and social interaction of children with Rett syndrome and reduced stress in their parents.

The study's results [16] suggest that trofinetide-based drug treatment effectively improves the communication skills of children with Rett syndrome. However, the researchers emphasize that pharmacotherapy should be combined with other intervention methods to investigate more effectiveness in treating Rett syndrome.

A study [17] evaluates the effectiveness of non-pharmacological methods in treating Rett syndrome in children. The results showed that music therapy, the use of special assistive technologies, cognitive rehabilitation, and attention and memory training contribute to the activation of communication skills in children with Rett syndrome.

The study [18] focuses on recommendations for coping with communication difficulties in children with Rett syndrome that negatively impact their quality of life and their caregivers. The results indicate that any interventions should be started as early as possible and should be supported throughout the life of a child with Rett syndrome by talking to him or her more often, attending corrective classes, using multimodal communication, etc.

The study [19] emphasizes the importance of rehabilitation for children with Rett syndrome. Based on the obtained results, rehabilitation programs contribute to improving gross and fine motor skills, communication skills, and social interaction. Rehabilitation of children with Rett syndrome involves pharmacological treatment, physical therapy, behavioral training, and socialization.

The article [20] explores the role of physical therapy in treating Rett syndrome. The authors compare the effectiveness of traditional physiotherapy, hydrotherapy, music psychotherapy, and experimental computerized training in treating Rett syndrome. As a result, it was found that the variety of symptoms of Rett syndrome requires a multidisciplinary approach, which involves a set of physical and mental functions of the child's body.

The analysis of the academic literature gives grounds to draw a conclusion about the active study of

the peculiarities of the course of Rett syndrome. However, the impact of art-therapy-based intervention programs on the development of social communication in children with Rett syndrome is poorly studied, which indicates the relevance and necessity of this study.

3. METHODS AND MATERIALS

3.1. Research Design

The study consisted of three stages. *The first stage* provided for the analysis of the initial level of social communication in all participants. *In the second stage*, the EG underwent an intervention program based on art therapy designed to improve social communication and environmental interaction. The program lasted for a period of 6 months, during which regular classes and therapy sessions were held. The CG did not receive any intervention at this time, which allowed them to ensure the purity of the experiment and to compare changes between groups. *The third stage* included a repeated analysis of social communication in all participants. The results of the obtained data were compared to assess the impact of the art-therapy-based intervention program.

3.2. Sample

The study was conducted in Kyiv from 2023 to 2024 by psychiatrists of Bogomolets National Medical University (Department of Pediatrics No. 2) and Shupyk National Medical Academy of Postgraduate Education (Department of General, Children's, Forensic Psychiatry and Narcology).

The empirical study involved 40 preschool children with Rett syndrome divided into two groups: 20 EG participants, who underwent an intervention program based on art therapy, and 20 participants of the control group, who did not receive art-therapy-based intervention. The sample was formed according to the method of stratified selection, taking into account the level of development of social communication and other characteristics in order to ensure the homogeneity of the groups. All research participants were girls, as Rett syndrome almost exclusively affects girls because of mutations in the MECP2 gene located on the X chromosome. These were preschoolers aged 4 to 5 years. The participants were selected at the following special medical and correctional institutions in Kyiv: Development Clinic Correctional Center, Brain Stimulation Centre, Erudyt Inclusive Correctional Centre, Happy Kids Correctional Center, and Neuroflex

Psychological Center. The children had to have been diagnosed with Rett syndrome by a qualified medical professional and recorded in the medical record to be included in the study. Inclusion criteria also required that children be between 4 and 5 years of age at the time of grouping and could regularly attend art therapy sessions as part of the intervention program with the consent of a guardian or parent.

The sample size is explained by the fact that Rett syndrome is a rare disease, so involving a large number of participants in the study is a difficult task. The sample was reduced to 40 children in order to ensure a sufficient number of participants for statistically significant results while maintaining the possibility of detailed and careful follow-up of each child. This sample size allows for a balance between academic accuracy and practical limitations in real-world research. The sample's age is explained by the fact that children of preschool age, in particular from 4 to 5 years old, are in a critical period of development of social and communication skills. At this age, children are actively learning the basics of interaction with the environment, and any interventions can have a significant impact on their further development. In addition, preschool age is optimal for the use of art therapy techniques, which can be an effective tool for improving social communication in children with Rett syndrome. The choice of this particular age group allows for the most effective assessment of the impact of the art-therapy-based intervention program on children's development.

3.3. Methods of the Research

Measurement

A *quasi-experimental method* was chosen because of the practical and ethical limitations associated with working with children with a rare genetic disease. In this method, participants were not randomly assigned to EG and CG, but the researchers made every effort to ensure that the groups were comparable in terms of main characteristics. The method of *direct (unstructured) observation* of children's behaviour during the intervention and in everyday situations was also used for a detailed assessment of changes in social interaction and communication.

The standardized method Social Responsiveness Scale (SRS) [21] was used as the main tool for measuring changes in social behavior and communication to evaluate the impact of an intervention program based on art therapy on the

emotional regulation of children with Rett syndrome. The SRS consists of 65 items that parents or guardians complete based on their observations of the child's behavior over the past 6 months (Appendix A). Answers are given on a 4-point Likert scale from "Not true" (0 points) to "Almost always true" (3 points) to explore the peculiarity of the child's social interactions, communication skills, and emotional behavior. The questionnaire is divided into five subscales: social awareness, social cognition, social communication, social motivation, and autistic mannerisms. The higher the score, the higher the severity of social disorders, while the total possible score gives a comprehensive assessment of the child's ability to participate in emotionally regulated social-reciprocal behavior. The total score can range from 0 to 195. The total SRS score is calculated by summing the scores [21].

Intervention

A six-month art therapy-based intervention programme is designed to employ the therapeutic potential of art to improve social communication and emotional regulation among children with Rett syndrome (Table 1).

Each session within the program lasted 35 minutes; the duration was chosen so that the children were

interested while maintaining concentration and attention. Sessions were held twice a week, establishing a steady rhythm and predictable schedule that increased their comfort and involvement in the therapeutic process. The sessions were held in a quiet, well-lit room equipped with individual workstations and a large common table for collaborative work. This setup provided an environment that minimized distractions and fostered a sense of safety and belonging, crucial for encouraging creative expression. An experienced art therapist led the sessions with experience working with children with autism spectrum disorder (ASD), supported by assistants trained to provide assistance in a therapeutic setting. This approach ensured that each child received attention and support.

3.4. Statistical Analysis

A paired sample t-test was used to compare Social Responsiveness Scale (SRS) scores before and after the intervention to detect changes in social communication and emotional regulation after the intervention program. An independent t-test was then performed to compare changes in SRS scores between the EG and CG to evaluate the effect of the intervention versus no intervention. The level of statistical significance of all tests was set only at the

Table 1: Art Therapy-Based Intervention Program

Month	Objective	Activities	Materials Needed
1	Acclimate participants to the drawing environment and materials.	- Introduction to different drawing tools. - Simple exercises focusing on lines, shapes, and colors. - Creating a personal art box for each child.	- Crayons, pencils, markers. - Paper, sketchbooks. - Personal art boxes.
2	Begin to explore emotional expression through drawing.	- Drawing faces expressing different emotions. - Group discussions about drawings. - Collaborative mural.	- Variety of drawing tools. - Large mural paper. - Emotion cards or pictures for reference.
3	Enhance communication skills through narrative art.	- Drawing sequences of events (storyboarding). - Sharing stories behind drawings. - Introduction to cartooning.	- Storyboard templates. - Comic strip sheets. - Coloured pencils, markers.
4	Foster self-awareness and personal expression.	- Self-portraits with emphasis on favorite things. - "My World" collage - "This is Me" quilt group project	- Mirrors for self-observation - Magazine clippings, fabric pieces - Large fabric for quilting, glue, scissors
5	Develop strategies for using art as a tool for emotional regulation.	- "Mood drawings" to different music or stories - Creating "When I Feel..." books - Guided relaxation drawing sessions	- Music player and various music tracks - Blank books or book-making materials - Soft drawing pencils, charcoal
6	Strengthen social connections and teamwork through collaborative art projects.	- Partner painting - Group sculpture project using recyclable materials - End-of-program art show	- Large canvases, paints, brushes - Recyclable materials, glue, paint - Frames or boards for art show presentation

Source: developed by the authors.

$p < 0.05$ level. Effect sizes were calculated to determine the magnitude of an intervention's effect, offering a quantitative measure of its practical significance beyond simple statistical significance.

Levene's test was used to test for equality of variances between the EG and CG of children with Rett syndrome to ensure that the data in both groups were similarly spread. This was important to ensure the correctness of subsequent statistical analysis using the *t*-test, which requires equality of variances.

4. RESULTS

Table 2 presents the obtained statistical indicators of the level of social communication of the CG and EG of children with Rett syndrome. This analysis aims to quantify the impact of a 6-month art-therapy-based program on participants' social communication.

Primary statistical analysis of pre-and post-test results in both the CG and EG reveals profound trends and differences. In the CG, mean scores decreased slightly from 100.95 in the pre-test to 100.75 in the post-test, indicating little change. This group had a standard deviation of approximately 13.66 on both tests, with scores ranging from 77 to 141 on the pre-test and from 76 to 139 on the post-test, and the median was consistently 101.5, indicating the minimal

shift in CG's social communication indicators. On the contrary, in the EG, there was a significant decrease in the average score from 102.82 in the pre-test to 88.30 in the post-test, suggesting a substantial improvement in social communication after the art therapy intervention. The standard deviation on the pre-test was slightly higher at 17.17, reflecting a wider range of scores, narrowing to 11.92 on the post-test. The range of scores in the EG showed a marked shift: from 70 to 158 in the pre-test to a more concentrated 56 to 117 in the post-test. At the same time, the average score decreased from 104.0 to 89.5, which further illustrates the significant impact of the intervention on the participants' ability to regulate emotions and participate in social life.

Secondary statistical analysis using the paired sample *t*-test provides insight into the differences between pre-and post-test scores in both the GC and EG in order to assess the impact of the art therapy-based intervention program on participants' social communication (Table 3).

For pair 1, representing the difference in pre-test and post-test scores of the CG, the mean difference was 0.2, with a standard deviation of 2.323. The standard error of the mean difference was 0.367, and the 95% confidence interval of this mean difference

Table 2: Statistical Summary of Pre-Test and Post-Test Scores Using the Social Responsiveness Scale (SRS)

	Pre-Test CG	Post-Test CG	Pre-Test EG	Post-Test EG
Mean value	100.95	100.75	102.82	88.30
N	40	40	40	40
Standard deviation	13.655	13.662	17.170	11.919
Minimum	77	76	70	56
Maximum	141	139	158	117
Median	101.50	101.50	104.00	89.50

Source: developed by the authors based on collected data on the participants of the experiment.

Table 3: Paired Samples T-Test Analysis of Pre-Test and Post-Test Scores

		Paired difference					t	Degrees of freedom	Value (two-tailed)
		Mean value	Standard deviation	Mean squared error of the difference	95% confidence interval of the difference				
					Lower	Upper			
Pair 1	Pre-Test CG - Post-Test CG	0.200	2.323	0.367	-0.543	0.943	0.545	39	0.589
Pair 2	Pre-Test EG - Post-Test EG	14.525	22.592	3.572	7.300	21.750	4.066	39	0.000

Source: developed by the authors based on collected data on the participants of the experiment.

ranged from -0.543 to 0.943. The t-test for this comparison was 0.545 with 39 degrees of freedom, resulting in a two-tailed p-value of 0.589. This indicates that the small change observed in the CG's social communication scores was not statistically significant, supporting the expectation that participants' scores would remain largely unchanged without the intervention.

In contrast, pair 2, representing EG differences between pre-and post-test scores, showed a significant mean difference of 14.525 with a standard deviation of 22.592. The standard error for this group was 3.572, and the 95% confidence interval for the mean difference ranged from 7.300 to 21.750. The t-test reached 4.066 with 39 degrees of freedom, resulting in a two-tailed p-value of less than 0.001. This indicates a statistically significant improvement in the social communication indicators of the EG after the intervention program based on art therapy, which suggests that the intervention had a significant and positive effect on the participants' ability for social participation and emotion regulation. These results emphasize the effectiveness of an intervention program based on art therapy in increasing the social communication of preschool children with Rett syndrome, as evidenced by significant positive changes in the EG compared to minor changes in the CG.

A secondary statistical analysis based on the t-test of independent samples was conducted to compare the

pre-and post-test results. This made it possible to evaluate the impact of the intervention program based on art therapy on the participants' social communication. The analysis also included Levene's test for equality of variances to assess the assumption of homogeneity of variances between the two groups (Table 4).

For the pre-test scores, Levene's test revealed no significant difference in variances between groups ($F = 0.953$, $p = 0.332$), suggesting that the assumption of equal variances was met. A t-test for equality of means under the assumption of equal variances resulted in a t-value of -0.541 with 78 degrees of freedom, resulting in a two-tailed p-value of 0.590. This indicates no statistically significant difference in mean pre-test scores between the CG and EG, confirming the compatibility of the groups at the beginning of the study. The mean difference was -1.875 with a standard deviation of 3.469, and the 95% confidence interval for the mean difference ranged from -8.781 to 5.031.

Levene's test in the CG again showed no significant difference in variances ($F = 0.455$, $p = 0.502$), confirming the use of the equal variance assumption. Student's test of equality of means showed a statistically significant difference in post-test scores between groups ($t=4.343$, $df=78$, $p<0.001$) with a mean difference of 12.450 and a standard error of the difference of 2.867. At the same time, the 95% confidence interval of this difference expanded from 6.743 to 18.157. This indicates that the EG showed a

Table 4: Independent Samples T-Test Analysis for Pre-Test and Post-Test Scores

		Levene's equality of variances		t-test for equality of means						
		F	Value	t	Degrees of freedom	Value (two-tailed)	Difference of means	Mean squared error of the difference	95% confidence interval of the difference	
									Lower	Upper
Pre-Test	Equal variances are assumed	0.953	0.332	-0.541	78	0.590	-1.875	3.469	-8.781	5.031
	No equal variances are assumed			-0.541	74.237	0.590	-1.875	3.469	-8.786	5.036
Post-Test	Equal variances are assumed	0.455	0.502	4.343	78	0.000	12.450	2.867	6.743	18.157
	No equal variances are assumed			4.343	76.591	0.000	12.450	2.867	6.741	18.159

Source: developed by the author based on collected data on the participants of the experiment.

significant improvement in social responsiveness compared to the CG after the intervention.

These results emphasize the significant impact of an intervention program based on art therapy on improving social communication in preschool children with Rett syndrome. The lack of a significant difference in pre-test scores confirms that any post-test differences can be attributed to the intervention. Significant differences after the test emphasize the effectiveness of the programme in improving the social communication skills and emotional regulation of the participants.

5. DISCUSSION

The results revealed a statistically significant improvement in the EG post-test compared to the CG, indicating that art therapy significantly improved participants' social skills and emotional regulation. It is notable that the effect size (Cohen's d) is 0.98, indicating a large intervention effect. The obtained results correspond to the aim and objectives of the study and testify to the effectiveness of a structured 6-month intervention programme based on art therapy in improving social communication and emotional regulation in children with Rett syndrome.

The results are consistent with existing literature indicating the potential benefit of art therapy in supporting children with Rett syndrome [22,23]. One of the studies based on the obtained results concluded the importance of early intervention and adaptation of intervention programs to improve social communication in children with Rett syndrome [14]. Earlier studies show that art therapy interventions can promote improvements in emotional expression, social engagement, and normalization of behavior [24,25]. A study [26] demonstrated that art therapy can significantly reduce anxiety and improve communication skills, which positively affects the overall development and quality of life of children with Rett syndrome. Our study expands this body of knowledge by providing particular evidence for the effectiveness of intervention programs as therapeutic tools for children with Rett syndrome.

It is important to note that the absence of significant changes in the CG emphasizes the specifics of the effect of the intervention. This contrasts with some studies that reported small improvements in CGs, possibly because of factors such as maturation or the placebo effect [27,28]. On the other hand, the

significant reduction in social communication difficulties in the EG after the intervention supports the formation of a general academic consensus that targeted well-structured therapeutic programs can positively influence the emotional regulation of children with Rett syndrome [27,28]. This is consistent with other Rett syndrome interventions that emphasize the importance of early targeted therapeutic efforts to maximize developmental outcomes [29,30]. A study [31] confirmed that art therapy effectively improves social skills and emotional well-being in children with Rett syndrome. The study showed that regular art therapy sessions help reduce stress and anxiety and improve children's ability to express themselves and interact with the environment.

The practical use of the obtained results consists of improving approaches to therapy for children with Rett syndrome by implementing effective intervention programs, particularly art therapy, to improve their social communication. The study results can be used to develop individualized therapeutic plans that consider the specific needs of children with this syndrome. These results can become the basis for further research in this field, which will contribute to the development of new methods and approaches to therapy, as well as to the implementation of similar programs in various educational and therapeutic institutions. The obtained data can help create a comprehensive support system for children with Rett syndrome.

5.1. Research Limitations

Assessment of social communication can be partly subjective, depending on the methods of observation and testing. This can affect the accuracy of the results, especially if the assessments are made by different observers or with tools that are not always standardized.

6. CONCLUSIONS

Improving social communication in children with Rett syndrome is important because of the significant impact of this aspect on their quality of life and integration into society. Research showed that participation in a structured art-therapy-based intervention program could lead to significant improvements in social communication, which is an important task in the adjustment of children with Rett syndrome. The study reveals the potential for non-standard therapeutic methods and early intervention in

Rett syndrome. The specifics of the effect, which is evidenced by the absence of significant changes in the CG, indicate that the noted improvements are directly related to the program and not to external factors. Overall, the study provides a compelling case for including art therapy in comprehensive treatment plans for children with Rett syndrome. This requires a wider recognition of the value of creative treatments, as well as a shift to integrated, inclusive treatment paradigms. The results obtained can be applied to developing and implementing effective intervention programs for children with Rett syndrome in educational and therapeutic institutions.

6.1. Research Prospects

Examining other forms of therapy or their combinations (for example, combining art therapy with exercise or language training) may provide new insights into improving social communication in children with Rett syndrome. This direction may deepen the understanding and improve the effectiveness of interventions for children with Rett syndrome and provide new solutions to support their development and well-being.

6.2. Recommendations

Further studies with larger samples and long-term follow-up are recommended to confirm the effectiveness of the interventions and assess their sustainability. Personalized therapeutic programs can be developed that combine art therapy with other approaches and actively involve parents in the therapeutic process. Increasing awareness and training of specialists, assessing the influence of external factors, introducing new technologies, and promoting international cooperation can significantly improve therapy results. It is also important to adopt methods that take into account the individual peculiarities of children in order to ensure a comprehensive approach to their development.

HUMAN AND ANIMAL RIGHTS

Studies were conducted according to the principles of the Declaration of Helsinki and the International Ethical Guidelines for Health-related Research Involving Humans, Fourth Edition.

CONSENT FOR PUBLICATION

The respondents provided voluntary informed consent for conducting the research, which indicated

anonymity, the purpose of the research, the use of data, and possible risks.

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APPENDIX A

Social Responsiveness Scale (SRS)

Child's name _____

Child's age _____

Rater's name _____

Date of rating _____

Relationship to the rated individual:

- Mother
- Father
- Other custodial adult
- Teacher
- Other specialist

Instructions

For each question, please darken the circle that best describes this child's behavior over the past 6 months.

1. Seems much more fidgety in social situations than when alone.
2. Expressions on his or her face don't match what he or she is saying.
3. Seems self-confident when interacting with others.
4. When under stress, he or she shows rigid or inflexible patterns of behavior that seem odd.
5. Doesn't recognize when others are trying to take advantage of him or her.
6. Would rather be alone than with others.
7. Is aware of what others are thinking or feeling.

8. Behaves in ways that seem strange or bizarre.
9. Clings to adults seem too dependent on them.
10. Takes things too literally and doesn't get the real meaning of a conversation.
11. Has good self-confidence.
12. Is able to communicate his or her feelings to others.
13. Is awkward in turn-taking interactions with peers (for example, doesn't seem to understand the give-and-take of conversations).
14. Is not well coordinated.
15. Is able to understand the meaning of other people's tone of voice and facial expressions.
16. Avoids eye contact or has unusual eye contact.
17. Recognizes when something is unfair.
18. Has difficulty making friends, even when trying his or her best.
19. Gets frustrated trying to get ideas across in conversations.
20. Shows unusual sensory interests (for example, mouthing or spinning objects) or strange ways of playing with toys.
21. Is able to imitate others' actions.
22. Plays appropriately with children his or her age.
23. Does not join group activities unless told to do so.
24. Has more difficulty than other children with changes in his or her routine.
25. Doesn't seem to mind being out of step with or "not on the same wavelength" as others.
26. Offers comfort to others when they are sad.
27. Avoids starting social interactions with peers or adults.
28. Thinks or talks about the same thing over and over.
29. Is regarded by other children as odd or weird.
30. Becomes upset in a situation with lots of things going on.
31. Can't get his or her mind off something once he or she starts thinking about it.
32. Has good personal hygiene.
33. Is socially awkward, even when he or she is trying to be polite.
34. Avoids people who want to be emotionally close to him or her.
35. Has trouble keeping up with the flow of a normal conversation.
36. Has difficulty relating to adults.
37. Has difficulty relating to peers.
38. Respond appropriately to mood changes in others (for example, when a friend's or playmate's mood changes from happy to sad).
39. Has an unusually narrow range of interests.
40. Is imaginative and good at pretending (without losing touch with reality).
41. Wanders aimlessly from one activity to another.
42. Seems overly sensitive to sounds, textures, or smells.
43. Separates easily from caregivers.
44. Doesn't understand how events relate to one another (cause and effect) the way other children his or her age do.
45. Focuses his or her attention to where others are looking or listening.
46. Has overly serious facial expressions.
47. Is too silly or laughs inappropriately.
48. Has a sense of humor and understands jokes.
49. Does extremely well at a few tasks but does not do as well at most other tasks.
50. Has repetitive, odd behaviors such as hand flapping or rocking.
51. Has difficulty answering questions directly and

- ends up talking around the subject.
52. Knows when he or she is talking too loud or making too much noise.
53. Talks to people with an unusual tone of voice (for example, talks like a robot or like he or she is giving a lecture).
54. Seems to react to people as if they are objects.
55. Knows when he or she is too close to someone or is invading someone's space.
56. Walks in between two people who are talking.
57. Gets teased a lot.
58. Concentrates too much on parts of things rather than seeing the whole picture. For example, if asked to describe what happened in a story, he or she may talk only about the kind of clothes the characters were wearing.
59. Is overly suspicious.
60. Is emotionally distant and doesn't show his or her feelings.
61. Is inflexible and has a hard time changing his or her mind.
62. Gives unusual or illogical reasons for doing things.
63. Touches others in an unusual way (for example, he or she may touch someone just to make contact and then walk away without saying anything).
64. Is too tense in social settings
65. Stares or gazes off into space

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