Using wearable activity trackers to distinguish COVID-19 from flu

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By analyzing Fitbit data and self-reported symptoms, researchers from Evidation Health and collaborators analyzed trends in heart rate, step count, and symptom duration between patients with flu and those with COVID-19. While both showed similar-looking spikes in resting heart rate and decreases in average step count, COVID-19 symptoms lasted longer and peaked later. Contrasting and comparing flu and COVID-19 is important for COVID-19 screening, as current practices often only check for more general symptoms like fever. The study was conducted using Evidation's app and network, Achievement—a connected cohort comprised of over 4 million individuals nationwide. The results appear December 12 in the journal *Patterns*.

"It's surprising to see that many screening tests at building entrances are all temperature-based, since a lot of people don't develop a fever right away and there are so many things that cause fever other than COVID-19," says senior author Luca Foschini, co-founder of Evidation Health, based in the United States. "A huge spike in resting heart rate is a more sensitive indicator of COVID. And for people with activity trackers, you could ask them permission to share that information for screening purposes, just like taking a temperature reading."

The findings confirmed that certain other symptoms are characteristic of COVID but not flu, like shortness of breath and coughing. They also examined the impact of each illness on decreasing daily step count, finding that the impacts lasted much longer for COVID than for flu.

"We used step count to measure change in mobility, because you don't move as much when you're sick," says Foschini, "Compared to their baseline, the number of steps didn't go back to normal for people with COVID, even after three or four weeks."

This result, as well as reports of long-term fatigue, also hinted at the existence of chronic COVID cases, which had not yet been studied closely at the beginning of the pandemic when this data was gathered.

"What was most interesting and surprising to us was looking at the progression of symptoms over time, particularly fatigue," says Foschini. "We didn't know about long-haulers back then, but now we know that Long COVID exists and that the hallmark is persistent fatigue."

While data from wearables such as Fitbit can reveal a lot about these respiratory illnesses, the researchers maintain that it should be used as a general screening method, not a complete diagnostic tool.

"There's potential to use wearable sensors and smartphones as high frequency/low-sensitive tests to shorten the time of detection and awareness of a possible ongoing infection.," says Foschini. "It's not a magic bullet, but if you can isolate yourself one or two days earlier than current standard testing procedures allow , that's the most important thing

because infectivity is highest around when symptoms first appear in symptomatic cases."

The researchers however warn that to develop these solutions, it is important to consider flu and other Influenza-like illness as a potential source of false positives. "Whoever designs these systems of detection needs to be wary of other conditions and focus not just on distinguishing COVID from healthy, but distinguishing COVID from anything else going on in the world, including flu," says Foschini. "Only 1 in 5 American have a wearable, and that 20% is not equally distributed. We must focus research toward solutions that can benefit everyone equally."

More information: Allison Shapiro et al, Characterizing COVID-19 and Influenza Illnesses in the Real World via Person-Generated Health Data, *Patterns* (2020). DOI: 10.1016/j.patter.2020.100188

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