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Original Article

The influence of motor activity on the swimming ability of preschool aged children

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Abstract
Research has indicated that motor activity can affect, or even accelerate, the learning process of preschool-aged children. The reference group consisted of 190 children from various kindergartens in Bratislava. The swimming course lasted two weeks, and consisted of ten lessons; the level of swimming ability was tested once prior to the start of the course, then again at its conclusion. The evaluation consisted of two tests of swimming skills: *underwater orientation followed by catching a hockey puck from a depth of 1m,* and *floating on the surface of the water.* Changes to both swimming skills were significant following the end of the course. When we investigated the impact of children's motor activity on their level of swimming ability, we found that physically active children were able to more easily acquire swimming skills as compared to those children considered passive.
Key words: swimming ability, motor ability, preschool age

Introduction

Swimming, and general movement in an aquatic environment, is one of the most popular and effective positive movement activities available at all ages, and is suitable for nearly everyone. The aquatic environment induces strong emotional energy – in children a feeling of spontaneous joy, and in adults a sense of pleasant mental and physical well-being. Being able to swim should be a natural part of every person's physical activity. Swimming skills have a unique position in swimming didactics, and form the basis for practicing various styles in the future. Only after a beginner is able to handle the basic skills (breathing into water, floating on the surface, jumping into deep water, and basic movements to assure one's position in relation to the surface) can they begin to train the elements which make up simple swimming techniques. The speed at which one learns these skills is reflected in adaptation to the aquatic environment and depends largely on the quality of his or her sensory and coordination skills. In the process of learning motor skills, the practice of basic swimming skills is a psycho-sensory-motor adaptation to the physical properties of water (Macejková, 2008). In other words, the individual, based on his or her own feelings, is trying to actively respond to the buoyancy, pressure, and resistance of the water through motion of swimming (Macejková et al., 2005; Macejková – Putala, 2010; Macejková - Viczayová, 2010; Macejková – Benčuriková, 2014).

You can learn to swim at any time, but preschool age is by far the most appropriate to begin swimming lessons; as with other skills, it is during this period that a child can most easily learn, and master, the basic skills that are necessary not only for learning future swimming styles, but also for saving their lives.

Material & methods

The aim of our research was to further expand the knowledge of the influence of motor behavior on the level of swimming capability in preschool-aged children.

The main tasks of the study were to, first, identify the start and end levels of the children's ability to swim; and, second, to identify the impact of physical behavior on the level of swimming ability. Based on the content of the swimming course and the professional leadership of the lessons, we assumed that the end swimming ability would rate significantly higher. In addition, we assumed that the children's motor ability would have a positive impact on the level of swimming ability, based on the simple fact that physically active children are able to grasp swimming skills more easily and quickly than those who are passive.

In terms of research, a selection (V_1) of 190 preschool children from nine randomly selected kindergarten schools in Bratislava was made, with the average decimal age being 5.8 years; for these, states S_1 - S_2, at time t_0 - t_1, were monitored under precisely defined conditions. On account of the research of dependent selections, the number of children in each group was the same. Such a defined situation allowed us to compare the level of swimming skills at specific time intervals (t_0 and t_1), and to ascertain the differences in the subjects' states at those specific intervals. The swimming course itself took place over two weeks in block teaching form,

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at a frequency of sixty minutes per day for an overall total of ten hours. Two specific swimming skills - *underwater orientation followed by pulling a hockey puck from a depth of 1m* and *floating on the surface of the water* – were monitored at the beginning and end of the course and rated as pass or fail.

The obtained data was processed and evaluated using basic statistical characteristics (mean, minimum, maximum, standard deviation, variation range). To assess differences in the input and output measurements, we used a relative value test for dependent selections. Empirical data was collected from parents using the questionnaire method, and the results were evaluated using percentage analysis. The relationship between the level of swimming ability and motor behavior was evaluated using the Chi-quadrat test, and calculated using data analysis in Excel.

Results

Input and output level of the swimming ability of preschool children

At the start of the course, 69.6% of the children failed the test of underwater orientation followed by pulling a hockey puck from a depth of 1m. At the end of the course, 81.7% were successful, i.e., were able to navigate underwater and pull the puck from a depth of 1m on their first attempt. Thus, we have found significate change following the course ($p < 0.01$; $t = 9.494^{**}$), (Fig. 1).

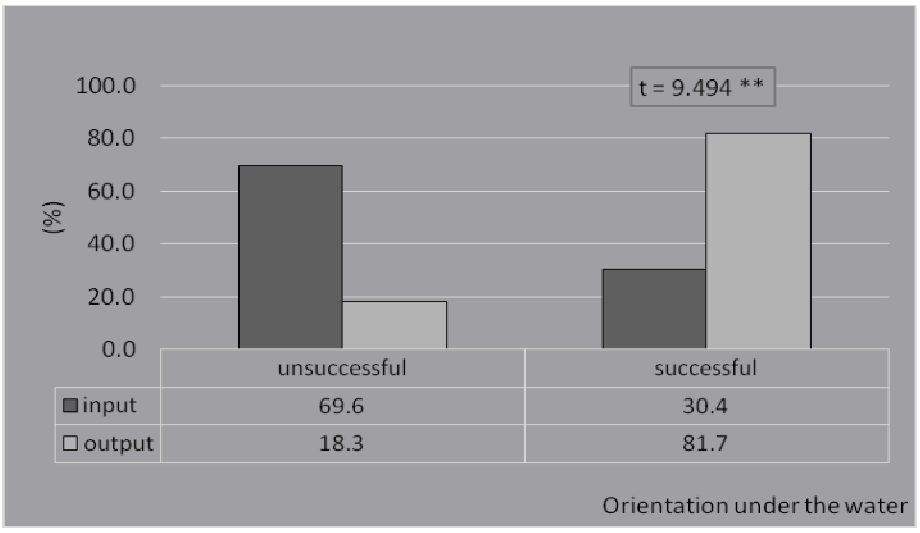

Figure 1: Changes in the skill level of underwater orientation followed by pulling a puck from a depth of 1m.

The ability to float on the surface of the water was assessed by evaluating how a child reacted to the aquatic environment, and whether he or she was able to lay in a horizontal position on the water's surface for at least five seconds while holding his or her breath. At the beginning of the course, 85.3% of children failed the test, and only 14.7% were successful. After completing the course, as in the previous skill test, we found a significant change in the overall ability of the children – 78.0% were successful, and only 22.0% of the children were unable to maintain their position on the surface of the water. Thus, changes at the end of the course for this skill were likewise significant ($p < 0.01$; $t = 12.860^{**}$), (Fig. 2).

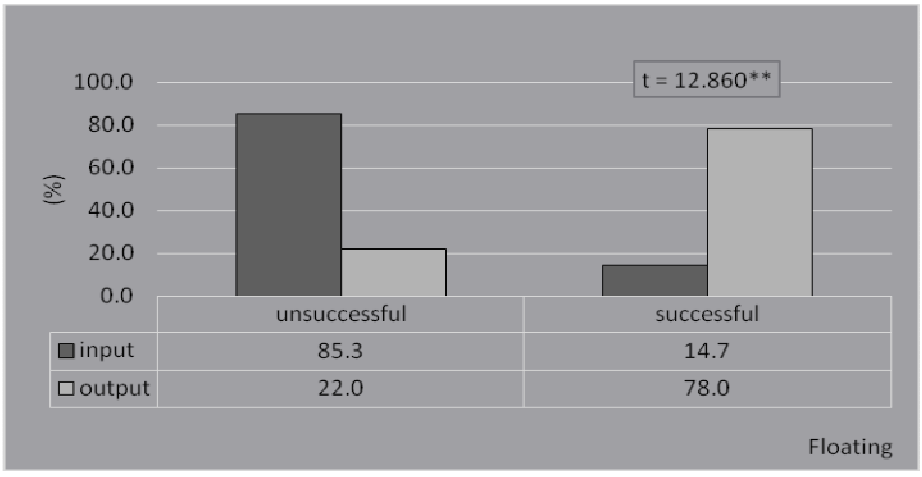

Figure 2: Changes in the skill level of floating on the surface of the water.

Based therefore on our results, we can assume that a basic swimming course (the content of which was chosen based on years of experience) can positively influence the children's overall skills.

The influence of motor behavior on the level of swimming skills

A preschool-aged child is constantly in motion; physical activity is natural to him or her, and in its absence, the child will become disturbed, irritated, and/or aggressive. Many experts have stated that a preference for passive forms of activity causes a higher incidence of musculoskeletal disorders, including bad body posture, muscle misbalance, and so on (Kacavas – Kanasova, 2007; Kovacova - Medekova, 2008, 2009; Medekova, 2010; Kanasova, 2015).

In our research, we have investigated the extent to which physical behaviour can influence the teaching of preschool-aged children. Information on the children's motor behaviour was obtained via questionnaire method from the parents, after which kindergarten teachers were consulted for follow-up information. Since our goal was not to look for the movement disorders in children (i.e., hyperactivity or hypoactivity) that are typical of preschool, but rather to characterize the children's motor skills, we developed an alternate rating system. A child who sought out sedentary activities of an easy movement nature was characterized as passive; a child whose energy expenditure was above the level of those in the passive group, was characterized as physically active. Following the answers to the questionnaire, we found that 75.4% of parents characterized their child as active, and 24.6% as passive (Fig. 3).

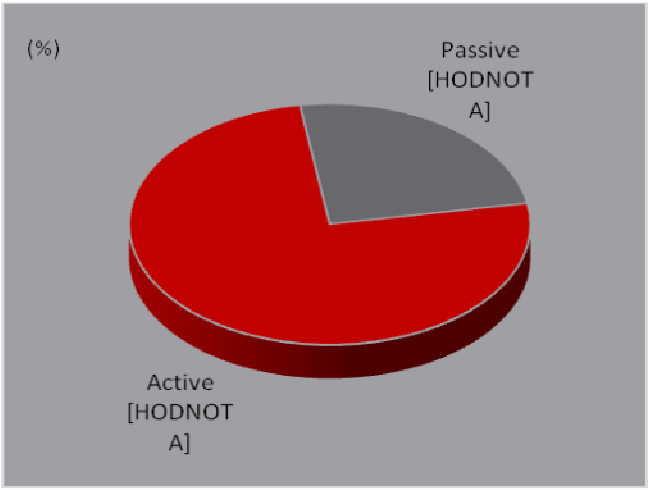

Figure 3: Motor behaviour of children.

For the purposes of detecting the effect of differentiated motion behavior on the children's ability to swim, we present the results of two skill tests: underwater orientation followed by pulling a hockey puck from a depth of 1m, and floating on the surface of the water. The analysis of success in acquiring the first skill (underwater orientation), evaluated in groups of children in terms of their motion behavior, revealed various responses of children to the aquatic environment. At the outset of the course, 69.6% of the children (Fig. 1), of which 50.8% were active and 18.8% were passive, did not pass this skill test (Fig. 4). We believe that this may have been caused by the attention deficit which is common to most active children – in a new and unfamiliar environment, it is much harder for them to focus and concentrate on the task at hand.

Furthermore, 30.4% of the children (Fig. 1), of which 24.6% were active and 5.8% were passive, were able to pass this test. Such a relatively high percentage of successful children can be attributed parents who have taught their children at least the rudimentary basics of swimming, and is also reflected in our entry level of a higher swimming ability (Fig. 4).

At the end of the course, 81.7% of the children were able to successfully dive into the water, navigate below the surface, and retrieve the puck (Fig. 1); of these, 62.3% were active, and 19.4% passive. Thus, we can say that all monitored indicators showed statistically significant relationships to the level of $p < 0.01$. While at the time of the initial assessment the indicators were in favor of passive motion ($t = 7.480^{**}$), at the course's conclusion the ratio turned in favor of higher activity ($t = 9.620^{**}$). The increase of success at the end of the course was higher for the physically active children (37.7%) versus the passive ones (13.6%); that said, despite the positive changes, we have not found a significant relationship between the input (Chi = 1.429 N) and output (Chi = 0.363 N) measurements (Fig. 4).

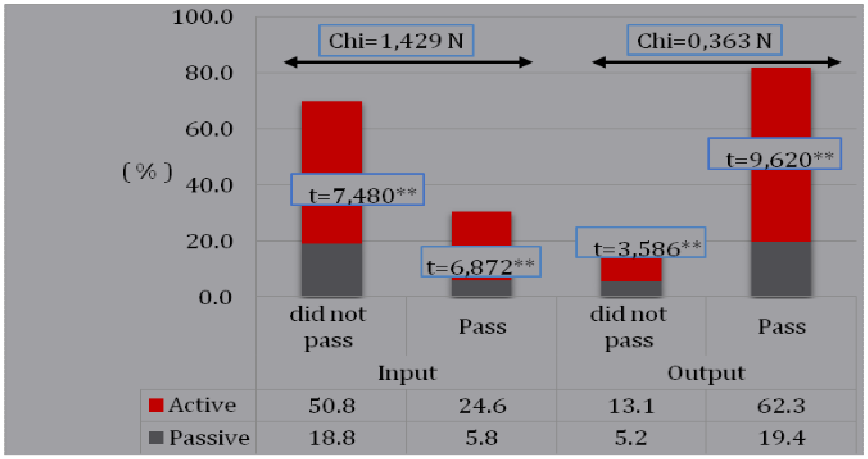

Figure 4: The influence of motor behaviour on the level of swimming ability in the underwater orientation test.

In determining the impact of the motor behavior of preschool children on their ability to float on the surface of the water, we found, as in the previous test, a positive influence in the swimming course on the output level of the children's swimming skills.

At the onset of the course, 85.3% of the children were unable to pass this skill test (Fig. 2); of these, 64.9% were active, and 20.4% passive. Of the 14.7% which passed the test, 10.5% were active, and 4.2% passive (Fig. 5). Following the course, 78% of the children, of which 61.8% were active and 16.2% passive, were able to pass the floating skill test (Fig. 2). The results demonstrate statistically significant relationships in the level of $p < 0.01$ in all monitored indicators (Fig. 5). In the initial assessment, of those which did not pass the test, the passive group of children fared better overall ($t = 9.415^{**}$); following the end of the course, the active group had far better results ($t = 10.080^{**}$). In other words, the active children were more successful than the passive ones (61.8% versus 16.2%), and the increase of this success was higher in the case of the former group (51.3%) than in the latter (12.0%). Thus, a significant relationship was found between the input and output measurements on levels of $p < 0.05$, $Chi = 5.279^{*}$ (Fig. 5).

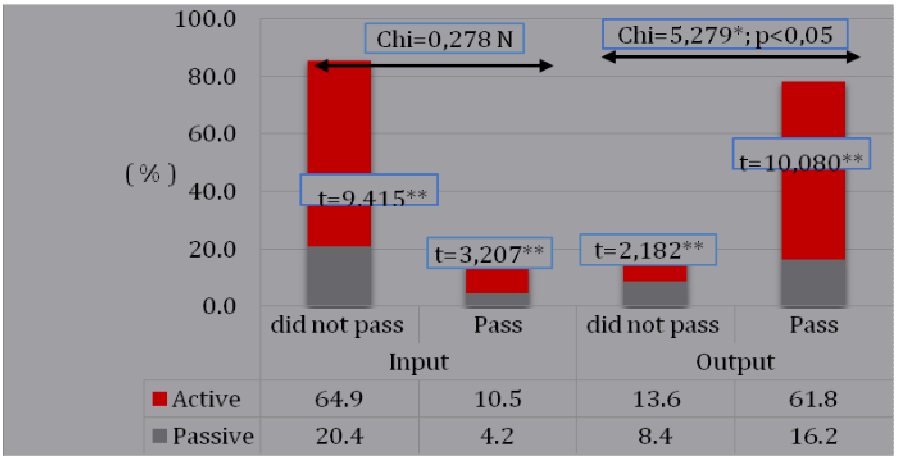

Figure 5: The influence of motor behavior on the level of swimming ability in the floating test.

In analyzing the follow-up results between motor behavior of children versus their swimming ability, we have found that these indicators show significant relationships in nearly all measured variables. Differences in the acquisition of swimming skills in groups of children characterized by their motor behavior were manifested between active and passive children, in favor of the active group. The relationship between motor behavior and the *floating* skill test was in high evidence following the end of the course.

We can therefore conclude that active children are able to more easily and quickly acquire swimming skills as compared to more passive children.

Discussion

Based on the review findings, knowledge regarding one of the many factors which can affect swimming lessons in preschool children has been expanded.

Spontaneous physical activity, with alternating movement load intensity and passive relaxation, is natural for this age. In the different reactions of children to the aquatic environment, largely according to personal characteristics, we can state that swimming ability was positively affected most directly in more physically

active children. In accordance with Miklankova (2007), we can, furthermore, conclude that when teaching swimming, the individual personality characteristics of children must be respected in addition to providing adequate didactic procedures, a high degree of emotional sensitivity, and playfulness.

On the basis of our results, we recommend fitting the swimming skills tests into the physical education curriculum in kindergartens, and thereby utilize it to stimulate the optimal development of somatic, functional, motor, and psychological qualities in preschool children.

Conclusions

In conclusion, we can safely state that there is no universal model for teaching children how to swim. Swimming lessons should accept not only the differentiated level of swimming skills natural to the children, but also their individual needs and the pace at which they are innately able to learn.

This research was a pilot for the objective evaluation of preschool swimming skills in children prior to beginning formal swimming preparation, and we recognize that the proposed swimming capability assessment procedure requires standardization as a prerequisite for wider practical application.

In order to increase swimming level ability, it is not enough just to learn how to swim – a positive relationship needs to be formed with the aquatic environment in order to fully exploit the potential of this physical activity as one of the most basic and important means of preventing the deterioration of the population's health.

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