

MOTOR DEVELOPMENT PROBLEMS OF CHILDREN WITH AUTISM AND THE MOTOR SKILLS IN AGE 3

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The aim of this study is to assess the motor development of children with autism and their problems with motor skills in the light of literature. Fine motor skills and gross motor skills that children around the age of three can do were presented with tables in the light of literature review. Those concerned may compare their children's skills with these skills and they may have knowledge about their children's motor skills by observing.

When the literature is reviewed, the problems with the motor development of children with autism come up with various motor problems. In addition, frequency of problems with motor skills increases the importance of motor development and problems in the diagnosis of autism.

Consequently, it is observed that the researches about autism and motor development haven't made clear the questions and problems in this field yet. While the presence of researches oriented to specific age range (e.g. 2-6) is limited, scarcely any research has been done that is oriented any specific age (e.g. 3). Increasing the number of researches which identify the motor skills of a specific age and which are oriented to locating the place of children with autism within this age is necessary to describe the problems of this field clearly.

Keywords: Autism spectrum disorder, motor development, age 3, skill

Introduction. Ranked among childhood neuro-developmental disorders and defined clinically [1], Autism Spectrum Disorder (ASD) is characterized by insufficiency of social interaction and communication, limited fields of interest and recurring behaviors and its symptoms come up in early childhood [2]. Despite frequent delays and failures in the basic motor skills of individuals with autism, [3] the confusion in motor activities isn't considered as one of the main insufficiencies of ASD [4]. However, the acceptance of motor disorder as one of the main components of ASD has increased recently [5].

As a gross motor disturbance, movement disorder can play an essential role in diagnosing autism in earlier age (in the first few months of life) [6]. The time that a child begins to participate in organized social settings is 3 years of age [6]. For parents, it is easier to realize that something is going on wrong in this age. Also it is easier to spot the typical ASD behaviors with these children for experts, because of this; autism is mostly diagnosed at around 3 years of age [6].

Because of the sensory motor symptoms, motor abnormalities, poor coordination, increased clumsiness; as a matter of fact researchers suggest

that evaluation of motor activity may aid in the early prediction of ASD [6,7]. Before three years of age, a child is seldom diagnosed with autism [8] as a result of this, parents mostly know about autism at this age. It is typically time to research for parents; in three years of age which behaviors and skills are 'normal' or which are not. In this prospective study, we aimed to explain the motor development characteristics of 3-year-old children with autism.

The number of researches about the motor skills of 3-year-old children with autism is limited. When human development periods are investigated, 3 to 6 years of age is called early childhood. The purpose of this study is to put forward some reference criteria in the evaluation of motor development of children who are in the age group of 3 years of age by taking into consideration developmental characteristics of normal children at the age of 3.

Motor Learning and ASD. Motor learning is defined as a kind of learning in which movement are crucial or as permanent changes occurring relatively in motor behavior, based on learning or the experiences gained by practicing [9]. Since autism is a neurobiological learning disorder [1] it has a negative influence on motor learning and motor skills [6, 10]. In recent studies, it has been stated that functional disorder in the mirror neuron system of the children with autism can be one of the main problems of autism [11]. While watching someone else's physical activity, motor neurons called mirror neurons become active as if you are doing the activity [12]. Namely, when you watch somebody throwing the tennis ball forward, your (the watcher's) mirror neurons become active with the person's active mirror neurons, who throw the ball. However, it has been found that mirror neuron mechanisms of the individuals with autism don't form the same respond [12]. It may not be sufficient to watch the action in order to learn the action itself for a child who has a neurological adversity, based upon the difficulty in doing the similar motor movement or the difficulty in processing the function information of the action. Thus, while the child is performing a new action s/he may need your physical direction repeatedly before s/he performs it.

Motor Deficits and ASD. Despite the fact that Autism Spectrum Disorder (ASD) is defined with the deficits in specific fields and motor deficits are evaluated as "associated symptoms", a great number of studies have been carried out so far about both motor deficits and their importance in ASD [3,13,14,15,16]. The prevalence of the presence of motor deficits in ASD (2-6 age) have been stated as: hypotonia 63%, apraxia 41%, toe-walking 25%, reduced ankle mobility 2%, and gross motor delay 12% [13]. Motor abilities and coordination are related with the qualities of sensory/motor functions of brain. The disorders, like the ASD, which correlate with the dysfunctions of the neurological system, can cause motor deficits such as akinesia, dyskinesia [3] gross and fine motor problems [14] hypotonia, limb apraxia,

movement problems, manipulative problems, stereotypic behaviors, interactive skill problems, oromotor problems, toe-walking [17]. These deficits affect motor coordination; clumsiness can occur in act like drawing, typing, writing, speaking, playing, walking, sitting, moving limbs, jumping, balance, reaching, clapping etc.. To sum up, the studies on motor deficits make the motor problems the core of symptoms of autism spectrum disorder.

Sensory Integration Related Motor Problems and in ASD. Processing all the learned information through our life via sensory system as a stimulant and storing them as a product occur by using them when necessary. And this is only possible with a healthy neurobiological system process and as a result of this a healthy sensor coordination process. In this sense, the individuals with autism having sensory problems based upon neurological system bring many problems in all of the stages of development with it. One of these significant problems is motor problem. Some of the motor problems result from the problematic working process of the sensory systems. One of these important systems is vestibular system. Vestibular system is a system that creates consciousness in being in charge of where and how a person's body is placed spatially and the control of an action. This system is also responsible for physical posture, which changes according to the speed of the action, to provide the continuity of the action sturdily. This system which has a vital role on postural tone and balance is assigned to balance and protect during the head's movement [18]. This system plays a key role in muscle tone, postural control, balance and the functions of eye and cowl muscles [19]. A child with autism can be hypersensitive or hyposensitive in terms of vestibular system. In this circumstance, mobility may be limited or there may be some problems with the coordination of the movement despite the increase in mobility, or there may be a need for stimuli much more than the threshold of usual stimuli. In this case, with the pleasure given by the system, attending to every kind of activities that throw off one's balance in spatial place and the desire to enjoy these extremely may show continuity.

One of the main problems in motor coordination is related to another sensory system, visual-motion system. Even though all the sensory systems' functions influence each other, visual-tactile-vestibular-kinesthetic senses work coordinately with each other in motor skills. If any one of them functions unusually, this causes some problems with manual skill, writing-drawing skill, ball exercises, manipulation skills, walking and running, balance, body coordination, power, force, agility, imitation, postural balance, speed and praxis. (Praxis consists of application of these components; 1. conceptualization or intellectual skill, 2. planning or organizing, 3. new or unusual motor action.) [20]. There are also problems with timing, rhythm and sequence actions.

The deficits in sensory processing, especially proprioception and vision system, can influence the motor learning process. This can cause motor deficits, motor coordination problems. Children with autism are better in learning dynamic adaptation skills because organizing their movement relies more on their proprioception than visual input/feedback [3].

Relationship between Motor Problems and Communicative and Language Skills in ASD. One important hypothesis is the problems between motor performing and verbal instruction. It is examined that there is a relation between gestures skills and verbal instructions in children with high functioning autism; decreasing ability of gesture skills can cause problems between gestures and verbal instruction [21]. There may be dysfunction at neurons in the brain related language neurons. If we think about how mirror neurons dysfunctions affect the visual descriptions; maybe there is a similar system deficit on verbal description.

Researches support that the brain area functioning for language and speaking skills also plays a role on motor functions. It can be evident why children with autism show repetitive behaviors or stereotypes after having an arousal emotion. This may also be a sequencing of motor problem related with expressing words and language-speaking skills. It seems like the child cannot organize the words to establish sentences for expression.

Gestures and motor imitations skills are dependent on motor activity for communication [4]. Due to not only motor but also communication and interaction problems, children with ASD at the age of 3 may not use gestures and motor imitation effectively. Imitation impairments commonly appear more in children with ASD than the others younger than the age of 4 [22].

Motor deficits and dysfunctions are important in terms of how they affect core symptoms of autism spectrum disorder.

Motor Development and skills of Children at Age 3 and Children with Autism. The importance of a three-year-old child's motor development is due to the fact that the child is in the first year of fundamental movement phase, initial stage. Thus, while the motor potentials of children are found out with elements such as throwing-capturing, running leaping and balance, these elements can also be used to find out whether there are problems. The purpose of the study is to form knowledge that will guide to those concerned in association with children with autism by referencing to the gross and fine motor skills of children around the age of three.

There are studies in literature which support that the children who are diagnosed with autism in early childhood have motor activity abnormalities and these abnormalities continue to increase during preschool period. Furthermore, these studies emphasize that these children have motor activity abnormalities before 2 years of age [4]. It is clear that motor activity problems are common in children with ASD. Parents who have a three-year-old child should be careful with regards to motor problems with their

children, because it can be the main feature of ASD for early diagnosis. Early diagnosing is too critical to start education and treatment to prevent additional problems.

In the study of Landa and Garret Mayer [8] two groups of babies were classified; first group had low-risk and second group had high-risk for development of autism. To examine the development of babies; they were checked at 6, 14 and 24 months. At age of 6 months, there were no differences between these two groups; however, by 14 months babies with high-risk of autism began to show slow development and delays, also by 24 months these differences increased significantly. At age 3, even if they had taken precaution, probably these children had a worrisome development in gross motor skills, fine motor skills and the other areas (like language delay). A 3 years old child with autism can walk a little like Parkinsonian adults who walk with shorter steps and more slowly than a normal one [23]. These mobilize the parents to do something to prevent these developmental anomalies.

Table 1

Motor Skills Which Can Be Performed By Children Around Age Three [24,25,26,27,28]

	Gross motor skills	Fine motor skills
Children around 3 years old	<ul style="list-style-type: none"> • S/he can jump from 20 cm to the ground • S/he can kick the moving ball. • S/he can walk on tiptoes. • S/he can ride the three-wheeled bicycle. • S/he can swing. • S/he can slide. • S/he can roll forward. • S/he can climb the stairs by changing foot. • S/he can catch the ball thrown in the air. • S/he can throw a ball without losing balance. • S/he can jump on one foot. • S/he can throw the ball up and down • S/he can stand on one foot for 5 seconds. • S/he can walk up and down without help. • S/he can move forward and back. • S/he can walk on a line. 	<ul style="list-style-type: none"> • S/he can do three-piece puzzle. • S/he can cut by using scissors. • S/he can copy the letters V,T,H • S/he can draw one piece man. • S/he can put X mark. • S/he can hold a crayon between thumb and other fingers • S/he can scribble. • S/he can put four-nine cubes on top of each other. • S/he can copy a circle. • S/he can copy a square. • S/he can draw 2-4 pieces man (close to end the age of 3). • S/he can unbutton but s/he can have difficulty in buttoning up. • S/he can wear her/his socks. • S/he can turn pages one at a time. • S/he can cut the paper 20 cm length as a line. • S/he can string beads. • S/he can turn the door handle. • S/he can fold the paper in half. • S/he can pick the small objects. • S/he can place the shapes such as round, square and triangular in their pattern successfully.

	<ul style="list-style-type: none"> • S/he can do gallop. • S/he can jump forward. 	<ul style="list-style-type: none"> • S/he can use spoon successfully while eating. • S/he can pour the water to a glass from a jug.
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Some gross and fine motor skills that can be performed by children around the age of 3 are given together in Table 1. While assessing their children for motor skills, using Table 1 would be beneficial for families to make their children's diversity clearer and to make early interventions.

Because of the common motor problems in children with autism, we suggest that motor activities checking should be a core feature of diagnosing ASD. In addition, not only physical therapists but also sport teachers and coaches should be the part of the team who determine the needs and preparing motor activities program of children with autism when they receive intervention services. To prevent the problems of motor activities in the future of children with ASD, we should resolve the motor activity delays which are observed in infants and toddlers [4].

If the numbers of studies which aim a particular age group are increased, families and educators can be presented with the motor development features of that age group and the development areas influenced.

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