

# ‘Wearables 3.0’:

## Exploring new tools for health and wellness



**The next generation of wearable technologies will offer real-time feedback and opportunities to promote health and wellness**

by Colin Milner

The first pedometer, according to some accounts, was a windup watch created in 1780 to measure steps and distance.<sup>1</sup> Swiss watchmaker Abraham-Louis Perrelet based the device on his 1777 mechanism to power a self-winding (or automatic) watch with the wearer’s movements while walking.<sup>1</sup> Leap forward to 2018. We now have a vast array of tools to help us measure our steps—from digital apps to smartwatches to, yes, pedometers. Those pedometers are what Stanford University’s Ken Smith, MS, calls “wearables 1.0,” the start of wearable tools.

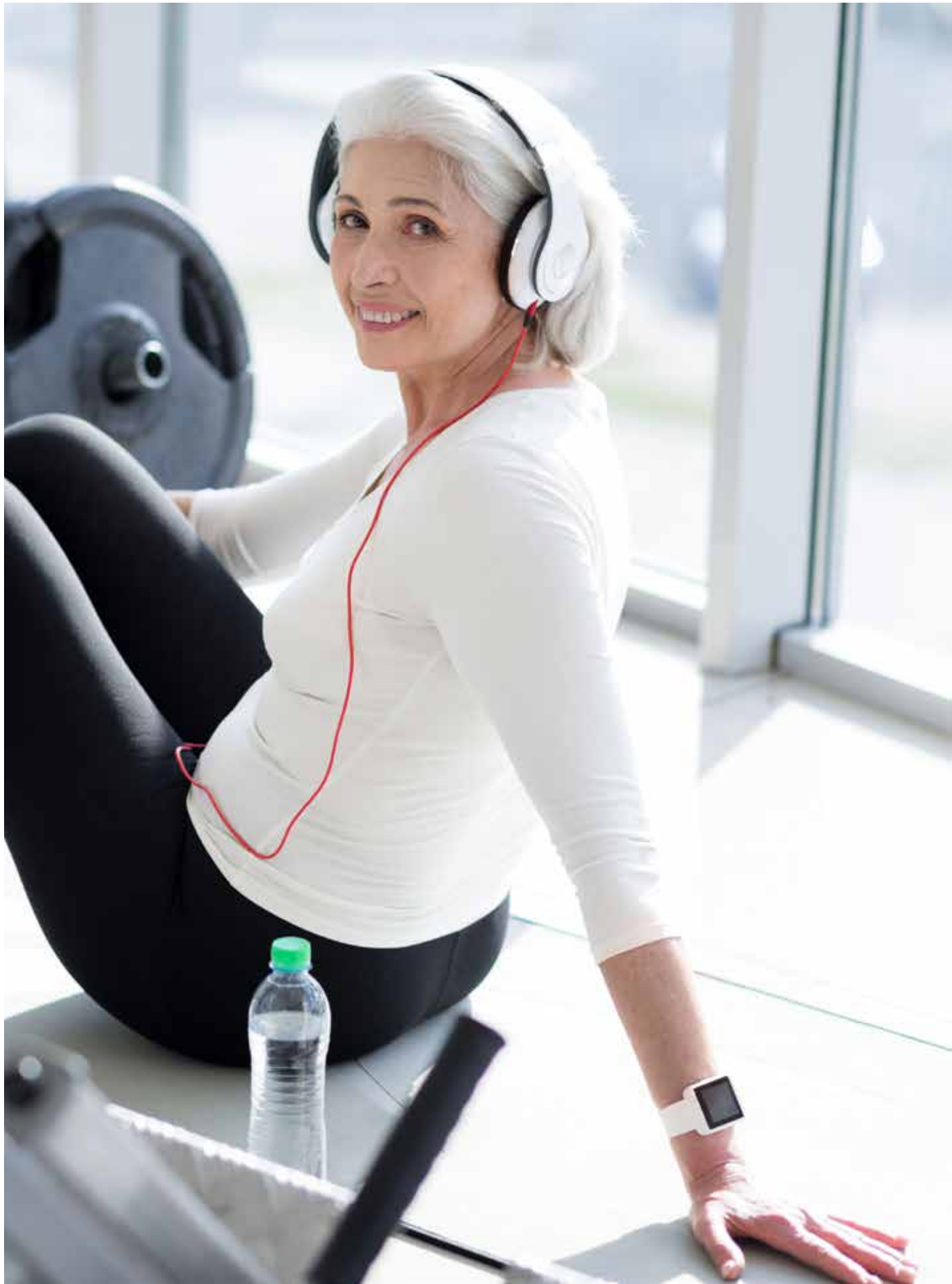
From this beginning, we have moved on to “wearables 2.0,” says Smith. We use the new form of wearable tools to track activities and behaviors such as nutrition and exercise (think FitBit and Apple Logic). Yet, it is the emergence of what he calls “wearables 3.0” that is set

to change how we manage our health and well-being, Smith believes. Why? Because these tools are a new class of wearables that measure what the body is doing in real time. Examples include blood glucose, blood pressure, heart rate variability, functional nutrition, sleep quality, and inflammation measures.

Smith is a senior research scholar, Design Challenge leader and Mobility Division director at the Stanford Center on Longevity. Founded in 2007 by Laura Carsensten, PhD, and Thomas Rando, MD, PhD,<sup>2</sup> the Center exists “to accelerate and implement scientific discoveries, technological advances, behavioral practices and social norms so that century long lives are healthy and rewarding.”<sup>3</sup> [Ed. See “Resources” on page 65 for website information.]

At the Center, Smith’s areas of focus include aging in place, design, health and wellness, and technology. He brings to his role more than 20 years of management and engineering experience, including positions in the computing, aerospace and solar energy industries.<sup>4</sup>

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Stanford Center on Longevity's Ken Smith believes the future 'will look more human than technology looks today.' Image courtesy of Stanford Center on Longevity

In addition, he served as an advisor to nonprofit collaborative AgeTech West.

To explore “wearables 3.0” for the *Journal on Active Aging*'s special technology issue, I recently asked Smith to discuss these new technologies and why he is so excited by them.

**CM:** *Welcome, Ken. To start our interview, what are your views on older adults and their adoption of technology? Is the stereotype true?*

**KS:** The stereotype for how older individuals interact with technology is incomplete. In that view, older individuals will not adopt technology because they are either too set in their ways or because they are not digital natives, and so forth. I see this differently. Older individuals have a higher bar for the use of a technology; they ask, “What does this do for me?” If individuals see the value that a technology could add to their lives, they will adopt it and figure the technology out. Technology is a tool, rather than an end in itself, for older users.

**CM:** *As we look toward the future, what do you find so interesting about “wearables*

*3.0,” as you call the new generation of these products?*

**KS:** The new iterations of wearables are interesting for two reasons. Firstly, given the heterogeneity of the aging population, it is very difficult to say how much a 70-year-old should exercise, for example. Some of these wearables will allow us to personalize things based on the *actual physical capability* of the individual instead of providing blanket solutions.

Secondly, behavioral change solutions are hard to do, particularly when we ask somebody to do something now that we hope will have a long-term effect—for example, will you avoid that donut now in order to have a lower likelihood of developing type 2 diabetes in 20 years time? This connects with what psychologists call *temporal discounting*.<sup>5</sup> It means that we tend to discount things that offer future rewards relative to things that reward us now.

With some of these new wearables, people will start to sense what's going on in the body in an almost real-time manner; they may also gain more immedi-

ate feedback—for example, if I ate that donut, I would see my glucose measurement jump and my blood pressure rise, and possibly also some inflammatory response. The wearables pull the action (eating the donut) and the impact (rise in glucose) tighter together, which helps individuals better realize what they're doing to themselves.

**CM:** *How will these tools change interactions with doctors and with the medical system in general?*

**KS:** I hope wearables put more focus on the things we can do to optimize wellness rather than to wait until something goes wrong and then try to fix it, which is the focus of the current medical system. These technologies will definitely push us in that direction.

Wearables could augment such things as doctor visits. Let me give you an example. Today, if a person talks to a doctor about something and the physician chooses to do a measurement in the lab, it will capture only one snapshot in time of that individual's health. However, it is possible to see different things with these new tools that measure people on a longer-term basis, so a doctor might respond very differently because there is more patient data. That's a good thing. Individuals will also be able to take ownership of a lot of that data, enabling them to reach some of their own conclusions.

**CM:** *Will we see artificial intelligence [AI] become integrated with wearables to make health recommendations long before the stage where a person needs to visit a doctor?*

**KS:** We are already seeing AI take on lots of tasks that are repetitive in nature and often driven by data. Medical diagnosis is one of those things. So, AI may become as good as a doctor at determining illness—perhaps even better. There is a caveat: We have all these theories of

how various measurements relate to our health, and we make recommendations based on these theories, yet we don't always have large data sets that actually tell us that those theories are valid.

This is a cart and horse problem. Right now, there is a lot of credible discussion going on about some of these measurements, but it is not really validated. If we collect a lot of data, we can eventually start to make conclusions. But, we will not have that data until we have more measurements, and until we can use the measurements for something, people will not necessarily do them, and so on.

Still, I think AI will gradually become the front end for doctors. Physicians will likely have much better information then, so they can spend more targeted time on what needs attention.

Let me throw in another caveat: Data security is one of the top concerns for organizations and individuals. We need something to be developed that allows people to trust where their data goes and what's being done with it. The double-edged sword of any data collection is that data can be used for good, but it also can be used to exclude a person from insurance or to change what insurance will pay to cover. So there is a lot of work needed to create that trust and that place where data goes. A place where we can say, "If data is taken on me, I know where it goes and I have control over who sees it and who does something with it."

**CM:** *Are there any technologies you think are terrific products? And why?*

**KS:** There are products I find interesting, and then there are products I think have a business model I would put my money behind. That has been a sticking point for many of these technologies—is there a real business case for them?

One area I'm excited about is heart rate variability [HRV], which is the statistical variation in the distance between the peak measurement on an electrocardiogram, or EKG. A lot of science indicates that people with lower HRV are less healthy than people with higher HRV.<sup>6</sup> Technologies are being developed to measure this variability, which it turns out can also be a good thing for athletic training.<sup>6,7</sup> When individuals do a big workout one day, they'll find the next day that their HRV has actually dropped, and that's an indicator that it might be a good day for a rest or to do something a little different. Wearable technologies that measure HRV give real-time input on how best to train. There are several other things we can do with HRV as well, and so I am interested in companies developing technologies in this area.

Similarly, I think some of the technologies measuring sleep are exciting. I like the idea of being able to measure sleep, because then it is possible to say, "Well, I could put darker curtains up or maybe I should choose not to have a drink an hour before I go to bed." My interests tend to be around things where I can imagine myself making day-to-day changes as a result of the data.

**CM:** *Do you think that at some stage we're going to develop technology fatigue?*

**KS:** I do. We're seeing this fatigue already in social media. There are dehumanizing effects when technologies try to replace real human interaction or human relationships. I am a little skeptical about these technologies, because those real human interactions and contacts are inherent to who we are as people. I believe there will be a backlash if people find themselves isolated and dehumanized as a result.

The other aspect is cognitive overload. As more technologies enter our daily lives, they all compete for our atten-

tion, and for our cognitive capabilities, which are limited. Eventually, these technologies will have to be able to help us without always demanding more of our attention.

**CM:** *There is so much excitement around technologies targeting older adults that it has given rise to a technology gold rush. Yet, is it fair to say that we have seen relatively few success stories to date?*

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## Mark your calendar

To hear more from Ken Smith about wearables and other technologies, come and check out his presentations at the ICAA Executive Leadership Summit in Long Beach, California, this fall. The Summit will take place concurrently with the ICAA Conference and Trade Show 2018, to be held October 18–20 at the Hyatt Regency Long Beach and Long Beach Convention & Entertainment Center.

On Friday, October 19, Smith will copresent "Senior living and technology: New horizons for improved quality of life among residents" with Ginna Baik of CDW Healthcare (see the article on pages 56–59) and Brian Grandbouche of Kisco Senior Living. The session will take place 8:00 a.m.–9:30 a.m. Smith will then give a "power talk" called "Moving outside-in: How the next generation of wearable devices is a better fit for an aging population." This power talk will be one of three offered in the Summit's 11:00 a.m.–12:30 p.m. time slot. For more information about these sessions, visit <https://www.icaa.cc/conferenceandevents/overview.htm>.

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**KS:** I would say that, so far, the impact rate of all the activity going on around technology and aging has not been that high. There haven't been that many great success stories for a couple of reasons. One reason is we are trying to develop these technologies while we are figuring out what an "aging market" means. We know there is a large, growing demographic that has needs and desires and money, which people are seeing as a business opportunity—and that is a really good thing. Yet, we are still lumping this market together. There are different markets here. These markets are driven by the needs and desires of people, not by age, so not only do we see efforts to find technology solutions but also efforts to figure out how this market breaks out and where the business models are.

Secondarily, I hope that we are developing better funding models at the same time. The current model of venture capitalism does not necessarily mesh well with needs in the aging space because it tends to push for the development of digital apps that have a bigger payback

with lower capital costs. It is hard to develop the investment, payback and business models at the same time as the technology. I do see some potential in social-impact investing changing how we view some of this.

**CM:** *Business 101: Understand who your customer is. But one thing we have heard a lot is that the subscription model for these new technologies is not what the buyer seeks.*

**KS:** Many of these tech organizations build themselves around the subscription model because of investors. Their investors want to hear about sustainable cash flow even though it might not be compatible with this market.

**CM:** *Where do you see "smart" technologies heading?*

**KS:** We seem to be reaching the stage where people are saying, "I don't want more things pushed at me. I want to have my own 'real' relationships, not ones chosen by algorithms."

Some people make claims such as "the algorithm will know you better than you know yourself." I am not sure I buy that. People change; they have rich, complex things that they want in their lives. I think people will get sick of something telling them what they should see and what they should do by pushing a vision on them rather than letting them develop it themselves.

**CM:** *What advice would you give entrepreneurs who want to develop a technology product for the older market?*

**KS:** I would recommend that entrepreneurs go out and speak with a lot of people. Ask questions to validate assumptions before spending a lot of money and time building something that might only have a market of one. The second piece of advice is to keep an open mind, as many companies end up doing something different based on the feedback they get.

**CM:** *What about scalability?*

**KS:** It is a challenge. Many investors try to find that hundred or thousand times return in a short period, which really only ever happens with some sort of digital application because it is the only thing that scales that fast. The issue is that investors want returns to match this one model when they are in a completely different one.

**CM:** Professor Joe Coughlin, who directs the Massachusetts Institute of Technology AgeLab, calls “gerontopia” the future of aging.<sup>8</sup> How would you describe the ideal setting, especially taking into consideration a senior living community? What do you envision as the backbone of the community from a technological standpoint?

**KS:** My background in mechanical engineering comes into play here, because I think we are a long way from gerontopia visions. Why? Because it is hard to implement things that touch real people and exist in the real world.

We have seen this explosion in the digital world of applications, but things in the digital world are very clean and relatively easy to design for. Things in the real world are difficult and messy, so it will be a long, hard process to achieve some of these visions. That said, I really like them.

I am a fan of something that Peter Thiel, one of the founders of PayPal, has said about what he called the “definite” futures versus “indefinite” futures.<sup>9</sup> These specific visions of the future tend to lead to engineers trying to create them. America has a long history of doing this really well. The 1962 World’s Fair included a vision that General Motors put out about the interstate highway system and roads, which people responded to and eventually built. Another prime example is US President John F. Kennedy’s vision of reaching the moon in a decade.

We need gerontopia visions, and I like Joe Coughlin’s. It is a good thing to chal-

lenge other people to put these definite visions out there.

When I envision the future, I think that, first, it will look more human than technology looks today. We have these visions of the future that tend to have lots of robots and machines and the like, but my real hope, and my vision, is that when we get better at technologies, they will slide into the background and we will focus on the interaction between people. As people get older, it becomes more about what they choose, who they talk with, how and with whom they socialize and what their purpose is—and that is what we have to build around.

I hope technologies actually bring people together. That’s the piece I find missing in our more tech-oriented society. Maybe we’ll look back at this period and say, “We had this great technological buildout, but then we had to figure out how it actually worked with being a human.”

*Colin Milner is founder and CEO of the International Council on Active Aging®. A leading authority on the health and well-being of the older adult, Milner has been recognized by the World Economic Forum as one of “the most innovative and influential minds” in the world on aging-related topics. The award-winning writer has more than 300 articles to his credit; he has also shared his perspectives with media outlets such as CNN, BBC, Newsweek and The Wall Street Journal. Milner’s inspiring and insightful speeches have stimulated thousands of business and government leaders, industry professionals and older adults worldwide.*

## References

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## Resources

### Internet

**Stanford Center on Longevity**  
<http://longevity.stanford.edu>

### Print

Bowman, D. (2017, August 10). Q&A: Stanford Center on Longevity’s Ken Smith talks tech’s role in senior living. *HealthTech*. Available at <https://healthtechmagazine.net/article/2017/08/qa-stanford-center-longevity-ken-smith-talks-techs-role-senior-living>