

# The activity levels and quality of life of physically disabled children who continued or did not continue rehabilitation during the COVID-19 pandemic

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## Abstract.

**BACKGROUND:** Social isolation during the COVID-19 pandemic had a harmful impact on the psychological and physical health of children and teenagers. It is known that interruptions in rehabilitation can cause soft tissue contractures, bone deformities and a decline in motor functions among other complications.

**OBJECTIVE:** The aim of this study was to compare the quality of life and physical activity levels of physically disabled children who continued and did not continue rehabilitation during the COVID-19 pandemic.

**METHOD:** The gross motor levels of 18 children who continued special education and rehabilitation during the COVID-19 pandemic and 18 children who did not continue were determined with the Gross Motor Function Classification System (GMFCS). The International Physical Activity Questionnaire Short Form (IPAQ) and Children's Quality of Life Scale (PedsQL) questionnaires were administered.

**RESULTS:** The study participants comprised 54.1% females and 45.9% males with a mean age of 9.02 years. No significant differences were detected between the two groups in respect of demographic, clinical and functional characteristics ( $p > 0.05$ ). The walking parameters of PedsQL ( $p = 0.02$ ) and IPAQ-SF scores ( $p = 0.03$ ) were determined to be statistically significantly better in the group that continued rehabilitation.

**CONCLUSION:** The results of this study demonstrated that the quality of life and walking capacity of children who continued rehabilitation during the COVID-19 pandemic were better. Methods should be developed to ensure that rehabilitation is not interrupted during isolation periods of any future pandemic.

Keywords: Cerebral palsy, down's syndrome, pandemic, physical therapy, spina bifida

## 1. Introduction

COVID-19 infection can present as a serious clinical condition leading to the development of acute respiratory distress syndrome and other considerable problems, including pneumonia and death, particu-

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larly in high-risk groups [1, 2]. Studies of COVID-19, which spread rapidly across the world, have shown that the pediatric population was affected less than the adult and elderly populations. Almost 90% of pediatric cases were reported to be asymptomatic, there were also cases of mild or moderate disease [3]. In children with critical conditions with neurological or neurodevelopmental disorders, 6.7% of cases may be severe [4], and respiratory complications have been reported to be the main cause of mortality in the chronic neuropediatric population [5]. Before the development of vaccines and because of the lack of effective antiviral treatments, strict public healthcare precautions such as social distancing were implemented in most countries as the only strategies able to reduce cases and mortality [6, 7]. Rehabilitation staff, such as physiotherapists, were at risk of contamination during the pandemic so activities had to be suspended. In Turkey, a 3-month quarantine period from March 2020 to June 2020 was applied to children attending special education and rehabilitation, and face-to-face rehabilitation sessions could not be continued.

The negative impact of social isolation during the pandemic affected the psychological and physical health of paediatric age groups [8, 9]. It has previously been reported that if children with physical disabilities do not participate in physical activity at the level recommended by the World Health Organisation (WHO), the physical, mental and mental states of these children will be affected [10]. Previous studies have demonstrated the importance of physiotherapy and rehabilitation for pediatric cases with chronic neurological problems [11, 12]. According to a study of the barriers faced by mothers with disabled children when applying for rehabilitation services, the difficulties encountered are in the 4 main areas of transportation and travel, priorities for the child, competing priorities for the family, and healthcare services [13]. It is known that not continuing with rehabilitation can cause bone deformities, impaired motor functions, soft tissue contractures, dysphagia, and respiratory function difficulties, and pediatric cases with neurology-related disorders may also experience a decline in motor functions [14].

Therefore, the aim of this study was to compare the quality of life and physical activity level of children with physical disabilities who continued and did not continue rehabilitation during the COVID-19 pandemic. The study was conducted during the pandemic although it was known that the real effects of social isolation on the health of children with phys-

ical disabilities would not be seen until the end of the COVID-19 pandemic. It is hoped that this study will increase awareness about individuals with special needs during possible pandemic periods and may also be informative for healthcare personnel working with individuals with special needs.

## 2. Methods

### 2.1. Research type

The research was designed as a prospective, single-centre, non-randomized controlled study.

### 2.2. Study population

The study included children with physical disabilities (cerebral palsy, spina bifida, down's syndrome), aged 2–18 years, with signed informed consent provided by their parents. Patients with a history of surgery to the trunk or upper or lower extremities in the last six months and those with severe psychological impairment were not included in the study.

### 2.3. Data collection tools

Before starting the data collection, the parents were given detailed information about the questionnaires. For the children who met the inclusion criteria and whose parents voluntarily consented to participate in the study, the gross motor level was determined according to the Gross Motor Function Classification System (GMFCS). Then the International Physical Activity Questionnaire Short Form (IPAQ), and Quality of Life Scale for Children (PedsQL) questionnaires were administered. Permission to use these questionnaires, which have been validated in Turkish, was obtained from the original researchers via e-mail. The questionnaires were administered face-to-face to the children and their parents in rehabilitation sessions, or by telephone to those who did not continue rehabilitation.

### 2.4. Study outcomes

Gross Motor Function Classification System (GMFCS): This was developed for physically handicapped children as a classification system based on sitting, displacement, and mobility. Age-related levels are defined for motor functions, as < 2 years old, 2–4 years old, 4–6 years old, and 6–12 years old. The

expanded version of the classification system can now be used for physically disabled children aged 12–18 years [15].

### GMFCS levels according to age

- Level I: Walks without limitation.
- Level II: Walks with limitations.
- Level III: Walks using hand-held mobility device.
- Level IV: Self-movement is limited. Can use a motorized mobility vehicle.
- Level V: Is transported in a manual wheelchair.

International Physical Activity Questionnaire Short Form (IPAQ-SF): This is an internationally valid questionnaire which is used for the evaluation of physical activity. The short form of the questionnaire includes 7 items providing information about the time spent sitting, walking, and in moderately vigorous activities. The assessment of all activities is based on each activity performed for at least 10 minutes at a time. A score is defined as “MET-minutes/week” by multiplying the minutes, days, and MET values. Walking time (minutes) is multiplied by 3.3 METs, moderately vigorous activity is multiplied by 4 METs, and vigorous activity by 8 METs. The classification is made as inactive, minimally active, or very active according to the numerical values obtained [16].

Quality of Life Scale for Children (PedsQL): This questionnaire consists of 23 items, each scored as 100, 75, 50, 25, or 0 points for the options of “never, rarely, sometimes, often, almost always”, respectively. The scale total score is obtained by dividing the total score of the items by the number of items answered, with a higher total score indicating a higher level of health-related quality of life. More than 50% of the scale must be completed for an evaluation [17].

### 2.5. Ethics consideration

Approval for the study was granted by the Hamidiye Ethics Committee (Protocol Number: 30167) and registered in the ClinicalTrial.gov website (registration number: NCT04900402). The study was conducted in accordance with the Helsinki Declaration. Written informed consent was obtained from the parent/legal guardian of each of the children included in the study and from the Special Education and Rehabilitation Centre officer.

### 2.6. Data analysis

Data were analyzed using IBM SPSS vn. 26.0 software. Continuous variables were reported as mean  $\pm$  standard deviation (SD) values, and categorical variables as number (n) and percentage (%). Conformity of the data to normal distribution was assessed with the Kolmogorov-Smirnov test. Differences in independent variables between groups were compared using the Student’s *t*-test.

Sample size was determined using power analysis and the results showed that a minimum of 18 patients was necessary in each group to be able to determine the minimum significant difference clinically with 8% power and 5% error level. Thus, the study included 18 children with physical disabilities who continued rehabilitation, and 18 children with physical disabilities who did not continue rehabilitation during the COVID-19 pandemic [18].

## 3. Results

The 18 patients who continued rehabilitation comprised 52.6% females and 47.4% males with a mean age of  $7.89 \pm 4.86$  years. The 18 patients who did not continue rehabilitation comprised 55.6% females and 44.4% males with a mean age of  $10.22 \pm 6.69$  years. No significant differences were detected between the two groups in respect of demographic and clinical data, and functional characteristics. The comparisons of the basic characteristics of the groups are shown in Table 1.

Significant differences were detected in PedsQL physical health and IPAQ-SF gait parameters when the rehabilitation and non-rehabilitation groups were compared ( $p < 0.005$ ). No significant differences were detected between the groups in respect of the PedsQL psychosocial health, total parameters, and IPAQ-SF vigorous physical activity, moderate physical activity, and total physical activity parameters ( $p > 0.005$ ). The comparisons of the two groups are shown in Table 2.

## 4. Discussion

COVID-19 affected the entire world and was declared a global pandemic by the WHO on March 11, 2020. To control the pandemic, strict rules were implemented in many countries. Participation in normal daily activities and travel was restricted.

Table 1  
Demographic characteristics of the participants

	Continued rehabilitation N= 19	Did not continue rehabilitation N= 18	p*
Age (years) median(min-max)	7.89	10.22	0.23
Gender (F/M) n. %	52.6/47.4	55.6/44.4	0.86
Distribution of diagnosis n. %			
Brachial plexus	10.5	50	
Cerebral palsy	52.6	11.1	
Down's syndrome	10.5	22.2	0.59
Growth retardation	15.8	11.1	
Spina bifida	10.5	5.6	
TOTAL	100	100	~
GMFCS level. n. %			
Level 1	57.9	50	
Level 2	5.3	16.7	
Level 3	15.8	5.6	0.58
Level 4	15.8	5.6	
Level 5	5.3	22.2	
TOTAL	100	100	~

GMFCS: Gross Motor Function Classification System. \*Kolmogorov Smirnov test  $p < 0.05$ .

Table 2  
The physical activity and quality of life characteristics of the participants  
who continued and did not continue rehabilitation

	Continued rehabilitation N= 19 Median (Min-Max)	Did not continue rehabilitation N= 18 Median (Min-Max)	p**
PedsQL			
Physical health	54.76	34.37	0.02
Psychosocial health	171.84	153.88	0.4
Total	226.61	182.71	0.1
IPAQ-SF			
Severe PA. kcal/d	90.94	35.55	0.1
Moderate PA. kcal/d	20.21	16	0.66
Walking. kcal/d	41.84	22.99	0.03
Total FA. kcal/d	153	74.61	0.06
IPAQ-SF activity level groups * n (%)			
Inactive	57.9	66.7	
Minimally active	42.1	33.3	0.59
Very active	–	–	
Total	100	100	~

PedsQL: Quality of Life Scale for Children, PA: Physical Activity, IPAQ-SF: International Physical Activity Questionnaire Short Form. \*Physical activity level groups were categorized according to MET values. Inactive < 600MET, Moderate 600–3000MET, Active > 3000MET. \*\*Student's *t*-test  $p < 0.05$ .

Both indoor and outdoor sports and recreation facilities, special education schools, gymnasiums and swimming pools were closed. With these implementations of social distancing the COVID-19 pandemic restricted physical activity for individuals of all ages [2, 19, 20].

The COVID-19 pandemic restrictions also significantly affected children with physical disabilities. The WHO recommends that children and young peo-

ple with disabilities aged 5–17 years should undertake at least 150 minutes of moderate to vigorous intensity physical activity per week, wherever possible. It has been estimated that there may have been negative changes in children who did not reach the recommended physical activity level during the pandemic [20].

In a study conducted in 2020 to examine the validity of the IPAQ-SF questionnaire to evaluate the

physical activity levels of children with Cerebral Palsy, it was reported that the IPAQ-SF parameters were not valid for moderate, vigorous, and total physical activity levels. This was stated to be due to the fact that perceived activity levels of children with CP did not match the reality. In the current study, no significant differences were detected between the children who continued and did not continue rehabilitation in the mentioned parameters. This was thought to be because 52.6% of the children who continued rehabilitation and 11.1% of the children who did not continue rehabilitation in this study had CP [21].

In a meta-analysis and a systematic analysis of the validity of the IPAQ questionnaire, it was emphasized that several factors affect the validity of IPAQ parameters. Some of the parameters, such as moderate physical activity and walking parameters may be ignored or not noticed in activities of daily living. However, it was also noted that participants were more able to distinguish the time spent walking than the time spent on moderate physical activities. It was also argued that the vigorous physical activity parameter was more easily remembered and reported.

In addition, there has been shown to be a low correlation between objective measurements of physical activity and the IPAQ questionnaire. Physical activity has been shown to be under-measured with a difference of at least 28%.

The moderate-intensity physical activity parameter values have been reported to be confused with walking and the walking parameter has been added to moderate-intensity activity in some cases. In the current study, significant differences were detected in the walking parameter. Considering the analysis supporting less deviation in the walking parameter, the result in the current study can be considered more explanatory [22].

In a study that was conducted for IPAQ validity with boys aged mean 14 years, it was reported that the measurement of moderate physical activity did not yield accurate results. In the current study, no significant results were detected in the moderate-intensity physical activity parameter of the IPAQ questionnaire, which was thought to be due to the inclusion of pre-adolescent boys in this study [23].

A study in France of school-aged children aged 8 to 18 years that evaluated child and parent feedback from the Health-related Quality of Life (HRQoL) questionnaire reported differences between child-reported and parent-reported quality of life. It was stated that parents tended to simplify their children's level of quality of life as measured by the HRQoL,

and therefore the variability of the scores between parents and children may hinder correct evaluation of the results [24].

The COVID-19 pandemic prevented access to physical therapy centres and therapy causing restriction of physical activity. Based on the PedsQL physical health score in this study, it was determined that the children who continued rehabilitation were more successful than the children who did not continue. However, there is still a need to increase the number of studies on this subject and to increase the participation of children in physical activity. In the evaluation of the IPAQ questionnaire results, there were seen to be some limitations inherent to the questionnaire. Nevertheless, the results of this study support the literature, although there is a need to use different methods for a more objective evaluation of physical activity.

## 5. Conclusion

The results of the current study demonstrated that the continuation of rehabilitation during the COVID-19 pandemic led to a better quality of life and walking capacity of children with disabilities.

Although the effects of the COVID-19 pandemic have almost disappeared from daily life, there is the possibility that social isolation could be introduced again in the event of a similar pandemic in the future. This study can be considered to make a valuable contribution to the literature data as it draws attention to the effects on physically disabled children during the pandemic, and demonstrates the importance of continuing treatment. The use of alternative rehabilitation models should be considered, so that healthcare providers and rehabilitation teams are prepared for such situations in the future. More studies are needed in this regard.

This study is not without limitations. The study was conducted in a single centre with a low number of participants and the data of the children with physical disabilities before the pandemic were not known. To be able to generalize the results, there is a need for further studies with larger samples. In addition, although this study dealt with the period of the COVID-19 pandemic, the problem of continuing rehabilitation is common at all times. This can be due to the distance between home and healthcare institution and the difficulties experienced by the parents. Therefore, regardless of the reason, there is a need for

healthcare institutions to organize alternative models to provide healthcare services to the patient.

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### Conflict of interest

None of the authors have any conflict of interest to declare.

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### Author contributions

Idea/Concept: FK, ZÖ; Design: FK, EP; Supervision/Consulting: EP; Analysis and/or Interpretation: EP, ZÖ; Resources: FK, ZÖ; Writing the Article: FK, ZÖ; Critical Review: EP.

### Disclaimer

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