American Academy of Insurance Medicine 131st Annual Meeting
October 16, 2023

Wearable and lifestyle data – fit for (insurance) purposes?

2023 – Washington, DC

Presenters

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Setting the scene

01

Swiss Re

Using wearables for

Wellness “programs”

Risk selection

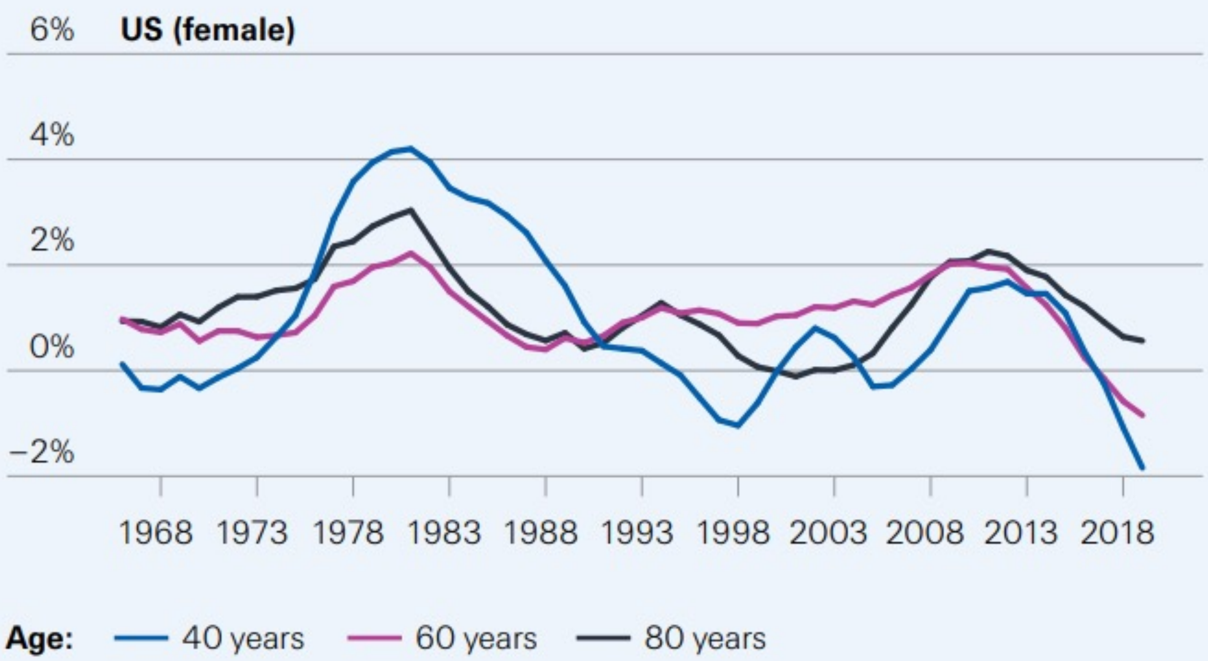
Using wearables for wellness programs

Lapse improvement

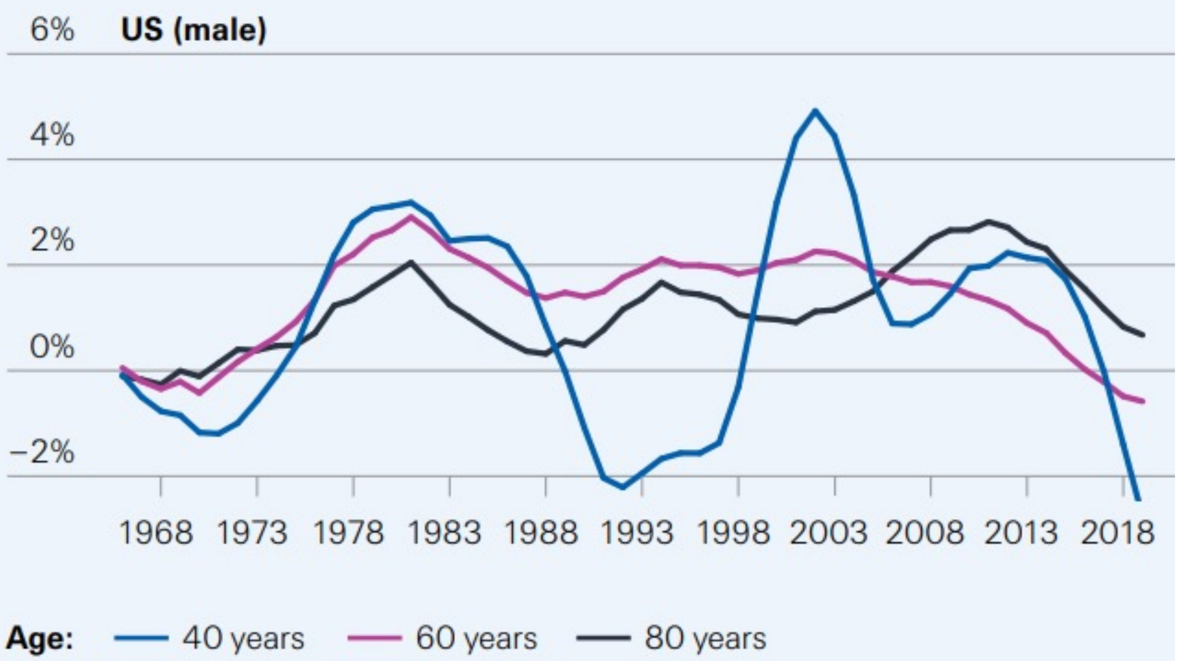
Health improvement ?

US mortality improvement

Mortality improvements, 8-year moving averages, female (1966–2019)



Mortality improvements, 8-year moving averages, male (1966–2019)



Questions to consider

02

Swiss Re

Using wearable data for risk selection

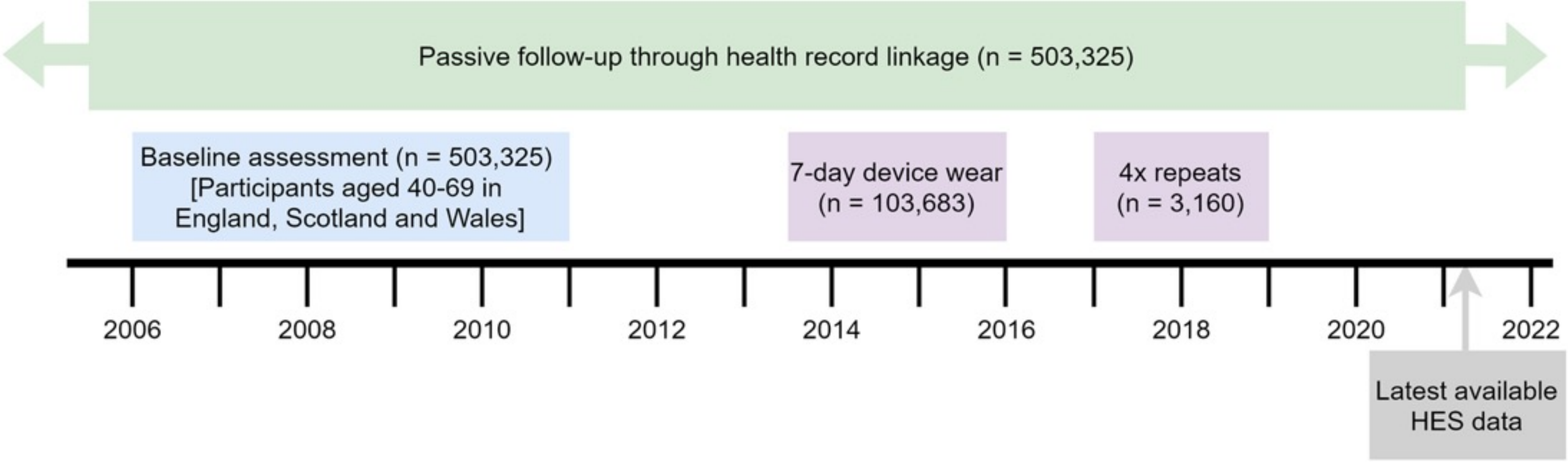
In **addition** to…

In **place of**…

Is there consistency and sustainability of wearable data?

Will the level of activity continue?
How long should data collection be for?

How long to collect wearable data? .... 7 days is ok but more better



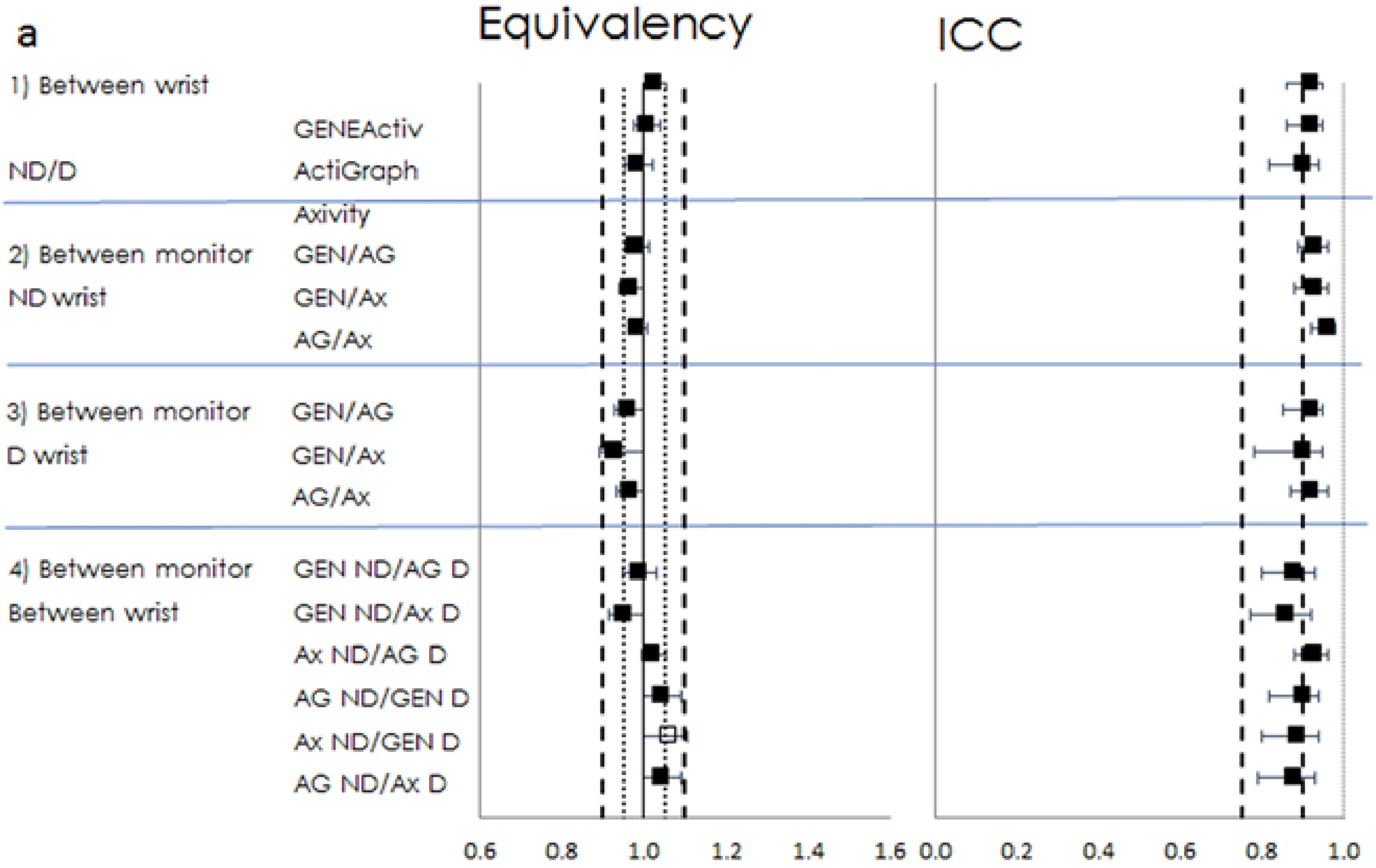
Within person measurement error lambda ≈ 0.70

Ramakrishnan et al ***PLOS Medicine*** 2021
Brage, Strain, Walmsley, Wijndaele, Bennett et al ***(in preparation)***

Phone, basic wearable, or high grade sports wearable?

Can one use “any” wearable?

Should we worry about which wearable?



48 adults

Wore a 3 devices on both wrists for 7 days

- GENEActiv
- Axivity
- ActiGraph

Rowlands et al. *Journal for the Measurement of Physical Behaviour (2019)*, *2*(3), 131-142.

Commercial wearables

nature medicine

Article https://doi.org/10.1038/s41591-022-02012-w

Association of step counts over time with the risk of chronic disease in the *All of Us* Research Program

*…Using the electronic health records data from the All of Us Research Program, we show that step count volumes as captured by participants' own Fitbit devices … **6,042 participants** included in the study … walked a median of 7,731.3 (5,866.8–9,826.8) steps per day over the **median activity monitoring period of 4.0 (2.2–5.6) years** with a total of 5.9 million person-days of monitoring.*

Smartphone step count is different

Figure 5: The average daily steps by chronic conditions

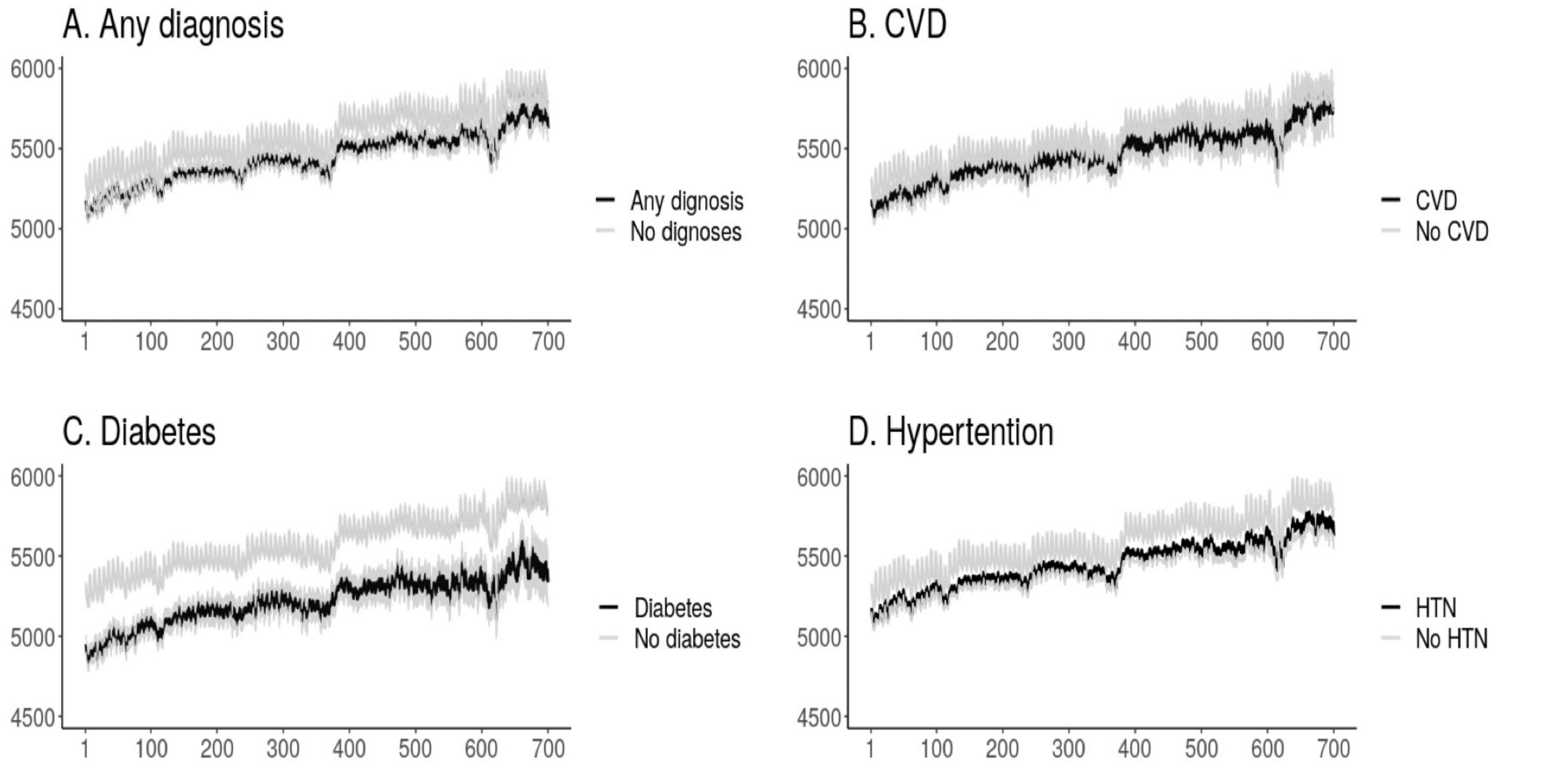
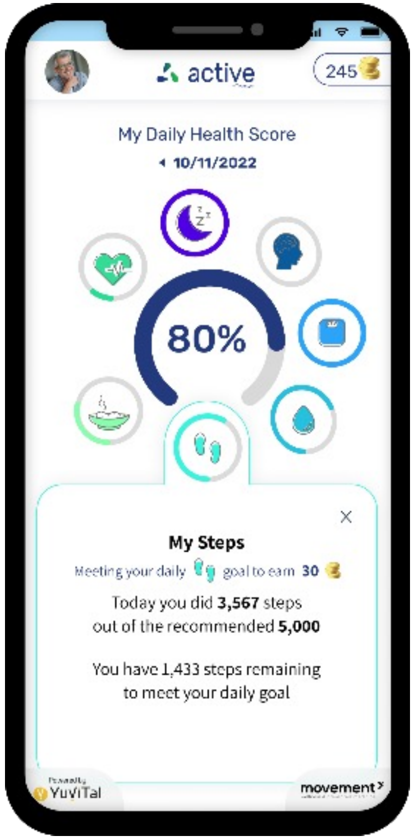


Figure 5: The average daily steps and Confidence interval (95%) for users with prevalent chronic condition at index date (i.e., cardiovascular disease, diabetes, or hypertension) are presented through the ongoing follow-up.

n = 622,584

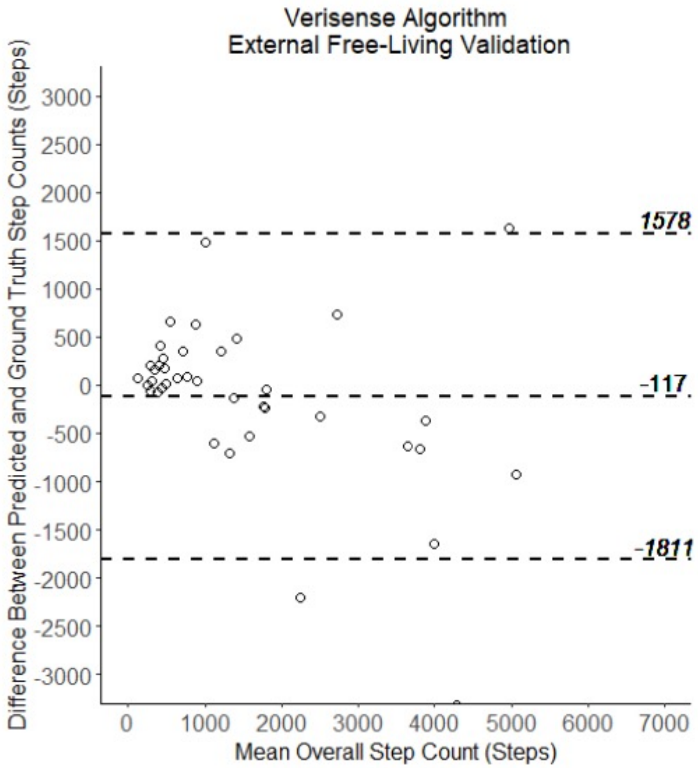
Consent = ~26 %
Adherence = ?? %

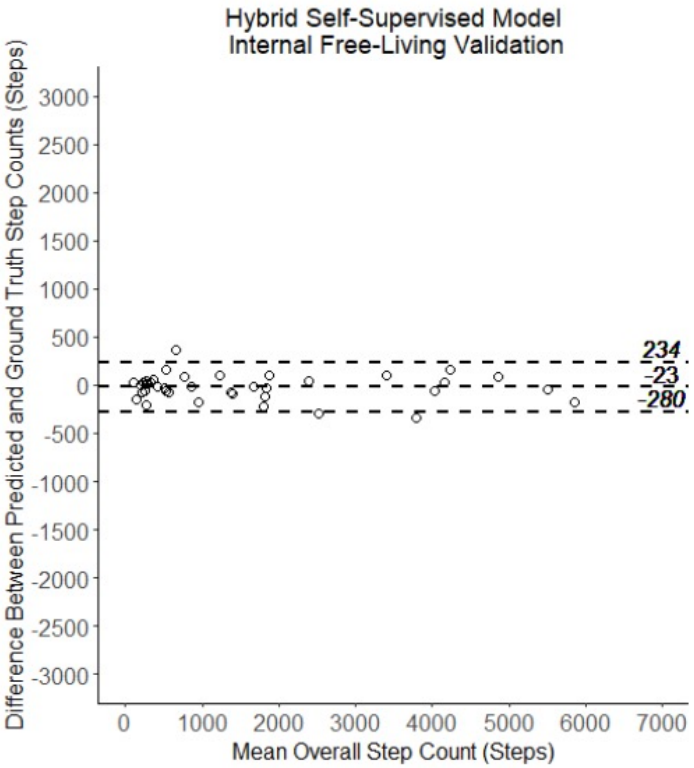


Berliner et al. ***(in preparation)***

Performance of different methods to measure steps

Internal Validation (Free-Living)	Verisense Model	OxWearables Model
Mean Bias (%)	-7.2%	-1.3%
Mean Average Percent Error	63.5%	12.5%





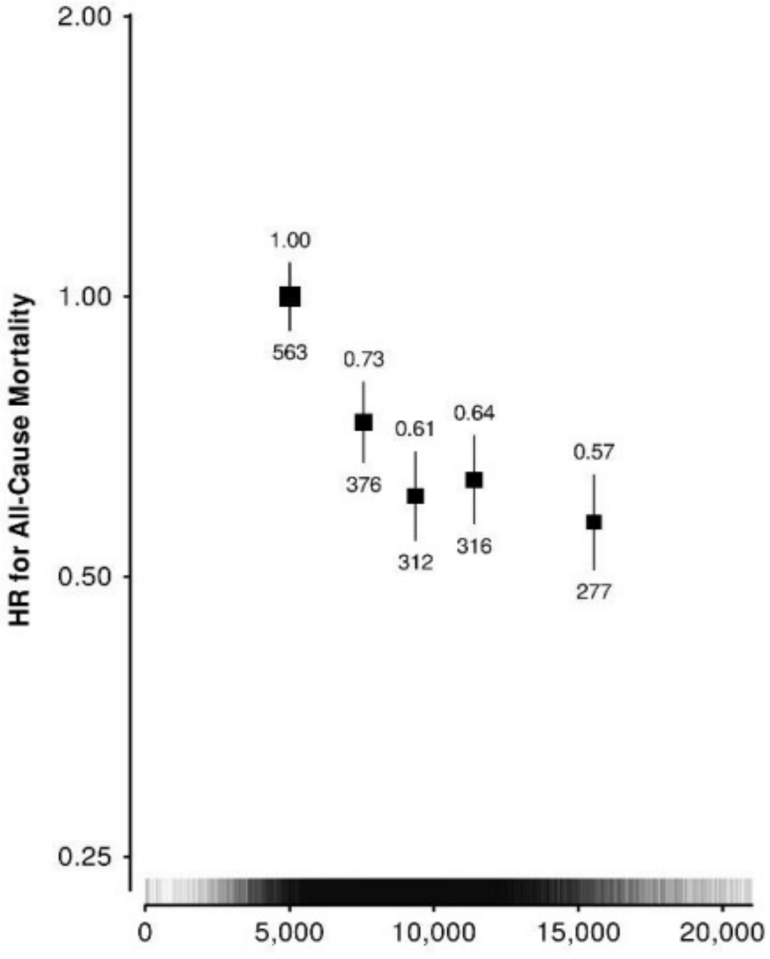
Small et al. ***medRxiv*** 2023.02.20.23285750

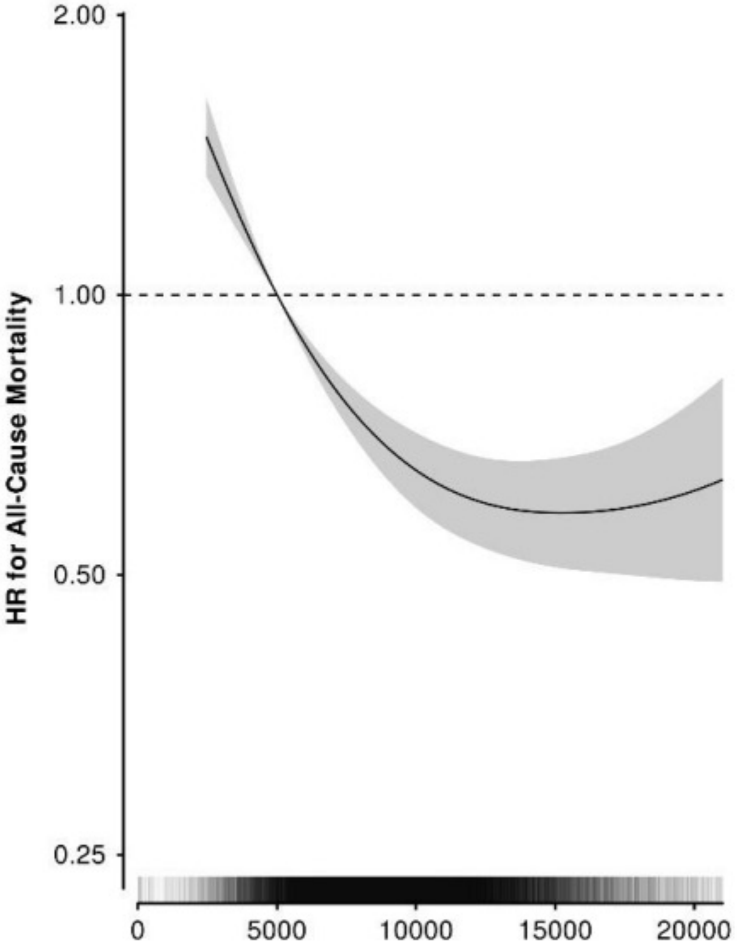
Which is better?

- step count
- granular activity data
- big buckets (6k steps)
- sudden change

Should we be granular or use large buckets?

For steps there is a dose-response curve showing that “some is good; more is better” up to a point beyond which the curve plateaus. For those aged 60 years or older, the plateau for all-cause mortality occurs at 6000 to 8000 steps a day; for those younger, 8000 to 10 000 steps a day.





Lee, Keadle, Matthews ***JAMA*** *2023 10.1001/jama.2023.19332*
Small et al. ***medRxiv*** 2023.02.20.23285750

Self-reported vs. measured

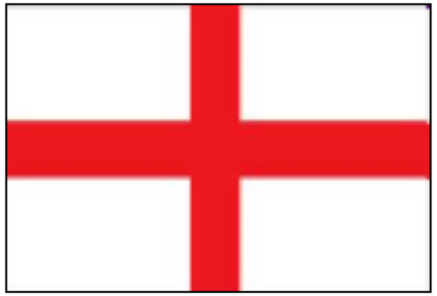
- can we rely solely on self-reported activity data?

Can people cheat the system?

% adults meeting physical activity recommendations

Self report : 50%

Device : 5%



Self-report : 38%

Device : 5%

Troiano; ***MSSE*** 2008; 40(1):181-8

Correlation between self-reported and device-measured activity

	N Women (%)	Correlation	95% Confidence Interval
Total	42,992	0.22	0.21, 0.23
Age group at recruitment (years)			
<55 years	18,973 (44.1)	0.26	0.25, 0.28
55+ years	24,019 (55.9)	0.20	0.19, 0.22
Socioeconomic status, fifths			
Top fifth	8,401 (19.5)	0.22	0.30, 0.24
Bottom fifth	8,744 (20.3)	0.22	0.30, 0.24
BMI (kg/m^2)			
<25	20,255 (47.1)	0.21	0.20, 0.23
25-29.9	15,146 (35.2)	0.18	0.17, 0.20
>30	7,591 (17.7)	0.15	0.13, 0.17
Smoking status			
Never	25,998 (60.5)	0.21	0.20, 0.22
Ever	16,936 (39.4)	0.23	0.22, 0.25

Guo et al. *BMJ Open* 2019;**9**:e024206. doi: 10.1136/bmjopen-2018-024206

Across all rating groups?

Is the risk reduction across "healthy" transfer to those with medical conditions?

Getting practical

03

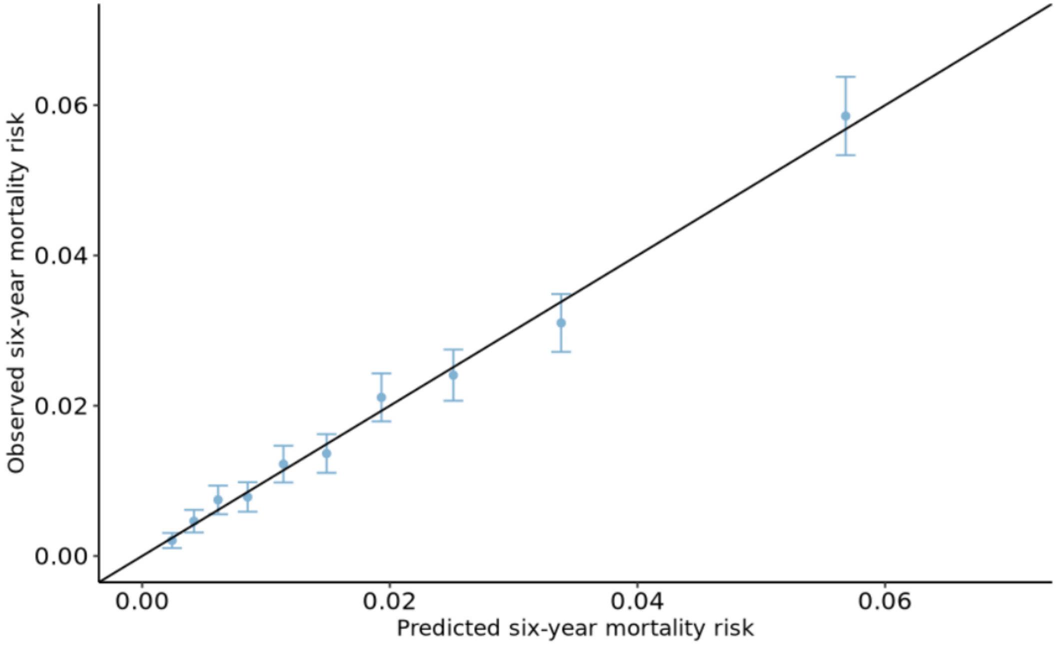
Using wearable data for risk selection in addition to traditional risk factors

Incremental protective value?

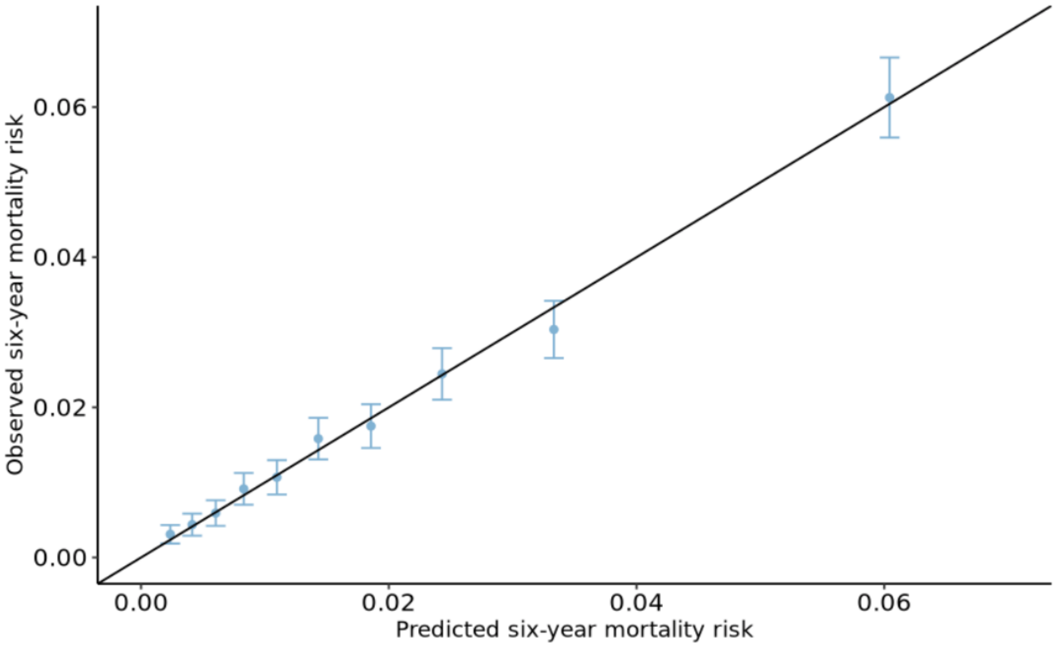
Depends on other information

What is the added value of wearables for risk prediction?

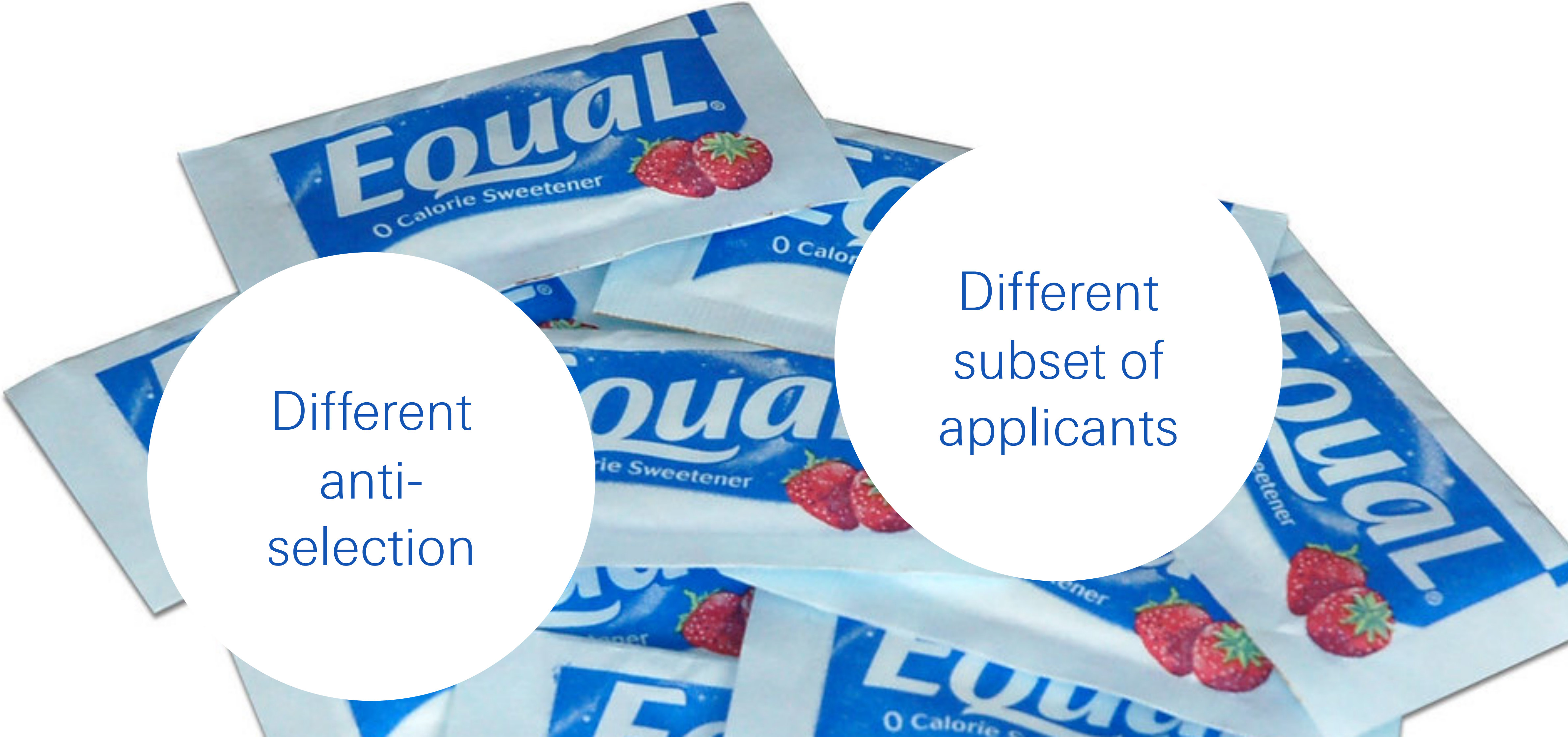
Age + sex + current smoker + SBP + BMI



Age + sex + current smoker + SBP + BMI + Wearables data (steps, sleep)



Using wearable data for risk selection in place of traditional risk factors



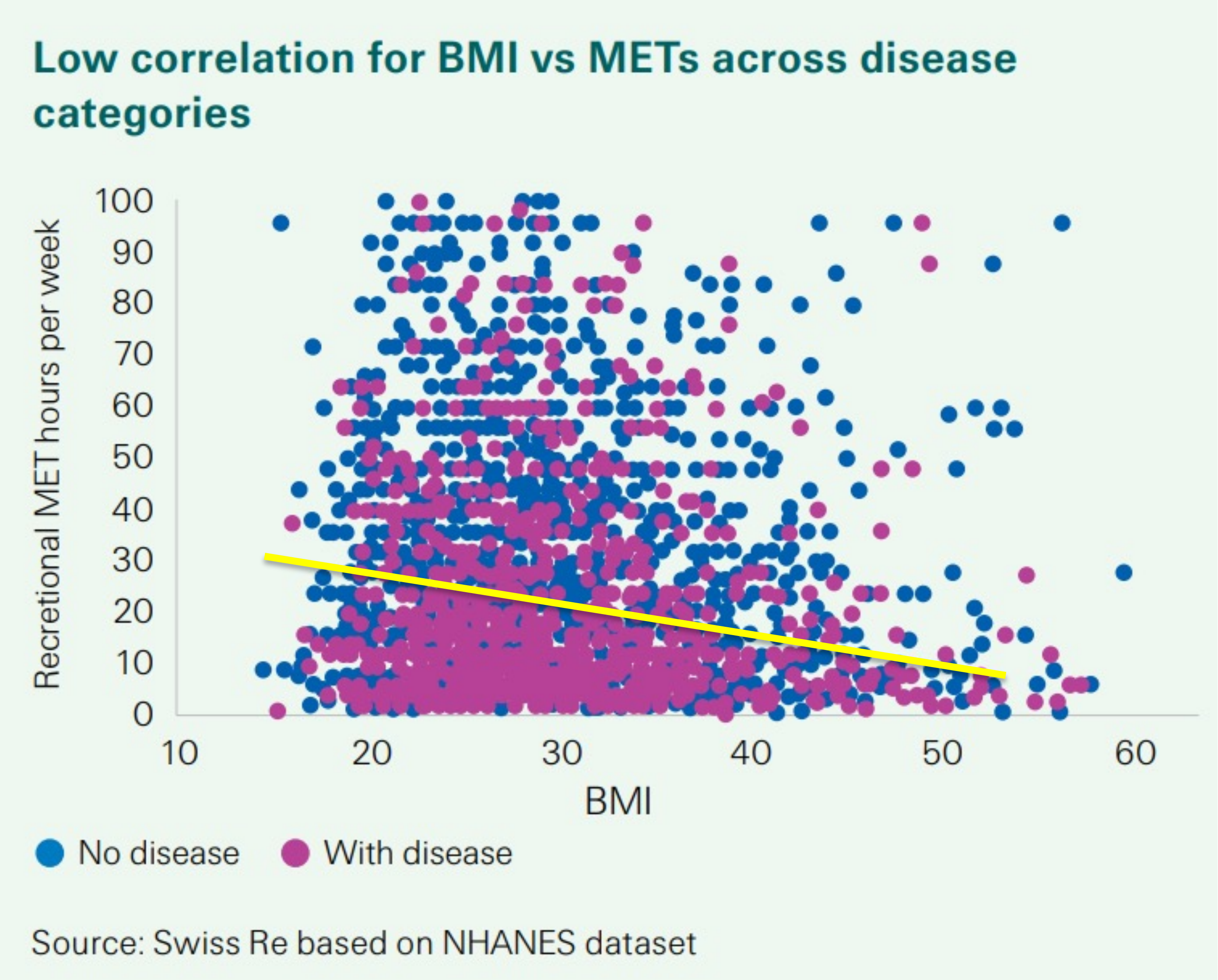
Different anti-selection

Different subset of applicants

Overlaps

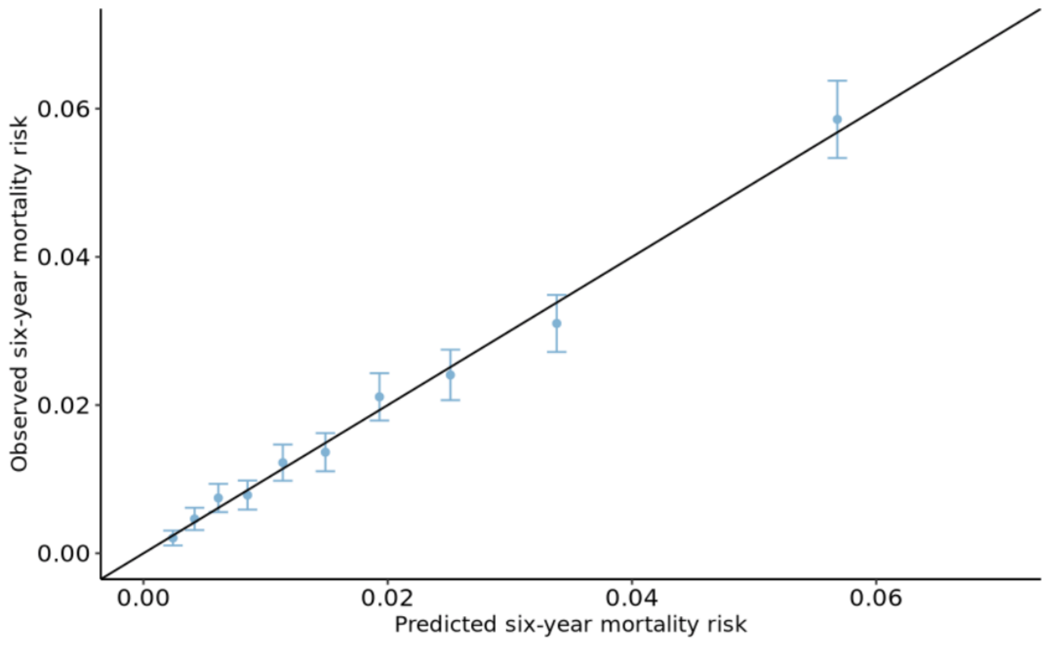
Source: Oxford university collaboration with Swiss Re

Correlation is often weak (BMI vs METS)

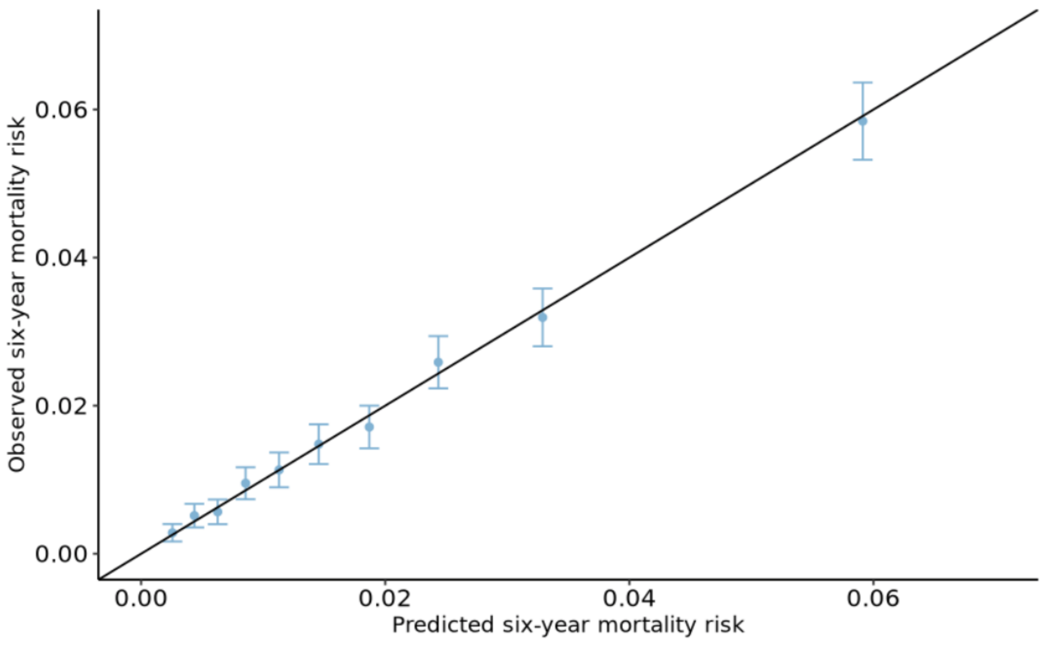


Can wearables data substitute for existing risk factors?

Age + sex + current smoker + SBP + BMI



Age + sex + current smoker + Wearables data (steps, sleep)



Harper et al. (in preparation)

Helpful for future risk, but can wearables tell us who has disease NOW?

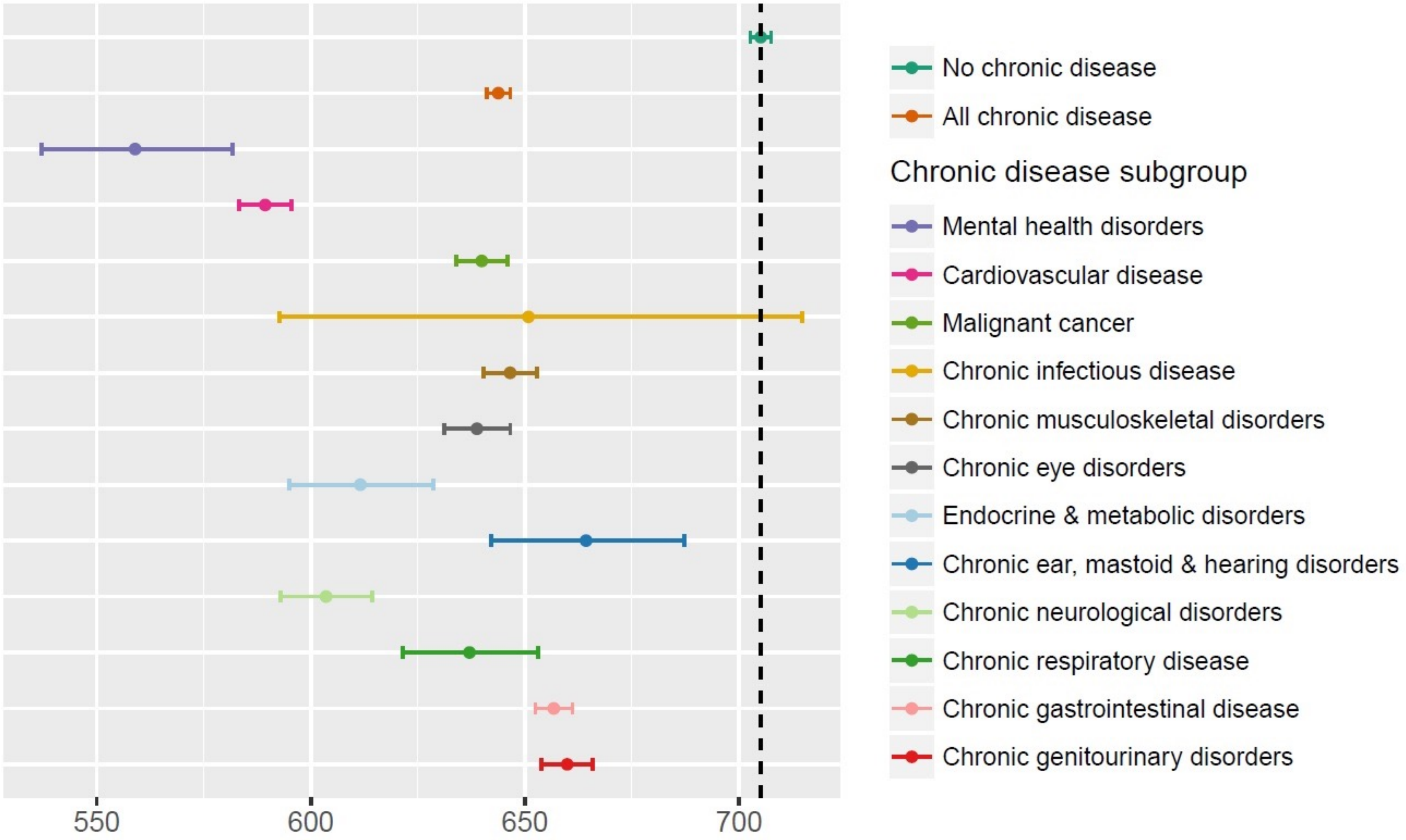


Figure 1. Geometric mean moderate activity in minutes per week for participants with and without chronic diseases

Using wearable data as part of dynamic risk assessment

Key modifiable risk factor

Most automated modifiable risk factor

Discussion and Q&A

04

Swiss Re

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