Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XII, ISSUE 2 Supplement 2012, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST, DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengace Learning

THE ROLE OF AQUATIC ACTIVITIES IN THE DEVELOPMENT OF PSYCHO-MOTOR SKILLS IN INFANTS

ŞALGĂU SILVIU[1], DOBRESCU TATIANA[1], LUPU GABRIEL STĂNICĂ[1]

Abstract

Purpose. The aim of this research was to experimentally prove the beneficial effects of water activities in infants.

Methods. The experiment, the test, the observation, the statistical-mathematical method, the graphical representation.

Results. The values of the experimental group were found to be higher than the ones for the control group.

Conclusions. Our hypothesis, "*The practice of physical exercise in an aquatic environment stimulates the psycho-motor development in infants"* was confirmed.

Key words: infants, psycho-motor skills, development, aquatic activities

Introduction

In the field of physical education in general, but also in the field of school physical education, we can signal the existence of several conceptual preoccupations regarding the diversification of the activity content, promoting new ways meant to enlarge the beneficial influence brought by exercise.

In the context of relative turmoils regarding the consolidation of the physical education status as an academic field, the phrase "physically educated" can be heard more and more often, and is considered to be a rightful component of the global basic education of the future members of society. They must be well educated, intellectually and physically.

Regarding the diversification of the physical education activity content, the "aquatic activities" are more and more visible, and moreover, the phrase "aquatic education" can be heard more often, this being a right step toward **considering the aquatic activity as a rightful component of physical education, and not just a training stage in teaching swimming.**

The aquatic activities are widely used in many European, North American, and other countries; they have a long history and are in a continuous development. In Romania, the clubs promoting aquatic activities as such, appeared at the beginning of the nineties, and are still very few of them.

The promoters of aquatic activities consider the action of raising a child as the most important task an adult can have, that is why raising your child "intelligently" by choosing the best options for him, is necessary in order to give the child a good start in life. The first three years in a child's life are the most important. What happens in these years, from the point of view of the child's development, has an important impact on his future life. **(FLEGEL, J., KOLOBE, T.H.A., 2002)**

Numerous scientific studies have proven the existence of a positive correlation between aquatic activity and movement synchronization; by trying to find his balance, the child experiments with his motor abilities and his creativity, as well as with the effects of risk, taking it into account as being a part of his environment. This psycho-motor development can lead to an earlier development of the motor skills.

As a premise, understanding the aquatic education as a basic condition, we must consider the infants' natural predisposition for floating. The infant's body density predisposes him to a natural horizontal flotation, while he retains, from his intrauterine life, an instinctual reflex to block his airways when immersed.

The aquatic environment, with its three spatial dimensions, offers new feelings to infants that lead them to explore various situations. This bodily and sensory "consciousness" must be encouraged.

We must also consider another characteristic of water, which is its great power of calming the infants, this being a favoring factor for the water activities.

Placing a new-born baby in an aquatic environment ensures continuity for the intrauterine development, thus accelerating the bio-psycho-somatic development through the autonomy of the movements. The children practicing simple aquatic movements can learn faster to walk on their own, in comparison with the ones that did not benefit from this psycho-motor stimulation. Immersion programs develop psycho-motor skills, especially by stimulating the perceptive activity, as an elementary experiencing process.

The great advantage of an aquatic session is a low demand on the bones, ligaments, and tendons. This advantage leads to the possibility of performing a large number of various movements that on land are not yet accessible to the child.

The 0-6 month old children rediscover in water

[1]Faculty of Movement, Sports, and Health Sciences, „Vasile Alecsandri" University of Bacău, ROMANIA
Email: salgausilviu@yahoo.com
Received 4.05.2012 / Accepted 4.08.2012

the environment that they left a short while ago.

The existence of a direct or indirect link between the specific reflexes and the later voluntary movements still remains unknown. A few of these reflexes can be stimulated in water in 0-4 year-old children. (**GRECU, A., 2006)** The great majority of the studies have shown that the effects of early psycho-motor stimulation in infants have positive influences on their future psycho-motor development. In infants, the movement reflexes used for the motor development can be successfully stimulated in water.

The researches conducted on this subject in the U.S.A. have demonstrated a series of stimulating effects produced by these programs performed in water: they have the potential to "increase" the child's intelligence, concentration skills, attention, and perception. Its favorable effects regarding social implications, emotional, and psychological, have also been proven. Of course, the manifestations regarding the cognitive and motor development need time, patience, and repetition. This has been proven by American researchers during 12 months children programs. (**GRECU, A., 2011)**

Water is a protective and stimulating environment for infants, and this is due to the lack of gravity. Optimal learning conditions, combined with patience and attention, can have beneficial effects also on a traumatized child.

A lot of children learn to move in water before they learn to walk. While they make progress in this direction, we can witness **an improvement of the coordination ability and endurance**, and an **improvement of the respiratory system.**

The practice and precision of water exercises have also an influence on sleeping. The parents have noticed an improvement of the **child's sleep**. **The early aquatic activity increases the child's self-confidence and independence** through the free movements performed in water that are impossible to perform on land at this age. Most times the aquatic activities start at the age of 3-4 months, but they an also start in the infant's first month of life.

The development stages reflect the progress of motor skill learning, of cognitive skills, and personal development in infants. **In each stage, they manifest personal, motor, and cognitive characteristics that determine their ability to engage in aquatic activities and to learn through them.**

Motor development refers to postural, locomotor, and manipulative aspects, while cognitive development refers to the modifications regarding the knowing, being aware, and understanding the environment, the daily events, and ways of communication. The development of emotional intelligence refers to the modifications related to the emotional needs and social skills.

Thus, we must admit that the aquatic activity can have a real influence on the psycho-motor development of the child. (IONESCU, M., ANGHELESCU, C, BOCA, O, HERSENI, I., POPESCU, C., STATIVA, E., ULRICH, C, NOVAK, C., 2010)

Aim of this research

The aim of this research was to experimentally prove the beneficial effects of water activities in infants, with regards to the development of psycho-motor skills, as a prelude to the individual's entire motor activity.

Objective of this research

The main objective of this research was to verify and confirm the hypothesis.

This research is a longitudinal analytical study, conducted over a period of 8 weeks, on two groups, one experimental, and one for control, the dependent variable being the age, which implies the process of growth and development, while the independent variable was a program of aquatic activity that was administered only to the experimental group.

Premises

Psycho-motor skills are a synthesis of the mental and motor skills allowing the individual to adapt harmoniously to his/her environment.

In physical education and sports, regarding the psycho-motor skills, we have in mind a healthy individual. In this case, the high performance depends primarily on the accuracy of the sensory information, on the inferior and superior thresholds of sensitivity, on the differential thresholds, respectively, on the sensory discrimination, all of them determining the level of the perceptive skills, on which the reception characteristics, information processing, and decision making depend. **(MOULIN, J.P., 2006)**

The psycho-motor skills develop progressively, allowing the constitution of a consciousness of the body and movements, as one of the richest and most important manifestations of the human behavior. The motor behavior results from the interaction between the evolution of skeletal and muscle structures, their maturing, and exercise, training level.

In comparison with the terrestrial environment, the aquatic environment offers proper conditions for the evolution and development of the psycho-motor skills, even from birth (through the reduction of the gravitational forces).

Hypothesis

The practice of physical exercise in an aquatic environment stimulates the psycho-motor development in infants.

Organization of the research

The aquatic education program was conducted over the course of 8 weeks, with a frequency of 2 sessions per week, at the aquatic activities club "EMD Tennis Academy", in Bacau.

The duration of the sessions was between 30 minutes and 50 minutes, maximum.

Material and methods

Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XII, ISSUE 2 Supplement 2012, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST, DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengace Learning

The research methods we used were: The experiment, the test, the observation, the statistical-mathematical method, the graphical representation, and the study of the specialized literature.

At the Bacau "EMD Tennis Academy", where the research was conducted, all the specialized conditions, material, and organizations, necessary for such an endeavor, were met.

The subjects were children who were enlisted in the club's aquatic activities.

For every subject, we had the parents' written consent regarding the child's participation in our experiment. We met some difficulties regarding the subjects of the control group, from the children's parents.

We tried to make the number of subjects in the experiment group to be as close as possible to the number of subjects in the control group.

A stable environment was ensured by providing the same teacher, who worked with every child in the experiment group.

Table 1 ***The subjects of the experiment***

EXPERIMENTAL GROUP			**CONTROL GROUP**		
The group of	No. of subjects	No. of subjects	The group of	No. of subjects	No. of subjects
Age	Male	Female	Age	Male	Female
1 - 6 months	2	5	**1 - 6 months**	4	3
7 - 12 months	12	3	**7 - 12 months**	2	4
13 - 18 months	8	7	**13 - 18 months**	3	5
19 - 24 months	12	3	**19 - 24 months**	4	5
25 - 30 months	8	7	**25 - 30 months**	2	2
31 - 36 months	8	7	**31 - 36 months**	2	3
Total subjects on gender	50	32	**Total subjects on gender**	17	22
Total number of subjects	82		**Total number of subjects**	39	

The subjects belonging to the experiment and control group were selected from different areas of the country. They did not have any experience regarding the practice of water activities.

The subjects from both groups did not have any health issues during pregnancy, birth, and until the moment of testing.

The tests were elaborated for measuring the following types of motor behavior:

- **Reflexes.** An innate fast and automatic reaction to a specific environment stimulus. This reaction is assessed through **8 drills** (items).
- **Non-locomotor** (stationary). This test aims to evaluate the child's ability to maintain his/her balance, to control his body by refining the kinesthesic sensations. It is composed of **20 drills**.
- **Locomotor.** This test assesses the child's ability to move, and it is composed of **65 drills.**
- **Object manipulation.** In this test, the manipulated object is a ball. Because from the point of view of development, it is impossible for an infant to organize and coordinate the manipulation of a ball, this test is aimed at children who are more than 11 months old. It contains **14 drills** and it involves activities of throwing, catching, and hitting/kicking.
- **Object grabbing.** This test evaluates the children's ability to use the muscles in their hands, and it determines, progressively, their prehensile ability, and their ability to control their fine movements (the fingers' grabbing movement). It contains **21 drills.**

Table 2 ***Age categories and tests for the experiment and control groups***

Tests	**Reflexes**	**Non-locomotor**	**Locomotor**	**Manipulation**	**Grabbing**
y.o.	**1**	**1**	**1-3**	**2-3**	**1**

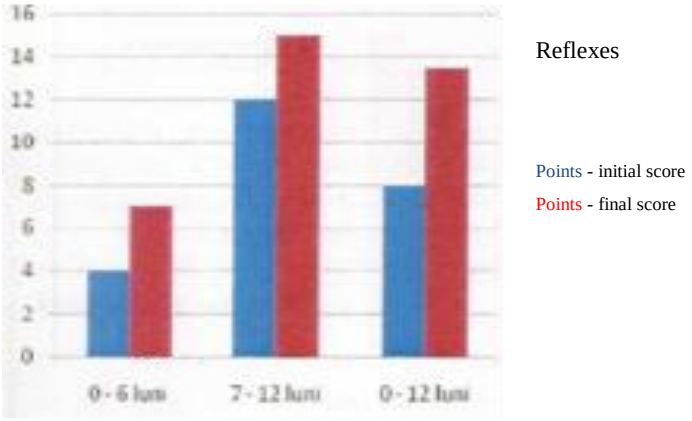
Categories (age in months)	0-6	0-6	0-6	-	0-6
	7-12	7-12	7-12	-	7-12
	-	-	13-18	13 - 18	-
	-	-	19-24	19-24	-
	-	-	15-30	25-30	-
	-	-	31 -36	31 -36	-

Results

The reflex test, for the categories: 0-6 months, 7-12 months, and grouped for the 0-12 months category.

The reflexes, as global manifestations, or spontaneous motor responses, represent a biological normality, and they gradually disappear with the maturing of the cortex and of the inhibition and facilitation mechanisms. The reflexes grow weaker and disappear before the appearance of organized skills.

The innate reflexes have a different evolution, some disappear, while others perfect themselves, and diversify (in compliance with the law of development, from global to specific); we must take into account these aspects especially when interpreting the results.

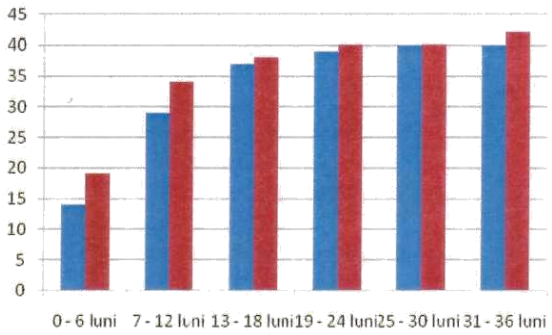


The non-locomotor test

Regarding the progress of the statistical indices for the six age groups, we can emphasize several relevant aspects.

For the point values and the month equivalent, the average values indicate a positive progress concerning the psycho-motor skills, in all age categories, a process that is not accompanied, nevertheless, also by distribution grouping, in all age categories.

Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XII, ISSUE 2 Supplement 2012, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST, DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengace Learning



Non-locomotor

Points - initial score

Points - final score

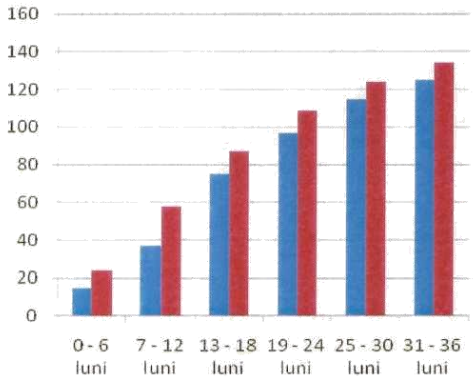
In all of the age categories, the values recorded before and after the testing, are increasing, and, except for the 25-30 months old category, they are superior for all age groups. The highest progress was recorded for the categories: 0-6 months, 7-12 months, and 31-36 months.

Regarding the month evaluation, the values stagnate for the 25-30 months old category, and the psycho-motor age has an ascending progress, the highest values being recorded in the 19-24 and 31-36 months old age category.

The distributions of the observations are based on the absolute values the subjects recorded in each test.

The locomotor test, for all age categories.

None of the distributions can be considered normal, because of the skewness of the observations in relation to the average, and because the quota of ½ of the total observations was exceeded. The statistical values show a positive progress. The average values increase from the initial tests to the final tests, with a slight improvement, for the values, points and months.



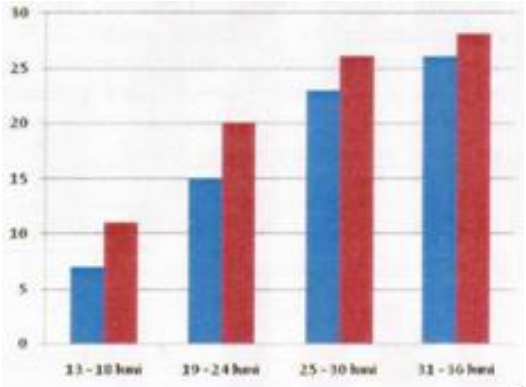
Locomotor

Points - initial score

Points - final score

The object manipulation test, for the 2-3 years old categories.

The abnormality of the distributions is obvious in all measurements, before and after the test. The average values increase slightly after the test, accompanied by a moderate amplification of the group.



Object Manipulation

Points - initial score

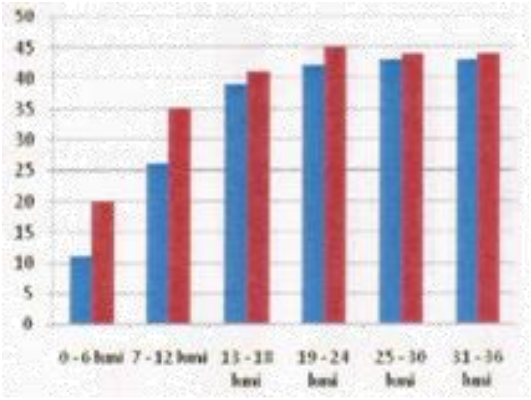
Points - final score

Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XII, ISSUE 2 Supplement 2012, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST, DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengace Learning

It results that all values, for all of the age categories, are higher in the final test, indicating a progress regarding the psycho-motor skills.

The object grabbing test, for all age categories.

All of the values recorded in the final test are higher than the values recorded in the initial testing.



We can emphasize a few aspects regarding the dynamics of the progress of the object grabbing ability. The final values are higher in this case also than the initial ones. Regarding the development of the psycho-motor age, this aspect is relevant for the last three categories of subjects.

Conclusions

- The activities performed in the aquatic environment have transcended the title of training stage for learning how to swim, and have gained a status of component of the physical education field, thus a new phrase being created, "aquatic education."
- The aquatic activity performed at an early age strengthens the child's self-confidence and independence, through the freely performed water movements, and presents a real interest by influencing the child's psycho-motor skills.
- The assessment of the psycho-motor development can be done on the basis of longitudinal or transversal studies. We opted for a longitudinal study of only eight weeks, in order to reduce the inherent influence of the dependent variable, the **chronological age**.
- The characterization of the shape of the distributions emphasizes the high occurrence of skewness, right, or left, excess or kurtosis (platykurtic), bi-modality or multi-modality, associated with a high spread of the values, in all tests and age categories of the subjects, this signifying a high heterogeneity, even in these categories with ages of close values.
- Taking into consideration all of the age categories, the greatest expansion regarding the reflex activity is found in the 7-12 months category, in which the psycho-motor performance is 3 months above the chronological age.
- The progress of the psycho-motor age, from the initial to the final tests, expressed in months, is as follows: **"Non-locomotor"** 2.18 - 4.37; **"Locomotor"** 2.24 - 2.9*;* **"Object manipulation"** 2.9 - 2.93; **"Object grabbing"** 2.82 - 6.1.
- With just a few exceptions, in all age categories and tests, the average final values are higher than the initial ones. With the exception of the **reflex** test, in the case of the other tests, several differences between the age categories can be mentioned, regarding the "**psycho-motor age"** progress, expressed in months:
  - For the tests **"Locomotor"** and **"Object manipulation,"** the progress is between 2-3, 2.5-3 and 3-4 months;
  - A higher progress was recorded for the tests **"Non-locomotor,"** between 2 and 7 months, and **"Object grabbing,"** between 3 and 8 months.
- Based on the results obtained during the final tests, we can say that our hypothesis, "*The practice of physical exercise in an aquatic environment stimulates the psycho-motor development in infants"* was confirmed.

a la piscine - vers une theorie de la practique, Editions Eres, Ramonville Saint-Agne, France
www.babyswimming.com
www.infantswimming.com

References

FLEGEL, J., KOLOBE, T.H.A., 2002, *Predictive Validity of the Test of Infant Motor Performance as measured by the Bruininks-Oseretsky Test of Motor Proficiency at school age.* Phys Ther, 82, , 762 – 771.

GRECU, A., 2006 'Aquatic Activities and Swimming between Age 0 to 4' in Balan, V (ed.)., *Swimming – a Theraputical Means, "*Cartea

Universitară" Publishing House, Bucharest, Romania.

GRECU, A., 2011, 'Immersion of Newly-born and Infants – Experimental Studies and Research' (in Romanian), "Săptămâna Medicală" Journal; 124 – 125

IONESCU, M., ANGHELESCU, C, BOCA, O, HERSENI, I., POPESCU, C., STATIVA, E., ULRICH, C, NOVAK, C., 2010, *Fundamental Landmarks in Learning and Early Development of Children from Birth to 7 Years*, Vanemonde Publishing House, UNICEF, Bucharest, Romania.

MOULIN, J.P., 2006, *Les Bebes et les jeunes enfants à la piscine - vers une théorie de la pratique,* Éditions Eres, Ramonville Saint-Agne, France

www.babyswimming.com

www.infantswimming.com