PHYSICAL ACTIVITY
HOW DO ACCELEROMETERS WORK?
ACCELEROMETER METHODS

RESULTING MEASUREMENTS
The LFE and Wrist Correction have a Variable Impact across Algorithms

The LFE Increases Step Estimates

Algorithm
- MVM3
- MVM2
- MVM1
- MK5
- MK4
- MK3
- MK2
- MK1
- MM2
- MM1

Percent Change
-100
-50
0
50
100

Average Daily Steps

Y-Crossing Method

LFE, Wrist Correction
LFE
Wrist Correction

+LFE, -Wrist Correction
- LFE, -Wrist Correction
Outcome Domain

Filtered/Correction

Combined Effect
Wrist Correction
Algorithm
LFE

Energy Expenditure
Steps
PA Intensity
Self-Report

= No effect
= Larger or smaller decrease
= Larger or smaller increase
= Larger or smaller variable effect

* Indicates exceptions
Figure 1. Average daily A) EE, time spent in B) sedentary, C) vigorous and D) moderate-to-vigorous PA categories, and E) steps as measured with/without the wrist correction and with/without the LFE. All pairwise comparisons are statistically significant (p<0.05) save those denoted (±).
Analysis Methods Produce Large Differences in Lifestyle Physical Activity Estimates

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INTRODUCTION

What?
- Physical activity (PA) can be objectively measured using accelerometers.
- Multiple algorithms and corrective filters (e.g., the Low Frequency Extension (LFE) and wrist correction) translate raw accelerations to useful PA outputs.
- Accurate PA estimates are important given increasing healthcare, tactical performance, research and recreational applications.
- The influence of multiple factors has not been well characterized.
- ME AND YOU!

Why?
- Past studies indicate output discrepancies between select methods and filters.
- Healthcare providers, researchers.

Who?
- Athletes, military

RESULTS

See QR code for more details

Question:
How are objective, wrist-worn estimates of lifestyle physical activity impacted by multiple analysis methods?

METHODS
See QR code for more details

CONCLUSIONS
See QR code for more details

1. Large differences between outputs exist using different accelerometer scoring methods which—though previously validated—are not interchangeable.
2. Researchers should thoroughly report accelerometer analysis methods across multiple factors to optimize cross-study comparisons and minimize scoring bias.
3. This variability complicates comparisons to normative guidelines; objective measures of physical activity may not be as accurate as commonly presumed.

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