Appendix 1. Questionnaire regarding parents and their offspring

Two questionnaires were delivered to all parents through the schools at baseline in August 2008 to be returned by post, with separate questions for parents and children.

The questionnaire for the children included questions on:
- Physical activity in school, during leisure time and at home
- Attitudes to physical activity
- Eating habits
- Attitudes to certain food products

The questionnaire for the parents included questions on:
- Demography
- Age
- Weight
- Height
- Genetic or chronic diseases in the closest family (list to choose from)
- Musculoskeletal conditions in the closest family (list to choose from)
- Living conditions
- Smoking in the household
- Use of child minding services
- Leisure time activities
- Attitudes to leisure time activities
- Educational
- Type of work
- Income
- Factors restricting child’s ability to be physically active
- Attitude to physical activity in children
- Estimate of child’s level of physical activity
Appendices Appendix 2. Anthropometric measurements, blood pressure and physical activity

**Anthropometric measurements**
Standard anthropometry measurements were performed on all children with light clothes and bare feet. Height was measured to the nearest centimeter using a Harpenden stadiometer and weight to the nearest 100 gram using a portable electronic weight (Tanita Electronic Scale BWB). The electronic weight was checked for accuracy every time it was moved, using 10, 20 and 30 kg weights for calibration.

Waist circumference was measured using a tape measure with a standardized tension of the tape measure. It was measured twice, and if the two measurements were more than 0.5 cm apart a third measurement was taken, using the mean of the two nearest measurements.

**Blood pressure**
Blood pressure was taken using an automated blood pressure machine (Welch Allyn®, Vital Signs Monitor, 300 Series with FlexiPort™ Blood Pressure Cuff 9), with the child sitting. The child was first introduced to the machine, the cuff was chosen and adjusted according to the size of child’s arm and the child left sitting quietly for 5 minutes before the first measurement was taken. In all, five measurements were taken and the mean of the last three was used as the measurement for the study, unless there was still a downwards trend in the measurements, in which case measurements were continued until the last three had become stable.

**Physical activity**
Physical activity was measured in three ways:
- Using a questionnaire at baseline to get information on baseline activity from a parent of the child (App. 1).
- Using weekly text messages to one parent of the child asking: How many times has [child’s name] been to sport during leisure time outside school the last week? If the answer was above 0 then they were asked what sport it was with nine possible answers (App. 8).
- Using GTX3 accelerometers with three axes and step frequency measured every two seconds for a week (App.6).
Appendix 3. Pubertal Stage

The children were presented with standard pictures showing the pubertal staging based on the original Tanner standard [5], but modified for this study. The questionnaire used in this study consists of drawings of the five Tanner stages respectively for pubic hair and breast development, Boys were presented with pictures and text of Tanner staging for pubic hair development, whereas girls were presented with pictures and text representing breast development and pubic hair (enclosed) [6]. The drawings were accompanied by an explanatory text in Danish. Children were asked, separately and in privacy, to point out the drawing that they considered resembled their own pubertal stage the most. Girls were also asked if they had started menstruating.
Girls

Schema vedr. pubertetudvikling

Piger

Navn: ______________________  Dato: __________
ID: ________________________
Alder: _____________________

Kunstehåring

- Der er ingen kunstehåring
- Der er næsten ikke eller ganske lidt kunstehåring
- Kunstehåringen er blevet lidt mere markant, fylder mere
- Kunstehåringen er næsten som hos en ung, voksen kvinde
- Kunstehåringen er som hos en ung, voksen kvinde

Brystudvikling

- Brystvorten er ikke begyndt at vokse
- Brystvorten er lige begyndt at vokse
- Selve brystet er ved at vokse
- Brystet er næsten som hos en ung, voksen kvinde
- Brystet er vokset som hos en ung, voksen kvinde

Menstruation:  Ja □  Nej □
Boys:

Schema vedr. pubertetsudvikling

_Drenge_

Navn: __________________________

ID: __________________________

Alder: __________________________

Kropsbehar

- Der er ikke kropsbehar
- Der er næsten ikke eller ganske lidt kropsbehar
- Kropsbehar er blevet lidt mere markørr, fylder mere
- Kropsbehar er næsten som hos en ung, voksen mand
- Kropsbehar er som hos en ung, voksen mand

Dato: ________
Appendix 4. Aerobic capacity

Aerobic capacity was measured using the Andersen test, a maximal running test which was validated for the age group before its use[7]. The test was carried out indoors on one-half of a handball court (wood flooring), on 20-m running lanes marked by cones. Subjects ran from one line to the other, where they had to touch the floor behind the line with one hand, turn around and run back. After 15 s, the test leader blew a whistle and the subjects stopped as quickly as possible (within two steps) and rested for the next 15 s. Other staff counted the laps for each child, 6-10 children ran at the same time [8]. This procedure was repeated during 10 minutes. Subjects ran as fast as they could in order to cover the longest possible distance during the test period. The total distance measured in meters was the test result. The test leader announced the end of the each resting period by counting backwards from 3 to 0. In addition all children wore heart rate monitors, making it possible to test the “degree of exhaustion” during the test.
Appendix 5. Motor performance

Motor performance was tested using a battery of five tests in addition to aerobic capacity (App.4). The tests were:

a. Backwards walking on balance beams, 6, 4.5 and 3 cm wide
b. Vertical jump height
c. Precision over hand throw
d. Ten times five meter sprint
e. Hand grip strength

These tests were chosen from the The “Körperkoordinations Test für Kinder”, the “Allgemeiner sportsmotorischer Test für Kinder von 6 bis 11 Jahren” and The Eurofit test battery because they are validated and had been used in a former Danish study, the Copenhagen Child intervention Study [9-13], thus making it possible to compare our results to this other large longitudinal school study.
Appendix 6. **Physical activity measured with accelerometer**

Physical activity (PA) was assessed objectively using the Actigraph GT3X accelerometer. The GT3X is a light, solid-state triaxial accelerometer, designed to monitor human activity and record energy expenditure. It measures rate of acceleration in the (Cartesian coordinate system) z-axis/vertical axis, x-axis/anterior-posterior axis and the y-axis/medio-lateral axis. The signal is digitalized and passes through a filter with band limits 0.25-2.5 Hz in order to help eliminate extraneous accelerations that are not due to human movement (e.g. vibration).

**Procedure**

Researchers from the project personally deliver the accelerometers to the children at the schools. Both oral and written information and instructions are given to children along with their parents. The children are instructed to wear the device from the time they wake up in the morning until bedtime in order to capture their entire PA for each day. The only exception is to remove the monitor when showering or swimming in order to prevent damage to the device. After the measurement period the accelerometers are recollected and data downloaded to a computer. The children wear the accelerometers for seven full, consecutive days, thus including all weekdays, and a full weekend. Seven days of measurements was selected in accordance with the findings of Trost et al [14], implying that an average of seven days is required in order to reliably characterize a child’s (1st – 12th grade) habitual PA behaviour. The accelerometer is set, to record PA data, every 2 seconds (2-sec. epoch).

**Data reduction and analysis**

The raw accelerometer outcome data is downloaded to a computer, the program Propero [15] is used to clean and break down the information. All raw data will be analyzed using both triaxial and vertical axis settings, in order to eventually generate variables for both PA level, and PA intensity.

In order to distinguish between true intervals of inactivity and “false inactivity” recorded when the monitor have been taken off, all strings of zero for 20 min or more will be defined as “accelerometer not worn” and subsequently deleted from the summation of activity. Thus, these periods will not contribute to the required minimum of valid registered activity.
Appendix 7. **Bone health measured with Dual Energy X ray Absorptiometry**

Whole-body DXA scans were performed on a subsample of 714 children from October 2008 till March 2009. This was repeated after two years and will be repeated every second year. The children that were DXA scanned were from 2nd to 4th grade at the first scan. The reason for not scanning the younger children was the ethical issue of transporting 5-7 year old children 50 km to a different city and introducing them to new unknown environments, without their parents being present. The ethical committee’s approval only included the children from 2nd to 4th grade.

Dual Energy X ray Absorptiometry (DXA), GE Lunar Prodigy (GE Medical Systems, Madison, WI), ENCORE software (version 12.3, Prodigy; Lunar Corp, Madison, WI), measured Bone Mineral Content (BMC), Bone Mineral Density (BMD), Bone Area (BA), and body composition. The total body less head values were used. The procedure took place at the Hans Christian Andersen Children Hospital, Odense University Hospital, Denmark.

The Lunar Prodigy is using a narrow angle fan-beam (4.5°); oriented parallel to the long axis of the body. To distinguish bone mineral from soft tissue, the Prodigy uses effective energies of approximately 40 and 70 keV for low and high energy, respectively. The ionizing radiation from a whole body DXA scanning using the Prodigy DXA machine has earlier been estimated to 2.2 µSv for a reference group of children aged 4.4 to 13.9 years [16].

The DXA machine was reset every day, following standardized procedures. The GE Lunar Prodigy has good reproducibility with precision errors (1 SD) of approximately 0.75 % CV (Coefficient of Variation) for bone mass in children and adolescents, mean age 11.4 years (5-17 years)[17]

The test subjects were instructed to lie still in a supine position wearing underwear; a thin T-shirt, stockings and covered with a blanket for the duration of the DXA scan. The typical scan duration was 5 min, depending on subjects’ height and weight. The instrument automatically altered scan depth depending on the size of the subject, as estimated from age, height, and weight. All scans were performed by two operators only and analysed by one person.
Appendix 8. Musculoskeletal problems and leisure time sport participation collected with SMS Track

Musculoskeletal complaints and sports participation were measured weekly by the “Short Messaging Service-Track-Questionnaire” (SMS-Track) version 2.1 (New Agenda Solutions, SMS-Track ApS, Esbjerg). SMS-Track is a web based IT-system developed as a tool for frequent surveillance, complying with Shiffman’s principle of Ecological Momentary Assessment. SMS-Track has shown to be a better and cheaper method to collect reliable data than paper-based surveys [18]. The method functions as a “follow up” procedure and is used in this study to investigate the fluctuations in musculoskeletal symptoms and sports participation over time. The questionnaire was automatically sent to the parent’s mobile phone once a week asking:

A. “Has [NAME OF CHILD] during the last week had any pain in
   1. Neck, back or low back
   2. Shoulder, arm or hand
   3. Hip, leg or foot
   4. No my child has not had any pain.”

   The parents were instructed to type the number in front of the correct answer.

B. “How many times did [NAME OF CHILD] engage in sports during the last week”?

   The parents were instructed to answer with a relevant number between 0 and 8. The answers 0 to 7 represent the unique number of times engaging in sports, whereas 8 stood for ‘more than 7 times’.

   The returned answers were automatically recorded and inserted into a database. To improve compliance rate, the responders were contacted by telephone if the answer did not meet the instructions. Furthermore, a reminder was automatically sent, if participants had not responded 72 hours later and, if necessary, 120 hours after receiving the message. Proxy parent reports were considerate appropriate in this cohort since self-report questionnaire in young children are unreliable [19]. Data collection was introduced to the first three schools in November 2008 and thereafter one school at the time was randomly included every month including all 10 schools by August 2009.
References.