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# Physical activity for children with autism spectrum disorder during COVID-19 pandemic

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In December 2019, Coronavirus disease (COVID-19) emerged in Wuhan, China that culminated in a serious pandemic condition. Physical distancing restrictions were a significant component of the public health emergency response to the COVID-19 pandemic. For children and youth, these restrictions included safety measures that impacted daily activities related to physical activity (PA) participation worldwide. Preliminary evidence suggests that in children with special needs such as Autism Spectrum Disorder (ASD), COVID-19 restrictions may have disproportionately led to reduced levels of PA. The aim of this study was to review the benefits of PA for children with ASD and suggest Home PA Program examples for Children with ASD during COVID-19 pandemic and the quarantine time.

**Keywords:** autism spectrum disorders; COVID-19; physical activity; quarantine; children; mental health

## Introduction

Autism Spectrum Disorder (ASD) a neuro-developmental disability characterized by deficits in social and emotional reciprocity (American Psychiatric Association 2013) is associated with problems in three important areas of growth that includes social interaction, communication, and repetitive and restricted behaviors (Shah and Frith 1983). Children with ASD have many cognitive, social, and behavioral problems that lead them to participate in PA less than their peers (Hassani *et al.* 2020a). Physical disorders of individuals with ASD include sensory disturbances, movement disorders, difficulty in walking normally, and decreased muscle tone, (Dowell *et al.* 2009). Children with ASD have also some problems with coordination of both fine and gross motor skills, balance, flexibility, and speed (Cairney *et al.* 2019). However, several studies included physical activity (PA) interventions that have shown positive physical, psychological, and physiological effects in children with ASD (Hassani *et al.* 2020b, Jones *et al.* 2017). Handling of children with ASD that

need special care could be challenging when they have to stay at home during COVID-19 pandemic.

The novel coronavirus disease (COVID-19) was first reported in December 2019 in Wuhan, Hubei Province, China. COVID-19 is highly contagious and its pandemic caused a general determination in countries and global health organizations, among other ones, to control and treat it; therefore, the normal life of people in most countries underwent special changes. Restrictions included the closure of schools and universities, the closure of sports venues and halls, restrictions on travel and various gatherings, and the enforcing social distances. The result of such actions is disruption of daily affairs. Given the lack of a comprehensive view of the end of COVID-19, it is important to take a comprehensive approach to managing this crisis in the short and long term.

While excessive restrictions imposed by governments lead people to staying at home to prevent the transmission of the virus from one person to another, it also has an adverse effect that caused people to be inactive for long terms. The World Health Organization (WHO) has emphasized the need to maintain PA that has benefits in physical and psychological which are both important for children (Shahidi *et al.* 2020). In the

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pandemic situation of COVID-19 in which the lives of ordinary people have been severely restricted and changed, paying attention to certain groups such as ASD should not be neglected. Before the COVID-19 situation in institution such as schools and rehabilitation centers were opened to help children who are need more attention but online learning environment do not provide a suitable educational for them (Narzisi 2020). Therefore, the aim of this study was to review the benefits of PA for children with ASD and suggest Home PA Program examples for Children with ASD during COVID-19 pandemic and the quarantine time.

### COVID-19, quarantine and its effects on ASD

With the global spread of COVID-19, its transmission from person to person and its long-term persistence in the environment, the disease has spread rapidly around the world, governments' restrictions became more serious and prevalent in the countries involved. Among the measures taken in most countries was the widespread closure of schools and educational centers. Quarantine can be a negative experience, as evidence shows that in the long run a wide range of physical and psychological problems occur in a significant proportion of people following home quarantine (Brooks *et al.* 2020).

Staying at home, for both families and children who are not physically support by their therapists and they cannot attempt the outside intervention is big issue (Narzisi 2020). Among vulnerable populations, children with ASD need special support to maintain their physical and mental health in this pandemic (Narzisi 2020) because there is no doubt that the rapid spread of the COVID-19 has led to a complex social situation that can increase the problems with social communication, group interactions and repetitive behaviors of children with ASD (American Psychiatric Association 2019). The National Disability Rights Network has offered online learning environments (Yarimkaya and Esentürk 2020b) and home education, in which parents and caregivers educate children that do not receive suitable educational and attention to be physically active (Cahapay 2020) It can be said that both approaches together can control the behaviors of children with ASD to some extent. Raising the knowledge of the family, whether in the online education or education through by themselves, is essential.

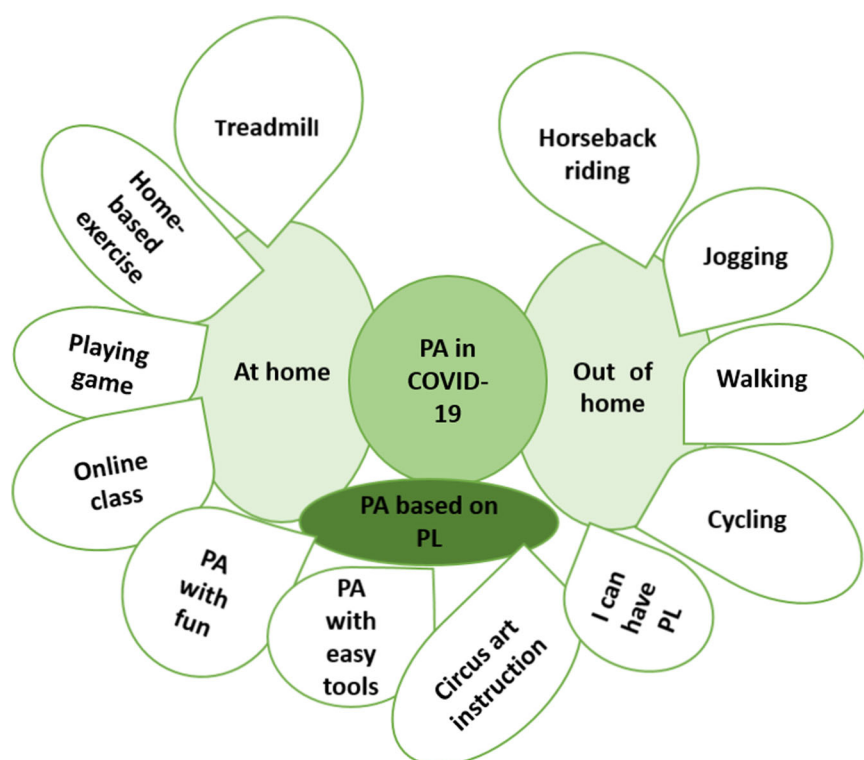
As it is known, children with ASD need highly predictable environmental conditions, while in the event of an unpredictable change, they may feel stressed, anxious, or confused (Colizzi *et al.* 2020). Cahapay in 2020 describe how parents and caregivers educate children with ASD in five items such as educate children as a family effort for most social service, the transition to cultivation of new activities, new social reality in preparation for the post- pandemic period, necessity of

all forms of home education and families encouraging families in these tough times (Cahapay 2020). Nazisi also presented some tips for children with ASD during COVID-19, for example put a daily life activity, put semi-structured play activities like LEGO program, using serious games like free games in App or PC and tablet, use and share special interests like maps, books, drawing for handles the children with ASD. Nazisi also recommend parents and caregivers have a weekly online consultation and keep maintain contact with schools during COVID-19 (Narzisi 2020).

### Effects of PA on ASD during the COVID-19 period

Children with ASD are in unfavorable conditions due to physical disorders as well as low physical fitness and physically inactive lifestyle (Pan 2014). Home quarantine and restrictions on PA also put more pressure on these children, who by themselves are prone to inactivity and lower physical fitness (Yarimkaya and Esentürk 2020a). Constant presence in home causes stress and depression in people, in particular in children with ASD, and this make them more prone to mental and physical weaknesses (Esentürk 2020). Significant decreases in PA, and increases in levels of sedentary behaviors between children with ASD during the COVID-19 outbreak have been noted, and effective strategies can be developed to reduce the negative impact of this event (Garcia *et al.* 2021b). For example, one of the programs that researchers conducted during the COVID-19 era was the participation of the family and their children in 6 weeks of the WhatsApp-delivered PA, which ultimately had a positive effect on the level of PA of children with ASD (Yarimkaya *et al.* 2021, Esentürk and Yarimkaya 2021). PA and playing game not only improve mood and vitality and calmness, but regulates and increases sleep in children with ASD, strengthens the immune system and consequently leads to the prevention of COVID-19 and improving the negative effects of quarantine in this group of children. PA also increase the transport of monoamines such as norepinephrine, dopamine and serotonin in the brain, which affect stimulation and attention (Ransford 1982).

Before the COVID-19 era, the global recommendation for health-enhancing PA for children and adolescents was 60 min of moderate to vigorous PA (MVPA) a day; vigorous PA (VPA) is recommended at least three times per week (World Health Organization 2010) but due to restrictions and complications of COVID-19, guideline of WHO is changed for children and adolescents with and without disability age 5–17 'they should do at least an average of 60 min per day of moderate to vigorous intensity, mostly aerobic, PA across the week' (Bull *et al.* 2020). It is because of the importance of sport that the government in some countries, such as the United Kingdom, As it has been said: 'People with



**Figure 1.** Examples of physical activity for children with ASD during COVID-19. Note: This figure is divided into two parts that include at home and out of home PA programs. Some activities like PA based on PL can use in both environments. ASD: Autism Spectrum Disorder; PA: Physical activity; PL: Physical literacy.

learning disabilities or autism can leave the house for exercise more than once a day and can travel outside of their local area under current lockdown measures' (Guardian 2020). Given that, the positive effect of participation in PA on health, motor coordination, cardiovascular fitness, social behavior, communication skills and quality of life in children with ASD is not hidden from everyone so maintaining regular PA in suitable and safe environment such as home can be great strategy for COVID-19 crisis (Chen *et al.* 2020, Yarimkaya and Esentürk 2020b, Garcia *et al.* 2021a).

### Home PA program for children with ASD during COVID-19 period

To show the positive effect of PA on children with ASD, we can refer to the study of Meneer and Neumeier, which during the study of other studies in this field, has accurately shown the positive effect of PA on Biological and Behavioral factors (Meneer and Neumeier 2015). Children with ASD often avoid participation in PA, especially group activities, due to social, physical, cognitive and behavioral limitations, which in turn leads to the formation of a passive lifestyle in them (Green *et al.* 2009). The home quarantine period and the restrictions imposed have caused inactivity in various strata of society. Due to their special physical and mental conditions, children with ASD have been exposed to inactivity and related problems even before the pandemic of COVID-19, and this can

increase the risk of obesity, diabetes, and even heart disease. Although PA and outdoor sports and club facilities are much more diverse and better than exercise at home, due to the current situation in the world and the COVID-19 pandemic, 'Less PA is better than no PA'. The educational approaches that have been considered for children with ASD during COVID-19 have resulted to believe that these children experience less PA, for this reason, to ensure that children with ASD maintain a non-sedentary life, it is important that they continue their PA in their home environment (Yarimkaya and Esentürk 2020b).

In choosing the type of PA for children with ASD, appropriate programs should be considered for this particular group based on the conditions and limitations resulting from ASD and the specific conditions of COVID-19 quarantine. Some ways to promote move activities for family and their children with ASD include meditation, online PA classes, educational games, and functional exercise (Cahapay 2020). However, due to the COVID-19 situation, it is better for children to play more solo games at home or with their siblings, parents, and caregivers. Judo was one of the physical activities that was studied on children with ASD during this period that Parental involvement and keeping children active were among the positive effects of this study (Garcia *et al.* 2021a). Using social networks such as WhatsApp and Facebook can show the role of family involvement and PA with fun in

increasing their children's physical activity (Yarimkaya *et al.* 2021, Esentürk and Yarimkaya 2021, Healy and Marchand 2020). In the line with the importance of the role of the family on PA, the responsibility of family member towards children with ASD has increased, for example, when the child intends to do PA at home the family wear sport cloths and performing exercise with child to encourage and increase social and communication skills (Yarimkaya and Esentürk 2020b). According to a study in COVID-19 for PA in children with ASD that have been conducted in Turkey, authors insist the importance of performing PA at home, for example determining the types of PA and how long they do based on their age, health status, and the frequency of participation in PA programs (Yarimkaya and Esentürk 2020b).

One of the important points to consider is that in order for children with ASD to succeed in PA, it is necessary to use appropriate strategies, such as using a social story to prepare children for movement. PA should be done in a suitable environment and appropriate physical activities should be used with the level of development and learning of children to create a safe and reliable environment for them (Menear and Neumeier 2015). Special conditions for designing PA sessions for children with ASD are divided into three parts: environmental structure, PA and instruction and feedback and reinforcement. The environmental structure of PA means that prior familiarity with exercise is important given the interest of children with ASD in not changing the environment. Therefore, it is recommended to run a familiar and repetitive program for the child and also ambient temperature should be appropriate because children's heating systems are immature. In addition, visual cues should be used to indicate the PA space; distractions such as loud noise and low or high light should be prevented (Srinivasan *et al.* 2014). Regarding PA, children should be involved in group or individual games according to their level of performance (Srinivasan *et al.* 2014). Then, based on the children's progress, the intensity of their physical programs can be increased and even its types can be expanded. Appropriate rest intervals between PA should be used. Observance of items such as cooling and heating, drinking proper amount of water and proper ventilation and temperature are among other things that should be considered during PA in this group of children. The important point is that the purpose of sports activities should be to attract children to activity as much as possible so that no humiliation or hateful and harmful behaviors in such PA programs (Srinivasan *et al.* 2014).

PA designed with gaming and entertainment that children can easily perform, increase the quality of their physical fitness and motivation to more participate in PA (Hassani *et al.* 2020b). In this context, we can refer to the design of PA based on Physical literacy (PL). PL

is the motivation, confidence, physical competence, knowledge and understanding that people need to value and take responsibility for engaging in PA for life (Shearer *et al.* 2018). 'I can have Physical literacy' (ICPL) that is based on PL for development and social skills in children with ASD, is designed by the Canucks Autism Network (CAN) and Pacific Institute for Sport Excellence (PISE) as a PA program (Jull *et al.* 2014). Motor skills like locomotor, balance, kicking, bubbles, balloons, cons, balls, hope and scarves are focused in this program. In this program any session is divided by four parts, meeting, warm up, main program, and cool-down. Using this intervention, Hassani *et al.* showed an increase in PL factors as well as both fine and gross motor skills in children with ASD (Hassani *et al.* 2020a, Hassani *et al.* 2020b). Due to the simple nature of this program and the fun and entertainment movement games along with that the program can be recommended to families to perform at home with their children. Also the PA that are designed based on PL in the conditions of staying at home that are informed in the study of PA during COVID-19 quarantine can be suggested to the families (Shahidi *et al.* 2020). Stationary bikes can be considered as another attractive examples of PA for children with ASD at home during COVID-19 pandemic (Figure 1).

## Conclusion

Increased COVID-19 and the emergence of certain conditions such as quarantine, staying at home and social distance increase sedentary behaviors and problems with mental health. Numerous studies have been conducted on the effects of PA on ASD, and all emphasize the positive benefits. children with ASD who rarely are attended in PA because of deficits in social and communication, nonfunctional use language, inappropriate behavior are in the risk of physical, mental, and physiological problem. The suggestions in this study for PA for children with autism can be an effective factor in children with ASD with their parents, siblings participating in PA during quarantine.

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## Ethical considerations

Not applicable.

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