

THE INFLUENCE OF PHYSICAL EXERCISE ON INDIVIDUALS WITH AUTISM: IS PHYSICAL EXERCISE ABLE TO HELP AUTISTIC?

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Received 2012-09-06; Revised 2014-06-11; Accepted 2014-06-29

ABSTRACT

The purpose of this study is to provide some background information on autism and how physical activity may be helping individuals with autism. Increasing rates of autism have been noted: Many researchers are involved in finding treatment methods that can help autistic children. Some studies have provided evidence that physical exercise and playing organized sport has been shown to be a beneficial intervention for the treatment of autistic individuals. The development of both motor and social skills has been seen to improve from physical exercise, which presents a challenge to individuals with autism.

Keywords: Autism, Exercise and Physical Activity, Stereotypic Behavior, Self-Stimulatory Behaviors

1. INTRODUCTION

Autism is a neurologically based developmental disability that seriously affects a person's communications, socialization and decision-making skills (Debbaudt, 2002). Autistics suffer from a lack of central coherence and a deficit of executive function and complex information processing. Belmonte *et al.* (2004) indicated that indiscriminately high physical connectivity and low computational connectivity may reinforce each other. They describe the distributed patterns of functional activation in the normal brain and abnormally intense and regionally localized activation in the autistic brain, displayed in **Fig. 1**.

The Swiss psychiatrist Eugen Bleuler used the Latin word autismus as a way of describing some of the symptoms of the disorder. This word is derived from the Greek word autos, which means "self"; the English translation is "autism" (Gallo, 2010).

Autism is a name given to a severe form of Pervasive Development Disorders (PDD) or Autism Spectrum Disorders (ASD). Several types have been

defined along the autism spectrum, which differ in the severity of the symptoms and total disability and in the combinations of autistic impairments with other disabilities. The most common types are:

- Autistic disorder/Classic autism
- Asperger disorder
- PDD-NOS/Atypical autism
- Rett's disorder
- Childhood disintegrative disorder (First and Tasman, 2011; Blanc and Volkens, 2009)

The estimated rates of autism seem to be increasing. For all individuals with a PDD or ASD the estimated rate is between 3 and 6 per 1,000 children. According to various international studies, the figures for strictly defined autism are estimated at 1.3 per 1,000 children. Typically autism is noticed in children by the age of three years. It affects males 3 to 5 times more than females (Volkmar and Wiesner, 2009) and the incidence of autism has risen sharply (Debbaudt, 2002) in the last twenty years.

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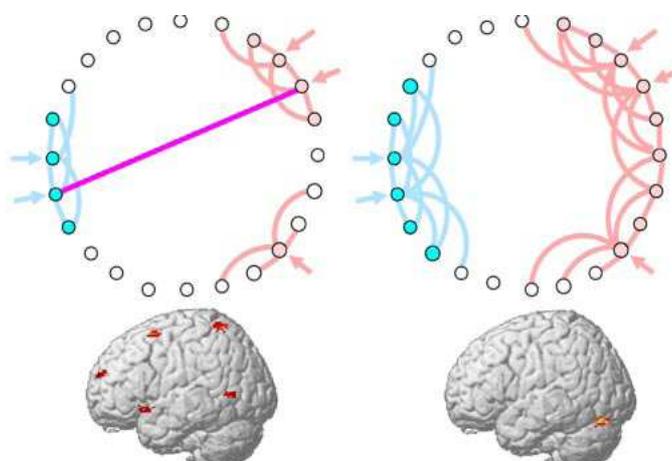


Fig. 1. Potential effects of network connectivity patterns on brain activation. In the network on the left, a combination of strong local connectivity within delimited groups of neural units and selective long-range connectivity between local groups constitutes a computational structure within which information can be efficiently represented and efficiently propagated. Inputs (double arrows) evoke representations that are easily differentiable from noise (single arrow) and can be linked across regions, yielding high computational connectivity. In the network on the right, strongly connected sub regions are not appropriately delimited and differentiated and computationally meaningful long-range connections fail to develop. The brain images at bottom, from a visual attention task, display distributed patterns of functional activation in the normal brain (left) and abnormally intense and regionally localized activation in the autistic brain (right), a pattern that may stem from such differences at the network level (Belmonte *et al.*, 2004)

In most cases, it is not known what causes autism. The reasons remain incomplete, although it is now recognized as a biological-neurological problem affecting certain parts of the brain. Some parents believe there is a strong link between autism and vaccinations. Research findings indicate a strong genetic component. Environmental immunologic and metabolic factors play a major role in the development of the disorder. Recent research into the anatomy and functioning of the human brain has indicated that there are consistent differences between the brains of autistics and non-autistic individuals. It seems that autistic individuals tend to have larger brains (Dodd, 2004; George, 2011).

Autistics must show at least two impairments in social interaction, in order to be diagnosed with an autistic disorder, first in the area of communication and second in restricted/repetitive and stereotyped patterns of behavior, interest or activity (APA, 2000).

Typical impairments in the area of social interaction include lack of eye contact, facial expression, or common social gestures; failure to develop appropriate peer relationships and reduced awareness of others and a tendency to play alone; and decreased spontaneous sharing of enjoyment, interests, or achievement.

Typical communication deficits include delayed or absent spoken language without attempts at alternative

communication. Mutism is very common among people with autism. There may be stereotyped or repetitive use of language, patterns of behavior, activities and interests such as hand-flapping and rocking (Maanum, 2009; Bourgeois *et al.*, 2009). Children who suffer from autism usually show uneven gross and fine motor skills and a lack of cooperativeness in group play (Ralabate, 2006).

Some methods widely used in behavioral intervention programs focus on developing communication, social and cognitive skills to treat children with autism. However, new research suggests that some alternative therapeutic choices that include sports, exercise and other physical activities can be of help to the autistic child. Individuals with autism need to improve their physical fitness and motor coordination; they need programs that can motivate them to participate in games in order to sidestep the child's lack of interest. Autistics generally demonstrate poor motor skills. Children and adolescents with autism spectrum and high functioning autism have delays or disorders in overall motor development, including locomotor and object control (Berkeley *et al.*, 2001). Consequently, rehabilitation programs should emphasize fundamental motor skills and patterns of movement, individual games and sports and developmental activities that increase physical proficiency. The (NRC, 2001) indicated that the

motor functioning of individuals with ASD has been a neglected area, although the results of the previous studies indicated that participation in physical activity has been shown to have multiple benefits, including reduction of stereotypic behavior.

Physical activity offers a variety of benefits for individuals with autism. It has been found to help decrease some of the many challenges those children with autism face (O'Connor *et al.*, 2000; Berkeley *et al.*, 2001).

Physical activity is important for a healthy lifestyle for children with and without disabilities (Huettig and O'Connor, 1999). It has been suggested that children should participate in physical activities that enhance and maintain strength at least twice a week and they should set a goal of accumulating at least 30 min of moderate to vigorous physical activity, preferably every day of the week in order to acquire substantial health benefits (USDHHS, 1996; Sutor and Kraak, 2007). Yilmaz *et al.* (2004) found that swimming training is effective for the development of physical fitness and water orientation in autistic children. Result indicated that the child's upper and lower extremity and grip strength increased. Flexibility, cardio-respiratory endurance, balance, agility and power also increased in these children. In the case described here, the amount of stereotypical autistic movements decreased after hydrotherapy; the results of this study are similar to the results of the Yilmaz *et al.* (2002) and Bumin *et al.* (2002).

O'Connor *et al.* (2000) suggested that physical activity programs for children with autism can include any rhythmic and large muscle activities. The levels of activities are dependent on the initial fitness level's of a child and on the child's respective behavior. The program must meet autistic's cognitive ability. Teachers and caregivers who plan such programs for individuals with autism should consider to the following:

- Promoting eye contact
- Being aware of sensory preferences and over selectivity
- Balancing social skills training and physical activity
- Using applied behavior analysis
- Using discrete trial format
- Using prompts
- Using reinforcement and considering different teaching techniques (Reid and O'Connor, 2003)

Levinson and Reid (1993) indicated that vigorous exercise, including the whole-body movements, can be used as practical and successful methods of temporarily

reducing the frequency of the stereotypic behavior of autistics. They applied two different exercise programs: The mild program consisted of 15 min of walking and the vigorous exercise program consisted of 15 min of jogging. Results indicated that the vigorous exercise program, consisting of jogging and motor activity, decreased stereotypic behavior, whereas walking had no effect.

Another area in which physical activity has been able to aid individuals with autism is how it helps to decrease their inappropriate play and disruptive behaviors. Quill *et al.* (1989) designed a program integrating physical activities for children with autism, known as Daily Life Therapy. The program included running, gymnastics, aerobic exercises and martial arts plus soccer, basketball and biking. These vigorous physical activities are used to reduce stereotypical behaviors.

Schleien *et al.* (1988) applied a collaborative socio-motor sport program and adapted the physical activity curriculum of learners with autism. They found that children with autism can develop their motor proficiency in catching and striking skills. They also reduced inappropriate play behavior in a variety of different settings.

Prupas and Reid (2001) found that a daily 10 min walk/jog session program reduced the stereotypic behaviors for children with developmental disabilities. Moreover, several research studies have shown that vigorous or strenuous exercise is often associated with decreases in stereotypic (self-stimulatory) hyperactivity, aggression, self-injury and destructiveness (Blanc and Volkers, 2009).

Supporting previous research, (Rosenthal-Malek and Mitchell, 1997) found that exercise can significantly reduce self-stimulatory behaviors such as hand-flapping, rocking and self biting, which represent a number of self-stimulatory behaviors shown by five autistic adolescent boys in a classroom setting and work setting, following either a 20 min jogging session or an academic session researchers have confirmed that "mildly strenuous aerobic exercise, such as jogging, decreases the self-stimulatory behavior of persons with autism, while also increasing the level of academic performance". The results showed improvement in work-related performance. These findings are similar to Celiberti *et al.* (1997) who found that jogging decreased stereotypic behavior in physical self-stimulation but walking had no effect.

Elliott *et al.* (1994) found that vigorous, aerobic exercise equally reduced both maladaptive behaviors and stereotypic/stimulatory behaviors.

In a study by Kern *et al.* (1984) they found that there was a significant decrease in self-stimulatory behavior

after 15 min of continuous vigorous exercise (jogging) whereas 15 min of mild ball playing program had no effect. Studies conducted by Watters and Watters (1980) compared three different settings to see which one produced the largest decrease in self-stimulatory behaviors. The three different interventions were an academic setting, TV watching for 10-15 min and jogging for a 5-10 min period. They found that physical exercise produced a decrease in self-stimulatory behaviors. Ball skills and dynamic balance as well as social communication and social motivation were improved after participating in the ten weeks intervention program which involved 35 min of exercise 3 times a week (Crawford *et al.*, 2007).

Johnson (2009) concluded that therapeutic horseback riding and treadmill workouts, skiing and swimming programs might also be beneficial for youths with developmental disabilities, but the evidence from those programs was not as strong.

2. CONCLUSION

Lack of communication and social isolation are common characteristics of individual with autism. Exercise and physical activity have been shown to be a beneficial intervention for the treatment of many physical and psychological illnesses and are used to reduce the stereotypic behaviors of autistic individuals. All kinds of organized sport and successful experiences can potentially help autistic children (Delaney and Madigan, 2009). Autism is a complex disorder, meaning no two cases are alike. Autistics can improve their motor skills via physical activity but these activities must suit each individual's needs. Teachers and caregivers need to understand each child in order to plan and find a suitable physical activity program that can help these children enhance their social interaction.

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