



RESEARCH ARTICLE

The Relationship Between Physical Activity Level and Quality of Life of Children with Autism Spectrum Disorder

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Abstract

Objective: The purpose of this research is to the quality of life levels of children with Autism Spectrum Disorder (ASD) and the relationship between quality of life (QoL) and physical activity (PA) level. **Materials and Methods:** 28 children with ASD participated in the research. A sociodemographic form consisting of 25 questions about the child and parents, the " Pediatric Quality of Life Inventory- Parent Form (PedsQL)" consisting of 23 questions to evaluate the QoL of children and adolescents, and the "Physical Activity Scale for Children (PAQ-C)" consisting of 9 questions to determine the level of PA was administered to the participants. **Results:** 28 children with ASD, including 8 girls and 20 boys, aged 8-18 participated in the study. The average PedsQL score of the children diagnosed with ASD was found to be 49.87±19.08. The association between children's PA level and QoL was investigated using Pearson Correlation analysis. No statistically significant correlation was determined between the PedsQL total score and the PAQ-C score ($p>0.05$). A statistically significant positive correlation was determined between psychosocial health and PAQ-C, one of the sub-scores of PedsQL ($p<0.05$). **Conclusion:** According to the research results; we can state that the psychosocial well-being of children with ASD and the social function parameter among the sub-parameters are more negatively affected. Although there is no association between children's PA levels and their QoL, there is a link between psychosocial QoL and PA levels.

Keywords

Autism Spectrum Disorder, Quality of Life, Physical Activity, Health

INTRODUCTION

Although it has many different definitions, autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by iterative behavior patterns, weak social contact, few interests, limiting activities (Ruggeri et al., 2020; Sefen et al., 2020). DMS-5 (the Diagnostic and Statistical Manual of Mental Disorders) has defined the criteria of ASD as permanent deficiencies in communication including social interplay, iterative behaviors, both restricted interests and activities. In addition, symptoms that occur in social, occupational and other areas

during early development are specified in the DMS-5. Those problems are not caused by intellectual disability (Duquette et al., 2016). While symptoms appear slowly in 70% of autistic patients, a clinical course that regresses in development between 18-24 months is observed in 30% of them (Yosunkaya, E, 2014). Some skills, such as social, communicative, behavioral, and cognitive development, may be limited by difficulty in completing age-appropriate motor skills (Ruggeri et al., 2020; Arnell et al., 2020).

Physical activity (PA) is effective for improving the healthiness of individuals with ASD. Regular PA has beneficial physical,

psychological and social effects on people, including individuals with ASD (Tiner et al., 2020). Physical inactivity is widely acknowledged as one of the century's most pressing issues in public health. Before a child reaches puberty, physical activity levels decrease and inactive behavior increases, resulting in increased health problems (Jachyra et al., 2020). Lack of physical activity defined as the leading, universal risk factor for mortality (Becerra et al., 2020). Despite the physical and developmental benefits of PA, research have shown that children with ASD have lower grades of PA than their peers who are growing normally. (Howells et al., 2019; Jachyra et al., 2020), and levels of PA decrease as they age (Arnell et al., 2020; Kim et al., 2020; Ruggeri et al., 2020). Lack of PA can cause diseases such as obesity, hyperlipidemia and hypertension (Kim et al., 2020), and has also been shown to contribute to medical sequelae such as chronic disease. (Howells et al., 2019; Jachyra et al., 2020). Considering that physical activity provides physical and cognitive benefits, it is considered to be reliable for improving general health and quality of life (QoL) (Bittner et al., 2017).

The assessment of health-related QoL, which evaluates the psychosocial, emotional and physical well-being of the person, is very suitable for conditions with multidimensional effects such as ASD (Kuhlthau et al., 2010). It has been determined that the QoL of people with ASD is lower than that of those with other chronic illnesses. (Bolbocean et al., 2021).

PA can be seen as a source of motivation to improve QoL. To measure an individual's QoL is important to determine the QoL of patients before and after treatment and to guide health studies. Considering the importance of PA to better the health and QoL of individuals with ASD, studies to understand and improve this in children with ASD have been considered important. The goal of this research is to determine the QoL levels of children with ASD and to examine the relationship between QoL and PA level. In line with the findings to be reached in this study, by revealing the QoL and PA status of children with ASD; It can be expected to be a guide in terms of protecting and increasing the quality of life.

MATERIALS AND METHODS

28 children with ASD and their parents who received special education at Gülşen Önal Special Education and Practice School in Isparta participated in this study. The study was found ethically appropriate with the decision numbered 72867572-050.01.04 of the Clinical Research Ethics Committee of Süleyman Demirel University Faculty of Medicine.

After the information was given, a voluntary consent form and a parent consent form were signed to the participants.

Inclusion criteria for the study;

- 1- Being diagnosed with Autism
- 2- To be between the ages of 8-18
- 3- Parents have sufficient Turkish reading and writing knowledge
- 4- Parent cooperation

Exclusion criteria

- 1- Having an orthopedic disability that will limit physical activity
2. Having Mental Retardation in Parents
3. Parent not cooperative

Data Collection Tools

The sociodemographic information of the participants was obtained using a 25-question sociodemographic questionnaire about the child and the parent; children's QoL was evaluated using a 23-question "Pediatric Quality of Life Inventory-Parent Form (PedsQL)"; and grades of PA were evaluated using a 10-question "Physical Activity Questionnaire for Children (PAQ-C)" online questionnaire.

The QoL of children and adolescents aged 2 to 18 was assessed using this measure. Physical well-being, emotional functioning, social functionality, and school functionality are all contained in the PedsQL scale. The overall score, total score of physical well-being, and total score of psychosocial well-being are the three levels of scoring. A high overall score indicates that the person has a great quality of life. Turkish reliability of the scale was done by Çakın Memik et al. (2008).

Children with ASD had their PA levels measured using the PAQ-C, which Sert and Temel converted into Turkish in 2014. Consisting of 10 questions, this scale is in a 5-point Likert type. The purpose of this survey is to measure the PA levels of children in the last 7 days. A high score on this scale means that the level of PA obtained is high.

The highest score that can be obtained from the scale is 45. Data were collected by the researcher through individual interviews in December-January 2020.

Statistical Analysis

Statistical analysis of the research was carried out using the SPSS 22.00 program. The mean \pm standard ($X \pm SD$) deviation of the data is expressed. Normality analysis was done with Kolmogorov-Smirnov. The association between QoL and PA scores was studied using Pearson correlation analysis. The level of significance was determined as $p \leq 0.05$.

RESULTS

The 28 of children with ASD participating in the study, 8 (28.6%) were girls and 20 (71.4%) were boys. 53.57% of the students are between the ages of 8-13, 46.42% are between the ages of 13-18. The average age of the children was 14.14 ± 3.92 years. The average height was 151.17 ± 21.90 cm, the average weight was 52.01 ± 23.97 kg, and the average age at which the diagnosis was made is 3.35 ± 1.62 years. It was determined that the children received special education for an average of 8.58 ± 4.03 years Table 1.

Table 1. Sociodemographic characteristics of children with ASD participating in the study

	N	Frequency	%	Mean(SD)
Age of the Child's	28			
Gender of the Child's	28	8	28,6	
Female		20	71,4	
Male				
Height of the Child's	28			151,17 (21,90)
Weight of the Child's	28			52,01 (23,97)
Age at Diagnosis	28			3,35 (1,62)
Duration of Special Education	28			8,58 (4,03)
Number of Children	28			2,32 (0,90)
Which Child Is Assessed?	28			1,89 (0,95)

The participants' PedsQL social function mean score was 41.80 ± 28.05 , the physical function mean score was 56.10 ± 22.69 , the emotional function mean score was 57.60 ± 20.72 , and the school mean score was 50.65 ± 17.23 . The participants' PedsQL total physical health score was 56.10 ± 22.69 , and the mean psychosocial score was 49.86 ± 16.66 . The mean PedsQL score of the participants was 49.87 ± 19.08 . The average PAQ-C score of the participants was determined as 14.92 ± 6.11 Table 2.

The PedsQL total score and the PAQ-C score had no statistically significant correlation ($p > 0.05$). A statistically significant positive correlation was determined between PAQ-C and psychosocial health, one of the sub-scores of PedsQL ($p < 0.05$). In addition, there was a correlation between PedsQL social function parameter and PAQ-C ($p < 0.05$); the correlation between the school parameter and the PAQ-C was statistically significant ($p < 0.03$) Table 3

DISCUSSION

The goal of this research is to define the QoL levels and to determine the relationship between QoL and PA levels of children with ASD. The research was conducted with 28 children, 8 girls and 20 boys. It is known that the rate of autism in boys is higher than in girls. A male-female ratio of 4.3:1 of the prevalence of ASD is reported (Siracusano et al., 2021). In this study, it was determined that the highest proportion of the participants were boys (71.4%). Lower cognitive and language skills, poor social contact, few interests, limiting activities and iterative behavior patterns, lower adjustment skills and greater problem behaviors have been described in women with ASD (Siracusano et al., 2021). PA is defined as any physiological action of the skeletal muscles that reasons energy spending (Caspersen and et al., 1985). PA has many advantages for people with ASD. However, people with ASD are more likely to be physically inactive than other individuals (Thomas et al., 2018, Thinner et al., 2020)

Table 2. PedsQL and PAQ-C score of children with ASD

	N	Frequency	%	Minimum	Maximum	Mean(SD)
Total Score of PedsQL	26			,00	78,26	49,87(19,08)
Physical Well-Being Total Score of PedsQL	25			12,50	84,38	56,10(22,69)
Psychosocial Well-Being Total Score of PedsQL	25			23,33	81,67	49,86(16,66)
Social Function of PedsQL	25			,00	100,00	41,80(28,05)
Physical Function of PedsQL	25			12,50	84,38	56,10(22,69)
Emotional Function of PedsQL	25			15,00	90,00	57,60(20,72)
School Function of PedsQL	25			20,00	90,00	50,65(17,23)
Total Score of PAQ-C	28			9,00	33,00	
PAQ-C: Category	28					14,92(6,11)
Inactive		17	60,7			
Low level active		8	28,6			
Moderately active		2	7,1			
Active		1	3,6			

PedsQL: Pediatric Quality of Life Inventory, PAQ-C: The Physical Activity Questionnaire for Children

Table 3. The relationship between QoL and PA

		PAQ-C Total score
Total Score of PedsQL	Pearson Correlation	,293
	Sig. (2-tailed)	,147
	N	26
Psychosocial Well-Being Total Score of PedsQL	Pearson Correlation	,426*
	Sig. (2-tailed)	,034
	N	25
Physical Well-Being Total Score of PedsQL	Pearson Correlation	,297
	Sig. (2-tailed)	,149
	N	25
Physical Function of PedsQL	Pearson Correlation	0,297
	Sig. (2-tailed)	0,149
	N	25
Emotional Function of PedsQL	Pearson Correlation	0,141
	Sig. (2-tailed)	0,500
	N	25
Social Function of PedsQL	Pearson Correlation	0,438*
	Sig. (2-tailed)	0,028
	N	25
School Function of PedsQL	Pearson Correlation	0,435*
	Sig. (2-tailed)	0,030
	N	25

PedsQL: Pediatric Quality of Life Inventory, PAQ-C: The Physical Activity Questionnaire for Children,

*. Correlation is significant at the 0.05 level

In this research, the average PAQ-C score of the participants was determined as 14.92±6.11. This rate is stated as low level of physical activity. The findings of this research are in line with former research findings PA behaviors in people with ASD. McCoy and Morgan (2019) found that adolescents with ASD were less likely to PA for

60 minutes or more each day and to participate in sports in the previous 12 months. They were also more likely to watch 2 hours of television. Benson et al. (2019) found that the average daily minutes of moderate-intensity physical activity of youth with ASD were half that of their non-ASD peers.

Healy et al. (2019) determined that children with ASD had significantly less moderate-intensity PA, less participation in sports, less participation in PA for 60 minutes or more. Bandini et al. (2013), parents noticed that children with ASD participate in and spend less time in significantly less PA than children with normal development. Older children with ASD were shown to be significantly less active than younger children, according to MacDonald et al. (2011). PA in children with ASD declines as they become older, according to the findings of this study.

The most common reasons reported to explain the low PA levels of children with ASD include lack of motivation, low interest in PA, including intrinsic factors such as perceived motor skill competence and little enjoyment of PA (Arnell et al., 2018); excessive time spent in inactive activities (i.e. watching TV), feeling tired, bored with physical activity, lack of peer partner, lack of time for parents, bad weather, transportation difficulties, and lack of equipment, child's lack of motivation/interest, working together a lack of existing community programs. (Stanish et al., 2015). In particular, there is strong argument that regular PA in children and adolescents improves cardiorespiratory fitness, muscle fitness, bone health, body composition (Müller et al., 2016).

In determining the health status of the person, the concept of "QoL", which shows how he perceives his own health and illness, was needed. The concept of QoL expresses the perceived satisfaction with life and personal well-being as well as representing the ability to perform daily activities. It is the perception of the individual's situation in life within the system of values in which he/she lives. An individual's physical, psychological and social health is an important indicator of quality of life (Aydiner Boylu & Paçacıoğlu, 2016, Nowak, 2019) Physical activity is of great importance in a healthy and productive life (Yıldırım et al., 2019). In this study, it was determined that the emotional function parameter, which is the sub-score of the participants, was the highest mean score (57.60 ± 20.72) and the social function parameter was the lowest mean score (41.80 ± 28.05). It was found that the psychosocial health total score (49.86 ± 16.66) was lower than the physical health total score (56.10 ± 22.69).

There are QoL studies with ASD patients and their families in the literature. The ASD group, the chronic physical disease group, and the healthy groups all had substantial disparities in QoL scores, according to Kuhlthau et al. (2010). Social functionality was revealed to be the area with the greatest differences, with children with ASD scoring lower than healthy children with chronic physical disease. It was determined that the ASD group was not distinct from the chronic physical disease group in terms of physical health and school functionality, but each group was different from the healthy group. In addition, it was found that the lowest QoL score in the ASD group was in the area of social function, and the highest score was in the area of physical health. The ability of a child to interact effectively with their environment has been shown to be directly linked to their quality of life. It was found that, the less autism-specific symptoms, such as social problems and repetitive behaviors, the greater the quality of life were discovered. Therapy or therapies that increase children's adaptive abilities or decrease repetitive behaviors have been shown to improve QoL. Given that these behaviors are socially produced, relationships with psychosocial health are likely to have a greater impact on QoL than with physical health (Kuhlthau et al., 2010).

Children and adolescents have established good relationship between PA and their physical and mental wellbeing. Rised levels of PA have been linked to improved QoL. It has also been reported that inactive behaviors are inversely proportional to QoL. It has been proven that children and adolescents who live an active lifestyle have better physical and mental health. Physical activity and inactivity have major impacts on a variety of physical, mental, and emotional elements of life (Wu et al., 2019). There was no statistically significant correlation between the overall score of the PedsQL and the overall score of the PAQ-C in this study ($p > 0.05$). Psychosocial health, social function parameter, and school function parameter all had a statistically significant positive correlation with PAQ-C ($p < 0.05$). Previous research suggests that motor disorders may have an increased association with ASD-specific social symptomology. It shows that increasing PA in children with ASD reduces the severity of symptoms (Thomas et al., 2018).

Acre et al. (2006) discovered that the quality of life scores in all eight domains of the QoL scale (general well-being, physical function, mental well-being, vitality, social function, role limitations related to physical well-being (role-physical), role limitations due to emotional well-being (role-emotional), bodily pain) were significantly higher ($p < 0.05$) in the group reporting more PA as against to the group reporting less PA. Children with ASD commonly experience reduced health-related QoL with behavioral and emotional disorders. Greater motor impairment precedes, correlates, and exacerbates social communication difficulties; It has been shown to be associated with more sentimental and behavioural disorders in children with ASD (Thomas et al., 2018).

This study also has limitations that must be acknowledged; PA level was determined using self-reported questionnaire, therefore, an incorrect estimation of PA level and recall bias is inevitable. It will be important for the findings to be studied in children with ASD with a bigger sample size. Moreover to the PA habits of children with ASD, the time spent sedentary is also important. For future studies, sedentary behavior habits of children with ASD can also be investigated. Children with ASD encounter simultaneous problems in multiple areas. It is significant to research the factors related to QoL with more comprehensive evaluations.

In this research, the relationship between PA levels and QoL in children with ASD was determined and this gap in the literature was tried to be filled. PA affects human life in many ways. It helps children improve not only their physical condition but also their self-confidence, social communication skills and behavior. Therefore, it is very important to create a good standard of living in the future. In this study, it was considered important to shed light on this area by revealing the PA and QoL grades of children with ASD.

According to the research findings, there is no significant relationship between levels of PA and QoL, but it has been determined that there is a significant relationship between psychosocial QoL and PA levels. Moreover, it was found that there was a statistically significant positive relationship between the social function parameter of QoL and PAQ-C, and between school functionality and PAQ-C. It has been shown that participation in PA

is important for children with ASD to develop especially in the psychosocial field.

Conflict of interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Statement

The participants of this study are humans. And it has been approved by the Süleyman Demirel University, Faculty of Medicine Clinical Research Ethics Committee. (Date: 21.12.2020; Decision/ Protocol number:72867572-050.01.04-). Participants who volunteered for the study were informed with a written informed consent form.

Author Contributions

Study Design, İS, TİP; Data Collection, İS, TİP, HŞP; Statistical Analysis, İS, TİP, HŞP; Data Interpretation, İS, TİP, HŞP; Manuscript Preparation, İS, TİP; Literature Search, İS, TİP. All authors have read and agreed to the published version of the manuscript.

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