Abstract inför halvtidskontroll

Felix Cronholm

Title: Physical activity, musculoskeletal traits and fractures

Background:

Fractures affect both children and adults, and cause morbidity and enormous costs for society. However, since physical activity (PA) improves bone mass and muscle strength, regular PA may also reduce the fracture incidence, in addition to all other positive health related effects that is associated with regular PA. If these benefits could be reached by PA already in childhood, this could possibly lead to lifelong beneficial health effects.

Methods:

The Pediatric Osteoporosis Prevention (POP) study is a population-based prospective and controlled PA intervention study including children from four elementary schools in Malmö (n = 349 at baseline). In one of the schools (intervention school) we increased PA from the Swedish standard of 60 minutes/week to 200 minutes/week (40 minutes/school-day). The remaining three schools (control schools) continued with 60 minutes/week PA. We invited children who began 1st grade in the four schools between the years of 1998-2000. They were then evaluated with dual energy x-ray absorptiometry (DXA), calcaneal quantitative ultrasound (QUS), muscle strength measurements and by questionnaires that evaluated lifestyle and PA-levels. The assessments were performed each year following baseline for a mean follow-up time of seven years. We also registered incident fractures during the follow-up period by using the regional digital x-ray archive.

Mister Osteoporosis (MrOs) Sweden is a population-based prospective observational study of elderly men (n = 3014 at baseline), who at baseline were assessed by DXA, QUS and muscle strength tests and had their life style evaluated by questionnaires. The follow-up examinations included radiographically verified incident fractures and mortality for ten years following baseline.

Aims: We assess whether a daily exercise intervention program in school during the compulsory school years confers benefits in the durations of total and leisure-time PA, and influence the duration of sedentary screen-time activities, bone mass, muscle mass, muscle strength, a composite score for fractures (that includes five musculoskeletal traits known to influence fracture risk) and incident fracture rates. We also aim at to in old men assess the potential advantage of using a composite score over single musculoskeletal traits for fracture prediction.

Preliminary results:

Article 1: The PA intervention program in children resulted in higher durations of both total and leisure-time PA and this effect remained with three years of intervention, this without
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being accompanied by higher durations of sedentary screen-time activities. The study opposes the activity-stat theory that infers that the level of PA in children, in each individual, is set to a pre-defined level.

**Article 2:** The previously reported higher total PA in children within the intervention program (Article 1) remained after seven years of intervention but there were no higher leisure-time PA and no different sedentary screen-time activities.

**Article 3:** When following children from Tanner stage 1 to 5, children within the intervention program had a lower incidence rate ratio for fractures than children in the control group. This could possibly be explained by a beneficial development in bone mass, muscle strength, and the composite score.

**Significance:** Since our studies show the benefits reported above, we suggest that daily PA should be implemented in the Swedish elementary school. A thrilling thought, when assessing the data, is that the program might be a strategy to reduce the future burden of fractures in adulthood.

**List of publications:**
