

Fitkids Exercise Therapy Program in the Netherlands

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Purpose: To describe the demographics, medical diagnoses, and initial aerobic fitness levels of children participating in Fitkids: an exercise therapy program for children with chronic conditions or disabilities in the Netherlands. **Methods:** We reviewed data of children who were in the program on September 2010. **Results:** In total, 2482 children from 105 Fitkids centers were included. Results showed the large heterogeneity of the population regarding demographic characteristics and medical diagnoses. Significantly reduced scores on the 6-minute walk test and half Bruce treadmill test were observed. **Conclusion:** The Fitkids population has great heterogeneity. In addition, a plethora of fitness tests were used, and registration of data in the Fitkids database was suboptimal. Moreover, this study showed the impaired aerobic fitness of children participating in Fitkids. Future research should investigate the effectiveness of the Fitkids program. (*Pediatr Phys Ther* 2013;25:7–13) **Key words:** aerobic capacity, child, chronic disease, disabilities, exercise, exercise therapy, physical fitness, the Netherlands

INTRODUCTION

Regular physical activity (PA) is important for healthy children as well as for children with chronic health conditions. Physical activity is generally thought to be associated with benefits for psychosocial health, functional ability, and health-related quality of life.¹ Moreover, PA has been proven to reduce the risk of coronary heart disease^{2,3} and some cancers⁴ in adults. Conditions associated with physical inactivity include obesity, type 2 diabetes, and hypertension.^{5–8} Regular PA increases exercise capacity and physical fitness.⁹ *Physical fitness* is defined as a set of attributes that people possess or achieve to perform PA.⁹ Impaired physical fitness has been reported in children and adolescents with all kinds of chronic health conditions.^{10–14}

Although children with a chronic health condition or disability are restricted in sports participation because of their impaired physical functioning, reduced physical fit-

ness seems also related to hypoactivity in daily life.^{10,15} Because of a sedentary lifestyle, which is defined as an unusual level of PA that is less than 60 minutes of moderate-intensity activity per day,¹⁶ the majority of children with chronic health conditions or disabilities are not meeting public-health guidelines for healthy PA levels. The sedentary lifestyle could be a result of the tendency of parents to be overprotective, anxiety, or perceived restrictions in sports participation. Or alternatively, the sedentary lifestyle could be a result of the limited access to nearby facilities and programs for these children, whether for leisure, recreation, or competition.^{17,18}

Besides the potential negative health effects, children with a chronic condition or disability who are inactive do not benefit from the controlling or slowing effect of PA on the progression of the chronic disease. Moreover, these children are at risk to become socially isolated from peers who are healthy because of their poor physical fitness.¹⁹

On the basis of these experiences, the Dutch foundation “Artsen voor Kinderen” (Physicians for Children) in 2003 developed an exercise therapy program (Fitkids) for children with a chronic condition or disability in the Netherlands. In 2006, Fitkids was housed in a distinct foundation, the Fitkids foundation, which has the responsibility to ensure the quality of the Fitkids program and to expand the program in the Netherlands. Fitkids can be regarded as a facilitator for an active lifestyle. The program focuses on improving physical health and, as a result, on optimizing health-related quality of life. The main goal is

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to bring children to a higher level of durable activity, which allows them to join peers who are healthy in PA at a regular sports club. In Fitkids, children from the age of 6 to 18 years with all kinds of physical disabilities can participate, for example, children with asthma, diabetes, congenital heart defect, rheumatic disease, autism, cystic fibrosis, cerebral palsy, developmental coordination disorder, and Down syndrome. Because of this diversity in children with different chronic diseases and/or disabilities within the program, the program is under supervision of experienced pediatric physical therapists. All therapists receive an intervention protocol and personal instruction to guarantee uniformity of the Fitkids program between the therapists and Fitkids centers. Within the program, children train in small, heterogeneous groups based on age, gender, and chronic condition or disability. Fitkids includes a warm-up and cool-down based on simple competitive and/or strategic games. Furthermore, the program is set up to improve cardiovascular fitness. For this, treadmills, cross trainers, stationary exercise bikes, rowing machines, and other indoor exercise equipment is used, which discriminates Fitkids from other pediatric exercise programs based on more functional exercises. Except for the warm-up and cool-down, the training is performed individually.

The physical therapy program consists of 2 to 4 phases each lasting 3 months in which the intensity of support is reduced. Since the start in 2003, 150 Fitkids centers have currently been opened, which makes Fitkids a nationwide program in the Netherlands, and which enables children to train in a pediatric physical therapy practice near their home. Studies describing the effectiveness of such a large nationwide program have not been performed yet. However, it is necessary to establish the effectiveness of the Fitkids program. The current study is the first step in this process toward improved evidence-based practice. In the current study, we want to describe the population of children currently participating in Fitkids.

The specific aims of the current study were to: (1) describe the demographics and medical diagnoses of the children participating in Fitkids; (2) specify the exercise tests used to determine the initial aerobic fitness of children participating in Fitkids; and (3) determine the initial aerobic fitness of children participating in Fitkids.

METHODS

Study Population

More than 6000 children had participated in the Fitkids program from May 2003 to September 2010. For this study, we reviewed data of children who were in the Fitkids program on September 2010. The outcomes that were analyzed for the study were obtained by pediatric physical therapists during the initial assessment of the participants. The data were entered and stored in a Web-based patient record, the Fitkids database, located at <http://www.fitkids.nl>. Outcomes included demographic characteristics of the participants (eg, gender, age, height,

weight, body mass index [BMI]), medical diagnoses, type of aerobic exercise test used to test the child's initial aerobic fitness, and initial test results. The analysis was performed on anonymous patient care data. Therefore, there was no medical ethics approval required for this study according to Dutch law.

Demographic Characteristics

Body mass and height of the children were determined with an electronic scale and a height-measuring device (wall-mounted measuring stick). Body mass index (kg/m^2) was derived from weight and height. Standard deviation scores (SDs) were calculated from Dutch growth charts.^{20,21} Overweight and obesity were defined as +1 or more and +2 or more SD BMI for age, respectively.

Medical Diagnoses

Data concerning medical diagnosis of the children were based on the information provided by the treating physician in the medical referral letter.

Aerobic Fitness

A variety of validated exercise tests were used to determine the initial aerobic fitness of the children participating in Fitkids. To some extent, the pediatric physical therapists were free to choose an aerobic exercise test that was most optimal to use in their center on the basis of the equipment available and patient characteristics. However, to guarantee uniformity between Fitkids centers, 3 aerobic exercise tests were recommended by the Fitkids foundation (eg, the 6-minute walk test [SMWT], the half Bruce treadmill test, and the shuttle-run test [SRT]). Test conditions, which are described later, were outlined in a Fitkids test manual, which was provided by the foundation. Training days were organized to educate the therapists in the administration of the recommended exercise tests. Furthermore, at set dates, centers were audited to determine whether they followed the Fitkids test manual.

Six-Minute Walk Test

The SMWT was conducted according to the American Thoracic Society guidelines.²² Subjects were instructed to walk from one end to the other of the walking path at their own pace, while attempting to cover the largest possible distance in 6 minutes. Physical therapists encourage subjects with the standardized statements "You're doing well" or "Keep up the good work." The 6-minute walking distance (SMWD) was recorded as the performance outcome measure. Percentage of predicted SMWD was calculated using an age- and height-based equation fitted to normative data by Geiger and colleagues.²³

$$\text{Equation boys: } 196.72 + (39.81 \times \text{age [years]}) - (1.36 \times \text{age [years]}^2) + (132.28 \times \text{height [m]})$$

Equation girls: $188.61 + (51.5 \times \text{age [years]}) - (1.86 \times \text{age [years]}^2) + (86.1 \times \text{height [m]})$

Half Bruce Treadmill Test

The half Bruce treadmill test was used because it has smaller increments in workload in comparison with the original protocol.²⁴ The half Bruce treadmill test has eleven 1.5-minute stages. The first stage starts at a speed of 2.7 km/h and a gradient of 10%. Except for the last 2 stages, which have an increment of 0.4 km/h, each subsequent stage has an increment of 0.6 to 0.7 km/h. All subsequent stages have an increment of 1% in gradient. Children were urged to continue to the point of severe fatigue. The test was finished when a child refused to continue the test despite verbal encouragement. Maximal endurance time was recorded as the outcome measure. As reference values for the half Bruce treadmill test are lacking, those for the original Bruce protocol were used. According to Binkhorst et al,²⁵ there is no significant difference in maximal endurance times between the 2 test protocols. Reference values published by van der Cammen et al²⁶ were used for children aged up to 10 years. For the remaining children, the reference values of Binkhorst et al²⁵ were used.

Shuttle-Run Test (10- or 20 m)

The SRT requires children to walk or run between 2 markers delineating the respective course of 10 or 20 m.^{27,28} Speed of movement was incremented and determined by an audio signal, which was played through a standard CD player. The endpoint of the 10-m SRT was reached when, on 2 consecutively paced signals, the children were more than 1.5 m away from the marker. The endpoint of the 20-m SRT was reached when, on 2 consecutively paced signals, the children were more than 3-m away from the marker. Level and number of shuttles reached before a child was unable to keep up with the audio signal was recorded as the performance outcome measure. As reference values for the 10-m SRT for healthy children are lacking²⁹ and recent reference values for the 20-m SRT are only known for the 13- to 18-year-old adolescents,³⁰ test outcomes of both the 10- and 20-m SRT were not compared with reference standards.

DATA ANALYSIS

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS-18.0, SPSS Inc, Chicago, IL). The distribution of the variables was checked with the Kolmogorov-Smirnov test. Because of the skewed nature of the age, weight, length, and BMI distributions, medians and interquartile ranges (IQRs) were presented for the total population as well as for boys and girls separately. The nonparametric Mann-Whitney *U* test was used to test for differences in demographic characteristics between boys and girls. For initial test results, normality assumptions were only met for the 10- and 20-m SRT. The

Wilcoxon signed rank test was used to test for significant differences between SMWD and distances predicted by the equations of Geiger et al.²³ Differences between maximal endurance times of the half Bruce treadmill test and reference values were analyzed using the SDS of the endurance time, that is, the difference between the observed and predicted value divided by the SD of the reference values. Statistical significance of the SDS endurance time was analyzed using a signed rank test. Significance level for all tests was set at $\alpha < 0.05$.

RESULTS

Study Population

Demographic Characteristics. A total of 2482 children were included in the analysis (1311 boys and 1171 girls), from 105 Fitkids centers. The demographic characteristics and SDSs are presented in Table 1 for the total population as well as for boys and girls separately. Because of the skewed nature of the variables' distribution, medians and IQRs are given. Because of incomplete data sets, each variable is based on a different number of children. The median age of the children was 10.8 years (IQR, 9.0 to 12.9). Median weight for height, height for age, weight for age, and BMI for age SDSs were respectively 2.1 (IQR, 1.1 to 2.8), 0.1 (IQR, -0.8 to 0.9), 1.7 (IQR, 0.6 to 2.6), and 2.1 (IQR, 1.0 to 2.6). Significant differences were found in age, weight, and BMI between boys and girls (Table 1).

Medical Diagnoses. In total, the study sample showed 67 different primary diagnoses. The 20 most common primary diagnoses of the children participating in Fitkids are presented in Table 2. Twenty-eight percent of the children had a primary medical diagnosis of obesity, whereas 18% were diagnosed with motor retardation and 10% with autism or autism-related disorder. Each of the remaining disorders/diseases (eg, asthma, orthopedic disorders, neurological disorders, mental retardation, Down syndrome, cerebral palsy, and attention deficit hyperactivity disorder) are reflected in less than 10% of the children.

Use of Exercise Tests

As recommended in the Fitkids test manual, the SMWT ($n = 1233$), the half Bruce treadmill test ($n = 306$), the 10-m SRT ($n = 82$), and the 20-m SRT ($n = 16$) are often used in the initial assessment of Fitkids. Other exercise tests applied during the initial assessment, which were not outlined in the Fitkids test manual, include Physical Working Capacity (PWC) 170 ($n = 62$), the shuttle-walk test (SWT) ($n = 14$), the Cooper Test ($n = 11$) or half-Cooper Test (6 minutes; $n = 7$), and a number of tests from the EUROFIT test manual³¹: 10 × 5 m sprint test ($n = 10$), sit and reach test ($n = 12$), standing long jump ($n = 14$), sit-ups ($n = 5$), and the handgrip strength test ($n = 2$). Results of the 5 tests that were most commonly used are outlined later, that is, the SMWT, the half Bruce treadmill test, the 10- and 20-m SRT, and the PWC170. No exercise test results were recorded for 681 children.

TABLE 1
Demographic Characteristics of Participants

	Boys (n = 1311)		Girls (n = 1171)		P ^a	Total Median (IQRs)
	n	Median (IQRs)	n	Median (IQRs)		
Age (y)	968	10.7 (8.9-12.5)	882	11.0 (9.2-13.2)	.002	10.8 (9.0-12.9)
Weight (kg)	895	49.0 (39.0-63.5)	823	53.0 (41.9-68.0)	.000	51.0 (40.0-65.2)
Height (cm)	899	148.0 (137.0-159.0)	813	150.0 (139.0-160.8)	NS	149.0 (138.0-160.0)
BMI (kg/m ²)	887	23.0 (18.9-26.8)	810	24.3 (20.7-28.2)	.000	23.7 (19.8-27.5)
Weight for height (SDS)	884	2.2 (1.0-2.9)	809	2.1 (1.3-2.7)	NS	2.1 (1.1-2.8)
Height for age (SDS)	772	0.1 (-0.8-1.0)	700	0.1 (-0.8 to 0.8)	NS	0.1 (-0.8 to 0.9)
Weight for age (SDS)	768	1.7 (0.4-2.7)	703	1.7 (0.7-2.5)	NS	1.7 (0.6-2.6)
BMI for age (SDS)	763	2.1 (0.9-2.7)	696	(1.2-2.6)	NS	2.1 (1.0-2.6)

^aBased on nonparametric Mann-Whitney *U* test.

Abbreviations: BMI, body mass index; IQR: interquartile range; NS: not significant; SDS, SD score.

TABLE 2
Medical Diagnoses (Primary)

	Boys (n = 1311)	Girls (n = 1171)	Total
Obesity	303 (23.1)	403 (34.4)	706 (28.4)
Motor retardation	267 (20.4)	186 (15.9)	453 (18.3)
Autism spectrum disorders	192 (14.6)	53 (4.5)	245 (9.9)
Asthma	91 (6.9)	95 (8.1)	186 (7.5)
Orthopedic disorders	53 (4.0)	55 (4.7)	108 (4.4)
Neurological disorders	40 (3.1)	38 (3.2)	78 (3.1)
Mental retardation	26 (2.0)	39 (3.3)	65 (2.6)
Down Syndrome	26 (2.0)	37 (3.2)	63 (2.5)
Cerebral Palsy	34 (2.6)	23 (2.0)	57 (2.3)
Attention deficit hyperactivity disorder	36 (2.7)	10 (0.9)	46 (1.9)
Visual impairment	19 (1.4)	18 (1.5)	37 (1.5)
Diabetes	13 (1.0)	21 (1.8)	34 (1.4)
(Congenital) Heart defects	20 (1.5)	11 (0.9)	31 (1.2)
Hypermobility syndrome	18 (1.4)	11 (0.9)	29 (1.2)
Developmental coordination disorder	20 (1.5)	8 (0.7)	28 (1.1)
Spina bifida	10 (0.8)	10 (0.9)	20 (0.8)
Neuromuscular diseases	18 (1.4)	4 (0.3)	20 (0.8)
Juvenile arthritis	5 (0.4)	13 (1.1)	18 (0.7)
Chronic fatigue syndrome	5 (0.4)	13 (1.1)	18 (0.7)
Cancer	10 (0.8)	7 (0.6)	17 (0.7)

Values given as number (% of total)

Aerobic Fitness

Six-Minute Walk Test. Initial test results of the SMWT are presented in Table 3. In total, 654 boys and 579 girls performed the SMWT during the Fitkids initial assessment. However, because of incomplete data, the percentage of predicted SMWD could only be calculated for 527 boys and 451 girls and only these children were included in the analyses. Median walking distance was 510.0 m for boys as well as for girls. Compared with reference values from Geiger et al,²³ the walking distance was significantly reduced for both boys and girls. The median predicted distances for boys and girls were 78.7%; $P < .0001$ and 80.3%; $P < .0001$, respectively (Table 3).

Half Bruce Treadmill Test. Initial test results of the half Bruce treadmill test are presented in Table 4. In total, 161 boys and 145 girls performed the half Bruce treadmill test during the Fitkids initial assessment. However, because of incomplete data, the SDS of the endurance time could only be calculated for 154 boys and 140 girls and

only these children were included in the analyses. Median maximal endurance time was 9.5 minutes (ie, boys 10.0 min and girls 9.3 min). Both in boys and girls, the maximal endurance time was significantly below the norm (median SDS endurance time, -1.7 ; $P < .0001$ and -1.6 ; $P < .0001$, respectively).

Shuttle-Run Test (10 or 20-m). Initial test results of the 10-m SRT are presented in Table 5. In total 40 boys and 42 girls performed the 10-m SRT during the Fitkids initial assessment. Mean level achieved was 8.7 (ie, boys level, 9.3; and girls level, 8.2). Initial test results of the 20-m SRT are presented in Table 6. In total, 12 boys and 4 girls performed the 20-m SRT during the initial assessment of Fitkids. Mean level achieved was 3.2 (ie, boys level, 2.9; and girls level, 4.1).

Physical Working Capacity 170. Initial test results of the PWC170 are presented in Table 7. In total, 27 boys and 35 girls performed the PWC170 during the initial assessment. Median PWC achieved at 170 beats per minute was 111 W (ie, boys 125 W and girls 105 W). Because of the

TABLE 3

Initial Test Results of the Six-Meter Walk Test

6-m Walk Test	Boys (n = 527)	Girls (n = 451)	Total
6-m walking distance (m)	510 (451-580)	510 (441-576)	510 (449-578)
Predicted distance (%)	78.7 (69.4-88.4) ^a	80.3 (68.7-89.4) ^a	79.3 (69.0-88.7)

Values indicate median (interquartile range).

^aP < .0001 for differences between walking distances and norm values.**TABLE 4**

Initial Test Results of the Half Bruce Treadmill Test

Half Bruce Treadmill Test	Boys (n = 154)	Girls (n = 140)	Total
Maximal endurance time (min)	10.0 (8.3-12.0)	9.3 (8.0-10.3)	9.5 (8.1-10.9)
SD score maximal endurance time	-1.7 (-2.9 to -0.8) ^a	-1.6 (-2.5 to -0.8) ^a	-1.7 (-2.7 to -0.8)

Values indicate median (interquartile range).

^aP < .0001 for differences between maximal endurance times and norm values.**TABLE 5**

Initial Test Results of the 10-m Shuttle-Run Test

10-m Shuttle-Run Test	Boys (n = 40)	Girls (n = 42)	Total
Level	9.3 ± 3.2 (1.0-15.5)	8.2 ± 3.1 (1.5-15.5)	8.7 ± 3.2 (1.0-15.5)

Values indicate mean ± SD (range).

TABLE 6

Initial Test Results of the 20-m Shuttle-Run Test

20-m Shuttle-Run Test	Boys (n = 12)	Girls (n = 4)	Total
Level	2.9 ± 2.2 (1.0-7.5)	4.1 ± 2.6 (0.5-6.0)	3.2 ± 2.3 (0.5-7.5)

Values indicate mean ± SD (range).

TABLE 7

Initial Test Results of the Physical Working Capacity 170

Physical Working Capacity 170	Boys (n = 27)	Girls (n = 35)	Total
Watt	125 (100-175)	105 (90-150)	111 (100-150)

Values indicate median (interquartile range).

lack of recent reference standard values for the PWC170, we did not compare the scores with reference standards.

DISCUSSION

The purpose of this study was three fold. First, to describe the demographics and medical diagnoses of children participating in Fitkids. Second, to determine the exercise tests used to determine the initial aerobic fitness of children participating in Fitkids. And, third, to determine the initial aerobic fitness of children participating in Fitkids. Results reveal a large heterogeneity of the Fitkids population with regard to primary medical diagnoses and demographic characteristics. The study sample included children reflecting 67 different primary conditions. The heterogeneity of the sample is also reflected in the relatively large range in weight, height, and BMI or age of children participating in Fitkids.

Furthermore, a plethora of aerobic exercise tests were used to test aerobic fitness. Although physical therapists received a Fitkids manual in which the procedures of the recommended tests were outlined, test procedures were sometimes slightly modified. For example, according to the Fitkids manual, rail holding is not allowed during the Bruce treadmill test. However, some therapists permitted children to hold the railing. Rail holding is known to increase endurance time and reduce physiological strain during submaximal exercise.³² Moreover, according to the Fitkids manual, the recommended length of the walking course of the SMWT test was 15 m. However, some Fitkids centers do not have the capacity to use 15 m, so shorter walking courses were used. A shorter walking course requires the performer to reverse directions more frequently, thus reducing the SMWD. Variability in test procedures within Fitkids centers makes it difficult to compare test results obtained in different centers. Better standardization

and more training days are needed to educate the therapists in the administration of the recommended exercise tests. Besides, the need to follow test procedures as outlined in the Fitkids test manual should be further emphasized among therapists.

In addition, results of this study reveal that children participating in Fitkids have reduced aerobic fitness compared with peers who are healthy. The SMWD was significantly reduced for both boys and girls ($\pm 20\%$ reduction). Test results of the half Bruce treadmill test indicate significantly reduced maximal endurance times for boys as well as for girls (median SDS endurance time, -1.7 and -1.6 , respectively).

Because of the lack of recent reference standard values of the PWC170, and the 10-m/20-m SRT for the 6- to 12-year-old children, we were not able to compare initial test outcomes of these tests with a reference population. New reference values for the PWC170 and 10-m/20-m SRT should be established.

Moreover, test results of the 20-m SRT show the relative short exercise times of children participating in Fitkids. Mean exercise time was 3.2 minutes, which is too short to reach a maximum cardiopulmonary effort. The optimal duration for a maximal exercise test is 6 to 10 minutes in children and 8 to 12 minutes in adolescents.³³ Therefore, the 20-m SRT is not recommended for use in the Fitkids population.

Results of this study point out a relatively high prevalence of children who are overweight and/or obese within the Fitkids program (median BMI for age SDS = 2.1). Of the children with weight and height recorded in the database, 19% (284 children) were overweight ($\geq +1$ SD BMI for age), whereas more than half of these children (784 children) were obese ($\geq +2$ SD BMI for age). As these numbers are based on the children with weight and height recorded in the database rather than on the total number of children in this study, these numbers should be interpreted with some caution. It is likely that pediatric physical therapists did record BMI of children with weight problems more frequently and, therefore, these numbers could indicate an overestimation of the prevalence of overweight and obesity in the Fitkids population. However, Schönbeck and van Buuren³⁴ reported in 2011 that 13% to 15% of Dutch children in the general population suffered from overweight and obesity, so the overweight and obesity conditions are dramatically increased in the Fitkids population: in a best-case scenario, 32% of the total population is obese, whereas more than 50% are obese in a worst-case scenario. The prevalence of overweight and obesity has been increasing in youth at an alarming rate. This is of concern because in this age group overweight has been associated with numerous health risks.³⁵ It should be questioned whether Fitkids is relevant for obese children because it is difficult to lose weight using exercise therapy.³⁶ However, the main goal for the children in Fitkids is to improve physical fitness and optimize, if applicable, psychosocial well-being. Moreover, children who are obese and demonstrate significant motor retardation are often excluded from obesity intervention

programs. Probably, these children should first participate in Fitkids to improve gross motor function and fitness and, thereafter, they might participate in multidisciplinary obesity programs in which nutritional advice is combined with a more active lifestyle to gain a more healthy weight.

Study Limitations

Limitations of this study include the problem of missing data. Although 2482 children were included in the database, only 1439 complete data sets including gender, date of birth, primary medical diagnosis, age, height, weight, type of initial test, and initial test outcome were available. For 681 (27%) children, the initial test outcome was missing, and for 785 children (32%), weight and/or height were missing. With regard to progress toward improved evidence-based practice, it is of high priority to optimize the process of recording data. Currently, pediatric physical therapists record demographic characteristics and test outcomes of patients participating in Fitkids twice: once for their own administration and recording systems and once in the Fitkids Web-based database. The Fitkids foundation could facilitate the recording of Fitkids data, with, for example, a data management system that assists Fitkids therapists with the data entry.

Clinical Usefulness

Determining the physical fitness levels of children with chronic conditions is important. Patients included in studies are, in general, a small select group of subjects with an existing interest in fitness or activity. The current database consists of a large unselected nationwide group of patients who were participating in Fitkids as a part of their medical care.

CONCLUSIONS AND PERSPECTIVES

This study showed the heterogeneity of the Fitkids population regarding demographic characteristics and chronic condition or disability. In addition, there were a plethora of fitness tests used, and the recording of data in the Fitkids database was suboptimal. Moreover, this study showed the impaired aerobic fitness of children participating in Fitkids. Fitkids aims to improve the physical health of these children as well as health-related quality of life. However, the effectiveness of Fitkids has not been established yet. Future research should investigate the effectiveness of the exercise therapy program Fitkids, taking the population heterogeneity into account.

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