Can smartphones predict mortality risk?

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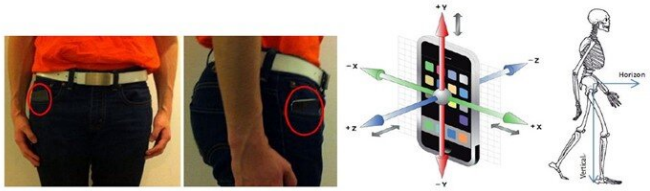

Measuring health with carried smartphone, from characteristic motion of human body computed from phone sensor. Credit: Qian Cheng (CC-BY 4.0, https://creativecommons.org/licenses/by/4.0/)

Passive smartphone monitoring of people's walking activity can be used to construct population-level models of health and mortality risk, according to a new study publishing October 20 in the open access journal *PLOS Digital Health* by Bruce Schatz of University of Illinois at Urbana-Champaign, U.S., and colleagues.

Previous studies have used measures of physical fitness, including walk tests and self-reported walk pace, to predict individual mortality risk. These metrics focus on quality rather than quantity of movement; measuring an individual's gait speed has become a standard practice for certain clinical settings, for example. The rise of passive smartphone activity monitoring opens the possibility for population-level analyses using similar metrics.

In the new study, researchers studied 100,000 participants in the U.K. Biobank national cohort who wore activity monitors with motion sensors for 1 week. While the wrist sensor is worn differently than how smartphone sensors are carried, their motion sensors can both be used to extract information on walking intensity from short bursts of walking—a daily living version of a walk test.

The team was able to successfully validate predictive models of mortality risk using only 6 minutes per day of steady walking collected by the sensor, combined with traditional demographic characteristics. The equivalent of gait speed calculated from this passively collected data was a predictor of 5-year mortality independent of age and sex (pooled C-index 0.72). The predictive models used only walking intensity to simulate smartphone monitors.

"Our results show passive measures with motion sensors can achieve similar accuracy to active measures of gait speed and walk pace," the authors say. "Our scalable methods offer a feasible pathway towards national screening for health risk."

Schatz adds, "I have spent a decade using cheap phones for clinical models of health status. These have now been tested on the largest national cohort to predict life expectancy at population scale."

More information: Population analysis of mortality risk: Predictive models from passive monitors using motion sensors for 100,000 UK Biobank participants, *PLOS Digital Health* (2022). DOI: 10.1371/journal.pdig.0000045

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