The Future of Wearable Technology

August 2021

TRAJECTORY
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About this report

This sets out to explore the future of wearables, examining:

• The evolution and emergence of consumer wearables
• The current state of adoption of wearable technology
• The next generation of consumer wearables and their pathway to consumer adoption
• The drawbacks of wearable technology for society
**Consumer Business and Government Implications**

**Consumer**

- **New Health Understandings:** Wearables present consumers with unprecedented insight into the relationship between behaviour, consumption and their health, presenting new opportunities for addressing – and changing – health behaviours.

- **Trojan Horse Adoption:** Many consumers will adopt powerful biometric capacities by ‘trojan horse’. Their decision to adopt constant heart rate monitoring or other biometric features may be secondary to their decision to adopt an Apple watch because it’s the latest gadget, or because they want a basic fitness tracker. As they gain these capacities, however, they will begin to use and understand the insights generated.

- **Two Tribes:** There are two tribes when it comes to rejectors; those open to and interested in wearables and the insights they generate, and those who reject wearables and want nothing to do with them. While new features – notably ones that can prevent health emergencies – will chip away at the rejectors, businesses and governments must speak to the two tribes differently when it comes to wearable technology.

**Business**

- **New Consumer Insights:** Wearables give consumers new methods for understanding their physiology, but they also give these opportunities to the businesses that gather and analyse physiological data. Within this data will be significant insight into how and why people behave on a physiological level, with biometrics a new area for consumer insight.

- **And New Ways to Influence them:** As the amount of physiological data gathered by wearables grows, businesses will become better able to research methods for influencing behaviour; using a particular ‘nudge’ and seeing if consumers react positively or negatively, for example. Combined with the technologies of the Internet of Things this will create incredible new opportunities for influencing consumers in real-time.

- **Adoption by Incentivisation:** Most consumers are already receptive to wearable technology, with many simply not having taken the plunge. The benefits of wearable technologies are significant, and for many businesses providing free wearables to consumers will represent a strong investment in the data and insights they generate.

**Government**

- **An Opportunity for a Healthier Society:** Many advanced economies face significant challenges with health and ageing, and wearables may present a significant opportunity to mitigate these problems through early intervention and behavioural change.

- **Not the Nanny State:** Governments must tread carefully when attempting to influence consumer behaviour, with caution surrounding any form of ‘nanny state’ interference a significant downside of wearable adoption for many consumers. In order to encourage wearable adoption, and to maximise the potential to positively influence behaviour, governments should seek to reward positive behaviours rather than punishing negative ones.

- **New Digital Divides:** Wearables present a new plane for digital divides, and most importantly, one which has the potential to directly influence consumer health. There is already a digital divide between those who like wearables and those who don’t but as the use of wearables to influence behaviour becomes more refined the technology could exacerbate existing health inequalities.
Introduction

Wearable technologies have long been touted as one of the ‘next big things’ when it comes to consumer technology. That’s no surprise: these are devices that can improve our lives, make us happier, healthier and live longer.

When it comes to new consumer technologies, however, long-touted is something of a back-handed compliment. As early as 1962 – before man set foot on the moon – Alan Whicker was displaying a ‘wearable television set’ on the BBC retailing for around £350. Fast-forward to 1987, and BBC’s Click was illustrating the magic of ‘running shoes with a built in brain’.

With consumers waiting so long for wearable technologies to arrive, it’s hard to escape the feeling that wearables are something of a busted flush; a piece of technology that we all assumed would be here by now, but one which we perhaps expect may never live up to our expectations.

Our perspectives on technology (and even on what we consider to be technology) are constantly evolving. Wearable technology is no different. If you are reading this text through glasses or contact lenses, or if you are wearing an analogue watch, then you are an adopter of a relatively early iteration of what we might call wearable technology.

Of course, this report is not about watches or eyeglasses, so it is important to set the boundaries of what we mean when we talk about wearable technology in the present day. For the purposes of this report, we consider ‘wearables’ to be the suite of emerging, wearable, consumer technologies that can gather, analyse and communicate an individual’s biometric data, or otherwise augment an individual’s experience of the world.

Wearable technologies have found themselves equally hyped and lampooned in the last decade, as the promise of a better understanding of health and cool new gadgets has been undermined by stuttering growth, low-tech mainstream product offerings and the failure of products like Google Glass.
However, this is a relatively well-worn path for emerging technologies. The Gartner Hype Cycle outlines the traditional path of new technologies from conceptualisation to productivity. In this model, new technologies pass through a series of phases, though not all technologies make it through to the end of the cycle. The phases are:

- **The Innovation Trigger**: the moment in which a new technology becomes possible, whether through the advent of other facilitative technologies or new innovation.

- **The Peak of Inflated Expectations**: the period in which we become carried away by the potential – the hype – of a new technology.

- **The Trough of Disillusionment**: the period in which consumers begin to understand the limits of a new technology, or that it may take significantly longer to reach its potential than previously anticipated.

- **The Slope of Enlightenment**: the period in which innovations continue, consumer applications become better and new technology is gradually adopted.

- **The Plateau of Productivity**: the moment in which a new technology reaches mainstream adoption and productivity; expectations remain lower than at the height of inflated expectation.

It is our view that wearable technologies as defined above are currently leaving this trough of disillusionment, with a wide range of technological and societal factors laying the foundation for the rapid growth in both sophistication and adoption of these devices.

As wearables reach maturity, as their capacities grow and as they are adopted by mainstream consumers, there are likely to be vast implications across society, and for the way consumers live their lives. In this report we’ll explore the current context of wearables, examining the more advanced iterations of the technology available to consumers today and their likely pathways to mainstream adoption. In addition, we will explore the potential of these technologies to change individuals’ behaviour, and in turn, to lead to widespread societal change.
The Tipping Point

So why now? Technologically, we stand on the brink of the 4th Industrial Revolution, a suite of technologies that includes 5G, artificial intelligence, the internet of things, and augmented reality, among others. Individually, each of these technologies are very powerful, but taken together they have the potential to drastically change our experience of the world.

Viewed through the prism of wearable devices we can see how these developments will lay the foundations for rapid growth in the capabilities of wearables. The sensors and processors vital to the internet of things (IoT) are crucial to the ability of wearable devices to gather and transmit the data that they collect. 5G represents a revolution in connectivity, allowing the vast quantities of data gathered by IoT to be transmitted wirelessly at high-speeds and in real time. Artificial intelligence will automate the analysis of this data, allowing vast datasets to be rapidly digested and presented back to consumers in slick, easy to understand applications on their computers and smartphones. Crucially, the cost of these technologies – both devices and connectivity – has fallen drastically over time. It has never been cheaper to purchase powerful electronic sensors and processors, to have them communicate, and to be able to automatically analyse the data they collect. These technologies are fundamental to both the power of wearable technology and to its affordability, and the foundations are laid for the widespread adoption of highly powerful wearable devices.

In addition to the improvement in the technological context as far as wearables are concerned, the societal context is also becoming more receptive to wearables and the insights they provide.

Consumers in advanced economies are becoming more health conscious, avoiding dangerous forms of consumption such as alcohol and cigarettes, with an emerging movement towards holistic mental and physical well-being. As wearables become increasingly adept at developing insights into our well-being and how to improve it, consumer demand for these potentially health-improving technologies will grow.
In the UK, wearables are used by a small but growing proportion of society, with 35% of people owning a wearable device as of January 2021.

As with many other technologies, wearable ownership is correlated strongly with age, with younger consumers more likely to own a wearable than their older counterparts. As of June 2021, Millennials (25-39 year olds) were the group with the highest rate of ownership – 47% owned a wearable device – followed by Gen X (40-55) on 40% and Gen Z on 36%. Consumers aged over 56 are considerably less likely to own a wearable device, with 27% of Baby Boomers (56-72) and 16% of the Silent Generation (73+) possessing a wearable.

Do you own a ‘wearable’ device – i.e. smart watch, fitness tracker, or other form of wearable technology?

- Yes
- No – but I would like to own one in the future
- No – and I would not like to own one in the future

Source: Trajectory Optimism Index, 9th – 16th June 2021
However, while wearables remain a technology adopted only by a minority, the proportion of consumers who own, or would like to own, a device, significantly outnumbers the proportion who state that they would not like to own one in the future. Overall, 64% of consumers state that they own, or would like to own, a wearable device, compared to just 36% who state that they would not like to own one in the future. Those aged over 56 are the only age groups in which rejectors outnumber owners and considerers – age groups where mainstream adoption will be difficult – with owners and considerers vastly outnumbering rejectors among under 40s; just 19% of under 40s do not own and do not want to own a wearable.

Among rejectors there are a wide range of barriers that leave people cold, particularly when compared to owners and considerers. There are some barriers that are felt similarly both by owner/considerers and rejectors. Issues like privacy and security, accuracy, health anxiety and simply not knowing how to apply the insights generated are felt by a small minority across all ownership categories, but they are barriers that are perceived as surmountable by owners or considerers. Where rejectors differ significantly, however, is in the fundamental sense of simply not needing one, wanting one or seeing the benefit in owning one. These could be more difficult barriers to overcome, though as wearables become more widely adopted, as their applications become more powerful and more widely applicable, and as they become more fashionable, rejectors’ attitudes may soften.

Which of the following statements do you consider to be a barrier to owning or using a wearable device?

Source: Trajectory Optimism Index, 9th – 16th June 2021
Among considerers, the price of wearables remains *the* standout barrier, with 48% of those who do not own a wearable but would like to do so in the future stating that the cost of wearables is a barrier to ownership. This is understandable, with smartwatches at the pointy end costing anywhere from £200 to £1000 and simple exercise wearables costing up to £200, but significantly cheaper options are emerging with companies like the Chinese brand Xiaomi bringing a continuous heart rate monitoring, sleep tracking and smartphone-GPS borrowing wearable device to the market for under £20.

As the technology underpinning wearables becomes cheaper, as newcomers drag incumbents’ prices down and as the most advanced iterations of the technology trickle down, we are likely to see the emergence of highly powerful, very affordable wearable devices brought to market by business like Garmin and Fitbit that currently face pressures both from Chinese newcomers and premium brands such Apple.

These market forces will remove a significant barrier for considerers and combined with the demographic context of adoption – young consumers remain highly open to adoption but may simply lack the disposable income to purchase one at present – there is significant low-hanging fruit for the wearables market, and significant potential for growth in adoption.
The Wearables of Today and Tomorrow

64% of the population either own, or want to own, a wearable device in future, and this proportion is likely to grow as each generation is as hungry – if not more hungry – for technology as the one that went before it. But what do the wearables of today look like, and how are they likely to evolve over time?

Today’s wearables have emerged overwhelmingly from the health and fitness sector, with brands like Garmin, and in particular, Fitbit bringing wearable devices to the market in the early 2010s to allow consumers to track their workouts and their general activity levels through basic metrics like heart-rate monitoring and the counting of steps.

In truth, these capacities have not grown enormously as far as mainstream adoption goes, but what has changed significantly is how these features are packaged, with the emergence of smartwatches – most notably the Apple Watch – seeing these capacities combined with other ‘smart’ features into an all-singing, all-dancing wearable device. Where previously only the individuals most engaged with their health or wellness would have sought out technology to better understand and better manage their health, now, individuals who simply want to be able to read e-mails or listen to music without constantly reaching for their phone are adopting a series of health measuring technologies as a by-product.

There are, however, a series of pioneering consumer technologies that have yet to penetrate the mainstream, but that offer a glimpse of what is possible from modern wearables at present.
Whoop is a continuous biometric monitoring device which tracks four physiological markers – heart rate variability (HRV), resting heart rate (RHR), sleep quantity and quality, and respiratory rate – that indicate the intensity of an individual’s exercise and day to day activity, the extent to which they have recovered from the activity of previous days, and the optimal amount of both sleep and activity in order to build or maintain fitness in the days to come. The Whoop strap and accompanying application take around 30 days in order to understand an individual’s ‘baseline’, learning how individuals respond to certain forms of exercise, and the amount and type of sleep an individual requires, personalising its analysis. At present, the device is targeted at individuals highly engaged in health, well-being and exercise, at a significantly higher price point than standard wearables. Whoop is a subscription model with subscriptions starting from £18 per month. Garmin’s entry level Vivofit 4 retails at £69.99 with free companion services, with Fitbit’s entry level devices retailing for around £50.

Oura is a titanium ring which, like Whoop, tracks bodily activity using optical heart rate monitoring, in order to track the same four metrics tracked by Whoop, in addition to skin temperature. Where Whoop is focussed on exercise, Oura’s niche is wellness, using these metrics to track an individual’s sleep. Oura uses a different form of measurement to Whoop – implementing infrared rather than green light – which provides more accurate results day to day, but performs poorly while moving, making it a poor tool for measuring exercise. If Whoop is advertised by professional athletes and targeted at aspiring ones, Oura is the device of choice of Silicon Valley CEOs like Jack Dorsey and Netflix Producer Prince Harry. Again, Oura is far more expensive than similar wearables. The ring retails for around $300 (around £220 at time of writing), which places it among entry level smart watches but with none of the bells and whistles such as telling the time, exercise-tracking or interacting with other smart devices.

Supersapiens is a continuous blood glucose monitoring system which comes in the form of a small biosensor worn on the back of the upper arm with a flexible filament inserted into the skin in order to access an individual’s interstitial fluid and the wealth of information it contains about your bodies fuelling requirements. The service is derived from the Dexcom range of diabetes management products, with Supersapiens adopting the analysis used in order to help diabetics manage their glucose levels and adapting it for athletes. The service can help individuals to understand the impact of what they eat on their ability to perform both mentally and physically in real-time, with the associated application giving individuals a live feed of their blood glucose level and the impact of both what and when they eat, and their activity levels, on their blood sugar. At present, Supersapiens remains the preserve of the elite athlete or the wealthy uber-enthusiast; a 28-day subscription costs €130 (around £113).
At present, these devices are both too expensive and too niche to be adopted by mainstream consumers. Each of the devices outlined here does a narrow set of highly advanced things very well, but for the price of 'jack-of-all trades' equivalents. However, as these capabilities are replicated – perhaps acquired – by businesses like Apple, Samsung and Google, and implemented into future generations of smartwatch, adoption will accelerate and the impacts of a society in which individuals are increasingly aware of the causal relationship between behaviour and their health will begin to show.

There is good reason to believe that this will happen. In January 2021, Google entered the wearable fray with its $2.1 billion acquisition of Fitbit, with Whoop sure to attract attention from the tech-giants having achieved unicorn status with a $1.2 billion valuation as of October 2020.

Further, an exploration of some of Apple’s patent activities provides a glimpse into the future of their wearable offerings, with the images below detailing plans for the placement of new biometric sensors in future iterations of Apple’s AirPods and Apple Watch. The biometric sensor billed for Apple’s earphones is likely to replicate some of the continuous heart rate monitoring features of Whoop and Oura, but crucially within a device that has already been widely adopted by consumers. The sensor patented in the image on the right is a ‘cuffless blood pressure monitoring system’ allowing consumers to monitor their blood pressure through the seismocardiogram data already collected by the device. In recent months, Apple have also won patents for blood glucose monitoring systems to be integrated into the Apple Watch as well as a ring with biometric sensors. Supersapiens and Oura must be thrilled.
These innovations are just the start when it comes to the consumer technology pivot toward healthcare. Apple's watch is already capable of identifying irregular heartbeats – something that can increase the risk of stroke – alerting a user that they should see a doctor in order to mitigate a worst-case scenario. Apple's devices are also highly accurate at differentiating between different types of heart attack, while they are currently 90% accurate at identifying the absence of a heart attack within healthy individuals. A 10% margin of error remains far too high to start putting a ‘heart attack warning system’ in place in consumers devices, but Dr Peter Libby – former Chief of Cardiovascular Medicine at Brigham and Women’s Hospital in Boston and Mallinckroft Professor at Harvard University – anticipates that a device that could provide and early warning system for heart attacks may be on the market within a decade.

If you were to buy a wearable device in the future, which of the following capabilities would be most attractive to you?

<table>
<thead>
<tr>
<th>Capability</th>
<th>Owners</th>
<th>Considerers</th>
<th>Rejectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to alert to medical emergency such as heart attack or stroke</td>
<td>38%</td>
<td>37%</td>
<td>20%</td>
</tr>
<tr>
<td>Tracking my steps</td>
<td>53%</td>
<td>54%</td>
<td></td>
</tr>
<tr>
<td>Tracking the number of calories I burn</td>
<td>18%</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>Ability to alert to emerging medical conditions such as diabetes or cancer</td>
<td>36%</td>
<td>43%</td>
<td></td>
</tr>
<tr>
<td>Monitoring physiological processes e.g. heart rate, respiratory rate, glucose levels</td>
<td>34%</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>Monitoring physiological processes e.g. heart rate, respiratory rate, glucose levels</td>
<td>38%</td>
<td>43%</td>
<td></td>
</tr>
<tr>
<td>Tracking sleep</td>
<td>39%</td>
<td>39%</td>
<td></td>
</tr>
<tr>
<td>Tracking my fitness activities</td>
<td>45%</td>
<td>44%</td>
<td></td>
</tr>
<tr>
<td>Providing advice on healthier behaviours</td>
<td>24%</td>
<td>21%</td>
<td></td>
</tr>
<tr>
<td>Ability to measure my carbon footprint</td>
<td>20%</td>
<td>19%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Source: Trajectory Optimism Index, 9th – 16th June 2021
Beyond the enormous implications that the ability to pre-emptively identify and potentially stop a heart attack or stroke could have for society, these are also the type of features that are most compelling to those who would otherwise reject a wearable.

While owners and considerers – typically younger consumers – are more interested in exercise or wellness specific features such as tracking steps, tracking fitness activities or monitoring physiological processes, for rejectors, the ability to alert an individual to a medical emergency is the most compelling reason to own a wearable. 20% of wearable-rejectors feel that the ability to alert to a medical emergency would be the most attractive feature of a wearable device, with a further 16% most attracted to the ability to identify an emerging medical condition such as diabetes or cancer as the most attractive feature.

64% of Brits own or would like to own a wearable device. Among considerers, price is the most significant barrier to ownership. Among rejectors, the most prevalent issues surround knowledge of the benefits or discomfort with connectivity. However, as wearables evolve, as their features become better assimilated into multifaceted smartwatches, and as their attributes increasingly transition from athletic geekery to potentially life-saving interventions, the most prominent barriers may face significant erosion, precipitating continued growth in mainstream adoption.
The applications of wearable technologies in the previous section remain too niche, and too expensive, to lead to rapid change in the short to medium-term. We are unlikely to see the emergence of a vast blood glucose monitoring segment of society in the next decade, while heart attacks and strokes are unlikely to be eradicated by smartwatches. However, as more of the more basic functions outlined above – from continuous heart rate monitoring to sleep tracking – are increasingly incorporated into mainstream devices, we are likely to see a range of gradual shifts in behaviour among the growing proportion of society that engage with their health via a wearable device.

But do wearables actually contribute to behavioural change?

There is no simple, single answer to this question. Wearables can lead to behavioural change, but it does not mean that they always will, with factors like incentives, the type of feedback and the individual in question all affecting the extent to which a wearable will drive behavioural change.
There are a number of studies illustrating the power of wearable technology to drive behaviour change. One of the largest explored the adoption of smartwatches by customers of Vitality’s Active Rewards programme in the UK, the United States, and South Africa, with the study revealing that customers that were given smartwatches significantly increased their activity levels having taken up the reward scheme. The extent to which activity levels increased differed by market, but in each case, users of wearables drastically increased their activity levels – and most notably, their days with ‘advanced activity’ having begun to use an Apple Watch. Importantly – as most of us who have taken out a gym membership or embarked upon a diet will know – individuals sustained these behaviours at levels significantly higher than their previous norm for over six months. Activity levels peaked two months after the devices were adopted, but remained elevated for over six months.

Incentives played a significant role in this study, highlighting the fact that a wearable alone will not always be enough to change behaviour. In Vitality’s scheme, users gain rewards for reaching different activity levels; maintain high levels of activity and you can gain access to discounts on fitness memberships or hotel stays for example. Perhaps more compelling, however, is that for users that adopt a smartwatch as part of the scheme there is a vast discount on the device that is maintained only through activity levels; stop exercising and you lose your discount on your monthly payments.

Source: Incentives and physical activity: An assessment of the association between Vitality’s Active Rewards with Apple Watch benefit and sustained physical activity improvements
There is a harmonious relationship here both for individuals for whom activity is an important and entrenched part of their day to day lives, as well as for the insurance company for whom risk-assessment is the name of the game; healthy individuals pay premiums that reflect their healthy lifestyles, while insurance companies can offer better tailored products on the basis of the data provided by wearable devices.

Further proof of the ability of a wearable device to change behaviour comes from a study conducted by Whoop published in 2016. While caveats about the source of the information are important – it is in Whoop’s interest to illustrate the positive impact of the devices – the results tell a mixed, instructive story about individuals, behaviour tracking, effectiveness, and attrition. The study [illustrated in the charts below] provided wearables to college athletes in the United States – high level athletes in sports ranging from swimming and long distance running to squash and tennis – before tracking their behaviours in relation to caffeine and alcohol consumption, as well as the use of screens before bed.

Two very stark findings emerge from the study. First, among the athletes who consistently tracked their behaviour – inputting their caffeine, alcohol and digital consumption manually on the Whoop application – there were significant declines in negative behaviours. Over a five month period, the proportion of the sample that consumed caffeine at night fell from 5% to 0.8%, while the proportion who consumed alcohol at night fell from 6.9% to 1.6%. Second, and perhaps more importantly, as the enormous attrition rate among a group of highly dedicated elite athletes, with the number of completed surveys falling drastically over the course of the study.

The extent of attrition here is vital because it highlights an important point about the nature of tracking and the friction that it can involve. The chart on the right illustrates the extent to which tracking alcohol consumption manually using a smartphone application contributed to reduced consumption among individuals with problematic alcohol consumption.

When individuals track their behaviour, whether they are using a wearable to do so or doing it manually, behaviour – in this instance, reduced alcohol consumption – improves. Among both male and female respondents here, consumption fell almost immediately when tracking started, remaining well below the baseline for three months from the start of the study. When individuals track their behaviour, behaviour improves, but it is the friction involved in doing so – remembering how much you’ve consumed, entering data that you know will reflect badly on you, being confronted by an undesirable reality – that sees people stop tracking.

Wearables are not a silver bullet for issues like damaging consumption, obesity, or inactivity, rather they are a tool – just like our smartphones or our computers – that need to be tweaked, honed and personalised in order to maximise effectiveness. Wearables are unlikely to spark brand new behaviours, and nor are they likely to provide intrinsic motivation to unmotivated individuals. If an individual is addicted to a substance, or does not want to exercise, a wearable is unlikely to make a significant difference. However, for the individual who has decided that enough is enough, or that its time for a change, a wearable might provide new insight in how to maximise the effectiveness of their behaviours, and for some people, this kind of insight, and the ability to track and see progress, might be the difference between sustaining a positive new behaviour or giving up after a few weeks.
The autonomous nature of the new breed of wearables is one significant reason that gives hope that wearables could play a far larger role in changing behaviour in future.

With Whoop & Oura, there is no need to fill out a diary on how you slept, how intense your exercise was, or how you feel that your body has responded to exertion; these technologies make these inferences accurately on the basis of thousands of biometric measurements per day. With Supersapiens, there is no need to laboriously log your meals to the nearest 10 grams or jot down every snack you eat while you’re on the move, as it will simply be sensed in your bloodstream.

As these technologies are tweaked, and as the nudges that an individual responds to are increasingly honed by machine learning and artificial intelligence, the ability of these devices and the technologies underpinning them to know ‘us’ and what we respond to, to coach us and to stimulate behavioural change is likely to grow.
The Argument Against Wearables

When wearables and the data and insights they generated are positively harnessed, it is clear that they offer vast potential benefits to society. They will allow us to better manage our health, to get more out of our hobbies, and to help us to develop a better understanding about the way we live our lives and the implications of our choices.

There are, however, a series of highly valid criticisms of wearables and the impacts that they could have on society, and if these developments are not addressed and mitigated, resistance to wearables among consumers, and the propensity of lawmakers to regulate their use, will begin to grow.

Digital Divides

Digital divides are already a significant issue in society with the adoption of certain devices, or of certain digital practices, allowing some users to thrive while others are increasingly excluded. These divides are most commonly predicated on demographic factors like age and income, with older, or less wealthy consumers less likely to adopt digital devices and the new digital practices they facilitate due to a lack of skills or a lack of income respectively. At present, digital divides revolve around issues like access to laptops for remote learning in low income households, or around the ability of older consumers to manage their financial matters with banking increasingly going digital.
Despite the rapid fall in the price of the cheapest wearable devices, income remains a significant barrier to adoption, with ownership strongly correlated with income. The proportion of respondents who say that the price of a wearable is a barrier to ownership is relatively stable among individuals from households earning over £21,000 per year; between 28% and 29% of these individuals say that the cost of wearables is a barrier. This figure increases drastically among individuals from households earning less than £21,000 per year, however, reaching 35%.

While the extent to which price is a barrier differs little beyond the £21,000 income threshold, wearable ownership increases in line with income from the poorest households to the largest households. In the wealthiest households in Great Britain, over 53% of survey respondents own a wearable device, falling to 28% within households with incomes of less than £21,000 per year.

Cost-as-barrier may not change drastically across household income levels, but where disposable income is a less available resource, wearables seem likely to be deprioritised – a nice-to-have that people haven’t gotten round to yet – when compared to wealthier consumers.

Source: Trajectory Optimism Index, 9th – 16th June 2021
Where the profile of both owners and considerers is remarkable similar when it comes to which applications of wearables they are comfortable with – and the extent to which they are comfortable with them – rejectors are markedly different. There is no gradation, no gradual shift in attitudes from rejectors to considerers to owners. When it comes to comfort levels with a wide range of wearable applications, considerers are owners who haven’t gotten round to purchasing a device, while rejectors are their own tribe entirely.

While both the extent of the entrenchment of these attitudes, and the level of health benefit that wearables can generate in time are uncertain, what is clear is that there is potential for the exacerbation of existing digital divides, and indeed new, wearable-specific ones should rejectors remain so averse to wearable technology. Digital divides are increasingly problematic, with their reach into individuals' lives expanding as our world becomes increasingly digital. Digital divides are already contributing to social and financial exclusion, and throughout the pandemic, they have contributed to educational and professional exclusion. Wearables, however, could see digital divides increasingly affect something much more fundamental, however, with younger and wealthier consumers likely to benefit from the positive health implications of wearable use with non-users left behind.

Source: Trajectory Optimism Index, 9th – 16th June 2021
Wearable Surveillance

When positively positioning wearable devices we speak about our ability to better understand our own health, to understand the implications of our behaviour on our well-being; wearable technology and the insights they generate could have truly empowering, positive implications for individuals’ health.

But, and it is a big but, as we develop our ability to understand these new findings about ourselves, it is allowing a host of other entities – primarily businesses and governments – to develop these understandings too. Mobile phones have changed our lives irreversibly, allowing us to be constantly connected with a rapidly expanding array of applications but it has also allowed for mass government surveillance. Facebook allowed us to be more connected to distant friends and family, but it also allowed businesses to develop a better understanding of how to sell to us, and to political consultancies to generate insights into how we might vote and how to influence that.

Surveillance is a pejorative term, but it is one which neatly summarises the pitfalls that come with wearables. These devices represent new, improved digital individuals; previously you could track an individual’s movement through spaces on the basis of where their phone had been, but these new devices are quite literally ‘always on’ while being always on your person. Further, they are collecting significantly different data than our smartphones, replacing step counts with the various biometric applications outlined previously in this report, allowing organisations to detect our physiological response to stimulus. As these capacities grow, and as the ability to analyse and make inferences from them increases, these technologies will become incredibly powerful at both understanding and influencing consumer behaviour.

Today, we can see the early stages of these developments, with companies already using wearables to offer incentives to customers who behave in line with a business’s interests, effectively penalising those who do not comply. This is most widely prevalent in the insurance industry, with Vitality’s Active Rewards scheme illustrating the way in which a business can benefit significantly from the use of wearables by influencing behaviour, in this instance, by ensuring that their life insurance customers stay healthy and in doing so, avoiding medical expenses.
Attempting to make your customers lead more healthy lives through the use of wearables is one thing, but there are other potential applications that could be used in future to influence or control individuals behaviour.

One potential application comes in the form of personalised advertising. This will be a concept familiar to anyone that has seen the film Minority Report – specifically a scene in which Tom Cruise’s character rushes through a shopping centre with billboards addressing him personally and enticing him to purchase products – but one which is a lot less futuristic than you might think. Advertising company Bidooh has created smart advertising boards capable of using facial recognition software to identify key demographic features about an individual before selecting which advertisement to show. In the example image above the advertisement is capable of identifying someone’s age, their gender, their facial hair or eyewear status as well as their emotion, before deciding what to sell them. If someone is out on a sunny day without sunglasses and they are advertised sunglasses that is one thing, but in an increasingly connected world the ability of an advertisement to combine knowledge of an individuals emotional state with their physiological information could see them advertised more damaging forms of consumption – from junk food or alcohol to cigarettes or gambling.
Other forms of extreme oversight are extremely plausible. Governments in advanced economies are currently attempting to ensure that their ageing populations maintain greater levels of health deeper into old age, with increased data on the health of an individual’s diet or lifestyle potentially vulnerable to incentivisation (or disincentivisation) through tax credits or punitive taxes. As businesses begin to grapple with the new hybrid context of work – and attempt to regain some of the control over employee behaviour that has been lost in the shift to remote work – could wearables be used to track employee movements, or the data gathered by a wearable device required to prove illness where and employee has taken time off work.

For now, these issues remain largely off the radar of consumers, with a relatively small minority of consumers concerned about the use of wearables to monitor damaging consumption or sleep habits, as well as with the privacy of their biometric data. However, as some of these potential use cases become realities, consumers are likely to develop a more refined sense of what they do and don’t like, what they are and are not comfortable with, when it comes to wearable technologies. Wearables remain in an embryonic phase of development, a time when social boundaries that will become entrenched will get developed. If governments and businesses push their citizens, their customers or their employees too hard, too fast, many of the potential benefits of the technology will be squandered.

![Discomfort, Concern and Disagreement with Wearable Applications](source: Trajectory Optimism Index, 9th – 16th June 2021)
Conclusion

For much of the last two decades, wearable technology has been overhyped, failing to live up to impossible – and inflated – expectations.

Now, however, we find ourselves at a tipping point when it comes to wearable technology, with mainstream adoption driven by a combination of low-powered fitness trackers and feature-packed smartwatches from the tech giants.

These technologies are vital to the adoption of wearable technology and the extent to which the benefits of wearables are realised. While the most sophisticated, or most advanced iterations of technologies often dominate the imaginations of tech-writers and futurologists, it is often the most banal, most widely-adopted technologies that have the biggest impact on society.

But the next generation of consumer wearables is here, and they are beginning to push the boundaries of what consumers previously thought possible. Whoop, Oura and Supersapiens lead the way in this regard, and while the scope of these technologies remains far too narrow – and the price far too high – for mainstream consumption, they do offer a glimpse of the future of wearable devices.

None of this has gone unnoticed by the tech giants, with both Google and Apple pivoting strongly toward health in the last 5 years, with Tim Cook, CEO of Apple, stating that the company’s biggest contribution to society will not be the personal computer or the smartphone, but its contribution to health.

These behemoths are developing their own iterations of sleep tracking, activity monitoring an constant heart rate and blood pressure monitoring, and as biometric sensors become cheaper, smaller and more powerful, we will increasingly see these technologies incorporated into future generations of smartwatches.
The wearables of the future will offer individuals unprecedented insight into the relationship between their behaviour, or what they consume, and the impact that it is having on their health.

This new knowledge presents a vast opportunity for behavioural change, and while it cannot be said that wearables will change consumer behaviour, we know that with the right consumers, or with the right incentives, wearables are capable of engendering significant changes to the way consumers behave and consume. As wearables gather vast quantities of data on their owners, businesses and governments have an unprecedented opportunity to learn how and why consumers behave the way they do, an importantly, the types of stimulus that may contribute to behavioural change.

There is overwhelmingly positive potential here; a healthier society that is better informed about their health, but there are also significant concerns in the realms of privacy, inequality and around the role businesses and governments should have in influencing our behaviour.

For most in society, this appears to be a deal worth taking; greater understanding of our health, and greater ability to intervene in order to prevent ill health, is worth the loss of privacy, the nanny-statery and the exclusion of the minority that do not see the same value in wearable technology.

As these technologies grow in adoption, power and capacity, their ability to influence society will increase significantly, presenting opportunity and disruption across for consumers, businesses and governments.

You might not like wearables, but you can’t afford to ignore them.
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You can contact us at the following places:

Online: [www.trajectorypartnership.com](http://www.trajectorypartnership.com)

[info@trajectorypartnership.com](mailto:info@trajectorypartnership.com)

Twitter: [@TrajectoryTweet](https://twitter.com/TrajectoryTweet)