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## Motor skill development for children between the ages of 6 to 8 as a result of finishing an initiation level swimming course

Dan Ionuț PÎRJOL<sup>1</sup>, Marcel RĂSĂDEAN<sup>2</sup>, Petre BANIAȘ<sup>3</sup>

### Abstract

*Introduction:* Swimming, as an activity, covers many of the basic humanistic needs by creating a state of wellbeing as well as help form a holistic person by developing their motor skills, cognition and affection through the stresses of training for competition or just by practicing for recreational purposes. Various scientific studies show the importance of the motor skill component when selecting those fit for competitive swimming. Additionally, there are other studies that demonstrate that swimming can have an anthropometric effect over the body. *The purpose* of our study was to test if an initiation level swimming course would produce a development of basic motor skills in children between the ages of 6 to 8. *Methodology and Participants:* for this study we recruited 10 participants out of which 5 were girls and the remaining 5 were boys. Their age ( $7,1\pm 0,73$ ) is between 6 and 8 where two of the children are 6 years of age, five are 7 years of age and the last three are 8 years of age. In order to conduct the study, we employed a set of tests that rely on 7 events extracted from the stock of EUROFIT tests. *Results:* the final results show that the participants have improved their performances with strong statistical significance. *Conclusions:* Undergoing an initiation level swimming course results in a noticeable development of motor skills as well as from the homogeneity of the group, which is considerably improved at final testing.

**Key words:** swimming, motor skill, initiation.

### Rezumat

Introducere: Înotul acoperă necesitățile de bază ale ființei umane de la o stare de bine, la o formare integrală a persoanei din punct de vedere motor, cognitiv, afectiv, de la îmbunătățirea condiției fizice la necesitatea antrenării pentru competiții sau doar în sens recreativ. Există studii de specialitate care demonstrează importanța calităților motrice în selecția pentru înotul de performanță. Alte cercetări ne arată importanța practicării cursurilor de înot asupra schimbărilor indicilor antropometrici. Scopul studiului nostru a fost de a verifica dacă prin parcurgerea lecțiilor de inițiere în înot a copiilor de 6-8 ani, dezvoltăm calitățile motrice de baza. Participanți și metoda: pentru acest studiu am recrutat 10 subiecți, dintre care 5 fete și 5 băieți, în ceea ce privește vârsta subiecților ( $7,1\pm 0,73$ ), ea este cuprinsă între 6 și 8 ani, dintre care 2 copii au vârsta de 6 ani, 5 au vârsta de 7 ani și 3 subiecți au 8 ani. În vederea realizării cercetării a fost realizat un set de teste care conține 7 probe, din bateria de teste EUROFIT. Rezultate: din testările finale reiese faptul că atât performanțele testatilor au fost îmbunătățite, cât și omogenitatea a fost mai mare din punct de vedere statistic, iar diferențele au fost semnificative. Concluzii: Practicarea cursurilor de inițiere înot, au un impact important asupra organismului atât din punct de vedere al calităților motrice care se dezvoltă simțitor, cât și din punct de vedere al omogenității grupului care se îmbunătățește considerabil la testarea finală.

**Cuvinte cheie:** înot, calități motrice, inițiere.

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<sup>1</sup> PhD Student, West University of Timisoara, Romania, Faculty of Physical Education and Sport, e-mail: [ionut.pirjol07@gmail.com](mailto:ionut.pirjol07@gmail.com)

<sup>2</sup> Lecturer, West University of Timisoara, Romania, Faculty of Physical Education and Sport

<sup>3</sup> Assoc. Prof., West University of Timisoara, Romania, Faculty of Physical Education and Sport

## Introduction

Swimming meets the basic needs of a human being, from general well-being to wholesome personal development in regards to motor, cognitive and emotional function. Its benefits are reaped whether it is engaged in for general fitness, as competition training, or just for fun.

The greatest advantage swimming presents is that the muscles and joints are exercised without having to support body weight, therefore reducing tension and minimizing the risk of injury. A good candidate for such exercise would be someone whose daily work proves a major strain on their joints, especially the knees and hips. During exercise in water, such strain is not felt, since the effects of gravity are felt differently [3, 11].

All sports have health benefits when correctly engaged in. Swimming, however, has a set of unique characteristics that other types of aerobic exercise do not have. Among them, it leads to remarkable cardiac-pulmonary endurance, it stimulates blood flow, contributes to stable blood pressure, reduces the risk of heart disease, it develops most muscle groups, strengthens ligaments, enhances flexibility, helps ameliorate anxiety and depression, stimulates physical and psychological growth and improves psycho-motor functions [1, 3].

Motor capacity is an organism's attribute that governs its ability to move with a certain speed, force, endurance and skill [7].

The aim of this paper is to prove that children's base motor functions (speed, endurance, force, skill and mobility) are developed when they engage in basic swimming lessons, and that group homogeneity increases.

Specialist studies prove the significance that motor function has in the selection process for performance swimming.[5] Other studies show the importance of swimming in relation to changing anthropometric parameters [9].

A recent study (2015) details the significant changes in motor function that a group of first graders in a Polish school underwent, after going through a swimming course [6].

## Materials and methods

Research was conducted in Timișoara, during the months of April and July 2014, tests being run on

the children who regularly attend the swimming courses held by the Studio Fit sports club in Dumbrăvița.

Ten subjects underwent tests, of which five boys and five girls, all aged between 6 and 8 years old (median age  $7.1 \pm 0.73$ ). Two children were of age 6, five of age 7 and three of age 8.

Testing for this piece of research consisted of a set of 7 tasks selected from the EUROFIT set [8].

The experiment consisted in testing children before starting out the swimming course and after 2 months of training in the water. Sessions were organized 2 times a week, every Tuesday and Thursday, each lesson taking 55 minutes. The lessons included all the specific steps of learning how to swim. [1, 10] The training spanned a total of 16 hours of swimming, children gladly engaging in all sessions.

The 7 tasks engaged in as part of testing were:

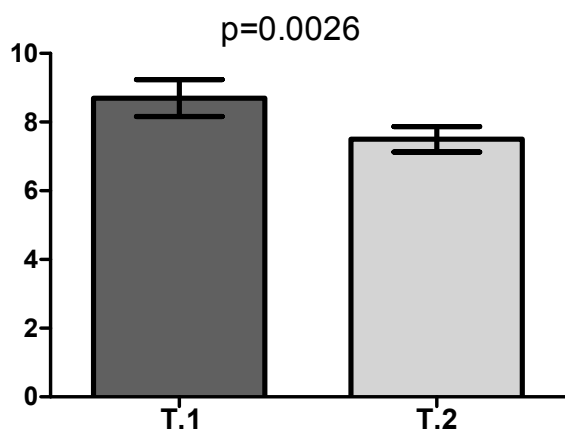
1. A 5 x 5m shuttle run test which involves sprinting at maximum speed and changing direction
2. Push-ups to measure upper body strength and speed
3. Squats to measure lower body strength and speed
4. Standing broad jump test, measuring explosive leg power
5. Abdominal crunches to measure core muscle strength and speed
6. Back extensions, measuring back muscle strength
7. Sit and reach test to measure spinal cord flexibility.

## Results

For this paper we have used the GraphPad Prism 6 statistics analysis software in conjunction with the paired T test to analyze result variations, both in the initial and final tests.

**Tabel 1. Results**

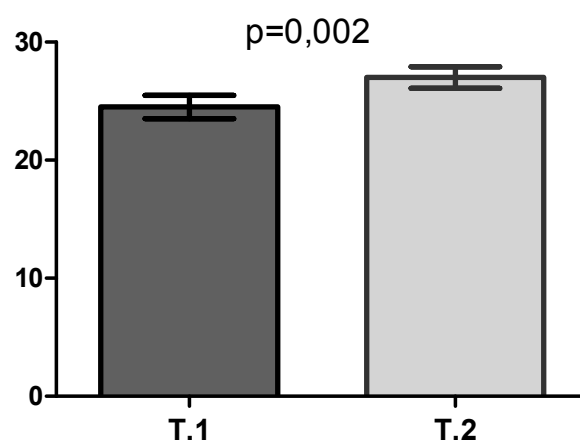
Task	Average		Variation coefficient	
	Initial test	Final test	Initial test	Final test
P1	8.7	7.5	22%	18%
P2	24.5	27	14%	12%
P3	28.3	31.5	21%	14%
P4	108.6	119.8	24%	18%
P5	19.1	22.7	42%	30%
P6	20.7	22.6	20%	18%
P7	2.7	3.2	50%	47%



**Figure 2.** Trend for Task no. 1 – Shuttle Run Test  
*Legend:* T.1: Initial testing; T.2: Final testing.

Result analysis shows that most subjects have improved their performance by 1 to 3 seconds. Subject no. 2 improved the most, gaining 3 seconds. The other results were comprised of: 2 subjects progressed by 2 seconds, 5 subjects progressed by 1 second and 2 did not register any progress.

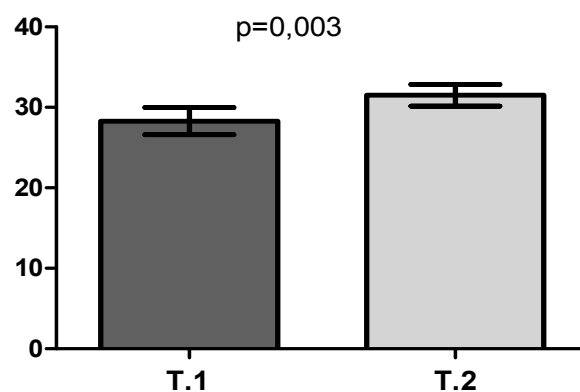
Result variability has also dropped, from an initial value of 22% to a final value of 18%. Statistically, the group has medium variability, since the final calculated value (18%) fits into the 10-20% range. After calculating the P value (0.0026), the difference between the initial and final tests is not statistically significant.



**Figure 3.** Trend for Task no. 2 - Push-ups  
*Legend:* T.1: Initial testing; T.2: Final testing.

Push-up test results show that one subject improved by 6 repetitions, one by 4 repetitions, four by 3 repetitions, two by 2, and finally, two did not progress at all.

At the outset of the experiment the variability value was 14%, and at the end it was 12%, a 2% increase. Statistically, the group has medium variability, since the final calculated value fits in the 10-20% range. The difference between the two tests is statistically significant because the P value is 0.002.



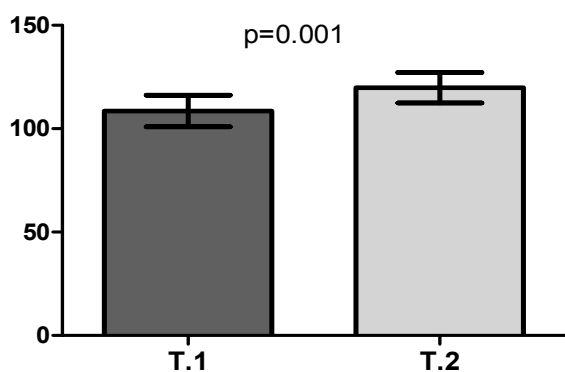
**Figure 4.** Trend for Task no. 4 – Squats  
*Legend:* T.1: Initial testing; T.2: Final testing.

Measured values for the initial squats test ranged between 15 and 35 repetitions, with a variability of 21%. The final test registered values between 21 and 37 repetitions, with a variability of 14%.

Subject no. 10 achieved the greatest performance increase, bettering his score by 6 repetitions, one other subject outdoing his initial score by 5 repetitions, two subjects by 4 repetitions, two by 3 repetitions, 3 by 2 repetitions and one did not manage to improve.

The group exhibited medium variability for the squats test, since the final calculated value of 14% fits into the 10-20% range.

After calculating the value of P (0.003) we can state that the difference between the two tests is significant.



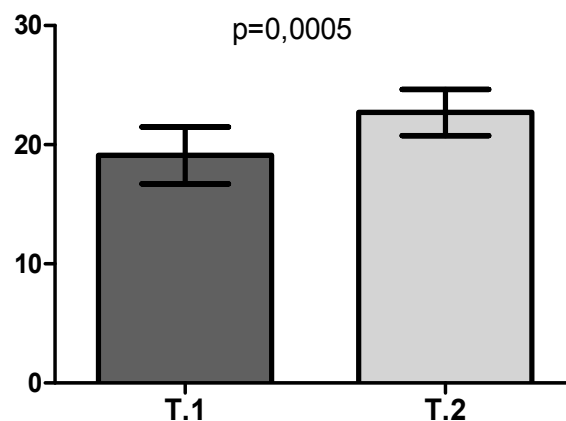
**Figure 5.** Trend for Task no. 4 - Standing broad jumps

*Legend:* T.1: Initial testing; T.2: Final testing.

Result analysis shows that while the initial test recorded values ranging between 53 and 140 cm, the final test had results between 60 and 150 cm. Subject no. 2 had the best performance increase, going from 95 cm at the start to 115 at the end.

Calculated initial variability had a value of 24%, going down to 18% by the end of the experiment. The group has medium variability, since its final value can fit into the 10-20% range.

The value of P (0.001) indicates that the difference between the initial and final tests is statistically significant.



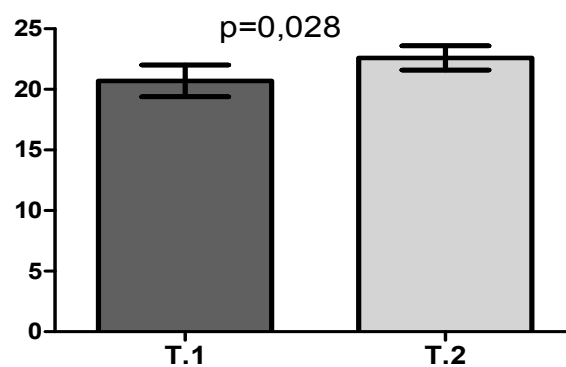
**Figure 6.** Trend for Task no. 5 - Abdominal crunches

*Legend:* T.1: Initial testing; T.2: Final testing.

Values for the initial test ranged between 7 and 29 repetitions, with a variability of 42%, while values for the final test ranged between 15 and 30 repetitions, with a variability of 30%.

Statistically the group is not homogeneous at all, since the variability value is 30%, well over the 20% ceiling.

The difference between initial and final test results is statistically significant, since P equals 0.0005.



**Figure 7.** Trend for Task no. 6 - Back extensions

*Legend:* T.1: Initial testing; T.2: Final testing.

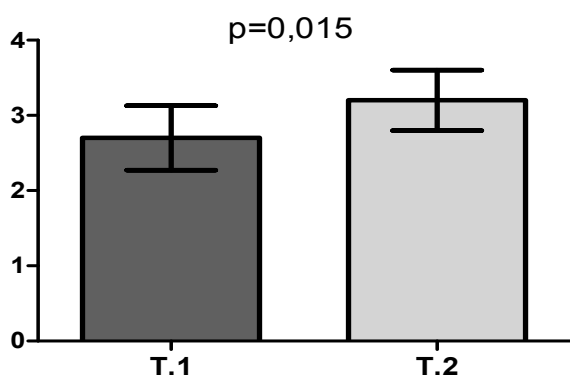
The initial variability for this test was 20%, measured values ranging between 14 and 20, while the final variability was 18%, values ranging between 17 and 27.

Subjects no. two and 5 improved the most on their initial scores, by 5 extra repetitions. Six of the

remaining subjects improved by 2 repetitions and two subjects improved by 1 repetition.

This test's results have medium variability, since the final calculated value fits in the 10-20% range.

The P value (0.028) indicates that the difference between the initial and final tests is statistically significant.



**Figure 8.** Trend for task no. 7 - Sit and reach test

Legend: T.1: Initial testing; T.2: Final testing.

Values measured in the initial flexibility test ranged between 0 to 5 cm, with a variability of 50%. Subsequent performance in the final test ranged between 1 and 5 cm, with variability dropping down to 47%.

The difference between the two tests is statistically significant, since the calculated P value is 0.015.

### Conclusions

The final results show that the results of individual subjects improved, while group homogeneity increased, with statistically significant results.

While on the initial test, most tasks results lacked homogeneity, following the swimming lessons we observed medium variability of results, fitting into the 10-20% range. One task had results with lower

variability, in the range of 0-10%, while two tasks had higher variability, over 20%.

The task that presented the best outcome was the one involving abdominal crunches, which improved on its variability by 12%, while the tasks with the least progress were the ones involving push-ups and back extensions, at 2% improvement.

The results we obtained confirm the current paper's hypothesis, which states that basic swimming lessons have an important impact on the body, noticeably improving motor functions, as well as group homogeneity by the experiment's end.

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