Daily physical activity patterns among aging workers: the Finnish Retirement and Aging Study (FIREA)

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ABSTRACT

Objectives Physical activity associates with work ability among aging workers and predicts working beyond retirement age. To better understand physical activity behaviour in this growing population group, we aimed at characterising 24-hour physical activity patterns among aging workers, and to describe the association between occupational category and total, occupational and leisure-time physical activity.

Methods We included 878 workers (mean age 62.4 years, SD 1.1, 85% women) from the Finnish Retirement and Aging study, who wore an accelerometer on their non-dominant wrist for one week. We plotted mean hourly activity counts/minute (CPM) for work days and days off. We also compared mean daily CPM between genders and occupations between work days and days off, and work and leisure time by using repeated measures analysis of variance.

Results Activity patterns were different between genders, occupations, and types of the day. Women (2580, 95% CI 2540−2620) had higher daily mean CPM than men (2110, 95% CI 2020−2000). Women in manual occupations were more active than women in non-manual occupations during work days. The differences among men were to the same direction but less pronounced than among women. We found no differences in activity levels between occupations during days off and leisure time on work days.

Conclusions In aging workers, physical activity differs by gender and occupation during work time, but not during leisure time. As low physical activity is associated with increased risk of early exit from employment, physical activity should be promoted at workplaces, especially among men and people in non-manual occupations.

Key terms Occupational physical activity, leisure-time physical activity, accelerometry, occupational status, aging worker

Key messages

What is already known about this subject?

Non-manual occupational status has found to be associated with more total or leisure time physical activity, but with less occupational physical activity. However, previous reports on differences in physical activity between occupational categories have mostly relied on self-reports, included only a very limited number of occupations, or not distinguished between work days and days off. In addition, hourly activity patterns in different occupations have not been previously presented.

What are the new findings?

We used objective methods to assess 24-h physical activity patterns in aging workers from a wide variety of occupations. Distinctly different activity patterns were found between genders and across occupations: women were more active than men during both work days and days off, and manual workers were more active during workdays than non-manual workers. No differences during leisure time were observed between occupations.

How might this impact on policy or clinical practice in the foreseeable future?

Occupational physical activity contributes markedly to total daily physical activity among aging workers. Since low physical activity is associated with increased risk of early exit from employment, more attention should be paid to possibilities to increase physical activity during workdays in non-manual workers and among men.

INTRODUCTION

Physical activity can occur in different domains: transportation, occupational and leisure-time[1]. Generally, non-manual occupational status has found to associate with more total or leisure time physical activity, but with less occupational physical activity.[2] However, the research on physical activity across different occupations has mostly relied on self-reported measures of physical activity,[1] which usually capture only moderate-to-vigorous physical activity (MVPA) and are prone to reporting bias.[3] Studies using objective physical activity measures have found that employees in manual occupations have more total and occupational physical activity, while there are no differences in physical activity level between occupational statuses during leisure time.[4-8]

With population aging, extending working lives has become a priority in many high-income countries.[9,10] Physical activity is one potential factor sustaining work ability as low physical activity is one risk factor for early exit from employment via disability retirement.[11] In addition, the incidence of chronic conditions (such as musculoskeletal and cardiovascular diseases), that are sensitive to physical activity increase sharply with age, as do the potential benefits of intervening.[10] Therefore, identifying possible risk groups with low physical activity among aging workers is important.

Continuous monitoring of physical activity for 24 hours/day for multiple days has lately become possible with wrist-worn accelerometers which provide an alternative to traditional hip placement with increased compliance.[3,12] Some recent studies have presented 24-hour activity patterns, which offer a detailed graphical view to activity levels throughout the day, showing when and how active people are during the day.[13-18] These studies have compared activity patterns in older adults, mainly between genders[19-23] and different age groups,[15,20,23,24] but also between different days of the week.[14,17] However, we are not aware of studies comparing activity patterns between different occupational categories on work days and days off, an information which would allow planning targeted interventions aimed at increasing physical activity e.g. at the workplaces during work time.

Using wrist-worn accelerometer data from the Finnish Retirement and Aging Study (FIREA), our aim was to characterize the 24-hour patterns of physical activity by gender and occupational status among aging workers both on work days and days off. We also examined the association between occupational status and physical activity volume between work days and days off and between work time and leisure time on work days.

METHODS

Setting and participants

The Finnish Retirement and Aging Study (FIREA) is an ongoing longitudinal cohort study of older adults in Finland established in 2013.[25] The FIREA study is conducted in line with the Declaration of Helsinki, and was approved by the Ethics Committee of Hospital District of Southwest Finland. The FIREA survey cohort included all public sector employees whose individual estimated retirement date was in 2014−2019, who were working in one of the 27 municipalities in Southwest Finland or in the 9 selected cities or 5 hospital districts around Finland during 2012, and who responded to at least one of the FIREA questionnaires (N=6,679). Information on individual estimated retirement date was obtained from the pension insurance institute for the municipal sector in Finland (Keva), and the working status at the time of activity measurement was self-reported. Participants were first contacted 18 months prior to their estimated retirement date by sending a questionnaire. Workers >50 years of age are defined as aging workers,[9] thus the participants of this study, with mean age of 62.4, were at the oldest end of the aging worker spectrum.

Of the Finnish speaking FIREA survey participants, 2,643 were eligible to this activity sub-study based on their estimated retirement year and self-reported working status (Online supplementary Figure S1). The eligible participants were invited by mail to participate in the activity sub-study. Of the 938 participants (36% of the eligible) who returned the informed consent and were sent an accelerometer, 29 did not wear the accelerometer and six had technical problems during the measurement. Further 25 participants were excluded because they had ≤4 valid days of ≥10 hours of wake wear time per day where waking time was defined by algorithm available in ActiLife software.[26] This left 878 participants in the analyses (33% of the eligible and 94% of those who were sent an accelerometer).

Activity measurement

Physical activity was measured over 7 consecutive days and 6 consecutive nights with triaxial ActiGraph wActiSleep-BT accelerometers (ActiGraph, Pensacola, Florida, US). The triaxial accelerometer measures activity as acceleration of the part of the body where the device is attached to in three orthogonal planes, i.e. axes.[12,15] Participants were instructed to wear the device on their non-dominant wrist at all times, including during water-based activities such as swimming, but to remove it for sauna. In an accompanying log, the participants were asked to record information about work day (work day or day off) and, for work days, time of the beginning and end of each work shift. Data collection took place between September 2014 and February 2018 during all the four seasons (26% spring, 17% summer, 30% autumn, 27% winter).

Data from the accelerometers were downloaded and converted into 60 second epochs in ActiLife software, version 6.13 (ActiGraph, Pensacola, Florida, US). We used the vector magnitude (VM) counts per minute (CPM) which were calculated as the square root of the sum of squared activity counts of the three axes. Currently, no validated count cut-offs for different activity intensities for wrist-worn accelerometers are available in the ActiLife software. We included wear time between the first and last time recorded in the participant log and excluded non-wear time using the algorithm developed by Choi, which has been validated for wrist-worn triaxial accelerometers.[27] Hours with less than 60 minutes of accelerometer counts were excluded (<2% of the hours) from the activity pattern analyses.

Assessment of occupational category

Occupational title codes in 2012 were obtained from the pension insurance institute and categorized into manual and non-manual status by the International Standard Classification of Occupations (ISCO). Manual occupations were further categorised into "managers and professionals" (ISCO classes 1-2, e.g. physicians, and teachers), and "associate professionals" (ISCO classes 3-4, e.g. registered nurses and secretaries). Non-manual occupations were categorised into "service workers" (ISCO class 5, e.g. practical nurses and cooks) and "manual workers" (ISCO-classes 6-9, e.g. maintenance workers and cleaners).[28]

Assessment of covariates

We obtained participants' gender and date of birth from the pension insurance institute. Current, doctor diagnosed cardiovascular diseases (angina pectoris, myocardial infarction, or cerebrovascular disease), musculoskeletal diseases (osteoarthritis, osteoporosis, sciatica, fibromyalgia, and rheumatoid arthritis), and diabetes, as well as mobility limitation (difficulty in climbing one flight of stairs or walking several blocks),[29] were derived from the questionnaires. Body mass index (BMI) was calculated from self-reported weight and height (kg/m^2). Participants' residential neighbourhood on 250 × 250 m map grids was also categorised according to the Finnish Environment Institute's urban-rural classification as inner urban area (compact and densely built area with continuous development), or other [30].

Statistical analysis

To examine selection into the activity sub-study, we examined whether gender, age, occupational category, self-reported physical activity and self-reported sitting time differed between those who consented in the accelerometer sub-study and those who were eligible for accelerometer measurements but did not consent. The differences in categorical variables were tested with chi-square test and differences in continuous variables with Student's t-test.

To visualize activity levels across the day, we plotted the mean CPM against hour of the day by gender and occupational categories separately for work days and days off. We calculated every participant's mean CPM for each 24 hours of each day, and then averaged the CPM for each hour across all valid days. All the included participants had data from all the 24 hours of the day. To describe 24-hour activity patterns between occupational statuses, we used linear models with generalized estimating equations (GEE) with exchangeable correlation structure and estimated the mean CPM levels with 95% confidence intervals (CI) per hour. The GEE model takes into account the intra-individual correlation between measurements.

To compare total daily physical activity volume, we used mean VM CPM during wake wear time, calculating them for all days (n=878, all participants, total number of days 6025), and separately for work days and days off (n=771, only participants who reported work days and had ≥1 work day and ≥1 day off, total number of work days 3374, total number of days off 1916). When focusing on work days, we calculated the mean CPM separately for physical activity during work time (i.e. occupational physical activity) and during leisure time based on the reported work times on the daily logs (n=731, only participants who reported their work time and had ≥1 work day and ≥1 day off). Both days off and leisure time on work days were considered to represent leisure-time physical activity. Because we observed interaction effects between gender and occupational status on total activity counts (p for interaction 0.01), we stratified the analyses by gender. First, we compared mean CPM between men and women and between the four occupational categories during all days using analysis of variance (ANOVA). Second, we compared mean activity counts between work days and days off, and third, between different times of the work days, in the gender and occupational categories, using repeated measures of ANOVA. We adjusted the models for gender, age, occupational category, and duration of wake wear time. As a sensitivity analysis, we adjusted the models additionally for chronic diseases (yes/no), mobility limitation (yes/no), BMI (continuous), and living in inner urban area (yes/no). The statistical analyses were performed using SAS version 9.4 (SAS Institute, Inc., Cary, North Carolina).

RESULTS

Mean wear time for the accelerometer was 22 h 41 min, 23 h 33 min and 21 h 5 min for all days, work days and days off, respectively. Manual and non-manual workers did not differ in terms of age, gender, chronic diseases, mobility limitation, BMI or living in urban neighbourhood (Table 1). Online supplementary table S1 presents the comparison of socio-demographic characteristics and activity indicators between the eligible participants who did or did not consent to accelerometer measurement. Compared to the not consented participants, there were more women (consented: n=795, 85%, not consented: n=1337, 78%) and “managers and professionals” (consented: n=355, 38%, not consented: n=501, 30%) among the consented participants. There were less inactive people by self-report among the consented (n=311, 33%) than among those who did not consent to the measurements (n=517, 30%) but no differences were seen in age and self-reported total daily sitting time (8.1 vs 8.1 hours/day).

Unadjusted 24-h activity patterns appeared to differ between work days and days off (Figure 1, Panel A). Daily activity was initiated earlier on work days than on days off. There were two activity peaks during the work days: one in the morning, approximately between 6 and 8 am, and one in the afternoon between 3 and 5 pm, during times corresponding with commuting to and from work place. Physical activity during days off peaked before midday and decreased thereafter, with decrease becoming more rapid towards the evening hours.

Despite similar patterns in men and women, women had higher hourly CPM during most of the daytime during work days and morning hours during days off. Overall, women (mean CPM 2580, 95% CI 2540−2620) were more active than men (mean CPM 2110, 95% CI 2020−2200, $p<0.001$). The mean daily activity counts were also higher for women than men during both work days and days off (Table 2), as well as during work time and leisure time during work days (Table 3). The sex differences remained significant after further adjustments for chronic diseases, mobility limitation, BMI and living area (Tables S2 and S3).

Figure 1, Panel B shows 24-hour activity patterns for work days and days off by occupational statuses among men and women. During work days, men and women in manual occupations were more active than men and women, respectively, in non-manual occupations especially during the usual work time from 6 am to 4 pm. Hourly CPM was at its highest level in women in manual occupations during work days.

When total daily activity volume was examined, women in “managers and professionals” and “associate professionals” occupational categories were more active than women in “service workers” or “manual workers” categories, and women in “manual workers” category were more active than women in “service workers” category both during work days (Tables 2 and S2) and during work time (Tables 3 and S3). In general, the differences in total activity volume between occupational categories were less pronounced among men. Among men, “manual workers” were more active than “managers and professionals”, during both work days and work time (Tables 2 and 3). Additionally, “manual workers” were more active than “associate professionals” during work time among men (Table 3). Further adjustments lead to few changes to the results among men: during work days “managers and professionals” were less active than “associate professionals” (Table S2) and the work time difference between “manual workers” and “associate professionals” disappeared (Table S3). Among both men and women, no differences in total activity volume were seen between occupational categories during days off (Tables 2 and S2) or leisure time during work days (Tables 3 and S3).

Women in manual occupations were more active than women in non-manual occupations during work days than days off (Table 2) and during work time than leisure time on work days (Table 3). This pattern was less clear among men, where "manual workers" were more active on work days than days off (Table 2), but had similar level of activity during work time and leisure time on work days (Table 3). On the contrary, women in non-manual occupations and men in "managers and professionals" category had higher activity level during leisure time compared to work days (Table 2) and work time (Table 3). In addition, after further adjustments, also men in "associate professionals" category were more active during leisure time on work day than during work time (Table S3).

DISCUSSION

In this study we investigated the 24-h patterns of objectively measured physical activity in a large sample of aging public sector workers in Finland. Women were more active than men throughout the days. Activity patterns were distinctly different between different occupational categories and between work days and days off. Women working in manual occupations were more active than women in non-manual occupations during all days, work days and work time, while men working in manual occupations were more active than men in non-manual occupations only during work time. No differences in total activity volume between different occupational groups were found during days off and leisure time on work days.

The observed 24-hour activity follows the patterns reported previously, with large differences in the patterns between week days and weekend.[13,14,16,17] Similar to our results, previous studies with younger populations from Finland,[14] the UK,[16] and Singapore[17] have also observed activity peaks during times most likely corresponding to commuting to and from work during work days. These activity peaks indicate that commuting contributes to total physical activity. In an international comparison of industrialised countries, Finland was in the mid-level with 31% of trips taken by walking or bicycling, while the range was from 6% to 50%.[31] Furthermore, commuting by public transport can also include incidental physical activity, e.g. walking from the bus stop to the workplace.[32] However, the results regarding commuting peaks should be interpreted with caution, because the simultaneous nature of commuting can exaggerate the peaks even though activity level itself would not be very high. More research on active and passive commuting is warranted to define the extent to which active commuting contributes to total physical activity.

In our study, aging women accrued more total, work and leisure-time physical activity than aging men, which is in line with the latest population-based, self-reported information from Finland.[33] In general, men have reported to be more active than women, especially when using self-reported physical activity.[34] However, several studies using objective physical activity measurements have found no differences in activity levels between men and women,[15,20] while other studies, similarly to our study, found higher activity among women than men, especially in the older age groups.[23,35] There are several potential explanations to the gender differences. First, gender-based segregation of occupations is particularly strong in Finland, especially in the public sector.[36] Most of the women work in health care, education and social services. Many men also work in health care and education, but a high proportion of men also work in administration and technical fields.[37] The attributes of different occupations, mainly that the occupations with more women require more activity, probably create most of the gender differences in occupational physical activity observed in our study. The requirements of work are usually the same for all the employees, thus we do not expect younger and older workers to have different activity patterns during work time. Second, active commuting is more common among women than among men. In a population-based study among adult Finns, 22% of women, but only 14% of men, reported active commuting in the age group of 60−64 years.[33] Third, higher level of leisure-time physical activity among women might be explained by household chores, which are more commonly taken up by women especially in this age group,[38] and which also are activities that might be well captured with the wrist-worn accelerometers.[15,22]

Not surprisingly, we found higher total and occupational physical activity among aging workers with manual than non-manual occupations. The absolute differences in work time physical activity were larger in women than in men across different occupations. Our results thus highlight that, among aging workers, work is a defining factor for physical activity during work days, and that the differences in occupational physical activity are large. Therefore, different types of interventions are needed for people in different occupations. In our study, especially men in non-manual occupations were at risk obtaining too little physical activity during work days, and work time. They would, for example, most probably benefit from workplace interventions, such as using activity-permissive workstations, increasing physical activity, such as walking up the stairs, during work time, or increasing active commuting.[39]

We found no differences in leisure-time physical activity between the occupational statuses, which is contrary to some previous studies which have used self-reported physical activity as an outcome.[2] Nevertheless, our results are similar to several studies using objective measures for physical activity which have not observed differences in leisure-time physical activity between manual and non-manual occupations.[5-8] Furthermore, participants in non-manual occupations were less active on work days than on days off, while those in manual occupations were more active on work days than days off. Unfortunately, we were not able to derive more concrete measures of physical activity, such as minutes in MVPA, to define whether workers in our study were more or less active during days of than other populations. However, it is possible that aging workers in manual occupations feel fatigued and respond to the fatigue by being less active on days off than during work days.[18]

The strengths of this study include objective 24-hour measurement of physical activity, assessment of occupational status by registry information, information of work days and work time and inclusion of a large sample of participants representing a wide variation of occupations. However, accelerometers have well-known weaknesses, such as not being able to detect specific types of non-impact activities, like cycling.[3] In addition, as all the accelerometers only detect movement of the part of the body where they are attached to, wrist-worn accelerometers may therefore overestimate some movements, such as household activities including vigorous hand movements.[3] We were not able to provide time spent in different activity intensities, such MVPA from the wrist-worn accelerometer. However, CPM have been previously used to describe patterns of physical activity [24,40] and the CPM patterns follow closely the patterns for MVPA from waist-worn devices.[24] Furthermore, the activity patterns from wrist and hip-worn accelerometer follow the same shape, even though the wrist-worn devices give around 5 times higher counts due to the larger movement of wrist compared to hip.[22] In addition, due to the lack of consensus of identifying spurious counts, we did not exclude spurious counts from the analyses. Although there were only 15% of men in the sample, this is representative of the public sector in Finland as 78% of people working in local government are women.[36] The narrow age range of the participants reflects aging workers and might restrict generalization to younger workers. Furthermore, compared to the not consented participants, the consented participants had slightly more often non-manual occupations and higher self-reported activity levels, which should be taken into account when interpreting the results.

In conclusion, we found that amount and timing of physical activity varies between gender and occupational categories among aging workers. Women were more active than men and those in manual occupations had more total and occupational physical activity than those in non-manual occupations. We did not find differences in the level of leisure-time physical activity between the occupational categories. Since low physical activity is associated with increased risk of early exit from employment, more attention should be paid to promoting physical activity of older workers at workplaces, especially among men and people in non-manual occupations. However, daily activity profiles highlighted that, during work days, physical activity is highest during times corresponding to commuting.

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Table 1 Comparison between participants in manual and non-manual occupations in the study sample

	Sample total n = 878	Non-manual occupation n = 601	Manual occupation n = 277	N missing
Women, n (%)	742 (85%)	503 (84%)	239 (86%)	0
Age, years, mean (SD)	62.4 (1.1)	62.4 (1.1)	62.3 (1.3)	0
Occupational category, n (%)				0
Managers and professionals (ISCO1-2)	342 (39%)	342 (57%)		
Associate professionals (ISCO 3-4)	259 (30%)	259 (43%)		
Service workers (ISCO 5)	210 (8%)		210 (78%)	
Manual workers (ISCO 6-9)	67 (8%)		67 (24%)	
Chronic disease, n (%)	456 (52%)	307 (51%)	149 (54%)	14
Mobility limitation, n (%)	21 (2%)	17 (3%)	4 (1%)	18
Body mass index, kg/m^2, mean (SD)	26.6 (4.6)	26.6 (4.7)	26.6 (4.2)	29
Living in inner urban area, n (%)	421 (48%)	300 (50%)	121 (44%)	5

ISCO, International Standard Classification of Occupations

Table 2 Mean wake time activity counts/minute in men and women and different occupational categories during all days, work days and days off

Variable	n for all days	All days Mean	95% CI		n for work days and days off	Work days Mean	95% CI		Days off Mean	95% CI		P-value for day difference
All[2]	878	2510	2470	2540	771	2530	2480	2570	2530	2480	2580	0.86
Gender[3]												
Men	136	2110	2020	2200	115	2110	2000	2230	2260	2150	2380	0.004
Women	742	2580	2540	2620	656	2580	2530	2630	2600	2550	2650	0.29
P-value for gender difference		<0.001				<0.001			<0.001			
Men, by occupational category[4]												
Managers and professionals	72	2060	1930	2180	69	2010	1900	2120	2270	2120	2420	0.01
Associate professionals	26	2110	1900	2310	21	2160	1950	2360	2120	1850	2380	0.22
Service workers	13	2260	1960	2550	10	2270	1980	2560	2260	1970	2540	0.51
Manual workers	25	2150	1940	2360	15	2440	2220	2650	2100	1870	2330	0.0007
P-value for differences in occupations		0.68				0.07			0.66			
Women, by occupational category[4]												
Managers and professionals	270	2460	2390	2520	245	2390	2320	2560	2570	2490	2650	<0.001
Associate professionals	233	2500	2440	2570	201	2490	2410	3000	2600	2500	2700	0.001
Service workers	197	2770	2700	2850	173	2910	2810	3390	2600	2490	2700	<0.001
Manual workers	42	2910	2750	3070	37	3200	3000	3390	2460	2250	2670	<0.001
P-value for differences in occupations		<0.001				<0.001			0.62			

[2] Adjusted for gender, age, occupational category, and wake wear time
[3] Analyses adjusted for age, occupational category, and wake wear time
[4] Analyses adjusted for age, gender, and wake wear time
CI, confidence interval

Table 3 Mean wake time activity counts/minute in men and women and in different occupational categories during work time and leisure time on work days.

Variable	n	Work time Mean	95% CI		Leisure time on work day Mean	95% CI		P-value for day difference
All [2]	731	2510	2440	2570	2540	2490	2590	0.31
Gender[3]								
Men	109	2000	1890	2110	2350	2220	2480	0.0001
Women	622	2590	2530	2660	2580	2530	2630	0.7
P-value for gender difference		<0.001			<0.001			
Men by occupational category[4]								
Managers and professionals	64	1800	1660	1930	2240	2070	2410	<0.001
Associate professionals	21	1930	1680	2180	2270	1970	2570	0.052
Service workers	10	2240	1840	2630	2480	2080	2880	0.49
Manual workers	14	2440	2150	2720	2450	2170	2720	0.85
P-value for differences in occupations		0.001			0.88			
Women by occupational category[4]								
Managers and professionals	227	2220	2120	2390	2560	2480	2640	<0.001
Associate professionals	191	2290	2190	3330	2620	2540	2700	<0.001
Service workers	169	3200	3080	4320	2590	2500	2680	<0.001
Manual workers	35	3940	3560	4320	2580	2390	2770	<0.001
P-value for differences in occupations		<0.001			0.75			

[2] Adjusted for gender, age, occupational category, and wake wear time.
[3] Analyses adjusted for age, occupational category, and wake wear time
[4] Analyses adjusted for age, gender, and wake wear time
CI, confidence interval

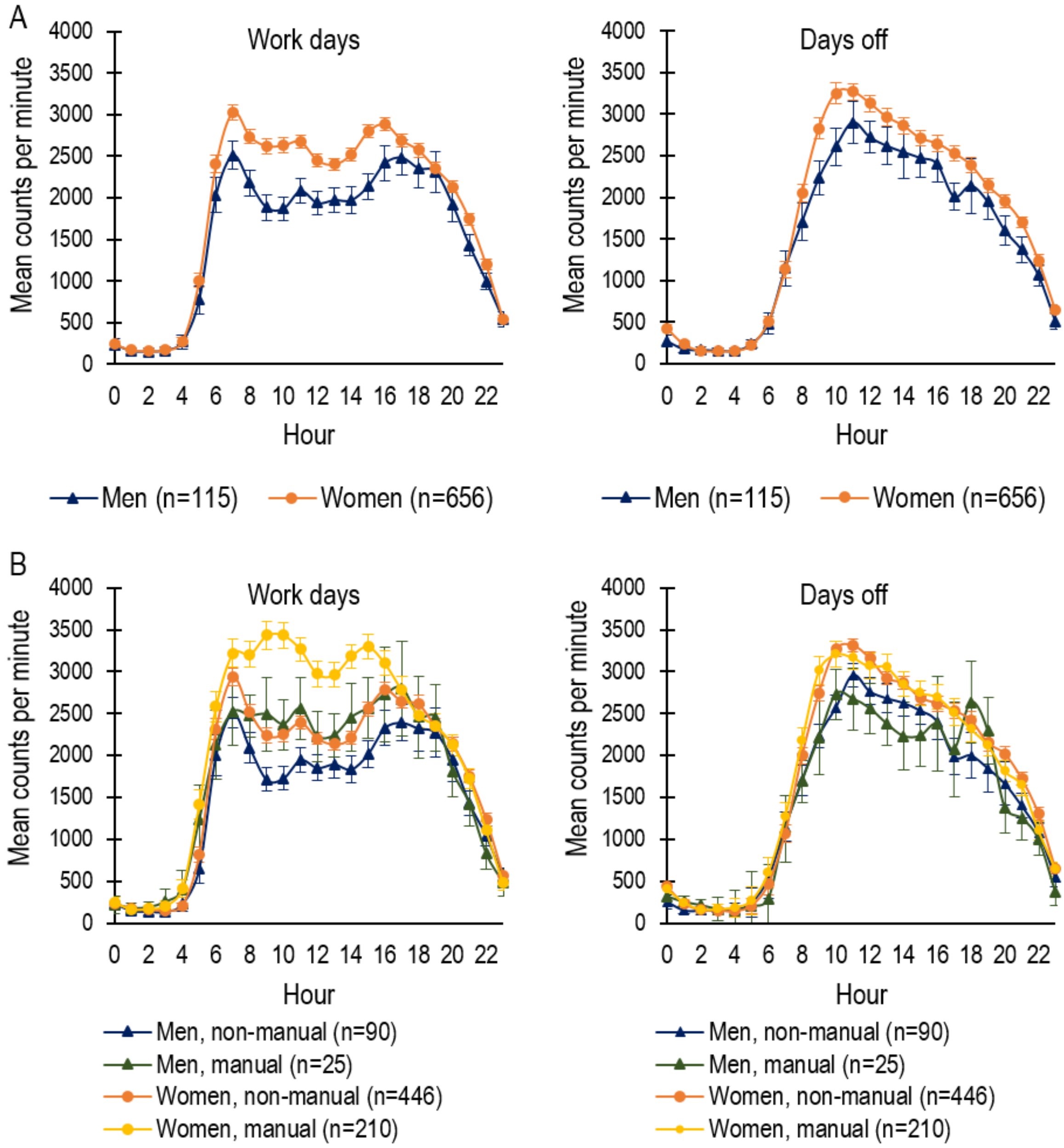

Figure 1 24-h activity patterns during work days and days off for (A) men and women and (B) men and women in different occupational statuses.

Figure 1 footnote

Lines presents mean hourly activity and error bars denote 95% confidence intervals.

Contributors

SS and JV conceived and designed this study and designed the data collection. AP analysed the data and drafted the first manuscript, with critical revisions from SS, TL, AK, JP and JV. All authors approved the final version of the manuscript.

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Competing interests

None declared

Daily physical activity patterns among aging workers: the Finnish Retirement and Aging Study (FIREA)

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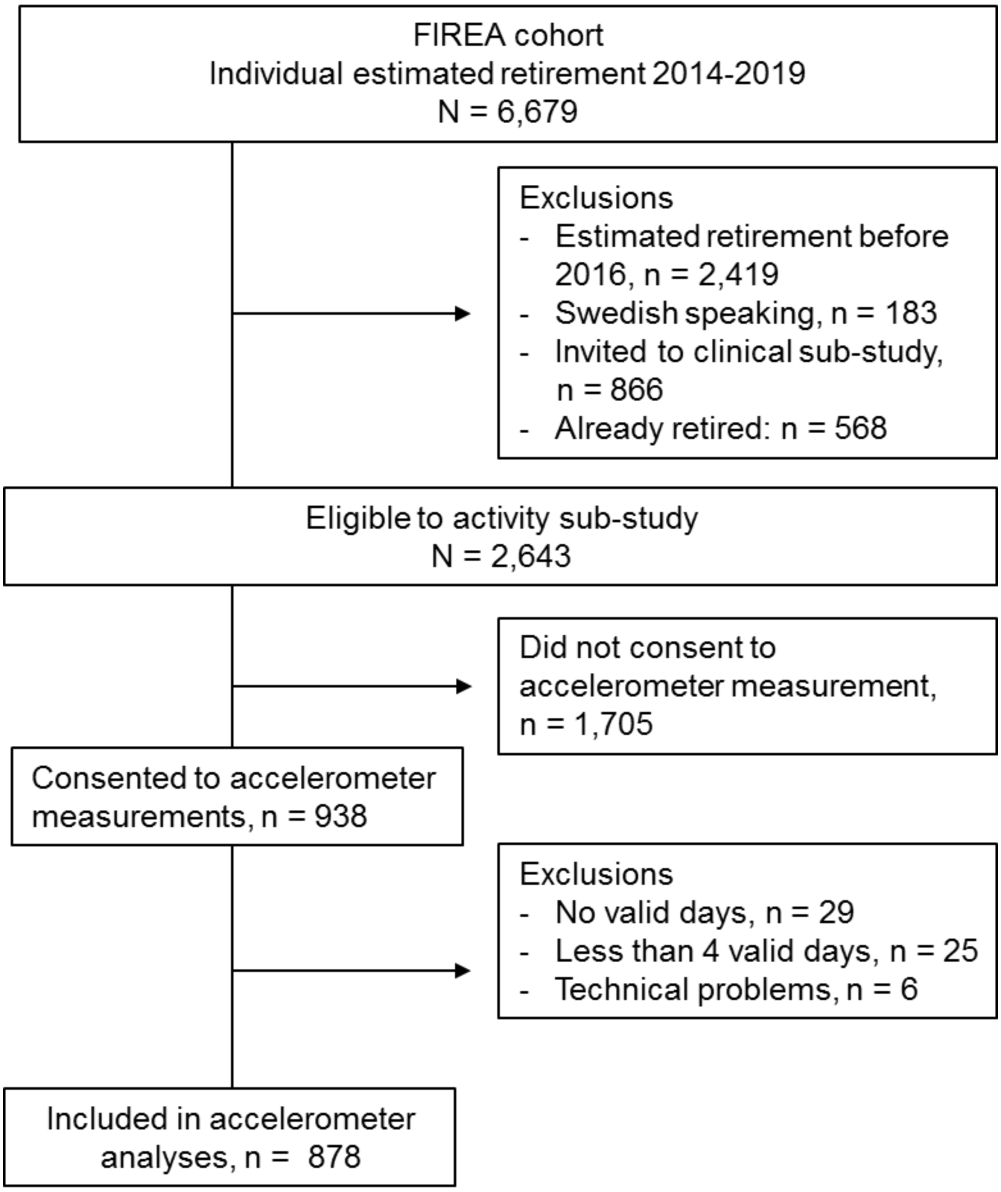

Online supplementary figure S1 Flow chart of the study sample selection in the Finnish Retirement and Aging Study (FIREA)

Online supplementary table S1

Comparison between those who consented to the accelerometer analyses and those who were eligible but did not consent to accelerometer measurement.

	Consented to accelerometer measurement n = 938	Eligible FIREA participants, who did not consent to accelerometer measurement n = 1705	P value
Women, n (%)	795 (85%)	1337 (78%)	<0.001
Age, years, mean (SD)	62.4 (1.1)	62.4 (1.1)	0.15
Occupational category, n (%)			<0.001
Non-manual occupational status			
Managers and professionals (ISCO1-2)	355 (38%)	501 (30%)	
Associate professionals (ISCO 3-4)	278 (30%)	506 (30%)	
Manual occupational status			
Service workers (ISCO 5)	229 (24%)	456 (27%)	
Manual workers (ISCO 6-9)	74 (8%)	229 (14%)	
Self-reported physical activity, MET-hours/week, mean (SD) [1]	25.1 (21)	23.1 (21)	0.01
Self-reported physical activity, n (%)[1]			0.04
High/vigorous	311 (33%)	517 (30%)	
Moderate	274 (29%)	520 (31%)	
Low	201 (21%)	340 (20%)	
Inactive	134 (14%)	314 (18%)	
Self-reported total sitting hours/day, mean (SD)[2]	8.1 (3)	8.1 (3)	0.63

[1] Inactive: <7 Metabolic Equivalent Task (MET)-h/week; low:≥7 to <14 MET-h/week; moderate: ≥14 to <30 MET-h/week; and high/vigorous: ≥30 MET-h/week. Based on self-reported average weekly hours of leisure-time physical activity (including commuting) within the previous year in four intensity levels: walking, brisk walking, jogging, and running.[1,2]

[2] self-reported sitting hours at the office, watching television, using computer, other and in a vehicle during week days.[3]

FIREA, the Finnish Retirement and Aging Study; ISCO, International Standard Classification of Occupations; SD, standard deviation

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Online supplementary table S2

Mean wake time activity counts/minute in men and women and different occupational categories during all days, work days and days off. The analyses are adjusted for gender, age, occupational category, duration of wake wear time, chronic diseases, mobility limitation, body mass index, and living in inner urban area.

Variable	n for all days	All days Mean	95% CI		n for work days and days off	Work days Mean	95% CI		Days off Mean	95% CI		P-value for day difference
All	827	2510	2480	2550	728	2530	2480	2570	2540	2490	2590	0.7
Gender												
Men	130	2130	2040	2220	109	2130	2050	2220	2290	2180	2400	0.003
Women	697	2580	2550	2620	619	2580	2540	2630	2610	2550	2660	0.40
P-value for gender difference		<0.001				<0.001			<0.001			
Men, by occupational category												
Managers and professionals	68	2030	1910	2150	65	1960	1850	2070	2280	2140	2420	0.0009
Associate professionals	24	2220	2020	2430	19	2250	2060	2430	2320	2070	2570	0.64
Service workers	13	2260	1980	2540	10	2290	2010	2570	2360	2080	2640	0.75
Manual workers	25	2190	1990	2390	15	2430	2210	2650	2060	1870	2250	0.003
P-value for differences in occupations		0.15				0.005			0.95			
Women, by occupational category												
Managers and professionals	261	2440	2380	2510	238	2370	2300	2550	2590	2510	2670	<0.001
Associate professionals	216	2520	2460	2590	185	2480	2400	2980	2650	2550	2750	0.002
Service workers	180	2790	2720	2870	160	2900	2810	3390	2630	2530	2740	<0.001
Manual workers	40	2890	2730	3050	36	3170	2940	3390	2460	2240	2690	<0.001
P-value for differences in occupations		<0.001				<0.001			0.26			

Online supplementary table S3

Mean wake time activity counts/minute in men and women and in different occupational categories during work time and leisure time on work days. The analyses are adjusted for gender, age, occupational category, duration of wake wear time, chronic diseases, mobility limitation, body mass index, and living in inner urban area.

		Work time			**Leisure time on work day**			**P-value for day difference**
Variable	**n**	**Mean**	**95% CI**		**Mean**	**95% CI**		
All	688	2510	2450	2570	2550	2490	2610	0.33
Gender								
Men	103	2040	1930	2150	2340	2230	2460	<0.001
Women	585	2610	2540	2680	2580	2530	2630	0.58
P-value for gender difference		<0.001			<0.001			
Men by occupational category								
Managers and professionals	60	1820	1670	1960	2160	2020	2310	<0.001
Associate professionals	19	2020	1790	2260	2470	2210	2730	0.005
Service workers	10	2250	1850	2640	2490	2130	2860	0.50
Manual workers	14	2470	2170	2770	2480	2220	2730	0.82
P-value for differences in occupations		0.003			0.1			
Women by occupational category								
Managers and professionals	220	2200	2100	2430	2540	2460	2620	<0.001
Associate professionals	175	2320	2210	3360	2650	2570	2730	<0.001
Service workers	156	3230	3100	4360	2610	2510	2700	<0.001
Manual workers	34	3970	3580	4360	2590	2380	2800	<0.001
P-value for differences in occupations		<0.001			0.37			