Consumer-based activity trackers as a tool for physical activity monitoring

*The Tromsø Study, Tromsø 8, 2024-25*

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The Tromsø Study research laboratory
77 544 inhabitants

https://uit.no/research/tromsostudy
Repeated measurements over 40+ years

The Tromsø Study

114 397 participants

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Attendance: 74%

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Aim for Tromsø 8 (2024)

To implement a system for **automatic and continuous physical activity monitoring using consumer-based activity trackers**, and to examine the usability of this system as a tool for long-term physical activity recording in epidemiological studies.
Measuring physical activity

Direct calorimetry
Doubly labelled water
Indirect calorimetry
Combined sensing
Heart rate
Accelermeters
Pedometers
Diaries and logs
Questionnaires

Energy expenditure
Physical activity intensity
Steps

Accuracy and cost
Ease of assessment

Consumer activity trackers
How does it work?

1: PARTICIPANT MOVES
2: DATA TRANSFER TO WATCH
3: DATA TRANSFER TO SMARTPHONE
4: DATA TRANSFER TO PROVIDER CLOUD
5: DATA TRANSFER TO PROJECT SERVER
Testing the system 1:
One year recording using a Polar M430
The RESTART pilot study 2017–18
Method

The RESTART pilot study 2017–18

Testing the system 2:
Detecting change in population activity due to COVID-19
Method

Share of individuals who have access to a smartwatch in their household in 2020

- U.S: 26%
- Norway: 24%
- UK: 20%
- Finland: 19%
- Germany: 17%
- Sweden: 16%
- Denmark: 11%

Creating variables

MVPA

LPA

MPA

VPA

MVPA

Steps

SEd

Sleep

Non-wear
Creating variables

LPA
Non-wear

MPA
VPA
MVPA

Steps
SEDA
Sleep

Black box
Benefits and drawbacks

- **Long term** objective recording
- Relatively low participant burden
- Validity not well known
- Activity tracker ownership
  - Penetration (24% in Norway, in 2020)
  - Socio-economic status
Take home message

- Consumer based activity trackers can assist in closing the gap between existing methods for PA collection.
- Best suited to estimate change over time.
- An additional tool, not necessarily a replacement.
- Potential bias in who owns a smart watch
Thank you for listening

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