Patterns and changes of 24-h movement behavior
Results from the Finnish Retirement and Aging study

Sari Stenholm
Outline

• Introducing FIREA study
• Activity domains
• Patterns and heterogeneity
• Temporal changes, CoDA
• Ongoing & upcoming research
Finnish Retirement and Aging Study (FIREA)

- People working in municipalities, mean age 63 years at baseline
- Wide range on occupations
- Survey cohort (n=6700), activity sub-study (n=1200)
- 4-5 annual measurements

1-week measurement with wActiSleep-BT or wGT3X-BT:
- Non-dominant wrist
- Sleep: ActiGraph algorithm
- Non-wear: Choi algorithm
- Total activity: counts
- Activity intensities: GGIR

Sleep
Working hours
Commuting habits
Work status
Measurement of movement behavior

ActiGraph (accelerometer)

Axivity (accelerometer)

SenseDoc (GPS and accelerometer)
Physical Activity across Retirement Transition by Occupation and Mode of Commute

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\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{chart.png}
\caption{Physical Activity across Retirement Transition by Occupation and Mode of Commute.}
\end{figure}
Distribution of activity volume by domains

(Pulakka et al. 2020 Med Sci Sports Exerc)

Work: 25 to 30%
Commuting: 5%
Leisure time: 65 to 70%
Mode of commute reflects total activity
(Pulakka et al. 2020 Med Sci Sports Exerc)

% of total daily activity accumulated from commuting

<table>
<thead>
<tr>
<th>Mode of Commute</th>
<th>Before Retirement</th>
<th>After Retirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car</td>
<td>-1%</td>
<td>-2%</td>
</tr>
<tr>
<td>Public transport</td>
<td>-6%</td>
<td>-3%</td>
</tr>
<tr>
<td>Walking</td>
<td>4%</td>
<td>-2%</td>
</tr>
<tr>
<td>Cycling</td>
<td>5%</td>
<td>-2%</td>
</tr>
</tbody>
</table>

% reduction in total daily activity

Adjusted for gender, occupational category, age, and wake wear time.
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**Latent trajectory groups on working days**

- Highest during the day and active in the evening  6%
- High during the day and decrease in the evening  10%
- Moderate during the day and increase in the evening  12%
- Moderate during the day and decrease in the evening  32%
- Low during the day and increase in the evening  7%
- Low throughout the day  33%

**Average total daily activity**

Mean hourly VM CPM

- Highest during the day and active in the evening
- High during the day and decrease in the evening
- Moderate during the day and increase in the evening
- Moderate during the day and decrease in the evening
- Low during the day and increase in the evening
- Low throughout the day

Mean daily VM CPM

0 1000 2000 3000 4000
Activity patterns vs. health-related physical fitness  
(Stenholm et al. 2021 JGMS)

Latent trajectory groups

- Highest during the day and active in the evening 6%
- High during the day and decrease in the evening 10%
- Moderate during the day and increase in the evening 12%
- Moderate during the day and decrease in the evening 32%
- Low during the day and increase in the evening 7%
- Low throughout the day 33%

Adjusted for age, sex, physical activity pattern on days off, smoking, and alcohol risk use.
Physical fitness is important for work ability (Suorsa et al. 2022 Eur J Ageing)

Estimated VO2peak
P for trend <.0001

Adjusted for age, gender and occupational status.
Compositional data analysis to examine changes during retirement transition

- CoDA provides statistical tool to analyze multivariate proportion-type data such as the 24-hour time use.
- Retirement is associated with changes in physical activity, sedentary time and sleep, but how the distribution changes is unknown.
- Important to consider gender and occupation.

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