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**TENNIS GAME EXERCISES THAT INFLUENCE THE
PSYCHOMOTOR DEVELOPMENT OF PRESCHOOL CHILDREN**

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Abstract

Problem Statement: the research was aimed to see the degree by which some tennis game exercises teaching applied within the educational program in Romania develops the psychomotor abilities of children having between 3 and 5 years.

Methodology: in conducting this research were used the survey method, the direct and indirect observation method, the measurement and evaluation method and the statistical and mathematical method. Data were collected during 12 months from 124 children enrolled in 4 kindergartens. The author developed a custom-tailored Protocol that was applied to the experimental group (62 children), while the control group (62 children) received the ordinary educational program.

Results: Descriptive statistics for the collected data indicate a statistically significant effect for the following variables: vertical jump $F(1,122)=1.563$, $p=.213$, $\eta^2=.012$; speed running $F(1,122)=7.206$, $p=.008$, $\eta^2=.051$.

Discussions: The predominant outcomes acquired in the test amass propose that their level was dictated by the particular setting of the Protocol. Also, the acquired results demonstrate a beneficial outcome because of the Evaluation – Intervention interaction, significantly higher for the variables: vertical jump, running speed, tennis ball throwing, torso bending.

Contributions and Conclusions: The author designed and tested a Protocol that increases the psychomotor abilities of children in a more efficient way than the ordinary Romanian educational program.

Educational sports activities and movement games – particularly tennis, raise the level of driving expertise advancement and psychomotor qualities, based on the biological factors - motor education interaction and a more noteworthy association in the right execution of game exercises

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1. Introduction

Physical activity can be defined as "any physical movement resulted from the skeletal muscle contraction. On the contrary, the accepted sedentary activities are reading, watching TV and some computer games" (Rideout & Hamel, 2006; Hinkley et al., 2010; Hinkley et al., 2013; Bleakley et al., 2013).

Social Learning Theory promotes the idea that "human individuals learn their habits and attitudes in general and towards physical education in special, by observing and imitating their parents. Two features of parental conducts that bolster physical education were noticed by some researchers (Welk et al., 2003; Emma & Jarrett, 2010; Oliver et al., 2010; Mitchell et al., 2012; Schary et al., 2012), more precisely: role modeling and parental support. The first, role modeling, includes a parent's interest in physical activity aside from their effort to be active. The second, parental support, refers to parental encouragement, involvement, and facilitation (e.g. providing access and opportunities for the child to be active)".

2. Problem Statement

The possibility that physical activity has a great deal of definite medical advantages is to a great extent grasped and perceived. For children, this is mainly vital as it improves motor skill development necessary for educational performance, self-esteem, and self-perceived competence. Practiced in groups and within team games also has many social advantages, providing new skills while developing new contacts and bonding friendships (Emck et al., 2009 ; Chaves et al., 2015).

Educational sports activities and movement games – particularly tennis, raise the level of driving ability advancement and psychomotor qualities, contingent on the biological factors - motor education interaction and a more prominent association in the right execution of game exercises.

3. Research Questions

How can be evaluated quickly and thoroughly the health status of children attending sport classes during the national education program?

How can be improved their health status in the same amount of time mentioned in the national education curriculum?

What types of exercises give the better results in the shortest time?

4. Purpose of the Study

The study was aimed to propose a method of health status evaluation for all the children attending the national education system.

Also, it was intended to propose a training methodology applicable in the national education system, which will give the best results in the shortest time.

5. Research Methods

The research methods used were: survey method, direct and indirect observation method, the method of measurement and evaluation, statistical and mathematical approach.

Information from estimations and assessment tests utilized were enlisted to the individual and aggregate documents keeping in mind the end goal to bring together, process, analyze and find connections between them.

5.1. The Design and Experimental Conditions

The research design used is a mixed 3x2 ANOVA design intervention (Cohen, 1988). Based on such variables were defined two groups: the experimental group and the control group.

5.2. The Measurements

"By evaluating the bio-motor potential one can retrieve helpful information about the physical development of the individual, the presence of any bad musculoskeletal attitudes and physical shape information thereof, which, in our view constitute a base for the manifestation of other forms of health" (Cojocaru et al., 2011). "They can be split into three divisions: somatic measurements made on target body measurements: waist, torso, thoracic perimeter, and body mass; functional measurements that reveal the values of functional parameters (respiratory); driving measurements using an evaluation sheet" (Câmpeanu, 2014).

To institute age and sex individualities, reasonable bio-motor ordinary preschool period and orientation of future intervention by the settled protocol, the author used the following methods of measurement and evaluation (Prodan, 2016):

Height - is denoted by H. Tools used: straightedge / anthropometrical frame, weight and height measuring scale. Definition: the distance from the vertex point halfway between the two pterions. Measuring technique: standing position, maintaining all body segments in anatomical position. It marks the vertex, and halfway between the two pterions then performs precision measuring instruments in centimeters.

Weight - is denoted by W. The resulting weight of the sum of the components of the human body that skeletal mass, muscle, adipose tissue, the mass of internal organs, the amount of water. Weight, the skeleton is 15-20%. The weight varies during the day. These variations can be between 200g / day in young children and infants, up to 1 kg and 600 grams per adult, given the degree of filling of the bladder and water loss during the day, sweating, sleep after exercise. Measuring technique - after checking scales, the subject wholly naked or with minimal clothing sits on the scales. It avoids the subject on the scales to balance. The touch must be made with the whole sole and both legs. "Performing such measurements is preferred in the morning, before eating and after emptying the bowels and bladder. To have a complete picture of the development of the matter, the weight will be reported to the waist; it is expressed in kilograms and grams" (Prodan, 2016). For kids, however, "the formula after which a ratio of weight and size is that of Lorentz" (De Landsheere G. & De Landsheere V., 1999), shown as children between 2-6 years: $W = (H-100) - [(H-123) \times 0.7]$

Torso – Tools: straightedge / anthropometrical frame, metric tape. Definition (Prodan, 2016): the distance from the vertex point to the ischial line from a sitting position on the subject. Measuring technique: the subject seated, keeping all body segments in anatomical position. It marks the vertex, and ischial line and the meter is placed between the two landmarks in centimeters.

Respiratory Rate – definition (Prodan, 2016): The amount of oxygen necessary for vital body processes is ensured through breathing. Breathing consists of a rhythmic inhalations and exhalations succession. In normal condition, breathing is calm without any effort. Chest movements are symmetrical, rhythmic and barely visible. Items to be tracked to measure respiratory rate:

- Respiratory type
- Symmetry of respiration
- Amplitude of respiratory movements
- The frequency of respiratory movements

The thorax perimeter – or chest thickness, measured in centimeters. Tools: metal band. The technique of measurement: metric tape placed below the top of the scapula posterior and anterior based xiphoid appendix for men and at joint 4th coast sternum for women. Measure the dimensions of the maximum inspiration thoracic perimeter, thoracic perimeter in forced expiratory movement.

There was applied the set of evaluation tests used in the Romanian national testing, composed of five anthropometrical measurements: size, weight, torso, chest perimeter in inhalation and chest perimeter in exhalation.

At all ages were applied five tests used in Romanian national testing: cardio-respiratory resistance, speed, the expansion force on the upper and the lower extremities, overall skill (Prodan, 2016).

Have been applied ten tests on kids, to be specific: expansion force on lower and upper extremities, speed, overall skill, joint mobility and muscle flexibility, muscle endurance under force, cardio-respiratory and running endurance.

Have been made measurements on the somatic motor potential of children born in 2010 and 2011 (the age was between 3 and 4 years when the experiment started), applying four driving samples, which consisted of arm detention, speed, overall skills, cardio-respiratory resistance.

Study span was a year and a half; repeated measurements have been made, returning a total of three sets of information on which the investigations have been executed.

In the first phase from October 17 to October 29, 2014, after a preliminary assessment, have been applied some preschool initial evaluation tests, on the groups selected subjects (62 subjects).

Upon the 3-year-old kids, a preliminary assessment was performed by the test of A. De Meur (Albu et al., 1999) aimed at building up a body plot. The tasks were driving some torso movements and body parts, made by imitation (Grosu, 2008).

A preliminary assessment was done in the first stage, by observing the kids and then they were explained to sit side by side on two benches, one after the other. Once all the kids were sitting on the bench, have been indicated the formation of a circle of children and with the educator in the middle of the classroom, holding his hands. After amounting circle, placing children in the line indicated in a row, with a sidearm and reaching fingertips. First settled the educator and then the kids were suggested to sit in that formation.

Next to the children's motor response followed by imitation. The sequence of movements was developed as follows: "in standing in line in a row, arms at the sides, at an interval of about two arm lengths to order and urge examiner in front of the group. Kids may run slowly, performing the following sequence of motions: time 1-2, carrying arms overhead and placing hands on the head, one over another and return with arms along the body; times 3-4, putting hands on hips and back; times 5-6, carrying a sidearm, return; times 7-8, carrying an arm stretched up and down the other side, while comeback" (Prodan, 2016).

Conduct directed reactions were tested by the subsequent elements and performance indicators:

- To perform the verbal command: walking "dwarf", 5-7 steps; Toe-walking, 5 to 7 steps; frog jumping, 3-5 jumps; riding "horses", a few meters. In total 8 points, 2 points for correctly executed sequence
- Easy runs to pass more than 5 obstacles (blocks or frames with a maximum height of 15 cm) located at 0.5 m distance; climb the climbing gym sitting on the bench with one end leaning on a pedestal 1-1.20 m high; by climbing down from the pedestal; throwing a ball the size of rounders' and they roll on the ground, 5-7 m with his right hand and then with his left hand, crawling under four tables. In total 10 points, two each for each sequence correctly executed.

Psychomotor parameters were tested by the following items and performance indicators (Prodan, 2016):

- On one foot standing ("Stork"), then on the other. Before testing children, they were shown maintenance of standing on one leg, the other being raised or bent at the knees, arms raised a side. The timer starts when the foot is lifted off the ground and stops when it returns to standing on both feet
- Walking along one gymnastics bench or on two benches put together, middle turn 360°, lowering jump back through 180°, went back 5-7 steps up to a line on the ground, walking with hands-on eyes 5-7 m, to the right of a predetermined landmark (line, box, pole, etc.), two rolls of squatting in the squat. 18 points, 4 for each sequence correctly executed.

The evaluation criteria and parameters for psychomotor motion behavior were: excellent - 18 points; well, between 10-16 points; satisfactory, between 6-10 points; unsatisfactory - under 6 points.

In this first phase, after the preliminary evaluation was conducted the initial assessment, which consisted of anthropometrical measurements and on motor capacity.

The second phase covered the period from November 3, 2014 to May 15, 2015, when was applied to the experimental group (62 subjects) the established "protocol" with the following objectives: static coordination enhancers, dynamic coordination of hands enhancers, improvers of general dynamic coordination, increment the speed of movements, improving basic motor skills luggage in close correlation with the level of bio-motor development, stimulating attention, memory motive, motivation during construction, incorrect body posture prevention. The objectives were reached through the training program and teaching strategy in two sessions per week (Prodan, 2016).

On the control group (62 subjects) was applied to the traditional teaching program.

In the third phase, from May 18 to May 29, 2015, was applied the transitional testing (granted to the settled protocol) in both groups: experimental and control. Data were recorded from all the subjects.

In the fourth phase, between October 5, 2015, and March 18, 2016, was applied to the experimental group (62 subjects) the established protocol by teaching sports game situations, according to the results

achieved in the transitional testing. On the control group (62 subjects) was applied for the classic teaching program.

The fifth phase was between March 21 and April 1, 2016, when the final evaluation was carried out. The potential driving force of both groups of subjects (124 subjects) was measured.

The last phase, between April 4 and April 15, 2016, was provided to process and interpret the data drawn from the experiment.

6. Findings

The consequences of this investigation bolster the feasibility of the "protocol" in the preschool program of exercises. One important note was that pre-schoolers of the two gatherings would be advised to come about at post-test appraisal than pre-test, in the wake of experiencing the "protocol" intervention. The size effect confirmed that pre-schoolers had developed some operational plans proposed by the motor qualities, taking into account the objectives set due to the results of the initial and transitional evaluation. In this research, upon the experimental group was administered a "protocol" for activity (educational sports games), while upon the control group was applied a classical program of sports activities, fine-tuned for participants' age.

The predominant outcomes got in the experimental group, appear to recommend that their level was determined by the particular setting of the "protocol" or the content differences. The results showed the effect of interaction, between the two variables Evaluation*Intervention, statistically significantly higher in the variables: vertical jump $\eta^2=0.012$; speed running $\eta^2=0.051$; torso bending $\eta^2=0.016$; torso extension $\eta^2=0.23$; tractions $\eta^2=0.21$; wall push-ups $\eta^2=0.53$.

Independent t-test results showed that the pre-schoolers in the experimental group, the mean values were altogether higher than those of pre-school children in the control group, for the following variables: vertical jump t-tests show significant differences between experimental and control groups stage interim study, $t(62) = 2.668$, ($p=0.009$). For variable speed running, $t(124 \text{ degrees of freedom} - d. o. f.)$ indicates significant differences between the experimental and control in the transitional stage ($t = 2.261$, $p = 0.025$) and the final one for the study, $t = 3.906$, ($p=0.001$). During initial phase differences are insignificant ($p>0.05$); If t-tests variable torso lifting (for 124 d. o. f.) indicate no significant differences between the experimental and control group in all three phases ($p>0.05$) (see Fig. 1). For variable traction, t tests (for 124 d. o. f.) indicate differences in the final phase of the study, $t = 5.252$, ($p=0.001$). In the first two stages are no significant differences ($p>0.05$). If the second test Running variable t (for 124 d. o. f.) show significant differences in the final phase of the study, $t = 4.504$, ($p=0.001$); in the first two stages are not significant differences ($p>0.05$).

Table 01. Descriptive Statistics for vertical jump

Intervention	Mean	Std. Deviation	N
Initial – control	4.63	1.656	62
Initial - experimental	4.46	1.813	62
Transitional - control	4.83	1.987	62
Transitional – exper.	5.15	2.118	62

Final – control	4.97	1.081	62
Final - experimental	6.88	2.216	62

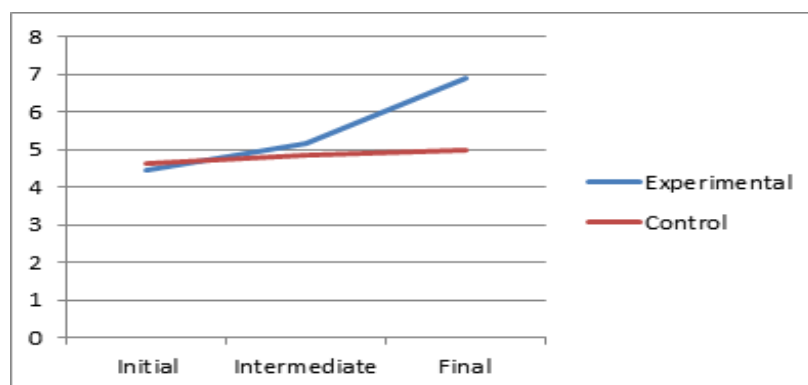


Figure 01. Vertical jump evolution for the two groups

Moreover, data collected for descriptive statistics indicate a statistically significant effect (medium to large) of the following variables: throwing tennis balls $F(1,122)=0.751$, $p=0.388$, $MSE=11.167$, $\eta^2=0.006$; vertical jump $F(1,122)=1.563$, $p=0.213$, $MSE=14.827$, $\eta^2=0.012$ (see Table 1.); speed running $F(1,122)=7.206$, $p=0.008$, $MSE=8.319$, $\eta^2=0.051$; commuting $F(1,122)=34.023$, $p=0.012$, $MSE=26.598$, $\eta^2=0.014$; torso bending $F(1,122)=38.676$, $p=0.001$, $MSE=311.753$, $\eta^2=0.008$; torso extension $F(1,122)=27.389$, $p=0.001$, $MSE=476.541$, $\eta^2=0.019$; tractions $F(1,122)=26.096$, $p=0.001$, $MSE=633.228$, $\eta^2=0.007$.

Thus, it was observed that the usual estimation of the experimental group was located in the focal point of the objective range, while the normal in the control group was in the base of the objective range. These outcomes reinforced the idea that the protocol was applied to guarantee preschool children expanded from medium to excellent motor skills.

After applying the conceived protocol to the experimental group, while upon the control group was used for the Romanian national educational program, the obtained values indicating the interaction between the Evaluation*Intervention (two variables statistically significant) were in the medium to large range, for the following tests: throwing tennis balls $\eta^2=0.08$; vertical jump $\eta^2=0.12$; speed running $\eta^2=0.13$; torso bending $\eta^2=0.015$; torso extension $\eta^2=0.002$; tractions $\eta^2=0.003$; wall push-ups $\eta^2=0.005$.

7. Conclusion

After analyzing the results, one can find that the when the degree of involvement of preschool children is higher in the correct performance of activities under the "Protocol", the gross motor skills are improved.

A superior comprehension of intentions behind physical movement or passiveness of youngsters could substantially add to confirm based arranging and advancement of national strategies for general wellbeing and dynamic living.

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