

The Effect of Aerobic Exercises on Skill Behaviour of Autistic Children

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ABSTRACT

The main reason of this research was to find the effect of twelve weeks of Aerobic exercises on skill behaviors of autistic children. The present study was a quasi-experimental research which was conducted as a pre-test and post-test. Participants of the present study included 30 voluntarily children with autism symptoms (8-10 yrs old) of Bartın city. They were randomly divided in two groups of 15 experimental and control groups. Before completing the exercises, Gars questionnaire was completed by parents. The experimental group performed Aerobic exercises under the supervision of an instructor and a psychologist for three sessions of 45 minutes a week for 3 months. At the end, both experimental and control groups were measured and parents completed the Gars questionnaire once again. For analysis of data SPSS 22 software was used at $p \geq 0.05$. Analysis of variance in repeated measures test was taken to find data. The results showed that twelve weeks of Aerobic exercises has a significant effect on the coordination and agility of autistic children.

Keywords: Aerobic, skillful behaviors, coordination, agility

INTRODUCTION

Children with autism have very different experiences of the world than other children, so it is not surprising that other children's actions and reactions often turn out to be a mystery to them. When a normal person is in social situations, he/she is heavily dependent on his/her own experiences to decide how to act and respond to others in this situation. This shared experience is the basis of his/her ability to feel and understand others. For children whose limbs and senses respond very differently, it is not surprising that they often react inappropriately. These children are often unaware of the subtle differences in facial expressions or hand and foot reactions when speaking. Raising an eyebrow causes us to change the title and subject of the conversation. Or a dry state is a sign for us to slowly move away from someone. The reactions of children with autism often seem uncontrollable or rude. Autism is a disorder that is affecting more and more children, and is most common in children as young as three months old. Infants usually show signs of attachment to their mother from the age of three months, but in children with autism, this initial attachment is less obvious, and parents of children with autism usually try hard to communicate with their baby and share each other's emotions. Expresses a difference in the feelings of parents and others around them and has many problems with the social world. The type of their interaction is such that it seems that autism patients live in a different world (Abdollahi and Salehian, 2022).

With the advancement of science and the development of research on autism, the salient features of these patients have been identified and the criteria for its diagnosis have become easier, so that unlike in the past when the disease was confused with other problems such as cerebral palsy and mental retardation, today psychologists and specialists They can differentiate this disease from other mental and cerebral problems and disorders and offer ways to treat it. In recent years, favorable results have been obtained for the treatment of this disease, which includes pharmacological and non-pharmacological therapies, and these two types of treatments should be done together. In non-drug therapies, we can mention the use of learning methods, behavior therapy, family education, communication and social skills exercises, and the use of reward and punishment techniques (Abdollahi and Salehian, 2022)

Research findings on the relationship between Autism disorder and participation in children's physical activities, creating opportunities for social interactions in sport and physical activity (Corbett and Prolak, 2010), reducing repetitive stereotyped movements (Van et al., 2017) and shows helping to increase skills (Matson, 2018). But despite the beneficial effects of research on exercise and physical activity on children with autism, not enough attention has been paid to this issue.

Aerobic exercises have many advantages that distinguish it from other types of exercises. This type of exercise can be performed in groups or individually for any gender, any age and in any physical condition. Aerobic exercises can be the most attractive in the form of games, sports and entertainment for children, which makes children participate in these exercises with enthusiasm and desire. It seems that this type of exercise in the form of games can be effective in developing skills and stereotypes (Golabchi and Salehian, 2022).

The positive effect of aerobic activities on skill behaviors of children has been reported by Abdollahi and Salehian (2022), Sabzi et al. (2021), Golabchi and Salehian (2022) and Dana et al. (2019). Aerobic exercises have a positive effect on motor skills. However, research showing the effect of this activity on improving some of the skills of boys with autism has not been observed in the literature. Due to the fact that this sport originated in Iran and is in its early stages, the researcher also decided that the effect of this sport activity on improving some of the skills and stereotyped behaviors of 9 to 10 year old boys with autism so that perhaps the results of this research can pave the way for improving some of the skills of these children and their stereotyped behaviors in order to target some of the research weaknesses of the basic information needed to design first-line therapeutic interventions to medical institutions, officials Education and families with a therapeutic approach should be provided to clinical sports psychologists.

MATERIAL AND METHOD

The present study was a quasi-experimental research with a pre-test and post-test.

Participants: According to the purpose, the statistical population of the present study included 30 children with autism symptoms aged 8 to 10 years who were referred to welfare centers in Bartın for treatment.

Sample: Participants included children with autism aged 8 to 10 years, 30 children who were referred to welfare centers by using voluntary sampling willing to participate in this study, the necessary number was selected and a briefing session was held. Parents who wished to participate in the desired treatment program. The criteria for entering this research included the following; No use of special drugs, no neurosurgery, no fractures in the limbs, complete physical health. Then the children were randomly divided into two groups of 15 children: Aerobic and Control. Before the exercise, Gars Autism Questionnaire (1994) was given to parents and completed. The exercise program was held on even days in the afternoons from 15:00 to 16:00 by an instructor and a psychiatrist every week for 45 minutes for 3 months. After the exercise sessions, a practical test was performed according to the standards of the provincial sports board and the scores were

recorded on special sheets. After completing the exercises, the Gars questionnaire was completed by parents.

Research measurement tools

A) Gars test: Gars test is a checklist that helps diagnose autistic children. The test was standardized in 1994 and identified issues of autism in a sample of 1,094 children from 46 states in Colombia, Puerto Rico and Canada. The Gars test is based on the definitions of the American Autism Society (ASA, 1994) and the American Psychiatric Association (APA) and relies on the DSM-IV.

The Gars test is suitable for children 3 to 22 years old and can be completed by parents and professionals at school or at home. Gars test includes four subscales and each subscale contains 14 items (items). The first subscale is stereotyped behaviors, which include 1 to 14 items. This subtest describes cases of stereotyped behaviors, movement disorders, and bizarre behaviors. The second subscale, which is communication, includes items 15 to 28. These items describe verbal and nonverbal behaviors that are signs of autism. Social interaction is the third subscale, which includes items 29 to 42. The items in this subscale evaluate topics that are able to properly describe events to children. The fourth subtest is developmental disorders, which include items 43 to 56. This subscale asks key questions about a person's childhood development.

Gars reliability is accepted in the acceptable range. Studies have shown an alpha coefficient of 0.90 for stereotyped behaviors, 0.89 for communication, 0.93 for social interaction, 0.88 for developmental disorders, and 0.96 in autism semiotics. Gars test is the only test that has not only reported the reliability of the test-retest method, but also more importantly, the reliability between the scorers. The validity of the test has also been confirmed by comparison with other autism diagnostic tools.

B) Motor skills

Reaction test: This test was used to determine motor function (reaction). Hold the ruler at the zero point from the end and ask the person to place the thumb and forefinger of one of their hands at the 50 cm point of the ruler. While staring at the ruler, it should be left unannounced. By taking the ruler, the number of the contact point of the fingers is recorded (Abdollahi and Salehian, 2022).

Coordination test by throwing the ball towards the wall by hand: This test is used to determine motor function (coordination). This test will be used to measure eye-hand coordination. This test requires a tennis or baseball, a bar meter and a stopwatch. To perform the test, a certain distance of two meters from the wall is specified, the person standing behind the error and in front of the wall. Throw the ball to the wall with one hand (throwing under the rampart) and in return try to catch it with the other hand. The ball is

thrown back into the wall with the receiver's hand and must be received with the first hand that made the first throw. This test can be continued as a period of time (30 seconds) or as the number of throws (Abdollahi and Salehian, 2022).

Agility test with 9 x 4 meters: This test is used to determine motor performance (agility). The subject is placed behind the starting line with a standing starter. It takes position with the sign in its place and starts moving with the sign. After a distance of 9 meters, he picks up the first piece of wood and then returns to the starting point and places the wood behind the line. Immediately return and remove the second piece of wood from the starting line to cross quickly (no need to put the second piece of wood on the ground). The best test record is recorded after two times (Abdollahi and Salehian, 2022).

Data collection method: After sampling and selecting the target individuals according to the criteria, data collection was done in several stages. Written consent was obtained from parents who wished to participate in the research program planning sessions. In order to conduct this research, a clinical psychiatrist conducted a clinical interview among the patients referred to several counseling centers in Bartın whose children had symptoms of autism and also in the age group of 8 to 10 years, and then they will try to obtain their consent to cooperate.

Assessment and evaluation of the group program was done in two stages: the first stage after receiving the registration package and just before the start of exercises sessions; And the second stage right after the last exercises session. In the first stage, before starting the special intervention program, the sample (pre-test), demographic characteristics of the family, and the subjects were evaluated through a Gars questionnaire completed by the children's parents. The children were then randomly assigned to experimental (n = 15) and passive control (n = 15) groups. Then, for 2 months, both groups under the supervision of an expert trainer engaged in Aerobic sports activities. During these 2 months, they were under the supervision of a researcher and a psychiatrist. Each group performed two sessions per week under the supervision of the researcher for 45 minutes and had a joint group session with the researcher each week to ensure the progress of the program.

Finally, in the second stage, after the implementation of the exercises program (post-test), both experimental and control groups were measured and measured by the parents by completing the Gars questionnaire.

Statistical analysis methods: Analysis of covariance in repeated measures was taken by using SPSS 21 software at level ≤ 0.05 as a significant level.

RESULTS

Table 1: Results of analysis of covariance to investigate the differences in coordination in the post-test between the experimental and control groups

Source of change	SS	df	Average squares	F	Sig.	Eta squares
The effect of pre-test	153.80	1	153.80	1645.14	0.001	0.984
Group effect	6.95	1	6.95	74.41	0.001	0.734
Error	2.52	27	0.093			
Total	1838.42	30				

According to the table 1, it can be seen that the group effect is significant at the level of 99% probability ($p=0.001$, Eta squared=0.73, $F=74.41$). That is, after adjusting the pre-test scores, the degree of coordination in the post-test in the control group and the experimental group has a significant difference.

Table 2: Modified average of coordination

Group	N	Adjusted mean	standard errors
Experimental	15	7.94	0.079
Control	15	6.97	0.079

On the other hand, the adjusted means indicate that the level of coordination in the experimental group ($m=7.94$) is significantly higher than the control group ($m = 6.98$). Therefore, it is concluded that twelve weeks of Aerobic exercises has a significant positive effect on increasing coordination in children with autism.

Table 3: Results of analysis of covariance to evaluate the difference in agility in the post-test between the experimental and control groups

Source of change	SS	df	Average squares	F	Sig.	Eta squares
The effect of pre-test	13522398.16	1	13522398.16	7571.02	0.001	0.996
Group effect	347819.89	1	347819.89	194.74	0.001	0.782
Error		27	1786.07			
Total		30				

According to the table, it can be seen that the effect of the group is significant at the level of 99% probability ($p= 0.001$, Eta squared=0.78, $F=194.74$). That is, after adjusting the pre-test scores, the degree of agility in the post-test in the control group and the experimental group has a significant difference.

Table 4: Modified mean agility

Group	N	Adjusted mean	standard errors
Experimental	15	2777.71	10.91
Control	15	2562.35	10.91

On the other hand, the adjusted means indicate that the level of agility in the experimental group ($m = 2777.72$) is significantly higher than the control group ($m = 2562.35$). Therefore, it is concluded that twelve weeks of Aerobic exercises has a significant positive effect on increasing agility in autistic children.

DISCUSSION

The results showed that twelve weeks of Aerobic exercises had a significant effect on the coordination of children with autism. Subsequent findings of the study showed that aerobic exercises have a significant effect on the coordination of autistic children. The explanation for this finding is that physical exercise distributes strength and timing between movements and better learning, resulting in the creation and refinement of related movement programs. The increase in coordination can also be attributed to the reliance on deep receptor motion sensing information. Therefore, it can be concluded that rhythmic exercises facilitate the transmission of messages from the somatosensory nerves to higher neural centers and lead to increased coordination (Ghasemi, 2012). Rhythmic movements create conditions for children to develop their talent for entering the next stages of education in other words this type of movement paves the way for the development of the next motor skills. (Korches et al. 2015) reported that 95% of autopsy specimens of cerebellar autism did not have a healthy physical structure. Autopsy studies revealed the absence of Purkinje and granule cells as well as incomplete growth of the hemisphere and vermis in the posterior region. On the other hand, the prominent role of the cerebellum in controlling movement, including balance and coordination, is well defined. The cerebellum acts as a two-way passage between the visual, auditory and sensory-physical cortex (Ghayuri et al., 2017).

The results showed that twelve weeks of Aerobic exercises had a significant effect on the agility of autistic children. These findings are consistent with the research results of (Bahrami et al. 2012), (Yilmaz et al. 2014), (Berkeley et al. 2011). To explain this, it can be said that exercise and physical activity are very effective for effective and efficient performance of children in the areas of motor skills, including agility. The greater the individual's movement, the greater the chance of perceptual-motor counterpart and the development of a rapid and agile response to different motor positions. Physical activity is the main factor in the development of most motor skills in which children achieve balance with a fact and control skills and knowledge of the environment. Physical activity, by stimulating the sensory-motor cortex, establishes many connections between the limbic region and the visual, speech, and auditory sectors. Nervous and thus improves motor skills (Bainer, 2018).

The results showed that twelve weeks of Aerobic exercises had a significant effect on the reaction of autistic children. This finding is consistent with the results of (Bahrami et al. 2011), (Payvastehgar et al. 2011), (Abdolla and Salehian 2022), (Berkeley et al. 2011). In explaining this issue, it can be said that the reaction time consists of two parts, the pre-motion time and the motion time, which are independent of each other. At the time of propulsion, perceptual and cognitive processing of the received stimulus is performed and at the time of motion, the motor output of the response begins. Research shows that changes in reaction time increase the complexity of the response. Research on motor skills has shown that movement time is more affected by practice and learning than pre-movement time, and that the reduction in reaction time may be due more to reduced movement time than to cognitive processing speed. (Magill 2018) also believes that sports activities increase a person's ability to process information. This growth in abilities is due to the fact that the individual adapts to unstable environmental situations and stimuli, and as a result, acquires the ability to solve problems and make decisions faster

and more correctly. Research has shown that physical activity increases the circulation of the central nervous system and makes information processing more efficient and faster, which is an important factor in reducing reaction time. On the other hand, physical activity causes more and faster blood circulation in the limbs and raises the ambient temperature, causing the muscles to contract faster and more powerfully, and the upper limbs to react faster.

The results showed that aerobic exercises had a significant effect on the social interaction of autistic children. The results of this study are consistent with the findings of with the findings of (Abdollahi and Salehian 2022). To explain this, it can be said that in these exercises, children were more exposed to social interactions with their peers, and cooperation and rhythmic group movements were considered more, and was probably due to the enjoyable and varied aerobic exercises. (Hashemi and Salehian 2015) studied the effect of selected games on the development of manipulative skills in 4-6 year-old preschool girls. The results showed that school games increased physical and social activities of children. In another study, (Levinson and Reid 1993) and (Prupas et al. 2016) concluded that physical activity improves communication skills and social interaction.

According to the results of the research, it can be said that the social development of children in experimental groups for aerobic due to the opportunities for social interaction and planned group activities and regular and improved Students who participate in these programs have a special advantage in terms of social development compared to students who do not participate in any regular program. (Smith 2014) sees socialization as a process that enables children to understand and anticipate the behavior of others, to control their behavior and to regulate interaction with others, and this seems to happen in aerobic exercises, and because the variety of movements is greater than aerobic exercise and more creativity is required.

In aerobic sports, skills such as cooperation, responsibility, empathy, self-control and self-reliance are strengthened, which are components of social development. Learning for students is fun and exciting when done in the light of thinking, feeling, playing, innovating, innovative activity and creative movements. In for-aerobic exercises, being socialized means being in line with the rules, values, and group and social attitudes. In this process, children learn skills, knowledge and methods of adaptation and the possibility of mutual relations in a continuous interaction (Bagheri et al., 2016).

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