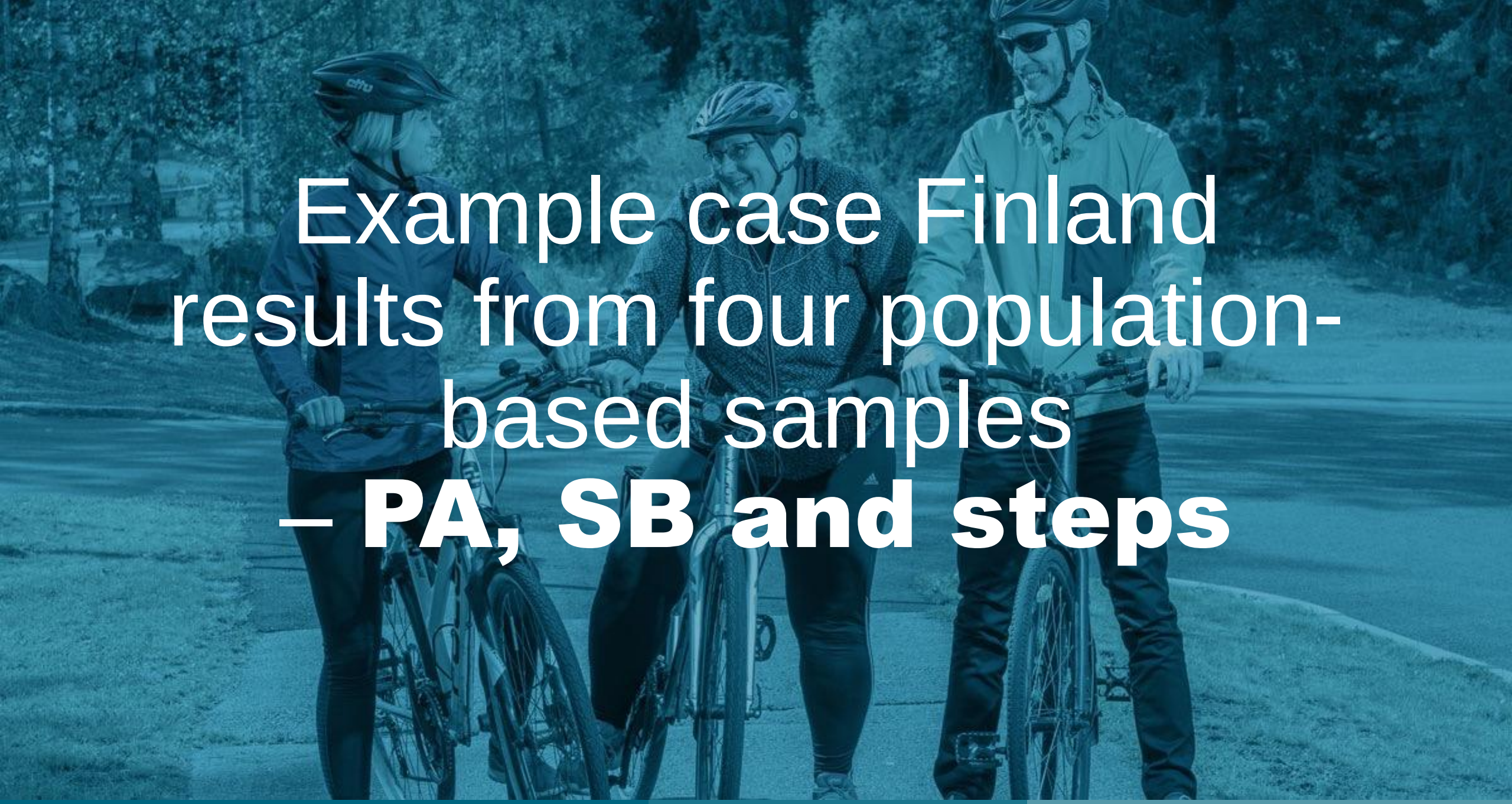
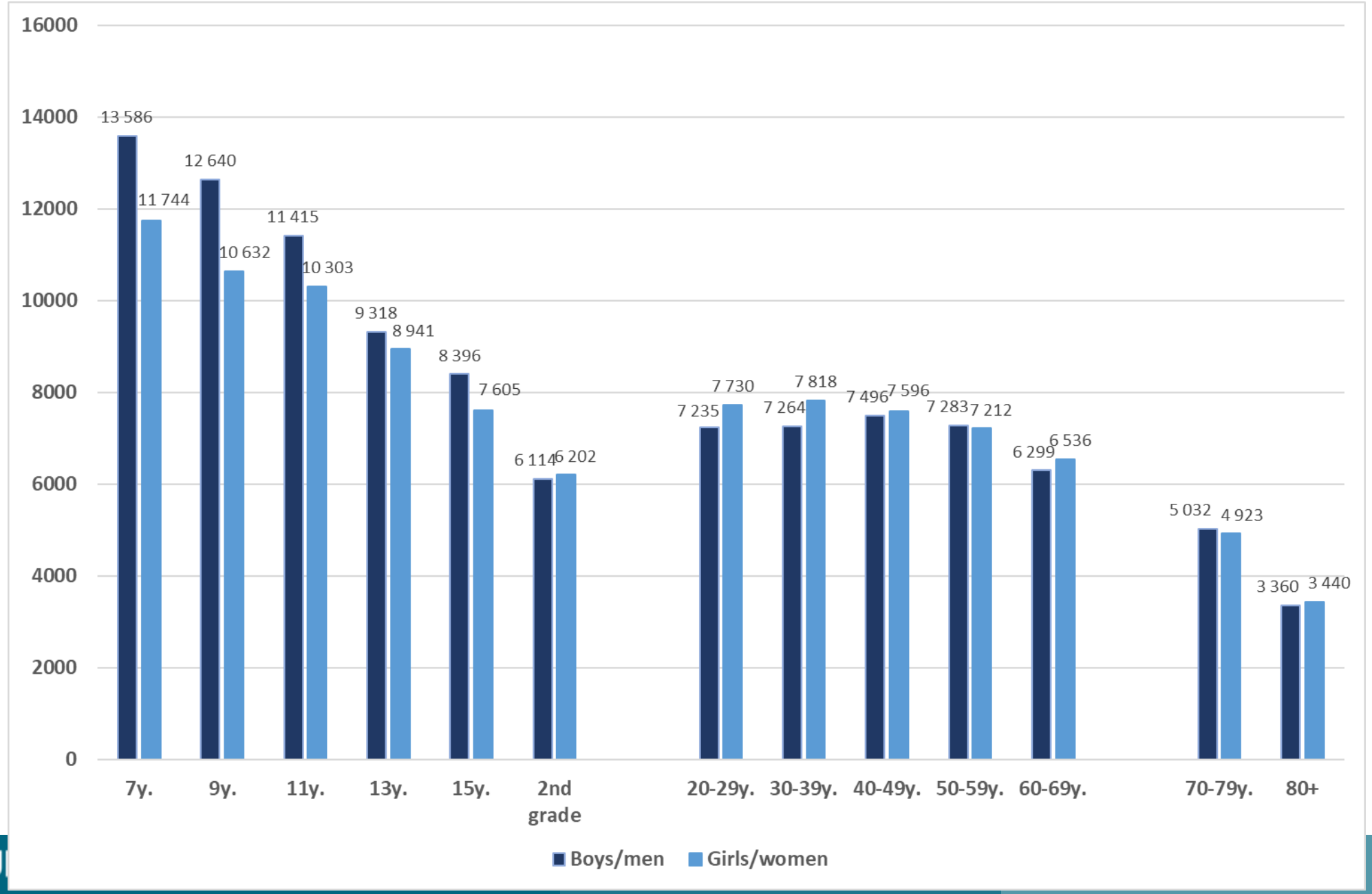


Example case Finland results from four population-based samples – **PA, SB and steps**

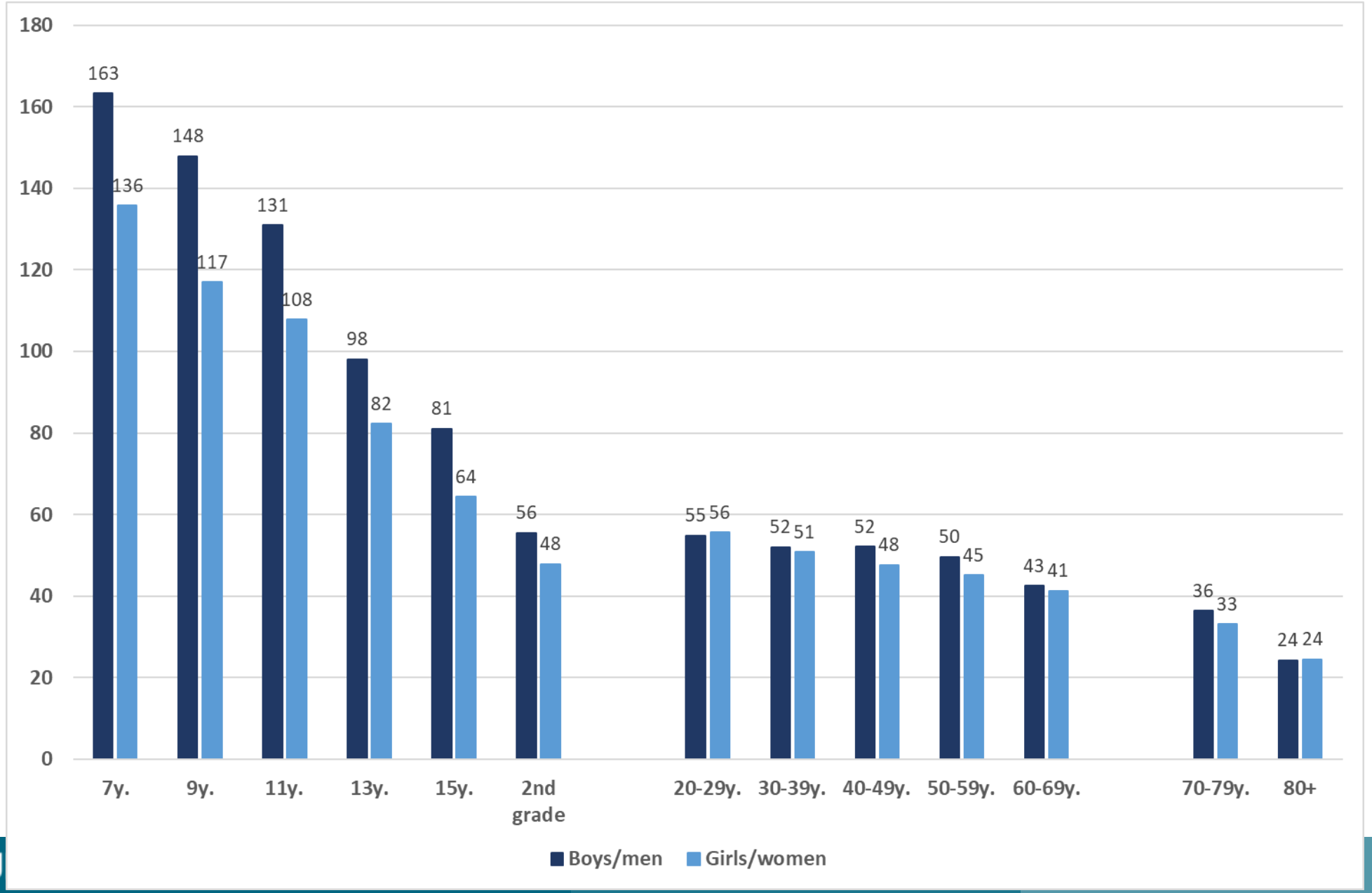
Methods in case Finland

- The following results are collected in four population-based samples:
  - School-aged children and young (7-15 y; spring 2018)
  - Second grade students (16-17 y; autumn 2020)
  - Working-aged adults (20-69 y; autumn 2021 – spring 2022) *
  - Elderly (70+ y; late 2019 – spring 2020) *
    - * tests of physical fitness are included in these samples
- All samples are collected using the same accelerometer (RM42).
- All analyses are done using the same algorithms (MAD = mean amplitude deviation, and APE = angle for posture estimation).
- Therefore, results are comparable.
- Time of the collection and COVID-19 pandemia have influenced on the results of second grade students and working-aged adults.
- New date collections for all of the four age groups are collected or planned to be collected during years 2023-2027.

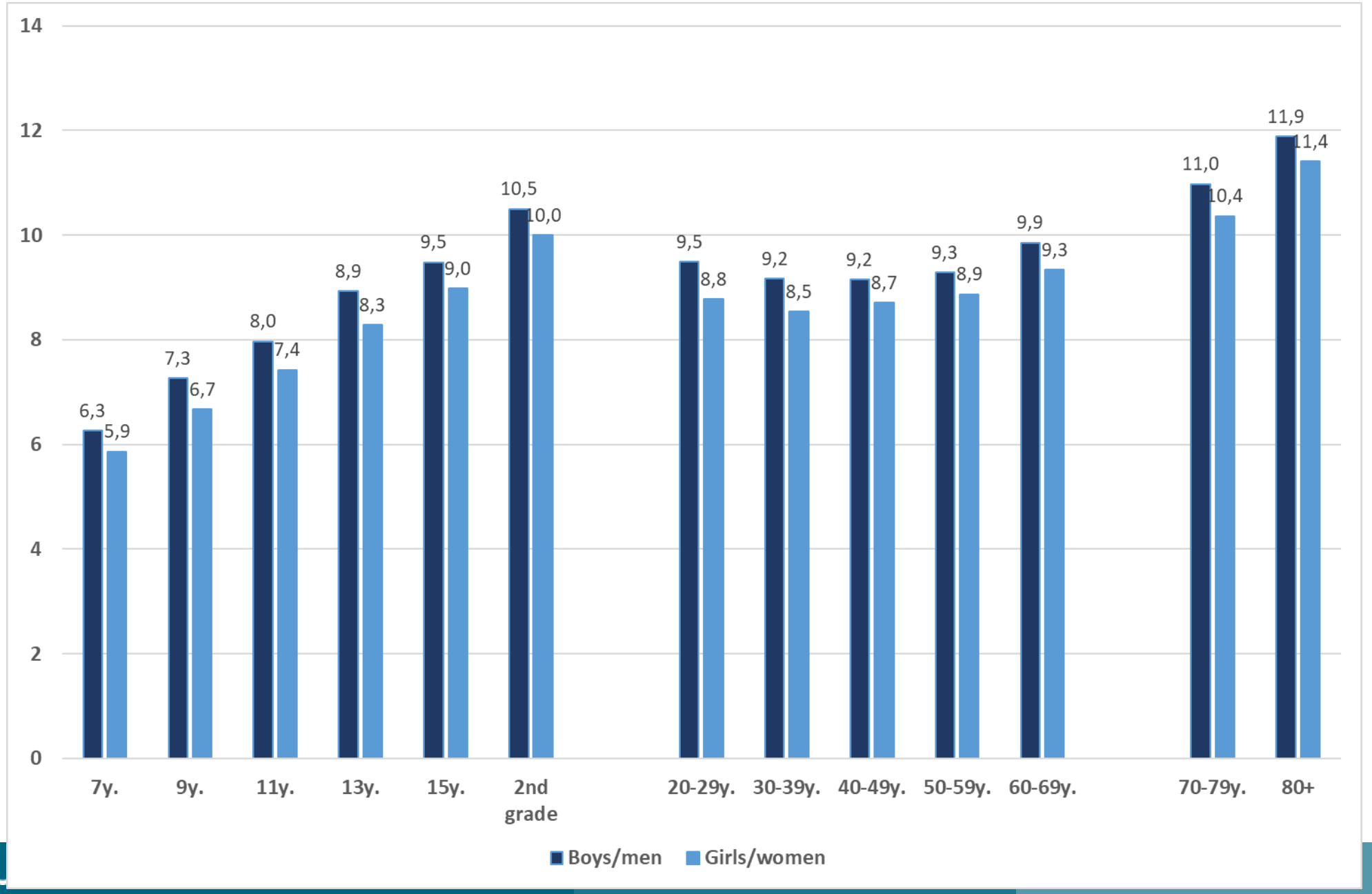
Steps / day in four population-based samples



MVPA min / day in four population-based samples



SB h / day in four population-based samples



Economic burden of low physical activity and high sedentary behaviour in Finland

Päivi Kolu ,[1] Jaana T Kari ,[2] Jani Raitanen ,[1,3] Harri Sievänen ,[1,3] Kari Tokola,[1] Eino Havas,[4] Jaakko Pehkonen ,[2] Tuija H Tammelin ,[4] Katja Pahkala ,[5,6,7] Nina Hutri-Kähönen ,[8] Olli T Raitakari ,[5,7,9] Tommi Vasankari [1,10]

► Additional supplemental material is published online only. To view, please visit the journal online (http://dx.doi.org/10.1136/jech-2021-217998).

For numbered affiliations see end of article.

ABSTRACT

Background Low physical activity and high sedentary behaviour are unquestionably relevant for public health while also increasing direct and indirect costs.

Methods The authors examined the direct and indirect costs attributable to low physical activity and high sedentary behaviour in Finland in 2017. Costs related to major non-communicable diseases drawn from Finnish

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Worldwide, around a third of adults do not reach the recommended weekly level of aerobic physical activity.

⇒ While prior work attests to a link between physical activity and higher labour market returns, little is known about physical

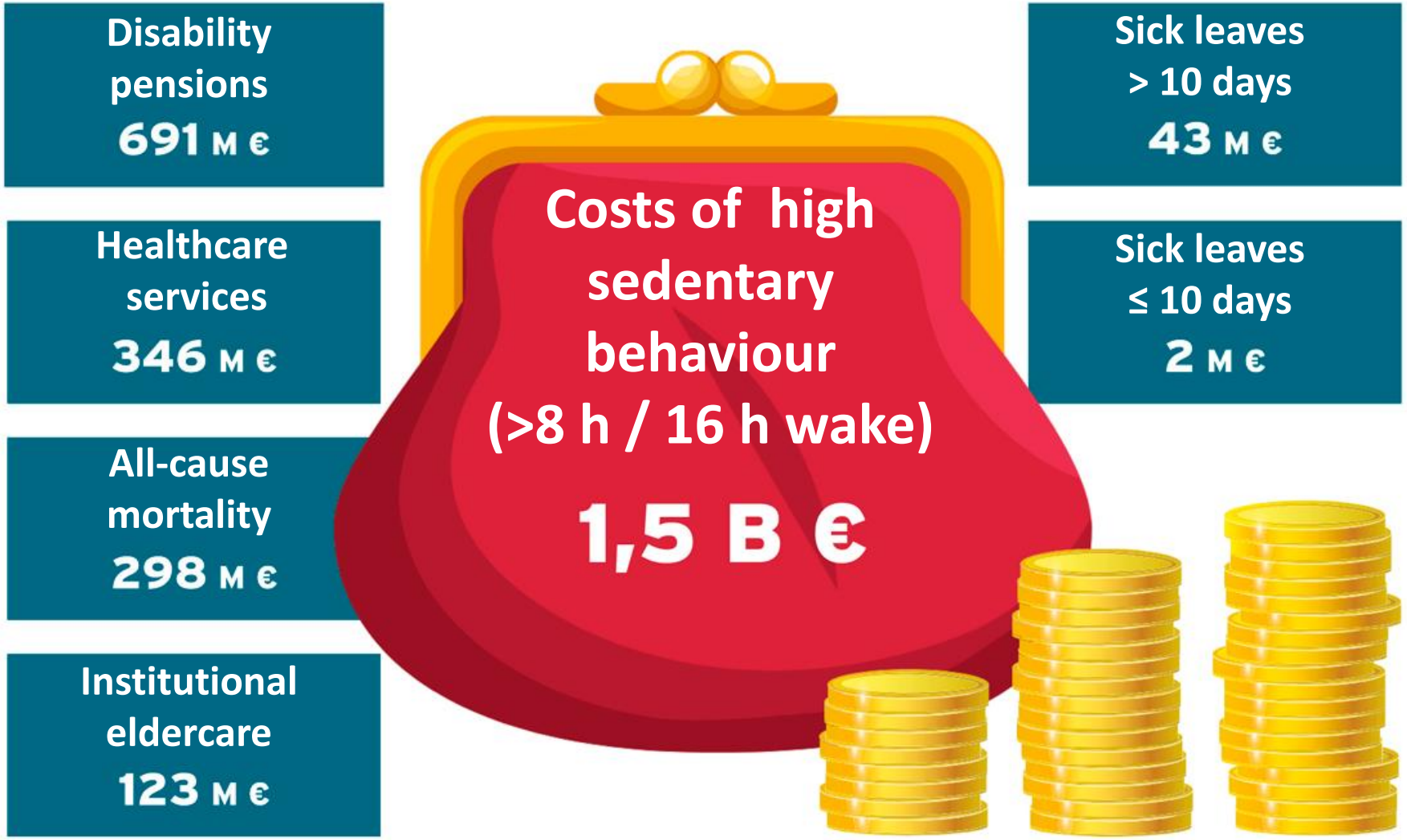
J Epidemiol Community Health: first published as 10.1136/jech-

Annual costs of low physical activity in Finland

UKK Institute

Kolu P, Kari J, Raitanen J, et al. J Epidemiol Community Health 2022

Annual costs of high sedentary behaviour in Finland



UKK Institute

Kolu P, Kari J, Raitanen J, et al. J Epidemiol Community Health 2022

Thank you!
Kiitos!

ukkinstituutti.fi

#liikkumallaterveyttä #liikkumisensuositus

In future how we can effectively enhance physical activity in population that are the most inactive?

Do you believe in deviced and health technology? If you do….

Data flow

Exsed devices and accessories

data to mobile

data to mobile

Secure data transfer from device to mobile

EXSED

Interventions & rehabilitation

Baseline

7 day & night health check

data to Exsed cloud

Secure data transfer from mobile to cloud

Exsed servers on AWS

EXSED Cloud databases

- Encrypted data and user identities
- Remote end-user goal settings and programs on rehabilitation use
- Raw (6s epoch) & calculated data (calculated data can be exported)
- Exsed Baseline Health Check reports and analysis
- User management, roles and data viewing permissions
- EU GDPR compliant architecture and security

API's & strong authentication

Direct data integration

Web console for data viewing and goal setting

Automated reports

3rd party services, heath professionals and partners

Study for cardiac patients

- PA intervention for patients scheduled for cardiac operations (three open-heart surgeries and cardiology operations (PCI and angiography).
- Three month intervention + 9-mo follow-up – two arms:
  - Control group: Standard care without any futher guidance
  - Intervention group: using 3-mo interactive accelerometer + smartphone application and cloud plus call from reseach physiotherapist 2-3 times / month.
- Sampling baseline, after 3-mo intervention and at 12-mo (after 9-mo follow-up).
- PA, SB, sleep, fitness, blood samples, questionnaires, etc analysed.
- One PhD thesis almost ready and two other any underway. Four scientific publications so far.

The PACO trial

Open access Protocol

BMJ Open Sport & Exercise Medicine

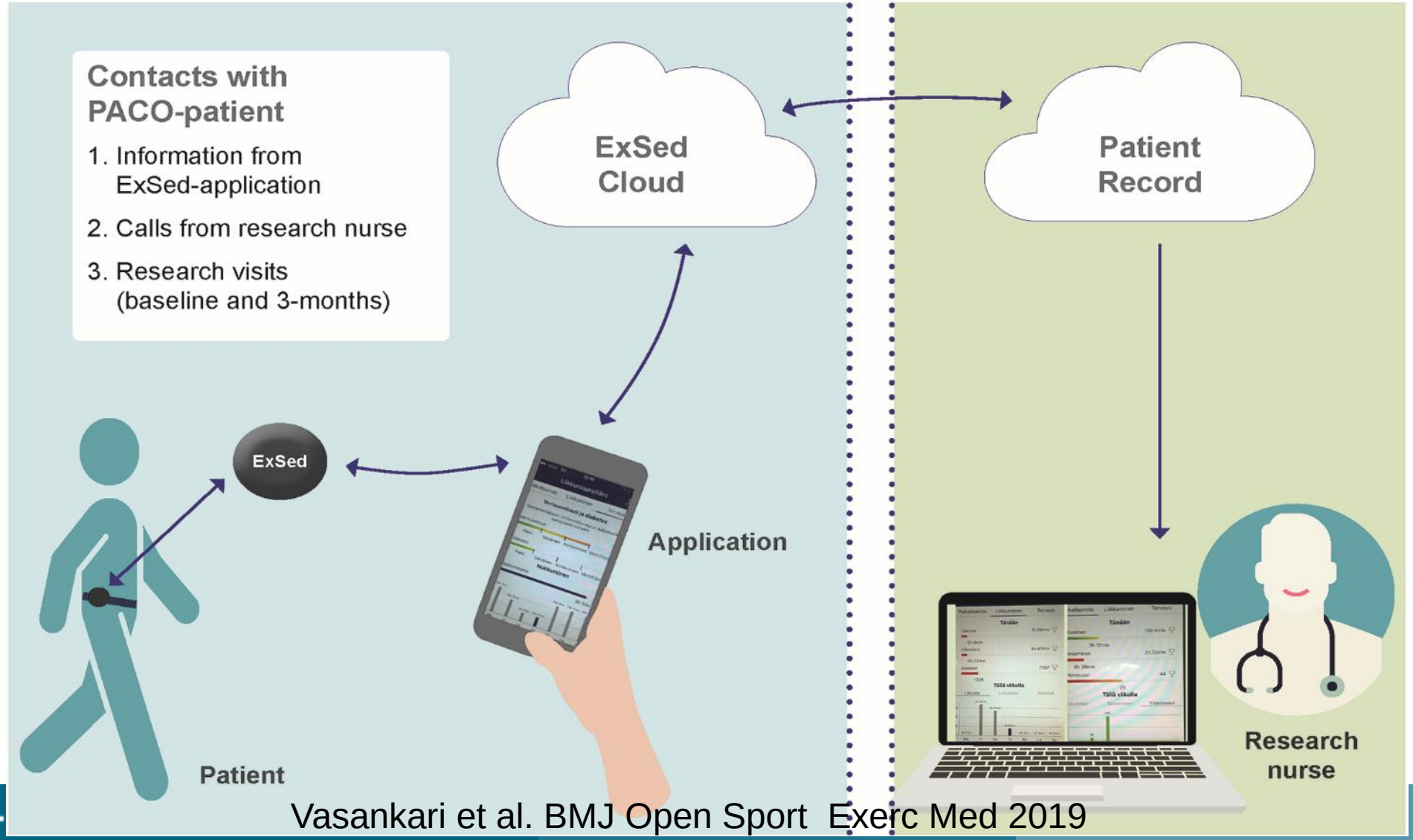
Personalised eHealth intervention to increase physical activity and reduce sedentary behaviour in rehabilitation after cardiac operations: study protocol for the PACO randomised controlled trial (NCT03470246)

Ville Vasankari,[1,2] Jari Halonen,[1,2] Pauliina Husu,[3] Henri Vähä-Ypyä,[3] Kari Tokola,[3] Jaana Suni,[3] Harri Sievänen,[3] Vesa Anttila,[4] Juhani Airaksinen,[4] Tommi Vasankari,[3] Juha Hartikainen[1,2]

Screenshots of ExSed applications

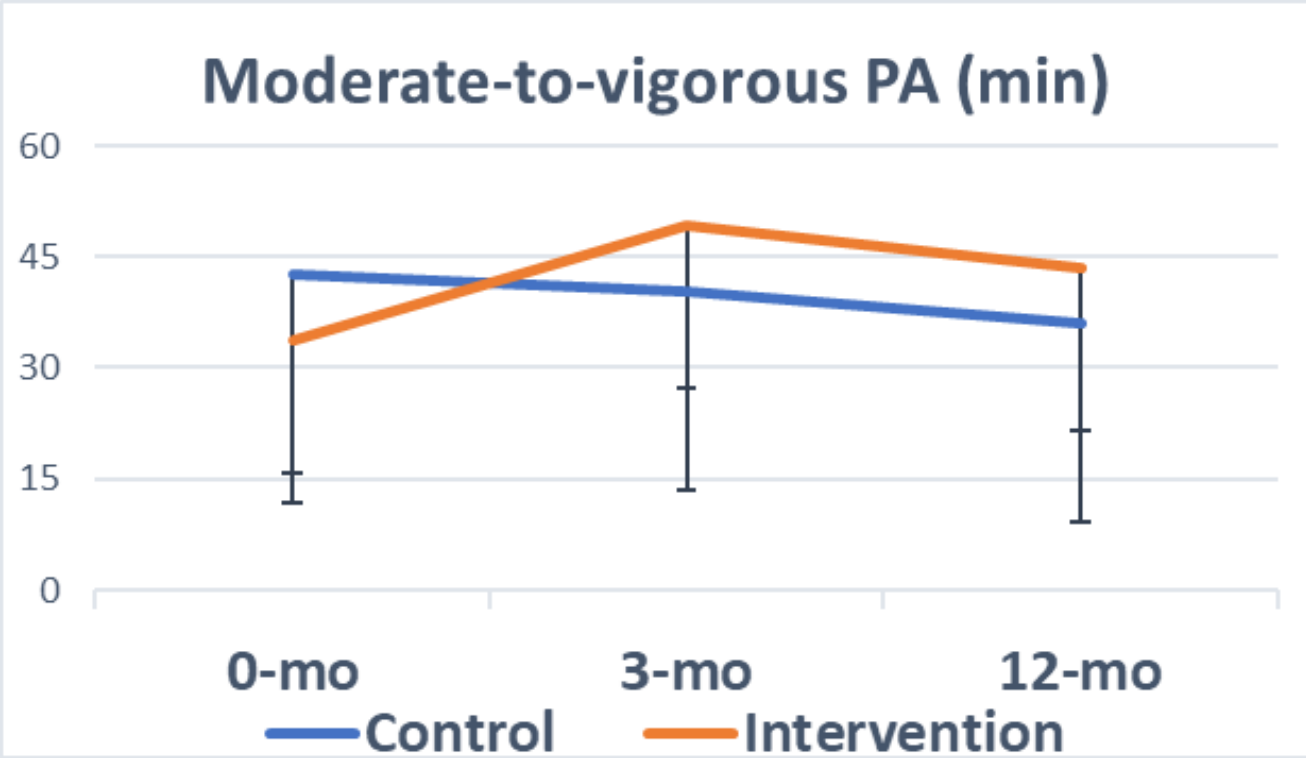
Figure 2 The contacts with the eHealth intervention patient and the view of the ExSed application for eHealth intervention patients.

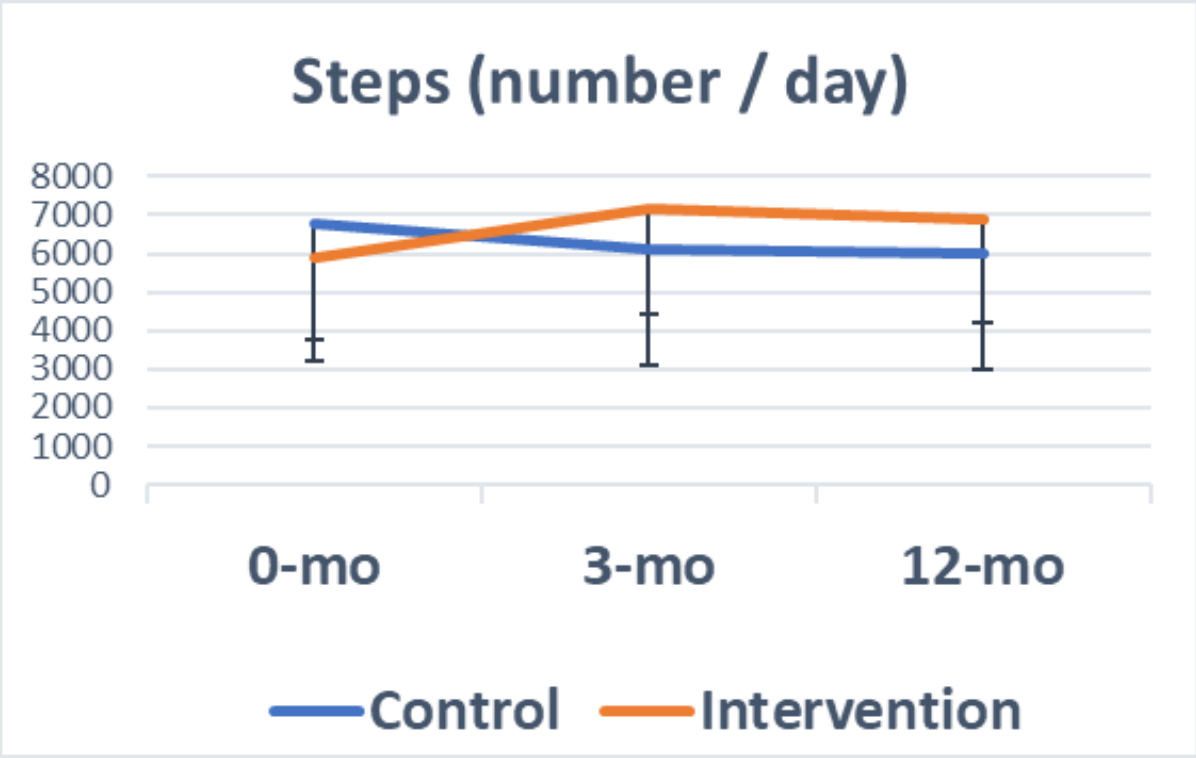
PACO study: PA to patients of elective cardiac procedures (CABG, valvular surgery, etc)



Vasankari et al. BMJ Open Sport Exerc Med 2019

Daily MVPA and steps in cardiac patients (on-going study)





Another study

- Another RCT for patients with metabolic syndrome.
- Six month internevention – two arms:
  - Control group using only interactive accelerometer + smartphone application and cloud without any counselling
  - Intervention group: using similar interactive accelerometer + smartphone application and cloud plus 2-3 personal visits and 2-3 group visits.
- Sampling baseline, after 3-mo intervention and after 6-mo intervention.
- PA, SB, blood samples, questionnaires, etc analysed.
- One thesis already published and two other any in finalising phase. More than 10 scientific publications.
- In next slide results of step count after 3-mo and 6-mo internetion.
- Key refe

Reducing Sedentary Time and Whole-Body Insulin Sensitivity in Metabolic Syndrome: A 6-Month Randomized Controlled Trial

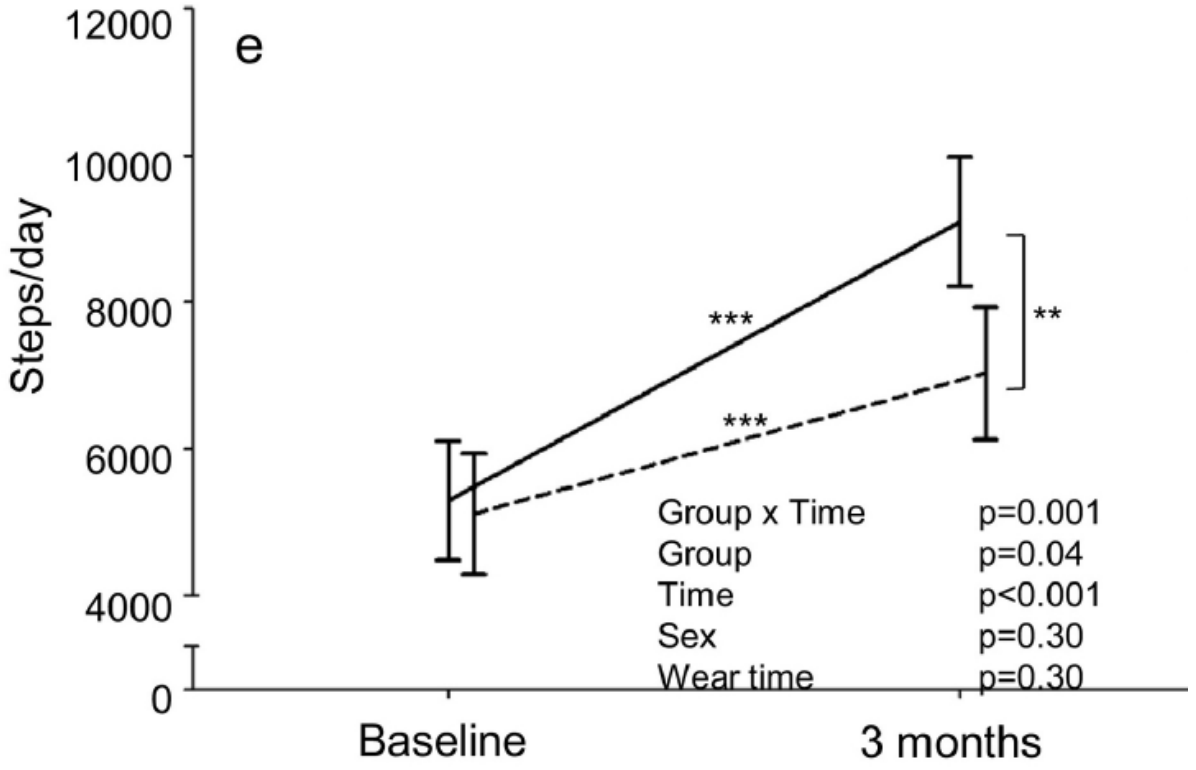
TANJA SJÖROS[1], SAARA LAINE[1], TARU GARTHWAITE[1], HENRI VÄHÄ-YPYÄ[2], ELIISA LÖYTTYNIEMI[3], MIKKO KOIVUMÄKI[1], NOORA HOUTTU[4], KIRSI LAITINEN[4], KARI K. KALLIOKOSKI[1], HARRI SIEVÄNEN[2], TOMMI VASANKARI[2,5], JUHANI KNUUTI[1], and ILKKA H.A. HEINONEN[1,6]

[1]Turku PET Cen... Promotion Resea... Biomedicine, Un... Tampere, FINLA... ...Institute for Health ...FINLAND; [4]Institute of ...ampere University, ...id, SWEDEN

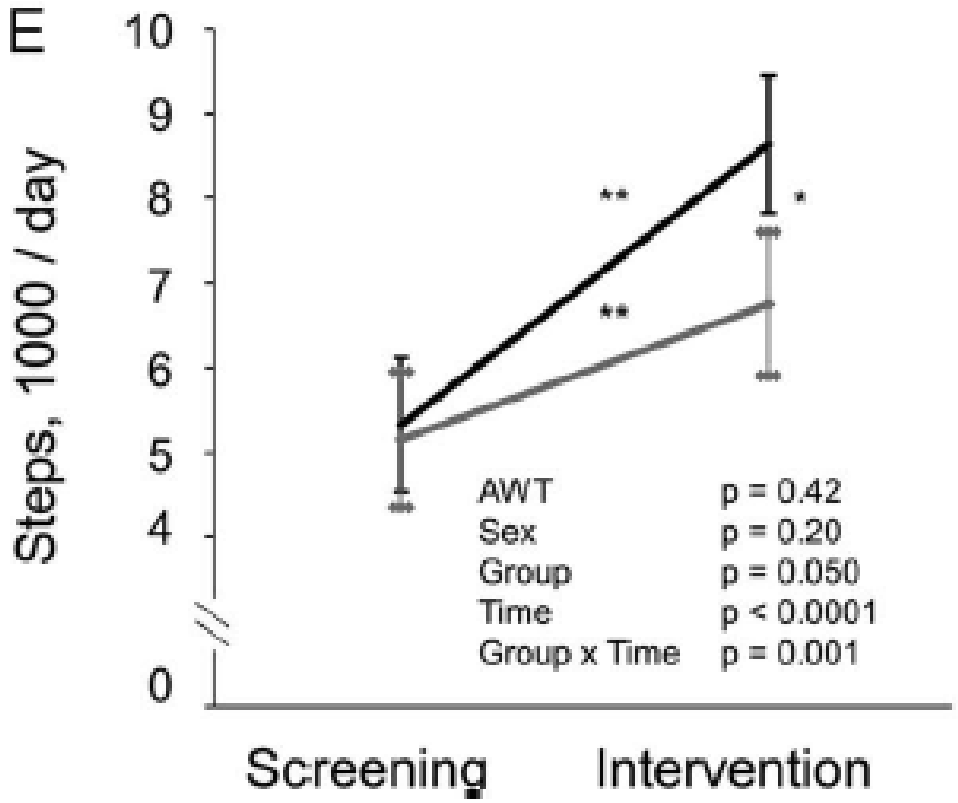
SJÖROS, T., S. LAINE, T. GARTHWAITE, H. VÄHÄ-YPYÄ, E. LÖYTTYNIEMI, M. KOIVUMÄKI, N. HOUTTU, K. LAITINEN, K. K. KALLIOKOSKI, H. SIEVÄNEN, T. VASANKARI, J. KNUUTI, and I. H. HEINONEN. Reducing Sedentary Time and Whole-Body Insulin Sensitivity in Metabolic Syndrome: A 6-Month Randomized Controlled Trial. *Med. Sci. Sports Exerc.*, Vol. 55, No. 3, pp. 342–353, 2023.

Purpose: This study aimed to investigate whether a reduction in daily sedentary behavior (SB) improves insulin sensitivity in adults with metabolic syndrome in 6 months, without adding intentional exercise training. **Methods:** Sixty-four sedentary inactive middle-age adults with overweight and metabolic syndrome (mean (SD) age, 58 (7) yr; mean (SD) body mass index, 31.6 (4.3) $kg \cdot m^{-2}$; 27 men) were randomized into intervention and control groups. The 6-month individualized behavioral intervention supported by an interactive accelerometer and a mobile application aimed at reducing daily SB by 1 h compared with baseline. Insulin sensitivity by hyperinsulinemic euglycemic clamp, body composition by air displacement plethysmography, and fasting blood samples were analyzed before and after the intervention. SB and physical activity were measured with hip-worn accelerometers throughout the intervention. **Results:** SB decreased by 40 (95% confidence interval, 17–65) $min \cdot d^{-1}$, and moderate-to-vigorous physical activity increased by 20 (95% confidence interval, 11–28) $min \cdot d^{-1}$ on average in the intervention group with no significant changes in these outcomes in the control group. After 6 months, fasting plasma insulin decreased (~1 $mU \cdot L^{-1}$) in the intervention group compared with the control group (time–group, $P = 0.0081$), but insulin sensitivity did not change in either group. The changes in body mass or adiposity did not differ between groups. Among all participants, the changes in SB and body mass correlated inversely with the change in insulin sensitivity ($r = -0.31, -0.44$; $P = 0.025, 0.0005$, respectively). **Conclusions:** An intervention aimed at reducing daily SB resulted in slightly decreased fasting insulin, but had no effects on insulin sensitivity or body adiposity. However, as the change in insulin sensitivity associated with the changes in SB and body mass, multifaceted interventions targeting to weight loss are likely to be beneficial in improving whole-body insulin sensitivity. **Key Words:** SEDENTARY BEHAVIOR, PHYSICAL ACTIVITY, METABOLIC SYNDROME, INSULIN RESISTANCE, OVERWEIGHT, ACCELEROMETRY

6-mo intervention increased 3.300 steps (app + counselling) app only 1.700 steps / pv



Journal of Science and Medicine in Sport, https://doi.org/10.1016/j.jsams.2022.04.002



Med. Sci. Sports Exerc., Vol. 55, No. 3, pp. 342–353, 2023.

Technology can help us in PA counselling!

- **We can use technology to show patients how active they are, how much they sit, how they sleep!**
- **We can encourage patients to increase their physical activity and reduce their sedentary behaviour – even without any other ”counselling efforts”.**
- **Can be used to show the effectiveness of the physical activity / life-style counselling.**
- **Can be active / effective part of the physical activity counselling / rehabilitation.**
- **Can be used in occupational health care in mini-intervention (physical activity, sedentary behaviour, sleep).**