

The effect of an education program on developing communication skills and some basic motor skills among children with autism spectrum disorder

Saad Yahya Athbah*, University of Jeddah, College of Education, Department of Special Educational, Jeddah, Saudi Arabi, <https://orcid.org/0000-0003-2813-0336>.

Suggested Citation:

Athbah, S. Y. (2022). The effect of an education program on developing communication skills and some basic motor skills among children with autism spectrum disorder. *Cypriot Journal of Educational Sciences*. 17(11), 4182-4198. <https://doi.org/10.18844/cjes.v17i11.7982>

Received from July 26, 2022; revised from October 11, 2022; accepted from November 24, 2022.

©2022 by the authors. Licensee Birlesik Dünya Yenilik Arastirma ve Yayıncılık Merkezi, North Nicosia, Cyprus. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Abstract

The purpose of the research was to measure how well an educational program helped ASD children with their basic communication and motor skills. In addition to determining the degree of the program's effectiveness in improving children with ASD's basic communication and motor skills after one month of participation. 40 children with ASD were split evenly between two groups of 20 (experimental) and 20 (control). The post-measurement communicative skills scale and basic motor skills mean scores of the control and experimental groups showed substantial statistical differences, favoring the experimental group. The study also revealed substantial statistical differences in the experimental groups mean scores in communication skills and basic motor skills before and after the program's implementation, favoring the dimensional measurement. Additionally, neither the post-test nor the follow-up assessments of the experimental group's communication skills or basic motor skills revealed any statistically significant changes.

Keywords: Educational Program, Communication Skills, Basic Motor Skills, ASD

* ADDRESS OF CORRESPONDENCE: Saad Yahya Athbah, University of Jeddah, College of Education, Department of Special Educational, Jeddah, Saudi Arabi,
Email address: sathbah@uj.edu.sa

1. Introduction

Autism is among the least well-understood forms of developmental disability due to the lack of access to its true causes precisely on the one hand, and the severity of the strangeness of its maladaptive behavior patterns on the other hand (Antipova & Miticheva, 2019). Autism is a condition characterized by a variety of symptoms, the most prominent of which are the child's extreme withdrawal and self-centeredness. Other symptoms include a lack of social skills and verbal and nonverbal communication, which prevent the child from engaging in healthy social interactions with those around him (Lapshina, 2019). Autism has three primary characteristics, according to the most recent edition of the Diagnostic and Statistical Manual of Mental Disorders, which was prepared by the American Psychiatric Association and released in 2005: difficulties with social communication, difficulties with language and conversation, and the presence of recurrent and persistent behavioral patterns (Akhmetzyanova & Artemieva, 2020).

Autism in light of these characteristics constitutes a disturbance to all those around the child, and its effects are directly reflected on the child, thus affecting his general communication, language acquisition, behavioral patterns, values and attitudes, and the method of expressing feelings and feelings (Belyaeva, 2020). In addition, the autistic child shows very few behavioral patterns compared to children who have good social acceptance, and he also suffers from abnormal socially unacceptable behavioral patterns such as social immaturity, aggression, and self-excitement (Akhmetzyanova, Artemieva & Gryaznova, 2022). Many studies have indicated that (50%) of children with ASD do not have the ability to speak, and do not develop their language skills, but they do not compensate for them by using non-verbal communication methods such as gestures or simulation, and they are unable even to use visual communication (Schmidt, 2017).

A number of researchers have discussed the basic problems in communication as representing the primary deficit in autism, while behavioral problems represent the secondary components of this condition (Mukayetova-Ladinska et al., 2018). Lord and Hopkins (1986) analyzed the communication functions of the unacceptable behavior of children with ASD, and found that some of the behavior patterns that they practice, such as self-harm, continuous crying and screaming, are only behaviors that result from the difficulties they face in communicating with others. The autistic kid frequently presents as being unable to comprehend the importance of communication and communicative expressions, leading to undesirable behaviors such as being unresponsive and uncooperative. In this regard, Siegel (2003) points out that the communication disorders experienced by the autistic child may result in a set of unacceptable behavior patterns such as continuous waves of anger.

A children with ASD has difficulty communicating his thoughts and desires to those around him, and he tries to communicate with his surroundings, but he often does not know how to use language appropriately (Haebig, Jiménez, Cox, & Hills, 2020). He also fails to use alternative language such as hand gestures and facial expressions, and this failure frustrates him and increases his isolation tendencies, and exacerbates unacceptable behavior (Mamokhina, 2017). Attempts to interfere with treatment programs by implementing training or educational methods for the skills of children with ASD is a means of providing them with a new linguistic outcome that helps them learn alternative forms of communication (Nason, 2016). It also helps them learn some behavior patterns and skills that work to reduce their behavioral and language disorders (Lapshina, 2019).

The teaching process is a growth process for teachers, learners and the family that uses multiple languages (Lotfizadeh, Kazemi, & Pompa-Craven, 2018). The instruction should be visible as photographs, communication boards and slides can be used that are distributed on the classroom walls (Bedford, Pickles, & Lord, 2016). Hwang and Lee (2022) indicates that motor education is that field of

instruction that deals with the growth and training of natural motor patterns, and it is a broad field for discovering the latent forces. Situations that invite creativity and allow the child to move easily. It also includes many situations that affect the child's personality by improving the concept of self, especially the physical self. As his relationship with himself improves through motor, because the body and motor are basic tools of communication with the soul, and through motor, his ability to notice, attention, perception, creativity, his sense of balance, space and time, his acquisition of knowledge and the development of his intelligence.

The fundamental motor abilities a kid develops in the teaching programs strengthen his motor and facilitate and straighten it, which makes it part of his personality and often uses it in his surroundings and environment to gain a lot of knowledge and experiences that benefit other aspects of his development as well as his physical and motor development (Choi, Leech, Tager-Flusberg, & Nelson, 2018). The motor teaching positions also allow the child to discover his body's motor potential, as well as his ability to control his locomotors system, as well as his ability to control cognition, understanding, and precise tight communication with his colleagues and the physical objects in the learning environment (Iverson, 2018). By teaching basic motor skills, including transitional motors, control and control motors, and motors of stability and balance of the body, the child can do more of these motors in various forms and patterns (Ketcheson, Hauck & Ulrich, 2017).

Children with disabilities benefit greatly from motor activities in terms of their development and quality of life, and we must remember that the mind and body are closely linked, and it must be considered that the human being is an integrated unit and that anything that affects the physical aspect must have a similar effect in the psychological aspect (LeBarton & Landa, 2019). This theory receives global support in the field of psychology and education, and one of the main foundations in mental health is the availability of instinctive play for a person, and play helps and benefits physical health, as it is considered one of the important factors that affect mental health (Ohara, Kanejima, Kitamura, & Izawa, 2020).

A child with ASD differs from any other child in the lack of consistency in the use of a particular hand so that he hesitates or alternates the use of the right hand with the left (Studenka, Gillam, Hartzheim & Gillam, 2017). It suggests that there is a functioning issue with the left and right hemispheres of the brain. From the above, it can be said that children with ASD need educational services and methods of intervention that differ from what is provided to normal children in order to reach the best level they can reach in terms of motor coordination (Sanz-Cervera et al., 2018). The studies of Azar, McKeen, Carr, Sutherland and Horton (2016), Choi et al. (2018) and Ohara et al. (2020) point to the role of educational programs in developing basic motor skills, communication and language among children with ASD, as these programs have a positive impact on the development of basic motor skills, increased language development in children, and their ability to interact socially.

Through the foregoing and within the researcher's knowledge, there is a dearth of scientific studies that dealt with the use of educational programs to develop communication skills and some basic motor skills for ASD children. Because of this, the researcher felt the necessity to design a program for children with ASD and test its effect on the acquisition of communication skills and some basic motor skills.

Research Questions

In light of the foregoing, this study seeks to address the following:

1. Do the scores of the control and experimental groups alter substantially after using the program on a measure of communication skills and certain basic motor skills?

2. Do the communication skills and certain basic motor skills ratings of the experimental group match before and after the implementation of the program differ significantly?
3. Did the experimental group scores significantly change on the communication skills and certain basic motor skills scale in the post- and follow-up application?

Literature Review

Autism disorder is not new, but rather it is deeply rooted in history, as the ancient doctors in the Middle eras noticed that there are children who do not speak, communicate and interact with their parents and those around them are weak and show many patterns of abnormal behavior (Koçak Uyaroğlu, Ertüzün & Taş Arslan, 2021). But after the nineteenth century and the beginnings of a shift in the view to psychological sciences, a clear interest in autism appeared. The term autism was first coined by Eugene Bloor in 1911 when he used it to describe a group of selfish thinking that mainly appears in schizophrenia (Azar, McKeen, Carr, Sutherland & Horton, 2016). But the doctor Leo Kanner 1943 added to this term a clear concept when he presented his famous article in a newspaper concerned with autism under the title of early childhood autism, thus becoming the first to define this disorder in psychiatry (Lourenco, Esteves, Nunes & Liu, 2020). However, the term autism was not used until the 1960s, when cases of this group were diagnosed as a type of infantile schizophrenia, according to the Statistical Manual of Mental Illness Diagnostics, second edition (Abdelkarima et al., 2017). In 1980, when the revised edition (DSM3) was published, it made a clear distinction between schizophrenia and autism, asserting that autistic disability is not an early form of schizophrenia (Chiva-Bartoll et al., 2021). This confusion may be due to the presence of some common symptoms between them, such as introversion and isolationism. But in fact, the difference in symptoms is more than the similarity between them, as the cases of autism are completely devoid of hallucination symptoms (Velsvik & Kvalsund, 2016). Thus, autism has been defined as a developmental rather than an emotive disorder.

Autism is a word translated from Greek and means isolation. Autism is not introversion, and it is a pathological condition that is not only isolation but a refusal to deal with others with different behaviors and problems from one person to another (Hamm & Yun, 2019). Infantile autism was originally recognized by Kanner (1943), defined as the inability to form relationships with others, delayed speech acquisition, non-communicative use of speech, stereotypical and repetitive play activities, conservatism on symmetry, and a lack of imagination and analytical ability are just a few of the behaviors and characteristics of autism that he described through observation of eleven cases.

Many definitions are still based on Kanner's description of autism. Autism is called Kanner syndrome (after the scientist Kanner, who coined the term autism). It is also called autism, a term taken from the Greek language, where this word is divided into two parts (autos) meaning self, and (ism) meaning abnormal condition, and this means that people with autism have an abnormal and unstable soul (Maenner et al., 2020). The Diagnostic and Statistical Manual of Mental Disorders IV issued by the American Psychiatric Association (DSM-IV, 1994) states that autism has three main characteristics: impairments in social communication, impairments in language and conversation, and the presence of repetitive and persistent patterns of behavior (Benson et al., 2019). Autism is a developmental issue that often manifests in the first three years of a child's life and is brought on by neurological conditions that impair brain function (Bo et al., 2019).

Habib, Montreuil and Bertone (2018) defined autism as one of the overall developmental disorders and that it is a behavioral crisis that results from several reasons characterized by a lack of communication skills and social relations, stereotyped behavior, and weakness in playing skills. Autism is a severe disorder in the communication process that affects children in early childhood and affects their

behavior, as these children are characterized by a lack of intelligible speech with a clear meaning, introversion in themselves, a lack of interest in reality, and an inability to use language in understanding and intellectual communication (Travers et al., 2017).

Studies conducted in England and the United States of America indicated that the prevalence rate of the disorder is (4-5) children per ten thousand, and studies in different countries mentioned cases of less than 5 cases per ten thousand cases (Colombo-Dougovito & Block, 2019). The US government has declared that autism has become a national emergency health problem due to its high prevalence rate of 10-17% (Ruggeri, Dancel, Johnson & Sargent, 2019). The increasing awareness and broader diagnostic standards for autism disorder are to blame for the condition's high occurrence (Ruggeri et al., 2019). This disparity is due to different genetic factors and environmental influences. In light of its effects on a person's behavior and his or her capacity to learn, normalize, train, prepare professionally, achieve any degree of learning ability, achieve even a small degree of social and economic independence, or the capacity to protect Self only to a limited degree and for a limited number of children, autism is therefore regarded as one of the most difficult disabilities (Licari et al., 2020). Additionally, it seriously impairs a person's abilities, particularly in the areas of language, social interaction, and communication because it makes it harder for the child to understand and interact with those around him. This deficit also affects how the child interacts with his physical environment (Hollis et al., 2017).

As a result of their impairment, individuals with ASD struggle in their interpersonal connections, social interactions, and ability to express themselves via speech and nonverbal means (Thomas, Hinkley, Barnett, May & Rinehart, 2019). During a child's formative years, they may develop unusual, deviant, and repetitive behavioral patterns on top of their incapacity to comprehend others (Healy, Aigner, Haegle & Patterson, 2019). According to Ratcliff, Hong, and Hilton (2018), autism spectrum disorder is a form of developmental disorder that remains synchronous and affects all aspects of development, and that may improve directly with the degree of interest in teaching social skills, verbal and nonverbal communication, and thinking skills, and that improvement may be very noticeable whenever the therapeutic intervention is early. Stanish et al. (2017) also points out that the treatment of autism differs from one child to another because its symptoms ease and intensify from one sufferer to another, and there is no single drug to treat autism, but there are a group of effective solutions in evaluating and modifying behavior which are three-dimensional: psychological, social, and pharmacological.

Appropriate treatment methods for autism should take into account the causes of autism, as there has been a misconception that autism is primarily caused by a genetic or genetic defect (Jones et al., 2017). Researchers turned to the possibility that the environment surrounding the child and the external factors had a hand in the development of this disorder, a defect whose symptoms are evident in early childhood and are clearly concentrated in social communication (Liang, Li, Wong, Sum, & Sit, 2020). This requires working to provide appropriate programs for children with ASD that can provide treatment for the lack of social skills and the assistance required to develop communication skills and positive interaction with others (Liang et al., 2020). Al-Ruwaili and Zureikat (2019) revealed that children with ASD who were taught in the program employing the crucial response had improved skills more than children who were educated in the conventional manner in terms of their communication abilities. Rivera, Renziehausen and Garcia (2020) also demonstrated the effectiveness of the electronic program based on applied behavior analysis in developing social communication skills for children with ASD.

Regarding motor education based on purposeful motor activity, which includes various sports activities and motors, it contributes to raising the level of individual capabilities in terms of functional, motor, psychological, and social aspects (Kruger, Silveira & Marques, 2019). Hence, it often also contributes to fulfilling many of the needs of children with special needs. Motor activities are among the most

educational activities that achieve goals in the pre-school and school stages, through which children's behavior can be modified and they acquire skills and concepts that develop in educational, social and motor aspects (Altunsöz & Goodway, 2016). Attention to the motor aspect of the child has a great impact on achieving various aspects of growth, as the value of motor increases children's imagination and helps their social integration (Bremer & Lloyd, 2016). Also, motor activities are the best way for children to acquire different concepts and experiences. The child's knowledge grows, his language score goes up, and he learns new skills and ideas when he moves around often (Choi et al., 2018).

Motor helps children to raise the efficiency of their vital systems, strengthen their muscles, and reduce their muscular, nervous, and psychological tensions. It also gives them happiness and fun because the child is an active and explorer being, and therefore the bulk of the stimulation and development of his skills comes through motor and play, which are the sources of pleasure and happiness for any child (Colombo-Dougovito & Block, 2019). Education through motor is one of the modern trends in education that brings education out of the traditional formula into positive and effective formulas in child development, allowing possibilities to reach comprehensive growth through programs that enable educators to achieve educational goals in a way that ensures the survival of the impact of learning (Gkotzia, Venetsanou & Kambas, 2017).

Good motor skills allow autistic individuals to practice all different life activities. It also gives them independence and the ability to maintain acquired skills and enables them to generalize skills in different life situations (Holloway et al., 2018). In fact, the results of many studies and research indicate that children with ASD suffer from a clear decline in the level of their basic motor skills, which is a source of stress for their parents. This decline is embodied in poor motor orientation, motor coordination and poor balance (Ketcheson et al., 2017). Many people with autism show abnormal motors while crawling, walking, sitting, rolling, jumping, and shaking the body during head swaying, swaying, and sudden transformation during that. Motor skills refer to the sensory, integrative, and implicit decision-making processes that precede the performance of the observed motor (LeBarton & Iverson, 2016). Motor skills are divided into basic motor skills and specialized motor skills. Basic motor skills include motor skills that enable an individual to communicate with the environment around him and explore the world around him. These skills include walking, running, jumping, and throwing (Mody et al., 2017).

The early phases of physical development, such as crawling, walking, running, rolling, leaping, throwing, climbing, and hanging, are sometimes referred to as having basic motor abilities (Pan, 2014). They are also known as innate motor patterns. These skills are considered the focus of motor education and are divided into three axes: the first is the transitional motors, which include: walking, running, leaping forward, jumping up, and partridge; the second is the control and control motors, which include: throwing, grabbing and patting, dribbling, and hitting with one hand; the third axis is the static and equilibrium motors, which include both static equilibrium and motor equilibrium (Gkotzia et al., 2017). In addition to the above, basic motor skills are defined as those natural, innate motors that the individual practices and performs without anyone teaching them, such as walking, running, jumping, hanging, and throwing (Colombo-Dougovito & Block, 2019). Basic motor skills are not only an introduction to the child's learning of special mathematical skills, but also help in his mental, cognitive, social, and emotional development. Motor is the most basic form of life and the most basic way to express thoughts, feelings, and ideas. Through motor, a child can gain self-awareness and knowledge on all levels, as well as get used to behaving logically, solving problems, and making evaluations (Kruger et al., 2019).

There are many educational programs offered for children with ASD. The diversity in the programs comes due to the heterogeneity among the individuals of this disorder, the multiplicity of needs of this group and the multiplicity of causes of the disorder (Akin & Alp, 2019). Some programs have proven to be effective with cases, but not with other cases, which makes specialists puzzled over the use of which methods are most effective (Najafabadi et al., 2018). This case opened the way for specialists to use the optimal program that suits each child based on his characteristics and needs.

Previous Studies

Najafabadi et al. (2018) employed exercises from the Sports, Play, and Active Recreation for Kids program to assess the motor and behavioral skills of children with ASD. 28 autistic kids between the ages of 5 and 12 took part in the research. The children were assessed using the Bruninkse-Oseretsky motor proficiency test, the second edition of the Gilliam autism rating scale, and the autism therapy evaluation checklist at the baseline, pre-test, and post-test. The findings revealed that the SPARK program significantly improved children with ASD in terms of balance (dynamic and static), social interaction, and bilateral coordination.

Stavrou et al. (2018) looked at how exercise affected a child with ASD's behavior and communication skills. A 7-year-old child who was given the diagnosis of ADS at age 3.5 and a pervasive developmental impairment at age 2.5 participated in the survey. He was diagnosed as having high-functioning autism at the age of six. Three phases of the research were separated. Throughout the interview, data was gathered using a questionnaire to gauge general opinions. Everyone involved (physical education teacher, parallel support teacher, general class teacher, and parents) completed the questionnaires two days before and two days after the intervention program's deployment to record observations. Four areas were examined by the survey: communication strategies, communication environment (framework), communication objective or function, and semantic categories and word use (means). The 12-week intervention program included three 40-45 minute sessions each week that included balance exercises, games in groups of three to four persons, activities for improving visual-motor coordination, lateral mobility exercises, and games that required spatial and time orientation. The child greatly improved when the intervention strategy was used in all domains and nearly all subcategories.

Akn and Alp (2019) looked explored how a long-term adaptive game-aided physical education intervention program affected the skill retention of a person with ASD. The participant was fourteen years old when the study began and fifteen years old when it was finished. The research was place over a period of 15 months, including 3 months of preparation time before the participant's retention test and 12 months of implementation. The Bruininks-Oseretsky Motor Proficiency Test, Second Edition, Short Form (BOT-2 SF), was used as a measuring set. The gathered information underwent visual analysis. The findings show that the development of BOT-2 SF in its eight sub-dimensions of fine and gross motor skills started at diverse points. All skills, with the exception of the power sub-dimension, were clearly preserved when the permanency test for an intervention program was completed after a three-month delay. Only the power sub-dimension somewhat diminished. Given all of these implications, it is reasonable to draw the conclusion that, even though it is too late, specialized intervention programs implemented on ASD patients have a positive impact on motor skill levels, and that this development will be helpful in enhancing the quality of life for those with ASD.

Azimirgarsi et al. (2020) investigate how hydrotherapy affects the communication skills of kids with ASD. This is an A-B study with a single instance. All children with ASD in the province of Alborz were included in the statistical population in 2017. Three children from the Kahrizak Rehabilitation Center who had signs of autistic disorder were chosen as a sample. The second version of the Gilliam Autism

Rating Scale (GARS-2) and a checklist the researcher designed to evaluate communication skills served as the research's main instruments. For two months and eight weeks, the Hollywick program reported that treatment sessions were held twice a week (16 sessions). During the participants' visual assessment of the image, the intervention was beneficial to all three.

Alkinj, Pereira, and Santos (2022) looked into the effectiveness of an educational program using a variety of techniques; a group of six high-functioning ASD youths at the Autism Academy of Jordan to hone their social communication abilities using techniques including social storytelling, video self-modeling animated and video modeling. The effect of the program on the experimental group was examined using a mixed method (qualitative and quantitative) strategy. The findings revealed that, in comparison to the control group, all experimental participants significantly increased on the post-test of the autistic social abilities profile in the social reciprocity and social engagement skill categories. Additionally, the results of the teacher interviews showed that pupils' social skills significantly improved once the educational program was put in place.

Methodology

The researcher employed the quasi-experimental method, which allows for the examination of the impact of an independent variable (the educational program) on a dependent variable (communication skills and basic motor skills). The researcher picked one of the experimental approaches, which entailed establishing a control group and an experimental group depending on how the sample children were selected at random and measuring them before and after the trial, as follow:

1. The sample children (40) who were selected were randomly distributed into two groups (control and experimental).
2. Verify the parity between the children of the two groups in terms of communication skills and basic motor skills.
3. Subjecting the experimental group to the independent variable (the educational program) and withholding it from the control group.
4. Post-measurement for the two groups (the control and experimental) to measure the effect resulting from the introduction of the independent variable.
5. After about a month, the experimental group is tested again to see if the educational program still has an effect and to ensure that the change in the dependent variable (communication skills and basic motor skills) is real and not just temporary.

Study Population and Sample

The sample members of this study were selected from Children with ASD who receive their therapy at the center first autism in Jeddah and Prince Muhammad bin Saud Al Kabeer complex in the Kingdom of Saudi Arabia within the time period (8/12/2021-8/2/2022). The individuals who meet the following conditions were considered to be the members of this study sample:

1. The child's age should be between 7 and 16 years old.
2. The child does not suffer from any disabilities that may affect his response or understanding, such as a hearing disability, and this condition has been verified through the medical reports that were given to these children by the Ministry of Health.
3. The child's intelligence level should be normal, and this case has been verified using the educational program appropriate to the Saudi environment. In addition, the child suffers from

a disorder in communication skills and basic motor skills, according to the results of the basic communication and motor scale after its application to children.

The number of children that satisfied the criterion was 40, who were randomly divided into two equal groups of 20 each. One of the two groups was chosen at random to be an experimental group that would get the educational program developed for the purposes of this study, while the other was a control group that would not receive the educational program. The educational program was applied to the experimental sample over the course of two months, at a pace of 12 sessions per month, bringing the total number of sessions received by each child to 24.

Study Instrument

To achieve the objectives study, two research instruments were used:

1. The measure of communication skills and basic motor skills: The scale was created by the researcher based on earlier research on communication skills and basic motor skills in ASD children. The scale consists of 50 items grouped progressively from simplest to most difficult activities that test verbal communication abilities (15 items), nonverbal communication skills (17 items), and basic motor skills (18 items). The scale was utilized as a pre-, post-, and follow-up measuring instrument on the research sample.
2. The Educational Program: The program aims to develop communication skills and basic motor skills for children with ASD , aged between (7-16) years, through a series of sessions implemented by lessons prepared by the researcher. The content of the program is a translation into the activities and practices from which the child learns the target skills so that it becomes a behavior that is not just knowledge and information. Therefore, the content of the program was determined based on the general objective and procedural objectives of the program, where several considerations were taken into account when developing the content based on what researchers in the field of special education indicated as follows:
 - All activities focus on achieving the objectives of the program, which have already been specified in relation to the development of communication skills and basic motor skills.
 - The content of the program should be commensurate with the level of understanding and awareness of the children.
 - The child should be provided with immediate feedback on the correctness or wrongness of the behavior that appears during the implementation of the program.
 - The content of the program is reasonably related to the child's direct experiences, personal interests and inclinations.

Instrument Validity and Reliability

The scale's validity was validated in two ways:

1. By presenting the scale to 12 arbitrators and adopting 80% as the proportion of approval of the arbitrators' agreement, the validity of the scale's content is established.
2. By using it on a group of twelve experimental children with ASD, the scale's discriminating validity was tested. There were three statistically significant coefficients for the (F) values of the discriminatory validity (1.53, 4.76, and 7.33).

The scale's internal consistency was computed using the internal consistency technique in accordance with Cronbach's alpha equation, and the reliability coefficient for the scale as a whole was (0.935), with reliability coefficients for the three dimensions ranging between (0.775-0.895).

Data Analysis

The pre- and post-test mean scores and standard deviations were determined after data collection. The Eta square was used to calculate the impact size, which demonstrates how well the educational program assisted children with ASD in developing their communication skills and basic motor skills. The Z-value and Wilcoxon's test were also employed to demonstrate the differences between two comparable samples.

Results and Discussion

Prior to implementing the educational program, it was made sure that the control and experimental groups had the same communication and basic motor skills, as indicated in Table 1.

Table 1: Pre-Measurement of Skills

| Skills | Groups | N | Mean Rank | Sum of Ranks | U | Z | P |
|-------------------------|--------------|----|-----------|--------------|--------|-------|-------|
| Verbal communication | Experimental | 20 | 18.90 | 378.00 | 168.00 | 0.872 | 0.398 |
| | Control | 20 | 22.10 | 442.00 | | | |
| Nonverbal communication | Experimental | 20 | 19.35 | 387.00 | 177.00 | 0.625 | 0.547 |
| | Control | 20 | 21.65 | 433.00 | | | |
| Basic motor | Experimental | 20 | 21.30 | 426.00 | 184.00 | 0.435 | 0.678 |
| | Control | 20 | 19.70 | 394.00 | | | |
| Total | Experimental | 20 | 20.30 | 406.00 | 196.00 | 0.108 | 0.925 |
| | Control | 20 | 20.70 | 414.00 | | | |

The pre-test mean scores of the children's verbal and nonverbal communication scales as well as their basic motor skills did not differ statistically significantly between the control and experimental groups, according to Table 1.

In order to answer the first question which states "Do the scores of the control and experimental groups alter substantially after using the program on a measure of communication skills and certain basic motor skills?". The following table displays the findings.

Table 2: Post-Measurement to Skills

| Skills | Group | N | Mean Rank | Sum of Ranks | U | Z | P |
|-------------------------|--------------|----|-----------|--------------|-------|-------|-------|
| Verbal communication | Experimental | 20 | 27.30 | 546.00 | 64.00 | 3.688 | 0.000 |
| | Control | 20 | 13.70 | 274.00 | | | |
| Nonverbal communication | Experimental | 20 | 29.90 | 598.00 | 12.00 | 5.115 | 0.000 |
| | Control | 20 | 11.10 | 222.00 | | | |
| Basic motor | Experimental | 20 | 30.10 | 602.00 | 8.00 | 5.216 | 0.000 |
| | Control | 20 | 10.90 | 218.00 | | | |
| Total | Experimental | 20 | 29.50 | 590.00 | 20.00 | 4.879 | 0.000 |
| | Control | 20 | 11.50 | 230.00 | | | |

According to Table 2, there are statistically significant differences between the control and experimental groups' mean scores on tests of fundamental motor skills and communication abilities following the post-measurement, with the experimental group generally benefiting. This suggests that the kids in the experimental group had advanced communication abilities in addition to good fundamental motor capabilities.

Many children with ASD face learning problems and difficulties, and they cannot acquire many of the concepts that help them communicate and deal with others. These children lack the ability to use forms of communication in a proper way that enables them to communicate with those around them. Basic motor skills have proven effective in recognizing children's problems from a long time ago, especially children who do not speak easily and clearly about their own problems and children who are difficult to gain confidence in. As a result, basic motor skills have become a means for children with special needs to feel efficient, effective, happy, and satisfied with themselves. Also, basic motor skills encourage children with ASD to initiate spontaneous communication because of their ability to understand the importance of the communication process. This is consistent with the research of Najafabadi et al. (2018), Stavrou et al. (2018), Akn and Alp (2019), Azimigarosi et al. (2020), and Alkinj et al. (2022).

In order to answer the second question which states "Do the communication skills and certain basic motor skills of the experimental group match before and after the implementation of the program differ significantly?". The following table displays the findings.

Table 3: Pre and Post-Measurement of Experimental Sample

| Skills | Pre/ Post | N | Mean Rank | Sum of Ranks | Z | P |
|-------------------------|---------------|----|-----------|--------------|-------|-------|
| Verbal communication | negative rank | 2 | 1.50 | 3.00 | 3.833 | 0.000 |
| | positive rank | 18 | 11.50 | 207.00 | | |
| | ties | 0 | | | | |
| | total | 20 | | | | |
| Nonverbal communication | negative rank | 2 | 1.50 | 3.00 | 3.970 | 0.000 |
| | positive rank | 18 | 11.50 | 207.00 | | |
| | ties | 0 | | | | |
| | total | 20 | | | | |
| Basic motor | negative rank | 2 | 1.50 | 0.00 | 3.945 | 0.000 |
| | positive rank | 18 | 11.50 | 210.00 | | |
| | ties | 0 | | | | |
| | total | 20 | | | | |
| Total | negative rank | 2 | 1.50 | 3.00 | 3.817 | 0.000 |
| | positive rank | 18 | 11.50 | 207.00 | | |
| | ties | 0 | | | | |
| | total | 20 | | | | |

According to Table 3, there are statistically significant variations in the experimental group's mean scores for basic motor skills, verbal and nonverbal communication skills, and total post-measurement score. Children in the experimental group shown progress in their basic motor skills as well as verbal and nonverbal communication skills during the post-measurement.

The researcher also assumed that efforts to intervene in training, therapeutic, or educational programs for the skills of children with ASD, which is a new way to provide them and help them learn alternative forms of communication, were to blame for the extent of improvement in the average scores of the experimental group's kids after implementing the training program on the verbal and verbal communication skills scale and the basic motor scale. Additionally, it aids in the acquisition of optimal behavioral habits. This is consistent with the research of Najafabadi et al. (2018), Stavrou et al. (2018), Akn and Alp (2019), Azimigarosi et al. (2020), and Alkinj et al. (2022), where the findings revealed the advantages of a training program for children with ASD.

In order to answer the third question which states "Did the experimental group scores significantly change on the communication skills and certain basic motor skills scale in the post- and follow-up application?". The following table displays the findings.

Table 4: Post and Follow-up Measurement of Experimental Group

| Skills | Pre/ Follow | N | Mean Rank | Sum of Ranks | Z | P |
|-------------------------|---------------|----|-----------|--------------|-------|-------|
| Verbal communication | negative rank | 4 | 2.50 | 10.00 | 1.857 | 0.063 |
| | positive rank | 0 | 0.00 | 0.00 | | |
| | ties | 16 | | | | |
| | total | 20 | | | | |
| Nonverbal communication | negative rank | 14 | 8.64 | 121.00 | 1.608 | 0.108 |
| | positive rank | 4 | 12.50 | 50.00 | | |
| | ties | 2 | | | | |
| | total | 20 | | | | |
| Basic motor | negative rank | 2 | 3.50 | 7.00 | 0.816 | 0.414 |
| | positive rank | 4 | 3.50 | 14.00 | | |
| | ties | 14 | | | | |
| | total | 20 | | | | |
| Total | negative rank | 5 | 6.00 | 30.00 | 0.937 | 0.349 |
| | positive rank | 4 | 3.75 | 15.00 | | |
| | ties | 11 | | | | |
| | total | 20 | | | | |

Table 4 shows that there are no statistically significant variations between the experimental group's average scores between the post and follow-up evaluations. This shows that the program's efficacy lasted throughout the follow-up period and that there was no relapse following the program. This outcome may be interpreted in light of the children's improved capacity to communicate, their development of basic motor abilities, and their continued exposure to program activities.

The program impact persisted throughout the follow-up period in addition to the continual evaluation inside the session and the homework for each session. This demonstrates how willing they were to cooperate and how much they enjoyed studying through this program. Additionally, the improvement in the experimental group's children can be attributed to the foundations used in using specific specifications for the training program hall to avoid child distraction factors, such as providing the child with a good seat, providing the hall with good lighting, and keeping the hall clear of other educational tools and posters. The program's use of a variety of educational methods and resources has resulted in the accomplishment of the desired objectives, including the use of audio-visual aids that help children make the connection between their actions and their thoughts and that give them opportunities to hear and imitate language vocabulary through concrete experiences.

Conclusion

This study supports the idea that educational programs can help children with ASD develop communication and basic motor skills. Additionally, the results suggests that programs created specifically for this goal may be more effective in boosting these kids' levels of skill mastery than conventional programs. Therefore, in keeping with the program's goals, it is advantageous for instructors to develop basic motor and communication skills in children with ASD who participate in a program designed to increase suspense- and attention-seeking abilities and lessen boredom. The findings of this study showed how the educational program aids in the development of children with ASD who have a clear knowledge of the value of effective basic motor abilities as well as communication and usage skills. The basis for drawing the conclusion that the program creates a calm and stress-free environment and gives kids a chance to support, encourage, and appreciate each other can be found in the use of specific specifications of the training program hall to prevent child distractions, such as good seating for the child, good lighting in the hall, and the absence of educational tools and other posters.

The small size of the groups in this study is a limitation since it makes it challenging to generalize the findings. Because this study primarily employed quantitative data, future research should incorporate some qualitative data, such interviews, to better understand how toddlers learn communication and basic motor skills.

Recommendations

According to the findings of the study, the researcher recommends:

1. Paying attention to the communicative skills and basic motor skills of a child with ASD, as the use of prepared educational programs has a positive effect in improving those skills for them.
2. Inviting those in charge of educational institutions in the field of autism to use the proposed program to improve communication skills and basic motor skills for children with ASD.
3. The necessity of providing all the necessary capabilities of devices and tools to implement the regulated programs and to ensure their safety and continuous improvement.
4. Using modern scientific methods in developing educational programs for children with ASD in proportion to their abilities and preparations.
5. The necessity of conducting several studies in the field of educational programs to learn other skills, as well as finding strategies that would teach communication skills and basic motor skills.

Acknowledgments

This work was funded by the University of Jeddah, Jeddah, Saudi Arabia, under grant NO (UJ-22-SHR-17). The authors, therefore, acknowledge with thanks the university of Jeddah for its technical and financial support

References

- Abdelkarima, A., Ammar, A., Chtourou, H., Wagner, M., Knisel, E., Hökelmann, A. & Bös, K. (2017). Relationship between motor and cognitive learning abilities among primary school-aged children. *Alexandria Journal of Medicine*, 53(4), 325-331. <http://dx.doi.org/10.1016/j.ajme.2016.12.004>
- Akhmetzyanova, A. I., & Artemieva, T. V. (2020). The relationship between prediction and positive socialization of children with developmental disabilities. *Psychological research*, 13(69), 5-15. http://dx.doi.org/10.1044/2017_ajslp-17-0066
- Akhmetzyanova, A., Artemieva, T., & Gryaznova, A. (2022). Study of Social and Language Skills in Children with ASD Spectrum Disorder. *ARPHA Proceedings*, 5, 17-28. <http://dx.doi.org/10.3897/ap.5.e0017>
- Akin, S., & Alp, H. (2019). Effect of Adapted Game-Aided Physical Education Program on the Motor Skills of Children with ASD Spectrum Disorders: Longitudinal Case Study. *Journal of Curriculum and Teaching*, 8(3), 63-72. <http://dx.doi.org/10.5430/jct.v8n3p63>
- Alkinj, I., Pereira, A., & Santos, P. C. (2022). The effects of an educational program based on modeling and social stories on improvements in the social skills of students with autism. *Heliyon*, 8(5), e09289. <http://dx.doi.org/10.1016/j.heliyon.2022.e09289>
- Altunsöz, I. H., & Goodway, J.D. (2016). SKIPing to motor competence: the influence of project successful kinesthetic instruction for preschoolers on motor competence of disadvantaged preschoolers. *Physical Education and Sport Pedagogy*, 21(4), 366-385. <http://dx.doi.org/10.1080/17408989.2015.1017453>
- Antipova, J. A., & Miticheva, T. I. (2019). Study of the peculiarities of the formation and development of social and communication skills in preschoolers with autism spectrum disorder in the process of playing activity. *Young scientist*, 48(286), 115-118.
- Azar, N. R., McKeen, P., Carr, K., Sutherland, C. A., & Horton, S. (2016). Impact of motor skills training in adults with autism spectrum disorder and an intellectual disability. *Journal on Developmental Disabilities*, 22(1), 28. <http://dx.doi.org/10.1177/1744629517750744>

- Athbah, S. Y. (2022). The effect of an education program on developing communication skills and some basic motor skills among children with autism spectrum disorder. *Cypriot Journal of Educational Sciences*, 17(11), 4182-4198. <https://doi.org/10.18844/cjes.v17i11.7982>
- Bedford, R., Pickles, A., & Lord, C. (2016). Early gross motor skills predict the subsequent development of language in children with ASD spectrum disorder. *Autism Research*, 9(9), 993–1001. <http://dx.doi.org/10.1002/aur.1587>
- Belyaeva, O. L. (2020). Comparative study of the features of communication skills of older preschool children with ASD spectrum disorder of the second and third groups of autism. *Autism and other developmental disabilities: current research and development*, 1(4), 2-14. <http://dx.doi.org/10.25146/2221-1160-2020-4-1-2-14>
- Benson, S., Bender, A. M., Wickenheiser, H., Naylor, A., Clarke, M., Samuels, C. H., & Werthner, P. (2019). Differences in sleep patterns, sleepiness, and physical activity levels between young adults with autism spectrum disorder and typically developing controls. *Developmental Neurorehabilitation*, 22(3), 164–173. <https://doi.org/10.1080/17518423.2018.1501777>
- Bo, J., Pang, Y., Dong, L., Xing, Y., Xiang, Y., Zhang, M., & Shen, B. (2019). Brief report: Does social functioning moderate the motor outcomes of a physical activity program for children with ASD spectrum disorders—a pilot study. *Journal of Autism and Developmental Disorders*, 49(1), 415–421. <https://doi.org/10.1007/s10803-018-3717-4>
- Bodnar, I. R., & Hamade, A. F. (2019). The effect of physical activity interventions on development of children with ASD spectrum disorder. content-analysis of researches. *Pedagogics, psychology, medical-biological problems of physical training and sports*, (3), 118-125. <http://dx.doi.org/10.15561/18189172.2019.0302>
- Bremer, E., & Lloyd, M. (2016). School-based fundamental motor-skill intervention for children with ASD -like characteristics: an exploratory study. *Adapted Physical Activity Quarterly*, 33(1), 66-88. <https://doi.org/10.1123/APAQ.2015-0009>.
- Chiva-Bartoll, O., Maravé-Vivas, M., Salvador-García, C., & Valverde-Esteve, T. (2021). Impact of a physical education service-learning programme on ASD children: A mixed-methods approach. *Children and Youth Services Review*, 126, 106008. <http://dx.doi.org/10.1016/j.childyouth.2021.106008>
- Choi, B., Leech, K. A., Tager-Flusberg, H., & Nelson, C. A. (2018). Development of fine motor skills is associated with expressive language outcomes in infants at high and low risk for autism spectrum disorder. *Journal of Neurodevelopmental Disorders*, 10(1), 1–11. <http://dx.doi.org/10.1186/s11689-018-9231-3>
- Colombo-Dougovito, A. M., & Block, M. E. (2019). Fundamental Motor Skill Interventions for Children and Adolescents on the Autism Spectrum: a Literature Review. *Review Journal of Autism and Developmental Disorders*, 6(2), 159-171. <https://doi.org/10.1007/s40489-019-00161-2>
- Gkotzia, E., Venetsanou, F., & Kambas, A. (2017). Motor proficiency of children with ASD spectrum disorders and intellectual disabilities: a review. *European Psychomotricity Journal*, 9(1), 46-69. <http://dx.doi.org/10.6033/tokkyou.56.241>
- Habib, K., Montreuil, T., & Bertone, A. (2018). Social learning through physical activity for students with Autism Spectrum Disorders (ASD). *Review Journal of Autism and Developmental Disorders*, 69, 158–168. <https://doi.org/10.1007/s40489-018-0139-3>
- Haebig, E., Jiménez, E., Cox, C. R., & Hills, T. T. (2021). Characterizing the early vocabulary profiles of preverbal and minimally verbal children with ASD spectrum disorder. *Autism*, 25(4), 958-970. <http://dx.doi.org/10.1177/1362361320973799>
- Hamm, J., & Yun, J. (2019). Influence of physical activity on the health-related quality of life of young adults with and without autism spectrum disorder. *Disability and Rehabilitation*, 41(7), 763–769. <https://doi.org/10.1080/09638288.2017.1408708>
- Healy, S., Aigner, C. J., Haegele, J. A., & Patterson, F. (2019). Meeting the 24-hr movement guidelines: An update on US youth with autism spectrum disorder from the 2016 National Survey of Children’s Health. *Autism Research*, 12(6), 941–951. <https://doi.org/10.1002/aur.2095>

- Athbah, S. Y. (2022). The effect of an education program on developing communication skills and some basic motor skills among children with autism spectrum disorder. *Cypriot Journal of Educational Sciences*, 17(11), 4182-4198. <https://doi.org/10.18844/cjes.v17i11.7982>
- Hollis, J. L., Sutherland, R., Williams, A. J., Campbell, E., Nathan, N., Wolfenden, L., ... Wiggers, J. (2017). A systematic review and meta-analysis of moderate-to-vigorous physical activity levels in secondary school physical education lessons. *International Journal of Behavioral Nutrition and Physical Activity*, 14(1), 52. <https://doi.org/10.1186/s12966-017-0504-0>
- Hwang, B. H., & Lee, D. (2022). Association between Motor and Language Skills Development in Children with ASD Spectrum Disorder: A Scoping Review. *International Journal of Disability, Development and Education*, 1-15. <http://dx.doi.org/10.1080/1034912x.2022.2092081>
- Iverson, J. M. (2018). Early motor and communicative development in infants with an older sibling with autism spectrum disorder. *Journal of Speech, Language, and Hearing Research*, 61(11), 2673–2684. http://dx.doi.org/10.1044/2018_jslhr-lrsaut-18-0035
- Jones, R. A., Downing, K., Rinehart, N. J., Barnett, L. M., May, T., McGillivray, J. A., ... Hinkley, T. (2017). Physical activity, sedentary behavior and their correlates in children with ASD spectrum disorder: A systematic review. *PLoS ONE*, 12(2), 1–23. <https://doi.org/10.1371/journal.pone.0172482>
- Kanner, L. (1943). Autistic disturbances of affective contact. *Nervous child*, 2(3), 217-250.
- Ketcheson, L., Hauck, J., & Ulrich, D. (2017). The effects of an early motor skill intervention on motor skills, levels of physical activity, and socialization in young children with ASD spectrum disorder: A pilot study. *Autism*, 21(4), 481–492. <http://dx.doi.org/10.1177/1362361316650611>
- Koçak Uyaroğlu, A., Ertüzün, E., & Taş Arslan, F. (2021). The effect of the therapeutic recreation program for children with autistic spectrum disorder on their social skills. *Baltic Journal of Health and Physical Activity*, 13(7), 3. <http://dx.doi.org/10.29359/bjhp.a.2021.suppl.2.03>
- Kruger, G. R., Silveira, J. R., & Marques, A. C. (2019). Motor skills of children with ASD spectrum disorder. *Revista Brasileira de Cineantropometria & Desempenho Humano*, 21. DOI: <http://dx.doi.org/10.1590/1980-0037.2019v21e60515>
- Lapshina, T. V. (2019). Psychological and pedagogical characteristics of children with ASD spectrum disorders. *Socio-pedagogical support for people with disabilities: theory and practice*, 26-30. <http://dx.doi.org/10.31499/2307-4906.2.2022.262966>
- LeBarton, E. S., & Landa, R. J. (2019). Infant motor skill predicts later expressive language and autism spectrum disorder diagnosis. *Infant Behavior and Development*, 54(March 2018), 37–47. <http://dx.doi.org/10.1016/j.infbeh.2018.11.003>
- Liang, X., Li, R., Wong, S. H. S., Sum, R. K. W., & Sit, C. H. P. (2020). Accelerometer-measured physical activity levels in children and adolescents with autism spectrum disorder: A systematic review. *Preventive Medicine Reports*, 19, Article 101147. <https://doi.org/10.1016/j.pmedr.2020.101147>
- Licari, M. K., Alvares, G. A., Varcin, K., Evans, K. L., Cleary, D., Reid, S. L., ... Whitehouse, A. J. O. (2020). Prevalence of motor difficulties in autism spectrum disorder: Analysis of a population-based cohort. *Autism Research*, 13(2), 298–306. <https://doi.org/10.1002/aur.2230>
- Lord, C., & Hopkins, J. M. (1986). The social behavior of children with ASD with younger and same-age nonhandicapped peers. *Journal of Autism and Developmental Disorders*, 16(3), 249-262. <http://dx.doi.org/10.1007/bf01531658>
- Lotfizadeh, A. D., Kazemi, E., & Pompa-Craven, P. (2018). Moderate Effects of Low-Intensity Behavioral Intervention. *Behavior Modification*, 44, 92-113. <http://dx.doi.org/10.1177/0145445518796204>
- Lourenco, C., Esteves, D., Nunes, C., & Liu, T. (2020). Motor proficiency of children with ASD spectrum disorder and typically developing children in Portugal. *Journal of Physical Education and Sport*, 20 (3), pp. 1491 – 1496. <http://dx.doi.org/10.1016/j.jecp.2013.05.005>

- Athbah, S. Y. (2022). The effect of an education program on developing communication skills and some basic motor skills among children with autism spectrum disorder. *Cypriot Journal of Educational Sciences*, 17(11), 4182-4198. <https://doi.org/10.18844/cjes.v17i11.7982>
- Maenner, M. J., Shaw, K. A., Baio, J., Washington, A., Patrick, M., DiRienzo, M... & Dietz, P. M. (2020). Prevalence of Autism Spectrum Disorder Among Children Aged 8 Years-Autism and Developmental Disabilities Monitoring Network. *MMWR Surveill Summ*, 69(SS-4), 1-12. <https://doi.org/10.15585/mmwr.ss6904a1externalicon>.
- Mamokhina, U. A. (2017). Features of speech in autism spectrum disorders. *Autism and developmental disabilities*, 15(3), 24-33. <http://dx.doi.org/10.17759/autdd.2017150304>
- Mukayetova-Ladinska, E. B., Simashkova, N. V., Mukayetova, M. S., Ivanov, M. V., & Boksha, I. S. (2018). Autism spectrum disorders in children and adults: approaches to the problem in different countries. *Journal of Neurology and Psychiatry named after CS Korsakov*, 118(12), 92-99. <http://dx.doi.org/10.17116/jnevro201811812192>
- Najafabadi, M. G., Sheikh, M., Hemayattalab, R., Memari, A. H., Aderyani, M. R., & Hafizi, S. (2018). The effect of SPARK on social and motor skills of children with ASD. *Pediatrics & Neonatology*, 59(5), 481-487. <http://dx.doi.org/10.1016/j.pedneo.2017.12.005>
- Nason, B. (2016). On key issues of autism: sensory aspects of autism. *Autism and developmental disabilities*, 14(3), 42-48. <http://dx.doi.org/10.4324/9781351252348-16>
- Ohara, R., Kanejima, Y., Kitamura, M., & Izawa, K. P. (2020). Association between social skills and motor skills in individuals with autism spectrum disorder: A systematic review. *European Journal of Investigation in Health, Psychology and Education*, 10(1), 276–296. <http://dx.doi.org/10.3390/ejihpe10010022>
- Pan, C. Y. (2014). Motor proficiency and physical fitness in adolescent males with and without autism spectrum disorders. *Autism*, 18(2), 156-165. <https://doi.org/10.1177%2F1362361312458597>
- Ratcliff, K., Hong, I., & Hilton, C. (2018). Leisure participation patterns for school age youth with autism spectrum disorders: findings from the 2016 national survey of children's health. *Journal of Autism and Developmental Disorders*, 48, 3783–3793. <https://doi.org/10.1007/s10803-018-3643-5>
- Rivera, P., Renziehausen, J., & Garcia, J. M. (2020). Effects of an 8-week judo program on behaviors in children with ASD spectrum disorder: a mixed-methods approach. *Child Psychiatry and Human Development*. <https://doi.org/10.1007/s10578-020-00994-7>
- Ruggeri, A., Dancel, A., Johnson, R., & Sargent, B. (2019). The effect of motor and physical activity intervention on motor outcomes of children with ASD spectrum disorder: A systematic review. *Autism*, 544–568. <https://doi.org/10.1177/1362361319885215>
- Sanz-Cervera, P., Fernández-Andrés, I., Pastor-Cerezuela, G., & Tárraga-Mínguez, R. (2018). The effectiveness of TEACCH intervention in autism spectrum disorder: a review study. *Papeles Del Psicólogo*, 39(1), 40-50. <http://dx.doi.org/10.5772/intechopen.95758>
- Schmidt, B. (2017). Towards a theory of autism. *Dubna state university bulletin. Series: Sciences about man and society*, 2(1), 27-41. <http://dx.doi.org/10.2307/44394127>
- Siegel, B. (2003). *Helping children with ASD learn: Treatment approaches for parents and professionals*. Oxford university press.
- Stanish, H. I., Curtin, C., Must, A., Phillips, S., Maslin, M., & Bandini, L. G. (2017). Physical activity levels, frequency, and type among adolescents with and without autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 47(3), 785–794. <https://doi.org/10.1007/s10803-016-300>
- Studenka, B. E., Gillam, S. L., Hartzheim, D., & Gillam, R. B. (2017). Motor and verbal perspective taking in children with ASD spectrum disorder: Changes in social interaction with people and tools. *Research in Developmental Disabilities*, 66, 64–79. <http://dx.doi.org/10.1016/j.ridd.2017.02.017>
- Thomas, S., Hinkley, T., Barnett, L. M., May, T., & Rinehart, N. (2019). Young children with ASD participate in the same level of physical activity as children without ASD: Implications for early intervention to maintain

Athbah, S. Y. (2022). The effect of an education program on developing communication skills and some basic motor skills among children with autism spectrum disorder. *Cypriot Journal of Educational Sciences*, 17(11), 4182-4198. <https://doi.org/10.18844/cjes.v17i11.7982>

good health. *Journal of Autism and Developmental Disorders*, 49, 3278–3289. <https://doi.org/10.1007/s10803-019-04026-9>

Travers, B. G., Bigler, E. D., Duffield, T. C., Prigge, M. D. B., Froehlich, A. L., Lange, N., ... Lainhart, J. E. (2017). Longitudinal development of manual motor ability in autism spectrum disorder from childhood to mid-adulthood relates to adaptive daily living skills. *Developmental Science*, 20(4), 12401. <https://doi.org/10.1111/desc.12401>

Velsvik, I., & Kvalsund, R. (2016). A longitudinal study of social relationships and networks in the transition to and within adulthood for vulnerable young adults at ages 24, 29 and 34 years: Compensation, reinforcement or cumulative disadvantages? *European Journal of Special Needs Education*, 31(3), 314–329. <https://doi.org/10.1080/00313830903488445>