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ORIGINAL ARTICLE

The Effectiveness of Paaryaad and Braitonic Training on Executive Functions of Children with Learning Disabilities

RAMAZANI BAGHMISHEH L, SALEHIAN MH*, HOSSEINZADEH PEYGHAN R

Department of Physical Education, Tabriz branch, Islamic Azad University, Tabriz, Iran

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ABSTRAK

Tujuan kajian ini adalah untuk membandingkan keberkesanan latihan braitonik dan paryaad terhadap fungsi eksekutif dalam kalangan kanak-kanak yang mempunyai masalah pembelajaran. Kajian ini menggunakan kaedah eksperimen separa. Kajian ini dijalankan dalam dua peringkat iaitu ujian sebelum dan ujian selepas. Populasi statistik ialah kanak-kanak yang mempunyai masalah pembelajaran (45 peserta) yang dirujuk kepada Tabriz Welfare Center secara sukarela. Ujian N-back digunakan untuk mengukur ingatan kerja manakala perisian Psychomotor task dan ujian Go/No Go digunakan untuk mengukur perencatan. Selepas pembahagian kanak-kanak kepada tiga kumpulan, komponen fungsi eksekutif (ingatan kerja dan perencatan) bagi latihan braitonik dan paryaad dalam kumpulan eksperimen yang mengikuti syarat kanak-kanak direka dan diukur. Analisis ujian varians digunakan untuk membandingkan pembolehubah dalam fungsi eksekutif kanak-kanak. Dapatan kajian ini menunjukkan latihan braitonik dan prayaad meningkatkan tahap fungsi eksekutif kanak-kanak yang mempunyai masalah pembelajaran. Kesan latihan paryaad mempunyai pembezaan yang lebih ketara berbanding dengan latihan braitonik terhadap peningkatan tahap fungsi eksekutif kanak-kanak yang mempunyai masalah pembelajaran.

Kata kunci: Braitonik; fungsi eksekutif; paryaad

ABSTRACT

The purpose of this research was to compare the effectiveness of braitonic and paaryaad trainings on executive functions on children with learning disabilities. This

Address for correspondence and reprint requests: Salehian Mir Hamid. Department of Physical Education, Tabriz branch, Islamic Azad University, Tabriz, Iran. Tel: +00989144174072 Email: m_salehian@iaut.ac.ir

research applied semi-experimental method. The research was performed in two stages which are pre-test and post-test. The statistical population was children with learning disabilities (45 participants) referred to Tabriz Welfare Center who were voluntary. N-back test was used to measure working memory while Psychomotor task software and Go/ No Go test were used to measure inhibition. After dividing the children into three groups, the braitonic and paaryaad training programs for the two experimental groups were designed and measured according to the children's condition and the components of executive function (working memory and inhibition) in two stages. Analysis of variance test was used to compare the variables in children's executive function. The findings demonstrated braitonic trainings and paaryaad trainings improved the level of executive functions of children with learning disabilities. The effect of paaryaad trainings was significantly greater than the effect of braitonic trainings in increasing the level of executive functions of children with learning disabilities.

Keywords: Braitonic; executive function; paaryaad

INTRODUCTION

Learning disability is a common term that refers to a heterogeneous group of disorders and is manifested by great difficulties in learning and using skills of listening, speaking, reading, writing, thinking, math, language, and motor skills in a variety of combinations and degrees which evolves and begins in preschool and continues into adulthood (Rief & Heimburge 1996). In addition, learning disabilities may be related to other areas; for example, daily activities at home that are affected by poor memory, reasoning or problem-solving performance (Silver et al. 2008). Learning disability reasoning is especially used to describe people who have problems with cognitive functions. These problems negatively affect their ability to learn as well as other life skills (Jeffries & Everatt 2004). According to the statistics, 20% of school-age children have been identified with a learning disability. The basic belief is that people with learning disabilities have the necessary potential for scientific activities, but have difficulty in acquiring scientific skills commensurate with their potential (Tanner 2001). Functions are important structures that play a key role in controlling and guiding people, and are important for successful adaptation and performance in real life. They also allow people to start and complete assignments and be resilient to challenges, identify unexpected situations and quickly design plans and programs that are appropriate to reality, manage daily stresses and prevent inappropriate behavior (Tanner 2001).

Research has shown that one of the areas affected by poor executive function is learning disabilities. Students with learning disabilities mainly have difficulty in using self-

regulatory strategies such as checking, supervising, and reviewing assignments while learning. Many often have difficulty in storing, organising and prioritising information but focusing on details rather than important issues. These weaknesses are known as problems in executive functions that appear in the academic area (Meltzer & Krishnan 2007). The field of executive functions are working memory, which in fact is a mental workspace that allows temporary storage and manipulation of information. Working memory is a set of cognitive processes that interact to store and manipulate the information needed to perform daily activities (Rapport et al. 2009).

The function of this component is essential in order to release and perform the activity properly of other components of executive function, and its proper functioning provides concentration, constant attention, reflection on stimulus response, and inhibition of unrelated impulses (Mattison & Mayes 2012). In working memory, the first information obtained from the environment is compared with the stored information in long-term memory, and then the desired decision is selected, organised and prepared for execution. Most research has focused on working memory maps in learning disabilities. The results of most of these studies in the field showed that children with learning disabilities in memory had poorer performance than other children and showed deficiencies in all components of working memory impulses (Mattison & Mayes 2012). Another important component of executive functions in Miyake et al. (2000) was inhibition and it seemed to be very important in the optimal performance of students with learning disabilities. Inhibition is the ability of a participant to block certain cognitive or behavioral responses. Some studies have shown that children with learning disabilities have impairments in tasks that measure cognitive inhibition (Wang et al. 2012). Numerous studies have shown that inhibition affect working memory. Inhibition generally reduces memory stimuli, so children with high inhibition ability will perform better during the memory encoding process (Alexander et al. 2002).

Research shows that training and physical activity can manage and control the symptoms of learning disabilities and make beneficial changes in executive functions by stimulating the neurobiological process. On the other hand, the best potential link between childhood training and executive functions has been suggested. Participating in training requires executive effort, and performing complex motor activity in turn enhances neural circuits related to executive functions, and shows a reciprocal relationship. Research shows that people who participate in training programs activate areas of the forehead and parietal cortex that are specific to cognitive functions. The greater a participant's physical fitness, the greater the benefits for cognitive function (Neudecker et al. 2015). Of course, the type of training can also be important, like the trainings used in the present study, place more emphasis on eye-foot coordination can have a more

beneficial effect on executive functions of children.

To date most research has confirmed the relationship between regular physical activity and brain development, especially in the prefrontal cortex. In fact, the more the participant interacts with his environment and gains more experience (cognitive and motor), the more his cognitive and mental abilities increase. Executive functions are largely related to the child's experiences. The child gains his experience through various means, especially games during development. Therefore, with the enrichment of the environment and creation of movement games, it will probably help the children to grow and improve their executive functions (Neudecker et al. 2015).

Training has stimulant effect for the development of the forehead cortex in young children. It is thought that motor activities can help to establish, recall, request and apply cognitive concepts. Some studies report that individuals' cognitive function increase after participating in a physical program. It is reasonable to assume that children may receive profound effects from physical training because both the environment and individual experience can affect the sensitivity development of brain at this immature stage. In fact, a meta-analysis of training and cognition had shown a greater positive magnitude in children than adults (Smith et al. 2010).

Other studies have shown that physical activities reduce reading difficulties and improve some important developmental components such as balance, coordination, and education (Reynolds & Nicolson 2007). Medcalf et al. (2006) showed the physical activity, behavioral development and perception of scientific skills increased in children with learning disabilities (Medcalf et al. 2006). However, the relationship between physical activity seems to have positive effect on students' levels of learning and cognitive development (Khezri et al. 2023). On the other hand, physical activity has positive effects on the development and growth of childrens' learning functions, while the first effect is an important argument for increasing academic achievement, the second effect is a tool to reduce irritating behaviors (Trudeau & Shephard 2008). Kumari & Raj (2016) examined the role of physical activity in learning disabilities and the results showed that physical activity improved health, cognitive skills, academic performance and learning in children. On the other hand, Masoudi et al. (2016) investigated the effect of aerobic training on cognitive function of children with learning disabilities; The results showed the positive effect of trainings on the cognitive function in these children (Masoudi et al. 2016). In another study, Abedi et al. (2012) examined the effect of aerobic training on improving executive functions and attention of neuropsychological learning disabilities children; and the results showed positive effect on executive functions (Abedi et al. 2014). Ghorbanpour et al. (2012) also investigated the effect of teaching aerobic rhythmic movements and games on the function of short-term memory and auditory memory of

students with learning disabilities, and showed the positive effects of these movements and games. Demirci et al. (2012) assessed the effect of physical activity level on learning ability of children with learning disabilities. The results showed the positive effect of physical activity on learning facilitation and academic achievement (Demirci et al. 2012). Golabchi and Salehian (2021) showed that swimming had a positive effect on reducing coping behaviors, cognitive problems and inattention of elementary school hyperactive girls (Golabchi & Salehian 2021). Harzandi and Salehian (2022) showed that the brain gymnastics and spark had positive effect on the gross motor skills of trainable mentally retarded girls (Harzandi & Salehian 2022). Abdollahi and Salehian (2022) found braitonic and yoga trainings have a positive effect on improving the level of perceptual and motor skills of multiple sclerosis children.

The trainings used in the present study were designed in such a way to perform them correctly (especially the trainings become more advanced), one must learn how to make the next move in each training and feedback on the result of his movement. Also, one of the basic principles in this type of training was nervous flexibility. Due to the lack of special facilities in the present study, it was performed in different times and places. On the other hand, due to the prevalence of this disorder, dealing with it in spending lesser money and time in the future and considering that the effects of exercise on cognition have been studied mainly in adults of university age or older, and relatively fewer studies in adolescents or children (Reynolds & Nicholson 2007). As the existence of contradictions in the research, it seems to be necessary to conduct this research at the present time.

MATERIALS AND METHODS

This research applied semi-experimental design. Voluntary participants were included. The research was done in pre-test and post-test.

Society

Participants included children with learning disabilities referred to the Welfare Center of Tabriz.

Participants

Fourty five children with learning disabilities referred to the Welfare Center of Tabriz were included. It should be noted that the diagnosis of learning disability began when parents realised the abnormality of their children's behavior and took them to the relevant centers for evaluation.

Inclusion Criteria

Children with learning disabilities, which had been tested by the relevant centers and not attending a regular training program in the last 2 months could participate in this research.

Method of Collecting Information and Data

(i) Measurement of Working Memory

N-back test was used to measure working memory. The N-back task is a task of measuring cognitive function related to executive actions that is commonly used in neuroimaging studies to stimulate subject brain function. The general procedure of the task was that a sequence of visual stimuli was presented to the subject in a step-by-step manner on the screen, and the participant should check whether the present stimulus was alongside with the n stimulus of the previous step or not. This experiment was performed with different values of n and by increasing the amount of n, the difficulty of the task was increased. Thus, in the back-1 task (n = 1), the last stimulus presented was compared with the previous stimulus, and in the back-3 task (n = 3), the last stimulus presented was compared with the previous three stimuli. In this task, n can be 1, 2 or 3. Based on a preliminary study, a back-1 task was used for children with learning disabilities in this study.

(ii) Inhibition Measurement

Psychometer task software and Go/ No Go test were used to measure inhibition. This test, the original version of which was designed by Hoffman (2012), is widely used to measure inhibition and includes two sets of stimuli; Subjects should respond to a group of stimuli (go and refrain from responding to another group). The number of go stimuli was usually more than do not go stimuli, the participant was more willing to respond.

Data Collection Tool

According to the quasi-experimental method of research, guidance from the professor and reference to the library and reputable internet sites, information were collected.

The tools needed for research trainings were basket, ball, obstacle, tables designed for bratonics, balance board, bar meter, paaryaad instrument, N-back test, Go No Go test and time recorder.

Training Protocol

(i) Braitonic trainings

Training 1. A table designed for braitonic was mounted on the wall. A basket full of balls (6 balls) in the same colors in the designed table was placed in front of the participant. The participant standing next to the basket accidentally picked up the ball and then threw it into a house whose color matched the ball.

Training 2. The braitonic table was installed on the wall and the participant was asked to stand next to the wall and jump up based on the color announced by the instructor and touching the desired number and color of the table with one of the hands.

Training 3. The braitonic table was designed with colored paper on the floor and placed in the middle of the balance board table. By placing a piece on the balance board for the participant in question and standing with their hanging legs on the table numbers in order to do the same with the other leg after finishing and they

should try not to lose their balance.

Training 4. The participant stood behind the "Braitonic" table with their hands on their backs and jumped on the desired number in pairs with the name of the color that the coach mentioned.

Training 5. It was provided the same training conditions, but this time the participant used one foot for 15 seconds on the numbers stated by the instructor, and other trainings that were designed and performed according to braitonic principles.

(ii) Paaryaad trainings (Specialised Center & Human Empowerment)

During the first and second series of trainings, the subjects put the sandbag with two hands and one hand in different directions of their body.

On the second day of series one and two trainings, the subjects hit the pendulum ball in different ways.

On the third day of the first series of trainings, hitting the pendulum ball with the hand became more complicated passing the base and the target cubes.

On the fourth day of the series of training, the subject hit the pendulum ball in different ways using a calibrated cane and according to its numbers.

On the fifth day of the two series trainings, the subject hit the pendulum ball in different ways using a calibrated cane and according to its numbers, and must try to pass the ball over the various base targets and target cubes.

On the sixth day of one and two series trainings, the subject threw special balls at the collision plate in different ways.

Data Analysis Method

To test this hypothesis, multivariate analysis of covariance (MANCOVA) was used using SPSS 21 software.

RESULTS

Table 1 showed the effect of the group was significant at the level of 99% probability (p = 0.001, Eta squared = 78, F = 1378.21). That was the amount of executive functions (working memory, inhibition) of children with post-test learning disabilities in the control group and the braitonic group had a significant difference.

Table 2 showed the adjusted means executive functions (working memory, inhibition) of children with learning disabilities in the Braitonic group (m = 47.54) was more than the control group (m = 38.06). Therefore, it was concluded that braitonic trainings had a positive effect on improving the level of executive functions (working memory, inhibition) of children with learning disabilities.

Table 3 showed the effect of the group was significant at the level of 99% probability (p = 0.001, eta squared = 0.72, F = 359.12). That was the level of perceptual and motor skills in the post-test of the control group and the Paaryaad group had a significant difference.

Table 4 showed the adjusted of that the rate of executive functions (working memory, inhibition) of children with learning disabilities in the paaryaad group (m = 42.580) was significantly

TABLE 1: Results of differences in executive functions (working memory, inhibition) of children with post-test learning disabilities in the two groups

Source of change	Total squares	df	Average squares	F	Sig.	Eta
Pre-test Effect	461.08	1	461.08	1582.2	0.001	0.98
Group Effect	418.54	1	418.54	1378.2	0.001	0.78
Error	7.868	27	0.291			
Total	55823	30				

higher than the control group (m = 39.31). Therefore, it was concluded that Paaryaad trainings had a positive effect on increasing the perceptual and motor skills of children with MS.

Table 5 showed that all components (working memory, inhibition) of the group effect were significant at the level of 99% probability (p<0.01). After adjusting the pre-test scores, the amount of components (working memory, inhibition) in the post-test of the control group and the Paaryaad group had a significant difference.

TABLE 2: Modified mean of executive functions (working memory, inhibition) of children with learning disabilities in control and braitonic groups

Group	N	Modified mean	Std. dev.
Control	15	38.06	0.132
Braitonic	15	47.54	0.132

Table 6 showed that the amount of components (working memory, inhibition) in the paaryaad group was more than the control group. Therefore, it was concluded that paaryaad trainings had a positive effect on improving the level of executive function (working memory, inhibition) of children with learning disabilities.

Table 7 showed the adjusted means of the rate of executive functions (working memory, inhibition) in children with learning disabilities in the paaryaad group (m = 56.76) was higher than the braitonic group (m = 53.48). Therefore, it was concluded that the effect of paaryaad trainings on improving executive functions (working memory, inhibition) of children with learning disabilities was greater than the effect of braitonic trainings.

Table 8 showed all components (working memory, inhibition) of the group effect was significant at the

TABLE 3: Results of differences in executive functions (working memory, inhibition) of children with post-test learning disabilities in the control and paaryaad groups

Source of change	Total squares	df	Average squares	F	Sig.	Eta
Pre-test Effect	535.48	1	535.48	1412.6	0.001	0.97
Group Effect	128.53	1	128.53	359.12	0.001	0.71
Error	11.173	27	0.356			
Total	51213	30				

TABLE 4: Modified mean of executive functions (working memory, inhibition) of children with learning disabilities in control and Paaryaad groups

Group	N	Modified mean	Std. dev.
Control	15	39.31	0.128
Braitonic	15	32.68	0.128

level of 99% probability ($p<0.01$). The amount of components (working memory, inhibition) in the post-test in the paaryaad group and the braitonic group had a significant difference.

Table 9 showed the adjusted means of the amount of components (working memory, inhibition) in the paaryaad group is higher than the braitonic group.

Table 10 showed the effect of paaryaad trainings on increasing the level of executive functions (working memory, inhibition) of children with learning disabilities was greater than the effect of braitonic trainings.

DISCUSSION

Braitonic trainings are combined trainings affect motor and perceptual skills, so in children, both object manipulation skills and motor skills are

TABLE 5: Results of univariate analysis of covariance to compare components (working memory, inhibition) in control and paryaad groups

Source of change	Total squares	df	Average squares	F	Sig.	Eta
Pre-test Effect	107.19	1	107.19	78.14	0.001	0.56
Group Effect	112.15	1	112.15	58.17	0.001	0.52
Error	30.55	27	1.38			
Total	24.34	30	1.09			

TABLE 6: Modified mean of components (working memory, inhibition) in control and paaryaad groups

	Group	N	Modified mean	Std. dev.
Post-test working Memory	Control	15	35.47	0.32
	Paaryyad	15	38.65	0.32
Post-test inhibition	Control	15	33.83	0.34
	Paaryyad	15	37.71	0.34

TABLE 7: Results of differences in executive functions (working memory, inhibition) of children with post-test learning disabilities in braitonic and paaryaad groups

Source of change	Total squares	df	Average squares	F	Sig.	Eta
Pre-test Effect	432.63	1	432.63	2375.1	0.001	0.99
Group Effect	8.25	1	8.25	440.61	0.001	0.64
Error	4.92	27				
Total	61570	30				

involved, and it is possible to develop MS children's perceptual and motor skills. They need the opportunity to practice and experience stimulating environment, encouragement and imagination to develop and strengthen their perceptual and motor abilities. The results of this study also showed braitonic trainings have an effect on executive functions (working memory, inhibition) of children with learning disabilities. The results of this study are in line with the results of Abdollahi and Salehian (2022), Golabchi and Salehian (2021), Salehian and Dehghani (2020), Hashemi et al. (2015), and Dana and Christodoulides (2019) with the difference they study the effect of braitonic trainings on the development of motor skills of children with teachable IQ had concluded that braitonic trainings were helpful in the motor development of normal and mentally retarded children. The perceptual-motor abilities of girl elementary school students showed braitonic trainings can be a good program for the comprehensive development of perceptual-motor abilities of children and elementary school students. All studies have examined the effect of braitonic trainings on perceptual and motor skills of students and children with specific diseases, and in all studies, the effect of braitonic on perceptual

TABLE 8: Modified mean of executive functions (working memory, inhibition) of children with learning disabilities in braitonic and paaryaad groups

Group	N	Modified mean	Std. dev.
Control	15	56.76	0.12
Braitonic	15	53.48	0.12

TABLE 9: Results of comparison of components (working memory, inhibition) in braitonic and paaryaad groups

Source of change	Independent variable	Total squares	df	Average squares	F	Sig.	Eta
Group	Post-test working memory	90.45	1	90.45	210.78	0.001	0.72
	Post-test inhibition	71.48	1	71.48	154.17	0.001	0.63
Error	Post-test working memory	9.47	27				
	Post-test working memory	10.75	30				

TABLE 10: Modified mean of components (working memory, inhibition) in braitonic and paaryaad groups

	Group	N	Modified mean	Std. dev.
Post-test working Memory	braitonic	15	35.96	0.17
	paaryyad	15	42.30	0.17
Post-test inhibition	braitonic	15	42.99	0.18
	paaryaad	15	39.73	0.18

and motor skills was positive. Activity should be a method of education in childhood and provides opportunities for children to interact with others and gain experience (Abdollahi & Salehian 2022). In this way, training and motor training can be considered as an effective factor in the development of children's perceptual and motor skills. Even in children with MS, there is a double interest in continuing to training, and this training affects the executive functions (working memory, inhibition) of children with learning disabilities (Hosseinzadeh Peyghan et al. 2022).

The results showed paaryaad trainings have a positive and significant effect on executive functions (working memory, inhibition) of children with learning disabilities. The results of this research were in line with the results by Ghasemian Moghadam et al. (2017), Noori and Azarang (2013) and Hoomanian and Khezri (2015). Ghasemian Moghadam et al. (2017) examined the effect of paaryaad perceptual-motor trainings on executive functions of children with learning disabilities in boys showed paaryaad perceptual motor trainings improved working memory in the experimental group. All these changes were significant compared to the control group. But the effect of these trainings on inhibiting children with learning disabilities was insignificant (Ghasemian Moghadam et al. 2017).

On the other hand, the larger the age range of the subjects, the greater the difference in terms of the development of cognitive components, so the trainings used in the study were selected for all age groups and may be due to the large age range of these subjects. Younger children, similar to older children, have not been able to perform the intended training properly. Another reason for the discrepancy was the duration of the training sessions; According to the results of studies, fatigue reduces the ability to produce force, neuromuscular coordination, precision of motor control, depth sense, joint stability, muscle contraction and increase reaction time, the main result from is a marked reduction in muscle function. Due to the fact that the trainings in the study were done in long weeks, so the factor of fatigue may have a negative impact on the performance and ultimately the academic achievement of these subjects (Hosseinzadeh Peyghan et al. 2022).

Among the components of executive functions, working memory is important in storing information also manipulating and processing information, which are related to learning and academic achievement, and its weakness can cause learning problems. On the other hand, the ability to inhibit irrelevant response is considered as one of the most important executive functions and is directly related to the self-regulatory goal-oriented behavior. Bull and Scerif (2001) had shown children with math learning disabilities had many problems with executive functions such as inhibiting responses and retaining information in working memory. Kaneda and Osaka (2008) argued children with difficulty to restraint can ignore information they

do not need and stop a thought or action abruptly. Incomplete control of executive inhibition can also jeopardise the ability of working memory and lead to the degradation of children's working memory and by given the choice of stimulus, choice of response and task execution of the response each requires inhibition at different stages of processing (Kaneda & Osaka 2008). Therefore, these children also face more problems in school-related homework due to the problems they face in inhibition. In other words, when inhibition is difficult, other executive functions will not function properly, and the problems of these children in inhibition are related to the poor function of the frontal lobe and their forehead. However, the relationship between physical activity and academic performance seems to have a positive effect on students' levels of learning and cognitive development. Two mechanisms have been proposed to explain the effects of training and physical activity on cognitive function; oxygen hypothesis, which measures blood flow to specific areas of the brain; and neurotrophic stimulation hypothesis, which promotes neuromuscular activity in brain centers. Higher brain function by physical activity prevents cognitive decline through various molecular mechanisms such as neurogenesis, synaptogenesis, and angiogenesis via interaction with hormones, secondary messengers, and neurodevelopmental factors. Training therapy directly affects the outcome structure and function of the brain and also improves the aerobic capacity to enhance cerebral blood flow, improves oxygen and glucose utilisation in the brain, accelerates the transfer of biochemicals and increases the activity of antioxidant enzymes (Clark 1996). Mohammadi et al. (2009) in a study entitled occupational therapy and cognitive-motor skills in special learning disabilities believed these methods served as a basis for improving brain function, such as reading and arithmetic increase the efficiency of more abstract levels of the brain, thereby affecting the educational and training efficiency of these children (Mohammadi et al. 2009). Numerous studies showed training caused certain changes in nerve function and increased learning ability and memory. Most likely, these effects are due to changes in hippocampal neurodegeneration, including increased neurogenesis, long-term reinforcement, and training-induced changes, particularly brain-derived neurotrophic factor.

According to the results of the study, which showed the superiority of the effectiveness of Paaryaad trainings over Braitonic trainings, no research had been done so far and this was the first case. Therefore, it is not possible to find consistent or inconsistent research with this research. However, it is certained that both trainings had positive effect on the executive functions (memory and inhibition) of children with learning disabilities. Therefore, the positive result of this work was compared and aligned with some researches. In cerebral blood flow, logic has been suggested as another possible mechanism for changes in cognition, including memory, which

explains the positive effects of training on cognitive processes. In addition, it has been observed in animal models training does not completely increase cerebral blood flow to all areas of the brain but it focuses on specific areas involved in movement, balance, and cardiorespiratory control, as well as areas of the hippocampus that involved in memory (Jones et al. 2003). However, the relationship between physical activity and academic performance seems to have positive effect on students' levels of learning and cognitive development. Numerous studies have also shown inhibition affects working memory. Inhibition generally reduces annoying memory stimuli, as a result, children with high inhibitory performance will perform better during the memory encryption process (Ezzati Arbat & Hosseinzadeh Peyghan 2023). The effect of training on the cognitive function of children with learning disabilities may be attributed to a series of neurochemical changes in specific areas of the brain increase the secretion of neurotransmitters such as acetylcholine, serotonin and noradrenaline. This neural mediator causes changes in the electrophysiological activity of the brain (Mohammadi et al. 2009) and improves cognitive functions such as attention, information processing, storage and retrieval of information (Jones et al. 2003). There has been much debate about how physical activity affects cognitive function, and the underlying mechanisms of intervention is not clear, but it is believed that these effects occur with changes in the body. According to the researchers and the results of this study, it can be concluded that training and physical activity have a great impact on the working memory of children with learning disabilities and can improve the working memory of these children. By doing all of paaryaad trainings on the balance board, both hemispheres of the brain are activated simultaneously, further improving executive function.

CONCLUSION

It can be said physical training and activity have a great impact on the working memory of children with learning disabilities and can improve the working memory of these children.

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