

# Wearable Computing and the Hype of Tracking Personal Activity

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## ABSTRACT

Wearable computing is a branch of embodied technology concerned with devices and gadgets that are worn in or on the human body. Wearable computing is a fast growing hot trend in the device industry today. This paper will look at wearable consumer devices that track and quantify personal activity with the goal of motivating consumers to exercise more, be more active and lead an overall healthier lifestyle. This paper explores some of the features that activity tracker devices adopt to motivate users to exercise, the potential impact of the devices on health insurance costs, what medical professionals think of it and how the activity trackers industry is shaping. The potential problems of using activity trackers such as privacy concerns and exercise addiction are explored as well.

## Keywords

Wearable computing, quantified self, personal activity trackers, exercise addiction.

## 1. INTRODUCTION

Wearable computing comes in many shapes and forms. This paper focuses on personal activity trackers, the consumer wearable devices that monitor personal activity like sleep, heart rate, movement and eating using built-in sensors. Trackers quantify these activities and present the user with data aimed at encouraging users to increase their exercising and activity. There is a common agreement about the magnitude of benefits of exercise and leading an overall active lifestyle. It improves the health, mood, boosts energy, and many other benefits [20].



Figure 1: From top to bottom, Nike+ FuelBand SE, Jawbone Up, Withings Plus

In 2013 the proliferation of tracking devices reached a mainstream level [15]. The market is already packed with a plethora of tracker

devices such as the Nike+ FuelBand SE, Jawbone UP and Withings Pulse (see figure 1). Tech giants are racing to occupy the top spot, while marketers are advertising and driving more consumers to purchase the devices. Medical professionals and health insurance companies are also beginning to pay attention to trackers data. The next period will be important in determining the long-term success of tracker devices.

This paper investigates and reflects on the potential benefits and drawbacks or problems resulting from the continuing rise in activity trackers usage. It is important to draw attention and raise awareness of the different stakeholders involved in the use and development of trackers, especially product designers and developers, to the potential issues, implications and unexpected results of using activity trackers. This would essentially inspire and guide the designers to design devices that offer great features and minimal problems.

The paper first outlines the expected growth of device usage and interest from users worldwide, then explores features trackers adopt to encourage and motivate users to exercise. Then it describes how medical professionals are increasingly interested in tracker data and their potential impact on health insurance rates. Finally, potential problems such as privacy concerns and fears of exercise addiction are discussed.

## 2. THE RISE OF ACTIVITY TRACKERS

It is common to question if tracking devices really encourage and motivate users to exercise. The popularity of the devices is growing steadily. The current device sales trends suggest that consumers increasingly believe in the benefit of tracking personal activity and the value of the so-called quantified self. A study conducted by IMS Research shows that “the coming five years will see a growth in the number of shipped activity trackers from 43.8 million to at least 56.2 million by 2017” [18].

An international collaboration of users and makers of self-tracking gadgets called “Quantified Self” [14] has been established, highlighting the growing interest from users worldwide in tracker usage. The community members hold conferences and meetings in more than 30 cities around the world. The community offers online forums, services and a guide to self-tracking devices [14].

### 2.1 Motivating more exercise and more activity

Activity trackers monitor, collect and quantify a user’s activity to offer it in a form that is meaningful to the user, represented in colorful, easy to read graphs and charts, trends, customizable dashboards and tools. This information is updated real-time and is easily accessible through an online account as well as smartphone and tablet apps, making them available virtually anywhere and anytime. “Knowing how close you are to reaching your goals

gives you added incentive to achieve them, sleep better, and aim higher” [6]. Jessica Matthews, an exercise physiologist with the American Council on Exercise says, “Many people are motivated by seeing their data” [9].

Tracking devices also apply the concept of “gamification” to motivate users. “Gamification is an informal umbrella term for the use of video game elements in non-gaming systems to improve user experience and user engagement” [4]. Nike+ Fuelband SE built on this concept by creating Nike Fuel, which is “a single, universal way to measure all kinds of activities” [10] (basically a fancy name for a points-collecting system). It is used to visualize the user’s performance and progress, and to offer achievements and rewards. Acquiring more Fuel results in unlocking trophies and other surprises (see figure 2).

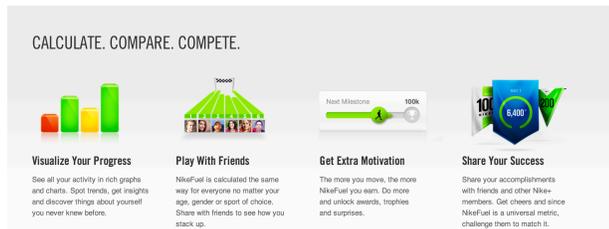


Figure 2: Features of NikeFuel

Social integration is also available. Users can share the results and achievements with friends and family, and compete with them. The Nike+ online community also allows users to discover new routes, running paths and get coaching tips and tricks.

### 2.2 Medical professionals pay attention

Activity trackers offer a great potential benefit in healthcare. Medical professionals are starting to pay attention and include trackers data in their patient’s records. “We have done a number of athletic performance tracking projects with people,” says Dr Paul Abramson, a physician in San Francisco interviewed by the BBC, who uses tracking technologies in his practice. “Things like the Fuelband or more complex versions of them can be very useful for people who want to exercise more” [2].

Dr Eric Topol, a cardiologist and professor of medicine at the Scripps Research Institute in California, says on the BBC’s website that personal data tracking has changed his whole practice. “I have hundreds of blood pressure measurements I could never get before, summarized in a beautiful graph” says Dr Topol. I can see how medicines are working out, how the patient’s blood pressure is being managed.” By allowing patients to monitor their steps, heart rates, and the like over time, Dr Topol says doctors can make more accurate diagnoses. “It’s very futuristic but it’s happening today” [2].

### 2.3 Incentives for exercise

The availability of rich, detailed personal fitness and activity data offers another potential benefit. Employers and health insurance corporations in the United States are beginning to try offering lower health insurance plans to employees based on their fitness level.

“Findings of behavioral economics suggest that the same decision errors that contribute to poor health-related behaviors can be used to “supercharge” incentive programs so that they motivate behavior change more effectively than simple premium adjustments do” [19].

The New York Times discusses how in the United States the health insurance industry is shifting towards awarding people who follow preventive practices and exercise more and eat wisely. Health insurance companies are “offering employers ways to reward workers with cash or reduced insurance premiums for exercising more and eating wisely.” At General Electric for example, smokers pay an extra \$625 a year on their health insurance [11].

U.S. lawmakers are also weighing in. Section 2705 of the Patient Protection and Affordable Care Act represents “an attempt to rein in health care costs, to which health conditions associated with unhealthy behaviors, such as smoking, overeating, and not exercising, are major contributors.” The hope behind this provision is that “it will improve health-related behavior and reduce the prevalence of chronic disease caused by unhealthy lifestyles” [19].

## 3. DISCUSSION

Nevertheless, the potential or unforeseen drawbacks or problems of activity trackers cannot be overlooked.

### 3.1 Privacy concerns

Activity trackers raise questions and concerns regarding data privacy. How and where is it stored, shared and processed? A typical tracker collects numerous data about the user, this data is then transferred either to a smartphone app or to the device’s online website. Nike+ for instance stores this information permanently on their servers [13].

We live in the age of big data. The presence of databases holding such personal information about health and fitness is worrying. No matter how secure these servers claim to be, it has been proven that even the biggest tech companies, supposedly running top-notch secure servers, get hacked, and sensitive personal information compromised (such as account passwords or payment information).

Hosain Rahman, CEO and founder of Jawbone, the company producing the UP activity tracker, insists on highlighting Jawbone’s obsessive protection of his customers. He acknowledges his company can build detailed population profiles and characterize various risk factors with substantially greater granularity [5].

Today all commonly used online services like email and social media raise similar questions regarding privacy. Trackers only add the availability of another type of personal data, fitness and healthcare information, to the cyberspace. However, these privacy concerns did not stop the majority of Internet users to have at least one email account. These concerns also did not stop 1.19 billion people from signing up and using Facebook neither [12].

Therefore privacy concerns will remain a controversial matter but do not necessarily have a direct impact on the success or failure of a product.

### 3.2 Exercise Addiction

Another potential problem that could result from obsessing too much with trackers data and the whole fitness hype is exercise addiction. The term “exercise addiction” was coined by Baekeland [1] in 1970, when he studied the effect of the deprivation of physical training on sleep patterns. Livestrong.com, an online health blog posted that “Exercising excessively can cause your body to become burnt out and increase your risk of injury. Becoming obsessive about your weight and your body image can lead to poor self-esteem” [8].

Several papers have attempted to set a criterion or quantify excessive exercise in order to classify it as a form of addiction. Nevertheless, it is relative and difficult to define “excess” with regards to a rather larger consumer base.

Thornton and Scott [17] “have shown this effect for exercise; the likelihood of an addiction increases for those who exercise with the goal of escaping unpleasant feelings or transforming their appearance to improve self-esteem as compared to those who exercise with the goal of improving performance and fitness” [7]. The Chicago Tribune posted an article on how a man’s exercising affected his relationship with his wife and family. As a result, he does not have time to hang out with his family or help with simple tasks such as fixing his wife’s computer. He spends more time exercising than he allocates to spend with his wife and family [3].

Although these findings are still rather in research phase, they shed light on an issue often taken for granted, and that is exercise is absolutely beneficial. These findings could pave the way to better understand the possible unexpected results of the excitement to encourage more exercise driven by activity trackers.

#### 4. CONCLUSION

Activity trackers have only recently peaked in the consumer market. As with a novel product or technology, trackers raise speculations and questions about their benefits and drawbacks. It is still early to determine to what extent they really succeed in encouraging people to exercise. For example, it may seem obvious that charging higher insurance rates for smoking would encourage people to quit smoking in order to reduce how much they pay, but evidence shows that charging more does not necessarily result in behavior change [19].

Although trackers target a wide audience, they may not necessarily be suitable for a massive audience yet. Many consumers may still find them uncomfortable to wear, or may not accept them as a wearable fashion accessory. Trackers are also not cheap. Nike+ FuelBand SE starts at \$149, with a higher-end version retailing for \$169. Jawbone UP sells for \$150.

However, there are indicators that trackers are here to stay. Tech giants are strongly backing this tech trend. The estimates about the potential growth in the industry range from \$10bn to \$50bn in the next five years [2]. Despite the price tag, a Huffington Post reviewer posted that the latest Nike device release did not meet his expectations, saying “But what we’re getting with Nike’s Fuelband SE is less of a revolutionary leap forward and more of a refresh”[16].

This paper has presented an argument for the potential benefits and problems of personal activity trackers. However, there are no solid scientific findings or studies yet to prove and support the absolute effectiveness of activity trackers at motivating users to exercise more and live a healthier life [21].

As with any new technology, the novelty is expected to wear off after some time. The next few years will be the verdict and will determine how they are positioned in the consumer market, and if they will succeed and are here to stay or not.

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