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Summary of the PhD Thesis:

**KINETOTHERAPEUTIC ASSESSMENT OF CHILDREN WITH
AUTISM SPECTRUM DISORDERS AND IMPLEMENTATION
OF KINETIC PROGRAMMES FOR THEIR REHABILITATION
AND INTEGRATION**

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Introduction

Autism spectrum disorders are nowadays an important and alarming category of conditions for which parents contact the family doctor, paediatrician or paediatric psychiatrist. The concern caused by the increased prevalence of autism among the population is also associated with difficulties related to the correct information and diagnosis, as well as the therapeutic interventions.

The thesis is structured in three parts: Part I – *Theoretical foundations of autism - aetiology, incidence and treatment methods*; Part II – *Preliminary research on the application of kinetic means for the rehabilitation of children with autism*; Part III – *Experimental research on the implementation of kinetic programmes in the therapy of children with autism*.

In the **first part** of the doctoral thesis, we analysed a lot of information about autism issues by reviewing 50 books in the national literature, 74 books in the international literature, 49 specialised studies and 30 digital sources.

Autism and autism spectrum disorders are terms used for a whole range of pathological alterations and manifestations in brain development. These alterations are classified into different degrees of manifestation and are characterised by difficulties in the sphere of social interaction, verbal or nonverbal communication, as well as by bizarre, ritualistic behaviours.

Autistic children are not interested in other children, are often nervous and anxious, do not feel comfortable in various social situations, do not show satisfaction or joy in games organised with other children, preferring to follow certain play routines or rituals. These children prefer games and activities that involve turning the wheels of a little car endlessly, opening and closing the doors of a drawer, for example, clicking, throwing or smelling objects, as well as spending time lining up various toys or objects, etc.

Also, children with autism spectrum disorders may be hypersensitive to sounds, touch, smells or visual stimuli, all these alterations being due to dysfunctional sensory integration.

The **aetiology** of autism is controversial; there are numerous theories in this regard, and researchers admit that there cannot be a single cause responsible for the occurrence of autism, as there is no a single type of autism. Many researchers find it beneficial to structure the aetiopathogenesis of autism into three causal chains: genetic causation, neurobiological causes and behavioural causes.

The **incidence** of autism has risen dramatically in recent decades, the data being really worrying. If, in 1943, the incidence was 1 in 10,000, the research carried out in 2000 highlighted a rate of 1 in 150, in 2006 – 1 in 110 children was diagnosed with autism, and in 2016, the astonishing figure of 1 in 68 was reached (data are taken from the Diagnosis and Control Centre).

In Romania, the latest studies (April 2016 - April 2017), performed by the Help Autism Foundation and the General Directorate of Social Assistance and Child Protection sector 3 and focused on the psychological assessment of 613 children aged 1 to 3 years, have revealed an alarming incidence rate of 1 in 51 children, the diagnosis being more common in male subjects.

The **prognosis** for patients with autism spectrum disorders is extremely wide, long-term studies emphasising that only a very low percentage (5% to 17%) of people with autism will be able to have an almost normal life at adulthood, and of them, only 2% will lead a completely independent life. The correct and early diagnosis, coupled with the child's involvement in physical activities aimed at developing all the elements of psychomotricity, is decisive for therapeutic success.

The **second part** of the doctoral thesis consisted of a preliminary research that aimed to identify the most efficient kinetic methods and means, which, used in the therapy of the child with autism, would contribute to reducing some psychomotor and sensory manifestations. The research subjects were 16 students aged 6 to 10 years, who were divided into two groups of 8 subjects each (experimental group and control group). The research was conducted at the Special Middle School for the Deaf nr. 1, and the kinetic programmes were performed in the kinetotherapy room, in the gym, in the sensory stimulation room and on the sports ground.

The **assumptions** underpinning the preliminary research consist of the theoretical statements expressed by the specialists in the field with regard to the beneficial influence of kinetic means in the form of sensory stimulation on reducing autism spectrum disorders.

Preliminary research hypothesis

Psychomotor stimulation of children with autism spectrum disorders through customised specific programmes reduces motor and cognitive deficits.

Research methods and techniques

In this research, we used the following methods: the literature review, observation, pedagogical experiment, specific testing methods (motor proficiency observation grid, cognitive ability observation grid and relational competence observation grid), mathematical and statistical method, graphical representation.

Subject assessment

The research subjects were assessed using the tests for motor proficiency, cognitive abilities and relational competencies proposed by Wauters-Krings, as well as a questionnaire addressed to parents.

The experimental group benefited from the sensory stimulation method, which included the following means: tactile perception exercises based on different stimuli (brushing, shaving foam, kinetic sand); proprioception exercises; vestibular perception exercises (swings, hammock exercises, roller-board sliding exercises); fine motor exercises (diverse games for using a variety of prehension types).

PRELIMINARY RESEARCH FINDINGS

The research data **partially confirm the research hypothesis**, in the sense that:

- ✓ regardless of the kinetic method used, improvements in the relational competencies, motor skills and cognitive abilities of children with autism are noticed after the specialist intervention;
- ✓ the method based on sensory stimulation, compared to the classical one, has a greater effect regarding the acquisition of cognitive abilities;
- ✓ relational competencies and motor skills are equally improved regardless of the stimulation method used.

The **third part** consisted of a research conducted at the Special Middle School for the Deaf nr. 1, which aimed at developing the autonomy of children with autism involved in the research through motor activities able to facilitate their rehabilitation. The kinetic programmes were performed in the kinetotherapy room, in the gym, in the sensory stimulation room and on the sports ground. The research subjects were 22 students aged between 6 and 11 years.

Research hypothesis

The application of a well-structured kinetic programme will lead to reducing motor and cognitive deficits by improving the psychomotricity components, all these aspects increasing the likelihood of rehabilitation for students with autism.

Research methods and techniques

The research methods and techniques used were: the literature review, experimental method, survey method, as well as mathematical and statistical method for: cross-tabular analysis; analysis of distribution normality at the measured time points (T0, T1); comparative analysis of the means between independent samples (Independent Samples T-Test with the Bonferroni Adjustment) and the Paired Samples T-test to compare the means and determine the significant differences in the same item at two different times (T0 and T1) for the same sample. All statistical analyses used the SPSS, version 17.0. For tables and graphs, Word, Excel and SPSS 17.0 were used.

The efficiency of kinetic programmes was assessed by the following tests:

1. Bruininks-Oseretsky – a motor proficiency test for assessing:
 - ✓ gross motricity (measured in turn by four indicators, namely: movement speed and agility, balance, bilateral coordination and strength);
 - ✓ upper-limb coordination;
 - ✓ fine motricity (measured in turn by three indicators, namely: reaction speed, visual-motor control and dexterity, and upper-limb execution speed).

2. Sensory Profile – a test for assessing the following indicators: sensory processing, sensory transmission, behaviour and emotional response.

EXPERIMENTAL RESEARCH CONCLUSIONS

The research results **confirm the research hypothesis**.

- ✓ Improvements in the motor skills (upper-limb coordination, gross motricity and fine motricity) of children with autism are noticed after the implementation of kinetic programmes.
- ✓ Subjects aged 9 to 11 years have higher scores for reaction speed and visual control compared to subjects aged 6 to 8 years. Final scores for the entire Bruininks-Oseretsky Test are also significantly higher for subjects aged 9-11 compared to subjects aged 6-8, which means that subjects aged 9-11 have improved their motor skills following the application of the stimulation programme.
- ✓ Gross motricity positively correlates with upper-limb coordination, meaning that the better the upper-limb coordination, the more the gross motricity will be improved, and vice-versa.
- ✓ The higher the reaction speed, the better the visual control and the upper-limb dexterity. Also, the better the visual control, the more the reaction speed and dexterity will increase.
- ✓ Improvements in the sensory profile of children with autism are noticed after the therapeutic intervention as regards sensory processing and transmission, but also behaviour and emotional response.
- ✓ Age correlates with behaviour and emotional response, in the sense that subjects aged 9 to 11 years better control their socio-emotional responses.
- ✓ As sensory processing, sensory transmission or behaviour and emotional response improve, the overall sensory profile will be significantly improved. At the same time, all these three dimensions positively correlate with each other, vary together. The more the sensory processing or sensory transmission improves, the more the behaviour and emotional response will be improved, and vice-versa.

Proposals and research limitations

- ✓ In order to estimate the time resistance of the positive results gained, the tests should be repeated over time, and their results should be compared with those obtained at the first measurements. For the beginning, the test repetition interval should match the duration of the stimulation programme applied. The representation over time of the performance parameters might indicate the therapeutic effectiveness.

- ✓ Another way for the therapy improvement is to repeat them over time by monitoring the performance growth and the child development prognosis based on the interpolation of the estimators' temporal behaviour regarding treatment performance.
- ✓ The study of structural efficiency per performance estimator will try to estimate which of the observation subcategories of each estimator record large increases and which of them record slower progress. By relating these sub-characteristics to the physical parameters of the subjects, it would be possible to get information on some organic causes of autism-specific phenomena.

Elements of originality

Throughout the research, we observed and were inspired by the needs of children with delayed psychomotor development affecting the performance of their daily and recreational activities. During discussions with parents, they reported that their children showed a major deficit in performing simple daily activities. Therefore, during the doctoral studies, we designed and made three panels specific to occupational therapy, with the possibility of adjusting their height, which allows performing exercises in the standing or sitting position.

We also made a corkboard on which a Velcro tape was fixed to serve as a visual timetable with applicability during the kinetotherapy class. This schedule has been adapted to the needs of children and contains pictograms (pictures) with specific exercises, the equipment in the kinetotherapy room, accessories from the sensory stimulation room and pictograms with certain needs of the child (water, toilet, support). The schedule also contains pictograms that allow the transmission of information about children's feelings (sadness, happiness, etc.). The use of the visual timetable when working with autistic children helps them to better understand the sequence of events, communicate and even express their preferences during the kinetotherapy class. By means of this schedule, the abstract notions become more concrete.

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