

# Intervention Models for The Pre-Integration of Children with ASD in Mainstream Education

Corina IVAN<sup>1\*</sup>,  
Corina CIOLCĂ<sup>2</sup>,  
Adina Andrea DREVE<sup>3</sup>

<sup>1</sup>National University of Physical Education and Sports, Faculty of Physical Education and Sport, Bucharest, Romania, [corinaivan.javelin@yahoo.com](mailto:corinaivan.javelin@yahoo.com)

\* Corresponding author

<sup>2</sup>National University of Physical Education and Sports, Faculty of Physical Education and Sport, Bucharest, Romania

<sup>3</sup>National University of Physical Education and Sports, Faculty of Physical Education and Sport, Bucharest, Romania

**Abstract:** *The pathology of autism dates back to the 1900s, being framed within the broad sphere of neuropsychological conditions. So far, the autism spectrum disorder (ASD) has passed through various pathologies, from socio-emotional disorders to schizophrenic disorders. The clear distinction between childhood autism and childhood schizophrenia was only made in the early 1980s. ASD is one of the most common invasive developmental disorders; defined as a neurological condition characterised by a distortion in the overall development of a person, it affects 1 in 150 children and 4 to 5 boys per girl. The autistic triad brings together qualitative anomalies in social interactions (in verbal and nonverbal communication), restricted interests and stereotypes. The 1980s and 1990s highlight the role of behavioural therapy and the use of highly controlled learning environments as a primary treatment for the forms of autism and related conditions. Promising studies on the role of oxytocin or certain amino acids involved in neurotransmission, especially in regulating stress and its emotional consequences, are currently in progress. Until now, the two therapies have remained primordial along with physical therapy and speech therapy. The purpose of this paper is to present some of the means that can contribute to the pre-integration of children in mainstream education, being also a starting point for future applied research. At the same time, the paper is helpful for the parents of children with ASD, who are given the opportunity to work themselves in the absence of a specialist or financial possibilities.*

**Keywords:** *autism; pre-integration; mainstream education; athletic exercises.*

**How to cite:** Ivan, C., Ciolcă, C., & Dreve, A. A. (2020). Intervention Models for The Pre-Integration of Children with ASD in Mainstream Education. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, 11(4Sup1), 144-155. <https://doi.org/10.18662/brain/11.4Sup1/161>

## **Introduction**

The first references to autism date back to the 1900s, when a wide range of neuro-psychological conditions were found under this name. In 1911, the term was used by the Swiss psychiatrist Eugen Bleuler to characterise a group of symptoms related to schizophrenia. In 1940, a group of American researchers used the term autism to describe children with socio-emotional problems. The American child psychiatrist Leo Kanner established benchmarks for this disease in 1943; thus, autism was classified as a childhood disorder and it remained like this until 1980, when a clear distinction was made between childhood autism and a type of childhood schizophrenia.

Currently, international classifications no longer order the types of autism into broad categories Kanner, Asperger, but have introduced the concept of autism spectrum disorder (ASD), which establishes criteria of continuous diagnosis, separating social disorders from behavioural disorders.

Autistic disorder is one of the most common invasive developmental disorders. Defined as a neurological condition characterised by a distortion in the overall development of a person, it affects 1 in 150 children and 4 to 5 boys per girl. The autistic triad brings together qualitative anomalies in social interactions (in verbal and nonverbal communication), restricted interests and stereotypes.

Being imprinted in the structural development of the brain, this disorder cannot be “cured”. Neuroscience has observed differences in cortical organisation and highlighted alterations in synapses (in the neurotransmitter system, especially related to serotonin transport), in combination with alterations of the genes involved.

## **Topic addressed**

Between 1960 and 1970, research concerning autism treatment focused on drugs (such as LSD), electric shocks and behavioural change techniques based on pain and punishment.

The 1980s and 1990s emphasise the role of behavioural therapy and the use of highly controlled learning environments as a primary treatment for the forms of autism and related conditions. Promising studies on the role of oxytocin or certain amino acids involved in neurotransmission, especially in regulating stress and its emotional consequences, are currently in progress. Until now, the two therapies have remained primordial along with physical therapy and speech therapy.

Autism can be encountered in people with all levels of intelligence. Most autistic people have below-average intellectual performance with a deficit in adaptive behaviour, depending on their degree of attention and their difficulty of understanding the surrounding world.

Mutism is present in almost half of the cases of autism. The other half have difficulty using speech, which sometimes lacks coherence. For example, people with autism repeat (like an echo) the heard words or sentences.

Resistance to change is strong: autistic people adopt routine habits, have an almost exclusive interest in certain objects or other staff, may have anxiety attacks, sleep or eating disorders, anger and/or aggressive attitudes including towards themselves, or hyper-/ hyposensitivity (to sounds, light, colours, touch, etc.).

Non-verbally, people with autism have major problems understanding facial expressions and gestures. The impairment of imagination can manifest by the absence of invented games and stories or the difficulty of imitating the gestures of others. The child refuses any contact with the outside world.

Recent scientific studies tend to show a decrease in stereotypes and an improvement in social skills or school outcomes due to physical activity programmes.

In general, the published papers refer to small groups that mainly consist of children or adolescents with autism spectrum disorders, often school students, and most of them address the relationship between overweight and obesity in the populations of autistic children, adolescents and adults.

According to Storch et al. (2020), anxiety is frequently encountered in young people with autism spectrum disorders. The use of behavioural cognitive therapy is recommended for treating this population; however, available treatment protocols may be difficult to implement outside of research settings.

Toma (2018) states that the involvement of ASD genetic factors in significant clinical heterogeneity, from intellectual disability to high-functioning profiles, is currently unknown.

In the study conducted by Munnich (2018), most cases of autism were syndromic forms of ASD with moderate to severe intellectual disability. Some patients later had transient epilepsy with an undiagnosed early onset attributed to a genetic condition.

A study cited by Hartley, Fisher and Fletcher (2018) shows that children with autism often perceive items belonging to famous people with

“good” or “bad” reputations as being more valuable than similar items belonging to less known people.

Another research on children with autism shows that individual perceptions of parents’ communication were a stronger predictor of relational turbulence than the parents’ self-reported communication (Brisini & Solomon, 2018).

The study conducted by Huseyin (2019) demonstrates how physical exercise improves the physical fitness of children with autism. At the end of a 12-week sports training programme, a positive development in basic and life motor skills was observed.

A research that involved various sports activities for young people with autistic syndrome and those with mental disability did not show significant effects on their ASD status, but people with intellectual disability alone had higher scores for positive social experiences compared to those with ASD and intellectual disability. Socio-communication skills, coach relationship and available resources mediated the relationship between ASD status and positive social experiences (Ryan et al., 2018).

Ince (2017) examines the effects of sport on children’s health problems and finds that physical activity has largely contributed to improving their communication skills (in a percentage of 66.7%) and speech development (in a percentage of 52.4%). Moreover, 65.9% of parents have indicated that special education centres do not have any physical education teacher or trainer. Consequently, due to the positive effect of sport on children with ASD, special education centres should have purposely trained staff, and sports installations should operate at appropriate levels.

The study by Duquette et al. (2016) contains the major points of a strategy for the involvement of youth with ASD in physical activities:

- Knowing the strengths and weaknesses of the individual participating in the activity
- Progressively integrating the individual in the activity
- Turning sport into a routine
- Promoting the importance of regularly practicing a sports discipline
- Reducing any form of intimidation or exclusion of people with ASD

It is even mentioned the possibility of using these motor disorders in order to identify children with an ASD risk factor very early in life (before the age of one year), given that there is a strong correlation between early motor disorders and communication disorders. Indeed, movements have a role in communication before the use of speech, therefore from an early age.

This suggests that early motor rehabilitation can improve the prognosis regarding child communication.

Among the findings revealed in the study published by Massion (2006), we find sports activities for people with ASD as a privileged means of learning, communication and socialisation. Access to such activities is often limited due to low financial possibilities, but the pecuniary factor should not be an obstacle because sport offers these people the important perspective of learning, feeling pleasure and increasing self-esteem. Last but not least, it is stated that sports activities help children with ASD develop a sense of belonging to a group.

Physical activity is recognised as a potential therapy that can reduce certain ASD symptoms. All sports activity programmes have triggered major progress in social and motor skills. Compared to group interventions, individual physical exercise has led to a significant decrease in ASD symptoms. In other words, individual interventions have greater impact than group interventions. In this regard, aquatic activities and jogging should be taken into account because they lead to the improvement of social and motor skills in people with ASD.

Therefore, there are quite a few sports activities for children with autism, which is why the main objective is to provide them with the opportunity to move, to have fun and (possibly?) to share these pleasant moments with a parent. In movies with/about autism, we can see that these children are able to do the same kind of activities as others, but they need extra time and patience. Parents can also see that their children have skills despite the differences, and teachers see how these students can be integrated into mainstream education.

To start a physical activity, it is absolutely necessary to take into account the characteristics of a child: tastes, skills and how they understand the activities. Autistic children are very different from each other; therefore, each child will have a certain sensory-motor level, will be able or not to communicate, will be interested or not in a specific activity. Consequently, it is essential to provide interventions as individualised as possible so that athletics becomes a means preferred by these children.

The optimal age to participate in an early physical exercise programme is unclear. However, most published studies that demonstrate the effectiveness of this treatment refer to children under 48 months (Sheinkopf & Siegel, 1998).

Athletics, as a way of social integration, is a strong point for experts but especially for students. In the first phase, we are all involved in the

sports activity, in the sense that students need to be organised to get to the activity room and then go back to the classroom.

The natural movement of the human being is a relational one. The more the physical exercise will be integrated into the child's consciousness due to the emotional support provided by the adult, the more the relational appetite will arouse their desire to participate, join the others and socialise. The encouraging presence of the adult in the child's activities develops emotional intelligence and thus the child can understand the others' physical and emotional states and intentions. This intelligence is built from the inside and feeds on bodily sensations combined with the ability to consider the other different from oneself (Robert-Ouvray, 2017). Also, the autistic child will better tolerate frustration by accepting not to be "the centre of the universe". It is about the relational contribution of sport: the more children are active, can do movements, discover the world and share what they learn, the more they will be socially open.

Athletic activities that consist of mixed actions based on various methods, starting from the observation method, involve compliance with a set of methodological requirements and the application of a specific teaching strategy.

a. Methodological requirements for applying the means of athletics

- the means of athletics must be designed so as to increase children's interest in practicing physical exercise;

- the difficulty of athletic means must increase progressively, in a direct relationship with the regularity of applying them;

- the interest in and the attractiveness to physical activity will increase if (coloured) objects are used;

- the means applied must be appropriate to the child's physical characteristics for the harmonisation of natural processes;

- during a physical education session, the learning content may vary because it should not be necessarily focused on a single element. Given that autistic children have very short attention spans, it is essential for them to be proposed various tasks, but without forgetting that they are reluctant and might be disturbed by too many transitions. Therefore, a fair compromise between the two situations is needed;

- athletic exercise should produce positive effects on the harmonious physical development concurrently with the increase in school performance;

- students with disabilities must practice special exercises adapted to the specifics of their needs during the activities.

b. Teaching strategies necessary to achieve social and educational integration

- fun athletic activities for those involved in the programme;
- games performed using the means of athletics based on the (essential) rules of community life;
- development of motor skills using playful means purposely designed for children with special educational needs;
- for the acquisition of global motor skills, a learning method based on the variation of tasks is more effective than a method based on constant practice.

#### *Adapted physical education programmes*

Functional deficits such as lack of strength or endurance should be reduced so as the student can solve the task efficiently. Structural defects such as dwarfism, visual impairments or physical disabilities cannot be remedied, which is why the activities need to be changed in these situations so as the student can achieve the objectives of general physical education.

ASD may also be accompanied by obesity, whose aetiologies can be numerous: a drug, a glandular disorder, ignorance of the diet/physical exercise ratio, etc., but regardless of the cause, it makes the movements difficult. In this situation, several recommendations will be followed:

- when children have difficulty running or staying engaged in an activity for longer, or are embarrassed to participate in activities such as gymnastics or sports games and need more time for recovery, they will work at a slower pace and will have more frequent and/or longer breaks;
- exercises that children do not perform well will be replaced (walking instead of running, hopping instead of jumping);
- the size of the field will be adapted, and the success of the children, especially in difficult situations, will be highlighted.

#### *Towards an inclusive school*

The pathway towards an inclusive school tracks how our society has perceived and defined the difference and disability over time. Thus, we can identify three main stages: a segregation period, an integrative period and the current one, which can be called “towards an inclusive school”. Each step corresponds to a new concept about difference and disability in our society.

In such a situation, teachers adapt the contents, which helps them in this endeavour. In order to successfully integrate a child with autism,

educators should give up some of their representations and see the world through the eyes of the child. No child is comparable with another, and the child with autism, who is very different from other children, is by no means inferior to them.

Sport is beneficial for people with autism only if physical activity is of good quality and is administered in a reasonable amount. Most global ASD programmes also involve parents, although the effectiveness of this collaboration is unknown (Diggle, McConachie, & Randle, 2013).

Jogging, swimming, race walking and muscle strengthening were the object of research in most studies (Breton, 2012). However, the most commonly used therapeutic activities with elements taken from athletics are the runs (or the attempts to run) over low obstacles. Their purpose is to teach people with autism to walk, run, hop, keep balance on various objects, correctly follow the route of an applied utilitarian circuit, be aware of exercises and their practical value in the context of socialisation and integration with other students, as well as to discipline them.

In general, all exercises will involve concentration of attention and awareness of the benefit provided by the means applied. All exercises will be performed with a partner and will be accompanied by short and concise commands; throughout the exercises, the child will be assisted by a teacher who will end the activity by granting various incentives.

The models that will be presented are mainly aimed to improve psychomotor skills and correct the attention deficit.

### *Objectives*

1. Behaviour adjustment
2. Improving motor and cognitive skills
3. Improving coordination
4. Improving coordination and spatial location
5. Procuring pleasure and reducing anxiety
6. Awareness of one's capabilities and limitations

### **Content**

Learning will be planned so as to put students in situations that make more sense for them ("I need to get to the stick to place the cone"), which will facilitate the act of turning the acquired skills into more general skills.

1. Walking, picking up a cone (possibly with help) and placing it over the others on a stick

2. Walking over very low obstacles in order to place the cone over the others on a stick
3. Walking/Running over low obstacles at each step (possibly with help)
4. Running over low obstacles with a cone in hand and placing it on a stick (at the end)
5. With help (the teacher is placed in front of the child and holds his or her hands), hopping with double-foot take-off
6. Circuit: walking over a higher obstacle (placed in the middle of a mattress) + walking/running into circles (8) + step + bench walking + bench hopping off + running over small obstacles (6)
7. With a cone in hand, running over uneven medium-height obstacles (10) + running over cones (4) + running over small but close obstacles + hopping into circles from one foot to the other (8) and placing the cone on the stick
8. Hopping (into circles) with double-foot take-off and one-foot take-off – like hopscotch and placing the cone on the stick
9. Along a cone corridor, forward running + backward walking
10. Forward running over very low obstacles + a stick hold with both hands
11. Running over 3-5 cones placed at an optimal distance – adapted to physical capabilities
12. Snake running around 6-8 cones in order to pick up a baton at the end of the circuit and bring it to the start
13. Walking along a ladder placed on the ground and stepping into the empty spaces with both feet. The final goal is to perform this exercise with gentle running.
14. Same as in exercise 13 but walking laterally
15. Walking over 4-6 low hurdles having 30-50 cm in height, according to capabilities
16. Walking under 4-6 low hurdles having 100-120 cm in height, according to capabilities, while holding the back in a correct position

## **Conclusion**

There is no drug treatment for autism. However, the earlier the diagnosis is established, the more the recommended complex of exercises helps to develop communication skills. In this context, parents should be careful and reluctant to professionals that offer them an exclusive,

miraculous method to completely heal their children. If each child is unique, the treatment must also be personalised.

The attempt to reduce ASD is a struggle, a battle of ideas with frequent divergences between therapists regarding its aetiologies and possible interventions, a confrontation of professionals to support their beliefs and especially the fight of autistic children and their families to find the way to an adapted lifestyle. Adaptation refers to the communication, structuring and means necessary to access the usual environment. The common goal should be to ensure the best possible quality of life for these children, which also involves going to school together with peers. This paper prefaces the need to study the impact of physical activity on several areas, such as quality of life.

Adapting and exploiting the physical activity field for autism spectrum disorders requires (at least initially) the experience of a specialised structure. It will establish the sets of exercises for beginners in line with the suggestions in the literature regarding the intervention methods and tools. Although special education centres use purposely trained staff, their number is (too) small, and in extreme cases, they can be replaced by parents, who provide children with encouragement and emotional support and help them perform the exercises.

Sports activities should be consistently practiced for at least 5 hours and no more than 15 hours per week, in a learning and practice climate free of any auditory or visual disturbance. The more it is simplified, the lower the risk of interfering with learning. It is also important that any object and space used has its own function, and the work area includes only the tools to be used, which should be functionally arranged.

The place of the helping adult is generally on the side; however, when placed in front of the child, the adult must avoid wide movements. The adult's gestures and gaze must be directed to the child, even he or she stubbornly looks the other way. The increased number of repetitions ensures progress.

Individual sessions have greater impact than group work, and applying the intervention models, such as the suggested ones, is essential and required by parents. Numerous studies have shown that regular physical exercise is accompanied by reduced aggressive behaviour (McGimsey & Favell, 1988), stereotypes and inattention (Watters & Watters, 1980), and, in addition to motor progress, by increased motivation (Boursier, 2001).

A discipline "in motion", psychomotricity has not stopped evolving. Thus, current challenges foreshadow what this profession will become tomorrow. It is important to recall that the intervention methods are

dependent on and limited by the conditions of practice, which must first rely on the autistic characteristics of these children. Unfortunately, the extreme heterogeneity of ASD makes it difficult to attempt any generalisation of an educational model.

### Acknowledgement

The paper is made within the project Sustainable social and educational integration through sports activities – PNP001.

### Authors' contributions

All authors have equally contributed to this study and should be considered as main authors.

---

### References

---

- Boursier, C. (2001). Enseigner et animer les activités physiques adaptées... aux enfants autistes [To teach and to lead adapted physical activities... for autistic children]. In A. Varray, J. Bilard & G. Ninot. (Ed.), *Enseigner et animer les activités physiques adaptées* (pp. 122-127). Revue EPS.
- Breton, L. (2012). L'activité physique adaptée chez l'enfant avec des troubles du spectre de l'autisme: Une dimension de bien-être [Adapted physical activity for the child with autism spectrum disorders: A dimension of wellbeing]. [https://doc.rero.ch/record/306305/files/TDB\\_M\\_lanie\\_Loann\\_Version\\_du\\_13.09.2017\\_apr\\_s\\_le\\_rdv\\_avec\\_Fran\\_oise\\_Cinter\\_VERSION\\_FINAL\\_E\\_DEFINITIVE\\_en\\_PDF.pdf](https://doc.rero.ch/record/306305/files/TDB_M_lanie_Loann_Version_du_13.09.2017_apr_s_le_rdv_avec_Fran_oise_Cinter_VERSION_FINAL_E_DEFINITIVE_en_PDF.pdf)
- Brisini, K. S. C., & Solomon, D. H. (2020). Relational turbulence and marital communication when children with autism start school: A longitudinal dyadic diary study. *Health Communication, 35*(4), 483-493. <https://doi.org/10.1080/10410236.2019.1567445>
- Diggle, T. J., McConachie, H., Randle, V. R. L. (2013). Parent-mediated Early Intervention for Young Children with Autism Spectrum Disorder, *Cochrane database of systematic reviews Cochrane Database of Systematic Reviews, 4*, CD003496. <https://doi.org/10.1002/14651858.CD003496.pub2>
- Duquette, M-M., Carbonneau, H., Roult, R., & Crevier, L. (2016). Sport and physical activity: Facilitating interventions with young people living with an autism spectrum disorder. *Physical Activity Review, 4*, 40-49. <https://doi.org/10.16926/par.2016.04.05>
- Hartley, C., Fisher, S., & Fletcher, N. (2020). Exploring the influence of ownership history on object valuation in typical development and autism. *Cognition, 197*, 104187. <https://doi.org/10.1016/j.cognition.2020.104187>

- Huseyin, O. (2019). The impact of sport activities on basic motor skills of children with autism. *Pedagogics, Psychology, Medical-Biological Problems of Physical Education and Sports*, 23(3), 138-144.  
<https://doi.org/10.15561/18189172.2019.0305>
- Ince, G. (2017). Opinions of parents who have children with autism spectrum disorder about sport. *Journal of Special Education*, 18(1), 109-124.  
<https://doi.org/10.21565/ozelegitimdergisi.302891>
- Massion, J. (2006). Sport practice in autism. *Science and Sports*, 21(4), 243-248.  
<https://doi.org/10.1016/j.scispo.2006.07.001>
- McGimsey, J. F., & Favell, J. E. (1988). The effects of increased physical exercise on disruptive behavior in retarded persons. *Journal of Autism and Developmental Disorders*, 18(2), 167-179.  
<https://doi.org/10.1007/BF02211944>
- Munnich, A. (2020). Unraveling the etiological complexity of autism spectrum disorders. *Developmental Medicine and Child Neurology*, 62(4), 404-404.  
<https://doi.org/10.1111/dmcn.14455>
- Robert-Ouvray, S, B. (2017). *Intégration motrice et développement psychique: Une théorie de la psychomotricité* [Motor integration and psychological development: A theory of psychomotricity]. Desclée De Brouwer.
- Ryan, S., Fraser-Thomas, J., & Weiss, J. A. (2017). Patterns of sport participation for youth with autism spectrum disorder and intellectual disability. *Journal of Applied Research in Intellectual Disabilities*, 31(3), 369-378.  
<https://doi.org/10.1111/jar.12414>
- Sheinkopf, S. J., & Siegel, B. (1988). Home-based behavioral treatment of young children with autism. *Journal of Autism Developmental Disorders*, 28(1), 15-23.  
<https://doi.org/10.1023/a:1026054701472>
- Storch, E. A., Schneider, S. C., De Nadai, A. S., Selles, R. R., McBride, N. M., Grebe, S. C., Lewin, A. B. (2020). A pilot study of family-based exposure-focused treatment for youth with autism spectrum disorder and anxiety. *Child Psychiatry & Human Development*, 51(2), 209-219.  
<https://doi.org/10.1007/s10578-019-00923-3>
- Toma, C. (2020). Genetic variation across phenotypic severity of autism. *Trends in Genetics*, 36(4), 228-231. <https://doi.org/10.1016/j.tig.2020.01.005>
- Watters, R. G., & Watters, W. E. (1980). Decreasing self-stimulatory behavior with physical exercise in a group of autistic boys. *Journal of Autism and Developmental Disorders*, 10(4), 379-387.  
<https://doi.org/10.1007/BF02414814>