

The Sports Game – A Means of Developing Motor Skills in Secondary School

A Study on Strength and Endurance

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Abstract: The research has followed the way to improve the motor qualities by applying the specific means of the sports game (handball) to the designated learning units. In the present paper, there are displayed the results regarding the strength and resistance skills. The experiment took place during the 2017-2018 school years. There were involved 79 students from the seventh grade from two different schools in the rural environment. The process of preparing the specific means for developing the strength and resistance skills was replaced by the process of preparing the specific means for the handball game. There were 10 exercises selected containing elements from the handball game for each motor skill (strength /resistance) For the strength motor skill were assigned sixteen lessons (six lessons on the first semester and ten lessons on the second semester) and for the resistance skill were assigned 10 lessons only for the second semester. For resistance were used 3exerciții during one lesson which were replayed during the lesson from the same week. The allocated time was 3 to 5 minutes for each exercise. For strength were used two means during the lesson, the allocated time being of 5 to 7 minutes. For the evaluation were used four trials taken from the National System of Evaluation. The data were registered and processed through the statistics application SPSS 23.0. The results showed significant progress, after applying the selected exercises, for experimental groups.

Keywords: *Physical education, middle school, sports game, handball, motor skills, strength, resistance.*

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Introduction

The process of harmonious physical development represents a concern of the national education system. This concept encompasses physical growth and development in agreement with the intellectual and mental ones. In this context, physical education is part of the general education process.

The school curriculum proposes a flexible offer that allows the teacher to modify, supplement or replace learning activities. The aim is to achieve a personalized didactic approach, which will ensure the formation of the competences mentioned in the curriculum in the specific context of each class and each student. A specific approach to education at this age level is also needed, which should offer a wide range of learning differentiation according to student acquisition (MEN, 2017).

The documents regulating the content of Physical Education are part of the educational reform process that has taken place in recent years in our country. In order to harmonies' with the social requirements and the variety of the means of practice, new curricular documents for primary and secondary school level were proposed (MEN, 2013, 2014).

Curricular changes are the result of new approaches that implement varied forms of practice as an alternative to traditional ones. Experts' opinions from research performed at different age levels come to support these approaches (Carse, 2015; MacLean, Mulholland, Gray, & Horrell, 2015; Starc & Strel, 2012).

Motor qualities alongside basic or specific motor skills are the central concern regarding the content of practical lessons and the educational objectives of Physical Education and Sports subject (Bota, 2016; Drăgoi, 2016; Lyakh, Sadowski, & Witkowski, 2011).

The phenomenon of physical education is oriented towards practicing various activities (European Commission, 2013). Experts from Romania (Bădău, 2017; Mîndrescu, 2018) and from abroad propose alternative activities that have favorable effects for physical development and specific skill formation (Aadland, Kvalheim, Rajalahti, Skrede, & Resaland, 2017; Burns et al., 2015; Mahar, Guerieri, Hanna, & Kemble, 2011; Sibley, 2012). There are also concerns to highlight the multiple influences of physical exercise as a social phenomenon (Rus, 2013; Rus & Radu, 2014).

Play, as a form of education, is increasingly being promoted internationally. The games develop qualities, form skills but, at the same time, make the person practicing them feel like belonging to a group. This aspect of sport integration is highly valued in the domain-specific literature,

especially in the social and technological context of recent years (Hodges, Wicke, & Flores-Marti, 2018).

At a global level, there is more and more research that highlight the beneficial effects of gaming and the use of technological equipment or of the virtual environment (Chacon et al., 2017; Chaput, LeBlanc, Goldfield, & Tremblay, 2013; Reynolds, Benham-Deal, Jenkins, & Wilson, 2018).

We have chosen to apply handball-specific means because it is addressed in all schools in the pre-university environment because it does not require special basic equipment and it can be practiced by all the students of a class, regardless of gender. The proposed experiment consisted in replacing the traditional means of developing motor skills with handball-specific means. The present paper represents the equal contributions of all authors.

Methods

Subjects

The research, conducted during the school year, included 79 7th grade pupils from two secondary schools in the rural area. The experiment group consisted of 38 students (20 girls and 18 boys) from "Lascăr Catargiu" secondary school, Schela village. The control group consisted of 41 pupils (21 girls and 20 boys) from secondary school "Prof. Emil Panaitescu", Cudalbi village. Both schools are from Galati County. 10 lessons were allocated for endurance (only in the second semester) and 16 lessons (6 lessons in the first semester and 10 lessons in the second semester) were allocated for strength.

Procedure

Throughout the research, we have altered the learning units for the development of motor skills. The change consisted in the application of specific handball methods, which we considered to have a favorable influence on the development of the strength and endurance skills. The specific, traditional methods have been replaced to develop the above-mentioned motor skills. The activity was carried out according to the planning documents, which were approved by the school management. According to them, 10 lessons were allocated for endurance, only in the second semester, and 16 lessons (6 lessons in the first semester and 10 lessons in the second semester) were allocated for strength.

There have been selected 10 handball-specific methods in order to improve endurance and strength. They have been coded for easier

identification and use. In lessons where the improvement of strength was sought, we used 3 handball-specific methods in each lesson. These were resumed in the second hour of the same week. For the second semester, the working procedure was the same, but the specific exercises were grouped by 3 to adequately cover the higher number of hours allocated. The time allocated to practice a specific method was 3 to 5 minutes. For endurance, we used two handball-specific methods within one lesson, the allocated time being of 5 to 7 minutes. Further on in our paper, we are going to present the methods selected as part of the working procedure used during the experiment.

Exercises for the development of endurance by means of handball-specific methods:

E1: The group is divided into four or five teams: each team runs freely on the handball field, at its own pace, and permanently changes the order, the last one becoming the first; 3 sets x 90 sec with 30 sec active pause (walking);

E2: The group is divided into four teams: each team is placed in the four corners of the handball court and, at the teacher's whistle, all the teams start running in the same direction, along the courtsides, one after the other and keeping the initial distance; 3 sets x 90 sec with 30 sec active pause (walking);

E3: Students are divided into two groups, placed on the 6-m semicircles: they have to move left-right (1) and forwards-backwards (2) with arm movements specific to the defense game, the command (1/2) being changed by the teacher: 4 sets x 1 min, 30 sec active pause (walk to the center of the court and back);

E4: Students are divided into two groups, placed on one of the 6-m semicircles, one behind the other: the first group performs left-right, backward and forward movements, at the first whistle, and, at the next whistle, the group counterattacks up to the 9-m semicircle in front of the opponents' goal, then they return walking; then the second group executes the same routine: 2 sets x 6-8 executions, active pause between executions (30-40 sec.) and sets (1-2 min.);

E5: Students are divided into two groups and they are placed on one of the 6-m semicircles, one behind the other: the first group performs defense movements, they counterattack and then they muster in defense; then the second group executes the same routine: 8-10 repetitions;

E6: The team is divided into 8, 12 or 16 players, who are arranged in a square: the ball is passed laterally to the right or to the left by changing the

place with the front pair or with the student from the opposite corner: 3 sets x 90 sec. active pause 30 sec. ;

E7: Students are divided into two groups, each occupying half the court: each pupil will have a ball with which he will dribble in different directions and a pupil who doesn't have the ball, will try to retrieve the ball, the one who loses the ball will take place of the pupil who didn't have the ball: 3 sets x 90 sec., active pause 30 sec.;

E8: Students are divided into two groups and organized in two rows, one by each goal, at 5m from the center of the court: the pupils execute multiple dribbles, followed by throwing to the goal from the 9-m.line, the ball is retrieved and the group is changed: 6-8 repetitions for each group;

E9: Students are divided into groups of three at the 6-m. semicircle: they execute passes by exchanging places towards the other goal, the ball is thrown from the student who is in the middle, followed by him throwing the ball to the goal, and then by the three pupils walking back: 10-12 repetitions;

E10: Students are divided into two groups of three on the center line of the court: the student who has the ball dribbles towards the goal up to the 9-m semicircle and passes back to one of the two players; after the pupil catches the ball, he executes the penetration and passes to the third one, who dribbles and throws, by jumping, to the goal, then he walks and places himself in the other group: 2 sets x 10-12 reps;

Exercises for the development of strength by means of handball-specific methods:

S1: Successive jumps on one or both legs holding the handball;

S2: Successive jumps on the spot and or by slowly moving, holding the handball between the ankles;

S3: While running, the ball is thrown into the air, high jumping and catching the ball in the air;

S4: Successive long jumps and catching the ball passed by the partner;

S5: Squat jumping with catching and passing the medicine ball (1 kg) to a partner;

S6: Throwing to the goal while running (3-5 m.) with the medicine ball (1kg) from all posts;

S7: Throwing to the goal while running over various obstacles (the gymnastics box);

S8: Throwing to the goal while running from different tactical situations and, when jumping, a partner holds him by the waist at all times, trying to prevent him from throwing the ball;

S9: Passes in pairs, by jumping, over the volleyball net;

S10: From a lay down position, with the arms bent at the level of the chest, the students have to hold the medicine ball (1-2 kg); they have to push it, throw it and then catch it when they raise their torso;

For assessment, 4 trials from the National Evaluation System (NES 1999) were used:

- 1000-m endurance running(boys) and 800-m endurance running (girls).It took place within the school, on the sports field, on the respective distances for boys and girls. The test was performed in groups of 4-6 students and the time was recorded in minutes and seconds.

- Standing long jump The student stands at a line marked on the ground with the feet slightly apart. He takes off and lands using both feet, swinging the arms and bending the knees to provide forward drive. Two executions were performed and the length of the best jump from the line to the heel was measured.

- Crunches, 30 seconds Lying on the back, with the palms behind one's neck, the legs fixed. At the teacher's signal, the torso is raised up to the vertical position and then the student returns to his original position. The number of executions performed in 30 seconds is recorded.

- Back hyperextensions from a face-down position, 30 seconds From a face down position, with the hands behind one's neck and the legs fixed, the student raises his torso, above the height of the gymnastics bench and then they return to the initial position. The number of executions performed in 30 seconds is recorded.

Results and discussions

After applying the trials from the National Evaluation System (MEN, 1999), we obtained data that would lead us to the results of the research. These data, collected in the initial and final trials, were statistically analyzed in order to provide a greater degree of scientific relevance to the performed research. Statistical data processing was performed using SPSS 23.0.The statistical analysis was carried out in two directions. On the one hand, statistical analysis was carried out within the groups to see whether, by using different means of training, the different groups obtain favorable results in the training process. On the other hand, the statistical analysis of the data obtained was performed between the control group and the experimental group to see if the use of the handball-specific methods had a favorable effect on the improvement of the motor skill manifestation indices, especially on the strength and endurance skills. The results recorded by the groups of girls are presented in Table 1 and Table 2.

Table 1. The statistical analysis within the groups of girls

Groups Trials	Girls					
	Control group (n=24)			Experimental group (n=24)		
	T.I. x±S	T.F. x±S	t	T.I. x±S	T.F. x±S	t
800-m endurance running (min)	4.35±.08	4.32±.08	13.03*	4.34±.08	4.28±.06	12.39 *
Standing long jump (m)	1.58±.10	1.69±.12	-13.02*	1.61±.12	1.73±.12	-20.72*
Crunches (no. rep./30 sec.)	18.57±2.01	21.52±1.63	-12.62*	18.77±1.90	22.31±1.42	20.77*
Back hyperextensions from a face-down position (no. rep./30 sec.)	19.85±1.15	22.19±1.07	-9.62*	19.54±1.56	23.40±1.36	-23.40*

*p<.001

The statistical analysis was carried out separately for girls and boys, to allow a discussion about them.

As it can be seen in Table 1, both groups of girls had similar values regarding the performance averages achieved in the initial trials. In the final trials, they achieved favorable results, superior to the original ones. These results were superior for all 4 trials. By comparison it can be said that the progress achieved by both groups of girls was significant because the value of the significance limit is $p < 0.001$. Therefore, it can be appreciated that, regardless of the means used, the effects on the pupils were favorable in improving endurance and strength.

Table 2 presents the statistical analysis of the results obtained by the groups of girls in the final trials.

Table 2 Statistical analysis of the results obtained by the groups of girls in the final trials

Groups Trials	Girls		
	Control group (n=24)	Experimental group (n=24)	t
	T.F. x±S	T.F. x±S	
800-m endurance running (min)	4.32±.08	4.28±.06	1.51
Standing long jump (m)	1.69±.12	1.73±.12	-0.92
Crunches (no. rep./30 sec.)	21.52±1.63	22.31±1.42	-2.34*

Back hyperextensions from a face-down position (no. rep./30 sec.)	22.19±1.07	23.40±1.36	-3.23*
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*p<.05

The statistical analysis among the groups aimed at comparing the results of the groups of girls only in the final testing. As it can be seen in Table 2, the results were favorable to the experimental group for 3 trials out of the 4 tested. For the "800-m endurance running", the experimental group recorded an average performance value (4.28 min) lower than that of the control group (4.32 min.). The progress obtained in this trial is therefore insignificant ($p > 0.05$). In the case of the "Standing long jump" trial, the average performance values obtained by the experimental group (1.73 m) were superior to the results of the control group (1.69 m). However, the progress of the experimental group for this trial is not significant because $p > 0.05$.

The experimental group of girls obtained superior results in the case of the trials that tested the strength of the torso muscles. For these trials, the average value of the obtained results was significant ($p < 0.05$).

The same type of statistical analysis was performed for the boys. The results obtained by them in the initial and final trials are presented in Table 3 and 4.

Table 3. The statistical analysis within the groups of boys

Groups Trials	Boys					
	Control group (n=22)			Experimental group (n=24)		
	T.I. x±S	T.F. x±S	t	T.I. x±S	T.F. x±S	t
1000-m endurance running (min)	4.39±.05	4.33±.05	11.07*	4.38±.04	4.29±.04	20.68*
Standing long jump (m)	1.76±.07	1.86±.09	-13.10*	1.74±.06	1.87±.08	-15.19*
Crunches (no. rep./30 sec.)	21.70±2.15	25.20±1.28	-7.98*	21.16±1.85	26.00±1.60	-15.83*
Back hyperextensions from a face-down position (no. rep./30 sec.)	21.60±2.64	22.90±2.31	-8.85*	22.66±2.05	25.38±2.09	-7.56*

*p<.001

From Table 3, it can be seen that in the initial tests the average performance values obtained by the groups of boys had similar values. In the final tests, the average values of the obtained results were superior to those from the initial tests for both groups involved in the research. This indicates that the learning process was efficient. The methods used, even if they were different, they led to an improvement in the motor skill manifestation indices. For both groups, the favorable results indicated significant progress ($p < 0.001$) for all 4 trials used in the assessment.

Table 4 presents the analysis of the average performance of the groups of boys in the final testing.

Table 4 Analysis of the average performance of the groups of boys in the final testing

Groups	Boys		t
	Control group (n=24) T.F. x±S	Experimental group (n=22) T.F. x±S	
1000-m endurance running (min)	4.33±.05	4.29±.04	2.20*
Standing long jump (m)	1.86±.09	1.87±.08	-0.22
Crunches (no. rep./30 sec.)	25.20±1.28	26.00±1.60	-1.70
Back hyperextensions from a face-down position (no. rep./30 sec.)	22.90±2.31	25.38±2.09	-3.46**

* $p < .05$, ** $p < .001$

We can see that the experimental group recorded positive results as compared to the control group in all 4 trials. These results do not mean that the experimental group achieved significant results, even if they are favorable.

From this perspective, the result of the experimental group (1.87 m) is not significant ($p > 0.05$) as compared to the result of the control group (1.86 m) for the "standing long jump" trial. Also, for the "crunches" trial, the average performance value of the experimental group (26 reps), although superior to the average performance of the control group (25.2 rep.), does not represent significant progress ($p > 0.05$).

The experimental group of boys achieved a significant improvement ($p < 0.05$) in the case of the "1000-m endurance running" trial with an

average performance value of 4.29 min. The best result recorded by the experimental group of boys was in the trial of "back hyperextensions from a face-down position". The average value of the obtained results (25.38 reps) led to a markedly significant progress ($p < 0.001$) as compared to the average value of the control group performances (22.90 rep.). After analyzing the results of the groups of boys, it can be stated that the use of methods specific to sports games has led to a moderate improvement in endurance and strength.

In the practice of physical education, the improvement of the indices of manifestation of the motor skills is equivalent to the formation of specific competencies. The use of sports play within the learning units can help improve these indices. Applying the games used in research o lessons will increase the attractiveness of the lesson. This is because sports play involves more students than specific means of physical training. The time spent on exercise should be increased when using sports as a means of education. Game-related aspects are not relevant to curricular purposes, but those related to motor-class performance indices are significant because they are found in day-to-day activities.

Conclusion

As a result of the research, we can draw more conclusions regarding the use of handball-specific methods in order to develop endurance and strength in students.

From the point of view of the results obtained in the experimental classes, we can see that the use of sports games-specific means was effective. The statistical analysis showed that students had higher endurance and strength manifestation indices after using the above-mentioned methods.

From the point of view of the progress made by comparison with the control groups, the sports-games-specific methods cannot be considered as being more efficient. Only in the "back hyperextensions from a face-down position" trial both experimental groups recorded average performance values that were considered significant ($p < 0.001$). For the "standing long jump" trial, both experimental groups recorded average performance values that were not considered to be significant as compared to those of the control groups ($p > 0.05$).

By using handball-specific methods, the experimental group of girls better developed the strength of the anterior torso muscles ($p < 0.05$). For the experimental group of boys, the same methods had a better influence on the development of endurance ($p < 0.05$).

We may assert that the use of sport-specific methods is a favorable prerequisite for the development of the motor skills of endurance and strength. We can also appreciate that, by using other methods, which are considered traditional, regarding the influence of endurance and strength manifestation indices, good results were also obtained by the control groups in the final tests ($p < 0.001$).

The influences that a category of methods may have depend on several variables. The basic material conditions, the students' interest in some types of exercises, the accessibility of the proposed methods or the number of hours allocated to a learning unit can influence the results regarding the improvement of motor skills.

In the cases in which the results were not significant, we believe that this was due to the insufficient hours allocated for the development of endurance and strength. At the same time, the short time spent in a lesson for developing motor skills is a limiting factor for their development.

Because the use of sports games-specific methods has had beneficial effects, we believe that this form of exercise can be beneficial to the educational process at this age level.

References

- Aadland, E., Kvalheim, O. M., Rajalahti, T., Skrede, T., & Resaland, G. K. (2017). Aerobic fitness and metabolic health in children: A clinical validation of directly measured maximal oxygen consumption versus performance measures as markers of health. *Preventive Medicine Reports*, 7, 74-76. doi:10.1016/j.pmedr.2017.05.001
- Bădău, D. (2017). The educational impact of implementing the education through adventure subject in the physical education and sports academic curriculum. *Physical Education of Students*, 21(3), 108–115. doi:10.15561/20755279.2017.0302
- Bota, E. (2016). Contribution of the game in the development of motor skills during the physical education class. *Timisoara Physical Education and Rehabilitation Journal*, 6(11), 59-63.
- Burns, R. D., Hannon, J. C., Brusseau, T. A., Eisenman, P. A., Saint-Maurice, P. F., Welk, G. J., & Mahar, M. T. (2015). Cross-validation of aerobic capacity prediction models in adolescents. *Pediatric exercise science*, 27(3), 404-411. doi:10.1123/pes.2014-0175
- Carse, N. (2015). Primary teachers as physical education curriculum change agents. *European Physical Education Review*, 21(3), 309-324. doi:10.1177/1356336x14567691

- Chacon, C. R., Zurita, O. F., Castro, S. M., Garces, T. E., Martinez, A. M., & Cortes, A. J. P. (2017). Motivational climate in sport and its relationship with digital sedentary leisure habits in university students. *Saude E Sociedade*, 26(1), 29-39. doi:10.1590/s0104-12902017166561
- Chaput, J. P., LeBlanc, A. G., Goldfield, G. S., & Tremblay, M. S. (2013). Are active video games useful in increasing physical activity and addressing obesity in children? *JAMA Pediatrics*, 167(7), 677-678. doi:10.1001/jamapediatrics.2013.2424
- Drăgoi, C. C. (2016). Comparative study regarding the development level of reaction and movement speed in 10-12-year-old children. *Gymnasium-Scientific Journal of Education, Sports, and Health*, 8(2S), 1-14.
- European Commission. (2013). Physical Education and Sport at School in Europe. Eurydice Report. Luxembourg: Publications Office of the European Union, 7-20. Retrieved from <https://eacea.ec.europa.eu/sites/2007-2013/archiving>
- Hodges, M., Wicke, J., Flores-Marti, I. (2018). Tactical games model and its effects on student physical activity and gameplay performance in secondary physical education. *Physical Educator-UV*, 75(1), 99-115. doi:10.18666/tp-2018-v75-i1-7551
- Lyakh, V., Sadowski, J., Witkowski, Z. (2011), Development of coordination motor abilities (CMA) in the system of long-term preparation of athletes, *Polish Journal of Sport Tourism*, 18(3), 187-191. doi:10.2478/v10197-011-0014-6
- MacLean, J., Mulholland, R., Gray, S., & Horrell, A. (2015). Enabling curriculum change in physical education: the interplay between policy constructors and practitioners. *Physical Education and Sport Pedagogy*, 20(1), 79-96. doi:10.1080/17408989.2013.798406
- Mahar, M. T., Guerieri, A. M., Hanna, M. S., & Kemble, D. (2011). Estimation of aerobic fitness from 20-m multistage shuttle run test performance. *American Journal of Preventive Medicine*, 41(4), 117-123. doi:10.1016/j.amepre.2011.07.008
- Ministerul Educației Naționale (MEN). (2013). School curricula for Physical Education and Sport, The preparatory class, 1st and 2nd grades.
- Ministerul Educației Naționale (MEN). (2014), School curricula for Physical Education and Sport, 3rd and 4th grades.
- Mîndrescu, V. (2018). The formative role of dance sport in the extracurricular activities in gymnasium. In M. Veaceslav, C. M. Rus & S. Rusnac (Eds.), *New approaches in social and humanistic sciences* (pp. 283-293), Proceedings Volume: 3rd Central & Eastern European LUMEN International Conference – New Approaches in Social and Humanistic Sciences, NASHS 2017, Chisinau, Republic of Moldova, June 8-10, 2017. Iasi, Romania: Lumen.

- Reynolds, C., Benham-Deal, T., Jenkins, J. M., & Wilson, M. (2018). Exergaming: Comparison of on-game and off-game physical activity in elementary physical education. *Physical Educator-US*, 75(1), 64-76. doi:10.18666/tpe-2018-v75-i1-7533
- Rus, C. M. (2013). Communication characteristics during teaching physical education and sport. *Sport science*, 6(2), 82-84.
- Rus, C. M., & Radu, L. E. (2014). The implications of physical education and sport in the moral education of high school students. *The Research and Social Intervention Magazine*, 45, 45-55.
- Sibley, B. A. (2012). Using sport education to implement a CrossFit unit. *Journal of Physical Education, Recreation & Dance*, 83(8), 42-48. doi:10.1080/07303084.2012.10598829
- Starc, G., & Strel, J. (2012). Influence of the quality implementation of a physical education curriculum on the physical development and physical fitness of children. *BMC Public Health*, 12(1), 2-7. doi:10.1186/1471-2458-12-61