

Health wearables: *Early days*

Health Research Institute

In summer 2014, PwC's Health Research Institute and Consumer Intelligence Series launched research to better understand consumers' attitudes and behaviors toward wearable technology amid rapid growth in the health industry.



**New Health
Economy**



Introduction

While the smartphone remains Americans' device of choice, the tech world is creating a future of wearable devices that promises to entertain consumers, save them money and help them live healthier lives. Technology companies' interests in health and wellness have sparked the creation of a myriad of wearable devices, from fitness bands that monitor activity and sleep patterns¹ to flexible patches that can detect body temperature, heart rate, hydration level and more.²

These devices produce data that, often enabled with analytics, can be used by consumers to manage their health and by healthcare organizations to improve care and potentially reduce costs through systems such as remote patient monitoring.

Data generated by personal devices can be used by insurers and employers to better manage health, wellness and

healthcare costs, and by pharmaceutical and life sciences companies to run more robust clinical trials and capture data to support outcomes-based reimbursement. Many consumers believe wearables can dramatically improve their health (see figure 1).

This potential is fueling venture capital investment in digital health and wearable tech. By mid-2014, digital health startups had raised \$2.3 billion, more than they raised in all of 2013.³ More than \$200 million went to digital medical devices such as wearables.⁴

Yet these are the early stages of the technology and product adoption lifecycle. Just one in five American adults owns a wearable, according to a national survey of 1,000 US consumers conducted by PwC in 2014. One in ten uses it every day. At the Rock Health Innovation Summit in August, Genentech CEO Ian Clark called health wearables "a bit trivial right now."⁵

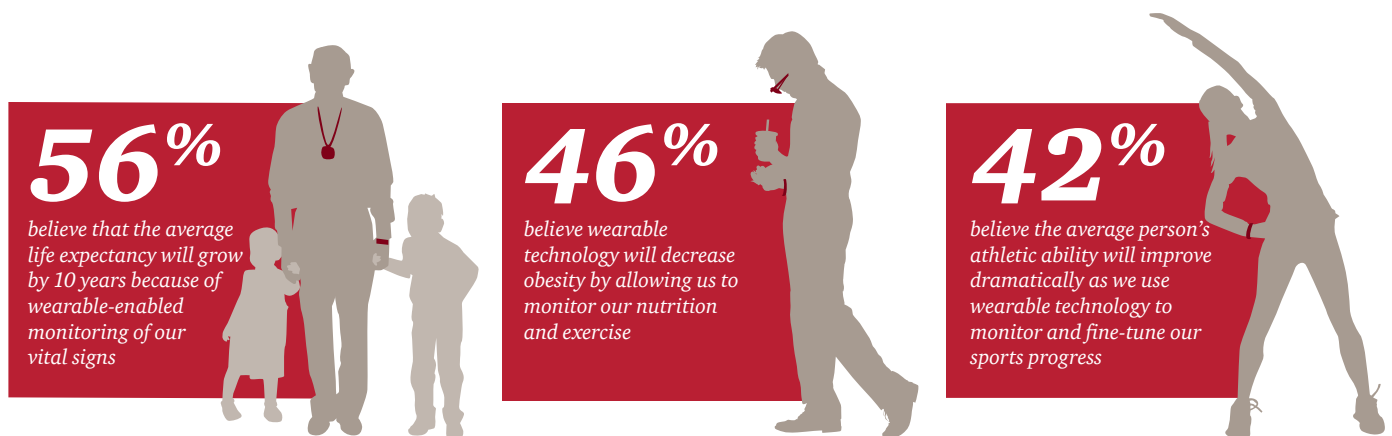
“

This is like the early days of the mobile phone, when the phones were bricks,” said Ivo Stivorc, vice president of research and development at Jawbone, during a PwC focus group held in New York City. “We are at the early stages.”

“I don’t doubt that the wearable piece is going to be a productive business model for people,” Clark told an audience packed with health wearables entrepreneurs. “I just don’t know whether it’s going to bend the curve in terms of health outcomes.”

Figure 1: High hopes for wearables

US consumers were asked how likely each of the following is to come about as a result of widespread use of wearable technology.



Source: HRI/CIS Wearables consumer survey 2014

As wearable technology becomes cheaper and more sophisticated, and data quality improves, these devices and their associated apps will become a part of consumers' lives and the health ecosystem.

The devices will need to be seamlessly interoperable, more self-sufficient and free from additional steps such as syncing and powering. Companies will need to interpret and use data streaming from these devices. The software side of wearables will be emphasized as much as the hardware. Consumers will place greater value on companies that can help them use data to improve their health.

In the summer of 2014, PwC's Health Research Institute (HRI) and Consumer Intelligence Series sought to better understand American consumers' attitudes toward wearables through

a consumer survey, focus groups with technology thought leaders and interviews with executives from inside and outside of the health industry.

Key findings:

- ◆ Consumers have not embraced health wearable technology in large numbers, but they are interested. Technology companies hoping to exploit this nascent interest will have to create affordable products offering greater value both for users and their healthcare partners (see figure 2).
- ◆ Most consumers do not want to pay much for their wearable devices. They would rather be paid to use them, and companies—especially insurers—offering incentives for use may gain traction. HRI's survey found that 68% of consumers would wear employer-provided wearables streaming anonymous data to a database in exchange for breaks on insurance premiums.
- ◆ Simple social strategies might not work well for health wearables. Few consumers are interested in sharing health data with friends and family. Social media strategies for health wearables must be engaging, interoperable and intelligent if they are to succeed.
- ◆ Consumers remain concerned about privacy. But they trust clinicians more with their data than any other entity. To retain that trust, companies will need to be transparent about what is being done with the data.

Figure 2: Wearables are not mainstream – yet
Just one in five US consumers say they own a wearable device.

21%
of US
consumers
currently
own a
wearable
technology
product

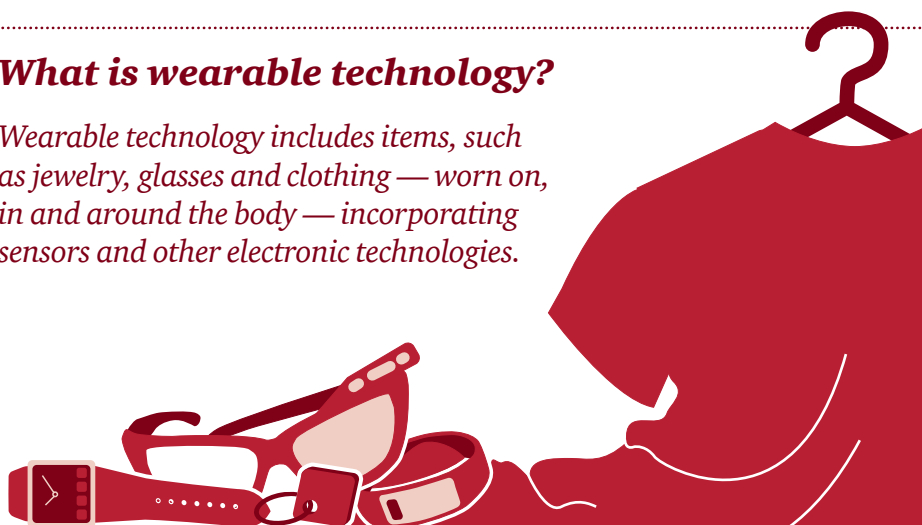


- **2%**
no longer
use it
- **2%**
wear it a few
times a month
- **7%**
wear it a few
times a week
- **10%**
wear it
everyday

Source: HRI/CIS Wearables consumer survey 2014

What is wearable technology?

Wearable technology includes items, such as jewelry, glasses and clothing — worn on, in and around the body — incorporating sensors and other electronic technologies.



Glimpses into the health wearable future are visible. More than one million customers transmit data from fitness trackers to Walgreen Co., in exchange for points that can be used like cash in the company's stores and through its website for many products.⁶

Physicians at Dignity Health use Augmedix's Google Glass program to enter patient information into electronic medical records. Ochsner Health System's "O Bar" sells a curated selection of wearables and apps that can be "prescribed" by physicians. At this year's US Open, Ralph Lauren launched its wearable, intelligent fabric that is

able to stream real-time biometric data, from heart rate to calories burned, to a smartphone or tablet.⁷

And in September, Apple unveiled a smartwatch that can monitor heart rate and activity, one more step toward creating a one-stop-shop for health information for consumers and their healthcare providers.⁸ Apple CEO Tim Cook called the Apple Watch "the most personal device we've ever created."⁹

A wearable world is emerging, slowly, helping build a New Health Economy (please see HRI's essay on the **New Health Economy**).

About this research

PwC's HRI, Consumer Intelligence Series and the Entertainment, Media, and Communications (EMC), Technology, Digital, Analytics and Retail & Consumer practices collaborated to better understand consumer attitudes toward wearable technology. (Please also see PwC's [industry report on wearables](#)).

Channels and demographics

- A summer 2014 survey of 1,000 US consumers of Census National Representation (across age, income, region and gender)
- Focus groups with experts from companies and organizations such as Jawbone and Astro Studios in San Francisco and New York City
- Social media listening
- Interviews with industry professionals

Health wearables: Key findings and recommendations

Consumers have not embraced health wearable tech, but they are interested.

Wearable tech is not a part of most Americans' lives. Just one in five own a piece, such as a fitness band, according to HRI's survey. Less than one-third said they were familiar with many top consumer brands.

Still, HRI's survey results suggest stirrings of consumer interest, especially in fitness bands and especially in receiving health information from wearables (see figure 3). Nearly one in two consumers said they were "very" or "somewhat" likely to buy one in the next year. Consumers indicated less interest in buying smart watches (35%), smart (sensor-equipped) clothing (20%), smart glasses (19%) or people-tracking devices (13%) (see figure 4 on page 5).¹⁰

Wearable tech owners tended to be younger males (18 to 34 years old). The next wave of fitness band buyers were more likely to be older females (35 to 54 years old). Survey respondents weighing the purchase of a fitness band said that their biggest hesitations were price, privacy and concern that they won't actually use it.

This last worry is based in reality, as studies of activity tracker users have found that many stop using them within months of purchase.¹¹ Just one in ten consumers told HRI they use a wearable every day. Once the novelty wears off, many consumers abandon their devices, many of which require regular syncing, powering up and other steps needed to keep it running.

"If you are going to build a great solution, you have to meet the consumer where they are," said Lee Shapiro, managing partner at venture capital firm, 7wire Ventures.

Recommendations:

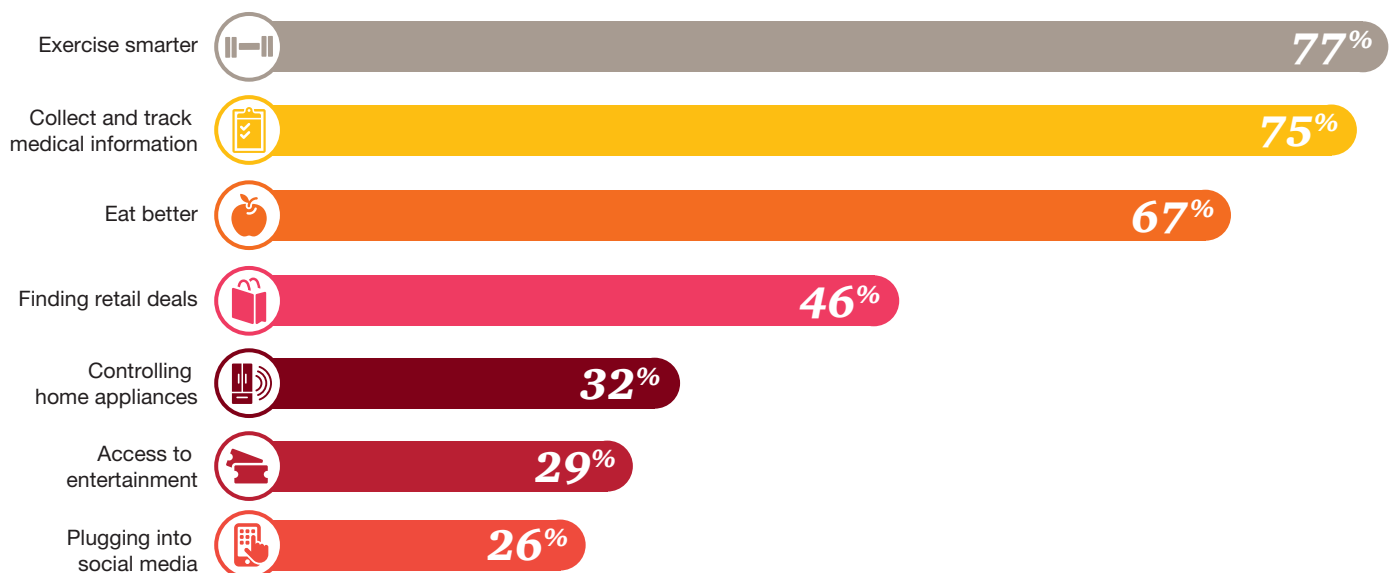
- ◆ Keeping the consumer engaged beyond the first few weeks of use is an important part of any wearable strategy. Companies should consider novelty, rewards, incentives and truly actionable insights as part of the user experience.

Dean Hovey, CEO of Digifit, an online ecosystem for health trackers, said the challenge is understanding each user and hooking the people who could benefit most. Right now, many wearable owners already are fit and not the people who could benefit most from monitoring, reminders, encouragement and other technological inducements to maintain health. "Our job," Hovey said, "is to engage the unengaged."

Wearables, apps and their associated platforms must be flexible enough to engage users as varied as an elderly grandmother and her teen-

Figure 3: Health tops list of information US consumers want from wearables

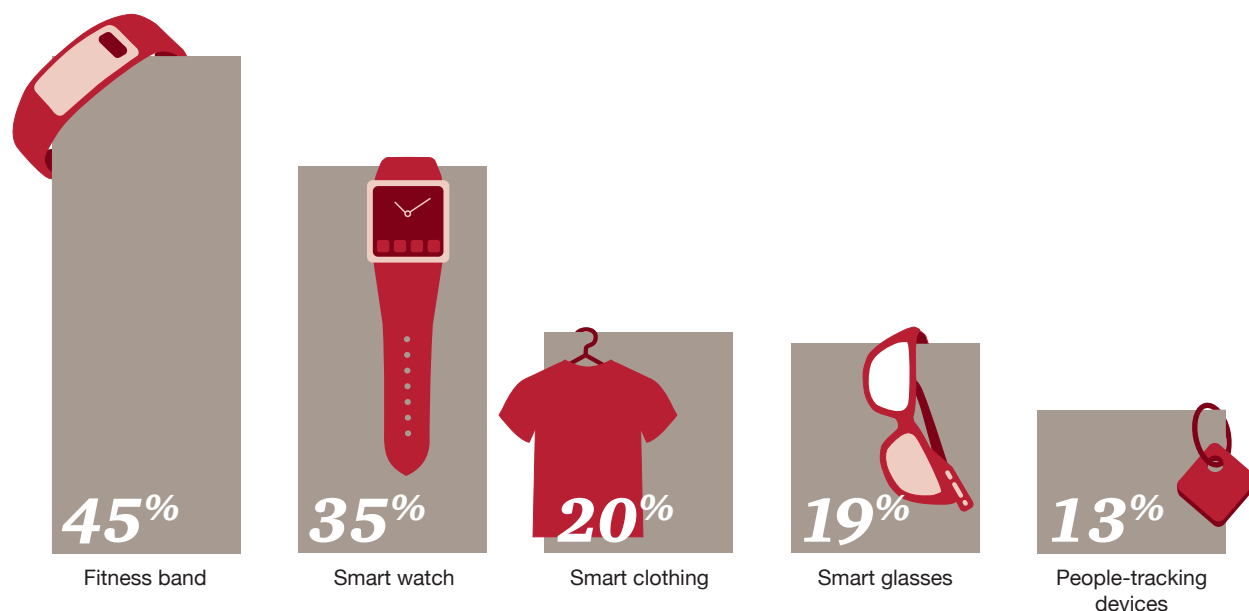
Consumers were asked what information they want to receive from wearable technology.



Source: HRI/CIS Wearables consumer survey 2014

Figure 4: Fitness bands remain US consumers' top wearable pick

Consumers were asked how likely they are to purchase the following wearable technology devices in the next 12 months.*



Source: HRI/CIS Wearables consumer survey 2014

* Note: This survey was conducted before the announcement of the Apple Watch.

aged grandson. Hovey said his company has identified 40 human motivators—from jealousy to the joy of checking items off a list—and aims to determine which matter most to each user.

“If you can play multiple motivators like a chord, you will have more success,” he said. Keeping users engaged over time increases the odds those users will achieve their health goals, from losing weight to controlling blood pressure to finishing a half-marathon.

Companies should look to the world of gaming, music and entertainment for engagement inspiration. For example, the free EpicMix app allows skiers to track vertical feet skied, earn “pins” based on where they skied, virtually race against Olympic champion Lindsey Vonn and share their accomplishments via social media.

EpicMix’s program uses radio-frequency identification chips embedded in lift tickets at participating mountains. During the 2013–2014 ski season, EpicMix skiers logged billions of vertical feet and shared millions of photos.¹²

◆ Companies must develop sophisticated algorithms that can turn data into insights for consumers or health organizations. These insights will need to be seamlessly woven into consumers’ lives, clinical workstreams and the daily operations of health companies.

Like consumers, insurance companies and healthcare systems want more evidence of improved outcomes and savings of time or money. “We are keeping a close eye on it and we are looking to partner more proactively,” said Dr. Tom X. Lee, founder and CEO of One Medical Group, which operates primary care clinics in six

US markets and has used technology such as email as a way to strengthen the connection between clinicians and patients.

One Medical launched a pilot program this year involving blood pressure monitoring wearables, but the company’s approach is deliberate, Lee said. “For us, being a startup, there is a true opportunity cost” to entering into wearables programs.

Some systems have begun to pair wearables with high-quality care. Northwestern Memorial Healthcare in Chicago is exploring using smartphones for remote monitoring

Wearable technology and apps should be:

- ***Intelligent*** so they provide useful insights
- ***Interoperable*** with other devices and apps
- ***Integrated*** into the consumer’s life and into the life cycle of care
- ***Social*** so insights can be shared based on user preference
- ***Engaging*** so they inspire consumers to use them.
- ***Outcomes-based*** for the consumer, healthcare practitioner or other healthcare partner

of more complex cases, said Dr. Lyle Berkowitz, associate chief medical officer of innovation. Northwestern is planning to test apps both created inhouse and sold by other companies, he said. These apps could be prescribed by physicians to monitor and educate these higher-risk patients.

In Pontiac, Michigan, St. Joseph Mercy Oakland hospital has been running a pilot program on Visensia, a patient vital-sign monitoring system that analyzes data streams to produce care recommendations for clinicians. In the first four years mortality rates fell 35%, according to Crain's Detroit Business. Length of patient stay fell half a day.¹³

Allan Cockell, president of Comvest Limited, investor in Visensia's developer, OBS Medical, said too much capital has been flowing to the hardware side of wearables, and not to the analysis. "There is a natural human bias to favor something physical – a product one can touch and feel," Cockell said. "But algorithms can produce benefits equivalent to devices."

◆ Partnerships between healthcare organizations and wearable companies early on can help sharpen business models, build credibility and ensure data match system needs.

"The first thing we need is credibility that we can make a difference. That is sorely lacking across the entire space," said Nirav Sheth, director of medical market development at MC10, a company making flexible wearable sensors for consumer, digital health, medical, industrial and defense uses.

The company recently announced a partnership with a pharmaceutical company that plans to use MC10's stretchable electronic sensing wearables to gain insights into patients with severe neurological disorders and their responses to therapy. "We found increasing numbers of pharmaceutical companies are interested in proving outcomes," Sheth said.

Companies such as Apple that create a health ecosystem – software, services and hardware such as the

new Apple Watch – that integrates with the traditional healthcare system will generate more value for consumers. Apple's support of clinical trials underscores the importance of creating intuitive products and services that engage consumers, expand access, improve adherence and lower cost.¹⁵

Most consumers do not want to pay much for their devices.

Most survey respondents—especially those considering purchasing a piece of wearable tech in the next year—repeatedly indicated price was a top concern, though a small number are willing to pay a premium, as evidenced by recent partnerships between tech companies and designer brands.¹⁶ Given a list of potential hesitations to purchasing wearable devices, from fitness bands to smart clothing, more than half of consumers chose price. Concern that the device won't be used and privacy came in second and third.

Figure 5: Most US consumers are interested in lower-priced or free wearables

Consumers were asked how likely they would be to purchase a fitness band at each price point.



Source: HRI/CIS Wearables consumer survey 2014

Few consumers indicated interest in purchasing a fitness band, smart watch or smart glasses at \$300 or \$500, according to the HRI survey. At \$100, between 29% and 42% of consumers said they were “very” or “somewhat” willing to buy each device.

But make the wearable free or paid for by an insurer or employer, and about two-thirds of consumers said they would wear a smart watch or fitness band. Most dramatically, 68% of consumers said they would opt in if their employers gave them wearables that send anonymous data to a pool in exchange for discounts on their insurance premiums (see figure 5).

Recommendations:

- ◆ Companies—especially insurers and health systems—exploring health and wellness programs involving wearables can expect buy-in if incentives are offered.

Insurers, with their wealth of claims data, could use data from wearables to produce valuable insights for members and health systems looking

“

The first day health insurance carriers offer a rebate for wearing a Fitbit, everybody who takes care of themselves will say, yes, I want it!”

—Roman Weishäupl, co-founder of online messenger service Twyxt, tech focus group participant

to manage populations in a risk-bearing environment, said Irem Mertol, Bay Area scout for accelerator StartUp Health. “Insurers are incentivized to figure out what to do with this,” Mertol said.

Employers could enjoy success too. Time Warner Inc., uses wearables in its Fit Nation program, which offers employees subsidized fitness trackers, offers training programs for runs and triathlons and walking challenges. Time Warner Vice President, Benefits Kathleen Harris said the program has at least 5,000 users with a wearable device subsidized by the company.

- ◆ Consumers may need a human touch to help them choose a device and its associated apps. An “apps formulary” of apps vetted by medical teams (and available in a virtual apps pharmacy) could help consumers wade through the thousands of health apps and devices.¹⁷

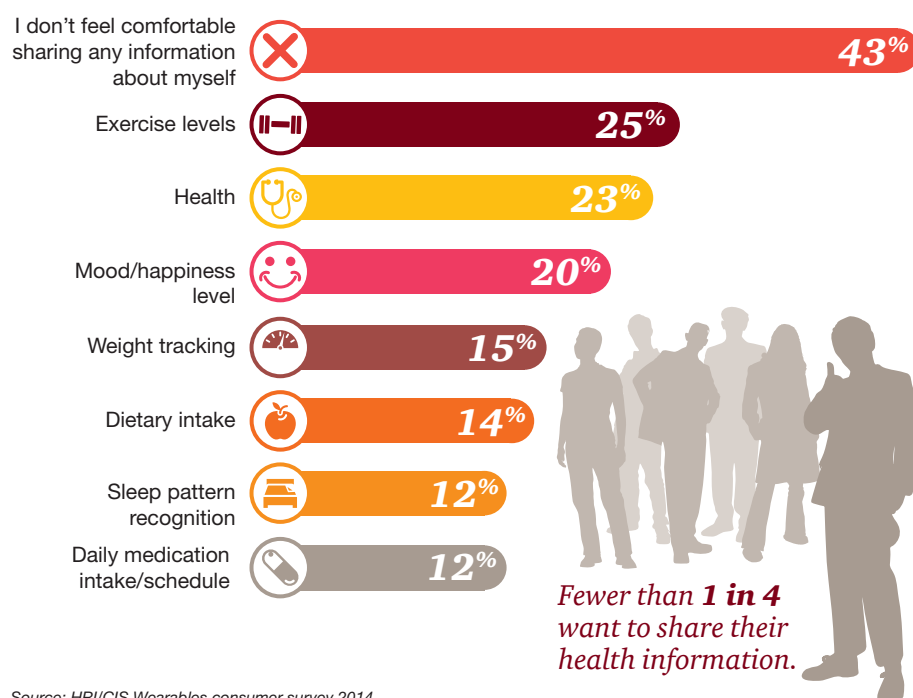
Earlier this year, Ochsner Health System in New Orleans opened its own Apple-inspired “O Bar” to help patients choose from a curated selection of wearables and apps, said Dr. Richard Milani, chief clinical transformation officer at Ochsner.

Ochsner physicians also can “prescribe” apps and wearables using mock prescription pads. So far, patients have downloaded 2,000 apps, mostly focused on fitness, diet and women’s health. Several hundred devices have been purchased, mainly blood pressure cuffs, glucose monitors and fitness trackers. “The public has spoken, so what can we do to help?” Milani said. “We can help them not have to do it on their own.”

Simple social strategies may not work well for health wearables.

Consumers do not want to share wearable-device-generated health information with friends and family, even though they trust their physician most with their wearable health data. Just one in four said they want to share exercise information or health information in general with friends and family through, say, social media.

Figure 6: Many US consumers don’t want to share health data with friends and family
Consumers were asked what kinds of information they would share with friends and family.



Source: HRI/CIS Wearables consumer survey 2014

Fewer said they want to share their weight (15%), sleep schedule (12%), medication intake (12%) or diet (14%) (see figure 6 on previous page).

Even fewer want to know any of this information about their friends and family.

This reluctance runs counter to industry sentiment that social media is an important path to consumer engagement. Let users post their daily runs and they'll quickly begin egging their friends to run too, or so the thinking goes. And for some users, this is a powerful motivator. But getting consumers to share more sensitive information, such as their weight or eating habits, will require more targeted approaches.

Recommendations:

- ◆ Some consumers are willing to share personal health details online with the right audience, especially people living with serious illnesses such as cancer or Parkinson's disease.

Virtual communities such as PatientsLikeMe and hundreds of disease-specific message boards, forums and more are flooded with patients seeking to connect with others undergoing similar experiences. At PatientsLikeMe, more than 250,000 members have posted millions of symptom and treatment reports about more than 2,000 conditions.¹⁸

HRI's research suggests simple social media strategies dependent upon users sharing health information with friends and family may fail. But more targeted ones may gain traction if they segment users and identify peer groups they may wish to join. Overweight users may not be eager to share daily weigh-ins with friends and family, but might

log into a forum packed with users just like them. Giving consumers control over what they share and with whom, with a lot of choices, will build engagement.

Consumers remain concerned about privacy.

Asked who they trust to hold their wearable data, consumers ranked their primary care doctor most highly (54%). In the survey, hospitals, pharmacies and dentists also ranked highly (see figure 7).

Irem Mertol of StartUp Health said that data privacy is a "big thing" in health wearables because companies don't want the liability of sharing health information without consumer consent. "The consumer owns this data," she said. "They get to choose who they want to share the data with."

Recommendations:

- ◆ Companies should ensure privacy policies are crystal clear. Physicians already have the trust of consumers, and healthcare organizations have expertise in protecting personal health information. Those standards should be applied to health wearables data, especially as they become integrated into electronic medical records.

As platforms multiply and integrate with each other, privacy concerns become more complex. Consumers may wind up choosing several devices and many apps, said Brett Lovelady, founder of Astro Studios, which worked on the Nike+ FuelBand. "You choose whatever delivery system and collector you want."

But as consumers direct data to more apps, they will have to understand the privacy implications.

Companies such as insurers or health systems curating apps will need to evaluate the privacy policies before recommending them.

Ian Shakil, CEO of Augmedix, which allows physicians to use Google Glasses to enter patient data into electronic medical records, said he would like to record audio and visual data from each exam and share them with the patient.

"The general trend is toward transparency," he said. "But, there are a variety of challenges here, many of which are legal. Any time you give information to a patient, you have to be very careful. Are you handing them the right information and only the right information?"

Figure 7: US consumers trust their primary care physicians most with their wearable health data.



Source: CIS Wearables consumer survey 2014

Closing thoughts

By the end of 2014, wearable companies will have shipped 7.6 million units within the US, an almost 200% increase over the year before.¹⁹ The US wearable market continues to grow. Still, relatively few consumers own a wearable. Most are not familiar with top consumer brands. The most popular potential medical device used by the average consumer today—a phone—isn't worn but instead resides close by in a pocket or purse.

Yet consumers are interested in wearables, and believe they hold great promise to better their health.

Employers and health company executives, from hospitals to insurers to drugmakers, also expect wearables to become valuable factories of insights about their patients, employees and members.

But before this promise can be realized, wearables will need to provide more than just data. They will need to provide useful insights and be interoperable, integrated, engaging, social and outcomes-driven. Analysis that provides insights or changes behavior will be key to winning over consumers and their physicians

and other healthcare providers. Investments in the software side of this emerging industry will be as important as hardware. Organizations will need to develop curation services to direct consumers to high-quality devices and apps.

As consumers begin introducing these devices into their daily lives over the next five to ten years, they should begin to gain better control over their own health and related healthcare costs, changes that will ripple into the \$2.8 trillion US healthcare system and help shape the New Health Economy.

Endnotes

1. <http://www.misfitwearables.com/>
2. <http://www.mc10inc.com/>
3. Rock Health, "2014 Midyear Digital Health Funding Update: Obliterating Records," <http://rockhealth.com/2014/06/2014-midyear-digital-health-funding-update>, June 30, 2014.
4. Rock Health, "2014 Midyear Digital Health Funding Update: Obliterating Records," <http://rockhealth.com/2014/06/2014-midyear-digital-health-funding-update>, June 30, 2014.
5. Lee, Stephanie M., "Genentech CEO wonders if wearables craze is 'a bit trivial,'" San Francisco Chronicle, <http://blog.sfgate.com/techchron/2014/08/21/genentech-ceo-wonders-if-wearables-craze-is-a-bit-trivial>, Aug. 21, 2014.
6. Interview with Dr. Harry Leider, Chief Medical Officer, Walgreen Co.
7. www.ralphlauren.com/shop/index.jsp?categoryId=46285296&AB=en_US_POLOSUPERSLIDEFA14_HP_Polo_HERO_S1_ExploreNow
8. <http://www.apple.com/live/2014-sept-event/>
9. <http://www.apple.com/live/2014-sept-event/>
10. Note: This consumer survey was conducted before the announcement of the Apple Watch.
11. Ledger, Dan and McCaffrey, Daniel. "Inside Wearables," Endeavour Partners, <http://endeavourpartners.net/assets/Endeavour-Partners-Wearables-White-Paper-20141.pdf>, Jan. 2014.
12. <http://www.epicmix.com/en.aspx?cmpid=PPC300129849&gclid=CPvuyb2nrMACFSdp7AodaU0AoQ>
13. Greene, Jay. "St. Joseph Mercy's new Pontiac tower puts hospitality into the hospital," Crain's Detroit Business, <http://www.craigslistdetroit.com/article/20140727/NEWS/307279966/st-joseph-mercys-new-pontiac-tower-puts-hospitality-into-the-hospital>, July 27, 2014.
14. <http://www.mc10inc.com/mc10-inc-ucb-partner-for-innovative-solutions-for-patients-with-neurological-disorders/>
15. Farr, Christina. "Exclusive: Two Apple medical trials shed light on how HealthKit will work," Reuters, <http://www.reuters.com/article/2014/09/15/us-apple-health-idUSKBN0HA0Y720140915>, Sept. 15, 2014.
16. <http://www.toryburch.com/accessories/tory-burch-for-fitbit/>
17. Falk, William et al. "Making Care Mobile: Introducing the apps pharmacy," PwC, 2014.
18. <http://www.patientslikeme.com/>
19. IDC, "U.S. Wearable Computing Device 2014–2018: Forecast and Analysis" March 2014.

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