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One-year effects of the FIT FIRST 20 high-intensity and multisport physical education program on cardiorespiratory fitness in early adolescents

Submission date
23/10/2023

Recruitment status
No longer recruiting

Registration date
30/10/2023

Overall study status
Completed

Last Edited
02/10/2026

Condition category
Other

[_] Prospectively registered
[_] Protocol
[_] Statistical analysis plan
[X] Results
[_] Individual participant data

Plain English summary of protocol
Background and study aims
In Denmark, less than one-third of 11- to 15-year-old children are sufficiently physically active. Physically inactive children are more likely to gain excessive weight, be inactive later in life, and develop chronic diseases. Therefore, this study aims to evaluate the effects of an evidence-based physical education program on cardiorespiratory fitness in early adolescents.

Who can participate?
Students enrolled in the 4th, 5th, or 6th grade of a Danish school.

What does the study involve?
Student participants will receive a special physical education program based on FIT FIRST principles if their schools are randomly assigned to receive the program. In the remaining schools, student participants will attend physical education classes, as previously established by the school. All students will respond to a questionnaire and carry out physical tests during a school day at school start, at the end of the school year, and 1 year after the project.

What are the possible benefits and risks of participating?
The potential benefits include improved physical fitness as well as enhanced well-being, self-concept, motivation to engage in physical activity, and psychological need satisfaction upon completion of the FIT FIRST 20 program. No adverse effects are expected.

Where is the study run from?
University of Southern Denmark (Denmark)

When is the study starting and how long is it expected to run for? (what are the overall start and end dates?)
January 2019 to July 2026

Who is funding the study?
Novo Nordisk Foundation (Denmark)

Who is the main contact?
Peter Krustrup, pkrustrup@health.sdu.dk

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Public, Scientific

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Additional identifiers

Protocol serial number
Fund application number: 0077612

Study information

Scientific Title
One-year effects of the FIT FIRST 20 high-intensity and multisport physical education program on cardiorespiratory fitness in early adolescents: A cluster-randomized controlled trial

Acronym
FIT FIRST 20

Study objectives
Current study objectives as of 09/01/2026:
(1) To examine the post-intervention effects of FIT FIRST 20 on cardiorespiratory fitness in early adolescents compared with a control group;
(2) To explore post-intervention effects of FIT FIRST 20 on secondary outcomes in early adolescents compared with a control group
(3) To examine the long-term intervention effects of FIT FIRST 20 on cardiorespiratory fitness by comparing an intervention-only group, an intervention-and-booster group, and a control group
(4) To explore the long-term intervention effects of FIT FIRST 20 on secondary outcomes by comparing an intervention-only group, an intervention-and-booster group, and a control group.

Previous study objectives:
A school-based physical activity intervention will improve psychosocial well-being and physical fitness and increase sports club participation among school-aged children and youth (4th to 5th grade, 10-12 years).

Ethics approval required
Ethics approval not required

Ethics approval(s)
Conforming to current legislation, the project was submitted to The Regional Scientific Ethical Committees for Southern Denmark. The committee decided that the project was exempt from the obligation to notify. Notification of this decision was forwarded via email on 01/05/2023.

Primary study design
Interventional

Study design
Cluster randomized controlled trial

Study type(s)
Quality of life

Health condition(s) or problem(s) studied
Low physical fitness and related psychological risk indicators in early adolescence

Interventions
Current interventions as of 09/01/2026:
FIT FIRST 20 is a high-intensity and multisport physical education program designed to target multiple domains of health, including cardiorespiratory fitness, metabolic and musculoskeletal fitness, and psychological outcomes in early adolescents. The program replaces standard curriculum PE and selected academic lessons with three weekly 40-minute sessions delivered during school hours over one school year. Sessions combine interval-based running and strength-focused activities across a broad range of sports and are designed to achieve high exercise intensity (≥75% of maximal heart rate) while remaining inclusive and feasible for delivery by teachers without formal PE training.

Participating schools are cluster-randomized to one of three groups: intervention-only, intervention-and-booster, or control. Both intervention groups implement FF20 for one school year, while intervention-and-booster schools additionally receive an 8-week booster program half a school year later to reinforce long-term effects. Control schools continue the usual practice and are offered the intervention one year later. Outcome assessments are conducted at baseline, post-intervention, and at one-year follow-up for all groups.

Previous interventions:
Participating schools are randomly assigned to the intervention group, the intervention and booster group, or the control group. The method of randomisation is stratified. The first and second strata include the schools recruited in the first and second recruitment rounds, respectively. As recruitment continues until summer 2024, new strata will be formed at a later stage.

The intervention and intervention-and-booster schools will implement three weekly 40-minute FIT FIRST lessons during one school year. Intervention-and-booster schools will also receive an 8-week FIT FIRST 20 booster program, half-school year after the FIT FIRST program is implemented. A booster is a strategy that is implemented after the end of an intervention to amplify its effects in the long term. It often applies the same principles of the original intervention within a shorter period, but more intensively. The control group will be offered the opportunity to implement the intervention 1 year later. Baseline measurements are conducted at the beginning of a school year, followed by post-intervention assessments at the end of the school year as well as 1 year after the end of the intervention for all participating schools.

Intervention Type
Behavioural

Primary outcome(s)
1. Cardiorespiratory fitness measured using the physical test Yo-Yo Intermittent Recovery Test Level 1, children’s version (YYIR1C) at baseline, 1 and 2 years after intervention start

Current primary outcome measures as of 09/01/2026:

Previous primary outcome measures:
All outcomes are measured at baseline as well as 1 year and 2 years after intervention start:
1. Physical fitness measured through the following physical tests: Yo-Yo IR1 Children´s test, the standing long jump test, arrow-agility test, balance test, the handgrip strength test, resting heart rate, blood pressure measurement, and InBody 230 bioimpedance measurements of body mass, lean mass, and fat percentage,
2. Well-being, measured using KIDSCREEN-27
3. Overall self-worth, measured using the Physical Self-Inventory (PSI-S)
4. Motivation to movement, measured using the perceived locus of causality questionnaire and the psychological need states in sport questionnaire

Key secondary outcome(s)
1. Lower-body muscular power, agility, handgrip strength, postural balance, body composition, resting heart rate and blood pressure measured using the standing long jump test, arrow-agility test, balance test, the handgrip strength test, resting heart rate, blood pressure measurement, and InBody 230 bioimpedance measurements of body mass, lean mass, and fat percentage at baseline, 1 and 2 years after intervention start

Well-being, measured using KIDSCREEN-27,
Self-worth, measured using the Physical Self-Inventory - very short (PSI-VS),
Motivation to engage in physical activity, measured using the Perceived Locus of Causality questionnaire,
Psychological need satisfaction, measured using the Psychological Need States in Sport questionnaire.

All outcomes are measured at baseline as well as one year and two years after intervention start.

Current primary outcome measures as of 09/01/2026:

Previous primary outcome measures:
Sports club participation. Data are collected through a questionnaire. Questions include "which sports do you practice in your spare time?" and "how many times a week do you practice sports in your spare time?". Measured at baseline as well as 1 year and 2 years after intervention start.

Completion date
01/07/2026

Eligibility

Key inclusion criteria
1. Student enrolled in a school in Denmark
2. Student attending 4th, 5th or 6th grade during the research project period

Participant type(s)
Learner/student

Healthy volunteers allowed
Yes

Age group
Child

Lower age limit
9 Years

Upper age limit
14 Years

Sex
All

Total final enrolment
1652

Key exclusion criteria
Students attending special-needs schools or schools in municipalities implementing targeted child-movement initiatives.

Date of first enrolment
01/04/2023

Date of final enrolment
31/08/2024

Locations

Countries of recruitment
Denmark

Study participating centre
University of Southern Denmark
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Sponsor information

Organisation
University of Southern Denmark

ROR
https://ror.org/03yrrjy16

Funder(s)

Funder type
Charity

Funder Name
Novo Nordisk Fonden

Alternative Name(s)
Novo Nordisk Foundation, Novo Nordic Foundation, NNF

Funding Body Type
Private sector organisation

Funding Body Subtype

Trusts, charities, foundations (both public and private)

Location
Denmark

Results and Publications

Individual participant data (IPD) sharing plan
The datasets generated and/or analysed during the current study will be available by requesting them from Peter Krustrup, Professor of Sport and Health Sciences at the University of Southern Denmark (e-mail: pkrustrup@health.sdu.dk). All data will be available after the end of the research project and indefinitely. Data is anonymized and there will be no restrictions in analyses or access criteria.

IPD sharing plan summary
Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article		30/09/2026	02/10/2026	Yes	No