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Original research

The effect of selected exercises on the motor skills and attention of Children

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Abstract

Introduction: The present study was conducted with the aim of investigating the effect of selected rowing exercises on motor skills and attention of high-functioning autism spectrum children.

Findings: This research was conducted with a semi-experimental method and with two experimental and control groups, pre-test and post-test. The statistical population of the research included all children with autism spectrum disorder referred to the collection of Azadi Stadium in 1400. 30 of these children with autism spectrum disorder were selected through purposive sampling after taking the relevant test. From this group, 15 people were in the experimental group and 15 people were in the control group. The experimental group was exposed to training in selected rowing exercises. In order to evaluate attention, the Wechsler children's intelligence scale (5th version) was used, and in order to evaluate motor skills, Ozoretsky motor skills questionnaire was used. Analysis of the obtained data using covariance analysis showed that there was a significant difference between the average scores of the experimental and control groups in all subscales of attention and motor skills ($p<0.05$).

Findings: The results showed that selected rowing exercises were effective as an intervention tool in increasing the attention and movement skills of children with high-functioning autism spectrum disorders.

Conclusion: Training parents to use this device is also important so that the autistic child learns not only movement and attention skills outside the home environment, but also in the home environment.

Key words: attention, children with autism spectrum, motor skills, selected rowing exercises

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Introduction:

Autism is a type of neurodevelopmental disorder that people with it have three main characteristics. Impaired socialization, impaired verbal and non-verbal communication, and limited and repetitive patterns of behavior (1). In general, autism disorder is a spectrum of disorders that includes problems in the field of cognition and language (2). In the past few decades, despite the progress made in the field of assessment, diagnosis and treatment of children and adults with autism disorder, there are still differences of opinion about this disorder. Although different theories are proposed in the field of etiology of this increasing disorder, none of them have yet reached the necessary certainty (3). Among the underlying causes of autism that have been identified so far, we can mention prenatal factors, immunological factors, neuro-anatomical factors, biochemical factors, genetic factors, and biological factors. Regarding the causes of autism, there are hypotheses such as same-sex mating, inability to excrete mercury, increased serotonin and decreased GABA, mirror neuron, steroid hormones, peptide hormones, vaccination damage and vitamin deficiency (4). One of the problems of these children is the lack of attention, accuracy and concentration, followed by learning problems, which causes the quality of life of these children to decrease, and the lack of proper education can cause irreparable damage to the mental health of the individual, family and society, and in the future Create obstacles in the child's learning path or expose them to the risk of disability and turn them into diseases such as learning disorders, confrontational behaviors, and behavioral disorders (5). So learning plays a key role in the lives of these children. The learning process cannot be done without the necessary focus and attention (6). In educational programs, attracting children's attention before and during education is one of the most important duties and responsibilities of educators. Choosing and finding an appropriate, short-term, efficient, effective and affordable treatment method that can be easily implemented for families in any social class is not an easy task (7). Studies show that between 1 and 11% of autistic children have significant delays. They are in motor skills. Children with autism spectrum disorders have problems in a set of gross motor skills (for example, running and jumping, fine motor skills and motor planning) of body movement in space. Although these children may acquire movement indicators in time, the quality of children's movement appears as raw movement (8). Srinivasan and Bhatt (9) found that in 73% of the participants with autism, there is a delay in basic skills and in the performance classification of Ulrich's gross motor development test, they were classified as poor and very poor. Uzonov, Yang, Goldering and Hess (10) by examining the gross motor development of autistic children found that the clinical growth of these children's movements is delayed. While there is no specific treatment for autism yet, there are appropriate treatment methods that can be used to help these children benefit from more abilities and even examples of complete recovery have been seen. Is. These therapeutic methods, in addition to helping to reduce the child's disordered behaviors, also teach the child independent tasks so that the child can meet his needs independently and gradually reach a normal life (11). As it is known, there is no definitive medicine for the treatment of autistic children, and many of the medicines that are prescribed are sedatives and somnolence and have a limited role in improving the symptoms of this disorder. As a result, they lead to a decrease in children's mobility; But by doing sports activities, children's inactivity and inactivity can be prevented (12). Sports and games have many benefits and values for children. During these processes, he understands the phenomena, understands the relationships and feels comfortable and uses it as a tool to establish communication, exchange, test and master the external realities (13). One of the functions of sports and games in the growth and

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development of children is its therapeutic role. Sports and games allow the child to show experiences, thoughts, feelings and tendencies that are threatening to him (14). Also, sports, movements or games with a specific pattern are one of the favorite training methods of children and teenagers. These movements and activities have a harmonious nature and their correct execution requires the regular execution of various movements with specific sequences. In this form of training, most perceptual-motor skills such as balance, coordination, understanding spatial and temporal relations and orientation of the whole body or different parts of the body are actively involved. As a result, children and teenagers show a great desire to perform these types of physical movements. This type of movements and sports, in addition to providing an effective tool for training and practicing basic motor skills, can affect cognitive processes, attention, perception, concentration of senses, neuro-muscular coordination and the development of personal relationships and Social skills are also effective (15). The tactile and movement stimulation obtained through these movements strengthens the physical perception and the integration of sensory reception from other dimensions. These types of movements and sports are enjoyable and involve the whole body of the child and help him to maintain his attention and concentration and control the behaviors caused by immediate stimulation (16). One of the exercises that seems to have an effect and does not have the side effects of drugs is upright exercise, and also according to the 2010 recommendations of the World Health Organization for children with and without disorders to prevent the risks of inactivity. And at least 10 minutes of moderate to vigorous physical activity per day is recommended to reap the benefits of physical activity (17). Based on the research conducted on sports and children with autism, it can be seen that by participating in sports, repetitive behaviors of children with autism disorder are reduced (18). The child shows less aggressive symptoms, the child's academic progress shows improvement, coordination Physical as well as movement skills are improved (19). In general, it can be said that since autism is a new and unknown or at least little-known disorder that is increasing in societies and people do not have enough knowledge and awareness about this disorder, as well as the increase and prevalence of autism disorder, the importance of control and He considers prevention of its consequences to be necessary for the individual and the society, and research in this field can be a step for recognition, awareness and treatment of this disorder. New treatment methods based on sports, such as rowing, can be a new step and an effective way to improve the performance of these children. Therefore, the current research is aimed at answering the question that to what extent the selected rowing exercises have an effect on motor skills and attention of high-functioning autistic children?

Research method:

The current research is of the type of applied research and semi-experimental method. The pre-test-post-test research design was carried out with two experimental and control groups and a follow-up phase. To analyze the data, descriptive and inferential statistical methods were used and statistical tests were used according to the scale of the data and from SPSS version 22 statistical software was used. In this research, we tried to investigate the effect of selected rowing exercises on motor skills and attention of high-functioning autism spectrum children by emphasizing the scientific method. The statistical population of this research included 15 children with autism spectrum disorder who referred to the Azadi Stadium in 1400 and were selected by available and purposeful sampling. Broninx Ozertsky motor skills test and Wechsler test were also controlled. It is worth mentioning

that these participants were examined by a general physician and a psychiatrist in terms of physical and mental health and were allowed to participate in training sessions. The researcher provided information through the sailing coach and also through a questionnaire that was answered by the child's parents. And after the samples were determined, the pre-test was performed by Broninx-Ozertsky motor skills and Wechsler's test, and then the test group did the rowing program for 10 weeks and three sessions (1 hour) every week. The training of these people is completely different and requires a lot of considerations. A touring boat was used for training. And the control group will remain on the waiting list for the sake of preserving and respecting ethical issues. In order to implement the ethical steps of the research, the parents of the subjects signed the consent form for their child's participation in all the steps of the research. And based on the families' consent and commitment to cooperation, the exercise program was implemented and they were assured that the results will remain confidential and will only be analyzed as a group. And a week before, all the stages of the research were prepared by a brochure and given to the parents. Because the researcher was in contact with most of the subjects for a long time. This factor had a great impact in creating a better relationship in the implementation of the research with the subjects. At the end of the exercise program, a post-test was conducted in completely similar conditions for both test and control groups to measure the effect of selected rowing exercises on motor skills and attention of high-functioning autistic children. Entry criteria for participants in Research

*Suffering from autism based on the criteria of the fifth edition of the diagnosis of mental disorder (DSM-2013)

*Complete mastery of swimming and interest in sailing exercises

* Having enough tolerance to do the test. Not suffering from mental retardation. The absence of special diseases (cardio-kidney diseases, etc.) and the absence of reports of any type of physical and orthopedic injury that interferes with the performance of exercises were checked.

Absence of sensory defects such as deafness, blindness

Exit criteria: * The subject's unwillingness to continue participating in the study was absent for more than three sessions in the training sessions. Tools used in research**:**

Bruininks-Oseretsky Test of Motor Proficiency: This test is a set of standard reference tests and evaluates the motor performance of children aged 4.5 to 14.5 years. The complete set of this test consists of eight sub-tests (including 46 separate sections) that evaluate motor skills or motor disorders in gross and fine motor skills. Bruininks prepared this test in 1972 by modifying Ozer Tesky's motor skills tests. It takes 45-60 minutes to complete the complete set of this test. Four subtests measure gross motor skills, three subtests fine motor skills, and one subtest measures both motor skills. Its eight subtests are: running speed and agility, balance, bilateral coordination, strength. Coordination of upper body speed. Visual-motor control and upper limb speed and agility. Bruniniks (1987): This test was conducted on 765 children based on age, gender, Race. Standardized community size and geographical area. The retest coefficient of this test is reported as 78%.

Test No. 1: Running speed and agility: to measure running speed with a two-way (round trip and by two running attempts and measuring the running speed with a stopwatch. The examiner marks the running path. The subject must the examiner stands next to the timing line and the subject stands

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behind the starting line. The subject should run to the wooden cube at full speed after hearing "in place - ready - go", pick it up and bring it with him. Running time is measured in the distance between the first and last crossing of the timing line. The test is repeated twice. If the subject falls, fails to pick up the cube, or drops the cube along the way, the test is repeated.

Test No. 2: Balance: to measure dynamic and static balance from two sub-tests: standing on the balance stick with the leading foot (maximum 10 seconds per attempt and maximum two attempts) and walking forward on the balance stick with the heel and toe (maximum 6 steps in every effort) is used. The test must wear sports shoes. The walking line is glued to the ground and the target is installed on the wall so that the lowest part of the circle is along the subject's eyes.

Test 1-2: standing on the ground with the superior leg: the subject should stand on the walking line with the superior leg while looking at the target, put his hands on the waist and bend the knee of the non-predominant leg so that the lower leg be parallel to the ground. If before 10 seconds the flexed leg contacts the ground, the knee of the non-dominant leg opens more than 45 degrees even after a warning, the flexed leg is hooked to the supporting leg, or the support leg is moved, the examiner records the time in seconds that the subject was in the correct position and repeats the test. Slight body sway is acceptable. If the subject can stay in the correct position for 10 seconds, the examiner will give him the maximum score (10). **Test 2-2:** heel-toe walking on the balance stick: the subject should walk on the balance stick with his hands on the waist in such a way that the heel of the front foot touches the big toe of the back foot. The examiner counts the number of correct and incorrect steps taken by the subject during 6 steps, and on the registration sheet, he assigns the number 1 for correct steps and the number • for incorrect steps. If the heel of the back foot does not touch the big toe of the front foot or the back foot comes forward and touches the heel of the front foot, it is considered a wrong step. If the subject leaves one or both feet completely outside the stick while walking, the examiner stops the test and records the number of steps taken. If the subject does not get the maximum score, the test will be repeated.

Test number 3: Consecutive and simultaneous two-way coordination of the upper and lower limbs: measurement of two-way coordination by means of two sub-tests of hitting one in the middle with the foot while drawing a circle with the fingers (maximum 90 seconds) and jumping up and clapping the measurement will be.

Experiment 1-3: tapping a door with the feet while drawing a circle with the fingers: the examiner sits on a chair in front of the subject and asks him to place his arm at or slightly below the shoulder and his index fingers take it to the examiner. The subject should move one index finger in the clockwise direction and the other in the opposite direction and at the same time hit the ground with one foot in between. The subject has 90 seconds to hit the ground correctly 10 times in a row. The score is recorded as pass/fail. The examiner takes time from the beginning and starts counting when the beats find a regular rhythm. In situations where the rhythm of the blows was mixed, the blows were not alternated, the circles were not drawn simultaneously with the fingers of both hands, the wrist and forearm were used to draw the circles, or the circles were not complete, the examiner gave a warning and started counting again slow down.

Test 2-3: jumping up and clapping: the examiner stands in front of the subject and asks him to jump as high as possible and clap his hands before reaching the ground (Figure 7-3). If the subject can

clap 5 times, he will get full marks. If the full score is not obtained, the examiner repeats the test. Floors that are performed when the subject hits the ground or below the chest will not be counted. If the subject's balance is disturbed and one or both hands touch the ground, the score is zero. The examiner counts and records the number of correct claps.

Test No. 4: Strength: measuring the strength of the lower limbs by means of a paired long jump subtest (reading the number from a tape measure and is measured in a maximum of three attempts. In the condition that the subject is tired, this subtest is performed after some rest or in It will be done another day.

Test 1-4: Paired Long Jump: Tester attaches a 61 cm tape to the ground (starting line). Then he installs the metal end of the tape measure on the starting line, stretches the meter perpendicular to the starting line and taps the meter to the ground after the last number. The examiner asks the subject to jump up and down a few times before starting. Then he stands behind the line, bends his knees, leans forward and swings his arms several times by his side. With the start signal, the subject should pull his arms back and jump forward as much as possible, and if he loses his balance, try to fall forward. The test is repeated three times and each time the distance jumped is recorded (the landing place of the heel of the rear foot or any part of the body that contacts the ground behind the heel).

Wechsler intelligence scale: Children, fifth edition: Wechsler scale 5 is the latest version of Wechsler scales for children. This scale is a comprehensive clinical tool for evaluating the cognitive abilities and intelligence of children aged 6 to 16 years and 11 months, which was presented in 2014 and adapted and standardized by the psychometric collection. The fifth edition of Wechsler is distinguished over its previous edition by integrating new research and applying software science about intelligence, cognitive development, neurodevelopment, neuroscience and important learning processes. This version consists of 21 subtests, including ten primary subtests for comprehensive description and assessment of intelligence ability, six secondary subtests for a broader sampling of intelligence performance for clinical decision making, and five subtests for providing more information about ability. Cognitive skills in case of clinical need. According to the research done by Karmi and colleagues, this test has high reliability in Iran, and three validity methods have also confirmed the high validity of the test in Iran.

Table 1: The content of the sessions of the 10-week research exercise program

weeks	Basic program (warming up) 10 minutes	The main part is 60 minutes	Final program (cooling down) 10 minutes
First	Stretching movements (stretching of arms and legs), rotation of the head, shoulders and wrists, rotation of the waist, running in place	Acquaintance with the wharf space and learning how to wear a life jacket and how to sit in the boat, how to hold an oar and how to paddle. Riding with the instructor in a two-person boat	warm-up exercises

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Second	Stretching and walking	Using a two-person boat with an instructor and learning how to separate the boat from the dock	warm-up exercises
Third	Running and playing soft movements	Practicing balancing inside the boat - the correct way to sit inside the boat - using a plastic rod instead of a paddle	warm-up exercises
Fourth	Stretching and sitting movements	Using a light pole instead of a paddle, but still, it is necessary to have a coach by their side to ensure their safety	warm-up exercises
Fifth	Stretching movements and two races	Using an oar, learning to put the oar in the water and specify the distance of the hands from each other, the direction of placing the hands on the oar.	warm-up exercises
Sixth	Stretching and softening movements	Practice combining and practicing on a fixed platform	warm-up exercises
Seventh	Stretching and running	Rowing practice and training to go back and forth on a path that is marked with two colored balls	warm-up exercises
Eighth	Stretching and flexibility movements	Sitting in a single boat and the presence of a coach in another boat and using palms instead of oars	warm-up exercises
Ninth	Stretching and warming up	Rowing practice and repetition and review of movements of previous sessions	warm-up exercises
Tenth	warm-up exercises	Practicing rowing and jumping into the water	warm-up exercises

In all training sessions, the previous sessions were done in shorter times, and the presence of the trainer is mandatory to observe safety issues with the students, and also using positive sentences and encouraging the students is very effective in the progress of training.

Findings:

Table 1- Descriptive indices of the experimental group's attention variable scores in the pre-test and post-test

Variable	pre-exam		post-test	
	Average	standard deviation	Average	standard deviation
symbolism	4/33	1/49	4/86	1/50
Encryption	3/66	1/44	4/06	1/16
remove	3/26	1/27	3/80	1/20
Overall processing speed score	75/66	4/79	76/53	4/58

Table 1 shows the descriptive indices related to the scores of the attention variable (Wechsler's processing speed subscale) in the pre-test and post-test of the experimental group. According to this table, it can be concluded that in the pre-test stage, the symbolization subscale has an average of 4.33, encoding has an average of 3.66, deletion has an average of 3.26, and the overall score of processing speed has an average of 75.66. Also, in the post-test stage, the symbolization subscale has an average of 4.86, encoding has an average of 4.06, deletion has an average of 3.80, and the overall score of processing speed has an average of 76.53. A significant difference can be seen between the pre-test and post-test scores of the experimental group. It should also be noted that by examining the skewness and skewness of the data, we found that the skewness and skewness of all components is less than $|2|$, so it can be claimed that the data has a normal distribution.

Table 2. Descriptive indices of the control group's attention variable scores in the pre-test and post-test

Variable	pre-exam		post-test	
	Average	standard deviation	Average	standard deviation
symbolism	4/46	1/58	4/20	1/69
Encryption	3/40	135	3/20	1/42
remove	3/60	1/35	3/20	1/37
Overall processing speed score	73/60	5/20	73/20	5/40

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Table 2 shows the descriptive indices related to the scores of the attention variable (Wechsler's processing speed subscale) in the pre-test and post-test of the control group. According to this table, it can be concluded that in the pre-test stage, the symbolization subscale has an average of 4.46, encoding has an average of 3.40, deletion has an average of 3.60, and the overall score of processing speed has an average of 73.60.

Table 3. Descriptive indices of motor skills variable scores of the experimental group in the pre-test and post-test.

Variable	pre-exam		post-test	
	Average	standard deviation	Average	standard deviation
Gross skills	6/66	3/17	7/33	3/10
Fine skills	6/60	2/29	7/13	2/35
Balance skills	5/93	2/40	6/46	2/19
Motor skills overall score	19/20	4/21	20/93	3/88

Table 3 shows the descriptive indices related to the variable scores of motor skills in the pre-test and post-test of the experimental group. According to this table, it can be concluded that in the pre-test stage, the subscale of gross skills has an average of 6.66, the subscale of fine skills has an average of 6.60, the subscale of balance skills has an average of 5.93, and the overall score of motor skills has an average of 19.20. Also, in the post-test stage, the subscale of gross skills has an average of 7.33, the subscale of fine skills has an average of 7.13, the subscale of balance skills has an average of 6.46, and the overall score of motor skills has an average of 20.93. A significant difference can be seen between the pre-test and post-test scores of the experimental group. It should also be noted that by examining the skewness and skewness of the data, we found that the skewness and skewness of all components is less than $|2|$, so it can be claimed that the data has a normal distribution.

Table 4 Descriptive indices of variable scores of motor skills of the control group in the pre-test and post-test

	Average	standard deviation	Average	standard deviation
Gross skills	7/26	2/91	7/00	2/85
Fine skills	6/80	2/54	6/60	2/55
Balance skills	5/20	2/88	4/86	2/77

Motor skills overall score	19/26	3/84	18/46	3/62

Table 4 shows the descriptive indices related to the variable scores of motor skills in the pre-test and post-test of the control group. According to this table, it can be concluded that in the pre-test stage, the subscale of coarse skills has an average of 7.26, the subscale of fine skills has an average of 6.80, the subscale of balance skills has an average of 5.20, and the overall score of motor skills has an average of 19.26. Also, in the post-test stage, the subscale of gross skills has an average of 7.00, the subscale of fine skills has an average of 6.60, the subscale of balance skills has an average of 4.86, and the overall score of motor skills has an average of 18.46. There is no noticeable difference between the pre-test and post-test scores of the control group. It should also be noted that by examining the skewness and skewness of the data, we found that the skewness and skewness of all components is less than $|2|$, so it can be claimed that the data has a normal distribution.

Table 5. Smironov Kolmogorov statistic to check the normality of the experimental group data

Variable	Smironov Kolmogorov		
	statistics	Degrees of freedom	Significance level
Symbolism	0/177	30	0/099
Encryption	0/175	30	0/108
remove	0/159	30	0/199
Overall processing speed score	0/152	30	0/156
Gross skills	0/144	30	0/200
Fine skills	0/106	30	0/200
Balance skills	0/083	30	0/200
Motor skills overall score	0/169	30	0/097

According to the results obtained from table 5 and the level of significance which is more than 0.05, therefore, the data obtained from attention and motor skills in the experimental group can be assumed to be normal with high confidence, as a result, our null hypothesis is not rejected and can be He used parametric statistical models. These data show that the hypothesis of normality of the data is established ($P \geq 0.05$).

Table 6 Smironov Kolmogorov statistic to check the normality of control group data

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Variable	Smironov Kolmogorov		
	statistics	Degrees of freedom	Significance level
Symbolism	0/138	30	0/200
Encryption	0/177	30	0/101
remove	0/160	30	0/105
Overall processing speed score	0/117	30	0/200
Gross skills	0/104	30	0/200
Fine skills	0/140	30	0/200
Balance skills	0/143	30	0/200
Motor skills overall score	0/151	30	0/168

According to the results obtained from table 6 and the level of significance which is more than 0.05, therefore, the data obtained from attention and motor skills in the experimental group can be assumed to be normal with high confidence, as a result, our null hypothesis is not rejected and can be He used parametric statistical models. These data show that the hypothesis of normality of the data is established (P≥0.05).

Table 7. t of two independent groups to compare the research variables with emphasis on the two experimental and control groups in the pre-test stage.

Variable	The difference of the averages	standard deviation	The amount of t	Degrees of freedom	The significance level
Symbolism	-0/133	0/581	-0/229	28	0/820
Encryption	0/266	0/511	0/521	28	0/606
remove	-0/333	0/480	-0/693	28	0/494
Overall processing speed score	2/066	1/826	1/131	28	0/268

Gross skills	-0/600	1/113	-0/539	28	0/594
Fine skills	-0/200	0/883	-0/226	28	0/823
Balance skills	0/733	0/969	0/757	28	0/456
Motor skills overall score	-0/066	1/472	-0/045	28	0/964

According to the above table and by emphasizing the amount of t values obtained, it can be stated that there is a significant difference at the level of α=0.05 between the averages of the research samples in attention and its components and motor skills components and its overall score with an emphasis on the experimental group. And there is no control in the pre-test stage. Therefore, it can be stated that the variances in the two experimental and control groups are homogeneous in the pre-test stage and are the same in terms of dispersion.

First question: To what extent do the selected rowing exercises affect the attention of high-functioning autism spectrum children?

Table No. 8 One-way covariance analysis related to the effects of rowing exercises on the overall attention score (Wechsler processing speed subscale) of high-functioning autism spectrum children

Source Changes	Total Squares	Degree the freedom	average Squares	Amount of F	The significance level	effect intensity
pre-exam	684/893	1	684/893	1072/597	0/000	
group	11/944	1	11/944	18/705	0/000	
error	17/240	27	0/639	---	---	0/409
total	168936/00	29	---	---	---	

Considering the amount of F and the level of significance in the table above, which is less than 0.05, the null hypothesis is rejected. That is, there is a significant difference between the average scores of the attention factor of the two groups in the post-test, and also by examining the table of descriptive statistics and comparing the average scores related to the attention factor of the two groups, it can be seen that the training of selected exercises in the field of rowing improves the attention scores of high-functioning autism spectrum children increases to some extent. . Also, by emphasizing the size of the effect, it can be seen that the training of selected rowing exercises has a favorable effect on increasing the attention (small scale processing speed in the Wechsler scale) of high-functioning autism spectrum children, which is equal to 0.409. Box test is also used to check the homogeneity of the covariance matrix of the processing speed subscale components in the research groups.

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Table 9 Box test results to check the homogeneity assumption of the covariance matrix in attention components (processing speed)

Significance level	DF2	Df1	F	BOX S M
0/231	5680/302	6	1/350	9/176

Table 9 shows that the level of significance is ($p<0.05$), which indicates that the condition of homogeneity of the covariance matrix is well met for the attention components ($F=1.350$ and $p\leq0.05$). It means that the covariance matrices observed between different groups are equal.

Table 10 post-test covariance analysis of attention components by removing the pre-test effect

Level	Source change	sum of squares	Degrees of freedom	mean square	F	Significance level	Effect size
symbology	group	5/610	1	5/610	17/816	0/000	0/416
	error	7/872	25	0/315			
	group	2/729	1	2/729	7/801	0/010	0/238
Encryption	error	8/747	25	0/350			
delete	group	5/797	1	5/797	22/173	0/000	0/470
	error	6/536	25	0/261			

Considering the amount of F and the level of significance in the table above, which is less than 0.05, the null hypothesis is rejected. That is, there is a significant difference between the average scores of attention components (small scale of Wechsler's processing speed) of the two groups in the post-test, and also by examining the table of descriptive statistics and comparing the average scores related to the attention components of the two groups, it can be seen that the training of selected exercises in the field of rowing, attention components (Wechsler's processing speed subscale (including symbolization, encoding, and deletion) of high-functioning autism spectrum children increases to some extent. Also, by emphasizing the size of the effect, it can be seen that the training of selected exercises in rowing increased the score of the subscale of symbolization by 0.416, the increase of the subscale of encoding by 0.238 and the increase of the subscale of deletion by 0.470. Second question: To what extent do the selected rowing exercises affect the motor skills of high-functioning autism spectrum children?

Table No. 11 One-way covariance analysis related to the effects of rowing exercises on the overall score of motor skills of high-functioning autism spectrum children

Source Changes	Total Squares	Degree the freedom	average Squares	Amount of F	The significance level	effect intensity
pre-exam	375/207	1	375/207	520/606	0/000	0/711
group	47/896	1	47/896	66/457	0/000	
error	19/459	27	0/721	---	---	
total	12083/00	29	---	---	---	

Considering the amount of F and the level of significance in the table above, which is less than 0.05, the null hypothesis is rejected. That is, there is a significant difference between the average scores of the motor skills factor of the two groups in the post-test, and also by examining the table of descriptive statistics and comparing the average scores related to the attention factor of the two groups, it can be seen that the training of selected exercises in rowing, the motor skills scores of children with autism spectrum with performance Increases the above to some extent. Also, by emphasizing the size of the effect, it can be seen that teaching selected exercises in rowing has a favorable effect on increasing the motor skills of high-functioning autism spectrum children, which is equal to 0.711. Box test is also used to check the homogeneity of the covariance matrix of the motor skills components of Ozoretsky questionnaire in the research groups.

Table 12 results of box test to check the assumption of homogeneity of the covariance matrix for motor skill components

Significance level	DF2	Df1	F	BOX S M
0/946	5680/302	6	0/281	1/912

Table 12 shows that the level of significance is ($p<0.05$), which indicates that the homogeneity condition of the covariance matrix has been well met for the components of motor skills ($F=0.281$ and $p\leq0.05$). It means that the covariance matrices observed between different groups are equal.

Table 13 Covariance analysis of the post-test components of motor skills by removing the effect of the pre-test

Level	Source change	sum of squares	Degrees of freedom	mean square	F	Significance level	Effect size
Gross skills	group	6/827	1	6/827	40/595	0/000	0/619
	error	4/204	25	0/168			
Fine skills	group	3/971	1	3/971	16/447	0/000	0/397
	error	6/036	25	0/241			
Balance skills	group	6/056	1	6/056	27/830	0/000	0/527
	error	5/440	25	0/218			

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Considering the amount of F and the level of significance in the table above, which is less than 0.05, the null hypothesis is rejected. That is, there is a significant difference between the average scores of motor skills components of the two groups in the post-test, and also by examining the table of descriptive statistics and comparing the average scores related to the motor skills components of the two groups, it can be seen that the training of selected exercises in rowing, the components of motor skills (gross skills, delicate and balanced) affects high-functioning autism spectrum children to some extent and has had an increasing effect on all these subscales. Also, by emphasizing the size of the effect, it can be seen that the training of selected rowing exercises has an effect on the increase of gross skills by 0.619, on the increase of fine skills by 0.397 and on the increase of balance skills by 0.527.

Discussion and conclusion:

To what extent do selected rowing exercises affect the attention of high-functioning autism spectrum children? The findings obtained in response to this question have shown that by emphasizing the table's No. 10 and 11, there is a significant difference between the average scores of attention and its components in the group that was trained in the selected exercises of rowing and the group that was not trained. The results of this question are in agreement with the results obtained from the researches of Kamalinejad, Sadeghian and Rahavi (20), Moradi, Mohadi, and Arabi (21), Najafabadi, Sheikh, Sakhtatabal, Amir, Rezaei, and Hafizi (22), Brigel (23) Is; Because these people also pointed out in their research that by emphasizing sports exercises, especially water sports, the level of cognitive abilities, including attention, increases in children with autism spectrum. In explaining the findings of this question, it can be pointed out that one of the signs of weakness in children on the autism spectrum is the lack of attention. The meaning of attention is the ability of a person to focus on the information in the focus of his visual attention, parallel to the information in the focus. Visual attention is someone else's. Problems related to attention can be considered as one of the main issues in the destruction of language, speech, learning and social relations. In connection with the explanation of this finding, it can be said that in referring to the nature of the disorder, they consider attention as one of the main cores of communication function (23). Therefore, one of the problems of children on the autism spectrum is the difficulty in paying attention and concentration, followed by learning problems, which causes the quality of life in these children to decrease, and the lack of proper education can cause irreparable damage to the mental health of the individual, family and society, and in the future Create obstacles in the child's learning path or expose them to the risk of disability and turn them into diseases such as confrontational behaviors and conduct disorder. So learning plays a key role in the lives of these children. The learning process cannot be done without concentration and attention. In educational programs, attracting children's attention before and during education is one of the most important duties and responsibilities of educators. The selected exercises of rowing have an effect on the movement skills of children with high-functioning autism spectrum. The findings in response to this question have shown that, emphasizing on tables no. 12 and 13, between the average scores of movement skills and its components in the group that is taught the selected exercises There is a significant difference between the group that had seen rowing and the group that did not receive training. The results of this question with the results obtained from the researches of Dehghanizadeh, Rahmati Arani and Heydari (24), Velayati Haghighi, Arabi, Lotfi and Amini (25), Pertovi, Shidaei and Qasimzadeh (26), Torabi, Aghaari and

Dashtabadi (27), Hosni, Shahrbanian, Shahidi and Sheikh (28), Hossein (2019) are consistent; Because these people also pointed out in their research that by emphasizing sports exercises, especially water sports, the amount of movement skills in children with autism spectrum increases. In explaining the findings of this research, it can be mentioned that movement and movement skills are among the basic skills as the basis of more special skills that develop at the end of childhood and are used in body movement and movement. Most autistic children have movement and balance problems. Abnormal conditions in the cerebellum of autistic people have caused balance and movement control abnormalities in these people. Although autistic children have problems with static balance and hanging, physical activity plays an effective role in activating motor potential and improving it (29). Physical exercises and sports activities are an important part of a healthy life. This issue is very important for autistic children. Because these children have a low level of physical fitness and also autistic children experience problems related to their overall motor development. Physical activity is beneficial for sensory integration, coordination, muscle tone and development of social skills, as well as reducing inappropriate behaviors and increasing appropriate behaviors of these people. In a research, Barkley showed that children and adults with autism have problems in the development and growth of movements such as movement movements and object control (30). Baran also observed that autistic children often have difficulty in gross and fine skills that are complex and in performing new skills. Penn et al. have confirmed the limitations of motor coordination and defects in the performance of gross and fine movements in people with autism. Reid and Staples have also confirmed the disorder in the coordination of bilateral movements. Considering that autistic children suffer from brain deficiencies, these deficiencies have a negative effect on their movement performance and cause their movement weakness (31).

Limitations of the research: The lack of books and resources in the field of sailing and attention and motor skills in people with autism is one of the limitations of this research. The presence of environmental noises, such as the sound of engines on the motorcycle track, as well as the movement of skis on the water, caused concern and confusion for children and prevented them from going into the water.

Ethical Considerations: After the necessary approvals and obtaining permission from the university, in order to complete the questionnaires, the goals and working methods were explained to all the people participating in the study, and their consent was obtained and they were assured that the results of the research will be available to them if they wish. They will be placed. Also, people were assured that they are free to participate or not participate in the research, and in case of non-participation and cooperation, their treatment or care will not be effective and will be followed up as usual. People were assured that they can decide to withdraw from the research at any stage of the research and this will not have any negative consequences for them.

Conflict of interest: The authors hereby declare that this work is the result of an independent research and does not have any conflict of interest with other organizations and persons.

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References

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1. Landa RJ, Gross AL, Stuart EA, Faherty A. Developmental trajectories in children with and without autism spectrum disorders: the first 3 years. Child Dev. Child development, 2013; 84(2): 429–442. https://doi.org/10.1111/j.1467-8624.2012.01870.x

2. Baron-Cohen S., Scott F.J., Allison C., Williams J., Bolton P., Matthews F.E., Brayne C. Prevalence of autism-spectrum conditions: UK school-based population study. The British journal of psychiatry: the journal of mental science, 2009; 194(6): 500–509. https://doi.org/10.1192/bjp.bp.108.059345

3. Nakutin S.N., Gutierrez G. Effect of physical activity on academic engagement and executive functioning in children with ASD. School Psychology Review, 2019; 48(2): 177–184. https://doi.org/10.17105/SPR-2017-0124.V48-2 4.

4. Rapin I., Tuchman R.F. Autism. Definition, neurobiology, screening, diagnosis, Pediatrics Clinical of North America, 2018; 55(5):1129–46. https://doi.org/10.1016/j.pcl.2008.07.005

5. Snow M, Gore B, Seale HA, Husdpeth E. A comparison of behaviors and play themes over a six - week period: Two case studies in play therapy. International Journal of Play Therapy. 2007; 16 (2): 147 -159. https://doi.org/10.1037/1555 -6824.16.2.147

6. Falahi V, Karimisani P. The effectiveness of narrative therapy on improvement of communication and social interaction of children with autism. 2016; 7 (2):81-104. [Persian] https://doi.org/10.22059/japr.2016.58414

7. Daneshvar SD, Charlop MH, Berry Malmberg D. A treatment comparison study of a photo activity schedule and Social Stories for teaching social skills to children with Autism Spectrum Disorder: brief report. Developmental Neurorehabilitation. 2018; 22 (3): 1 -6. https://doi.org/10.1080/17518423.2018.1461947

8. Martin JS, Poirier M, Bowler DM. Brief report: Impaired temporal reproduction performance in adults with autism spectrum disorder. Journal of Autism and Developmental Disorders. 2010; 40(5):640–6. https://doi.org/10.1007/s10803-009-0904-3.

9. Srinivasan SM, Bhat AN. A review of "music and movement" therapies for children with autism: embodied interventions for multisystem development. Frontiers in Integrative Neuroscience. 2013; 7: 22 https://doi.org/10.3389/fnint.2013.00022.

10. Ozonoff S., Young G.S., Goldring S., Greiss-Hess L., Herrera A.M., Steele J., Macari S., Hepburn S., Rogers S.J. Gross motor development, movement abnormalities, and early identification of autism. Journal of autism and developmental disorders, 2008; 38(4): 644–656. https://doi.org/10.1007/s10803-007-0430-0

11. Logan S. Getting the fundamentals of movement: a meta-analysis of the effectiveness of motor skill interventions in children. Child: care, health and development, 2012. 38(3): 305-315. https://doi.org/10.1111/j.1365-2214.2011.01307.x

12. MacDonald M., C. Lord D. Ulrich, The relationship of motor skills and adaptive behavior skills in young children with autism spectrum disorders. Research in autism spectrum disorders, 2013; 7(11): 1383-1390. https://doi.org/10.1016%2Fj.rasd.2013.07.020

13. Reddy L.A., Files-Hall T.M., Schaefer C.E. (Eds.), empirically based play interventions for children, American Psychological Association; 2005. https://psycnet.apa.org/doi/10.1037/11086-001

14. Wethinton H.R., Hahn R.A., Fugua-Whiteley D.S., Pe T.A., Crosloy A.R.L., Liberman A.M. The effectiveness of interventions to reduce psychology harm form traumatic events among child and adolescents. American Journal of Preventive Medicine; 2015; 53(3): 287-373. https://doi.org/10.1016/j.amepre.2008.06.024

15. Karim A.E.A. A.H. Mohammed, Effectiveness of sensory integration program in motor skills in children with autism. Egyptian Journal of Medical Human Genetics, 2015; 16(4): 375-380. https://doi.org/10.1016/j.ejmhg.2014.12.008

16. Kyhani F., Kosari S. Effect of a Selected Course on the Development of Object-Controlled Skills for Children with Disorders. Motor Development, 2015. (In Persian).

17. World Health Organization. Global recommendations on physical activity for health. www.who.int/dietphysicalactivity/ factsheet recommendations/en, 2010:1-18.

18. Lawson LM, Little L. Feasibility of a swimming intervention to improve sleep behaviors of children with autism spectrum disorder. Therapeutic Recreation Journal. 2017; 51(2): 97–108. https://doi.org/10.18666/TRJ-2017-V51-I2-7899.

19. Kanupka JW, Oriel KN, George CL, Crist L, Deardorff K, Douglass D, et al. The impact of aquatic exercise on sleep behaviors in children with autism spectrum disorder. Journal of Intellectual Disability - Diagnosis and Treatment. 2018; 6(1):1–7.

20. Kamalinejad F., SadeghianShahi M.R., Rahavi Ezabad R. The Effect of Motor and Cognitive Exercises on Motor Function and Attention among Children with Developmental Coordination Disorder. Journal of Sports Psychology, 2022; 14(2): 36-21. https://doi.org/10.48308/mbsp.2021.209360.0

21. Moradi H, Movahedi A, Arabi M. The Effect of Perceptual-Motor Exercise on Improvement in Executive Functions of Children with Autism Disorder. Shefaye Khatam 2020; 8 (2): 1-8. http://dx.doi.org/10.29252/shefa.8.2.1

22. Najafabadi MG, Sheikh M, Hemayattalab R, Amir M, Rezaii M, Hafizi S. The effect of Spark on social and motor skills of children with autism. Pediatrics and Neonatology, 2018; 20: 1-7. https://doi.org/10.1016/j.pedneo.2017.12.005

23. Berigel G. 04-06 Examination of the effects of the sport activities on cognitive development of personal care, fine-gross motor and language for 04-06 age group children with autism [Master Thesis]. Istanbul: Haliç University Institute of Health Sciences; 2015.

24. Dehghanizade J, rahmati arani M, Heydari M. The Effect of Braitonic Exercise on the Motor Skills of Educable Children with Intellectual Disability. JOEC 2018; 18 (1): 85-96. http://dorl.net/dor/20.1001.1.16826612.1397.18.1.3.0

25. Velayati Haghighi V., Arabi M., Lotfi N., Amini N. The effect of selective training on fundamental motor skill development of children with autism spectrum disorder. Journal of Sports Psychology, 2018; 10(1): 123-138. https://doi.org/10.48308/mbsp.3.1.123

Family and health Quarterly, vol14, Issue 4, Winter 2025, ISSN: 2322-3065
https://sanad.iau.ir/en/Journal/fhj/Article/1205907

JFH

26. Partovi H, Sheydaei H, Ghasemzadeh A. The Effectiveness of Aquatic Exercises on the Gross Motor Skills in Autistic Children. Depiction of Health. 2018; 8(4): 241-251. https://doh.tbzmed.ac.ir/Article/doh-205

27. Torabi F., Aghayari A., Dashtabadi S. The Effect of Basic Swimming Skills Training on Gross Motor Skills in Autistic Children (7-11 Years Old). Journal of Sports and Motor Development and Learning, 2015; 7(2): 171-185. https://doi.org/10.22059/jmlm.2015.55249

28. Haesen B., Boets B., Wagemans J. A review of behavioral and electrophysiological studies on auditory processing and speech perception in autism spectrum disorders. Research in Autism Spectrum Disorders, 2011; 5(2): 701–714. https://doi.org/10.1016/j.rasd.2010.11.006

29. Forti S, Valli A, Perego P, Nobile M, Crippa A, Molteni M. Motor planning and control in autism, A kinematic analysis of preschool children, RASD 5. 2011; 5(2): 834-842. https://doi.org/10.5861/ijrsp.2017.1667

30. Sowa M., Meulenbroek R. Effects of physical exercise on Autism Spectrum Disorders: A meta-analysis. Research in autism spectrum disorder, 2012; 6(2): 46-57. https://doi.org/10.1016/j.rasd.2011.09.001

31. Staples KL, Reid G, Fundamental of movement skills and autism spectrum disorders, J Autism Dev Disorder, 2010; 40 (2): 209-217. https://doi.org/10.1007/s10803-009-0854-9