**Supplementary files 1-2**

**Supplementary file 1** Exercise Library: Overview of exercises primarily used in the physical training programme. The focus was on stability/balance, mobility, strength (resistance) and cardiorespiratory fitness. Several of the exercises affect more than one focus area.

|  |
| --- |
| **Mobility, strength** |
| **Lower-extremity exercises:**  |
| Up on toes / walk on toes |
| Up on heels / walk on heels |
| Squat (air, front, Bulgarian) |
| Wall sit |
| Deadlift (both legs, single leg) |
| Thrusters |
| Lunges |
| Side step / shuffle |
| Side step / shuffle crossover |
| Skip |
| Walking backwards |
| Jumps |
| Jumping jacks |
| Frog jumps |
| Knees to elbows |
| Crawl (bear, crab) |
| Making turns |
|  |
| **Upper-extremity exercises:**  |
| Push-ups |
| Fly |
| Rowing |
| Shoulder press |
| Flyers |
| Laterals |
| Dips |
| Dumbbell press |
| Pull-down |
| Biceps curl |
| Hammer curl |
| Push-down |
|  |
| **Core and pelvis exercises:**  |
| Hip thruster |
| Plank |
| Back extensions |
| Abdominal crunch / sit-up |
| Leg lifts |
| Bicycle legs |
|  |
| **Stability/balance and cardiorespiratory fitness** |
| **Balance, stability and neuromuscular exercises:**  |
| Stand on one leg |
| Walk in a straight line |
| Agility course |
| Balance on an unstable base (e.g. foam pad) |
| Balance board |
| ‘Throwing’ balls from unstable surfaces |
| Sitting and kneeling balance exercises on Swiss exercise ball (eyes open and closed) |
|  |
| **Cardiorespiratory fitness exercises:**  |
| Steps |
| Bicycle ergometer |
| Treadmill |
| Cross trainer |
| Running / marching on the spot |
| Walks |
| Walking in intervals |
| High knee running |
| Step up onto bench |
| Heel kick running |
| Stairways |
|  |
| **Play/games** |
| The floor is made of lava |
| Playing with balls (variations of throws and kicks) |
| Game of tag |
| Agility course |
| Kings successor |
| Interactive screen |
| Silly walks |
| Hopscotch |
|  |
| **Minor training programmes** |
| 7-min workout |
| Superheroes workout |

**Supplementary file 2** Physiological tests

|  |  |
| --- | --- |
| **VO2peak cardiorespiratory fitness (1, 2)** | VO2peak was measured during a cycle ergometer test on an electronically braked cycle ergometer (Lode Corival Paediatric or Monark Ergomedic 839 E) using a modified Godfrey protocol with the workload increasing progressively by 10 watts/min to the point of exhaustion (1). We used a Hans Rudolph valve (2-way NRBV, Hans Rudolph Inc., Kansas City, MO, USA) or a Hans Rudolph mouthpiece especially designed for children and a nose clip if the children had a gastrointestinal tube. Ventilation and gas exchange data were determined breath by breath. Peak oxygen uptake was the average of the highest values continuously recorded over 60 seconds during the test expressed in millilitres per kilogram per minute (ml/kg/min) and litres per minute (l/min) to eliminate the weight component. VO2peak was determined with a portable INNOCOR Ergo Spirometry System, INN00010 (Innovision, DK 5260 Odense, Denmark), and heart rate and saturation were continuously monitored every 30 seconds (Polar FT2 Sport Tester, Kempele, Finland). The cycle ergometer was mechanically calibrated before each test.The children were instructed to keep going until exhaustion. One subjective and two objective criteria were used to determine whether the test was considered a valid VO2peak test. These were signs of intense effort such as unsteady cycling pattern, sweating, facial flushing, unsteady breathing and clear unwillingness to continue in spite of repeated strong verbal encouragement and heart rate >180 beats/min and respiratory exchange ratio (RER) >1.05. In collaboration with an external scientific unit, we validated our portable INNOCOR system against the Douglas bag system, which showed high compliance (2). |
| **Timed Up-and-Go test (TUG) (3)** | The Timed Up and Go (TUG) test evaluates basic mobility. The test measures the time it takes to get up from a chair, walk 3 metres, turn, walk back to the chair and sit down again. The last of three scores was used in the analysis. |
| **Sit-to-stand test****(STS) (4)** | The sit-to-stand test evaluates muscle strength in the lower extremities and in the hip and core muscles. The test measures the number of times a person can rise from a sitting position to an upright standing position, with no support from the hands, and sit down again in 30 seconds.  |
| **Grip strength (5)** | Grip strength as an indication of manual force is measured using a Saehan hand dynamometer (Glanford Electronics, Scunthorpe, UK). Two trials were conducted for each arm and performed standing or sitting with the elbow and dynamometer not touching anything. The higher of the two scores was used in the analysis. |
| **Flamingo balance test (6)** | The modified flamingo balance test measures a person’s ability to balance on one leg and provides information about the functioning of the vestibular organs and proprioceptors as well as leg, hip and abdominal muscle strength. The child performed the test barefoot, balancing on their preferred leg with the opposite leg lifted from the ground. The number of times the child lost balance in a 60-second period was recorded. |
| **Andersen fitness** **test (7)** | The Andersen test is a simple aerobic fitness test. The aim of this test is to cover the greatest distance in 10 minutes. The test involves running or walking back and forth for 15 seconds along a 20 meters track as fast as you can followed by 15 seconds’ standing, repeated for 10 minutes. We modified the test, so they should not touch the ground with a hand at each end of the pitch, but simply a foot. At the end of 10 minutes, we measured the distance covered. |

**REFERENCE LIST FOR THE SUPPLEMENTARY MATERIAL**

 (1) Shephard RJ, Allen C, Benade AJ et al. The maximum oxygen intake: an international reference standard of cardiorespiratory fitness. *B World Health Organ* 1968, 38:757–764

 (2) Jensen K, Jorgensen S, Johansen L. A metabolic cart for measurement of oxygen uptake during human exercise using inspiratory flow rate. Eur J Appl Physiol 2002;87:202–6.

(3) Podsiadlo D, Richardson S. The timed “Up & Go”: a test of basic functional mobility for frail elderly persons. J Am Geriatr Soc 1991, 39:142–148

 (4) Bohannon RW. Sit-to-stand test for measuring performance of lower extremity muscles.Percept Motor Skills 1995, 80:163–166

 (5) Abizanda P, Navarro JL, Garcia-Tomás MI et al. Validity and usefulness of hand-held dynamometry for measuring muscle strength in community-dwelling older persons.Arch Gerontol Geriat 2012, 54:21–27.)

 (6) Eurofit, Eurofit Tests of Physical Fitness, 1993, 2nd Edition, Strasbourg

 (7) Andersen, Lars Bo; Andersen, Thor-Einar; Andersen, Eivind; Anderssen, Sigmund A. An intermittent running test to estimate maximal oxygen uptake: the Andersen test. / In: Journal of Sports Medicine and Physical Fitness, Vol. 48, No. 7, 01.12.2008, p. 434-437.