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DYNAMIC GAMES AS A MEANS OF PSYCHOMOTOR DEVELOPMENT IN STUDENTS WITH SPECIAL EDUCATIONAL NEEDS

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Abstract: The study investigated the effects of a structured dynamic games program on the development of psychomotor skills in primary school students with special educational needs enrolled in the "Sfântul Stelian" Special Middle School in Rădăuți. The research was conducted in the 2024-2025 school year and included 20 students (10 girls, 10 boys) aged 10 to 11, diagnosed with moderate intellectual disability. The intervention design was organized into three modules: initial assessment September-October 2024, systematic implementation of the program November 2024-February 2025 and final assessment March–May 2025. Psychomotor performance was assessed using standardized motor tests 5×5m shuttle run, 25m sprint, standing long jump, 30s sit-ups, bench press, and a 2min 30s endurance run, supplemented by observation of progress and engagement. The results showed consistent improvements: in girls, the average 5×5m shuttle run time decreased from 16.84s to 15.32s, approx.9%, and the 25m sprint time decreased from 9.36s to 8.19s, approx.12%. Standing long jump performance increased 95.6cm-119.2cm, and endurance running distance improved 261.5m-331.5m, confirming the effectiveness of dynamic games in improving psychomotor capabilities.

Introduction: The specialized literature highlights the important role of adapted motor activities in the general development of children with special educational needs, emphasizing the positive impact of dynamic games on motivation, learning efficiency and the development of motor skills. In this regard, the study [2] shows that the use of movement games adapted to the psychophysiological characteristics of children contributes significantly to the optimization of the instructional-educational process, provided that effective methods and an adequate dose of effort are applied. Research in the field of psychomotor education emphasizes the importance of integrating vestibular,

auditory, tactile and visual stimuli in intervention programs, as they play a decisive role in facilitating sensory integration and improving balance in children with intellectual disabilities [4]. Furthermore, the study [6] highlights that expanding the time dedicated to movement games, both during curricular and extracurricular activities, has positive effects on health, psycho-emotional balance, memory and attention, contributing to a favorable evolution of general psychomotor development. From a learning theory perspective, active body movement influences brain function and cognitive processes, supporting the idea that movement is a central element in cognitive and emotional development in special education [9]. In this context, motivational games are considered effective non-pharmacological interventions, with positive therapeutic effects on the psycho-emotional and physical state of children with intellectual disabilities and are recommended within adapted physical education programs [10]. The development of educational technologies has opened new research directions, with studies demonstrating that computer-assisted educational games, based on user-system interaction through movement, can support the development of psychomotor skills in children with educable intellectual disabilities [5]. At the same time, physical education is recognized as a fundamental scientific field in optimizing the components of psychomotricity, offering specific interventions adapted to the needs of children with special needs [7]. In the case of specific learning disabilities, the specialized literature frequently reports difficulties in the development of coordination, balance and motor control, highlighting the effectiveness of motor education programs in improving psychomotor development [1]. Recent contributions from the fields of physiotherapy and special motor education emphasize the need for interdisciplinary interventions and the use of standardized specialized terminology to support rehabilitation and education processes [8]. At the same time, the role of medical and physiotherapeutic intervention is considered fundamental in the prevention, early detection and treatment of developmental disorders, directly influencing the child's psychomotor and psycho-emotional maturation in a social context characterized by lifestyle changes and accelerated growth processes [12].

Material-method: Research hypothesis: It is assumed that the implementation of a structured program of dynamic games for primary school students with special educational needs at the "Sfântul Stelian" Special Middle School in Rădăuți will contribute to the development of psychomotricity (gross and fine motor skills, balance, coordination, body schema, rhythm and spatial-temporal orientation), as well as to increasing motivation and involvement in educational activities. Study Purpose: The purpose of the study is to assess and optimize the psychomotor development of primary school students with SEN by implementing a structured dynamic games program. Research objectives: The research objectives are designed to support the achievement of the study goal and include: (1) initial

assessment of the psychomotor level of students with SEN using coordination, balance, gross motor and fine motor tests; (2) implementation of a structured dynamic games program adapted to the individual characteristics of the students, which aims to stimulate psychomotor components, such as motor skills, balance, rhythm, body schema and spatial-temporal orientation; (3) monitoring psychomotor progress during the implementation of the program by observing changes in motor performance, effort capacity and level of involvement; and (4) final evaluation of the results by comparing initial and final data to determine the impact of the program on the psychomotor development of the students. The research on the development of psychomotricity in primary school students with SEN through dynamic games was conducted in the 2024-2025 school year and was structured into three modules, each with specific objectives and activities. Module I: Initial Assessment and Program Design September-October 2024. The objectives of this module focused on the initial assessment pretest of the students' psychomotor level, the identification of individual motor and cognitive characteristics, and the development of a structured dynamic game program tailored to their specific needs. Activities included anthropometric measurements (body weight, height, waist circumference, and skinfold thickness), the administration of motor tests (5×5m shuttle run, 25m sprint, standing long jump, bench press, supine sit-ups, and a 2min 30s endurance run), and the completion of individual progress records based on systematic observation. Module II: Implementation of the Dynamic Games Program November 2024-February 2025. The objectives of this module were to systematically apply the dynamic games program within psychomotor activities, progressively develop gross and fine motor skills, balance, coordination and rhythm, as well as increase student motivation and engagement. The activities involved organizing weekly sessions of adapted dynamic games (locomotor activities, running exercises, balance exercises, catching and throwing games, rhythmic and musical activities), monitoring progress through observation and interim assessments, and gradually adjusting the exercises according to individual needs. Module III: Final Evaluation and Analysis of Results March-May 2025. The objectives of this module were to conduct the final evaluation posttest, conduct the mathematical-statistical analysis and interpretation of the data obtained, and formulate conclusions and recommendations for educational practice. The activities included re-administering the initial motor tests, comparing the initial and final results using statistical indicators (mean, standard deviation, coefficient of variability, minimum and maximum values, and quartiles), presenting the data in tables and graphs, and formulating conclusions regarding the effectiveness of the dynamic games program on the psychomotor development of students with SEN. The research was conducted on a sample of 20 students with special educational needs in the 4th grade, with the following characteristics: total number of participants - 20; gender distribution - 10 girls and 10 boys; type of SEN - moderate intellectual

disability, with more advanced cognitive and motor development in certain areas; age of students - 10-11 years. Participants presented heterogeneous levels of motor development, with more developed abilities among those who had previously carried out psychomotor activities, required adapted educational support to stimulate gross and fine motor skills, balance and coordination, and demonstrated varying degrees of autonomy in daily activities, influenced by their level of psychomotor development.

Table 1. Experimental program based on dynamic games for psychomotor development-Module I

Period	Specific Objectives	Proposed Activities (Dynamic Games)	Targeted Psychomotor Components
September-October 2024	Initial assessment of psychomotricity. Familiarization of pupils with activities. Stimulation of gross motor skills and balance.	Walking, light running, jumping. Follow the Leader for coordination and spatial orientation. Raft and Water (balance on a course). Single-leg and double-leg jumps. Manipulation of balls, cubes, and cones. Rhythmic games using clappers or drums.	Gross motor skills, fine motor skills, balance, coordination, body schema, spatial and temporal orientation, rhythm.

Fig. 1. Dynamic games implemented in Module I

Table 2. Experimental program based on dynamic games for psychomotor development - Module II

Period	Specific Objectives	Proposed Activities (Dynamic Games)	Targeted Psychomotor Components
November 2024 – February 2025	Development of fine and gross motor skills. Improvement of balance, coordination, and rhythm. Increase in motivation and engagement.	5×5 m shuttle run, 25 m sprints, obstacle courses. Sit-ups from the supine position, bench pull-ups. "Break through and retrieve" ball games. Line walking, balancing on benches or mats. Simple choreographies performed to musical rhythm. Spatial path-following activities.	Gross and fine motor skills, balance, coordination, rhythm, spatial and temporal orientation, motivation and engagement.

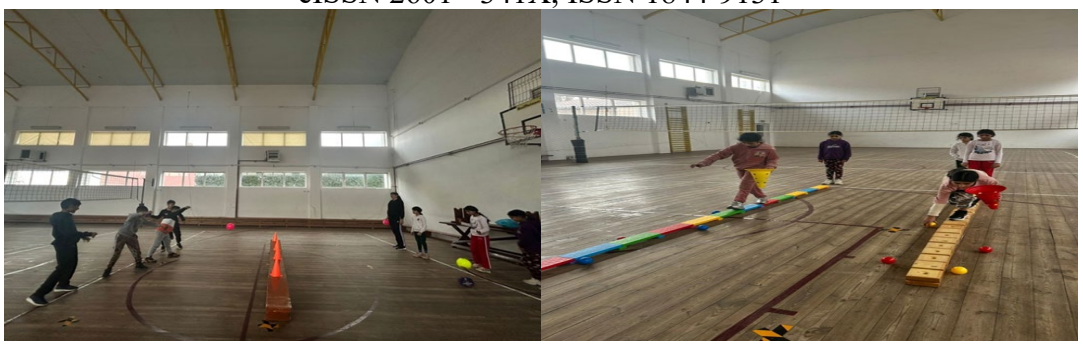

Fig. 2. Dynamic games implemented in Module II

Table 3. Programul experimental bazat pe jocuri dinamice pentru dezvoltarea psihomotricității-Modul III

Period	Specific Objectives	Proposed Activities (Dynamic Games)	Targeted Psychomotor Components
March - May 2025	Assessment of psychomotor progress. Consolidation of developed skills. Encouragement of cooperation and active engagement.	Combination of running, jumping, and balance exercises ("combined course"). Ball and various object exercises performed in pairs or groups. Final tests: 5×5 m shuttle run, 25 m sprint, standing long jump, sit-ups, 2 min 30 s endurance run. Final recreational games with symbolic rewards.	Gross and fine motor skills, balance, coordination, rhythm, body schema, spatial and temporal orientation, motivation, and social engagement.

Fig. 3. Dynamic games implemented in Module III

Results:

In the 5×5m shuttle run test girls, the initial mean time was 16.84 seconds, while the final mean decreased to 15.32 seconds, indicating an average improvement of approximately 9%. This reduction in time suggests that students improved their reaction speed and agility during movement, components of psychomotricity. The initial standard deviation was 0.54, decreasing to 0.41 at the final assessment, indicating that students' performances became more homogeneous following the implementation of the dynamic games program. This trend is also reflected in the decrease in the coefficient of variation from 3.23% to 2.66%, demonstrating a reduction in performance differences between students

with poorer and better performances. The extreme values confirm the overall progress, with the maximum time decreasing from 17.60s to 16.00s, and the minimum time from 16.00s to 14.80s. The quartiles Q1, Q2, Q3 showed a uniform decrease, reflecting a steady improvement across the entire group. This evolution can be explained by the fact that dynamic games stimulated coordination, reaction speed and segmental mobility, encouraging students to actively participate and overcome individual limits in a playful context. In the 25m sprint, the mean initial time was 9.36seconds, decreasing to 8.19seconds at the final assessment, representing an improvement of approximately 12%. This change highlights the development of cyclic speed and quick reaction capacity, essential components in running exercises and activities requiring rapid movements over short distances. The standard deviation increased slightly from 0.25 to 0.28, and the coefficient of variation increased from 2.72% to 3.38%, suggesting that although most students improved, individual differences in the rate of development became more pronounced, probably due to varying initial levels of motor skills and physical capacity. However, the minimum and maximum values indicate an improvement in all students, and the quartiles Q1: 9.20 - 8.00; Q2: 9.35 - 8.20; Q3: 9.48 - 8.30 confirm that progress occurred across the entire group, even if students with lower initial performance improved at a slightly slower pace.

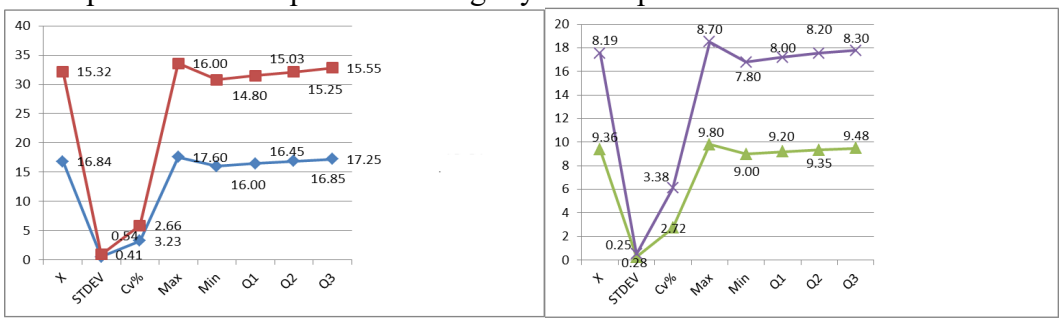

Fig. 1. Results of the 5×5 m shuttle run and 25 m sprint tests - Girls (n = 10)

In the 5×5m shuttle run test, the average progress of the group can be observed by comparing the initial and final values: the initial times ranged between 15.1 and 17.2 seconds, while the final times decreased to a value between 12.4 and 14.6 seconds. This reduction in time indicates a clear improvement in reaction speed and agility during movement. For example, student 4 improved from 16.4 seconds to 12.4 seconds, representing an improvement of approximately 24%, highlighting that students with lower initial performances can make substantial progress through structured and repetitive activities. The final values are closer to each other than the initial ones, suggesting increased homogeneity within the group. Playful activities involving short sprints, changes of direction and quick reactions stimulate reaction speed, segmental coordination and motivation. By repeatedly practicing these games,

students develop the ability to respond quickly to stimuli and coordinate their movements more effectively. In the 25m sprint, the students' initial times ranged from 8.8 to 9.4seconds, while the final times ranged from 7.7 to 8.2seconds, indicating an average improvement of approximately 10-12%. The most significant progress was made by student 4, who reduced his time from 9.3seconds to 8.2seconds, demonstrating the effectiveness of the program even for students with lower initial performance levels. Analysis of variance of the data shows a reduction in the differences between the fastest and slowest students, suggesting that the dynamic games had a positive impact on the entire group. The 25 m sprint requires cyclic speed, arm-leg coordination, and rapid muscle activation-motor skills that were effectively stimulated by dynamic games. The playful nature of the activities and continuous feedback contributed to increased motivation and engagement among students with SEN.

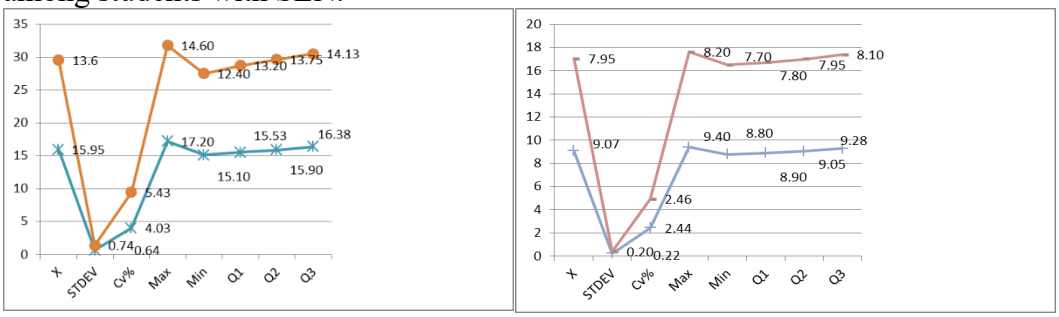

Fig.2. Results of the 5x5m shuttle and 25m sprint tests- Boys (n = 10)

In the standing long jump test, the group mean increased from 95.6cm at baseline to 119.2cm at the final assessment, indicating a mean improvement of 23.6 cm, equivalent to approximately 25%. This result demonstrates a significant development of explosive strength and lower limb coordination. The standard deviation was 3.67cm at baseline and increased slightly to 4.43cm at the final assessment, suggesting that some students made greater progress than others; however, all students improved, indicating the overall effectiveness of the program. The coefficient of variation decreased slightly from 3.84% to 3.72%, reflecting a relative homogeneity of performance levels within the group. The minimum and maximum values show clear progress: the lowest performing student improved from 90cm to 112cm, while the highest performing student progressed from 101 cm to 126cm. Therefore, the initial performance gap between the lower and higher performing students was relatively small. The quartiles Q1, Q2, Q3 increased proportionally - Q1 from 93 to 115 cm, Q2 (median) from 95.5 to 119 cm and Q3 from 98.5 to 123 cm - highlighting a uniform progress in the entire group, not just among a few students. The jumping tasks require muscle strength, balance and coordination; the dynamic games applied effectively stimulated these components, while the playful nature of the activities increased the students' motivation and

involvement in physical exercise. In the 2min 30s endurance running test, the mean distance increased from 261.5m at baseline to 331.5m at the final assessment, representing a mean improvement of approximately 70m. This result indicates a significant improvement in cardiovascular endurance and aerobic capacity. The standard deviation increased from 13.2m to 14.8m, indicating that some students progressed more quickly; however, overall group progress was evident. The coefficient of variation decreased from 5.05% to 4.46%, indicating greater uniformity of relative performance despite different initial levels. The minimum and maximum values also reflect a steady improvement: the lowest performing student increased from 240m to 310m, while the highest performing student improved from 280m to 350m. All students made progress, thus reducing the initial performance disparities. The quartiles increased proportionally - Q1 from 250 to 320m, Q2 (median) from 257.5 to 332.5m, and Q3 from 270 to 345m - confirming that improvements were uniform across the entire group. Endurance running develops aerobic capacity, coordination, and the ability to sustain effort; the progressive dynamic games applied within the program effectively stimulated these skills, while the structured progression of exercises allowed adaptation to the individual level of each student.

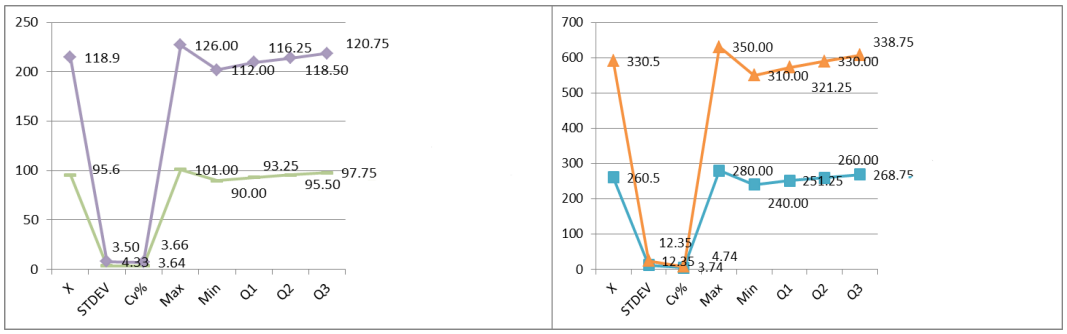

Fig.3. Results of the long jump and endurance run tests - Girls (n = 10)

In the standing long jump test, the average performance increased from 104.5cm at baseline to 131.3cm at the final assessment, indicating an average improvement of 26.8cm. This result highlights a substantial improvement in explosive strength and lower limb coordination. The standard deviation decreased slightly from 3.03cm to 2.91cm, suggesting greater homogeneity of performance within the group. The coefficient of variation also decreased from 2.90% to 2.21%, confirming increased consistency of relative results following the intervention. The extreme values show a clear progress for all students (minimum: 100 - 127cm; maximum: 109 - 136 cm), reducing the gap between participants with lower and higher performances. The quartiles (Q1-Q3) increased uniformly-Q1 from 102.25 to 129.25cm, Q2 from 104.50 to 131.50cm, and Q3 from 106.75 to 132.75cm-indicating that progress was evenly distributed within the group. The increase in both mean and quartile values

reflects improvements in explosive strength, balance, and coordination, while the playful nature of the dynamic games contributed to increased motivation and engagement. In the 2min 30s endurance running test, the mean distance increased from 278.5m at baseline to 358.5m at the final assessment, representing a mean improvement of 80m (approx.28%), reflecting a significant increase in endurance and aerobic capacity. The standard deviation remained constant at 8.18m, indicating proportional progress within the group, without large inter-individual variability. The coefficient of variation decreased from 2.94% to 2.28%, demonstrating increased uniformity and relative stability of the results. The extreme values also improved (minimum: 265 - 345m; maximum: 290 - 370m), confirming the increase in performance across all students. The quartile values increased steadily - Q1 from 275 to 355m, Q2 from 277.5 to 357.5m and Q3 from 283.75 to 363.75m - supporting the conclusion that the improvements were uniform across the entire group.

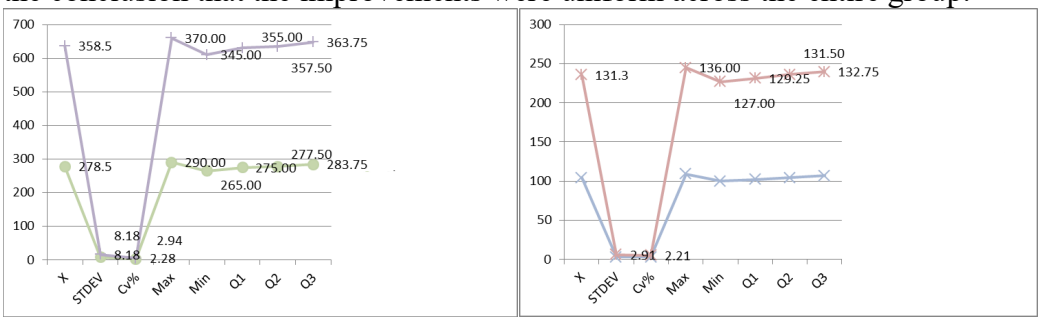

Fig.4. Results of the long jump and endurance run tests - Boys (n = 10)

In the supine crunch test, at the beginning of the program, students performed between 8 and 12 repetitions, with a mean of 9.6 crunches, indicating a moderate level of core muscle strength. The median was 9.5 repetitions, while the first quartile (Q1) was 8.5 repetitions, indicating that 25% of students performed less than 8.5 crunches; the third quartile (Q3) was 10.5 repetitions, indicating that 25% of participants performed more than 10.5 repetitions. After completing the program, all values increased, ranging from 12 to 17 repetitions, with a mean of 14.5 crunches. Q1 increased to 13.5, the median to 14.5, and Q3 to 15.5 repetitions, demonstrating clear and consistent progress. The absolute mean increase was 4.9 repetitions, corresponding to an improvement of approximately 51%. The program proved effective for the entire group: students with lower initial performances (Q1) showed substantial improvements, while progress was also maintained among initially stronger students (Q3), suggesting a balanced distribution of gains. In the pull-up test, the initial performances among the girls ranged from 2 to 5 repetitions, with a mean and median of 3.5 pull-ups. The quartiles were Q1 = 3, corresponding to the 25% of participants with the lowest performance, and Q3 = 4, representing the 25% with the highest performance. Following the intervention, performances increased

from 4 to 8 repetitions, with a mean of 6.3 pull-ups. The quartile values increased to Q1 = 5.5, median (Q2) = 6, and Q3 = 7.5, indicating significant progress in both the initially weaker and the strongest participants. The absolute mean increase was 2.8 pull-ups, corresponding to an improvement of approximately 80%.

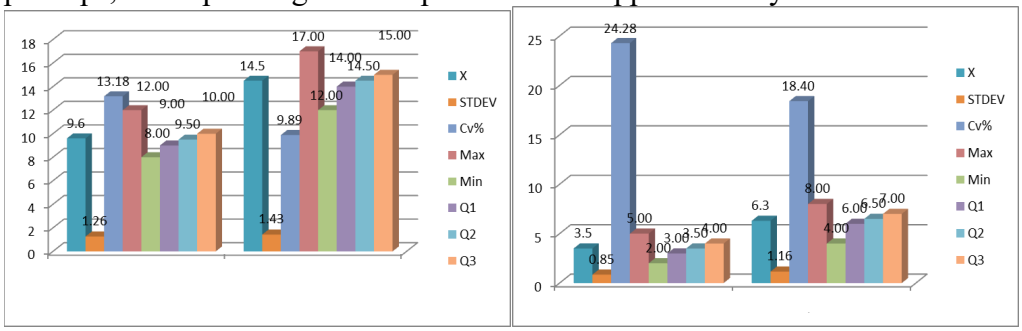

Fig.5.Results of the tests of trunk lifts from initial supine position (30 sec) and pull-ups - Girls (n = 10)

In the 30second sit-up test at the beginning of the program, students performed an average of 11.9 repetitions, with a low dispersion = 1.20, indicating a relatively homogeneous group. The coefficient of variation of 10.06% confirms limited variability among participants. The extreme values showed that the student with the lowest performance performed 10 sit-ups, while the student with the highest performance performed 14. The first quartile (Q1) was 11 repetitions, suggesting that 25% of participants performed up to 11 sit-ups, while the third quartile (Q3) was 12.75, indicating that 25% of participants performed more than 12.75 repetitions. The median (Q2) was 12 repetitions, meaning that half of the participants performed above and half below this value. After the training period, the mean increased to 17.9 crunches, representing an absolute increase of 6 repetitions and an improvement of approximately 50%. The dispersion remained similar = 1.20, while the coefficient of variation decreased to 6.69%, indicating greater homogeneity of performance. The extreme values also increased, with the worst performing student performing 16 crunches and the best performing student performing 20. The quartile values increased accordingly (Q1 = 17, Q2 = 18, Q3 = 18.75), demonstrating that even the weakest participants made substantial progress, while the differences in performance between students remained relatively consistent. In the pull-up test, at the beginning of the program, students performed an average of 4.6 repetitions, with a modest dispersion = 0.70 and a coefficient of variation of 15.20%, indicating greater variability among participants compared to the sit-up test. The minimum and maximum values were 4 and 6 repetitions, respectively, while the quartiles were Q1 = 4, Q2 (median) = 4.5 and Q3 = 5, suggesting that most participants clustered around the mean values, with a few higher performances. Following program implementation, the average number of pull-ups increased to 8.5 repetitions, representing an absolute increase of 3.9 repetitions and an approximate percentage

improvement of 85%. The variance increased slightly = 0.85; however, the coefficient of variation decreased to 10%, indicating greater uniformity of progress within the group. The extreme values also improved (minimum = 7, maximum = 10), and the quartile values increased to Q1 = 8, Q2 = 8.5, and Q3 = 9, confirming substantial and consistent gains across all participants.

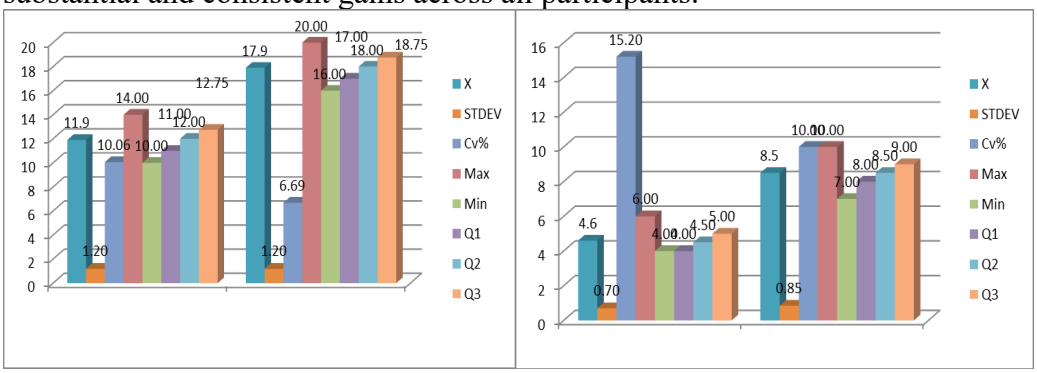

Fig.6.Results of the initial supine trunk raises (30 sec) and pull-ups tests - Boys (n = 10)

Discussions: The adapted psychomotor program proposed in study [3] showed significant 4 increases in motor skills, reflected by increased stimulus identification (approx.13-approx.14; $p < 0.05$) and reduced processing time (approx. 28.7s - approx. 28s; $p < 0.05$), without dynamic (equilibrium chi-square, without closed dynamic aprox. 0.88 $p > 0.05$). Another study shows that the reduced differences between centers 18.7% support the applicability of the same intervention program, results being confirmed by subsequent research on the psychomotor behavior of adolescents with special needs [11].

Conclusions: Dynamic games had a positive impact on the psychomotor development of students with SEN, contributing to the improvement of coordination, balance, strength and physical endurance. The integration of exercises in a playful context promoted active participation, intrinsic motivation and reduced anxiety. In addition, the activities stimulated both gross and fine motor skills, as well as social and cognitive skills and adaptability, demonstrating the effectiveness of dynamic games as both an educational and therapeutic method.

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