Fitness tracker data can enhance biomedical research and personalized health

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Fitness trackers can be used to predict various markers of risk for cardiovascular diseases such as obesity, high blood pressure and high blood sugar. Credit: Filip Mroz on Unsplash

Wearable sensors are not just useful for personal fitness tracking, but can also be used to gain new insights in several fields of biomedical research. In a research article publishing February 27 in the open access journal PLOS Biology, Weng Khong Lim and colleagues from the SingHealth Duke-NUS Institute of Precision Medicine, Singapore, and the National Heart Centre Singapore show that wearables are not only able to identify groups of volunteers with similar patterns of daily activity, but can also predict various markers of risk for cardiovascular diseases such as obesity, high blood pressure and high blood sugar.

The increasing availability and take-up of low-cost consumer-grade wearables has given rise to considerable interest in investigating how these devices can enhance and augment biomedical research and healthcare. Answering this question, however, has proved challenging, largely due to a lack of comprehensive datasets that integrate wearable data with other data types.

The researchers profiled 233 normal volunteers using multiple approaches, including wearable-based activity and heartrate monitoring, lifestyle questionnaires, cardiac imaging, serum lipidomics (profiling of fats in the blood), and a battery of other clinical tests. Notably, the team found that wearable activity data could be used to identify active individuals at increased risk of having enlarged hearts, a condition also known as "Athlete's heart", commonly thought only to affect competitive athletes. The team also showed that activity data from wearables can

predict circulating levels of a class of lipids known as ceramides, which have been associated with obesity, diabetes and heart disease.

"An enlarged left ventricle could be caused by heart disease or harmless adaptation to sustained exercise, and these two conditions share overlapping features. Activity data from wearables may help us identify individuals more likely to have this condition due to exercise, and are therefore at risk of misdiagnosis in the clinic," said senior author Professor Stuart Cook

"Compared to their more sedentary counterparts, active volunteers had lower levels of circulating ceramides. In the past, researchers studying the interaction between lifestyle and lipid metabolism would have relied on questionnaires or expensive experimental studies." said Associate Professor Khung Keong Yeo, another study senior author.

This study is the result of collaborative research, and as senior author Professor Patrick Tan notes, "discoveries such as this are only possible through multi-disciplinary partnerships between clinicians, clinical researchers and health data scientists, and access to high quality multi-modality data from well-phenotyped cohorts."

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