

# Examination of the Relationship Between Physical Activity Levels and Physical Activity Perception of Families of Children with Neurodevelopmental Disorders

## Nörogelişimsel Bozukluğu Olan Çocukların Ailelerinin Fiziksel Aktivite Düzeyi ile Fiziksel Aktivite Algısı Arasındaki İlişkinin İncelenmesi

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### ABSTRACT

**Introduction:** Parental perceptions have an important role in the development of positive health behaviors in children. It is known that families' physical activity beliefs are directly related to children's physical activity behaviors. Physical activity levels of families may affect their perception of physical activity. This study aims to investigate of the relationship between physical activity level and physical activity perception of families of children with neurodevelopmental disorder.

**Materials and Methods:** Parents of children with neurodevelopmental disorders between the ages of 2 and 6 were included in the study. Families' characteristics, such as age, gender, income status and education level were determined by the sociodemographic form. International Physical Activity Questionnaire was used to determine the physical activity level of the parents, and the Parent Perceptions of Physical Activity Scale was used to measure their perceptions of physical activity.

**Results:** A total of 83 parents, 62 mothers and 21 fathers with a mean age of 36.47±6.14 years were included in the study. physical activity levels of the parents were 23.3% in the inactive category, 54.7% in the minimal active category and 22.1% in the highly active category. It was concluded that there was a weak level of positive correlation between the physical activity levels of the parents and the total results of physical activity perceptions ( $p=0.04$ ,  $r=0.224$ ) and physical activity benefits ( $p=0.04$ ,  $r=0.219$ ).

**Conclusion:** It was defined that there was a low level of relationship between the families' physical activity levels and their perceptions of physical activity. Improving parents' perception of physical activity can also positively affect children's physical activity behaviors.

**Keywords:** Child, family, neurodevelopmental disorder, parents, physical activity

### ÖZ

**Giriş:** Ebeveyn algıları çocuklarda olumlu sağlık davranışlarının gelişiminde önemli bir role sahiptir. Ailelerin fiziksel aktivite inançlarının çocukların fiziksel aktivite davranışlarıyla doğrudan ilişkili olduğu bilinmektedir. Ailelerin fiziksel aktivite düzeyleri fiziksel aktivite algılarını etkileyebilir. Bu çalışma, nörogelişimsel bozukluğu olan çocukların ailelerinin fiziksel aktivite düzeyi ile fiziksel aktivite algısı arasındaki ilişkiyi araştırmayı amaçlamaktadır.

**Materyal ve Metodlar:** Çalışmaya 2-6 yaş aralığında nörogelişimsel bozukluğu olan çocukların ebeveynleri dahil edildi. Ailelerin yaş, cinsiyet, gelir durumu ve eğitim düzeyi gibi özellikleri sosyodemografik form ile belirlendi. Ebeveynlerin fiziksel aktivite düzeyini belirlemek için Uluslararası Fiziksel Aktivite Anketi kullanıldı ve fiziksel aktivite algılarını ölçmek için Fiziksel Aktiviteye İlişkin Ebeveyn Algı Ölçeği kullanıldı.

**Bulgular:** Çalışmaya yaş ortalamaları 36,47±6,14 yıl olan 62 kadın ve 21 erkek olmak üzere toplam 83 ebeveyn dâhil edildi. Ebeveynlerin fiziksel aktivite düzeyleri inaktif kategoride %23,3, minimal aktif kategoride %54,7 ve çok aktif kategoride %22,1 olarak bulundu. Ebeveynlerin fiziksel aktivite düzeyleri ile fiziksel aktivite algılarının toplam sonuçları ( $p=0,04$ ,  $r=0,224$ ) ve fiziksel aktivite yararları ( $p=0,04$ ,  $r=0,219$ ) arasında düşük düzeyde pozitif korelasyon olduğu sonucuna varıldı.

**Sonuç:** Ailelerin fiziksel aktivite düzeyleri ile fiziksel aktivite algıları arasında düşük düzeyde ilişki olduğu belirlendi. Ebeveynlerin fiziksel aktiviteye ilişkin algılarını iyileştirmek, çocukların fiziksel aktivite davranışlarını da olumlu yönde etkileyebilir.

**Anahtar Sözcükler:** Çocuk, aile, nörogelişimsel bozukluk, fiziksel aktivite

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## Introduction

Neurodevelopmental disorder is used as a term that includes a wide range of psychiatric and neurological problems that involve some type of disruption in brain development, such as cerebral palsy, rare genetic syndromes, congenital neural anomalies, autism, attention deficit hyperactivity disorder, epilepsy (1). Common symptoms seen in these disorders can be motor development problems, language and speech delays, behavioral problems, and weakness in various skills such as weakness in tasks requiring coordination (2). In particular, deficiencies in social communication skills can strain parent-child relationships, and stress on the parent can have negative transactional effects that hinder the child's development (3).

Physical activity (PA) is any bodily movement made by skeletal muscles that requires energy consumption (4). Physical activity refers to all movement, including leisure time, for commuting, for transportation, or as part of a job. It is known that PA contributes to individuals' physical, mental, psychological, social, environmental and, intellectual health (5). Also, studies in the literature show that it contributes to the development of children with neurodevelopmental disorders and its positive effects on physical health, mental health and higher cognitive functions (6,7). Physical activity also positively affects cognitive and emotional functions in late childhood (8). Physical activity habits acquired in the early period can have a positive impact on prenatal and postnatal brain development (9).

Children with neurodevelopmental disorders have low participation rates in physical activities due to limitations such as motor abilities and social communication skills. If they can participate more in these activities, they will be more successful in physical development and establishing healthy social relationships (10). Families play an important role in these children's participation in activities requiring motor skills and social communication skills (11). While the parent's participation in the activity positively affects the child's PA behavior, even watching the activity without participating positively affects on this behavior (12).

It is known that parents' PA beliefs are directly related to children's PA behaviors (3). Therefore, examining the factors affecting parents' PA beliefs is essential. Physical activity levels of parents, may affect perceptions of PA. In the literature, there are not many studies on this topic. This study aims to investigate the correlation between the PA levels and PA perceptions of families of children with neurodevelopmental disorders.

## Materials and Methods

### Participants

The participants included in the study were selected from the parents of children with neurodevelopmental disorders who came to Gazi University, Developmental Pediatric Rehabilitation Unit

between January 2023 and July 2023. Signed parental informed consent forms were obtained from the parents participating in the study. The ethics committee permission was received by Gazi Ethics Commission on 12.01.2023 with ethics committee permission numbered E-77082166-604.01.02-558216.

The inclusion criteria for the study were having a child with a neurodevelopmental disorder between the ages of 2 and 6, knowing Turkish, being literate, being at a cognitive level to answer the questions, and volunteering to participate in the study.

Assuming that the effect size of the relationship to be examined in the power analysis may be lower ( $r=0.3$ ), it was calculated with the G\*Power program (version 3.1.9.2 Universität Düsseldorf, Düsseldorf, Germany) that 80% power could be reached at 95% confidence level when at least 82 people were included in the study. Seventeen out of 100 parents who met the inclusion criteria were excluded from the study because they did not volunteer to participate. Eighty-three parents of a child with a neurodevelopmental disorder were included in the study.

### Measures

First, parents were asked to fill out a sociodemographic form that included information about their children, such as age, height, weight, gender, and their child's disease history, in addition to their own information such as their age and education level. Families filled out this form after agreeing to participate in the study.

Parents' PA level was measured with the International Physical Activity Questionnaire-Short Form (IPAQ-SF) developed by Craig et al. (13). The Turkish validity and reliability of the IPAQ-SF was made by Saglam et al. (5). The survey consists of 7 questions about physical activities in daily life. Parents were asked to answer these questions by considering the time spent physically in the last 7 days. After the survey was completed, the total of the duration (minutes) and frequency (days) of walking, moderate activity and vigorous activity was used to calculate the sum score. The energy needed for activities was calculated by Metabolic Equivalent of Task (MET)-minute score. Standard MET values were recorded for these activities (sitting: 1.5 MET, walking: 3.3 MET, moderate PA: 4.0 MET, and vigorous PA: 8.0 MET). Using the specified values, daily and weekly PA levels were calculated. According to these calculations, PA levels were examined in 3 categories: inactive category, minimal active category and highly active category.

Parents' perceptions of physical activity were assessed with Parent Perceptions of Physical Activity Scale (PPPAS). It was developed by Lakes et al. (14). The PPPAS is a scale used to assess the PA perception of parents of preschool children with neurodevelopmental disorders (14). The Turkish validity and reliability study of the scale was conducted by Akkaya et al.

(15). The scale has two versions for use in infants and preschool children. In our study, the preschool version of the scale was used. The scale, which originally consisted of 25 questions, is evaluated over 22 questions as a result of the Turkish validity and reliability study. With this scale, the perspective of families on their children's participation in PA was evaluated. Two sub-results were obtained: parental perceptions of the benefits of PA and the barriers to PA. The benefits of PA address issues such as physical, behavioral, cognitive benefits, and increased attention and memory functions. The barriers to PA includes personal, social, environmental and policy barriers.

### Statistical Analysis

The results were analyzed with IBM Statistical Package for Social Sciences (SPSS) program version 25.0. The categorical variables are given as numbers and percentages and the continuous variables are given as mean  $\pm$  standard deviation. Spearman correlation analysis was used to examine the relationships between numerical data. Spearman correlation was defined as follows:  $<0.20$ , very weak;  $0.40$  to  $0.20$ , weak;  $0.60$  to  $0.40$ , moderate;  $0.80$  to  $0.60$ , strong;  $\geq 0.80$ , very strong (16). In all analyses,  $p < 0.05$  was considered statistically significant.

### Results

A total of 83 parents participated in the study, consisting of 62 mothers and 21 fathers, with an average age of  $36.47 \pm 6.14$  years. Demographic data of the parents (average age, income level, and education level) are shown in Table 1.

The mean and standard deviation of the benefit, barrier and total scores obtained from the PPPAS are shown in Table 2.

Data regarding the relationship between MET values obtained from the IPAQ-SF and PPPAS scores are shown in Table 3.

When MET values obtained from IPAQ and PPPAS scores were compared, a weak relationship was found between perception scores regarding the benefits of PA and MET values ( $p=0.04$ ;  $r=0.219$ ). A weak relationship was also found between PPPAS total scores and MET values ( $p=0.04$ ;  $r=0.224$ ).

### Discussion

In this study, conducted to investigate the relationship between the PA levels of parents of children with neurodevelopmental disorders and their perceptions of PA, it was defined that there was a low level of relationship between the families' PA levels and their perceptions of their children's PA.

Physical activity occupies a critical place in the lives of children with neurodevelopmental disorders. When the literature was examined, it was seen that in addition to eating behaviors and weight loss or gain, children's social, cognitive and physical

**Table 1.** Socio-demographic information of participants

Parents' gender	n	%
Female	62	74.7
Male	21	25.3
<b>Income rate</b>		
Minimum wage>	1	1.2
Minimum wage	22	26.5
Minimum wage x2	21	37.3
Minimum wage x3<	29	34.9
<b>Children's diseases</b>		
Autism	23	27.7
Delayed speech	18	21.7
Cerebral palsy	10	12
Developmental delay	8	9.6
Other	24	29
<b>Physical Activity Level</b>		
Inactive	22	26.5
Minimal active	42	50.6
Highly active	19	22.9
<b>Education Level</b>		
Primary school (M-F)	5-3	6-3.6
Middle school (M-F)	7-6	8.4-7.2
High school (M-F)	26-31	31.3-37.3
University (M-F)	45-43	54.2-51.8
	<b>Mean<math>\pm</math>SD</b>	<b>Min-Max</b>
Parent's age	36.47 $\pm$ 6.14	25-52
Child's age	4.18 $\pm$ 1.35	2-6
Child's height(cm)	106.65 $\pm$ 13.31	68-130
Child's weight(kg)	18.75 $\pm$ 5.31	11-38

SD: Standard Deviation; min: Minimum; max: Maximum; M: Mother; F: Father; Minimum wage: 11.402 TL

**Table 2.** Participants' PPPAS scores

	Mean $\pm$ SD
PPPAS Benefit Score	3.32 $\pm$ 0.40
PPPAS Barrier Score	1.99 $\pm$ 0.51
PPPAS Total Score	3.02 $\pm$ 0.29

SD: Standard Deviation; PPPAS: Parent Perceptions of Physical Activity Scale

**Table 3.** The relationship between families' physical activity level and physical activity perception

	p	r
MET-PPPAS Benefit	0.04*	0.219
MET-PPPAS Barrier	0.73	-0.038
MET-PPPAS Total	0.04*	0.224

MET: Metabolic Equivalent of Task; PPPAS: Parent Perceptions of Physical Activity Scale \*  $p < 0.005$

development (17) was also related to PA (18,19). It was also noted that children's motor skills, academic achievement (20), executive functions and motor skills (21) positively improved.

It is known that individuals with neurodevelopmental disorders are more inactive than healthy children (22). At the same time, children with neurodevelopmental disorders face many difficulties

and barriers in doing PA. They have difficulties with many issues such as pain, discomfort, other people's misconceptions and accessibility (23). In addition, they have difficulty enjoying PA due to being dependent on their parents when going to places such as the gym or public activity areas and having difficulty communicating with their typically developing peers (24). With developing technology, reasons such as increasing children's screen time, limiting the places where they can be physically active and decreasing their accessibility can also be cited as barriers to PA (25). In order to overcome these barriers, determining families' perceptions of their children's PA and carrying out studies that will positively reinforce them will be useful in increasing children's PA levels. In their study, Mutz et al. (26) found that parents' support for PA and their desire to do sports with their children were closely related to the child's PA level.

Many factors may affect families' perception of PA. Mitchell et al. (27) collected families' perception of PA under three headings in their review. These are; fear of safety, adequacy of the child's physical abilities and perception of the importance of PA. One of the factors affecting families' perception of PA may be the PA level of the parents. Giving suggestions to families to be physically active with or without their children and encouraging them to increase their PA levels can positively affect their perception of PA. In the literature, it has been stated that families' encouraging attitudes towards increasing their children's PA levels and spending time with the child outside are behaviors that increase the child's PA level (27). However, there are not many studies directly examining the relationship between families' PA levels and their perceptions of PA.

When PA levels of parents are examined, it is seen that approximately half of them (50.6%) are in the minimal active category. Considering the benefit scores obtained from the PPPAS; it can be said that the majority have positive thoughts about PA. Even though families are not very physically active, it can be said that they are aware of the importance of PA. But some families can be "overprotective" against the possibility of their children being injured or harmed (22). Situations such as the family of a child with neurodevelopmental disorder being concerned about their child's health and fear of being excluded by their peers are obstacles to their children being physically active. They may also encounter many barriers, such as their children not being physically or mentally competent compared to their other typically developing peers (26). When we look at the PPPAS barriers scores, these barriers are seen. Identifying and minimizing the barriers faced by families and children will make PA more accessible. Positive reinforcement of families' perception of the importance of PA will provide an environment for children to be more physically active (28).

In this study, the relationship between families' perception of PA and PA levels was examined. In the study, it was noted that a high rate of "agree" or "strongly agree" answers were given

to the questions asked to families about the benefits of PA. It was determined that families generally had positive thoughts on issues such as encouraging and supporting PA. Although this study found a weak relationship between families' PA levels and their perceptions of the benefits of PA, it was thought that studies aimed at supporting and increasing families' attitudes and thoughts would make positive contributions to children's physical lives.

### Limitations

One of the limitations of the study is that the evaluation scales used in this study are subjective. Using more objective tools will increase the reliability of the study. Another limitation of the study is that data on the PA levels of children with neurodevelopmental disorders was not collected in the study, which can be studied in the future studies.

### Conclusion

In this study, the correlation between PA level and PA perception of families with children with neurodevelopmental disorders was examined. As a result of the evaluations, it was found that there was a weak relationship between the families' PA levels and their perception scores regarding the benefits of PA. Knowing how families' perceptions of PA affect their PA levels and their approach to the child is an important tool for physiotherapists working with children. In future studies, with a larger sample size, answers to questions such as how families' perception affects children's PA levels can be found.

**Ethical Considerations:** The ethics committee approval required for the study was obtained from the Ethics Committee of Gazi University (Number: E-77082166-604.01.02-558216, date: 12.01.2023). A signed parent-informed consent form was obtained from the families of all children participating in the study.

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**Consent of Patients:** The participants were informed in detail, and informed consent was obtained.

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**Data Availability Statement:** All relevant data are within the paper and they are available from the corresponding author on reasonable request.

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