

Promoting physical activity for children with autism spectrum disorders during Coronavirus outbreak: benefits, strategies, and examples

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Described as a global outbreak (pandemic) by the World Health Organization, Coronavirus disease (COVID-19) raises great concern with more than 2 million infected patients worldwide. A series of measures are taken by governments worldwide to prevent the spread of the outbreak. As new cases increase, people are asked to stay at home. Active living areas such as sports centers, parks and schools are closed in most countries. In this process, staying at home for a long time makes it difficult for individuals with special needs such as Autism Spectrum Disorders (ASD) to stay physically active as well as typically developing individuals. The education process of children with ASD is disrupted, especially due to closed special education schools and rehabilitation centers. Online learning environments are often not suitable for children with ASD. It is predicted that excessive weight, obesity and sedentary life, which are high in children with ASD, may increase even more due to COVID-19. This article outlines the benefits of physical activity for children with ASD and provides strategies and examples of physical activity for children with ASD during the COVID-19 outbreak. The article is thought to be a guide for encouraging children with ASD in the home environment to physical activity.

Keywords: COVID-19, children with ASD, stay at home, physical activity

Introduction

Coronavirus disease (COVID-19), which started in December 2019 in Hubei Province of China, has now become the world's most important agenda (Zhu 2020). With more than 2 million infected patients and over 140,000 deaths, COVID-19 led to a major concern in many countries around the world such as China, Italy, Spain, France, Germany, the Netherlands, Belgium, the UK, Japan, South Korea, the USA, Iran and Turkey. Currently, there is no approved vaccine or medicine for the disease (Chen *et al.* 2020) however, news from countries indicate that the number of cases and mortality rates will increase day by day.

As a result of the spread of the outbreak and increasing mortality rates, on January 30, 2020, the World Health Organization (WHO) declared a global public health emergency (WHO 2020). Within the scope of struggling with the outbreak, rapid and protective measures were taken by the Chinese government first and

then by the governments of other countries around the world. These included a number of measures such as: 1) quarantining cities, 2) declaring curfews, 3) closing public areas such as parks and sports grounds, 4) warnings, cancellations and prohibitions for travel, 5) public permits for people with chronic conditions and elderly people and 6) closure of schools.

Although the measures taken to limit the public's exposure to the virus contributed to the stay at home of many people around the world, including individuals with special needs such as Autism Spectrum Disorders (ASD), this led people to have a sedentary life at home (watching television, using mobile devices), disrupting their daily routines and decreasing regular physical activity (thus lower energy expenditure) (Chen *et al.* 2020). In particular, the closure of schools due to the COVID-19 emergency caused children with special needs such as ASD and their families to experience serious educational problems (Kohli and Writer 2020). Since schools and rehabilitation centers are closed, the intense practical aid required for the physical needs and

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education of children with ASD cannot be reached (Narzisi 2020). Online learning environments, on the other hand, do not provide a suitable educational environment for most children with special needs such as ASD. A number of serious suggestions, apart from regulations such as waving hands in the virtual environment for families, are needed in order to enable these children, staying at home due to the COVID-19 outbreak, to be physically active and meet their needs for movement (Kohli and Writer 2020).

ASD is a prevalent neurological symptoms observed even in childhood stages (American Psychiatric Association 2013), and WHO stated that people with ASD constitute a special risk group because of their sedentary lifestyle, given that this increases the risks of heart disease, diabetes and obesity (WHO 2008). It is considered that sedentary life in quarantine days may increase the risk of obesity more for children with ASD. Their quarantines can also cause additional parental stress, and harm their mental health (aggression, maladaptive behavior etc.). For this reason, it is recommended to continue physical activity at home in order to stay healthy and maintain immune function. Various physical activities that are safe, simple and easily applicable in the home environment can be effective for maintaining the physical activity level (Chen *et al.* 2020). Physical activities that can be done without leaving home help strengthen muscles and bones and prevent time to be spent in front of the screen (computer, tablet etc.).

In recent studies by Chen *et al.* (2020) and Zhu (2020), extremely useful information about examples of physical activity that can be done at home during COVID-19 outbreak days is included. However, this information is mostly examples of activities that typically developing individuals can do. As it is known, some adaptations are needed for individuals with ASD to participate in physical activity. Nevertheless, attention should be paid to the fact that exemplary physical activities can be applied to children with ASD by families and that some suggestions be made to families about this issue. In this context, it is expected that the studies, which provide families with exemplary physical activities that can be done in order to meet the needs of their children with ASD in the current insecure environment, will support the children with ASD and their families during the COVID-19 crisis. The aim of this article is to outline the benefits of physical activity on children with ASD and to present physical activity strategies and examples for children with ASD during the COVID-19 outbreak.

Benefits of physical activity for children with ASD

Staying at home for a long time due to the COVID-19 outbreak can be a major challenge to stay physically

active. Inactive behavior and low levels of physical activity can have negative effects on quality of life, health and well-being of children with ASD. Physical activity and relaxation techniques can be valuable tools to help calm down and protect health during this time (European WHO [EWHO] 2020).

Participation in physical activities has a positive effect on the health, motor coordination and cardiovascular fitness of children with ASD (Lalonde *et al.* 2014; Menear and Neumeier 2015; Solish *et al.* 2010; Sowa and Meulenbroek 2012). Through these activities, the social behavior (Gregor *et al.* 2018), communication skills (Yarımkaya *et al.* 2017) of children with ASD develop and their quality of life improves (Groff *et al.* 2009). Moreover, participation in physical activities contributes to the reduction of aggression behavior (Allison *et al.* 1991), stress levels (Hillier *et al.* 2011) and behavioral problems (Lang *et al.* 2010; Sorensen and Zarrett 2014) of children with ASD.

Block and O Bruniskova (2007) stated that children with special needs such as ASD can participate in the physical activities successfully if they are given sufficient support. In this context, determining strategies to facilitate the participation of children with ASD in physical activities at home can enable children with ASD to the benefit from the mentioned effects of physical activity during the COVID-19 crisis.

Physical activity strategies for children with ASD

During the COVID-19 outbreak, family members are strongly recommended by the governments of countries around the world to stay in their homes. The purpose of any measure taken within this framework is to ensure that each family is isolated in their own home and to minimize the risk of transmission of the disease. In this process, where social inactivity is considered as the most important medical precaution, appropriate learning environments are needed in terms of cognitive and physical development of children with ASD. It is because the more important is the idea of training individuals with ASD at an early age, the more important it is to ensure the continuity of educational processes. For this reason, measures should be taken to ensure that children with ASD who maintain a sedentary life at home continue their physical activity in the home environment. Maintaining regular physical activity and routine exercise in a safe home environment is an important strategy for healthy life during the COVID-19 crisis (Chen *et al.* 2020). At this point, primarily, families have great responsibilities. In order for children with ASD to have a healthy time on the isolation days, families should also wear sports clothes and encourage them by doing physical activities, which involve games, exercise and sports, with their children. Families can access many articles that offer examples of physical

activities and strategies for children with ASD. One of the aims of this article is to remind families that they have a variety of physical activity strategies that they can use to keep their children with ASD physically active during the COVID-19 outbreak.

Determining how long and what kind of physical activities to do every day: Depending on the age and health status of the children with ASD and other family members (parents and siblings) who can participate in activities, exercising for at least 20 min at high intensity or 30 min at moderate intensity every day may be among the options (U.S. Department of Health and Human Services 2018). It is best to seek advice from health professionals regarding the exercise time for children, the elderly and individuals who have previously had health problems (Chen *et al.* 2020) and determining the appropriate physical activity time. When deciding what kind of physical activity to be done every day, the opinions of children with ASD and other participants (parents and siblings), if any, should be taken and attention should be paid to the activities that the participants love. Goals such as strengthening muscles, having fun, reducing anxiety, improving attention and decision making, gaining flexibility, strengthening breathing etc. can be determined for the physical activities to be done. Warm-up and stretching exercises before the activities are advisable. During the activities, the special situation of the participants (health and age) should be taken into account and movements should be done slowly.

Prepare the environment and children with ASD for physical activity: It will be useful to prepare the environment to be used for physical activities in advance to spend a more effective time with children with ASD. It should not be forgotten to ventilate the environment before and after the activities. The environment should be arranged so that it is large enough to carry out activities easily. If activities are going to be in a room, unnecessary items should be removed for security purposes. Physical activity and sports pictures can be hung on the walls of the room that may be of interest to children with ASD. For the goal of physical activities, in which children with ASD can participate, to be achieved, children can be prepared for activities by using pre-activity social stories. Using a pre-activity preview or using social stories will help the children know what to encounter during the activities (Grenier and Yeaton 2011). For this, the equipment you will use in the activities can be introduced to the children or the instructions for an activity to be implemented can be read. This method will contribute to the child's relaxation and getting ready for physical activity (Menear and Neumeier 2015).

Family involvement for physical activity: While the relationship between the parents and the children with ASD is firstly established on meeting the basic needs of

the child, with the development of the social and emotional bond, it turns into a feature that lasts for life and has a direct effect on all developmental dimensions of the children with ASD (Olçay-Gül and Tekin-Iftar 2016). The strength of this relationship between parents and children has triggered the direct involvement of parents in practices, and many studies have been conducted in this context (Charlop-Christy and Carpenter 2000; Harris, 1986; Koegel *et al.* 1996; Mahoney and Perales 2003; Marcus *et al.* 1978). Studies show that if the active participation of the parents is not achieved in the educational applications offered to children with ASD, activities will not reach the specified goals in terms of both the children and the family (Diken 2009; Sameroff and Fiese 2000). Therefore, active involvement of the family with the children with ASD in practices during quarantine may have an effect that may increase the efficiency of the practices.

Parents are required to perform physical activities that they will prepare and apply in a home environment for their children at certain stages. It is anticipated that these stages can give practices a systematic system and prevent parents from having difficulty in practice. In general, we can discuss the physical activities that parents will perform with their children in three parts. The first part consists of steps such as application environment, security measures and determination of suitable materials, which is called pre-application preparation. The second part includes the parents preparing the siblings without disabilities in the family for physical activities with children with ASD. Parents have an important role in ensuring that siblings with and without ASD participate effectively in physical activities together. Strengthening this teaching-learning relationship and taking into account the points to be considered in determining appropriate teaching methods, parents can enable their typically developing children to offer education to their siblings with ASD in their homes (Tekin and Kiracaali-Iftar 2002). Social interaction and communication patterns emerging among siblings with and without ASD during physical activities should be seen by the families as a positive motivating factor, rather than anxious. The last part describes what the parents should do during the application process and consists of steps of the parent's interaction with their children, directing their attention to the activity, explanation of the activity rules, simple warm-up movements and rewarding.

Examples of physical activity for children with ASD

When we consider the process of doing physical activity at home with a holistic approach, it should be noted firstly which activities children with ASD like. Then the required area for activity should be created in a suitable room. The most important factor to be considered

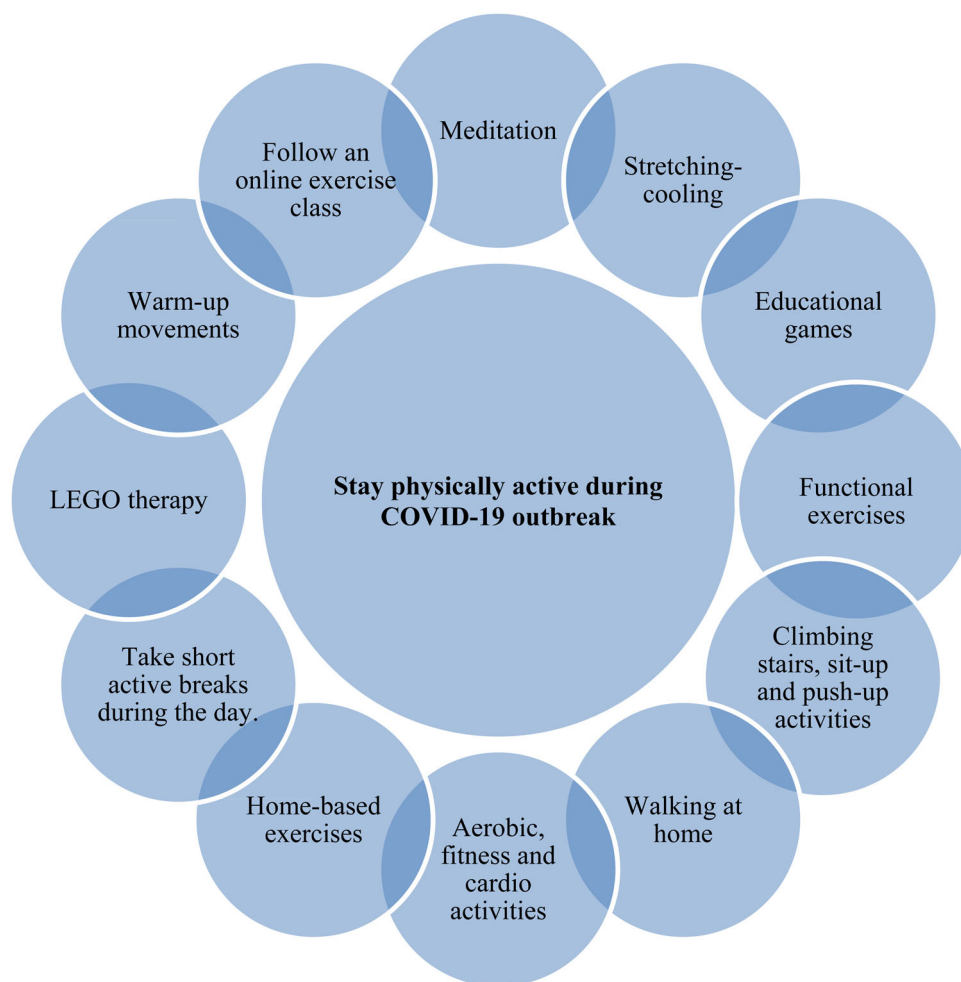


Figure 1. Examples of physical activity for children with ASD during COVID-19.

in the home environment is security measures. Due to the nature of the home environment, items that are likely to be broken and overturned must be removed from the application environment. Another important issue about the home environment is ventilation. Application environment should be ventilated at certain intervals. Simple warm-up movements can be done prior to the decided physical activity. The activities should be continued in the mood of the game and the children with ASD should be given the opportunity to experience the feeling of winning. Rest periods must be given between activities and the children should be waited to be ready for the next application. At this point, in order to make the applications more enjoyable, it can be ensured that other family members take a role like a spectator. Appreciation of the success of the children with ASD by other family members (parents and siblings) will increase the child's motivational power. For example, the parents decide that their children will play bowling, adjusts the environment, and takes security measures. They place 10 empty water bottles at a certain distance. They tell their children the rules of the game. The parents interact with their children, draw their children's attention to the application and the activity continues in a fun way with the participation of

other family members as a spectator. In line with these principles and sample case, the following activities can be performed with children with ASD (see Figure 1):

- In general, warm-up movements (with rhythm and music), functional exercises (paired and individual), educational games (games carried out with pair, cooperation, group, rule, rhythm and music), traditional children's games, stretching-cooling (paired, group and individual) activities can be used (Yarimkaya *et al.* 2017).
- Short physical activities can be done to be active throughout the day. Dancing, playing games with the entire family, and performing domestic chores such as cleaning and gardening are other means to stay active at home (EWHO 2020).
- In addition, walking at home, placing food, climbing stairs, sit-up and push-up activities can also be used as inspiration to be active during the day (Chen *et al.* 2020; EWHO 2020). If it is decided to walk or to do physical activity outside, it should be ensured that there is at least 1 meter distance from other people (EWHO 2020).
- Aerobic, fitness and cardio activities can also be applied if you have expert knowledge on this subject although it requires more advanced health and training knowledge.
- Home-based exercises recommended by EWHO (2020) such as knee to elbow, plank, back extensions, squats, side knee lifts, superman, bridge, chair dips,



Figure 2. Examples of home-based exercises (EWHO 2020).

chest opener, child's pose, seated meditation and legs up the wall can be used (see Figure 2).

- Intermittent periods of sitting and lying down during the day periodically may be allowed. During free time, time may be devoted to cognitive activities such as reading books, board games and puzzles (EWHO 2020).
- To be active all day long, LEGO therapy (LeGoff and Sherman 2006) can be a semi-structured game activity shared with parents or siblings in the home environment (Narzisi 2020; Peckett *et al.* 2016).
- Meditation and breathing techniques can be used for calmness. Sit comfortably on the floor with legs crossed. Eyes are closed and concentrate on breath for 5-10 minutes without focusing on thoughts and concerns (EWHO 2020).
- For all the examples of activities mentioned above, online health and exercise videos that are aimed at promoting physical activity can be used (Chen *et al.* 2020).

Conclusion

Considering the increasing rate of spread of COVID-19, the measure of staying at home should be followed to control infections. However, attention should be paid to the effects of sedentary life caused by staying at home for a long time in this process (Chen *et al.* 2020). A sedentary life and low physical activity level during the COVID-19 outbreak can have adverse effects, especially on the health and quality of life of children with ASD. Staying at home can also turn into a source of stress for these children, leading to a number of problems with mental health. This process may also bring different problems for parents with children with ASD. Negative conditions such as stress, anxiety, depression

and peer-to-peer difficulties which are more common in parents with children with ASD (Yirmiya and Shaked 2005), can increase during the COVID-19 outbreak. Examples of physical activities recommended in this article can encourage parents to engage in physical activity with children with ASD, keep children with ASD physically active and calm at home, and contribute to other family members gaining psychological gains.

As ASD researchers, we should continue to provide parents with advice and support to keep children with ASD physically active at home. Also, we should encourage parents to take responsibility for the experiences of physical activity of their children with ASD and encourage them to include their children with ASD in physical activity at home.

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References

- Allison, D. B., Basile, V. C. and MacDonald, R. B. 1991. Brief report: Comparative effects of antecedent exercise and lorazepam on the aggressive behavior of an autistic man. *Journal of Autism and Developmental Disorders*, 21, 89–94. [10.1007/BF02207001](https://doi.org/10.1007/BF02207001)
- American Psychiatric Association. 2013. *Diagnostic and statistical manual of mental disorders*. 5th ed. Arlington, VA: American Psychiatric Publishing.
- Block, M. E. and Obrusnikova, I. 2007. Inclusion in physical education: A review of the literature from 1995-2005. *Adapted Physical Activity Quarterly*, 24, 103–124. [10.1123/apaq.24.2.103](https://doi.org/10.1123/apaq.24.2.103)
- Charlop-Christy, M. H. and Carpenter, M. H. 2000. Modified incidental teaching sessions: A procedure for parents to increase spontaneous speech in their children with autism. *Journal of*

- Positive Behavior Interventions*, 2, 98–112. 10.1177/109830070000200203
- Chen, P., Mao, L., Nassiss, G. P., Harmer, P., Ainsworth, B. E. and Li, F. 2020. Coronavirus disease (COVID-19): The need to maintain regular physical activity while taking precautions. *Journal of Sport and Health Science*, 9, 103–104. 10.1016/j.jshs.2020.02.001
- Diken, I. H. 2009. Turkish mothers' self-efficacy beliefs and styles of interactions with their children with language delays. *Early Child Development and Care*, 179, 425–436. 10.1080/03004430701200478
- European World Health Organization. 2020. *Stay physically active during self-quarantine*. Available at: <<http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/novel-coronavirus-2019-ncov-technical-guidance/stay-physically-active-during-self-quarantine>> [Accessed 7 March 2020].
- Gregor, S., Bruni, N., Grkinic, P., Schwartz, L., McDonald, A., Thille, P., Gabison, S., Gibson, B. E. and Jachyra, P. 2018. Parents' perspectives of physical activity participation among Canadian adolescents with Autism Spectrum Disorder. *Research in Autism Spectrum Disorders*, 48, 53–62.
- Grenier, M. and Yeaton, P. 2011. Previewing: A successful strategy for students with autism. *Journal of Physical Education, Recreation & Dance*, 82, 28–34. 10.1080/07303084.2011.10598558
- Groff, D. G., Lundberg, N. R. and Zabriskie, R. B. 2009. Influence of adapted sport on quality of life: Perceptions of athletes with cerebral palsy. *Disability and Rehabilitation*, 31, 318–326. 10.1080/09638280801976233
- Harris, K. R. 1986. Self-monitoring of attentional behavior versus self-monitoring of productivity: Effects on on-task behavior and academic response rate among learning disabled children. *Journal of Applied Behavior Analysis*, 19, 417–423. 10.1901/jaba.1986.19-417
- Hillier, A., Murphy, D. and Ferrara, C. 2011. A pilot study: Short-term reduction in salivary cortisol following low level physical exercises and relaxation among adolescents and young adults on the autism spectrum. *Stress and Health*, 27, 395–402. 10.1002/smi.1391
- Koegel, R. L., Bimbela, A. and Schreibman, L. 1996. Collateral effects of parent training on family interactions. *Journal of Autism and Developmental Disorders*, 26, 347–359. 10.1007/BF02172479
- Kohli, S. and Writer, S. 2020. *Students with disabilities deprived of crucial services because of coronavirus closures*. Available at: <<http://www.latimes.com/california/story/2020-03-25/coronavirus-school-special-education>> [Accessed 6 March 2020].
- LaLonde, K. B., MacNeill, B. R., Eversole, L. W., Ragotzy, S. P. and Poling, A. 2014. Increasing physical activity in young adults with autism spectrum disorders. *Research in Autism Spectrum Disorders*, 8, 1679–1684.
- Lang, R., Koegel, L. K., Ashbaugh, K., Regester, A., Ence, W. and Smith, W. 2010. Physical exercise and individuals with autism spectrum disorder: A systematic review. *Research in Autism Spectrum Disorders*, 4, 565–576. 10.1016/j.rasd.2010.01.006
- LeGoff, D. B. and Sherman, M. 2006. Long-term outcome of social skills intervention based on interactive LEGO® play. *Autism*, 10, 317–329. 10.1177/1362361306064403
- Mahoney, G. and Perales, F. 2003. Using relationship-focused intervention to enhance the social-emotional functioning of young children with autism spectrum disorders. *Topics in Early Childhood Special Education*, 23, 74–86. 10.1177/02711214030230020301
- Marcus, L. M., Lansing, M., Andrews, C. E. and Schopler, E. 1978. Improvement of teaching effectiveness in parents of autistic children. *Journal of the American Academy of Child Psychiatry*, 17, 625–639. 10.1016/S0002-7138(09)61016-5
- Meneer, K. S. and Neumeier, W. H. 2015. Promoting physical activity for students with autism spectrum disorder: Barriers, benefits, and strategies for success. *Journal of Physical Education, Recreation & Dance*, 86, 43–48. 10.1080/07303084.2014.998395
- Narzisi, A. 2020. Handle the autism spectrum condition during Coronavirus (COVID-19) stay at home period: Ten tips for helping parents and caregivers of young children. *Brain Sciences*, 10, 207–204. 10.3390/brainsci10040207
- Olçay-Gül, S. and Tekin-Iftar, E. 2016. Family generated and delivered social story intervention: Acquisition, maintenance, and generalization of social skills in youths with ASD. *Education and Training in Autism and Developmental Disabilities*, 51, 67–78.
- Peckett, H., MacCallum, F. and Knibbs, J. 2016. Maternal experience of Lego Therapy in families with children with autism spectrum conditions: What is the impact on family relationships?. *Autism*, 20, 879–887. 10.1177/1362361315621054
- Sameroff, A. J. and Fiese, B. H. 2000. *Transactional regulation: The developmental ecology of early intervention*. In: J. P. Shonkoff and S. J. Meisels, eds. *Handbook of early childhood intervention*. New York: Cambridge University, pp. 135–159.
- Solish, A., Perry, A. and Minnes, P. 2010. Participation of children with and without disabilities in social, recreational and leisure activities. *Journal of Applied Research in Intellectual Disabilities*, 23, 226–236. 10.1111/j.1468-3148.2009.00525.x
- Sorensen, C. and Zarrett, N. 2014. Benefits of physical activity for adolescents with autism spectrum disorder: A comprehensive review. *Review Journal of Autism and Developmental Disorders*, 1, 344–353. 10.1007/s40489-014-0027-4
- Sowa, M. and Meulenbroek, R. 2012. Effects of physical exercise on autism spectrum disorders: A meta-analysis. *Research in Autism Spectrum Disorders*, 6, 46–57. 10.1016/j.rasd.2011.09.001
- Tekin, E. and Kircaali-Iftar, G. 2002. Comparison of the effectiveness and efficiency of two response prompting procedures delivered by sibling tutors. *Education and Training in Mental Retardation and Developmental Disabilities*, 37, 283–299.
- U.S. Department of Health and Human Services. 2018. *Physical activity guidelines for Americans*. 2nd ed. Washington, DC: U.S. Department of Health and Human Services. Available at: <http://health.gov/sites/default/files/2019-09/Physical_Activity_Guidelines_2nd_edition.pdf> [Accessed 5 March 2020].
- World Health Organization. 2008. *The world health report 2008 - Primary health care (Now more than ever)*. Geneva: World Health Organization. Available at: <<http://www.who.int/whr/2008/en/>> [Accessed 7 March 2020].
- World Health Organization. 2020. *Statement on the second meeting of the International Health Regulations (2005) Emergency Committee regarding the outbreak of novel coronavirus (2019-nCoV)*. Available at: <[http://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-\(2005\)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-\(2019-ncov\)](http://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-ncov))> [Accessed 4 March 2020].
- Yarımka, E., İlhan, E. L. and Karasu, N. 2017. An investigation of the changes in the communication skills of an individual with autism spectrum disorder participating in peer mediated adapted physical activities. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Özel Eğitim Dergisi*, 18, 225–252. 10.21565/ozelegitimdergisi.319423
- Yirmiya, N. and Shaked, M. 2005. Psychiatric disorders in parents of children with autism: A meta-analysis. *Journal of Child Psychology and Psychiatry*, 46, 69–83. 10.1111/j.1469-7610.2004.00334.x
- Zhu, W. 2020. Should, and how can, exercise be done during a coronavirus outbreak? An interview with Dr. Jeffrey A. Woods. *Journal of Sport and Health Science*, 9, 105–107. 10.1016/j.jshs.2020.01.005