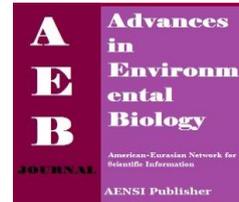




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The Impact of 8- Week Perceptual - Motor Training on Memory Span of 8 to 10 Years Old Children

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ABSTRACT

Background: This study aimed to investigate the impact of 8 weeks of perceptual - motor training on memory span of 8 to 10 years old children. The semi-experimental method was used. The population consisted of elementary school students from both the north and south of Kermanshah city studying in academic year 2012- 2013. **Objective:** The sample included 32 children who were randomly assigned to two active (experimental) and sedentary (control) groups. First, all of the participants undertook the pre-test. Then, the active group undertook perceptual- motor activities for 8 weeks (24 sessions). **Results:** After this period, the post-test was carried out for both groups. The children's memory span was investigated with memory assessment test. Data were analyzed using descriptive and inferential statistics. The independent T test was used to determine the difference between averages of active and sedentary groups. Also, the dependent T test was used to determine differences between pre-test and post-test. The results indicated that short-term memory increased in active group compared to the sedentary group. **Conclusion:** According to the findings of this study, it was deduced that the perceptual- motor training improved children's memory performance. Thus, given the importance of learning and memory in academic success and daily activities of children, it seemed necessary to conduct perceptual- motor training to increase memory performance.

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INTRODUCTION

Life is a constant struggle with the environment and trying to understand and benefit from it. In this effort, it is the psychological abilities of human which provide the necessary capabilities to achieve environmental understanding and modify or change it [24]. The motor activities are among various methods for fostering creativity and mental development. The relationship between motor activities and mental development is an issue which has attracted the attention of education and physical education professionals. The conceptual- motor abilities have a crucial role in motor learning [29].

The proponents of perceptual - motor method believe that motor learning is the starting point of learning. They state that higher mental processes are created after proper growth of motor system, perceptual system, and the links between motor learning and perceptual learning. According to Newell Kephart, one of the most famous leaders of perceptual – motor method, motor learning impacts the education and memory [26]. The learning and memory are important mechanisms which alter human behavior through the environment. Learning is a process by which we acquire knowledge about the world. While, memory is a process by which knowledge is encoded, stored, and then reminded [28].

The short-term memory is a storage system for storing the information sent from either short term sensory storage or long-term memory. The capacity of memory span or short-term memory is the capacity that each person can remember a number of items in his/ her short-term memory. Based on the experiments of various researchers and scholars of psychology, its capacity is 7 ± 2 items which is a minimum of 5 characters and a maximum of 9 characters. This memory is used in situations where we want memorize materials for a few seconds.

Ericsson, Chase and Faloan (1980) showed that someone with 175 hours of practice could improve his/her short-term memory from memorizing 7 items to 79 items. The short-term memory is encoded in abstract terms and is able to store data for about 30 seconds[28]. The mental abilities cannot be separated from the basic motor abilities. Thus, the study of these movements and enabling their development may strengthen and even restore

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mental abilities According to Piaget, the children development depends highly on their manipulation and interaction with their surrounding environment. He believes that knowledge comes through implementation [4]. Bloom's findings show that 50%, 30%, and 20% of the intellectual development of children occurs from birth to 4 years old, 4 to 8 years old, and 8 to 18 years old, respectively. Furthermore, success in motor skills may stimulate some people to work harder to be successful in other effort such mental exploration. Many people, especially school children, show more willingness to participate in physical activities. So, when physical activity is used as a means to teach the laboratory subjects, in most cases, the interest to learning increases very much [27].

Chomsky believes that the cognitive structure is created by the child's efforts to deal with the environment and understand it. Movement, here, means communication and education. It can be used to teach basic concepts such as weight, orientation, shape, quantity, quality, time, location, and meaningful perception to children [27]. However, Santrak (2001) pointed out that from the perspective of dynamic systems, the perceptual and motor development does not grow in isolation from each other; they are mixed. Thus, people move to experience the perception [4]. In various stages of child growth and development, perception and motor actions have important role.

The perception is identifying and explaining the stimuli that brain receives through sense organs. The motor reactions arising from the brain analysis is its perceptual- motor response [5]. The perceptual - motor term refers to the individuals' interpretation of a response to a stimulus [10]. There are two reasons for having dash between perceptual - motor words. First, it explains the dependence of voluntary motor activity on some forms of perceptual information. Second, the dash indicates that the development of perceptual abilities is partly dependent on motor activities [6]. Guilford (1967) developed a model that shows the logical relationship between motor perception and cognitive performance. Providing this model, he emphasized that more complex cognitive functions such as using abstract data in evaluation activities may impact heavily the sufficient growth of lower levels performance such as effective readout of tangible information [9].

Many researchers emphasize on the importance of sensor-motor learning as building components of complex cognitive- perception development in subsequent years. Some others, from the perspective of nerve psychology, emphasize on the importance of early motor learning as an integral part of establishing and building brain released cells which are responsible for higher functions of the brain [19]. Copaat believes that perceptual-motor training such as balance, eye-hand coordination, dominated part, learning orientation, spatial and temporal perception, and understanding the problem increases the cognitive and motor function [12].

The perception - motor area consists of a range of physical activities including simple activities such as walking to complex activities such as balancing on the balance beam [17]. Although perceptual- motor abilities are shaped by heredity and environment in different proportions, one of the most important environmental factors in the development of these capabilities is the child's life quality in critical early years [17]. Training in early childhood has attracted the attention of many physical education experts.

The effective use of child's body and considering the development of his/ her skilled movements may play an important role in his/ her education [5]. Ganzalhe, Koorteh, and Doobinz (2003) found a high positive correlation between motor capabilities, growth of cognitive abilities, and academic achievement [3]. Paying attention to the elementary students in a community is one of the most important methods of investment for the future of the community [4]. A cognitive and mental program is required for conduction of a series of coordinated movements by the child [18].

This study aims to investigate the impact of 8 weeks perceptual - motor training on short-term memory improvement of 8 to 10 years old children. This study is necessary because children have more reformation and education flexibility compared to adults. Considering their growth rate, children can be provided with suitable exercises to impact on their physical and emotional development, memory, and intelligence development.

Methodology:

This is a semi-experimental study which used pre-test post-test field method. The population consists of 320 elementary school students aged 8 to 10 years old in Kermanshah city. Using random clustering method, 160 girls and 160 boys were selected from four schools in the north and south of the city. The participants were divided into two experimental (80 girls and 80 boys) and control (80 girls and 80 boys) groups. From each school, 40 children of 8- years old and 40 children of 10 years old were chosen. First, all of the participants undertook the pre-test. Then, the experimental group undertook perceptual- motor activities for 8 weeks (24 sessions). During this period, the control group undertook their regular daily activities. Then, the same test was used to conduct post test. The memory capacity was measured using span indicators and through the effect of free recalls. The digit span is a span index in which after hearing all the numbers and words, the subjects repeat a series of them randomly in correct order. In fact, it is a part of the test. The tester should present a number of items to the subject and ask him/ her to repeat them. The number of presented items and provided responses will be the short term memory span of subjects. By doing this, we can measure the subjects' short-term memory capacity. The question items may be a number, letter, word, or concept. Memory evaluation test was taken from

the psychology center of city, tested, and approved. Its validity and reliability were confirmed recently. The test's reliability coefficient is 0.801. According to this coefficient, the test has high internal consistency. The experimental group undertook 8 weeks (24 sessions) of the perceptual- motor exercises such as identifying the different ways of balancing, ball throwing to the goal, receiving and throwing the ball, and the skills that required precision. They also undertook the handling skills (run, gallop, hop, spring, jump, slip, etc.), manipulation skills (throwing skills, getting kicked in, get out, knocking object, and rolling), endurance skills (getting bend and straight, rotate, and walk on balance beam), and 5 minutes of stretching and recovery. The independent T test was used to determine the difference between averages of active and sedentary groups. Also, the dependent T test was used to determine differences between pre-test and post-test. Using SPSS 19 software, all statistical tests were performed at significant level ($P = 0.05$).

Findings:

Cronbach's alpha test was conducted on 320 boys and girls to obtain the memory test reliability. The results showed that the test has suitable reliability ($=0.801$). It is summarized in Table 1.

Table 1: The reliability of memory test

Reliability Statistics	
N of Items	Cronbach's alpha
2 memory	0.801

The descriptive statistics of age, height, and weight of subjects were measured. The mean age of the subjects in this study was 9 years old. The average height of boys and girls were 137.43 and 141.57, respectively. The average weight of boys and girls were 35.64 and 93.13, respectively. The results are summarized in Table 2.

Table 2: Descriptive statistics of subjects' age, height, and weight.

Variable	Gender	Mean	Standard deviation
Age	Boy	9	1/001
	Girl	9	1/001
Height	Boy	137/43	4/25
	Girl	141/57	6/18
Weight	Boy	35/64	7/64
	Girl	39/13	8/14

The dependent T test was used to compare the mean of memory assessment pre-test and post-test in active and sedentary groups. The results are summarized in Table 3.

Index Variable	The mean, standard deviation, dependent t-test	
	Pre-test, post-test, df	change percentage, significance level of t
Active group	.000 159 -7/74 -700 1/84	+9/60 2/05 +8/90
Non active group	.107 159 -1/62 -119 1/80	+8/98 1/99 +8/86

There is a significant difference between the mean of active group's pre-test and post-test ($df=159$, $t=-7.74$, $p=0.000$). Since the significance level (0.001) is less than 0.05, so the null hypothesis is rejected. Therefore, there is significant difference between pre-test and post-test of the active group.

The independent t-test was used to compare the active and non-active groups' mean in the memory assessment test. The results are summarized in Table 4

Table 4: Comparison of memory assessment post-test mean in both active and non-active groups.

Index Variable	Post test of non active group, post test of active group, t test of independent groups	
	The mean, standard deviation, mean, standard deviation, p, degrees of freedom, t	
Memory assessment	-3/06 318 .002 1/84 9/60 1/80 8/98	

There is significant difference between the post-test mean of active and non- active groups. Therefore, there is significant difference between the post-test of active and sedentary groups.

The results show that perceptual- motor training increases children's short-term memory. Brain is described as the most complex structure of the universe that has been identified so far. Neural transmission is a key to understand the relationship between brain, behavior, and etc [7]. Many important behaviors are learned. Learning is the process by which we acquire knowledge about the world. While, memory is a process by which knowledge is encoded, stored, and then reminded [16]. The research found that older Americans have been able to reform their memory by simple changes in their lifestyle such as a memory exercise, fitness, healthy eating, and stress reduction [14]. In this study, the perceptual- motor exercises were used to increase children's short-term memory. Then, memory assessment test was used to assess the validity of this increase. It was found that physical activities affect the brain function. However, there are two major limitations for short term memory

including the high speed of amnesia and limited capacity [2]. In the study titled the comparison of short-term memory and working memory performance in normal children and children with learning disabilities, Hassanpour (2003) concluded that there is significant difference between these two groups in terms of short-term memory and working memory [4]. In the short-term memory, data are usually encrypted in auditory form. Memory span or short-term memory capacity is the amount of items an individual can recall by his/ her short-term memory. The short term memory is used in situations where we want memorize materials for a few seconds [4]. Nezamabadi (2002) compared the short-term and long-term memory of normal students, lower dyslexic students, and higher dyslexic students. He concluded that there is no significant difference in short-term memory of both lower and higher dyslexic groups. However, there was significant difference in both groups in terms of short-term memory and working memory [22]. The learning and memory are the most important mechanisms which change human behavior through the environment [16]. The flexibility is one of the brain capabilities by which the brain structure and function can gradually change [1]. Based on the model of mental flexibility, Johnston (2009) argues that the nerve flexibility system provides an opportunity to the central nervous system to learn skills, recall information, and recognize neural networks to respond to environmental stimuli [15]. In different studies, Dela Cato (1996), Cerati (1979), and Greene (1990) found a positive correlation between conceptual- motor development and academic performance and achievements of children [15]. Contrary to the above which several researchers confirmed the relationship between conceptual- motor abilities and academic performance, Singer (1968) and Salamat, in separate studies, did not found any relationship between conceptual- motor abilities and academic performance [3]. These conflicting results may be due to differences in biological systems (age, maturity, development) and environment (nature of the task and the context in which it occurs) [8]. The physical activity increases heart rate. Therefore, heart pumps more blood. Then, lungs should inhale and exhale more to supply oxygen. Blood carries more oxygen to the organs and brain. As a result, more oxygen improves mental activity of brain [20]. Jensen (1998) showed that physical activity is very important to improve brain function. The activities such as running, jumping, and swimming strengthen basic ganglia, cerebellum, and the corpus callosum. Sport and physical exercise delivers more oxygen to the brain and increases the inter- neurons communication. Learning can be enhanced and strengthened through walking, stretching, and other physical activities.

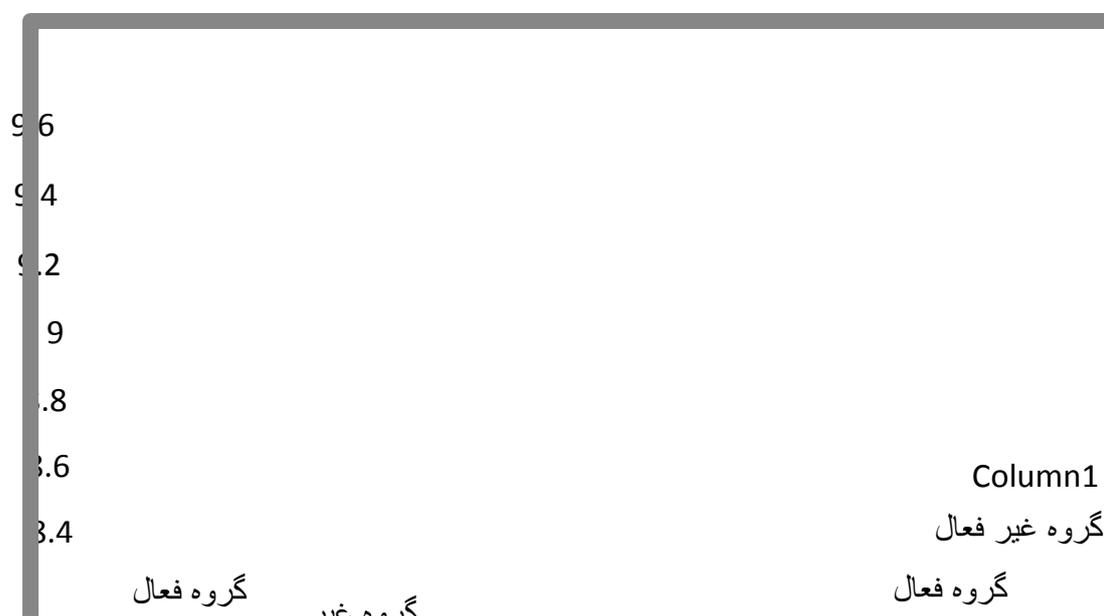


Fig. 1: Assessment of memory.

The figure 1 shows that the mean of children's memory increased from 8.9 to 9.6 after perceptual- motor training. This increase is due to perceptual- motor exercises which children undertook for 24 sessions.

The research conducted on animals have shown that exercise increases brain volume, insulin-like growth factor, brain-derived factor, increased blood flow to the brain, increased synapses and neurotransmitters, and etc. All of these may cause increased memory capacity [20]. In his study, Greene (1995) concluded that those programs that improve the perceptual – motor capabilities of students increase their thinking abilities [4]. Vaysaks Payne (2002) states that any movement undertaken by individuals are perceptual - motor processes. The process of conceptual- motor abilities is sensory and further develops by voluntary movements [23]. The

perceptual- motor training programs are the valid sports programs are regulated based on development level and have many similar elements. The purpose of these programs is to increase academic success or progress in readiness for the school jobs. The perceptual - motor activities have an important role in the development of motor abilities of children. Therefore, it is recommended to run these programs in elementary schools [26].

REFERENCES

- [1] Ayers, A.J., 1972. Sensory Integration and learning Disorders. Los Angeles,CA: Western psycho Logical Services.
- [2] Bassam Tabar, S.M., 2013. The effect of 8 weeks perceptual - motor training on motor abilities, attention span and memory of schoolchildren. Master's thesis. Boroojerd University
- [3] Camry, Z., 2009. The effect of motor skills training on working memory capacity in children aged 7 to 11. Master's thesis. University of Kermanshah
- [4] Dortaj, F. and S. Asemi, 2012. The effects of motor selective program on motor- conceptual abilities and educational progress of students, *Journal of School Psychology*, 1(4): 56-39
- [5] Fotini, A.K., 2011. the effects of age and gender on balance skills in preschool children physical education and sport, 9: 81-90.
- [6] Gallahue, D., J. Ozmun, 2006. Understanding motor development in fants, children , adolescents, adults, 4th ed Madison wi: Brown & Benchmark.
- [7] Ghanai, A. Chamanabad, T. Grossi Farshi, H. Ashayeri, A. Babapour Jalil, A. Moghimi, 2007. The effect of sport's rhythmic movements on numerical memory function of students with learning disorders. *Studies of Education and Psychology*, Ferdowsi University & Benchmark.
- [8] Ghotbi, V., A. Zarghami, M. Saemi, I. Maleki, 2012. The effect of cognitive style on the accuracy of working memory, *Journal of Motor Learning – Sport*, 10: 78-61.
- [9] Guilford, J., 1967. The nature of human intelligence, New York MC Grew. Hill Book company.
- [10] Hadavi, F., 1998. Measurement and Evaluation in Physical Education
- [11] Hassan Pour, A., 2003. The comparison of short-term memory and working memory performance in children with learning disabilities and normal children, master's thesis, School of Psychology, Tehran University
- [12] Isaacs, D. Larry, W. Gregory Payne, 2007. Human motor development an approach in life. Translated by Khajavi and Khalaji. Arak. Arak University
- [13] Jessica, R., 2005. Elderly can improve memory By exercise Brain and Body Arai Lable at: www.conocast.com/News.Files/AOEW4/News2.htm-41k
- [14] Jensen, E., 2002. Minds with Brain in the mind NY: ASCD .
- [15] Johnston, M.V., 2009. Plasticity in the developing brain :Implications for rehabilitation. *Developmental disability research reiews*, 15: 94-10.
- [16] Kandel, E.R., J.H. Schwartz, T.M. Jessell, 2002. Principle of Neural Science, Fourth edition, center for Neurobio Logy and Behavior College Hunghes Medical Institute, MC Graw-Hill.
- [17] Khalaji, H., E. Mahshid, 2002. Effects of the selective activity on cognitive - motor function of children 4 to 6 years old, *Motor and Sport Science Journal*, I(1): 30-42.
- [18] Kothari, S., H. Keihani, R. Arab-Ameri, 2012. The effect of a selected physical activity on the growth of motor skills in children with attention deficit disorder / ADHD and children with autism present insights HFA. *Journal of growth and motor learning – Sport*, 10: 60-45.
- [19] Mohammadi, R., F. Behyna, F. Mozhghan, 2009. Work therapy and cognitive - motor skills in learning disorders, *special education journal*, pp: 93-94.
- [20] Namazizade, M., L. Salahshoor, 2004. Public Physical Education, Tehran: Institute for Humanities university study and compilation books (Samt).
- [21] Naurbakhsh, P., 2006. Perceptual-motor abilities and their relationships with academic performance of fifth grade pupils in Comparison with oseretsky scale, *kilesiology*, 38(1): 40-48.
- [22] Nezam Abadi, F., 2002. Short-term and long-term memory in a variety of surface and deep dyslexia in school children in Tehran. Master's thesis. Azad University of Tehran
- [23] Payne, V.G., L.D. Issacs, 2002. Human motor development. 5th ed Boston: MC Graw. Hill.
- [24] Piaget, J., 1951. Play, Dreams and imitation in child hood .New York: Norton.
- [25] Sadeghi, N., H. Khalaji, 2013. The effect of physical activity on memory of women 70-50 years old with memory impairment. *Journal of new information about Cellular - Molecular Biotechnology*. Third period. No. XI
- [26] Salman, Z., M. Sheikh, M. Seif Naraghi, E. Arab-Ameri, S.M. Agha Pour. 2009. Effects of conceptual-motor training on improvement of motor function in children with developmental coordination disorder, primary school in Tehran. *Journal of perceptual learning - Sport2 -Ss63-47*

- [27] Sene, A., Z. Salman, H. Agha Zadeh, 2008. Effects of physical activity and games on the growth of mental abilities in preschool children, *Journal of Educational Innovations*, 26, VII.
- [28] Schmitt, R., T. Lee, 1941. Control and motor learning with an emphasis on motor behavior. Translated by Ahoor Farouki, Abbas. Bahram., Hasan. Khalaji.
- [29] Sheikh, M., F. Bagher Zadeh, M. Shahbazi, Sh. Tahmasebi Boroujeni, D. Hoominyan, 2006. The relationship between motor- conceptual abilities and mental development of students. *Journal of the No.* 28.