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## Abstract

*The schooling of children with autism spectrum disorder (ASD) and severe intellectual disability (ID) in special schools, requires personalized professional intervention. Sensory, motor and psychomotor education of the disabled child is an important part of integration in all aspects: educationally, professionally, socially. Activities aimed for the development of the psychomotricity in children with ASD and severe ID are carried out in accordance with the requirements of the national curriculum for special-needs education. The multisensory room is a complex of multifaceted instrument.*

*Our study aims to establish the level of efficacy of an intervention program comprising of activities for the development of psychomotricity carried out in the multisensory room, individualized for children with ASD and severe ID.*

### Keywords:

Autism Spectrum Disorder; Psychomotricity; Intellectual Disability; Special-Needs Education; Intervention Plan.

## Zusammenfassung

*Die Schulbildung von Kindern mit schwerer geistiger Behinderung (GB) und Autismus-Spektrum-Störung (ASS) in der Sonderschule beinhaltet angepasste spezialisierte Intervention. Die sensorische, motorische und psychomotorische Bildung des Kindes mit Behinderung ist ein wichtiger Bestandteil der Integration in allen Aspekten, sowohl in pädagogischer, beruflicher als auch in sozialer Hinsicht. Die Aktivitäten zur Entwicklung psychomotorischer Fähigkeiten bei Kindern mit ASS und schwerer GB werden in Bezug auf den Lehrplan für Sonderpädagogik durchgeführt. Der multisensorische Raum ist ein Komplex von Instrumenten mit mehreren Valenzen.*

*Unsere Studie zielt darauf ab, den Wirkungsgrad eines Interventionsprogramms zu ermitteln, das Aktivitäten zur Entwicklung psychomotorischer Fähigkeiten umfasst, die im multisensorischen Raum durchgeführt werden und für Kinder mit ASS und schwerer GB individualisiert sind.*

### Schlüsselworte:

Autismus-Spektrum-Störung; Psychomotorik; beschränkter Intellekt; Sonderpädagogik; Interventionsplan.

## 1. Introduction

We refer to psychomotricity as an expression of a personal GPS, a tool used by a child to learn how to place himself in space and in time, to adapt to the changing educational and social environment. Starting from the premise that the main activities in children's development are play, environmental exploration, and psychomotricity, our research has also valued these components in the children in our target group. Children with ASD and ID have difficulties in motor coordination and spatial orientation, throughout the determining factors: perception, orientation, etc. These psychomotor difficulties require specialized interventions from the first observation of their occurrence, as well as the evaluation of the development of the psychomotor components. The detection of psychomotricity disorders and early intervention on psychomotor development help in training the necessary skills vital in school activity and

then for the social and professional integration of the disabled child.

Due to its importance in the interpersonal relationship development and in the acquisition of physical independence, psychomotricity is an issue of general interest for people with ASD and ID. Psychomotricity is a significant part in educating children with ASD and ID because it helps them build better relationship with others, with the environment around them, to cope with the educational requirements and thus promote personal well-being.

In the context of children's development with the purpose of their integration, specific activities are carried out in the C.R.D.E.I.I. Special-Needs Middle School, activities aimed at educating the psychomotricity of children with ASD, severe ID and associated disabilities. These activities are carried out

within the sensory, motor and psychomotor education classes. The multisensory room can be a valuable tool in creating the educational and recovery process.

## 2. Theoretical foundation

The specialists in the field define psychomotricity as the inextricable link between the psychic and the motor skills (Horghidan, 2000, Radu & Ulici, 2003, Epuran, 2011) with major influences on the educational and socio-professional integration of the individual.

The connection between the psychic and the motor functions can be disturbed by close proximity internal and external factors. There is a common etiology between the ID and the psychomotor disorders. The degree of impairment of the sensory-perceptive development, the representation of motor acts is reflected in the psychomotor development of children with ID. The frequency of psychomotor disorders is higher in children with ID (Radu & Floșnița, 2011). By affecting the sensitivity of the child's movement, the perception of movement is also affected, and, in this context, psychomotricity.

In addition to cognitive impairments (sensory deficits, intelligence disorders, attention deficits, memory disorders, language disorders) and social interaction disorders, psychomotricity disorders also occur in ASD.

According to DSM 5 (2016) ASD and ID fall into the category of neurodevelopmental disorders. ASD occurs very early in the child's preschool period and affects the entire personality, physical, psychomotor, cognitive, socio-emotional development. ID occurs during the child's development period (until the age of 18) before the school period and is characterized by deficits in general mental abilities (reasoning, problem solving, abstract thinking, school learning, learning from experience). This development impairment causes a deficiency on a social, school and occupational personal level and affects the adaptive function of the individual.

Due to the developmental gaps between children of the same age but with different individual characteristics (data such as disability, severity level, association of multiple disabilities in the same child) it is necessary to individualize the intervention and to develop personalised intervention plans.

An intervention tool with multiple applicability in language, cognition and psychometrics is the

multisensory room or Snoezelen room, as it was originally called. Studies carried out by Bera (2008), Fava & Strauss (2010), Ziegler (2015), Toro (2019) have shown that the recovery programmes in the multisensory chamber for people with developmental disorders, autism spectrum disorders, brain damage, profound intellectual disability, dementia, produces beneficial effects on the human being by reducing aggression/self-aggression behaviors, avoidance, stereotyping, inappropriate behavior, significantly better results in solving tasks involving memory, improving concentration and learning capacity, increasing muscle activity, developing general motor skills and perceptive-motor structures.

## 3. Research methodology

In this research we used the following methods and tools for the initial and final evaluation and the development of the psycho-pedagogical intervention plan for the development of general motor coordination, static and dynamic balance, oculomotor coordination in children with ASD and ID

- observation, case study, analysis of the curriculum documents;
- Assessment tools:
- Portage Assessment Scale is an inventory of behaviours and abilities that allows an evaluation of the development of children aged 0-6 years and children with disabilities in the following areas: socialization, language, personal autonomy, cognitive skills, motor skills, comprising age-based items that naturally occur in the standard development of a child;
  - Callier-Azussa-G Scale is a development scale specifically designed to help assess deafblind children and those with multiple, severe and profound disabilities. Its aim is to provide the necessary information to be able to select the activities appropriate to the level of child development;
  - Grid for the evaluation of psychomotor development in children with autism spectrum disorder adapted in terms of the specificity of items in children with autistic spectrum disorder. The selected evaluation grid comprises a set of items that help us identify specific behaviors tracked, an inventory of psychomotor behaviors structured on the components of psychomotricity as on the grid formulated by Radu (2003), which represents an

inventory of skills of children developed normally in psychomotor aspect aged 3 to 14 years.

Intervention instruments used:

- Multisensory room or Snoezelen room.
- An intervention plan tailored to the needs of each child.

*The purpose* of this research was to highlight the effectiveness of the activities carried out in the multisensory room related to the psychomotor development of participating children with ASD and severe ID. In the research, through the selected instruments, we monitored the contribution of the psychomotor development of the intervention plan to the psychomotor development of the participants in the program.

*Objectives of the research:* elaboration and implementation of a psychological-pedagogical intervention plan for the development of general motor coordination, static and dynamic balance, oculomotor coordination in children with ASD and ID, activities carried out in the multisensory chamber within sensory, motor and psychomotor education classes.

### 3.1. Target group

Children participating in the program are enrolled in the 6th grade at the CRDEII Special-Needs Middle School. The number of students in the class is 6, with multiple disabilities. Out of the 6 students enrolled, we selected 3 students in the intervention program, students who responded to the following selection criteria:

- severe deficit in the psychomotor field
- ASD marker occurrence and ID

Next, we will present the case study representative for the initiated approach, in order to highlight the process taken with the children in the selected sample (three of the six students in the sixth grade). The activities carried out under the intervention plan have as specific objectives: manipulation of objects in the close proximity, training of the general muscles of the hands, torso, neck and legs, formation of the bilateral coordination, walking the routes back and forth with the preservation of balance; the objectives being related proposed research: the development of general motor coordination, static and dynamic balance, oculomotor coordination.

### 3.2. Case Study Presentation

Participant S1, aged 14 years and 1 month at the time of the beginning of the study, attends sixth grade courses at the C.R.D.E.I.I. Special-Needs Middle School. The diagnosis is: autistic spectrum disorder, hyperkinetic syndrome, severe intellectual disability, retardation in language development.

Based on psycho-pedagogical observations we present the main relevant aspects of the pupil S1' s background information.

S1 benefited from early intervention. The followed educational route was: special-needs kindergarten, primary school at the special-needs school and, at the time of the start of study, S1 was in the 6th grade in the special needs school. He benefited from specialized intervention in the cognitive, communication/language, personal autonomy, socio-emotional, psychomotor fields.

As a main feature of autistic spectrum disorders, he faces difficulties in relationships, disruptive behaviors that negatively influence the educational approach (running away from the classroom to avoid a work load or to attract attention), stereotypes (balance, trotting of the feet with hands held to the chest and while emitting specific sounds), sensory stimulation (visual, tactile). Having fixations on closing and opening doors or on certain objects (glue tubes, cardboard boxes from puzzle games, etc.), the student establishes occasional eye contact and only with the help of verbal and physical prompts, imitation capacity is very low as well as cognitive performance. S1 exhibits severe language retardation. S1 has a low ability to concentrate and maintain focus, he concentrates for less than 10 seconds on the workload, often avoids, is not willing to engage in tasks that require sustained physical and mental effort, he often is easily distracted by external stimuli. He shows impulsiveness in his activities and low compliance with tasks. The initiation of social interaction with adults and children is non-existent due to the absence of language.

## 4. Results

The initial assessment intended to provide information about the child's level of development so that, using the data obtained, a personalised intervention plan to be designed. Using these considerations, the following assessment tools were used: Portage Assessment Scale, Callier-Azusa-G Scale, the evaluation grid of psychomotor

development in children with autism spectrum disorder.

Following the completion of the Portage Assessment Scale for the acquisition of the motor abilities S1 showed a level of development of approx. 2 years and 8 months having acquired a number of 74 behaviors out of 140 items described by the motor skills scale, that is 52.8% of the total items. Thus, it did not exceed the threshold at 2-3 years, completing 64.7% of the items for this age range.

After the completion of the Callier – Azusa – G Scale to establish the psychomotor development of the study participant, 4 subscales were completed: postural control, locomotion, development of fine, visual-motor motor skills. All 4 subscales fall into the age group of 24-36 months.

By completing the initial evaluation grid, the following behaviors have been identified as partially acquired : climbing stairs with alternating legs, running on an established path while maintaining balance, having full mobility of the body (rotates the torso, head, limbs), standing on one leg, then on the other with support (5 seconds), having precision in climbing and descending stairs, competence in dressing and undressing himself, walking straight on a line drawn on the floor forward and backward , standing on the tiptoes (a few seconds), standing on one leg, then on the other (3 seconds), from the standing position, with his hands on his hips, bending from the trunk to the front, back, right, left, moving with appropriate balance (on a straight line drawn by the examiner draws (without much precision) a man, a house, a tree), drawing according to the pattern a rectangle, twisting buttons, handles, switches, opening and closes locks, etc., turning the pages of a book (one at a time), folding a paper in half, after demonstration, making balls out of playdoh, performing, after prompting, various hand movements (rises, descents, held up, held sideways)

The student did not perform the following behaviors: descending the stairs with alternating feet, performing long jumps, jumping from one foot to the other, standing on one leg without help (4-8 seconds), walking forwards or backwards on the balance beam (raised from the ground 20 cm), jumping over a small obstacle (brick), standing on the tiptoes while executing movements with his hands, scissors cutting, folding a paper square twice diagonally.

Psychomotoric intervention

Having as a reference point the information obtained in the initial evaluation, a personalised intervention plan focused on towards the development of psychomotricity aiming mainly the basic motor coordination has been implemented. This consists of the outline of the intervention programme, with the role of developing psychomotricity and more specifically oculomotor coordination, general motor coordination and static and dynamic balance. Its framework has tried to achieve the essential aspects in this respect.

*The purpose* of the intervention plan was: the development of basic motor behaviours through activities performed in the multisensory chamber.

*The specific aimed objectives* were: handling objects in close proximity, exercising the main muscles of the hands, torso, neck and feet, training bilateral coordination, walking on a route back and forth while maintaining balance.

*Methods used:* imitation, modeling, demonstration, explanation, exercise.

*Materials used:* The following games and devices were used to implement the activities and exercises proposed in the multisensory chamber: the ball pool, magnet fish and fish rod, water bed with resonance system, air bubble column, aroma diffuser, HIFI system with vibrating base, fiber optic system with bright effects, visual effects projector with discs, simple motor route, stones, interactive sensory panel, large fine motor panel, lock box, floor surf, geometric shapes, fruit tower.

The proposed activities were performed in the educational institution during sensory, motor and psychomotor education classes in the multisensory chamber. The activities have been selected in accordance with the pursued objectives.

Proposed activities to achieve the objective: handling objects in close proximity (O1):

- Ball handling exercises in the ball pool (catching/throwing).
- Fish-finding exercises in the ball pool.
- Exercises to use the magnet rod to catch the fish in the ball pool.
- Assembling the motor path.

Proposed activities to achieve the objective: exercising the main muscles of the hands, torso, neck and legs (O2):

- Climbing exercises using the small stone route.
- Mounting of the motor path consisting of stones and beams. Can be assembled by children and can have varying degrees of difficulty.
- Walking exercises using floor surf.
- Walking a path front-facing.
- Walking exercises using a correct posture.

Proposed activities to achieve the objective: bilateral coordination practice. ( O3):

- Object handling exercises.
- Shapes and colors sorting exercises: geometric shapes.
- Practice Exercises for the fine muscles of the hand and fingers by using large fine motor panel, a lockbox, an interactive sensory panel, wall path with balls.

Proposed activities to achieve the objective: back and forth movement with the preservation of balance. (O4)

- Exercises to maintain dynamic balance by taking a motor balance path walking back and forth.
- Exercises to maintain static balance at the beginning and end of the motor route.

The following devices were used for relaxation: a water bed and resonance system, ball pool, air bubble column, aroma diffuser, HIFI system with vibrating base, fiber optic system with light effects, visual effects projector with discs.

The intervention period was 12 weeks (December 2019-March 2020)

#### *Final assessment*

The final evaluation was carried out at the end of the intervention programme and the following

progress was observed in relation to the initial evaluation for the psychomotor field:

After the completion of the Portage scale for the motor area on the basis of his acquisitions S1 indicated a development level of a child approx. 2 years and 9 months, having acquired a number of 77 behaviors described by the scale items for the motor domain. These behaviors are: turning the pages one by one, making balls out of playdoh, gathering and dismantling stackable toys. Even though S1 has a breakthrough in psychomotor development, he shows serious deficits in general motor skills, orientation in space, and oculo-motor coordination.

On the Callier-Azusa-G Scale the student has acquired new behaviors as follows: on the postural control subscale he is able to stand 3 seconds on one leg; on the locomotion subscale the student walks up and down 4 stairs using alternating legs, he runs and takes the curve; on the scale the development of fine motor skills he is able to use one hand to hold something and with the other to handle another object; on the visual-motor scale he developed the following behaviors: copy a circle, draw horizontal and vertical lines according to a model. S1, even though he had progressed, according to the scale, he did not exceed the 36-month development level threshold, still ranging from 24-36 months.

Reduced aggression and self-aggression were observed due to relaxation and sensory stimulation in the multisensory chamber. Also, after meeting the need for sensory stimulation, the student was more compliant in carrying out tasks.

## **5. Discussions**

Final evaluation based on the psychomotor development assessment grid in children with autism spectrum disorder. In this table we will note the behaviours that in the initial phase were in the process of being achieved and those that were not present then but were developed as a result of the intervention.

Table 1. Psychomotor behaviors in the initial and final stage

Behavior	Presence/absence of behaviour at the initial assessment stage	Presence/absence of behaviour at the final assessment stage
<b>General motor coordination</b>		
Bending the knees (squats)	Absent	Bends slowly in the squat position with support 1 time only when needed (to pick something up), does not repeat the same action immediately upon request
Climbing the stairs using alternating legs	Climbs the stairs one at a time with right foot forward	Climbs 4 stairs using alternating legs with hand support on railing
Running on an established path while maintaining balance	Runs on a straight-line path	Passes over 1, 2 obstacles, with support
Full mobility of the body (rotates the torso, head, limbs)	Rotates the head and limbs and partially the trunk	Rotates limbs and torso
Sitting on one leg, then the other with support (5 seconds)	Stands on one leg for 1 second	Stands on one leg 3 seconds with support
Precision in climbing and descending stairs	One foot ahead	4 stairs, alternating legs
Independent Dressing	Pulls his pants but does not properly arrange them over his belly and buttocks	Correctly arranges pants due to increased torso mobility Puts his hands up his sleeves
<b>Static and dynamic balance</b>		
Going straight on a line drawn on the floor back and forth.	Takes 2 steps forward on a drawn line and no steps back	Takes 4 steps forward on a straight line and 1 step back
Standing on tiptoes (a few seconds)	He does not stand on toes	He lifts on toes and descends immediately
Standing on one leg, then on the other (3 seconds)	He stands on one leg for 1 second.	Stands on one leg 3 seconds with support
Bowing from the standing position, with hands on hips, bending the torso to the front, back, right, left	Bends only forward	Bends forward and sideways
Going in balance (on a straight line drawn by the examiner)	Goes in balance 2 steps on a drawn line	Goes in balance 4 steps forward in a straight line
<b>Oculo-motor coordination</b>		
Drawing (without much precision) a man, a house, a tree	Scribbles with circular movements and draws lines	Draws a circle (going 2-3 times in a circular direction)
Turning buttons, handles, switches, open and close locks etc.	Twists buttons, handles, switches	Opens and closes locks to open a box
Turning pages of a book (one at a time)	Turns multiple pages at once	The first 3 pages one by one then loses interest and turns more at once
Folding paper in half after demonstration	Folds a paper in half with physical hand guidance	Folds a paper in half after demonstration
Modeling playdoh balls	Model playdoh sticks	Model playdoh balls with a diameter of 1-2 cm
Performing, by imitation, various hand movements (lifts, descents, hold-ups, sideways movements)	Performs, by imitation, various hand movements (lifts, descents, hold ups, hold sideways)	Performs, by imitation, various hand movements (lifts, descents, hold up, hold sideways)
Unbuttoning buttons	Does not unbutton	Unbuttons only large buttons with a diameter of 1.5 cm
Closing buttons	Does not finish task	Able to work with large buttons with a diameter of 1.5 cm

There has been made some progress in the psychomotor field, the development of the general motor skills of static and dynamic balance, oculo-

## 6. Conclusions

In the operational approach to education, the implementation of any change requires constant consideration and integration of the following specific aspects: the variables of the change, the ongoing stages of the change, the strategies used to implement the change and the effects of this phenomenon. On the path of change, each of us builds and/or activates certain

motor coordination. This improves the quality of life for S1 and contributes to the well-being of the child.

barriers. A good teacher is mindful of these barriers that need to be overcome without causing malfunctions in teaching and management, or irreconcilable conflicts (Bocoş, Chiş, Răduţ-Taciu, 2015).

Improvements in S1's psycho-behaviour were observed as a result of the intervention programme applied. They refer to the development of psychomotricity, namely general motor coordination,

static and dynamic balance, oculo-motor coordination. During the activities in the multisensory chamber, a decrease in sensory stimulation behaviors (bite of one's own hand, oral stimulation) was observed.

Since significant progress has been made in S1's psycho-behaviour, family involvement is recommended in reference with the intervention plan developed and it needs approval from the parents. The aim is to generalize the skills formed. It is recommended to cooperate with a speech therapy specialist in the particularities of autism, in order to formulate objectives and develop an intervention plan in the area of communication and language (understanding vocabulary, pronunciation of different phonemes, etc.). It is further recommended to stimulate the development of general motor skills, fine hand muscles, oculo-motor coordination to improve the quality of life and the exercise of the self-management skills/personal autonomy (to dress himself, to place clothes in the folded closet, to clean after themselves, to butter a slice of bread, etc.).

The research initiated, with the general objective of developing psychomotricity in students with ASD and ID, by presenting the selected Case Study, aimed to highlight the intervention process on basic motor coordination through activities carried out in the multisensory chamber.

The obtained results recommend interventions in other situations with the prospect of generalizing the followed process, with the required customizations.

**Authors note:** The authors had equal contributions to this article.

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