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Wearable technology in health care: Getting better all the time

Smartwatches and wearable medical devices help people monitor their health 24/7. Their impact could increase if doctors trust their utility and people feel their data is secure

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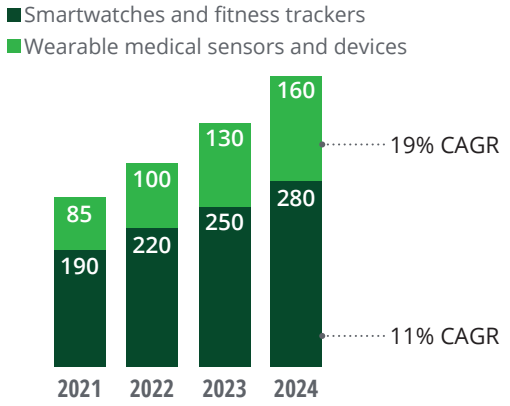
ADVANCES IN SENSORS and artificial intelligence (AI) are helping millions detect and manage chronic health conditions and avoid serious illness on devices small enough to be worn on a wrist or penny-sized patch. Deloitte Global predicts that 320 million consumer health and wellness wearable devices will ship worldwide in 2022 (figure 1). By 2024, that figure will likely reach nearly 440 million units as new offerings hit the market and more health care providers become comfortable with using them. These numbers include both smartwatches, which are marketed to and purchased by consumers, and medical-grade wearables—typically called "smart patches"—which are often prescribed by health care professionals but are increasingly becoming available off the shelf.

FIGURE 1

The global health wearables market is already big and expanding fast

Number of units shipped globally (millions), 2021–2024



Source: Deloitte analysis of industry market sizing data.

Smartwatches and smart patches are getting smarter about health—and more widely used

While health care companies produce a range of devices that help patients monitor health markers intermittently—including blood pressure cuffs and ECG monitors—our analysis focuses on smartwatches and smart patches, which are seeing rapid consumer adoption.

Deloitte's 2021 Connectivity and Mobile Trends survey found that 39% of respondents owned a smartwatch.[1] Their most common uses have historically been to help people get fit, lose weight, and beat their personal best in their next race (figure 2). But increasingly, people are using smartwatches to monitor their health, not just their running pace, as new hardware, software, and apps have turned them into personalized health clinics. Heart rate monitors are now standard on most smartwatches, and some have FDA approval for detecting abnormalities such as atrial fibrillation, a major cause of stroke. As these devices get more sophisticated, the percentage of consumers using them to manage chronic conditions and detect symptoms of serious diseases will likely increase.

The pandemic highlighted the value of smartwatches for monitoring health. As COVID-19 spread, smartwatches that measure blood oxygen saturation (SpO_2) became widely available, alerting people with low SpO_2—a life-threatening symptom that is hard for people to detect unassisted.[2] More than 10% of US consumers who own smartwatches are now using them to detect COVID-19 symptoms. The pandemic may even have encouraged smartwatch sales: Fifteen percent of US consumers who own a smartwatch purchased it after the onset of COVID-19.[3]

Smartwatch innovation is progressing rapidly, driven by advances in sensors, semiconductors, and AI. For example, some smartwatches now feature optical sensors that continuously measure variations in blood volume and composition using a technology called photoplethysmography (PPG). Algorithms produced and continually improved via machine learning use data from these sensors to provide insights into users' activity levels, stress, heart pattern anomalies, and more.[4]

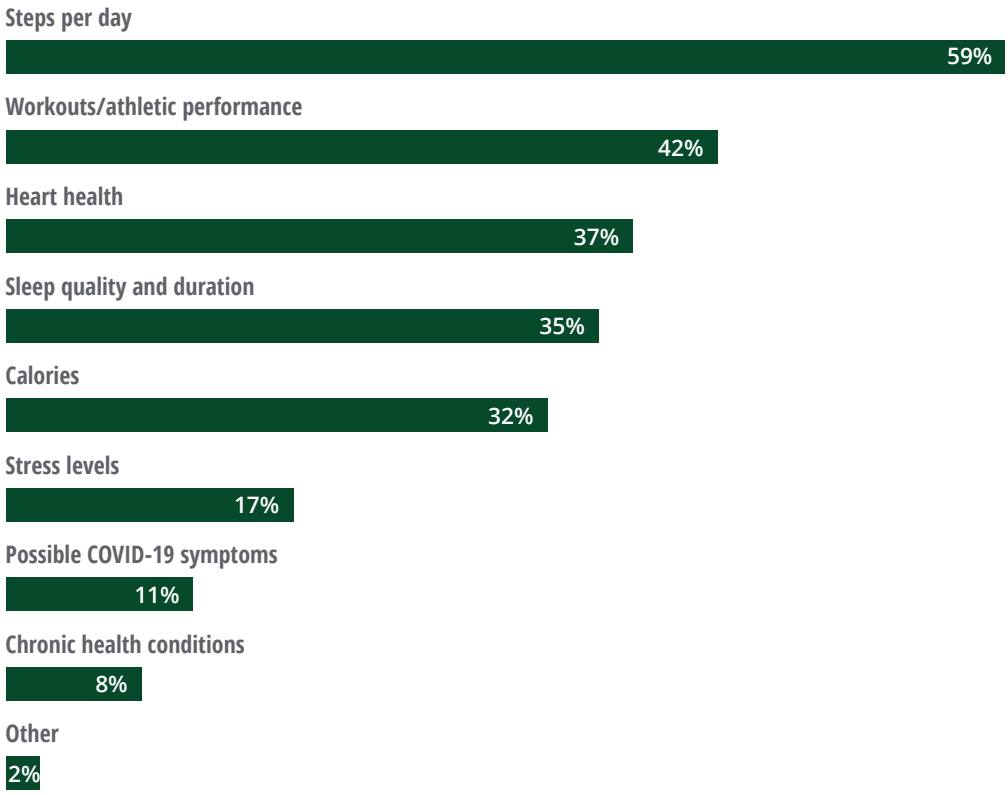
As another example, companies are getting closer to enabling smartwatches to monitor blood pressure, using PPG and other technologies such as Raman spectroscopy, and infrared spectrophotometers.[5] Measuring blood pressure with a cuff is inconvenient and uncomfortable. Most importantly, periodic blood pressure measurements can miss signs of chronic hypertension, which can cause heart disease, heart attacks, and strokes. Accurate, continuous, unobtrusive blood pressure measurement could expand the smartwatch market: 1.3 billion adults worldwide suffer from hypertension.

Of course, there are limits to what current smartwatch sensor technology can do without attaching to—or getting under—a person's skin. That's where smart patches come in.

FIGURE 2

People use smartwatches to monitor heart health, sleep quality, and chronic conditions

Which of the following do you use your smartwatch to measure? Select all that apply.



Notes: Respondents to this question both owned a fitness tracker or smartwatch personally *and* used these devices. The data reflects responses from US consumers to a survey conducted in June 2021.

Source: Deloitte 2021 Connectivity and Mobile Trends Survey.

Smart patches, developed mostly by medtech companies, are typically small and unobtrusive, affixing directly to a person's skin. Some "minimally invasive" smart patches use microscopic needles that painlessly penetrate the skin to act as biosensors and sometimes to deliver medications.

Unlike smartwatches, which provide a broad range of health data and insights, smart patches are typically designed for a single indication such as diabetes management, patient monitoring, and drug delivery. Smart patches also employ a broader range of technologies. For example, smart patches that measure heart rate variability often use electrocardiogram technology that tracks the heart's electrical activity directly and more accurately than smartwatches.[6]

Smartwatches and smartphones still play an important role. Data from smart patches is being integrated with smartwatch and smartphone apps, sending data to these devices for display and analysis. With the right technology, including interoperability capabilities, doctors could see wearable health data on a patient's health record, gaining access to more comprehensive information to inform diagnosis and care.

THE BOTTOM LINE

Companies of all kinds, from giants to upstarts, are developing new functionalities to meet growing demand for health care wearables in 2022 and beyond. But more widespread acceptance by consumers and health care providers may come slowly, as wearables are relatively new. Headwinds include:

Doctor skepticism. Health care providers who use wearable technology to monitor chronic health conditions and to track vitals, sleep quality, and medications are finding the technology helpful.[7] However, they also report three main drawbacks:

1. **Data utility.** Deloitte's latest survey of US physicians shows that if technology doesn't increase efficiency and isn't incorporated into their workflow, clinicians aren't interested in using it.[8] Only 10% of responding physicians said that they had integrated data from patient wearables into their electronic health records (EHRs). This is slowly changing: Major EHR vendors are now enabling consumers to share data from their health apps with their doctors.[9] For now, however, most doctors either don't have access to data from patient wearables or need to enter it manually.[10]

2. **Data accuracy.** Some doctors don't trust data from consumer wearables. For instance, those who have already been diagnosed with atrial fibrillation can be alerted of episodes by various smartwatches, an application cleared by the FDA and other regulators globally.[11] But this smartwatch capability is less useful as a mass screening tool, generating many false positive results and sending healthy patients for unnecessary further tests, putting both the patient and the health care system under stress.[12]

3. **User error—and anxiety.** When wearables aren't worn correctly, they can be inaccurate. Some who use wearables to monitor their health also fall prey to anxiety and obsessive behavior. Paying too much attention to pulse rate and heart rhythm, for example, can cause physical reactions that mimic symptoms of serious conditions such as atrial fibrillation, leading to unnecessary admissions and patient distress.[13]

Data privacy concerns. Since the COVID-19 pandemic began, consumers have become more willing to share health data.[14] Data privacy remains a hurdle, however. Forty percent of smartwatch or fitness tracker owners are concerned about the privacy of data these devices collect, according to Deloitte's 2021 Connectivity and Mobile Trends survey. That figure rises to 60% among smartwatch owners who use them exclusively to track their health.

Cybersecurity threats. Like all connected devices, health and wellness wearables are vulnerable to cybersecurity threats. The consequences for users could be severe. Fake smartwatch alerts could prompt patients to overdose on medications. [15] Medical devices such as drug infusion pumps and pacemakers have been hacked, too.[16] As more smart patches administer medications, millions more people could be vulnerable to threats. Finally, hackers have recently stolen millions of health and fitness records originally collected on smartwatches.[17] With health and wellness wearables, it's critical that companies integrate cybersecurity into their product development, software, supply chains, and cloud computing.[18]

Increased regulation. Currently, tech companies can decide not to classify smartwatches as health care devices to avoid regulations such as the United States' Health Insurance Portability and Accountability Act, which requires people's explicit knowledge and consent to share sensitive health information. But as these devices and their outputs are integrated into EHRs, and their alerts direct more patients into the health care system, regulators could require companies to adhere to more restrictive rules.[19]

These headwinds are not insurmountable barriers, and likely won't stop consumer health and wellness wearables from growing in the next two years. Devices will get more accurate, and the apps will get smarter, enabling people to monitor a broader range of health indicators and conditions. It also seems likely that regulators will approve wearable devices for additional indications. For these reasons, big tech, medtech, and a legion of startups believe that the health wearables market is a strong one, and their investment and innovation could make it a self-fulfilling prophecy.

Endnotes

1. Thirty-eight percent of consumers own a smartwatch or a fitness tracker. As noted above, we combine these categories in this study.
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