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Leskinen, Tuija

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1 **Changes in non-occupational sedentary behaviors across the retirement transition: the**
2 **Finnish Retirement and Aging Study (FIREA)**

3 Tuija Leskinen 1,2, Anna Pulakka 1, Olli Heinonen 2, Jaana Pentti 1,3, Mika Kivimäki 3,4,5,
4 Jussi Vahtera 1, Sari Stenholm 1

5 1 Department of Public Health, University of Turku and Turku University Hospital, Turku,
6 Finland;

7 2 Paavo Nurmi Centre & Department of Health and Physical Activity, University of Turku,
8 Turku, Finland;

9 3 Clinicum, Faculty of Medicine, University of Helsinki, Helsinki, Finland;

10 4 Finnish Institute of Occupational Health, Helsinki, Finland;

11 5 Department of Epidemiology and Public Health, University College London, London, UK

12

13 **Corresponding author:** Dr. Tuija Leskinen, Department of Public Health, FIN-20014
14 University of Turku, Finland, phone: +35823338440, fax: +358294505040, email:
15 tuija.leskinen@utu.fi

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17 **Word count: 3392**

18 ABSTRACT

19 **Background** Retirement is a major life transition and it may influence health behaviors and
20 time use as people no longer go to work. Very little is known how sedentary behavior changes
21 as a result of increased time availability after the retirement transition. The aim of this study
22 was to examine changes in non-occupational sedentary behaviors across the retirement
23 transition. In addition, we examined which pre-retirement characteristics were associated with
24 these changes.

25 **Methods** The study population consisted of 2,011 participants from the Finnish Retirement
26 and Aging Study (FIREA). Repeated postal survey including questions on sedentary behavior
27 domains (television viewing, computer use at home, sitting in a vehicle and other sitting) were
28 conducted once a year across the retirement transition, covering on average 3.4 study waves.
29 Linear regression analyses with generalized estimating equations (GEE) were used for the
30 analyses.

31 **Results** Total sedentary time increased by 73 (95% CI 66-80) minutes/day to 5.9 hours/day
32 during the retirement transition. Of the domain-specific sedentary behaviors, television
33 viewing time increased by 28 (95% CI 25-32) minutes/day, computer use at home by 19 (95%
34 CI 17-22) minutes/day, and other sitting time by 37 (95% CI 33-41) minutes/day, while time
35 sitting in a vehicle decreased by 6 (95% CI 4-9) minutes/day during the retirement transition.
36 Women and persons who had high occupational sitting time, low physical activity level, sleep
37 difficulties, mental disorders, or poor health before retirement increased mostly time spent on
38 sedentary behaviors during the retirement transition (all P-values for interaction <0.03).

39 **Conclusion** Total and domain-specific sedentary times, except sitting in a vehicle, increased
40 during the retirement transition.

41 **Key words:** sedentary behavior, sitting, retirement, cohort, aging, television viewing

42

43 **What is already known on this subject?**

44 Retirement is associated with increased time spend sedentary.

45 There are no longitudinal studies with repeated measures of sedentary behavior domains

46 across the retirement transition.

47

48 **What this study adds?**

49 Total and domain-specific sedentary behaviors, except sitting in a vehicle, increase during the

50 retirement transition.

51 Total non-occupational sedentary time continued to increase during the post-retirement

52 period.

53 Women, and those who had high occupational sedentary time, low physical activity level,

54 sleep difficulties, mental disorders, or poor health before retirement were most likely to

55 report an increase in total non-occupational sedentary time during the retirement transition.

56 BACKGROUND

57 Sedentary behavior, defined as any waking behavior characterized by an energy expenditure
58 ≤ 1.5 metabolic equivalents (METs) whilst in a sitting or reclining posture [1], is highly
59 prevalent among adult population [2]. Older adults are the most sedentary age group spending
60 65% to 80% of their wake time on sedentary behaviors [3]. This is a major public health
61 concern as sedentary behavior is associated with poor health [4,5] and mortality [6,7].

62 Retirement is one of the major life transitions which can modify lifestyle after middle life [8].
63 Retirement is associated with positive lifestyle changes, such as increased leisure physical
64 activity [9] and sleep duration [10] most likely due to increased time availability, restructure
65 of leisure activities and awareness of one's own health and well-being [11,12]. However,
66 retirement has also been listed as a strong determinant for engaging sedentary behavior [13].
67 To date, only a small number of studies have examined how sedentary behavior changes during
68 the retirement transition [14].

69 Prior longitudinal studies have shown that retirement is associated with increased time spend
70 on television viewing and computer use, and with decreased passive transportation time [8,14–
71 17]. However, previous studies have not been able to repeatedly follow people across the
72 retirement transition nor to illustrate the short and long-term changes in both total and domain-
73 specific sedentary behaviors [8,15–17]. Furthermore, previous studies have examined changes
74 in sedentary behavior only by education or work-related factors [14]. However, multiple other
75 factors, such as lifestyle and health factors, are shown to be associated with sedentary behavior
76 [18] and it is of interest to examine how these factors moderate the changes in sedentary
77 behavior during retirement transition.

78 To address the limitations of the previous studies, this longitudinal study examined how non-
79 occupational sedentary behavior, namely television viewing, computer use at home, sitting in

80 a vehicle and other sitting, changed across the retirement transition using repeated annual
81 measurements. We also investigated which pre-retirement characteristics were associated with
82 changes in total and domain-specific sedentary times during the retirement transition.

83

84 **METHODS**

85 **Study population**

86 Finnish Retirement and Aging Study (FIREA) is an ongoing longitudinal cohort study of older
87 adults in Finland established in 2013. The aim of the FIREA study is to follow aging workers
88 from work to full-time retirement and to determine how health behaviors and clinical risk
89 factors change during transition to statutory retirement. The eligible population for the FIREA
90 study cohort included all public sector employees whose individual retirement date was
91 between 2014 and 2019 and who were working in year 2012 in one of the 27 municipalities in
92 Southwest Finland or in the 9 selected cities or 5 hospital districts around Finland. Information
93 on the estimated individual retirement date was obtained from the pension insurance institute
94 for the municipal sector in Finland (Keva). Participants were first contacted 18 months prior to
95 their estimated retirement date by sending a questionnaire, which was thereafter sent annually,
96 four times in total. The actual retirement date was self-reported by the participants. Due to the
97 eligibility criteria, large majority of the FIREA participants retired based on their age, and not
98 due to diseases. The FIREA study was conducted in line with the Declaration of Helsinki, and
99 was approved by the Ethics Committee of Hospital District of Southwest Finland.

100 By the end of 2017, 6,673 (63% of the eligible sample, n=10,629) of the FIREA cohort
101 members had responded to at least one questionnaire and of them 4,311 had so far responded
102 at least twice to questionnaires, 2,082 both prior and after the actual retirement date reported

103 by the responders. There were two possible study waves before retirement (wave -2, wave -1)
104 and three possible waves after retirement (wave +1, wave +2, wave +3). Each successive wave
105 was one year apart from each other. To be included in this study, the participants had to have
106 information on total sedentary time immediately before and after transition to statutory
107 retirement (i.e. at wave -1 and at wave +1) (n=2,058). Then we excluded those with missing
108 information on socio-economic status (n=24) and those who were not working full-time or part-
109 time at wave -1 (n=23) resulting in an analytic sample of 2,011 persons. Thus, depending on
110 the retirement date, participants' observations came from one of the following alternative set
111 of waves: 1) wave -2, wave -1, wave +1, wave +2, or, 2) wave -1, wave +1, wave +2, and wave
112 +3. Study waves around retirement are demonstrated in Table 1. On average, these participants
113 provided information on total sedentary time at 3.4 (range 2-4) of the possible four study waves.
114 The analytical sample did not differ from the eligible sample (83 vs. 80% of women, 33 vs.
115 29% of upper grade non manual, 37 vs. 42% of manual workers, respectively).

116

117 **Assessment of sedentary behavior**

118 Sedentary behavior was inquired at each study wave with a question: "On average, how many
119 hours on a non-weekend days you spend on sitting: 1) at the office, 2) watching television or
120 videos at home, 3) using computer at home, 4) in a vehicle (car, train, airplane), and 5) other
121 sitting?" Response alternatives for each domain were: 0 (sitting less than an hour or not at all),
122 1, 2, ..., 9, ≥ 10 hours per day, coded as 0 to 10 hours, respectively. We calculated a total non-
123 occupational sedentary time by summing up sitting times for television viewing, computer use,
124 vehicle and other.

125 **Assessment of covariates**

126 Sex, date of birth, and occupational status were obtained from the pension insurance institute
127 for the municipal sector in Finland (Keva). Occupational status was categorized into three
128 groups according to the occupational titles by the last known occupation preceding retirement:
129 upper-grade non-manual workers (e.g. teachers, physicians), lower-grade non-manual workers
130 (e.g. registered nurses, technicians) and manual workers (e.g. cleaners, maintenance workers).
131 All other covariates were based on the responses in the last questionnaire prior to retirement
132 (wave -1). These covariates were selected because they have been shown to be associated with
133 sedentary behavior [18] and might influence the decision to retire [19]. Work status was divided
134 into full-time or part-time workers and marital status into married/cohabiting or not
135 married/other. Heavy physical work (no vs. yes) was assessed by using validated gender-
136 specific job exposure matrix (JEM) for physical exposures [20,21]. Occupational sedentary
137 time before the retirement transition was categorized into four groups: <4 hours, 4 to <6 hours,
138 6 to <8 hours and ≥ 8 hours daily.

139 Physical activity was assessed with a question on average weekly duration and intensity of
140 leisure and commuting physical activity during the past year. Weekly physical activity was
141 expressed as metabolic equivalent (MET) hours and categorized as: low (<14 MET
142 hours/week), moderate (14 to <30 MET hours/week), and high (≥ 30 MET hours/week) activity
143 levels [22]. Body mass index (BMI) was calculated from self-reported weight and height and
144 categorized into: underweight (<18.5 kg/m²), normal weight (18.5 to <25.0 kg/m²), overweight
145 (25 to <30 kg/m²) and obese (≥ 30 kg/m²) [23]. The participants reported their habitual
146 frequency and amount of beer, wine, and spirits consumption, in weekly units of alcohol.
147 Heavy alcohol use (no vs. yes) was defined as >16 drinks/week for women and >24
148 drinks/week for men, as these limits correspond with the lower limit for heavy use of alcohol
149 set by the Finnish Ministry of Health and Social Affairs [24]. Smoking status was categorized
150 into non-smokers (never and former) and current smokers. Sleep difficulties were measured

151 with the Jenkins Sleep Problem Scale [25] and categorized as no sleep difficulties (sleep
152 difficulties ≤ 1 night/week), moderate sleep difficulties (2-4 nights/week), or severe sleep
153 difficulties (5-7 nights/week) [26].

154 Data on chronic diseases was based on question “Have your doctor ever told that you have or
155 have had” and following diseases were taken into account: angina pectoris, myocardial
156 infarction, stroke, claudication, osteoarthritis, osteoporosis, sciatica, fibromyalgia, rheumatoid
157 arthritis, migraine, and malign cancer. For the analyses, participants were categorized into
158 having no chronic disease, having one chronic disease or having more than one chronic
159 diseases. Mental disorders included depression and/or other mental diseases (no vs. yes). Self-
160 rated health was assessed with a 5-point scale (1=good, ..., 5=poor), and was then categorized
161 as good (1-2), average (3), and poor (4-5) health. Psychological distress was measured with the
162 12-item version of General Health Questionnaire (GHQ-12), which gives a total score ranging
163 from 0 to 12. A cut-off point of three or more symptoms was used to indicate psychological
164 distress (no vs. yes) [27].

165

166 **Statistical analysis**

167 Characteristics of the study population before retirement (at wave -1) are presented as numbers
168 and percentages for categorical variables and as means and standard deviations (SDs) for
169 continuous variables. We first calculated mean estimates and their 95% confidence intervals
170 (CI) for the total and domain-specific sedentary times in each study wave to illustrate the levels
171 of these behaviors across the retirement transition (from wave -2 to wave +3). We used linear
172 regression analyses with generalized estimating equations (GEE). The GEE models control for
173 the intra-individual correlation between repeated measurements using an exchangeable
174 correlation structure and is not sensitive to measurements missing completely at random

175 [28,29]. The difference in the mean change in total and domain-specific sedentary times
176 between two specific time periods: the retirement transition period (from wave -1 to wave +1)
177 and the post-retirement period (from wave +2 to wave +3) were tested using a period*time
178 interaction term.

179 We also examined whether sociodemographic and work-related factors (sex, occupational
180 status, work status, marital status, heavy physical work and occupational sedentary time),
181 lifestyle factors (physical activity, BMI, heavy alcohol use, current smoking status, sleep
182 difficulties), and health factors (number of chronic diseases, mental disorders, self-reported
183 health, and psychological distress) before retirement were associated with the magnitude of
184 changes in total and domain-specific sedentary times during the retirement transition (from
185 wave -1 to wave +1). For these analyses, the interaction term pre-retirement factor*time was
186 added to the GEE models. All models were adjusted for age, sex, and occupational status. The
187 SAS 9.4 Statistical Package was used for all of the analyses (SAS Institute Inc., Cary, NC).

188

189 **RESULTS**

190 Characteristics of the study population are shown in Table 2. Of the participants, 83% were
191 women, 33% had upper grade non-manual work, and 37% had manual work. Before the
192 retirement transition (at wave -1), the mean age of the study population was 63.2 (SD 1.3)
193 years, 39% had low physical activity level, 38% had normal BMI, and 28% were free of chronic
194 diseases. The mean time spent being sedentary at leisure was 4.7 (95% CI 4.5-4.8) hours/day.
195 The total sedentary time before retirement differed by sex, work and marital status, physical
196 strenuousness of the work, physical activity level, BMI category, alcohol use, severity of sleep
197 difficulties, self-reported health, and psychological distress ($p < 0.05$ for all).

198 Figure 1 illustrates the changes in total and domain-specific non-occupational sedentary times
199 across the retirement transition. The total sedentary time, including sitting time for television
200 viewing, computer use, vehicle and other, increased by 73 minutes/day to 5.9 hours/day during
201 the retirement transition and continued to increase by 18 minutes/day to 6.2 hours/day during
202 the post-retirement period. Thus the change in total sedentary time during the retirement
203 transition was four times that of change during the post-retirement period (period*time
204 interaction $p<.0001$). Of the domain-specific sedentary behaviors, television viewing time
205 increased by 28 minutes/day to 2.7 hours/day, computer use at home by 19 minutes/day to 1.1
206 hours/day, and time spent on other sitting activities by 37 minutes/day to 1.6 hours/day during
207 the retirement transition. Time sitting in a vehicle decreased by 6 minutes/day during retirement
208 transition. Computer use and other sitting times continued to increase during the post-
209 retirement period (by 5 and 8 minutes/day, respectively).

210 Table 2 presents mean estimates for the change in total non-occupational sedentary time during
211 the retirement transition by the pre-retirement characteristics. Supplemental Tables 1-3 present
212 results for domain-specific sedentary times. Women increased their total sedentary time more
213 than men during the retirement transition (77 vs. 56 minutes/day, sex*time interaction $p=0.01$).
214 Changes in total sedentary time by men and women are shown in Supplement Figure 1.

215 Those who retired from full-time jobs increased total sedentary time more than those who
216 retired from part-time jobs (78 vs. 62 minutes/day, pre-retirement job status*time interaction
217 $p=0.02$). This was also seen for change in television viewing time (Supplemental Table 1).
218 Those who had high pre-retirement occupational sedentary time reported higher increase in
219 total sedentary time during the retirement transition than those who had low occupational
220 sedentary time (98 vs. 65 minutes/day, pre-retirement occupational sedentary time*time
221 interaction $p<0.0001$). This association was also seen for change in computer use
222 (Supplemental Table 2) and change in other sitting time (Supplemental Table 3). In addition,

223 those who had low pre-retirement physical activity level reported higher increase in total
224 sedentary time during the retirement transition than those who had high pre-retirement physical
225 activity level (79 vs. 62 minutes/day, pre-retirement activity level*time interaction $p=0.02$).
226 The pre-retirement physical activity level associated also with changes in television viewing
227 time (Supplement Table 1).

228 Among those with severe sleep difficulties before retirement, the increase in total sedentary
229 time during the retirement transition was reported to be higher than among those who had no
230 pre-retirement sleep difficulties (89 vs. 64 minutes/day, pre-retirement sleep difficulties*time
231 interaction $p=0.002$). Sleep difficulties were also associated with changes in sitting time for
232 computer use (Supplemental Table 2). Those who had chronic diseases reported higher increase
233 in total sedentary time during the retirement transition than those who had no chronic diseases
234 before retirement (79 vs. 61 minutes/day, pre-retirement disease status*time $p=0.03$).
235 Furthermore those who had mental disorders before retirement increased their total sedentary
236 time more than those who had no pre-retirement mental disorders (94 vs. 71 minutes/day, pre-
237 retirement mental health*time interaction $p=0.009$). Also self-reported health before retirement
238 associated with changes in total sedentary time so that those reporting poor health increased
239 their total sedentary time more than those reporting good health (96 vs. 68 minutes/day, pre-
240 retirement health*time interaction $p=0.03$). Self-reported health showed strongest association
241 with increased television viewing time (Supplemental Table 1). In addition, psychological
242 distress before retirement associated with the changes in television viewing time (Supplemental
243 Table 1) and computer use (Supplemental Table 2) during the retirement transition.

244

245 **DISCUSSION**

246 This is the first longitudinal study examining changes in non-occupational sedentary behavior
247 across the retirement transition. Total sedentary time as well as television viewing time,
248 computer use at home, and other sitting time increased during the retirement transition. Total
249 sedentary time, and especially computer use and other sitting domain, continued to increase
250 during the years following retirement. Women, and those who had high occupational sedentary
251 time, low level of physical activity, sleep difficulties, mental disorders, or poor health before
252 retirement were most likely to report an increase in total sedentary time during the retirement
253 transition. An advantage of the present comprehensive investigation over previous studies is
254 that we examined annual changes in sedentary behavior by using repeated measures of domain-
255 specific sedentary behaviors (television viewing time, computer use at home, sitting in a
256 vehicle and other sitting) across the retirement transition. In addition, we have studied the
257 associations between pre-retirement characteristics and the changes in total and domain-
258 specific sedentary times during the retirement transition.

259 Our finding that total sedentary time, television viewing, computer use, and other sitting time
260 increase during the retirement transition corresponds to previous longitudinal findings showing
261 higher increase in total leisure sedentary time [16], television viewing time [8,15,16], and
262 computer time [16] among retiring adults than among those who remained employed. As
263 sedentary behavior in general [2,4] and television viewing specifically [30–32] are related to
264 adverse health outcomes among older adults, our findings, among others, suggest that more
265 attention should be paid to reducing overall sedentary behavior and especially television
266 viewing time after transitioning to retirement. We also observed that total, computer use at
267 home, and other sitting time continued to increase in the years following retirement. However,
268 computer use and other sitting time increased to lower absolute level of sedentary behavior per
269 day than television viewing. It is worth of noting that computer use is mentally activating
270 compared to passive television viewing[33], and may not be as harmful for health among older

271 adults [34]. Despite the overall increase in sedentary behavior during retirement, we also
272 observed that sitting in a vehicle decreased during the retirement transition. Similarly to our
273 finding, a previous study has shown that passive transportation decreases more among retiring
274 than among already retired adults [17]. This decrease is probably mostly due to absence of
275 commuting-related passive transportation after retirement.

276 A unique feature in our study compared to previous ones is that we also examined wide range
277 of pre-retirement characteristics that could affect the magnitude of change in total and domain-
278 specific sedentary times during the retirement transition. We found that women increased their
279 total and other sitting time more than men, although men were more sedentary before
280 retirement. Also high occupational sedentary time before the retirement transition was
281 associated with greater increases in total, computer use and other sitting times during the
282 retirement transition. Similar relationship was also seen in previous study where higher work-
283 related sitting associated with greater increase in screen time after retirement [35] and in
284 another study in which less physically demanding job associated with increased time spent
285 watching television after retirement [15]. Although less educated adults [17] and those retiring
286 from manual social class [16] have previously been shown to be more susceptible to increase
287 television viewing time after retirement, we did not observe association between occupational
288 status or heavy physical work and total or domain-specific sedentary times.

289 According to our findings, high level of physical activity before retirement was associated with
290 less increase in total and television viewing times during the retirement transition. Another
291 novel finding is that those who had sleep difficulties, mental disorders or poor health before
292 retirement were most likely to report an increase in total sedentary time during the retirement
293 transition. Sleep difficulties were associated with increased sitting time for computer use
294 whereas poor self-reported health associated with increased television viewing time. Also pre-
295 retirement psychological distress was associated with increased television viewing and

296 computer use after retirement. These findings adds to previous studies which have found that
297 sedentary behavior associate with poor sleep quality [36], poor mental health [37,38] and with
298 increased risk of depression [39,40].

299 The main limitation of this longitudinal study is the reliance on self-reported data in relation to
300 the behavioral changes, which is commonly used in large data collection but can lead to bias
301 and underreporting of sedentary time [3]. To our knowledge the questionnaire used in this study
302 is not validated against objective measurements of sedentary behavior. However, the
303 assessment of sedentary behavior as self-reported hours/day is frequently used in observational
304 studies [7]. In addition, since we calculated the total non-occupational sedentary time based on
305 the time used in different domains, we were not able to control the simultaneity of domain-
306 specific sedentary behaviors. This may have lead slight overestimation of the total sedentary
307 time. Future studies with objective monitoring of sedentary time are therefore needed to fully
308 understand the changes in sedentary behavior during the retirement transition. There are also
309 some other methodological issues that deserve discussion. We only assessed sedentary time on
310 non-weekend days. This can be a limitation, because sedentary time may be different in
311 weekend vs. non-weekend days among older adults [41]. On the other hand, by focusing on
312 week-days only we were able to better capture changes in sedentary behavior when week-day
313 routines change after moving into retirement. In addition, we did not include occupational
314 sedentary time in the calculation of total sedentary time because occupational sitting disappears
315 after retiring from work [16] and this would have masked the increase in non-occupational
316 sedentary behavior [14]. Instead we examined changes in sedentary behavior during the
317 retirement transition based on the levels of pre-retirement occupational sedentary time. Finally,
318 the study population is representative of the Finnish public sector employees, however, the
319 results may not necessarily be generalizable to other sectors.

320

321 **Conclusions**

322 Total non-occupational sedentary time in general and television viewing, computer use and
323 other sitting time increased during the retirement transition. Total sedentary time continued to
324 increase during the post-retirement period. Women and adults who had high occupational
325 sedentary time, low physical activity level, sleep difficulties, mental disorders, or poor health
326 before retirement were most likely to report an increase in time spend sedentary after the
327 retirement transition. However, objective measurements of sedentary behavior are needed to
328 fully understand the changes in sedentary behavior across the retirement transition.

329

330 **Contributionship** SS and JV designed this study and the data collection. TL analyzed the
331 data and drafted the manuscript. All authors contributed to data interpretation, revised article
332 critically, and approved the final version of manuscript.

333 **Competing interest:** None declared.

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338 **Data sharing** The datasets used and analyzed during the current study are available from the
339 corresponding author on reasonable request.

340 **Ethical approval** The FIREA study is conducted in line with the Declaration of Helsinki,
341 and was approved by the Ethics Committee of Hospital District of Southwest Finland.

342

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473

474 **Figure Labels**

475 **Figure 1. Total and domain-specific sedentary times across the retirement transition.**

476 **Adjusted for age, sex and occupational status.**

477

478 **Tables**

479 **Table 1. Study design. Annual study waves around retirement and the construction of the**
 480 **pre-retirement, retirement transition and post-retirement periods.**

Pre-retirement period	Retirement transition		Post-retirement period		
<i>n</i> =955	<i>n</i> =2,011	RETIREMENT	<i>n</i> =2,011	<i>n</i> =1,211	<i>n</i> =547
	wave -1		wave +1	wave +2	wave +3
wave -2	wave -1		wave +1	wave +2	

481

482 **Table 2. Total non-occupational sedentary time before retirement (wave -1) and mean changes in total sedentary time during the**
 483 **retirement transition period (from wave -1 to wave +1) by pre-retirement characteristics of the population. All models adjusted for age,**
 484 **sex and occupational status.**

	n	%	Before retirement			During retirement transition			P-value for interaction with time
			Total sedentary time (h)	95% CI		Mean change (h)	95% CI		
Total	2011	100	4.65	4.52	4.78	1.23	1.11	1.34	
Sex									0.01
Men	335	17	5.02	4.77	5.26	0.94	0.69	1.19	
Women	1676	83	4.39	4.29	4.49	1.28	1.16	1.41	
Occupational status									0.45
Upper grade, non-manual	665	33	4.55	4.38	4.71	1.24	1.07	1.42	
Lower grade, non-manual	605	30	4.67	4.48	4.86	1.30	1.10	1.50	
Manual	741	37	4.71	4.53	4.89	1.15	0.98	1.32	
Work status									0.02
Full-time	1401	70	4.52	4.38	4.66	1.31	1.18	1.44	
Part-time	610	30	4.94	4.75	5.15	1.04	0.85	1.23	
Marital status									0.43
Married or cohabiting	1436	73	4.57	4.44	4.71	1.21	1.09	1.34	
Not married or other	518	27	4.82	4.59	5.04	1.30	1.10	1.51	

Heavy physical work									0.33
No	1713	85	4.58	4.44	4.72	1.24	1.12	1.36	
Yes	298	15	5.01	4.74	5.29	1.10	0.85	1.36	
Occupational sedentary time									<.0001
0-<4 h	931	50	4.54	4.37	4.71	1.08	0.93	1.23	
4-<6 h	400	22	4.74	4.51	4.97	1.34	1.11	1.56	
6-<8 h	452	24	4.38	4.18	4.57	1.70	1.49	1.91	
≥8h	78	4	4.47	3.99	4.95	1.63	1.10	2.16	
Physical activity									0.02
Low	777	39	4.85	4.67	5.03	1.31	1.14	1.49	
Moderate	589	29	4.50	4.31	4.68	1.32	1.13	1.51	
High	631	32	4.51	4.33	4.68	1.03	0.86	1.20	
Body mass index									0.65
Underweight	7	0.5	4.72	3.36	6.09	NA			
Normal weight	757	38	4.38	4.20	4.55	1.19	1.03	1.35	
Overweight	806	41	4.56	4.41	4.71	1.20	1.03	1.36	
Obese	414	21	5.31	5.06	5.55	1.30	1.06	1.54	
Heavy alcohol use									0.83
No	1837	92	4.60	4.47	4.72	1.23	1.11	1.35	
Yes	164	8	5.19	4.80	5.58	1.20	0.86	1.53	
Current smoking									0.32
No	1802	91	4.62	4.48	4.75	1.21	1.09	1.33	
Yes	172	9	4.90	4.53	5.28	1.39	1.05	1.73	

Sleep difficulties									0.002
No	985	49	4.54	4.38	4.69	1.06	0.91	1.21	
Moderate	460	23	4.78	4.57	4.99	1.22	1.00	1.44	
Severe	565	28	4.77	4.58	4.97	1.48	1.28	1.68	
Number of chronic diseases									0.03
0	540	28	4.60	4.42	4.79	1.02	0.83	1.21	
1	745	38	4.64	4.45	4.82	1.29	1.12	1.47	
≥2	655	34	4.71	4.52	4.89	1.32	1.13	1.50	
Mental disorders									0.01
No	1527	84	4.63	4.49	4.78	1.18	1.05	1.31	
Yes	285	16	4.80	4.53	5.07	1.56	1.29	1.83	
Self-reported health									0.03
Good	1492	74	4.52	4.38	4.65	1.13	1.00	1.26	
Average	438	22	4.92	4.70	5.13	1.40	1.18	1.63	
Poor	78	4	5.70	5.07	6.34	1.60	1.11	2.10	
Psychological distress									0.08
No	1760	88	4.62	4.48	4.75	1.18	1.06	1.30	
Yes	243	12	4.90	4.61	5.18	1.46	1.16	1.77	

485

486

487 **Supplement material**

488

489 **Supplemental Figure 1. Total sedentary time across the retirement transition for men and women.**

490

491 **Supplemental Table 1. Television viewing time before retirement (wave -1) and mean changes in television viewing time during the**
492 **retirement transition period (from wave -1 to wave +1) by pre-retirement characteristics of the population. All models adjusted for age,**
493 **sex and occupational status.**

494

495 **Supplemental Table 2. Computer use at home before retirement (wave -1) and mean changes in computer use during the retirement**
496 **transition period (from wave -1 to wave +1) by pre-retirement characteristics of the population. All models adjusted for age, sex and**
497 **occupational status.**

498

499 **Supplemental Table 3. Other sitting time before retirement (wave -1) and mean changes in other sitting time during the retirement**
500 **transition period (from wave -1 to wave +1) by pre-retirement characteristics of the population. All models adjusted for age, sex and**
501 **occupational status.**