Thigh-worn accelerometry for measuring movement and posture across the 24-hour cycle: a scoping review and expert statement

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ABSTRACT

Introduction The Prospective Physical Activity Sitting and Sleep consortium (ProPASS) is an international collaboration platform committed to harmonise thigh-worn accelerometry data. The aim of this paper is to (1) outline observational thigh-worn accelerometry studies and (2) summarise key strategic directions arising from the inaugural ProPASS meeting.

Methods (1) We performed a systematic scoping review for observational studies of thigh-worn triaxial accelerometers in free-living adults (n=100, 24-hours monitoring protocols). (2) Attendees of the inaugural ProPASS meeting were sent a survey focused on areas related to developing ProPASS: important terminology (Q1); accelerometer constructs (Q2); advantages and distinct contribution of the consortium (Q3); data pooling and harmonisation (Q4); data access and sharing (Q5 and Q6).

Results (1) Eighty eligible articles were identified (22 primary studies; n=17 685). The accelerometers used most often were the ActiVPal3 and Actigraph GT3X. The most commonly collected health outcomes were cardiometabolic and musculoskeletal. (2) None of the survey questions elicited the predefined 60% agreement. Survey responses recommended that ProPASS: use the term physical behaviour or movement behaviour rather than ‘physical activity’ for the data we are collecting (Q1); make only minor changes to ProPASS’s accelerometer construct (Q2); prioritise developing standardised protocols/tools (Q4); facilitate flexible methods of data sharing and access (Q5 and Q6).

Conclusions Thigh-worn accelerometry is an emerging method of capturing movement and posture across the 24-hours cycle. In 2020, the literature is limited to 22 primary studies from high-income western countries. This work identified ProPASS’s strategic directions—indicating areas where ProPASS can most benefit the field of research: use of clear terminology, refinement of the measured construct, standardised protocols/tools and flexible data sharing.

INTRODUCTION

Different aspects of movement and posture-defined physical behaviour—such as physical activity, sitting and sleep—are vital and modifiable determinants of health.1,2 Traditionally, much of the research into physical behaviours has operated in subdisciplinary silos (eg, physical activity, exercise, sedentary behaviour, sleep) partially owing to variations in methodological paradigms, in particular differences in measurements.3–7 Recent advances in wearable technology, such as accelerometers, provide the potential to concurrently quantify multiple aspects of such behaviours in free-living conditions continuously across a number of days or weeks.6,7 This presents opportunities for a major breakthrough in our ability to understand how all these aspects of physical behaviour synergistically influence health and promote chronic disease prevention.7

One area of vigorous debate regarding the use of accelerometers is where they should be placed, with the aim to maximise feasibility...
and the breadth and depth of collected data. In the first generation of accelerometer studies, most large-scale studies focused on physical activity used devices worn on a belt around the waist/hip.8–10 This location was initially chosen due to its simplicity (ease of setup and wear) and close proximity to a person’s centre of gravity (minimising the effect of extraneous movement). However, due to its interference with clothing (requiring removal of the device when changing, etc) and sleep, waist/hip-worn devices have often been used only for waking hours, or part thereof.

Waist/hip-worn devices are also limited regarding the aspects/constructs of physical behaviour that they can currently identify. For instance, although they have been extensively validated for measuring energy expenditure,11 they have difficulty quantifying postures and distinguishing between different physical behaviours (eg, sitting vs standing, walking on a flat surface vs stair climbing).12 Wrist-worn devices, traditionally favoured in sleep research, have also gained popularity for physical activity assessment. This ‘watch-like’ wrist attachment carries less burden for research participants, resulting in higher compliance, and thus, may be more feasible for complete monitoring of 24 hours daily cycles than waist/hip-worn methods.13 14 However, similar to waist/hip-worn devices, wrist-worn accelerometers currently have difficulty distinguishing between basic aspects of physical behaviour, such as posture and activity type.12 15

An emerging accelerometer placement location is the thigh. Thigh-worn accelerometers are typically taped to the front of the thigh and can be worn under clothing 24 hours a day for multiple days.16–18 In addition to energy expenditure outcomes,19 thigh placement allows detection of the specific physical behaviours (ie, sitting/lying, standing, walking, running, stair climbing, cycling) with excellent accuracy.20 21 As such, an increasing number of major international cohorts have recently adopted such methods to measure thousands of participants, such as the Maastricht Study (n~8000), HUNT4 (n~38000) and the 1970 British Birth Cohort (n~6000).22 The successful incorporation of thigh-worn accelerometer by these studies demonstrates that thigh-worn accelerometry is feasible for comprehensively quantifying physical behaviour across the 24-hour cycle in large-scale health research.

The Prospective Physical Activity Sitting and Sleep consortium (ProPASS) is a recent research collaboration platform22 of investigators utilising observational studies of thigh-worn accelerometry. ProPASS’s ultimate scientific objective is to produce longitudinal evidence on the associations of physical activity, posture and sleep with long-term health outcomes and longevity. To fulfil these aims, ProPASS will harmonise and integrate thigh-worn accelerometry and corresponding health outcomes data—including linkage to administrative health data such as mortality and cause-specific hospital admissions. Besides its function to harmonise previously collected data, a fundamental aspect of ProPASS is its prospective nature. As such, ProPASS will develop standards to support future population-based studies to collect preharmonised thigh-worn accelerometry data. Meeting these objectives and handling sensitive health-related data is complex and demands long-term planning.

In line with publications describing previous accelerometer consortia,23 this paper had a dual aim:

► To identify studies potentially eligible for inclusion in ProPASS via a systematic scoping review to summarise observational studies that collected 24-hour thigh-worn triaxial accelerometry data in population or community-based adult samples.

► To guide the development of ProPASS by compiling and summarising key discussions and decisions arising from the initial ProPASS collaborators meeting (held in October 2018 in Copenhagen, Denmark) into an expert collaborator statement.

OBJECTIVE 1: SCOPING REVIEW

Methods

We conducted a scoping review and reported it according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) reporting standards24 and the PRISMA Extension for Scoping Reviews.25

Search strategy and article selection

Systematic searches scanned the literature (initial: July 2018; updated: August 2020) in MEDLINE via Ovid and Embase via Ovid, with no date or language restrictions. The search included terms for accelerometers combined with terms for observational studies. Full details of the search strategy are provided in online supplemental appendix 1.

Articles identified during the search were screened for their eligibility for the study in two stages by two reviewers independently (MLS, TC, NG, EIE). The first stage involved screening articles by title and abstract and clearly ineligible articles were excluded at this stage. If there was doubt about the eligibility of an article or disagreement between the reviewers, the article was included in the full-text review. The second stage involved a full-text review; any disagreements at this stage were resolved by discussion between the two reviewers until consensus was reached. For each excluded full text article, the reason for exclusion was noted.

To be included in this review, articles had to meet the following criteria: full-text publication using an observational study design where community-based, free-living adult participants wore thigh-worn triaxial accelerometers that used 24-hour activity data monitoring protocols. Exclusion criteria were: studies with <100 participants; studies of institutionalised participants or specialised clinical cohorts (eg, undergoing or perioperative major treatments or surgery); validation and calibration studies and non-English language studies. If studies included some participants (<20%) under 18 years of age, we considered to include them on a case-by-case basis so
long as the participant range was close to adulthood (ie, older than 15).

**Data extraction, outcomes and analysis**

Data extraction, undertaken by a single author (EIE and MLS), included details of:

1. Study participants (eg, design, recruitment, sample criteria, size, location, age, sex, employment, whether the study belongs to a ‘primary’ study/cohort).
2. Accelerometry protocols (eg, device, placement, other sensors, days of wear, software used, variables created).
3. Physical behaviour information collected by other methods (eg, collected by questionnaire).
4. Health outcome variables (eg, cholesterol, fasting glucose, body mass index (BMI), back pain).
5. Data sharing policies.

The data extracted is presented and summarised.

**Results**

Of the 9654 articles identified through the search, 1845 were duplicates, leaving 7809 articles to be screened for eligibility. Of these 7809 articles, 6742 were excluded after reading through the full text. This left 80 articles eligible for inclusion (figure 1). Full details of the data extracted from each study are provided in online supplemental appendix 2.

**Studies design and participants**

Of the 80 articles identified, 72 were cross-sectional, leaving 8 articles that presented prospective data. The 80 articles contained data from 22 different primary studies. These 22 primary studies consisted of 18 longitudinal studies and 4 cross-sectional studies. The 22 different primary studies (~17 685 participants) were mainly from the Netherlands, UK and Denmark. The mean/median age range for participants was 20–79 years and all collected data in both men and women. Ten of the 22 primary studies recruited participants from their workplace and such as healthcare, construction, manufacturing and cleaning. The remaining 12 studies recruited participants from the general population.

**Accelerometry protocols**

The accelerometer used most often was the ActivPAL (10 primary studies), followed by the ActiGraph GT3X (eight primary studies) and MOX Accelerometry Monitor (two primary studies).
Most studies processed accelerometry data using either ActivPAL software (four primary studies) or custom Matlab software (11 primary studies, of which 9 used the custom Matlab Acti4 program). All accelerometers were attached to the skin on the front of the thigh (roughly midway between the anterior superior iliac spine and the patella). Participants were asked to wear the accelerometer continuously for between 3 and 10 days with the most commonly requested wear time being 7 days (11 primary studies).

**Daily logs/diary data**

Fourteen primary studies used diaries to supplement the information collected by accelerometry. Mostly, diary-based information was used to identify participants’ time in bed (11 primary studies) and times at work (7 primary studies). The most commonly reported health outcomes were cardiometabolic (11 primary studies), followed by musculoskeletal (five primary studies). Commonly reported cardiometabolic outcomes were insulin and cholesterol levels, fasting/2-hour postload glucose, blood pressure, body composition and BMI. The most commonly reported musculoskeletal outcome was low back pain, followed by neck/shoulder pain. Other identified health outcome fields were mental health (eg, depression, mental fatigue; three primary studies) respiratory/cardiorespiratory (eg, forced expiratory volume, forced vital capacity, submaximal cycle ergometer; two primary studies) and epigenetics (DNA methylation; one primary study). We identified no prospective studies linked to mortality or incident disease outcomes.

**Health outcomes**
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**Data sharing**

Six primary studies mentioned the potential for data-sharing.

**OBJECTIVE 2: EXPERT COLLABORATOR STATEMENT**

**Methods**

In October 2018, 19 ProPASS collaborators (including all authors of this paper) met in Copenhagen for 2 days to discuss strategies relevant for the successful establishment, growth and management of the consortium. The meeting was structured around the following areas: (1) The main aims and purpose of ProPASS (including terminology); (2) the constructs that thigh-worn accelerometry can output; (3) the advantages and unique contribution that ProPASS can make to the health literature; (4) the optimal methods for data pooling, harmonisation and linkage with health administration data and (5) the data access and sharing model. To inform this discussion, the results from the above scoping review (initial search) were presented.

Following this meeting there were several key points—vital to the progression and goals of ProPASS—about which no clear decision had been made. Thus, we decided to conduct a formal survey of meeting participants regarding these key points. The purpose of the survey was to systematically consolidate ProPASS collaborators’ views on the topics discussed during the 2-day meeting towards an expert collaborator statement as the blueprint for the next stages of the consortium’s growth and its contribution to the field.

**Participants**
The attendees at the ProPASS Copenhagen meeting were associated with the participating ProPASS cohorts, members of the ProPASS advisory group, or scientists with expertise in one or more of the key ProPASS development priority areas. All who attended the 2018 ProPASS meeting were invited to participate in the survey (n=19).

**Survey procedures**

From the minutes of the ProPASS Consortium meeting in Copenhagen in 2018, we identified key areas that required further input and developed six questions to capture collaborators’ views on these areas. Each question corresponded to one of the workshops at the meeting. All survey questions were multiple choice, but permitted ‘other’ responses and also provided space for unrestricted free comment. This allowed participants to elaborate on their answer and expand beyond the specific questions. These survey questions were:

1. What term best describes the data we aim to collect and analyse in ProPASS?
2. Do you agree with the ProPASS Accelerometry Construct? The ProPASS construct is an ideal set of accelerometer-based movement/posture variables that ProPASS will aim to extract and harmonise (figure 2).
3. What do you think is the main advantage of harmonising and pooling thigh-worn accelerometer data for epidemiological research?
4. What is the best approach for harmonising thigh-worn accelerometer data?
5. What is the best approach for managing access to ProPASS pooled accelerometer data (provided that regulatory and legal conditions are met)?
6. What should be the data sharing model for a thigh-based accelerometer pooled data resource?

In March/April 2019, all attendees of the ProPASS Copenhagen meeting were sent the survey. The survey was communicated by email, and contained the expert collaborator statement protocol and a link (SurveyMonkey (SurveyMonkey, California, USA; www.surveymonkey.com)) to the survey. All participants were asked to complete the survey within 2 weeks. Those not responding to the initial email were sent a single reminder email and given an additional week to respond.
Data analysis
For each survey question, we calculated frequencies of endorsement for each response and summarised the open-ended responses using thematic analysis. Agreement for a particular response was indicated by an endorsement rating of 60%. Where 60% agreement was not reached, the leading responses (those within 20% of the lead response) were provided. Thematic analysis was performed by identifying the key idea(s) within each free-text field and then collating those ideas into themes that developed from the ideas identified within each question. The thematic analysis was conducted jointly by two authors (MLS/EIE) before being opened up to the whole author group for comment and feedback.

Results
Of the 19 attendees at the ProPASS meeting, 16 responded to the survey. Responders were from 11 different institutions (including government, academia and industry) distributed across seven countries. No question reached the predefined threshold for agreement of 60%. The percentage responses for each question are provided in table 1.

Question 1: what term best describes the data we aim to collect and analyse in ProPASS?
The overall term to describe the data that ProPASS aims to collect and analyse that was voted most highly was ‘physical behaviour’ with 50% of the votes, followed closely by ‘movement behaviour’ with 44% of votes. Analysis of the free-text indicated that although many respondents were in favour of the term ‘movement behaviour’, it missed important concepts such as sedentary time and/or sleep. No respondent voted for the use of ‘physical activity’. The free-text suggests that this is because the term ‘physical activity’ is generally regarded as referring to data collected using accelerometry counts-based methods, a connotation that is not compatible with ProPASS objectives, and also misses sedentary behaviour, postures and sleep behaviours.

Question 2: do you agree with the ProPASS accelerometry construct?
The ProPASS Accelerometry Construct was designed to bring the research theories in physical behaviour research together with the variables to be used in ProPASS. It consists of several dimensions of the construct that are not necessarily hierarchical and can be combined to form new hybrid variables (figure 2). The dimensions are:

Dimension A: ‘intensity zones’—containing the information on whether an individual is sedentary or conducting light physical activity (LIPA), moderate physical activity (MPA) and vigorous physical activity (VPA).

Dimension B: information about both posture and physical activity types. For example, short bouts (0–5 mins), moderate (>5–10 mins) and long (>10 mins) bouts of standing; meaningful bouts length could be different for sitting and other activity types or postures.

Dimension C: information of time spent on various length of bouts with uninterrupted periods of physical activity types and posture. For example, short bouts (0–5 mins), moderate (>5–10 mins) and long (>10 mins) bouts of standing; meaningful bouts length could be different for sitting and other activity types or postures.

Dimension D: domains where the physical activity components and posture occurs.

Dimension E: Acknowledgement that sleep is a different biological state.

Dimension F: indicates that the profile is a combination of all other dimensions A–E.

ProPASS, Physical Activity Sitting and Sleep consortium.

Figure 2  The dimensions of the proposed ProPASS Accelerometry Construct. Dimension A: the basic intensity-based dimension of the 24 hours physical activity (PA) construct stratified on sedentary behaviour, light physical activity (LIPA), moderate physical activity (MPA) and vigorous physical activity (VPA). Dimension B: information about both posture and physical activity types. Dimension C: information of time spent on various length of bouts with uninterrupted periods of physical activity types and posture. For example, short bouts (0–5 mins), moderate (>5–10 mins) and long (>10 mins) bouts of standing; meaningful bouts length could be different for sitting and other activity types or postures. Dimension D: domains where the physical activity components and posture occurs. Dimension E: Acknowledgement that sleep is a different biological state. Dimension F: indicates that the profile is a combination of all other dimensions A–E. ProPASS, Physical Activity Sitting and Sleep consortium.
| Question                                                                 | Option 1: Physical activity | Option 2: Physical behaviour | Option 3: Movement behaviour | Option 4: Other (please describe) |
|------------------------------------------------------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------------|
| 1. What term best describes the data we aim to collect and analyse in ProPASS? | 0%                          | 50%                         | 44%                        | 6%                              |
| 2. Do you agree with the ProPASS Accelerometry Construct? The ProPASS construct is an ideal set of accelerometer-based movement/posture variables that ProPASS will aim to extract and harmonise. (Please note that these dimensions are not mutually exclusive) | I agree with the construct as it is | I have minor suggestions to improve the construct (describe below) | I have major suggestions (describe below) | 50% | 44% | 6% |
| 3. What do you think is the main advantage of harmonising and pooling thigh-worn accelerometry data for epidemiological research? | Superior statistical power | Better ecological validity/generalisability | Opportunities for network building | Other (please describe) |
| 4. What is the best approach for harmonising thigh-worn accelerometry data? | Central processing—Collaborators send ProPASS the raw data to reprocess from scratch | ProPASS develops software tools, processes, and protocols to allow collaborators to reprocess their own accelerometry data from scratch | Make use of the variables collaborators have already extracted (this will limit the number of harmonised variables available) | Other (please describe) |
| 5. What is the best approach for managing access to ProPASS pooled accelerometry data (provided that regulatory and legal conditions are met)? | All/most data to be pooled/deposited centrally—Data are sent to data analysts when appropriate. | All/most data to be pooled/deposited centrally—Analysts access data remotely through appropriate IT infrastructure | Federated data analyses (the data stay in each cohorts' servers)—data are accessed remotely by analysts | Other (please describe) |
| 6. What should be the data sharing model for a thigh-based accelerometry pooled data resource? | Fee to access for all users | Free to all bona fide researchers worldwide | Fee to ProPASS collaborators, fee to access for all bona fide researchers | Closed, available to ProPASS collaborators only for a nominal fee | Closed, available to ProPASS collaborators only for free | Other (please describe) |

IT, Information Technology; ProPASS, Prospective Physical Activity Sitting and Sleep consortium.
DISCUSSION

The aim of this paper was to highlight the existing observational thigh-worn accelerometer literature and to capture and summarise key discussions and decisions that arose at the initial ProPASS collaborators meeting. In this section, we discuss the main outcomes of the two paper components and their main implications for the immediate future of ProPASS.

Scoping review: key findings and future directions

The scoping review identified 22 primary studies with the potential to pool thigh-worn triaxial accelerometer data. These studies were primarily conducted in the Netherlands, UK and Denmark and contained participants recruited from both workplaces and the general population. However, the (likely) limited consent for some of these studies means that not all should be expected to be able to contribute to ProPASS. On the other hand, several additional cohorts (which are relatively new and thus were not identified in our scoping review due to a lack of published data) may also be included in the harmonised ProPASS data set.

Although there have been many reviews of accelerometer methods, to date none have focused specifically on thigh-worn accelerometer. Compared with our study, prior reviews have identified a much greater number of individual studies but with a wider variation in accelerometer protocols (including differences in the device used, its placement and processing method). For
instance, one review (focused on the use of hip-worn ActiGraph accelerometers in youth studies) found that their included studies used 6 different epoch lengths, different definitions of non-wear time, 13 different definitions of a valid day, 8 different minimum wear day thresholds, 12 different cut points for moderate intensity physical activity and 11 different cut points for sedentary behaviour.\(^\text{106}\) In contrast, the data from thigh-worn accelerometry were more homogeneous with 13 of the 22 identified primary studies using one of two primary methods. Moreover, in a recent study, we have shown that processing raw triaxial thigh-worn accelerometer data using a single software package (Acti4, 20) produces consistent and accurate results across different accelerometer devices.\(^\text{21}\) This supports the potential for thigh-worn accelerometer data to be harmonised retrospectively and prospectively across different studies. However, even though there may be less heterogeneity in the collection and processing of thigh-worn accelerometry compared with other wear-locations, there are still several areas for which standardised protocols would be of benefit to the field (eg, number of days of wear, definitions for a valid day, detection of non-wear time).\(^\text{109}\)

From the results of our review, there are at least four important implications for ProPASS. The first is the opportunity for ProPASS to be a source of information and infrastructure for collecting and harmonising triaxial thigh-worn accelerometer data. The second can be seen in the relative youth of these studies—which only entered the scientific literature in 2015—and the small number of primary studies containing this data. This indicates the opportunity to collaborate in the development of standardised protocols (and outcome definitions) for collecting triaxial thigh-worn accelerometer data and associated health outcomes—setting the standard for prospective harmonisation. Third, there is currently a lack of studies investigating the prospective associations of physical behaviours with incident health outcomes. For example, despite the longitudinal nature of most of the primary studies identified (82%) only a very small proportion of all identified studies (10%) have used this prospective data. This is likely due to the relative youth of these studies which means that these studies may still be collecting data and/or are waiting to have enough events. Finally, there is also a lack of studies that collect repeated measures of physical behaviour using thigh-worn accelerometry.

**ProPASS collaborator statement: responses and implications for moving forward**

The responses regarding the terminology for ProPASS highlight its importance for achieving a clear identity and avoiding misunderstanding and confusion. Although there was no clearly favoured response, there was a desire to differentiate from terms that are generally used to describe counts-based measurements of physical activity. As both movement and physical behaviour were highly endorsed it seems that some combination of these ideas may be ideal (eg, movement and posture defined physical behaviour). However, the ability to quickly and simply reference an idea is important and as such a longer, more descriptive term would still require a shortened form (eg, physical behaviour).

The relative agreement around the physical behaviour constructs developed meant that collaborators generally agreed with the ProPASS constructs as defined. However, there is a need for continued refinement of the construct. The purpose of this construct is to provide guidance on the optimal set of accelerometer variables to be extracted and analysed in a framework for understanding the ways in which physical behaviours can be structured. Therefore, it is important to make sure its dimensions are clear and cover all important health-related aspects of physical behaviour.

Although not reaching our predefined agreement of 60%, the relative endorsement of both decentralised processing and federated analyses suggest that there is general agreement towards ProPASS collaborators maintaining control of and being responsible for their own data. This requires that ProPASS develops/adapts tools and processes that enable collaborators to easily manage and process their data in a consistent fashion. Such methods may be easier from a privacy perspective, but require more work on behalf of the collaborators to setup and maintain these systems. In contrast to this trend for ProPASS collaborators to maintain control and responsibility for their own data, the other major accelerometer database—the International Children’s Accelerometry database—pooled and processed all data centrally.\(^\text{110}\) These differences may be due to tightening privacy laws across Europe\(^\text{109}\) and/or the prior lack of the technology required to conduct federated analyses, which were only recently introduced to large scale harmonisation studies with the Biobank Standardisation and Harmonisation for Research Excellence in the European Union project.\(^\text{111}\)

With regard to the data sharing model and methods for accessing the data for conducting research, the option most favoured (although not reaching the predefined agreement level of 60%) was to restrict access and put in place an access fee for external researchers. Such a fee would help to offset the costs of developing and maintaining such a database while also rewarding those contributing data. However, it would be important that the fee is not so large as to deter researchers with fewer resources. As the implementation of a fee to access the data does not align with the principles of open access, ProPASS will carefully consider its implementation in the next few years. However, if sustained funding cannot be acquired through other means (grants etc) it may be a necessity.

**CONCLUSION**

This scoping review and systematically developed expert collaborator statement will guide ProPASS and set the direction for ProPASS’s contribution to understanding the associations of physical activity, posture, and sleep
with long-term health outcomes and longevity. Directions taken as a result of this work are currently being implemented and have led to positive outcomes in terms of consortium growth, funding and progress with the consortium’s aims. We are: (1) using the term physical behaviour to account for the full spectrum of movement and posture related physical behaviours that includes physical activity, sedentary behaviours and sleep; we encourage others to do the same for the reasons outlined above; (2) developing a comprehensive set of standardised protocols and tools for the collection of accelerometry and important health outcomes data (including fieldwork training materials); (3) developing tools for processing thigh-worn accelerometer data according to the ProPASS construct presented in this manuscript and (4) developing/adopting systems for conducting federated data analysis.

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Thigh-worn Accelerometry for measuring Movement and Posture across the 24 hour cycle: A Scoping Review and Expert Statement

Appendix 1 - Search Strategies

Table S1-1: MEDLINE Search Strategy

| Database       | MEDLINE                          |
|----------------|----------------------------------|
| Platform       | OvidSP 1946 - present           |
| **Row #**      | **Terms**                        |
| 1              | activpal.ti,ab,mp.               |
| 2              | actigraph.ti,ab,mp.              |
| 3              | axivity.ti,ab,mp.                |
| 4              | 1 OR 2 OR 3                      |
| 5              | accelerom*.ti,ab,mp.             |
| 6              | inclinomet*.ti,ab,mp.            |
| 7              | acceleratory.ti,ab,mp.           |
| 8              | 5 OR 6 OR 7                      |
| 9              | observational.ab,mp.             |
| 10             | Thigh.ab,mp.                     |
| 11             | cohort.ab,mp.                    |
| 12             | cross-sectional.ab,mp.           |
| 13             | case-control.ab,mp.              |
| 14             | case series.ab,mp.               |
| 15             | 9 OR 10 OR 11 OR 12 OR 13 OR 14  |
| 16             | 8 AND 15                         |
| 17             | 4 OR 16                          |
| 18             | Limit 17 to humans               |
| **Filters**    | Humans: yes                      |
| **Restrictions**| Date restrictions: none          |
|                | Language restrictions: none      |

#: row number; *: truncate; ab: abstract; mp: keywords; ti: title.
### Table S1-2: Embase Search Strategy

| Database | Embase |
|----------|--------|
| Platform | OvidSP 1947 - present |
| **Row #** | **Terms** |
| 1 | activpal (ti,ab,mp) |
| 2 | actigraph (ti,ab,mp) |
| 3 | axivity (ti,ab,mp) |
| 4 | 1 OR 2 OR 3 |
| 5 | accelerometer (ti,ab,mp) |
| 6 | inclinomet* (ti,ab,mp) |
| 7 | accelatory (ti,ab,mp) |
| 8 | 5 OR 6 OR 7 |
| 9 | observational (ab,mp) |
| 10 | thigh (ab,mp) |
| 11 | cohort (ab,mp) |
| 12 | cross-sectional (ab,mp) |
| 13 | case-control (ab,mp) |
| 14 | case series (ab,mp) |
| 15 | 9 OR 10 OR 11 OR 12 OR 13 OR 14 |
| 16 | 4 AND 15 |
| 17 | 8 AND 15 |
| 18 | 16 OR 17 |
| 19 | Limit 18 to humans |
| **Filters** | Humans: yes |
| **Restrictions** | Date restrictions: none |
| | Language restrictions: none |

#: row number; *: truncate; ab: abstract; mp: keywords; ti: title.
**Thigh-worn Accelerometry for measuring Movement and Posture across the 24 hour cycle: A Scoping Review and Expert Statement**

Appendix 2. Study Details

**Table S2-1: Details of studies that use thigh-worn accelerometry to measure 24-hour Physical Behaviour**

| Study Details | Accelerometry Protocol | Accelerometry Variables | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|----------------|-------------------------|-------------------------|--------------------------|-----------------------------------------------|---------------------------------------------|-----------------------------------------------|--------------|
| Design         |                         |                         |                          |                                               |                                             |                                               |              |
| 1. Cross sectional | 1. ActivPAL3 | • Total sitting time   | • Insulin | • Age                                           | • Stage I to III colorectal cancer survivors diagnosed and treated between 2002 and 2010 | | Record sleep and any non-wear periods |
| 2. 2011-2012    | 2. Right anterior thigh | • Prolonged sitting time | • Cholesterol | • Menopausal status                             |                                             |                                               |              |
| 3. Purposive sampling | Water proofed, hypoallergenic patch | • Sit-stand transitions | • Fasting plasma glucose | • Contraceptive pill use                        |                                             |                                               |              |
| 4. Multi-centre | 3. 7 consecutive days, 24/7 no removal | • Usual bout duration | • 2-hour post-load glucose | • Blood pressure tablets                       |                                             |                                               |              |
| 5. N = 678     | 4. Minimum 4 days wear  |                         | • Triglycerides          | • Cholesterol tablets                          |                                             |                                               |              |
| 6. Age: 57.8   | 5. ActivPAL Software 6.4.1; custom SAS v9.3 program |                         | • Diabetes               | • Diabetes medication                          |                                             |                                               |              |
| 7. Gender: F, M | 6. - |                         | • BMI                     | • Ethnicity                                   |                                             |                                               |              |
| 8. Community   | 7. - | | • Waist circumference | • Employment status     |                                             |                                               |              |
| 9. Health outcomes |                      | | • Lower back pain | • Annual household income |                                             |                                               |              |
| 10. The Australian Diabetes, Obesity, and Lifestyle study (AusDab) | | | • High-density lipoprotein | • Fiber intake |                                             |                                               |              |
| 1. Cross sectional | | | • Low-density lipoprotein | • Alcohol intake |                                             |                                               |              |
| 2. May 2012 and December 2013 | 1. MOX activity monitor | • Total sedentary time | • HbA1c | • Saturated fat | | | |
| Study Details | Accelerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|---------------|-------------------------|--------------------------|-----------------------------------------------|---------------------------------|---------------------------------------------|----------------|
| 1. Design     | 1. Device               | Total physical activity time | Diet                                           |                            |                             | Record sleep and any non-wear periods |
| 2. Years      | 2. Placement/attachment | Usual sedentary bout duration | Cancer stage age at diagnosis               |                            |                             |                             |
| 3. Sampling method | 3. Other sensors   |                            | Treatment                                     |                            |                             |                             |
| 4. Multi-centre? | 4. Protocol n Days / hour/day |                            |                                                |                            |                             |                             |
| 5. N          | 5. Valid n of days for inclusion |                            |                                                |                            |                             |                             |
| 6. Age*       | 6. Software            |                            |                                                |                            |                             |                             |
| 7. Gender     | 7. Processing Method   |                            |                                                |                            |                             |                             |
| 8. Setting (community, occupational, clinical, other) |                  |                            |                                                |                            |                             |                             |
| 9. Study Type (descriptive; health outcomes; correlates) |                  |                            |                                                |                            |                             |                             |
| 10. Mother study name |                |                            |                                                |                            |                             |                             |
| 5. N: 145     | 1. N: 70               |                            |                                                |                            |                             |                             |
| 6. Age: 70    | 2. Gender: F, M        |                            |                                                |                            |                             |                             |
| 7. Gender: F, M | 3. Community           |                            |                                                |                            |                             |                             |
| 8. Community  | 4. Descriptive         |                            |                                                |                            |                             |                             |
| 9. Descriptive | 5. ColoRectal cancer (EnCoRe) study |            |                                                |                            |                             |                             |
| 10. ColoRectal cancer (EnCoRe) study |                  |                            |                                                |                            |                             |                             |
|               | waterproofed in a finger cot | Total physical activity time | Diet                                           | Age at time of cognitive testing | Age at time of cognitive testing | Record sleep periods |
|               | 24 h/d during 7 consecutive day | Usual sedentary bout duration | Cancer stage age at diagnosis               | Maximum educational attainment | Employment |                             |
|               | 4 valid days           |                            | Treatment                                     | Long-standing illness         |             |                             |
|               | 6. Customized Matlab program (Version R2012a) | |                                                |                              |                             |                             |
|               | 7. activPAL3c          | Avertnate percentage of waking time | Age at time of cognitive testing | | Age at time of cognitive testing |                             |
|               | 2. the front of the thigh of their dominant leg using a waterproofing dressing | spent sedentary | Maximum educational attainment | | Maximum educational attainment |                             |
|               | 3. 7-days continuous recording | The number of sit to stand transitions | Employment | | Employment |                             |
|               | 4. activPAL software   |                            | Long-standing illness | | Long-standing illness |                             |
|               | 7. -                   |                            |                                                | |             |                             |
|               | 8. -                   |                            |                                                | |             |                             |
| 1. Cross sectional Seniors Understanding Sedentary Patterns (USP) study | | | | | | |
| 2. -           | | | | | | |
| 3. Purposive sampling | | | | | | |
| 4. Multi-centre | | | | | | |
| 5. N: 700     | | | | | | |
| 6. Age: 65, 79, 83 | | | | | | |
| 7. Gender: F, M | | | | | | |
| 8. Community  | | | | | | |
| 9. Correlates | | | | | | |
| 11. The Lothian Birth Cohort, 1936 (LBC1936), and two cohorts of the West of Scotland Twenty-07 study (Twenty-07) study | | | | | | |
| 1. ActivPAL | | | | | | |
| 2. The front of the right thigh | | | | | | |
| 3. Waterproofed using a nitrile sleeve. | | | | | | |
| 4. Protocol: eight consecutive day | | | | | | |
| 5. - | | | | | | |
| 6. - | | | | | | |
| 7. - | | | | | | |
| 8. - | | | | | | |
| 1. Total time spent sedentary (sitting/lying), standing and stepping | | | | | | |
| 2. Stepping intensity | | | | | | |
| 3. Sedentary breaks | | | | | | |
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[28]

[29]
| Study Details | Acclerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|---------------|-----------------------|--------------------------|-----------------------------------------------|------------------------------------------------|---------------------------------------------------|-------------|
| 1. Design     | 1. Device             |                          |                                               |                                                 |                                                   |             |
| 2. Years      | 2. Placement/attachment |                          |                                               |                                                 |                                                   |             |
| 3. Sampling method | 3. Other sensors       |                          |                                               |                                                 |                                                   |             |
| 4. Multi-centre?| 4. Protocol n Days / hour/day |      |                                               |                                                 |                                                   |             |
| 5. N          | 5. Valid n of days for inclusion |                |                                               |                                                 |                                                   |             |
| 6. Age*       | 6. Software            |                          |                                               |                                                 |                                                   |             |
| 7. Gender     | 7. Processing Method   |                          |                                               |                                                 |                                                   |             |
| 8. Setting (community, occupational, clinical, other) |                          |                          |                                               |                                                 |                                                   |             |
| 9. Study Type (descriptive; health outcomes; correlates) |                          |                          |                                               |                                                 |                                                   |             |
| 10. Mother study name |                      |                          |                                               |                                                 |                                                   |             |

| Accelerometry Variables                                                                 | Health Outcome Variables                                                                 | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|---------------------------------------------------|-------------------------------------------------|---------------------------------------------------|-------------|
|                                                                                         |                                                                                         |                                                   |                                                 |                                                   |             |

| Accelerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|------------------------|--------------------------|---------------------------------------------------|-------------------------------------------------|---------------------------------------------------|-------------|
| 1. Device              | 1. Total sitting time    | 1. Age                                               | 1. Available upon request                      |                                                   |             |
| 2. Placement/attachment| 2. Occupational sitting time | 2. Job seniority                                      |                                                 |                                                   |             |
| 3. Other sensors       | 3. Leisure sitting time  | 3. BMI                                               |                                                 |                                                   |             |
| 4. Protocol n Days / hour/day | 4. Influence at work | 4. Time spent carrying/lifting at work                  |                                                 |                                                   |             |
| 5. Valid n of days for inclusion | 5. Smoking        | 5. Gender                                             |                                                 |                                                   |             |
| 6. Software            |                          | 6. Smoking                                             |                                                 |                                                   |             |
| 7. Processing Method   |                          | 7. Smoking                                             |                                                 |                                                   |             |
| 8. Setting (community, occupational, clinical, other) |                          | 8. Smoking                                             |                                                 |                                                   |             |
| 9. Study Type (descriptive; health outcomes; correlates) |                          | 9. Smoking                                             |                                                 |                                                   |             |
| 10. Mother study name  |                          | 10. Smoking                                            |                                                 |                                                   |             |

| Study Details | Accelerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|---------------|-----------------------|--------------------------|---------------------------------------------------|-------------------------------------------------|---------------------------------------------------|-------------|
| 1. Design     | 1. activPAL3c         |                          |                                                   |                                                 |                                                   |             |
| 2. Placement/attachment | 2. the anterior thigh of the dominant leg with a waterproof dressing | |                                                   |                                                 |                                                   |             |
| 3. Other sensors | 3. Continuously for 7 days | |                                                   |                                                 |                                                   |             |
| 4. Protocol n Days / hour/day | 4. 7seven days | |                                                   |                                                 |                                                   |             |
| 5. Valid n of days for inclusion | 5. activPAL software (v7.2.32) | |                                                   |                                                 |                                                   |             |
| 6. Software | 6. activPAL software | |                                                   |                                                 |                                                   |             |
| 7. Processing Method | 7. activPAL3c | |                                                   |                                                 |                                                   |             |
| 8. Setting (community, occupational, clinical, other) | 8. the anterior thigh of the dominant leg with a waterproof dressing | |                                                   |                                                 |                                                   |             |
| 9. Study Type (descriptive; health outcomes; correlates) | 9. Continuously for 7 days | |                                                   |                                                 |                                                   |             |
| 10. Mother study name | 10. activPAL software | |                                                   |                                                 |                                                   |             |

| Study Details | Accelerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|---------------|-----------------------|--------------------------|---------------------------------------------------|-------------------------------------------------|---------------------------------------------------|-------------|
| 1. Design     | 1. Actigraph GT3X+    |                          |                                                   |                                                 |                                                   |             |
| 2. Placement/attachment | 2. the medial front of the right thigh, midway between the hip and knee joints processus spinosus at the level of T1–T2 Water resistant | |                                                   |                                                 |                                                   |             |
| 3. Other sensors | 3. Total sitting time | |                                                   |                                                 |                                                   |             |
| 4. Protocol n Days / hour/day | 4. Occupational sitting time | |                                                   |                                                 |                                                   |             |
| 5. Valid n of days for inclusion | 5. Leisure sitting time | |                                                   |                                                 |                                                   |             |
| 6. Software | 6. Low Back Pain intensity | |                                                   |                                                 |                                                   |             |
| 7. Processing Method | 7. Age | |                                                   |                                                 |                                                   |             |
| 8. Setting (community, occupational, clinical, other) | 8. Job seniority | |                                                   |                                                 |                                                   |             |
| 9. Study Type (descriptive; health outcomes; correlates) | 9. BMI | |                                                   |                                                 |                                                   |             |
| 10. Mother study name | 10. Influence at work | |                                                   |                                                 |                                                   |             |

**Notes:**
- Fasting plasma glucose Medication use
- BMI
- Difficulties with activities of daily living
- Education
- DNA methylation: epigenetic age acceleration
- Age
- Depressive symptoms
- Chronic physical disease
- Low Back Pain intensity
- Available upon request

**References:**
[30] Cross sectional
[31] Cross sectional
[32] Cross sectional

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| Study Details | Accelerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|---------------|------------------------|--------------------------|-----------------------------------------------|---------------------------------------------|-------------------------------------------------|-------------|
| 1. Design | 1. Device | Sitting time | - | - | Available upon request |
| 2. Years | 2. Placement/attachment | Moderate vigorous physical activity | - | - | |
| 3. Sampling method | 3. Other sensors | Bouts | - | - | |
| 4. Multi-centre? | 4. Protocol n Days / hour/day | Exposure Variation Analysis of sedentary time (EVA) | - | - | |
| 5. N | 5. Valid n of days for inclusion | Weight and fat percentage | - | - | |
| 6. Age* | 6. Software | BMI | - | - | |
| 7. Gender | 7. Processing Method | Age | - | - | |
| 8. Setting (community, occupational, clinical, other) | 8. Study Type | Gender | - | - | |
| 9. Study Type (descriptive; health outcomes; correlates) | 9. Mother study name | Influence at work | - | - | |
| 10. Mother study name | Accelerometry Variables | Smoking behaviour | - | - | |
| | Health Outcome Variables | Poor dietary habits | - | - | |
| | Covariates (confounders) / Mediators / Moderators | Alcohol intake | - | - | |
| | Sample Health Status (Descriptors variables) | | - | - | |
| | PA/SB/Sleep Variables collected via Questionnaires | | - | - | |
| | Data sharing | | - | - | |

**Notes:***

1. Cross sectional
2. August 2011 and April 2012
3. Convenience sampling
4. Multi-centre
5. N:205
6. Age: 44.8
7. Gender: F, M
8. Occupational
9. Health outcomes
10. New method for Objective Measurements of physical Activity in Daily living (NOMAD) Denmark

| Accelerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|------------------------|--------------------------|-----------------------------------------------|---------------------------------------------|-------------------------------------------------|-------------|
| 1. Actigraph GT3X+ thigh and trunk Water resistant | Sitting time | - | - | Available upon request |
| 2. | Moderate vigorous physical activity | - | - | |
| 3. | Bouts | - | - | |
| 4. | Exposure Variation Analysis of sedentary time (EVA) | - | - | |
| 5. | Weight and fat percentage | - | - | |
| 6. | BMI | - | - | |
| 7. | Age | - | - | |
| 8. | Gender | - | - | |
| 9. | Influence at work | - | - | |
| 10. | Smoking behaviour | - | - | |
| 11. | Poor dietary habits | - | - | |
| 12. | Alcohol intake | - | - | |

**Notes:***

1. Cross sectional
2. August 2011 and April 2012
3. Convenience sampling
4. Multi-centre
5. N:205
6. Age: 44.8
7. Gender: F, M
8. Occupational
9. Descriptive
10. New method for Objective Measurements of physical Activity in Daily living (NOMAD) Denmark

| Accelerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|------------------------|--------------------------|-----------------------------------------------|---------------------------------------------|-------------------------------------------------|-------------|
| 1. Actigraph GT3X+ thigh and trunk Water resistant | Sitting time | - | - | Available upon request |
| 2. | Moderate vigorous physical activity | - | - | |
| 3. | Bouts | - | - | |
| 4. | Exposure Variation Analysis of sedentary time (EVA) | - | - | |
| 5. | Weight and fat percentage | - | - | |
| 6. | BMI | - | - | |
| 7. | Age | - | - | |
| 8. | Gender | - | - | |
| 9. | Influence at work | - | - | |
| 10. | Smoking behaviour | - | - | |
| 11. | Poor dietary habits | - | - | |
| 12. | Alcohol intake | - | - | |

**Notes:***

1. Cross sectional
2. August 2011 and April 2012
3. Convenience sampling
4. Multi-centre
5. N:205
6. Age: 44.8
7. Gender: F, M
8. Occupational
9. Descriptive
10. New method for Objective Measurements of physical Activity in Daily living (NOMAD) Denmark

**References:**

1. [33](#)
2. [34](#)
3. [35](#)
| Study Details | Accelerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|---------------|-------------------------|---------------------------|---------------------------------------------|---------------------------------|---------------------------------|--------------|
| 1. Design     | Accelerometry Protocol  | Health Outcome Variables  | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
| 2. Years      | Accelerometry Protocol  | Health Outcome Variables  | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
| 3. Sampling method | Accelerometry Protocol  | Health Outcome Variables  | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
| 4. Multi-centre? | Accelerometry Protocol  | Health Outcome Variables  | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
| 5. N          | Accelerometry Protocol  | Health Outcome Variables  | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
| 6. Age*       | Accelerometry Protocol  | Health Outcome Variables  | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
| 7. Gender     | Accelerometry Protocol  | Health Outcome Variables  | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
| 8. Setting (community, occupational, clinical, other) | Accelerometry Protocol  | Health Outcome Variables  | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
| 9. Study Type (descriptive, health outcomes; correlates) | Accelerometry Protocol  | Health Outcome Variables  | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
| 10. Mother study name | Accelerometry Protocol  | Health Outcome Variables  | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |

(NOMAD) Denmark

[35]

1. Cross sectional
2. October 2011 to April 2012
3. Convenience sampling
4. Multi-centre
5. N:147
6. Age: 44.4
7. Gender: F, M
8. Occupational
9. Health outcomes
10. New method for Objective Measurements of physical Activity in Daily living (NOMAD) Denmark

[36]

1. Cross sectional
2. Spring 2012- Spring 2014
3. Convenience sampling
4. Multi-centre
5. N:692
6. Age: 45.1
7. Gender: F, M
8. Occupational
9. Health outcomes
10. Danish Physical ACTivity cohort with Objective measurements (DPhacto) Denmark

[37]

1. Prospective
2. Actigraph GT3X+

4. Total sedentary time (total time spent sitting or lying)
5. Total time spent standing still, moving
6. Total time spent stair-climbing, running, cycling
7. MVPA time
8. Total walk time
9. Exposure Variation Analysis of sedentary time
10. Sex
11. Age
12. Smoking behaviour
13. Alcohol intake
14. Poor dietary habits
15. Influence at work

Available upon request

• Danish Data Protection Agency accepted the handling and storage of data
| Study Details | Accelerometry Protocol | Accelerometry Variables | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|---------------|------------------------|-------------------------|--------------------------|--------------------------------------------------|---------------------------------------------|-----------------------------------------------|--------------|
| 1. Design     | 2. Device              | Total time spent        | 3. Age                   | 4. Gender                                         | 5. Danish Physical ACTivity cohort with Objective measurements (DPhacto) Denmark |
| 2. Years      | 3. Placement/attachment| walking, climbing stairs, running, cycling | 4. BMI                  | 5. Influence and social support at work           | 6. Danish Data Protection Agency accepted the handling and storage of data |
| 3. Sampling method | 4. Other sensors    | Total time spent        | 5. Social support at work | 6. Current use of cardiovascular drugs            | 7. Accepted the handling and storage of data |
| 4. Multi-centre? | 5. Protocol n Days / hour/day | weekends, leisure time | 7. Age                   | 8. BMI                                           | 8. BMJ accepted the handling and storage of data |
| 5. N          | 6. Valid n of days for inclusion | Resting systolic and diastolic blood pressure | 8. Gender                        | 9. BMI                                           | 9. BMJ accepted the handling and storage of data |
| 6. Age*       | 7. Software            | Heart rate variability  | 9. Smoking                     | 10. BMI                                          | 10. BMJ accepted the handling and storage of data |
| 7. Gender     | 8. Processing Method   |                          | 10. Social support at work    |                                                |                                             |
| 8. Setting (community, occupational, clinical, other) | 9. Actilife software version 5.5 |                          | 11. Seniority in the current job                  |                                                |                                             |
| 9. Study Type (descriptive; health outcomes; correlates) | 10. Actilife software version 5.5 |                          | 12. Current use of cardiovascular drugs            |                                                |                                             |
| 10. Mother study name | 11. - |                          | 13. Danish Data Protection Agency accepted the handling and storage of data |                                                |                                             |
|              | 12. -                  |                          | 14. Written diary to note working hours, leisure |                                                |                                             |
| 2. Spring 2012- Spring 2013 | 13. - |                          | 15. time and sleep, as well as the time of the reference measurements |                                                |                                             |
| 3. Convenience sampling | 14. - |                          | 16. Danish Data Protection Agency accepted the handling and storage of data |                                                |                                             |
| 4. Multi-centre | 15. - |                          | 17. Accepted the handling and storage of data |                                                |                                             |
| 5. N:625      | 16. -                  |                          | 18. Available upon request     |                                                |                                             |
| 6. Age: 44.8 | 17. -                  |                          | 19. Accepted the handling and storage of data |                                                |                                             |
| 7. Gender: F, M | 18. - |                          | 20. Accepted the handling and storage of data |                                                |                                             |
| 8. Occupational | 19. - |                          | 21. Accepted the handling and storage of data |                                                |                                             |
| 9. Health outcomes | 20. - |                          | 22. Accepted the handling and storage of data |                                                |                                             |
| 10. Danish Physical ACTivity cohort with Objective measurements (DPhacto) Denmark | 21. - |                          | 23. Accepted the handling and storage of data |                                                |                                             |
| 38 | 39 | | | | | |
### Study Details

- **1. Design**
- **2. Years**
- **3. Sampling method**
- **4. Multi-centre?**
- **5. N**
- **6. Age***
- **7. Gender**
- **8. Setting (community, occupational, clinical, other)**
- **9. Study Type (descriptive; health outcomes; correlates)**
- **10. Mother study name**

### Accelerometry Protocol

- **1. Device**
- **2. Placement/attachment**
- **3. Other sensors**
- **4. Protocol n Days / hour/day**
- **5. Valid n of days for inclusion**
- **6. Software**
- **7. Processing Method**

### Accelerometry Variables

- Sitting periods
- EVA
- The total time spent walking, climbing stairs, running and cycling
- Neck shoulder pain
- Age
- Smoking
- BMI
- Seniority in the current job
- Job
- Lifting and carrying at work
- Influence at work
- Social support
- Self-reported neck—shoulder pain
- A diary for noting working hours, leisure time, sleep periods, and time of reference measurement

### Health Outcome Variables

- Sitting time
- Total time spent walking fast-pace, running, cycling, and walking stairs
- Heart Rate Variability during night-time sleep
- Age
- Gender
- Smoking
- BMI
- Seniority in the current job
- Influence at work
- Lifting and carrying time at work
- Working night shifts
- Regular use of prescribed heart
- Self-reported data on medical diagnoses
- The life-time occurrence of diagnosed
- diabetes, cardiovascular disease, hypertension, and depression
- A diary for noting working hours, non-wear time, sleep periods
- Available upon request

### Covariates (confounders) / Mediators / Moderators

- Neck shoulder pain
- Self-reported neck—shoulder pain
- A diary for noting working hours, leisure time, sleep periods, and time of reference measurement
- Danish Data Protection Agency accepted the handling and storage of data

### Sample Health Status (Descriptors variables) / PA/SB/Sleep Variables collected via Questionnaires

- Sitting periods
- EVA
- The total time spent walking, climbing stairs, running and cycling
- Neck shoulder pain
- Age
- Smoking
- BMI
- Seniority in the current job
- Job
- Lifting and carrying at work
- Influence at work
- Social support
- Self-reported neck—shoulder pain
- A diary for noting working hours, leisure time, sleep periods, and time of reference measurement
- Danish Data Protection Agency accepted the handling and storage of data

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**[40]**

- Cross sectional
- Spring 2012- Spring 2013
- Convenience sampling
- Multi-centre N:659
- Age: 45
- Gender: F, M
- Occupational
- Health outcomes
- Danish PHysical ACTivity cohort with Objective measurements (DPhacto) Denmark

### Accelerometry Protocol

- Actigraph GT3X+
- Actiheart monitor
- Four consecutive days
- At least 1 day
- Actilife software version 5.5; a custom-made MATLAB-based software, Acti4

### Accelerometry Variables

- Sitting periods
- EVA
- The total time spent walking, climbing stairs, running and cycling
- Neck shoulder pain
- Age
- Smoking
- BMI
- Seniority in the current job
- Job
- Lifting and carrying at work
- Influence at work
- Social support
- Self-reported neck—shoulder pain
- A diary for noting working hours, leisure time, sleep periods, and time of reference measurement
- Danish Data Protection Agency accepted the handling and storage of data

### Health Outcome Variables

- Sitting time
- Total time spent walking fast-pace, running, cycling, and walking stairs
- Heart Rate Variability during night-time sleep
- Age
- Gender
- Smoking
- BMI
- Seniority in the current job
- Influence at work
- Lifting and carrying time at work
- Working night shifts
- Regular use of prescribed heart
- Self-reported data on medical diagnoses
- The life-time occurrence of diagnosed
- diabetes, cardiovascular disease, hypertension, and depression
- A diary for noting working hours, non-wear time, sleep periods
- Available upon request

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**[41]**

- Cross sectional
- October 2011 to April 2012
- Convenience sampling
- Multi-centre N:138
- Age: 45.5
- Gender: F, M
- Occupational
- Health outcomes
- New method for Objective

### Accelerometry Protocol

- Actigraph GT3X+
- Thigh and trunk water-resistant
- Actiheart monitor
- Four consecutive days
- At least 1 day
- Actilife software version 5.5; a custom-made MATLAB-based software, Acti4

### Accelerometry Variables

- Sitting time
- Total time spent walking fast-pace, running, cycling, and walking stairs
- Heart Rate Variability during night-time sleep
- Age
- Gender
- Smoking
- BMI
- Seniority in the current job
- Influence at work
- Lifting and carrying time at work
- Working night shifts
- Regular use of prescribed heart
- Self-reported data on medical diagnoses
- The life-time occurrence of diagnosed
- diabetes, cardiovascular disease, hypertension, and depression
- A diary for noting working hours, non-wear time, sleep periods
- Available upon request

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Stevens ML, et al. BMJ Open Sp Ex Med 2020; 6:e000874. doi: 10.1136/bmjsem-2020-000874
### Study Details

1. Design
2. Years
3. Sampling method
4. Multi-centre?
5. N
6. Age*
7. Gender
8. Setting (community, occupational, clinical, other)
9. Study Type (descriptive; health outcomes; correlates)
10. Mother study name

| Accelerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|------------------------|--------------------------|-----------------------------------------------|---------------------------------|---------------------------------|--------------|
| 1. Device              | Accelerometry Variables  | • Sedentary behaviour (lying/sitting)          | • Occupational sector          | • A diary for noting            |
| 2. Placement/attachment|                          | • Light (stand/slow walking)                   | • Job seniority                | working hours, non-             |
| 3. Other sensors       |                          | • Moderate-to-vigorous (fast walking/running/cycling) | • Smoking                     | wear time, sleep                |
| 4. Protocol n Days / hour/day |                        |                                               | • Frequency of fruit and vegetable intake | periods, and time of             |
| 5. Valid n of days for inclusion |                    |                                               | • BMI                          | reference measurement          |
| 6. Software            |                          |                                               |                               |                                 |
| 7. Processing Method   |                          |                                               |                               |                                 |

### Measurements of physical Activity in Daily living (NOMAD) Denmark

1. Cross sectional
2. 2011 to 2013
3. Convenience sampling
4. Multi-centre
5. N:812
6. Age: 45
7. Gender: F, M
8. Occupational
9. Descriptive
10. New method for Objective Measurements of physical Activity in Daily living (NOMAD) Denmark and the Danish Physical ACTivity cohort with Objective measures (DPhacto)

1. Actigraph GT3X+
2. Halfway between crista iliac and patella at the medial front of the right thigh
3. -
4. Four successive days
5. -
6. Actilife software version 5.5
7. -

- Sedentary behaviour (lying/sitting)
- Light (stand/slow walking)
- Moderate-to-vigorous (fast walking/running/cycling).

### [42]

1. Actigraph GT3x+
2. Right thigh
3. Waterproofed
4. -
5. 5 continuous working days
6. Only working hours
7. Actilab software (Acti4)

- Number of sit-to-stand transitions
- Total sitting time
- Number of prolonged sitting periods
- Total time accumulated in prolonged sitting periods

- Waist circumference
- Weight
- BMI
- Age
- Sex
- Smoking
- Self-rated health
- A log for noting sleep periods and any irregularities such as problems with the ActiGraph, days off work or working at home

### [43]

1. ActiGraph GT3x+
2. Right thigh
3. Waterproofed
4. -
5. 5 continuous working days
6. Only working hours
7. Actilab software (Acti4)

- Number of sit-to-stand transitions
- Total sitting time
- Number of prolonged sitting periods
- Total time accumulated in prolonged sitting periods

- Waist circumference
- Weight
- BMI
- Age
- Sex
- Smoking
- Self-rated health

### [44]

1. Take a Stand!
2. -
3. Convenien sampling
4. Multi centre
5. N:317
6. Age: 45
7. Gender: F, M
8. Occupational
9. Health outcomes
10. -

- Number of sit-to-stand transitions
- Total sitting time
- Number of prolonged sitting periods
- Total time accumulated in prolonged sitting periods

- Waist circumference
- Weight
- BMI
- Age
- Sex
- Smoking
- Self-rated health
- A log for noting sleep periods and any irregularities such as problems with the ActiGraph, days off work or working at home
| Study Details | Accelerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|---------------|------------------------|--------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-------------|
| Design        | Accelerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
| Years         | Multi-centre?          | N                         | Age                                           | Gender                                        | Study Type                                     | Mother study name |
| Sampling method | 6:704                  | N:479                     | Age: (median: 47 for no LBP, 46 for LBP)       | Gender: F, M                                 | Study Type                                     | Mother study name |
| Multi-centre  | N:704                  | N                         | Age                                           | Gender                                        | Study Type                                     | Mother study name |
| Age*          | N:704                  | N:479                     | Age                                           | Gender                                        | Study Type                                     | Mother study name |
| Gender        | N:704                  | N:479                     | Age                                           | Gender                                        | Study Type                                     | Mother study name |
| 8. Setting (community, occupational, clinical, other) | 6:704                  | N:479                     | Age                                           | Gender                                        | Study Type                                     | Mother study name |
| Study Type    | (descriptive; health outcomes; correlates) | 6:704                  | N:479                     | Age                                           | Gender                                        | Study Type                                     | Mother study name |
| 9.             | 6:704                  | N:479                     | Age                                           | Gender                                        | Study Type                                     | Mother study name |
| 10.            | 6:704                  | N:479                     | Age                                           | Gender                                        | Study Type                                     | Mother study name |
| Mother study name | 6:704                  | N:479                     | Age                                           | Gender                                        | Study Type                                     | Mother study name |
| [45]          | 6:704                  | N:479                     | Age                                           | Gender                                        | Study Type                                     | Mother study name |

1. Cross sectional
2. December 2012-March 2013
3. Convenience sampling
4. Multi-centre
5. N:704
6. Age: 45
7. Gender: F, M
8. Occupational
9. Health outcomes
10. Danish PHysical ACTivity cohort with Objective measurements (DPhacto) Denmark

Accelerometry Variables
- Sitting periods
- Sitting during the whole day
- Sitting during work
- Plus EVA variables

Health Outcome Variables
- Low back pain
- Age
- Sex
- Smoking
- BMI
- Level of occupational lifting
- Occupational sector
- Previously diagnosed with a herniated disc
- Leisure-time physical activity
- Intensity of physical activity during working hours
- Social support at work
- Age
- Sex
- BMI
- Occupational sector
- Level of physical activity during leisure time
- Intensity of physical activity during working hours

Covariates (confounders) / Mediators / Moderators
- Age
- Gender
- Marital status
- Educational level
- Smoking
- Chronotype
- Occupation

Sample Health Status (Descriptors variables)

PA/SB/Sleep Variables collected via Questionnaires

Data sharing

A diary for noting working hours, time off work, non-wear time and sleep periods

Danish Data Protection Agency accepted the handling and storage of data

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Stevens ML, et al. BMJ Open Sp Ex Med 2020; 6:e000874. doi: 10.1136/bmjsem-2020-000874
| Study Details | Accelerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|---------------|-------------------------|--------------------------|-----------------------------------------------|------------------------------------------|---------------------------------------------|-------------|
| 1. Design     | 1. Device               | 1. Stepping time         | 1. Sex                                       | 1. Global Initiative for Chronic Obstructive Lung Disease (GOLD) COPD diagnosis with a moderate to very severe degree of airflow limitation (GOLD grades 2-4) |
| 2. Years      | 2. Placement/attachment | 2. Waking time          | 2. Age                                       | 2. Exercise motivation (Behavioral Regulation and Exercise Questionnaire 2 (BREQ-2)) |
| 3. Sampling method | 3. Other sensors      | 3. Total amount of sedentary time | 2. Relationship between patient and loved one |                               |
| 4. Multi-centre? | 4. Protocol n Days / hour/day | 4. Number of sedentary breaks | 2. Working situation                          |                               |
| 5. N          | 5. Valid n of days for inclusion | 5. Number of prolonged sedentary bouts | 2. Smoking status                           |                               |
| 6. Age*       | 6. Software             | 6. Average sedentary bout duration | 3. Time living together                      |                               |
| 7. Gender     | 7. Processing Method    |                          | 3. Receiving informal care from relatives    |                               |
| 8. Setting (community, occupational, clinical, other) | |                          | 3. Rollator use                             |                               |
| 9. Study Type (descriptive; health outcomes; correlates) | |                          |                                              |                               |
| 10. Mother study name | |                          |                                              |                               |

| Accelerometry Variables | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|-------------------------|--------------------------|-----------------------------------------------|------------------------------------------|---------------------------------------------|-------------|
| 1. MOX Activity Monitor | 1. Time in sedentary behavior | 1. Age                                       | 1. Global Initiative for Chronic Obstructive Lung Disease (GOLD) COPD diagnosis with a moderate to very severe degree of airflow limitation (GOLD grades 2-4) |
| 2. The right thigh     | 2. Time in light activities | 2. Relationship between patient and loved one | 2. Exercise motivation (Behavioral Regulation and Exercise Questionnaire 2 (BREQ-2)) |
| 3. -                    | 3. Time in moderate to vigorous physical activity | 3. Working situation                          |                               |
| 4. At least 7 days     |                          | 3. Smoking status                           |                               |
| 5. At least 5 days of assessment (three weekdays, Saturday, Sunday), each with at least 10 h of measurement. |                          | 4. Time living together                      |                               |
| 6. -                    |                          | 4. Receiving informal care from relatives    |                               |
| 7. -                    |                          | 4. Rollator use                             |                               |

**Note:** The table includes information on study design, sampling method, setting, study type,母亲研究名称, and data sharing. The details are provided in the document for each study, including specific measurements and outcomes. The table structure is designed to summarize these details efficiently.
### Study Details

1. **Design**
2. **Years**
3. **Sampling method**
4. **Multi-centre?**
5. **N**
6. **Age**
7. **Gender**
8. **Setting (community, occupational, clinical, other)**
9. **Study Type** (descriptive; health outcomes; correlates)
10. **Mother study name**

#### Accelerometry Protocol

| Device | Placement/attachment | Other sensors | Protocol n Days / hour/day | Valid n of days for inclusion | Software | Processing Method |
|--------|----------------------|---------------|---------------------------|-------------------------------|----------|-------------------|
| ActiGraph GT3X+ | Thigh and hip | Water resistant | 4 consecutive days for at least two working days | Days with at least 4 h of work | Actilife software version 5.5; a custom-made MATLAB-based software, Acti4 | - |
| ActivPAL3 | The front of the right thigh | Waterproofed | 8 consecutive days | At least 1 valid weekday and 1 valid weekend day (≥10 h of waking data) | activPAL software MATLAB R2013b | - |

#### Accelerometry Variables

- Duration of standing still and walking at work
- Low back pain intensity
- The total sedentary time
- The total amount of stepping
- The total standing time

#### Health Outcome Variables

- • Cane use
- • Long-term oxygen therapy
- • Exacerbations past 12 mo
- • Medications in use
- • BMI

#### Covariates (confounders) / Mediators / Moderators

- • Gender
- • Age
- • Seniority
- • BMI
- • Smoking
- • Time on feet during leisure hours
- • Forward bending
- • Carrying/lifting
- • Influence at work

#### Sample Health Status (Descriptors variables)

- • Self-reported
- • LBP intensity

#### PA/SB/Sleep Variables collected via Questionnaires

- • A diary for noting working hours, leisure time, non-wear time, sleep periods and time of reference measurement
- • Available upon request

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[48] Cross sectional
1. October 2011 – April 2012
2. Convenience sampling
3. Multi-centre
4. N:187
5. Age: 45
6. Gender: F, M
7. Occupational
8. Health outcomes
9. New method for Objective Measurements of physical Activity in Daily living (NOMAD) Denmark
10. Home Sweet Home study

#### Accelerometry Protocol

| Device | Placement/attachment | Other sensors | Protocol n Days / hour/day | Valid n of days for inclusion | Software | Processing Method |
|--------|----------------------|---------------|---------------------------|-------------------------------|----------|-------------------|
| ActiGraph GT3X+ | Thigh and hip | Water resistant | 4 consecutive days for at least two working days | Days with at least 4 h of work | Actilife software version 5.5; a custom-made MATLAB-based software, Acti4 | - |

#### Accelerometry Variables

- Duration of standing still and walking at work
- Low back pain intensity

#### Health Outcome Variables

- • Cane use
- • Long-term oxygen therapy
- • Exacerbations past 12 mo
- • Medications in use
- • BMI

#### Covariates (confounders) / Mediators / Moderators

- • Gender
- • Age
- • Seniority
- • BMI
- • Smoking
- • Time on feet during leisure hours
- • Forward bending
- • Carrying/lifting
- • Influence at work

#### Sample Health Status (Descriptors variables)

- • Self-reported
- • LBP intensity

#### PA/SB/Sleep Variables collected via Questionnaires

- • A diary for noting working hours, leisure time, non-wear time, sleep periods and time of reference measurement
- • Available upon request

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[49] Cross sectional
1. November 2010 - September 2013
2. Convenience sampling
3. Southern part of the Netherlands
4. N:2,045
5. Age: 60.2
6. Gender: F, M
7. Community
8. Descriptive
9. The Maastricht Study
10. The Maastricht Study

#### Accelerometry Protocol

| Device | Placement/attachment | Other sensors | Protocol n Days / hour/day | Valid n of days for inclusion | Software | Processing Method |
|--------|----------------------|---------------|---------------------------|-------------------------------|----------|-------------------|
| ActivPAL3 | The front of the right thigh | Waterproofed | 8 consecutive days | At least 1 valid weekday and 1 valid weekend day (≥10 h of waking data) | activPAL software MATLAB R2013b | - |

#### Accelerometry Variables

- • The total sedentary time
- • The total amount of stepping
- • The total standing time

#### Health Outcome Variables

- • Employment status
- • Age
- • Sex
- • Diabetes Status
- • Mobility limitations
- • Level of education
- • Smoking
- • Alcohol consumption
- • BMI
- • Frequency of shift work

#### Covariates (confounders) / Mediators / Moderators

- • Gender
- • Age
- • Seniority
- • BMI
- • Smoking
- • Time on feet during leisure hours
- • Forward bending
- • Carrying/lifting
- • Influence at work

#### Sample Health Status (Descriptors variables)

- • Self-reported
- • LBP intensity

#### PA/SB/Sleep Variables collected via Questionnaires

- • A diary for noting working hours, leisure time, non-wear time, sleep periods and time of reference measurement
- • Available upon request

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Stevens ML, et al. BMJ Open Sp Ex Med 2020; 6:e000874. doi: 10.1136/bmjsem-2020-000874
| Study Details | Accelerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|---------------|------------------------|--------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-------------|
| 1. Design     | 1. Device              | 1. Time spent walking, standing, sitting | 1. Sex                                  | 1. Cross sectional                  | 1. A diary for noting working hours, non-wear time and sleep periods |
| 2. Years      | 2. Placement/attachment | 2. High intensity activities (HIPA: stair climbing, running and cycling). | 2. Age                                 | 2. March 2013 to March 2014             |                                                |
| 3. Sampling method | 3. Other sensors | 3. Sedentary behavior (sitting and lying). | 3. BMI                                  | 3. Convenience sampling              |                                                |
| 4. Multi-centre? | 4. Protocol n Days / hour/day | 3. Time in bed | 3. Shift work                             | 4. Multi-centre                     |                                                |
| 5. N          | 5. Valid n of days for inclusion | 4. Pain in lower back, knees and feet/ankles | 4. Information about pain in lower back, | 5. N:895                             |                                                |
| 6. Age*       | 6. Software            | 5. Information on whether the worker was skilled | 5. Gender: F, M                        | 6. Age: 46.6 men, 46.5 women        |                                                |
| 7. Gender     | 7. Processing Method   | 6. Information on whether the worker was skilled | 6. Occupational                    | 7. Gender: F, M                      |                                                |
| 8. Setting (community, occupational, clinical, other) |                     | 7. A diary for noting whether the worker was skilled | 7. Health outcomes                  | 8. Age: 46.6 men, 46.5 women        |                                                |
| 9. Study Type (descriptive; health outcomes; correlates) |                     |                          | 8. Correlates                        | 9. Age: 46.6 men, 46.5 women        |                                                |
| 10. Mother study name |                     |                          | 9. Active Buildings study             | 10. Age: 46.6 men, 46.5 women       |                                                |
| 10.            | 1. Actigraph GT3X+     |                          | 10. Active Buildings study            |                                                |                                                |
|               | 2. upper back and right thigh |                      |                                         |                                                |                                                |
|               | 3. -                   |                          |                                         |                                                |                                                |
|               | 4. Four consecutive days |                          |                                         |                                                |                                                |
|               | 5. At least one day of valid accelerometer measurements |                      |                                         |                                                |                                                |
|               | 6. Actilife software version 5.5 |                      |                                         |                                                |                                                |
|               | a custom-made MATLAB-based software, Acti4 |                      |                                         |                                                |                                                |
|               | 7. -                   |                          |                                         |                                                |                                                |
|               | 1. Actimy3            |                          |                                         |                                                |                                                |
|               | 2. Middle front of the right thigh waterproof |                      |                                         |                                                |                                                |
|               | 3. -                   |                          |                                         |                                                |                                                |
|               | 4. Five consecutive days (encompassing ≥3 workdays) |                      |                                         |                                                |                                                |
|               | 5. Days when the Actimy3 was not worn continuously were Removed |                      |                                         |                                                |                                                |
|               | 6. Actimy3 software Microsoft Excel 2010 |                      |                                         |                                                |                                                |
|               | 7. -                   |                          |                                         |                                                |                                                |
| **Study Details** | **Accelerometry Protocol** | **Accelerometry Variables** | **Health Outcome Variables** | **Covariates** (confounders) / Mediators / Moderators | **Sample Health Status** (Descriptors variables) | **PA/SB/Sleep Variables collected via Questionnaires** | **Data sharing** |
|------------------|---------------------------|-----------------------------|-----------------------------|-----------------------------------------------------|---------------------------------------------|------------------------------------------------|----------------|
| 1. Design        | 1. Device                 | Percentage of waking time   | Objective neighbourhood     | Record sleep periods                                 |                                             |                                               |                |
| 2. Years         | 2. Placement/attachment   | Sedentary behaviour         | Subjective neighbourhood    |                                                    |                                             |                                               |                |
| 3. Sampling method|                           |                             | Social support              |                                                    |                                             |                                               |                |
| 4. Multi-centre? |                           |                             | Social participation       |                                                    |                                             |                                               |                |
| 5. N             |                           |                             | Home environment measures  |                                                    |                                             |                                               |                |
| 6. Age*          |                           |                             |                             |                                                    |                                             |                                               |                |
| 7. Gender        |                           |                             |                             |                                                    |                                             |                                               |                |
| 8. Setting       |                           |                             |                             |                                                    |                                             |                                               |                |
| (community,      |                           |                             |                             |                                                    |                                             |                                               |                |
| occupational,    |                           |                             |                             |                                                    |                                             |                                               |                |
| clinical, other  |                           |                             |                             |                                                    |                                             |                                               |                |
| 9. Study Type    |                           |                             |                             |                                                    |                                             |                                               |                |
| (descriptive;    |                           |                             |                             |                                                    |                                             |                                               |                |
| health outcomes; |                           |                             |                             |                                                    |                                             |                                               |                |
| correlates)      |                           |                             |                             |                                                    |                                             |                                               |                |
| 10. Mother study name |                 |                             |                             |                                                    |                                             |                                               |                |
| **Accelerometry Protocol** | 1. Device | Percentage of waking time | Objective neighbourhood | Record sleep periods |
|                   | 2. Placement/attachment   | Sedentary behaviour         | Subjective neighbourhood    |                                                    |
|                   |                           |                             | Social support              |                                                    |
|                   |                           |                             | Social participation       |                                                    |
|                   |                           |                             | Home environment measures  |                                                    |
| **Accelerometry Variables** | 1. activPAL3c | Total time spent | Education | Record sleep periods |
|                   | 2. the front of the thigh of their dominant leg using a waterproofing dressing | walking, running, cycling and walking stairs | Occupation |                                                    |
|                   | 3. Other sensors | | Car ownership |                                                    |
|                   | 4. 7-days continuous recording | | Subjective social position |                                                    |
|                   | 5. - | | Parental social |                                                    |
|                   | 6. - | | class |                                                    |
|                   | 7. - | | Lifetime social class |                                                    |
| **Health Outcome Variables** | 1. activPAL3c | Sedentary behaviour | Education | Record sleep periods |
|                   | 2. the front of the thigh of their dominant leg using a waterproofing dressing | Time spent walking | Occupation |                                                    |
|                   | 3. Other sensors | | Income |                                                    |
|                   | 4. 7-days continuous recording | | Car ownership |                                                    |
|                   | 5. - | | Subjective social position |                                                    |
|                   | 6. - | | Parental social |                                                    |
|                   | 7. - | | class |                                                    |
| **Covariates** (confounders) / Mediators / Moderators | 1. activPAL3c | Sedentary behaviour | Education | Record sleep periods |
|                   | 2. the front of the thigh of their dominant leg using a waterproofing dressing | Time spent walking | Occupation |                                                    |
|                   | 3. Other sensors | | Car ownership |                                                    |
|                   | 4. 7-days continuous recording | | Subjective social position |                                                    |
|                   | 5. - | | Parental social |                                                    |
|                   | 6. - | | class |                                                    |
|                   | 7. - | | Lifetime social class |                                                    |
| **Sample Health Status** (Descriptors variables) | 1. activPAL3c | Sedentary behaviour | Education | Record sleep periods |
|                   | 2. the front of the thigh of their dominant leg using a waterproofing dressing | Time spent walking | Occupation |                                                    |
|                   | 3. Other sensors | | Car ownership |                                                    |
|                   | 4. 7-days continuous recording | | Subjective social position |                                                    |
|                   | 5. - | | Parental social |                                                    |
|                   | 6. - | | class |                                                    |
|                   | 7. - | | Lifetime social class |                                                    |
| **PA/SB/Sleep Variables collected via Questionnaires** | 1. activPAL3c | Sedentary behaviour | Education | Record sleep periods |
|                   | 2. the front of the thigh of their dominant leg using a waterproofing dressing | Time spent walking | Occupation |                                                    |
|                   | 3. Other sensors | | Car ownership |                                                    |
|                   | 4. 7-days continuous recording | | Subjective social position |                                                    |
|                   | 5. - | | Parental social |                                                    |
|                   | 6. - | | class |                                                    |
|                   | 7. - | | Lifetime social class |                                                    |
| **Data sharing** | 1. activPAL3c | Total time spent | Education | Record sleep periods |
|                   | 2. on the thigh and the upper back; waterproof upper back | walking, running, cycling and walking stairs | Occupation |                                                    |
|                   | 3. | | Income |                                                    |
|                   | | | Car ownership |                                                    |
|                   | | | Subjective social position |                                                    |
|                   | | | Parental social |                                                    |
|                   | | | class |                                                    |
|                   | | | Lifetime social class |                                                    |

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| Study Details | Accelerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|---------------|------------------------|--------------------------|---------------------------------------------------|---------------------------------------------|-------------------------------------------------|-------------|
| 1. Design     | 1. Device              | Accelerometry Variables  | 1. for depression                                 | 1. Cross sectional                         | 1. The Movement at Work survey                    |             |
| 2. Years      | 2. Placement/attachment|                          | 2. participant’s workplace                        | 2. Convenience sampling                     | 2. A diary for noting sleep periods and any irregularities such as problems with the ActiGraph, days off work or working at home |             |
| 3. Sampling method | 3. Other sensors      |                          | 3. Intensity and extent of musculoskeletal         | 3. Multi-centre                            |                                                 |             |
| 4. Multi-centre? | 4. Protocol n Days / hour/day | 4. Pain               | 4. Pain                                            | 4. N:650                                    |                                                 |             |
| 5. N          | 5. Valid n of days for inclusion | 5. Shift work       | 5. Shift work                                      | 5. Age: 49                                  |                                                 |             |
| 6. Age*       | 6. Software            |                          | 6. Number of working hours per week               | 6. Gender: F, M                            |                                                 |             |
| 7. Gender     | 7. Processing Method   |                          | 7. Age                                             | 7. Occupational                             |                                                 |             |
| 8. Setting (community, occupational, clinical, other) | 8. Accelerometry Variables | 8. Ethnicity                                        | 8. Ethnicity                                 | 8. Descriptive                               |                                                 |             |
| 9. Study Type (descriptive; health outcomes; correlates) | 9. Health Outcome Variables | 9. Job role                                        | 9. Job role                                  | 9. Active Buildings study                      |                                                 |             |
| 10. Mother study name | 10. Covariates (confounders) / Mediators / Moderators | 10. Sample Health Status (Descriptors variables) | 10. Sample Health Status (Descriptors variables) | 10. Accelerometry Protocol | 10. PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|               | 1. Accelerometry Protocol | 1. Sample Health Status (Descriptors variables) | 1. Cross sectional | 1. Accelerometry Protocol | 1. Data sharing |             |
|               | 2. Health Outcome Variables | 2. Sample Health Status (Descriptors variables) | 2. Convenience sampling | 2. Health Outcome Variables | 2. Data sharing |             |
|               | 3. Covariates (confounders) / Mediators / Moderators | 3. Sample Health Status (Descriptors variables) | 3. Multi-centre | 3. Covariates (confounders) / Mediators / Moderators | 3. Data sharing |             |
|               | 4. Sample Health Status (Descriptors variables) | 4. Sample Health Status (Descriptors variables) | 4. N:164 | 4. Sample Health Status (Descriptors variables) | 4. Data sharing |             |
|               | 5. PA/SB/Sleep Variables collected via Questionnaires | 5. Sample Health Status (Descriptors variables) | 5. N:116 | 5. PA/SB/Sleep Variables collected via Questionnaires | 5. Data sharing |             |
|               | 6. Data sharing | 6. Sample Health Status (Descriptors variables) | 6. Age: 39 | 6. Data sharing | 6. Data sharing |             |
|               | 7. Sample Health Status (Descriptors variables) | 7. Sample Health Status (Descriptors variables) | 7. Gender: F, M | 7. Sample Health Status (Descriptors variables) | 7. Data sharing |             |
|               | 8. Data sharing | 8. Sample Health Status (Descriptors variables) | 8. Occupational | 8. Data sharing | 8. Data sharing |             |
|               | 9. Data sharing | 9. Sample Health Status (Descriptors variables) | 9. Descriptive | 9. Data sharing | 9. Data sharing |             |
|               | 10. Data sharing | 10. Sample Health Status (Descriptors variables) | 10. Active Buildings study | 10. Data sharing | 10. Data sharing |             |

[55] Cross sectional 2013 to 2014
Convenience sampling Multi-centre N:164 Age: 39 Gender: F, M Occupational Descriptive
1. ActivPAL3 middle front of the right thigh; waterproof
2. 24 hours a day for five consecutive days (encompassing ≥3 workdays)
3. Days when three or more weekdays and at least one weekend day
5. Minimum of 3 workdays
6. ActivPALTM3 software Microsoft Excel 2010
7. • Time spent sitting, standing, stepping
  • Step counts
  • Frequency of sit/stand transitions
  • Age
  • Sex
  • Ethnicity
  • Job role
  • A diary for noting sleep periods and any irregularities such as problems with the ActiGraph, days off work or working at home

[56] Cross sectional March 2013 to March 2014
Convenience sampling Multi-centre N:116 Age: 40 Gender: F, M Occupational Descriptive
1. ActivPAL3 middle front of the right thigh; waterproof
2. 24 hours a day for five consecutive days (encompassing ≥3 workdays)
5. Minimum of 3 workdays
• Occupational step counts, stepping time, sitting time, standing time and sit-to-stand transitions
• Age
• Sex
• Ethnicity
• Job role
• Habit strength
• Organisation
• BMI
• Socio-cultural workplace environment
• The Movement at Work survey
• A diary for noting working days, time of arrival and departure from the office and non-wear time
### Study Details

| Design | Years | Multi-centre? | N | Age* | Gender | Setting (community, occupational, clinical, other) | Study Type (descriptive; health outcomes; correlates) | Mother study name |
|--------|-------|---------------|---|------|--------|---------------------------------------------------|----------------------------------------------------|------------------|
|        |       |               |   |      |        |                                                   |                                                    | Accelerometry Protocol |
| 1.     |       |               |   |      |        |                                                   |                                                    | Accelerometry Protocol |
| 2.     |       |               |   |      |        |                                                   |                                                    | Accelerometry Protocol |
| 3.     |       |               |   |      |        |                                                   |                                                    | Accelerometry Protocol |
| 4.     |       |               |   |      |        |                                                   |                                                    | Accelerometry Protocol |
| 5.     |       |               |   |      |        |                                                   |                                                    | Accelerometry Protocol |
| 6.     |       |               |   |      |        |                                                   |                                                    | Accelerometry Protocol |
| 7.     |       |               |   |      |        |                                                   |                                                    | Accelerometry Protocol |
| 8.     |       |               |   |      |        |                                                   |                                                    | Accelerometry Protocol |
| 9.     |       |               |   |      |        |                                                   |                                                    | Accelerometry Protocol |
| 10.    |       |               |   |      |        |                                                   |                                                    | Accelerometry Protocol |

### Accelerometry Protocol

1. **ActivPAL3**
2. The front of the right thigh; waterproofed
3. Other sensors
4. 24 h/day for 8 consecutive days
5. At least 1 valid day (>14 h of waking data)
6. activPAL software
7. MATLAB R2013b

### Accelerometry Variables

- Sedentary time
- Number of sedentary breaks
- Prolonged sedentary bouts
- Average duration of the sedentary bouts

### Health Outcome Variables

- Oral glucose tolerance test
- Metabolic syndrome
- Waist circumference, Triacylglycerol levels
- HDL-cholesterol levels
- Fasting glucose levels
- Blood pressure
- Medication use
- Sex
- Age
- Level of education
- Smoking status
- Alcohol consumption
- Mobility limitation
- Health status
- Diabetes duration
- Medication use
- BMI
- HbA1c
- Higher intensity physical activity
- Record sleep periods

### Covariates (confounders) / Mediators / Moderators

- Mobility limitation
- Depression
- Glucose lowering medication
- Status

### Sample Health Status (Descriptors variables)

- Prevalent cardiovascular disease
- Use of lipid-modifying, antihypertensive
- Glucose-lowering medication
- Depression
- Glucose metabolism
- Status

### Active Buildings study

1. Cross sectional
2. November 2010 - September 2013
3. Convenience sampling
4. Southern part of the Netherlands
5. N=2,213
6. Age: 60
7. Gender: F, M
8. Community
9. Health outcomes
10. The Maastricht Study

### Example of Accelerometry Protocol

1. **ActivPAL3**
2. The front of the right thigh; waterproofed
3. Other sensors
4. 24 h/day for 8 consecutive days
5. At least 1 valid day (>14 h of waking data)
6. activPAL software
7. MATLAB R2013b

### Example of Accelerometry Variables

- Sedentary time (sitting or lying)
- The total amount of standing time
- The total amount of stepping time

### Example of Health Outcome Variables

- Waist circumference
- HDL cholesterol
- Total-to-HDL cholesterol ratio
- Triacylglycerol
- Fasting glucose
- 2 h postload glucose
- HbA1c
- Fasting insulin
- Metabolic syndrome
- Type 2 diabetes

### Example of Covariates

- Mobility limitation
- Depression
- Glucose lowering medication
- Status
| Study Details | Accelerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|---------------|------------------------|--------------------------|--------------------------------------------------|--------------------------------------------|-----------------------------------------------|-------------|
| 1. Cross sectional | 1. ActivPAL3 | 1. Sitting, standing and stepping time | 1. BMI | 1. A diary for noting sleep periods and non-wear time | 1. | |
| 2. May and August 2014 | 2. The front of the right thigh; waterproofed | 2. Average number of transitions from sitting to standing | 2. Age | | | |
| 3. Convenience sampling | 3. 24 h/day over 7 days | 3. Number of steps | 3. Average weekly working hours | | | |
| 4. One centre | 4. At least four full days | 4. Average cadence of steps | 4. Medical problems | | | |
| 5. N:159 | 5. activPAL software; custom Microsoft Excel macro | 5. Blood pressure | 5. Medication | | | |
| 6. Age: 50 | 6. - | 6. Heart rate | 6. Intake of fruit and vegetables, | | | |
| 7. Gender: M | 7. - | 7. Waist circumference | 7. Alcohol intake | | | |
| 8. Occupational | | 8. Hip circumference | 8. Smoking status | | | |
| 9. Health outcomes | | 9. Body composition | 9. Anxiety and depression | | | |
| 10. | | 10. Fasted capillary blood glucose | 10. BMI | | | |
| | | 11. Triglycerides | | | | |
| | | 12. High density lipoprotein cholesterol | | | | |
| | | 13. Low-density lipoprotein cholesterol | | | | |
| | | 14. Total cholesterol | | | | |
| | | 15. The duration of forward bending | | | | |
| | | 16. Trunk and low back pain intensity | | | | |
| | | 17. Age | | | | |
| | | 18. Gender | | | | |
| | | 19. Smoking habits | | | | |
| | | 20. BMI | | | | |
| | | 21. Social Seniority | | | | |
| | | 22. Lift burden at work | | | | |
| | | 23. The Danish Data Protection Agency has accepted the handling and storage of data | | | | |
| Study Details | Accelerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|---------------|-------------------------|--------------------------|-----------------------------------------|-----------------------------------------------|-----------------------------------------------|--------------|
| 1. Design | 1. Device | 1. The duration of forward bending of the trunk | • Forward bending of the trunk during work | • A diary for noting information about specific time episodes during the measurement period | • Danish Data Protection Agency accepted the handling and storage of data |
| 2. Years | 2. Placement/attachment | | • Social support at work | | | |
| 3. Sampling method | 3. Other sensors | | | | | |
| 4. Multi-centre? | 4. Protocol n Days / hour/day | | | | | |
| 5. N | 5. Valid n of days for inclusion | | | | | |
| 6. Age* | 6. Software | | | | | |
| 7. Gender | 7. Processing Method | | | | | |
| 8. Setting (community, occupational, clinical, other) | | | | | | |
| 9. Study Type (descriptive; health outcomes; correlates) | Masses | | | | | |
| 10. Mother study name | | | | | | |

| Accelerometry Variables | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|--------------------------|--------------------------|-----------------------------------------|-----------------------------------------------|-----------------------------------------------|--------------|
| superior and the patella | • Forward bending of the trunk during work | • Social support at work | • A diary for noting information about specific time episodes during the measurement period | • Danish Data Protection Agency accepted the handling and storage of data |
| 3. - | 4. For several consecutive days during work | | | | | |
| 4. - | 5. ≥4 hours of recordings of working time or ≥75% of average self-reported working time, and ≥4 hours measured during leisure time or ≥75% of average self-reported leisure time per day if the worker had ≥2 days of recordings. | | | | | |
| 6. MATLAB based Acti4 | 7. The duration of forward bending of the trunk | • EVA | • Age | • Gender | • Smoking habits | • Low back pain intensity | • Danish Data Protection Agency accepted the handling and storage of data |
| 7. - | | | | | | | |
| Study Details | Accelerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|---------------|-------------------------|--------------------------|-----------------------------------------------|---------------------------------------------|-------------------------------------------------|-------------|
| 1. Design  
2. Years  
3. Sampling method  
4. Multi-centre?  
5. N  
6. Age*  
7. Gender  
8. Setting (community, occupational, clinical, other)  
9. Study Type (descriptive; health outcomes; correlates)  
10. Mother study name | Accelerometry Protocol  
1. Device  
2. Placement/attachment  
3. Other sensors  
4. Protocol n Days / hour/day  
5. Valid n of days for inclusion  
6. Software  
7. Processing Method | Accelerometry Variables  
- The duration of forward bending of the trunk  
- LBP intensity | Covariates (confounders) / Mediators / Moderators  
- Age  
- Gender  
- Smoking habits  
- BMI  
- Work-related psychosocial risk factors  
- the duration categories of forward bending of the trunk during work | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |

| [63] | 1. Cross sectional  
2. October 2011 to April 2012  
3. Convenience sampling  
4. Multi-centre  
5. N:198  
6. Age: 44.7  
7. Gender: F, M  
8. Occupational  
9. Health outcomes  
10. New method for Objective Measurements of physical Activity in Daily living (NOMAD) Denmark | 1. Actigraph GT3X+  
2. At processus spinous at the level of T1–T2 and at the halfway mark on the vertical line between spina iliaca anterior superior and the patella  
3. -  
4. -  
5. ≥4 working hours and ≥10 of total recordings per day  
6. Actilife software version 5.5; a custom-made MATLAB-based software (Acti4)  
7. - | 1. The duration of forward bending of the trunk  
2. LBP intensity | 1. Age  
2. Gender  
3. Smoking habits  
4. BMI  
5. Work-related psychosocial risk factors  
6. the duration categories of forward bending of the trunk during work | 1. A diary for noting working hours, leisure hours, sleep, non-wear time and specific time for the reference measurements | 1. Available upon request |

|  | 11. | 8. | * | * | * | * |
|  | 12. | 9. | * | * | * | * |
|  | 13. | 10. | * | * | * | * |
|  | 14. | 11. | * | * | * | * |
|  | 15. | 12. | * | * | * | * |
|  | 16. | 13. | * | * | * | * |
|  | 17. | 14. | * | * | * | * |
|  | 18. | 15. | * | * | * | * |
|  | 19. | 16. | * | * | * | * |
|  | 20. | 17. | * | * | * | * |
|  | 21. | 18. | * | * | * | * |
| Study Details | Accelerometry Protocol | Accelerometry Variables | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|---------------|------------------------|-------------------------|--------------------------|---------------------------------------------|-----------------------------------------------|-------------------------------------------------|-------------|
|               | Design                 |                         |                          |                                             |                                               |                                                  |             |
|               | Years                  |                         |                          |                                             |                                               |                                                  |             |
|               | Sampling method        |                         |                          |                                             |                                               |                                                  |             |
|               | Multi-centre?          |                         |                          |                                             |                                               |                                                  |             |
|               | N                      |                         |                          |                                             |                                               |                                                  |             |
|               | Age*                   |                         |                          |                                             |                                               |                                                  |             |
|               | Gender                 |                         |                          |                                             |                                               |                                                  |             |
|               | Setting (community,    |                         |                          |                                             |                                               |                                                  |             |
|               | occupational, clinical,|                         |                          |                                             |                                               |                                                  |             |
|               | other                  |                         |                          |                                             |                                               |                                                  |             |
|               | Study Type (descriptive; |                         |                          |                                             |                                               |                                                  |             |
|               | health outcomes;       |                         |                          |                                             |                                               |                                                  |             |
|               | correlates)             |                         |                          |                                             |                                               |                                                  |             |
| 10. Mother study name |                      |                         |                          |                                             |                                               |                                                  |             |

| 22. | 19. | ● | ● | ● | ● | ● | ● |● |
| 23. | 20. | ● | ● | ● | ● | ● | ● |● |
| 24. | 21. | ● | ● | ● | ● | ● | ● |● |
| 25. | 22. | ● | ● | ● | ● | ● | ● |● |
| 26. | 23. | ● | ● | ● | ● | ● | ● |● |
| 27. | 24. | ● | ● | ● | ● | ● | ● |● |
| 28. | 25. | ● | ● | ● | ● | ● | ● |● |
| 29. | 26. | ● | ● | ● | ● | ● | ● |● |
| 30. | 27. | ● | ● | ● | ● | ● | ● |● |
| 31. | 28. | ● | ● | ● | ● | ● | ● |● |
| 32. | 29. | ● | ● | ● | ● | ● | ● |● |
| 33. | 30. | ● | ● | ● | ● | ● | ● |● |
| 34. | 31. | ● | ● | ● | ● | ● | ● |● |
| 35. | 32. | ● | ● | ● | ● | ● | ● |● |
| 36. | 33. | ● | ● | ● | ● | ● | ● |● |
| 37. | 34. | ● | ● | ● | ● | ● | ● |● |
| 38. | 35. | ● | ● | ● | ● | ● | ● |● |
| 39. | 36. | ● | ● | ● | ● | ● | ● |● |
| 40. | 37. | ● | ● | ● | ● | ● | ● |● |
| 41. | 38. | ● | ● | ● | ● | ● | ● |● |
| 42. | 39. | ● | ● | ● | ● | ● | ● |● |
| 43. | 40. | ● | ● | ● | ● | ● | ● |● |
| 44. | 41. | ● | ● | ● | ● | ● | ● |● |
| 45. | 42. | ● | ● | ● | ● | ● | ● |● |
| 46. | 43. | ● | ● | ● | ● | ● | ● |● |
| 47. | 44. | ● | ● | ● | ● | ● | ● |● |
| 48. | 45. | ● | ● | ● | ● | ● | ● |● |
| 49. | 46. | ● | ● | ● | ● | ● | ● |● |
| 50. | 47. | ● | ● | ● | ● | ● | ● |● |
| 51. | 48. | ● | ● | ● | ● | ● | ● |● |
| 52. | 49. | ● | ● | ● | ● | ● | ● |● |
| 53. | 50. | ● | ● | ● | ● | ● | ● |● |
| 54. | 51. | ● | ● | ● | ● | ● | ● |● |
| 55. | 52. | ● | ● | ● | ● | ● | ● |● |
| 56. | 53. | ● | ● | ● | ● | ● | ● |● |
| 57. | 54. | ● | ● | ● | ● | ● | ● |● |
| 58. | 55. | ● | ● | ● | ● | ● | ● |● |
| 59. | 56. | ● | ● | ● | ● | ● | ● |● |
| Study Details | Accelerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|---------------|------------------------|--------------------------|---------------------------------|---------------------------------|---------------------------------|-------------|
| 1. Prospective | Actigraph GT3X+         | Total time spent walking, climbing stairs, running, cycling, sitting | Age | • A diary for noting working hours, leisure time, sleep periods, and time of reference measurement | • Available upon request |
| 2. Spring 2012- Spring 2013 | 2. Thigh, dominant upper arm, hip, and trunk | • Neck shoulder pain | BMI | • Danish Data Protection Agency accepted the handling and storage of data |
| 3. Convenience sampling | 4. Four to five days, including at least two working days | | Seniority in the current job | | |
| 4. Multi-centre | 5. At least 1 day | | Lifting and carrying time at work | | |
| 5. N:625 | 6. Actilife software version 5.5; a custom-made MATLAB-based software (Acti4) | | Change in physical work tasks over the 12-month period | | |
| 6. Age: 44.8 | 7. | | Influence and social support at work | | |
| 7. Gender: F, M | | | The number of days with NSP during the previous 12 months | | |
| 8. Occupational | | | The number of days with pain | | |
| 9. Health outcomes | | | Intake of pain medication | | |
| 10. Danish PHysical ACTivity cohort with Objective measurements (DPhacto) Denmark | | | • Influence at work | | |
| 1. Cross sectional | Actigraph GT3X+ | Total sitting time | Age | | | |
| 2. October 2011 to April 2012 | 2. the medial front of the right thigh, midway between the hip and knee joints the trunk (spine) process at the level of T1 – T2 water-resistant | • Neck shoulder pain | Smoking behaviour | | | |
| 3. Convenience sampling | 3. | | BMI | | | |
| 4. Multi-centre | 4. Four consecutive days for at least two working days | | Seniority in the job | | | |
| 5. N:202 | 5. At days were only included if they contained objective measurements for at least 4 h of work | | Perceived influence at work | | | |
| 6. Age: 44.8 | 6. Actilife software version 5.5; a custom-made | | Time spent carrying/ lifting at work | | | |
| 7. Gender: F, M | | | Working with arms raised | | | |
| 8. Occupational | | | Working with repetitive arm movements | | | |
| 9. Health outcomes | | | Influence at work | | | |
| 10. New method for Objective Measurements of physical Activity in Daily living (NOMAD) Denmark | | | | | |
| Study Details | Accelerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|---------------|-------------------------|--------------------------|-----------------------------------------------|---------------------------------------------|-----------------------------------------------|-------------|
| 1. Design     | 1. Device               |                           |                                               |                                             |                                               |             |
| 2. Years      | 2. Placement/attachment |                           |                                               |                                             |                                               |             |
| 3. Sampling method | 3. Other sensors       |                           |                                               |                                             |                                               |             |
| 4. Multi-centre? | 4. Protocol n Days / hour/day |                           |                                               |                                             |                                               |             |
| 5. N          | 5. Valid n of days for inclusion |                           |                                               |                                             |                                               |             |
| 6. Age*       | 6. Software             |                           |                                               |                                             |                                               |             |
| 7. Gender     | 7. Processing Method    |                           |                                               |                                             |                                               |             |
| 8. Setting (community, occupational, clinical, other) | 8. Other sensors       |                           |                                               |                                             |                                               |             |
| 9. Study Type (descriptive; health outcomes; correlates) | 9. Protocol n Days / hour/day |                           |                                               |                                             |                                               |             |
| 10. Mother study name | 10. Device             |                           |                                               |                                             |                                               |             |

**Accelerometry Variables**
- Forward bending
- Domain-specific forward bending (work or leisure)
- Low back pain
- Age
- Gender
- Working conditions (eg, seniority and lift factor at work)
- BMI
- 1-year monthly follow-up on LBP intensity: every four weeks over a 1-year period
- A diary for noting working hours, non-wear time, and sleep periods
- Danish Data Protection Agency accepted the handling and storage of data

**Health Outcome Variables**
- Minutes spent in sitting and standing positions
- Forward bending during work
- Low back pain
- Age
- Gender
- Seniority in Profession
- BMI
- Smoking status
- Self-reported
- LBP intensity for the preceding four weeks

**Covariates (confounders) / Mediators / Moderators**
- Age
- Gender
- Working conditions (eg, seniority and lift factor at work)
- BMI
- Smoking status
- 1-year monthly follow-up on LBP intensity: every four weeks over a 1-year period
- A diary for noting working hours, non-wear time, and sleep periods
- Danish Data Protection Agency accepted the handling and storage of data

**Sample Health Status (Descriptors variables)**
- Age
- Gender
- Working conditions (eg, seniority and lift factor at work)
- BMI
- Smoking status
- 1-year monthly follow-up on LBP intensity: every four weeks over a 1-year period
- A diary for noting working hours, non-wear time, and sleep periods
- Danish Data Protection Agency accepted the handling and storage of data

**PA/SB/Sleep Variables collected via Questionnaires**
- Minutes spent in sitting and standing positions
- Forward bending during work
- Low back pain
- Age
- Gender
- Seniority in Profession
- BMI
- Smoking status
- Self-reported
- LBP intensity for the preceding four weeks

**Data sharing**
MATLAB-based software (Acti4)

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[66] Prospective  
1. April 2012- May 2014  
2. Convenience sampling  
3. Multi-centre  
4. N:644  
5. Age: (median: 47 for no LBP, 46 for LBP)  
6. Gender: F, M  
7. Occupational  
8. Health outcomes  
9. Danish PHysical ACTivity cohort with Objective measurements (DPhacto) Denmark

[67] Prospective  
1. April 2012- May 2014  
2. Convenience sampling  
3. Multi-centre  
4. N:1,165  
5. Age: 39.9 for construction, 44.5  
6. Age: 39.9 for construction, 44.5  

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doi: 10.1136/bmjsem-2020-000874:e000874. 6 2020;BMJ Open Sp Ex Med, et al. Stevens ML
| Study Details | Design | Accelerometry Protocol | Health Outcome Variables | Covariates (confounders) / Mediators / Moderators | Sample Health Status (Descriptors variables) | PA/SB/Sleep Variables collected via Questionnaires | Data sharing |
|---------------|--------|------------------------|--------------------------|-----------------------------------------------|--------------------------------|-----------------------------------------------|-------------|
| 1. | | 1. Device | Accelerometry Variables | | | | |
| 2. | | 2. Placement/attachment | | | | | |
| 3. | | 3. Other sensors | | | | | |
| 4. | | 4. Protocol n Days / hour/day | | | | | |
| 5. | | 4. Valid n of days for inclusion | | | | | |
| 6. | | 5. Software | | | | | |
| 7. | | 6. Processing Method | | | | | |

| 1. | Accelerometry Protocol | 2. Placement/attachment | 3. Other sensors | 4. Protocol n Days / hour/day | 5. Valid n of days for inclusion | 6. Software | 7. Processing Method |
| 8. | Device | | | | | | |
| 9. | Design | | | | | | |
| 10. | Mother study name | | | | | | |

| 1. | Device | 2. Placement/attachment | 3. Other sensors | 4. Protocol n Days / hour/day | 5. Valid n of days for inclusion | 6. Software | 7. Processing Method |
| 8. | Design | | | | | | |
| 9. | Mother study name | | | | | | |

| 1. | Accelerometry Protocol | 2. Placement/attachment | 3. Other sensors | 4. Protocol n Days / hour/day | 5. Valid n of days for inclusion | 6. Software | 7. Processing Method |
| 8. | Device | | | | | | |
| 9. | Design | | | | | | |
| 10. | Mother study name | | | | | | |

N: sample size; PA: physical activity; SB: sedentary behaviour; LBP: low back pain; COPD: Chronic Obstructive Pulmonary Disease; BMI: Body Mass Index; MVPA: moderate to vigorous physical activity; EVA: Exposure Variation Analysis; T2DM: Type 2 Diabetes Mellitus; CVD: cardiovascular disease; NSP: neck shoulder pain

*Age is given as mean unless otherwise stated.

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Note: Reference numbers match those used in the primary manuscript

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