



## Physical activity levels in Iranian children and adolescents with autism spectrum disorder

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Article Info	Abstract
<p>Original Article</p> <p><b>Article history:</b></p> <p>Received: 20 August 2020</p> <p>Revised: 28 August 2020</p> <p>Accepted: 1 September 2020</p> <p>Published online: 1 January 2021</p> <p><b>Keywords:</b> adolescents, autism spectrum disorder, children, physical activity.</p>	<p><b>Background:</b> Autism spectrum disorder is a neuro-developmental disorder with a significant deficiency in communication characteristics, social interactions and stereotyped behaviors.</p> <p><b>Aim:</b> The purpose of this study was to investigate physical activity participation in Iranian children and adolescent with autism spectrum disorders.</p> <p><b>Materials and Methods:</b> The research method was descriptive and survey. The statistical samples were 370 children and adolescent with ASD, age 8-20 years from Iran. The international physical activity questionnaire for older children and adolescents used for measuring physical activity levels. Data analyzed by using SPSS<sub>23</sub>.</p> <p><b>Results:</b> The results showed that 73.8% of participants were inactive during the last 7 days; 17.8% of them were active occasionally (1 to 2 times); 6.5% (3 to 4 times) and 1.1% (5 to 6 times) were physically active. During the last 7 days on weekends, 58.2% reported usually sitting position, 22.2% walking or standing, and 14.6% running or active playing and only 1.1% reported lots of running or playing. There was no significant difference in physical activity levels between girls and boys.</p> <p><b>Conclusion:</b> The results showed the limited participation in physical activity among Iranian children and adolescents with ASD. This study seems to be a helpful for identifying the patterns and promotion of physical activity.</p>

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## 1. Introduction

Autism spectrum disorder is a neurodevelopment disorder characterized by deficits in communication, social skill and repetitive and restricted behaviors [1]. The prevalence of autism spectrum disorder is 1 in 54 children in the United States. The prevalence is growing rapidly in the world. Autism spectrum disorder (ASD) identified in females at a substantially lower rate than in males, in the most epidemiological studies reporting approximately a 4:1 male to female ratio [2]. Regular participation in physical activity (PA) recognized as a critical component to maintaining a healthy lifestyle. A number of studies showed the low levels of participation in physical activities in children and adolescents with autism spectrum disorder. They reported higher amounts of time in sedentary behavior. The level of physical activity and physical fitness of children and adolescents with autism spectrum is lower than their typically development peers [3]. Health-related problems emerge from this tendency toward inactivity including a relatively higher obesity prevalence of about 30% for children with ASD live in the United States, compared with 17% among typically developing children, a pattern that continues through adulthood [4].

Although individuals with autism spectrum disorders and their families might experience the same benefits of physical activities as most individuals, they have unique barriers to PA. Multiple barriers may disrupt participation in physical activity in children and adolescents with ASD, such as problems specifically associated with ASD, social challenges, communication deficiencies, sensory hypersensitivity, difficulties with rules, regulations and social norms, limited opportunity [5], deficit in motor function

and motor skills, weakness in physical fitness, low motivation, Interest and self-control [6] which make challenging participation in physical activity and sports, leading to negative experiences in children and adolescents with ASD [5, 6]. This is very important subject because understanding these nuances barriers will help policy makers, program managers, and frontline workers provide the most beneficial and successful services for promotion physical activity levels in these population.

Research consistently suggests that physical activity participation for children and adolescents with autism spectrum disorders can present a number of physical, psychological, and social benefits [7]. Participation in physical activities can lead physical health promotion and brings useful experiences in creating and maintaining effective social communication interactions, cognitive outcomes and improvements in academic engagement, self-stimulatory behavior [8], improvements in social skills and physical functioning and decrease aggression, stereotypical and self-stimulatory behavior in children and adolescent with autism spectrum disorders [9]. Due to the necessary of physical activity and the importance of promotion physical activity, there is a need for more comprehensively describes the levels of physical activity participation in this population.

Thus, the main purpose of this study is to investigate the levels of physical activity in Iranian children and adolescents with autism spectrum disorders.

## 2. Materials and Methods

The present study has descriptive and survey method. The statistical population consists of all children and adolescents with

autism spectrum disorder in Iran. The statistical samples of this study include 370 children and adolescents with autism spectrum disorders in both gender (233 boys and 137 girls) and in the age of 8-20 years who were selected through cluster sampling. All children received a clinical diagnosis according to diagnostic and Statistical Manual of Mental Disorders (5th Edition).

In this study, we identified parents through their children's documents who had been enrolled in the autism associations throughout the Iran. We used the international physical activity questionnaire for older children (PAQ-C) and the international physical activity questionnaire for adolescents (PAQ-A) which provide general measurements of physical activity [10]. They are valid, cost-effective and feasible tools for evaluate physical activity and provide general measurements of physical activity for ages 8 to 14 and 14 to 20, respectively. These are two 7-days self-report questionnaires that measure the levels of moderate to severe physical activity. These questionnaires are consists of 9 questions structured to minimum level (score 1) to high level (score 5) of physical activity during the last seven days and question 10 in order to identify children or adolescents who had unusual activity during the previous week. One of the limitations of these questionnaires is that they do not provide accurate information about the frequency, time, and intensity of activities to assess the overall level of adjusted activities and do not distinguish between moderate and severe activities [10].

The questionnaires sent electronically to families who had children with autism spectrum. The link sent to those targeted in

the participant recruitment process, which were interest in the study. The parents completed a demographic information and physical activity questionnaire through an online link. Finally, descriptive and inferential statistical methods used for analyze the data via SPSS<sub>23</sub>.

### 3. Results

Data analyzed by using SPSS<sub>23</sub> and descriptive and statistical methods. The descriptive characteristics of the participants showed that 63% of them (233 person) were boys and 37% (137 person) were girls. Also, according to educational levels, 61% were educated in elementary school (226 person), 23.8% junior high school (88 people), 13.5% high school (50 people), and 1.1% preschool (4 people). Also, the frequency of autism severity reported: 23.5% mild autism (87 person), 37.3% moderate autism (138 person), 23.8% severe autism (88 person), 5.9% asperser (22 person), 0.5% rat syndrome (2 person) and 7.6% other type. Based on descriptive analysis, the levels of physical activity over the physical education and exercise classes during the last seven days in children and adolescents with autism spectrum disorder reported as following: 58.4% (216 participants) never participated in physical education and sports classes; 29.7% (110 person) rarely participated in physical education and sports classes; 11.4% (42 person) participated sometimes; and 0.5% (2 person) participated often. Also, nobody (0%) was active always.

The frequency distribution of physical activity over the weekend during last seven days in children and adolescents with autism spectrum disorders reported as following: 58.2% sitting, 22.2% walking or standing, and 14.6% running or active playing and only 1.1% reported lots of

running or playing.

The physical activity levels at lunch time (in addition to eating lunch) during the last seven days in children and adolescents with autism were as following: Sitting 50.8% (188 person), standing or walking 30.3% (112 person), small amount of running, playing 1.5% (64 person), large number of running or playing 0.5% (2 person). Nobody reported most of time involvement in active playing and running.

The dance or play levels after school time during the last seven days in children and adolescents with autism spectrum disorder were reported as following: 68.4%, (253 person) attended once after school, 24.9% (92 person) attended 2 or 3 times and 4.9% (18 person) attended 4 times.

The levels of participation in dance or play in the evening during the last seven days in children and adolescents with autism spectrum disorder reported as following: 75.9%, (281 person) without any participation, 17.3% (64 person) one time participation, 5.7% (21 person) 2 or 3 times participation and 0.3% (1 person) participated 4 or 5 times in dance or play in the evening.

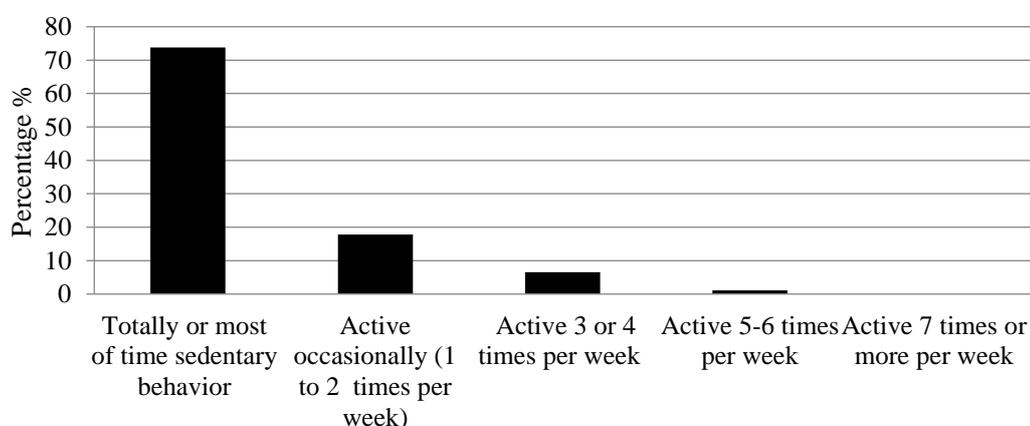
The dance or play participation levels in the weekend during the last seven days in

children and adolescents with autism spectrum disorder reported as following: 71.4%, (264 person) without any participation, 20.3% (75 person) 1 time participation, 6.5% (24 person) 2 or 3 times participation, and 0.8% (3 person) participated 4 or 5 times.

In general, the best description of the physical activity levels in children and adolescents with autism spectrum disorder during the last seven days showed in Figure 1. We found, 73.8% of children and adolescents with autism spectrum disorder reported sedentary behavior most of time or totally during the last seven days and only 17.8% of them were active occasionally (1 to 2 times per week), 6.5% (3 to 4 times per week) participated in physical activity, and 1.1% (5 to 6 times last week) participated in physical activity.

Also, independent t-test used for investigation the differences between girls and boys with autism spectrum disorders in the levels of physical activity participation (Table 1).

According to the t-test analysis and the significance levels, which is higher than 0.05, we can report there is no significant difference between girls and boys in participation in physical activity.



**Figure 1.** The best description of the physical activity levels in children and adolescents with autism spectrum disorder during the last seven days

**Table 1.** Independent t-test to compare the level of physical activity in girls and boys with autism spectrum disorder

Statistical indicators					Variables	
Confidence Interval 95% for Difference in Mean		Mean Difference	Significant t level	Degrees of freedom		T
High level	Low level					
0.109	0.016	0.465	0.147	368	454.1	Physical activity levels

The most commonly reported regular physical activity based on type among children and adolescents with ASD during the last seven days of the subjects were as following: Walking (44.6%, 1-2 times per week), chasing (32.2%, 1-2 times per week), dancing (35.1%, 1-2 times per week), running (14.3%, 1-2 times per week), cycling (12.4%, 1-2 times per week), soccer (7.8%, 5-6 times per week) and swimming (5.7%, 1-2 times per week), respectively.

#### 4. Discussion

Daily physical has important role in the psychosocial development of children and adolescents. In fact, an appropriate physical activity profile prevents them from isolation in adulthood and significantly influences the wellbeing. Several studies discovered that individuals with disabilities are more likely to be inactive and due to abundance of impediments, they are less likely to participate in activities when they are compared with the general population [11]. This study sought to investigation the participation of the physical activity among Iranian children and adolescents with autism spectrum disorder. Our findings are consistent with previous studies that children and adolescents with ASD have lower levels of physical activity. The results showed the Iranian children and adolescents with autism spectrum disorder participated in few frequently of physical activity.

The physical activity guidelines for Americans recommend that children and adolescents ages 6–17 years engage in a minimum of 60 min of moderate-to-vigorous intensity physical activity (MVPA) each day to achieve these health benefits [12]. The most current evidence indicates that children and adolescents with autism spectrum disorder are not sufficiently active and do not meet the Center for Disease Control's Physical Activity Guidelines. Also, they are less physically active than their typically developing (TD) peers [13, 14, 15].

Stanish et al. (2017) compared physical activity levels, frequency of participation, and type among 35 adolescents with and without autism spectrum disorder ages 13–21 and 60 typically developing adolescents, ages 13–18 years. Accelerometers measured physical activity levels. Adolescents with autism spectrum disorder spent less time in physical activity compared to their typically developing peers (29 min/day vs. 50 min/day) [16].

Healy et al. (2017) compared the physical activity participation, screen-time habits, obesity, and reported reasons for lack of participation in sport, between children with and without autism spectrum disorder. They reported the participation in moderate to vigorous activity, light activity, and sports were significantly lower among the group with ASD. Also, time spent watching TV was higher among children

with ASD. Overweight or obese status was more prevalent among the group with ASD (34.4 vs. 24.7%) [17].

Macdonald et al. (2011) assessed physical activity patterns of 72 children with autism spectrum disorder in the ages of 9-18 years. Physical activity was measured using accelerometer. Their findings indicated significant differences between the mean time spent in moderate to vigorous physical activity and the mean time spent in sedentary activity. Also, they relevant significant differences in participation in moderate to vigorous physical activity patterns in the total in school, after school and evening [18].

Memari et al. (2015) investigated daily physical activity participation in 83 children (52 boys and 31 girls) with autism spectrum disorders aged 6–15 years. Physical activity involvement during leisure time was examined using a modified checklist adapted from Godin-shephard leisure time questionnaire (GLTEQ). Results indicated that only 10 people (12%) of children with autism spectrum disorder were physically active. Only 6% of children with autism spectrum disorder “often” participated in physical activities, whereas 85.5% of them had “never/rarely” participated and 8.5% were “sometimes” involved in physical activities. Also, boys with ASD participated in physical activities more than girls with autism spectrum disorder [11].

In addition, Janz et al. (2017) reported children and adolescents with ASD follow similar physical activity patterns in which boys are more physically active than girls, and children are more physically active than adolescents [10]. These data are inconsistent with our results related to gender differences in levels of physical activity participation, which can be caused by the number of participants and the

difference in the physical activity measuring tools.

McCoy et al. (2016) did not find a statistically difference in the physical activity participation between males and females which is consistent with our study. They investigated weekly physical activity, sedentary behavior, and body mass among adolescents with and without autism spectrum disorder. Participants included 33,865 adolescents (1036 person with ASD). They found adolescents with ASD engaged in less physical activity and were more likely to be overweight and obese compared with their typically developing peers [4]. Also, Macdonald et al. (2011) revealed no significant differences in physical activity based on gender [18].

Must et al. (2015) compared the prevalence of parent-reported barriers to PA among 58 typically developing (TD) children and 53 children with ASD and 3 to 11 years. They investigated the association between barriers and PA participation and screen time among children with ASD [19].

Pan et al. (2016) found that boys with ASD were less physically active and engaged in MVPA for a lower percentage of time compared with peers of typical development [14].

These studies relevant the low participation in physical activities in children and adolescents with autism spectrum disorder which are consistent with our findings. Some studies reported a variety of barriers which can limit the participation of children with ASD in daily physical activities. Those mainly include lack of positive experiences in exercises, frequent failures, emotional impairments, and low self-esteem [20].

However, Memari et al. (2015) showed that financial complaints and lack of resources or opportunities, time constraints,

lack of motivation, and fear of injury can further limit the participation of autistic children in activities [11]. Importantly, the evidence suggesting that deficits in motor skills and these barriers may limit the opportunities for children and adolescents with ASD to participate in physical activity. Importantly, the evidence suggested that limited potential social, motor, attention, behavioral deficits, and narrow interests, impaired attention, motor performance and lack of community programs which influences on physical activity levels inactivity in children and adolescents with autism spectrum disorders [9]. Also, many physical activity behaviors and sport require social interaction, making friends, and turn-taking, which may prove difficult for those with ASD [19].

Decreased participation in physical activity and increased levels of sedentary behavior and unhealthy weight are a continued public health concern in children and adolescents. It is important to understand if children and adolescents are meeting the minimal recommended levels of beneficial physical activity, which can inform the need for further research and programs targeting this population. However, there are currently no quantitative guidelines for sedentary behavior in children and adolescents [21]. In the United States, only 37.2% of 2 to 19 year-old children and adolescents are currently meeting this physical activity recommendation [4].

The literature has established lower levels of PA for populations with ASD compared to their peers without disability [4, 6, 11, 13, 14, 17] and our finding confirms them. But, more information is needed to understand how to improve the activity levels of individuals with ASD.

Physical activity participation among children and adolescents with autism spectrum disorder is complex and requires addressing barriers at individual, environmental, and systemic levels. There are effective ways to promotion physical activity in children and adolescents with ASD in order to optimize their integration in physical activity [22]. More opportunities for individuals with ASD in school and community organizations are a helpful way to increase physical activity. Ways to facilitate this are to offer a range of activities and supports, eliminate physical, attitudinal and policy barriers, partner with families/disability organizations, train staff and respect individual differences [16]. Supporting the participation of ASD in physical activities will require finding ways to promote their participation at sufficient intensity levels to extend periods of time. Physical activity providers have an important role in adapting activities and accommodating the needs of youth with ASD so that they may be successful in school- and community-based activities [16]. Working together with parents and youth with ASD to identify enjoyable activities and to determine appropriate modifications will increase the effectiveness of physical activity programs, especially in inclusive settings insights informing how to design interventions, programs, supports, and policies that are reflective of their lives, needs, and abilities [23].

One of our study limitations was lack of objective measure of physical activity and relied on parent's report based on International Physical Activity Questionnaire. Future investigators might expand our findings with more direct physical activity measures, such as

pedometers, ActiGraph, or heart rate monitors. Another limitation of our study was lack of control group and comparison with the peers without autism spectrum disorders.

## 5. Conclusion

The current study was the first research to explore the levels of physical activity participation among the wide range of Iranian children and adolescents with autism spectrum disorders. The results of this study have shown the low levels of physical activity among children and adolescents with autism spectrum disorder. Studies reported physical activity is an essential, because it is associated with mental, social and physical health benefits. It seems that the information of this research is a positive step towards identifying physical activity patterns of children and adolescents with autism spectrum disorder in Iran. These findings can provide insight into building programs to increase PA among children and adolescents with ASD. Therefore, investigation and characterization of the physical activity behavior and the frequency of participation in physical activities of this population are essential to inform and improve future interventions. It is expected that the results of this study can be a helpful for considerable efforts and investments the resources for promotion of participation of this population in different types of physical, motor and sport activities.

## Conflict of interest

The authors declared no conflicts of interest.

## Authors' contributions

All authors contributed to the original idea, study design.

## Ethical considerations

The author has completely considered ethical issues, including informed consent, plagiarism, data fabrication, misconduct, and/or falsification, double publication and/or redundancy, submission, etc. Ethical approval was obtained from the research ethics committee of the Institute of physical education and sport sciences research center (Code: REC.SSRI.1400-1289).

## Data availability

The dataset generated and analyzed during the current study is available from the corresponding author on reasonable request.

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This study was extracted from the PhD Thesis of the first author at Department of Sport Injuries and Corrective Exercise, University of Guilan, Rasht, Iran.

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