ADDS 2024

UNIVERSITY OF CANBERRA

Improving physical activity measurement for the secondary prevention of heart disease

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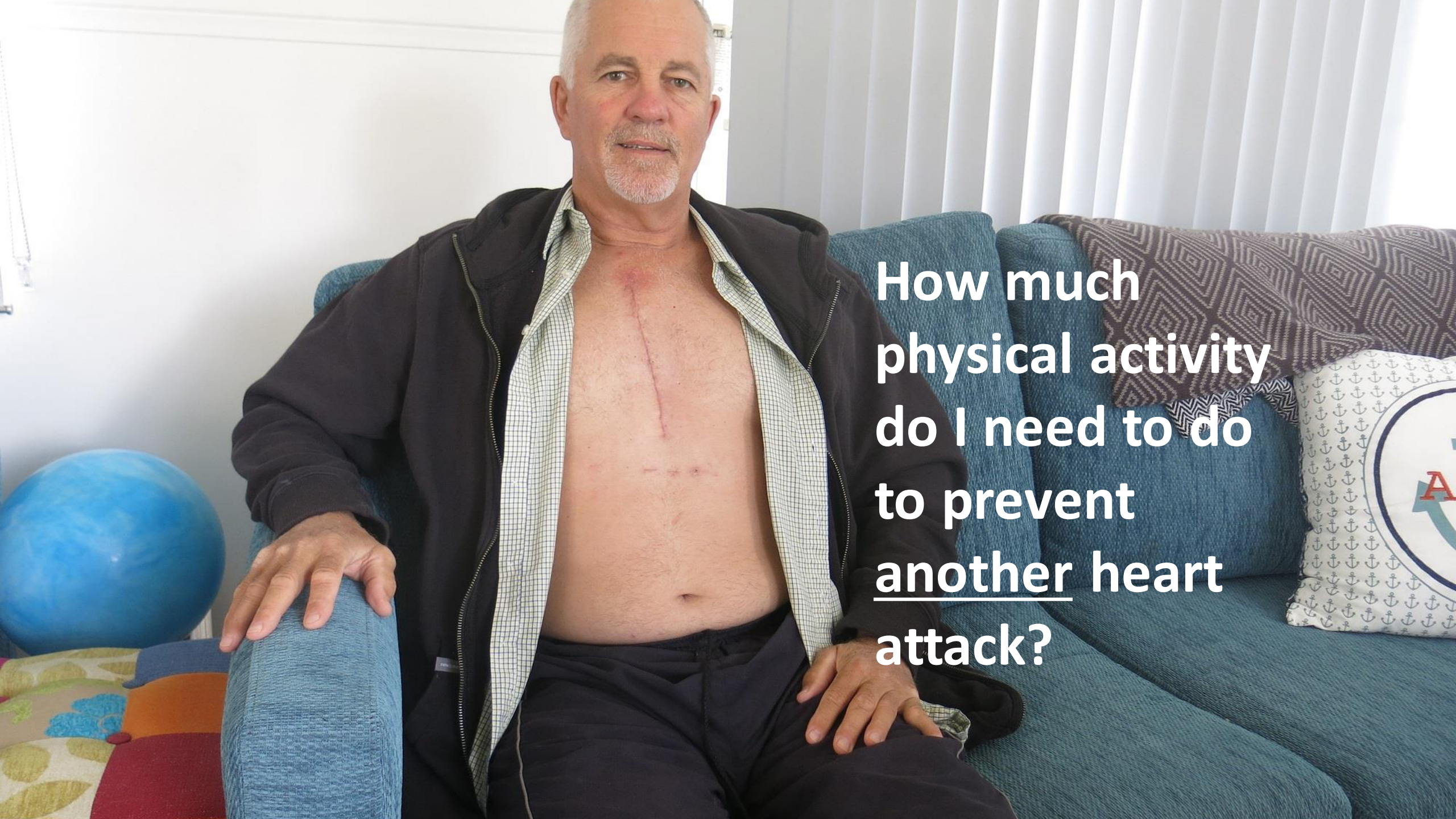
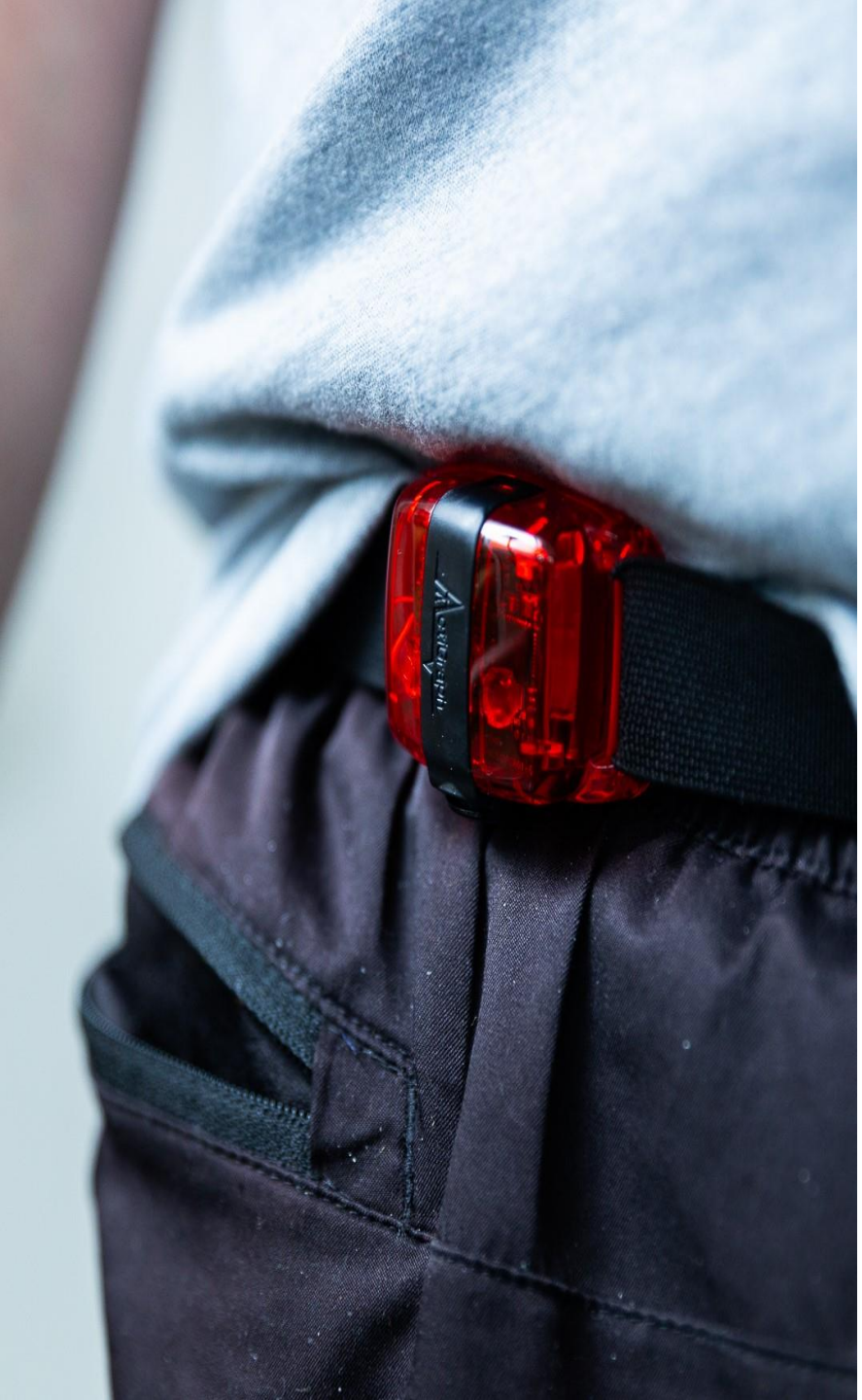

How much physical activity do I need to do to prevent another heart attack?



Aims

1. Explore the relationship of ActiGraph **accelerometer counts and step rate** with

   a) **absolute intensity** (metabolic equivalents, METs)

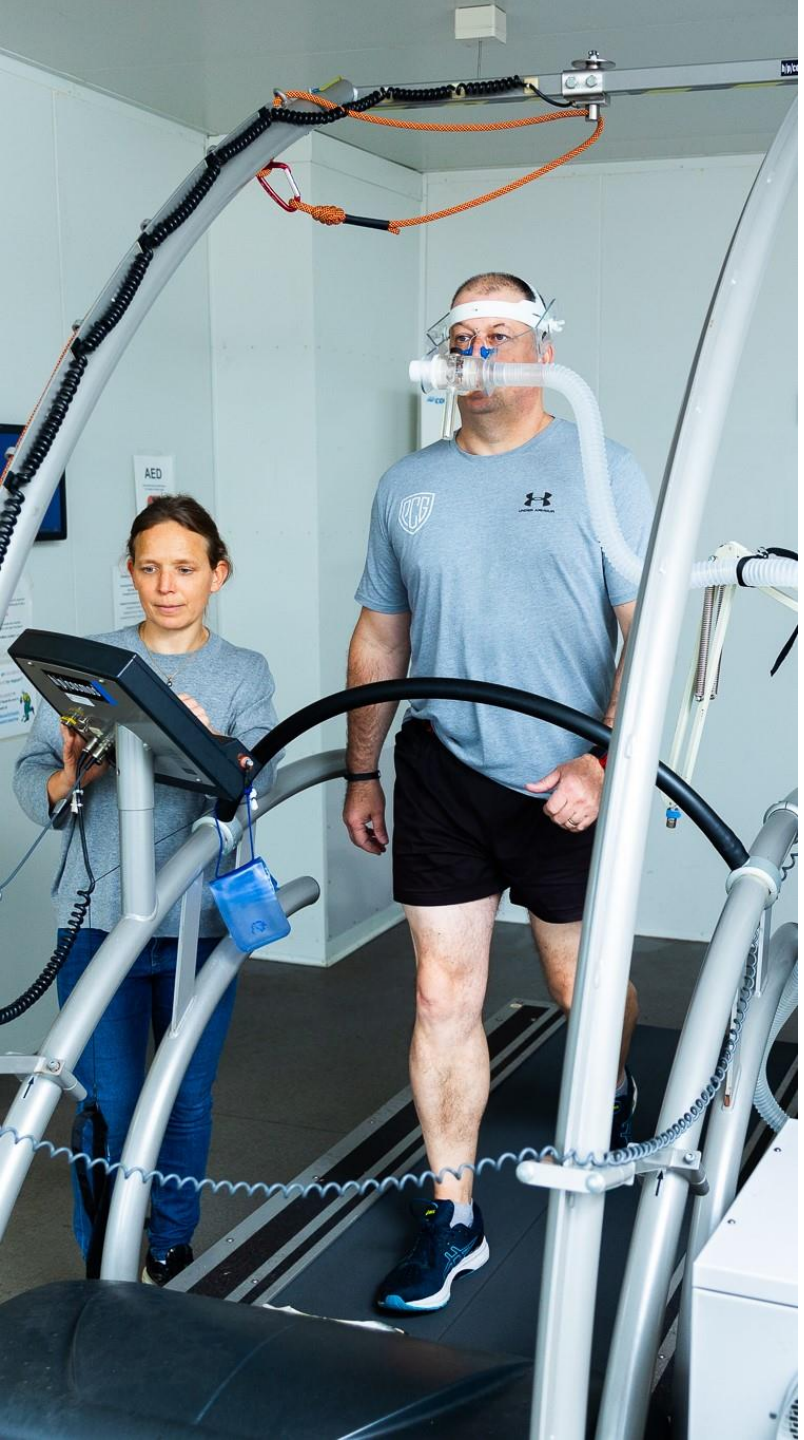
   b) **relative intensity** (percentage peak oxygen consumption, %VO_2peak)

   in people with CHD (n=164) using treadmill walking and ADLs

2. **Validate** newly developed cut-points in a **sub-sample** of participants, as well as with **international** cardiac rehabilitation accelerometer data (n>500)

3. **Compare** the **newly developed** and **commonly used** cut-points to determine if there are significant and noteworthy (≥10%) differences in moderate-to-vigorous intensity physical activity

4. **Develop and validate step count algorithms** for detecting steps in the **heart failure** population (sub-study, n=20)

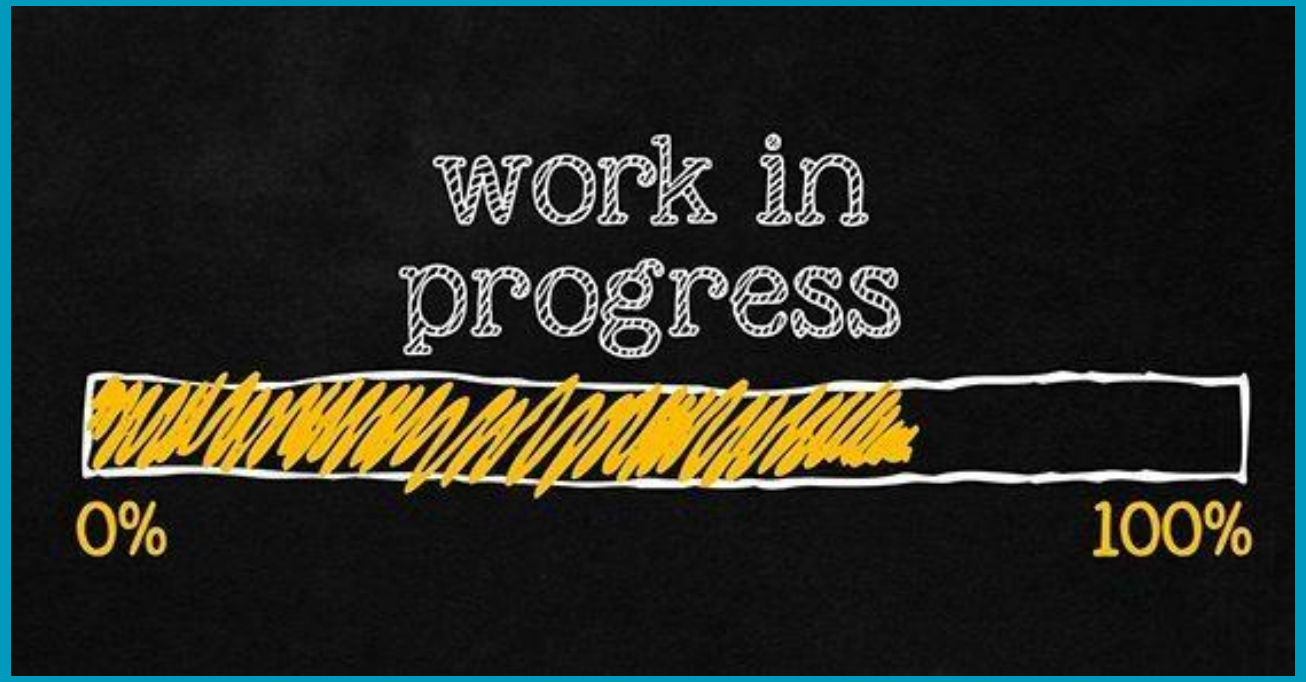


Methods

- Accelerometry (waist & wrist)
- Step counts (video & manual)
- Oxygen consumption
  - Resting metabolic rate
  - Peak treadmill test
  - ADLs (watch TV, standing stretching, floor sweeping, stepping in place)
- Free overground walking (heart failure)

Data Analysis:

- Linear regression (repeated measures)
- Bland-Altman analysis (cut-points & step count algorithm)
- Paired Wilcoxon signed rank tests (Absolute vs Relative vs Sasaki VM cut-points)


work in
progress
0%
100%

Results

n=31: 84% male
Mean age 67 ± 10 years
81% in a relationship
45% tertiary educated

64% Percutaneous Coronary Intervention (PCI)
26% Connery Artery Bypass Graft (CABG)
10% Coronary Heart Disease (CHD) with conservative management
7% CHD + heart failure
3.4 (1.6-8.6) years since last cardiac event

BMI 28.1 ± 4.5 kg/m^2
BP 127/81 mmHg
77% BP medication, 97% cholesterol medication
13% Type II diabetes

240 (180-341) min/wk moderate-to-vigorous physical activity
Resting Metabolic Rate 2.9 (0.5) ml/kg/min
VO_2peak 24.6 (9.5) ml/kg/min

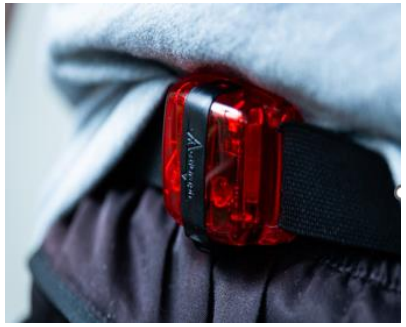
Results

Dependent variable[a]	B1	B2	Independent variable
%VO_2peak	30.1	0.006	Y-axis
%VO_2peak	28	0.006	VM
%VO_2peak	52.1	0.064	steps
METs	-0.814	0.001	Y-axis
METs	0.649	0.001	VM
METs	4.4	0.003	steps

[a]Adjusted for age, gender, BMI

Example - moderate intensity (46% VO_2peak; 3 METS) VM counts per minute

- Relative (%VO_2peak): 3,000
- Absolute (METs): 2,351
- Sasaki (METs): 2,690



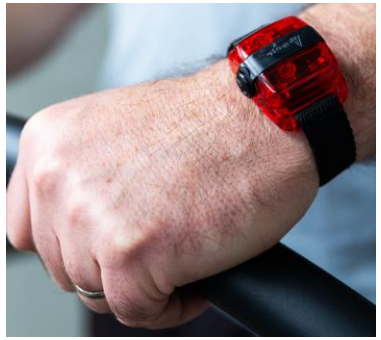
Results

Dependent variable[a]	B1	B2	Independent variable
%VO_2peak	36.4	0.001	Y-axis
%VO_2peak	36.1	0.002	VM
%VO_2peak	43.6	0.12	steps
METs	2.7	0	Y-axis
METs	2.7	0	VM
METs	4.3	0.004	steps

[a]Adjusted for age, gender, BMI

Example - moderate intensity (46% VO_2peak; 3 METS) VM counts per minute

- Relative (%VO_2peak): 4,950
- Absolute (METs): Error
- Sasaki (METs): 2,690



Without accurate measurement of physical activity:

- **clinicians** are unable to monitor physical activity adherence, nor the effectiveness of physical activity interventions
- **researchers** are unable to determine the relationship between physical activity and health outcomes

→ guide **disease-specific physical activity guidelines for people with coronary heart disease**

ActiGraph™

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