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Does using wearable data lead to a better engagement between insurer and insured?

Wearables, new data metrics and life insurance underwriting

Introduction

In 2015, the Chair of the World Economic Forum talked about how individuals and industries should "Master the Fourth Industrial Revolution", a revolution centred on the rise of 'cyber-physical technologies' that blur the lines between the physical, digital, and biological spheres[1]. How can the life insurance industry, born during the first industrial revolution of the 18th century, deal with and harness the technological change and tsunami of related data created by the fourth?

Wearables

Wearable health devices are electronic equipment that record and collect data from their users about a vast range of information around their health and activities. The devices are part of and feed into the 'Internet of Things' (IoT), a term that describes the way the online world is extended, linked to or embedded into the physical realm[2]. It seems like a blink of the eye since the first smartphones arrived in the mid noughties (Apple's iPhone and Google's Android). Critically these devices were permanently connected to the internet and they passively logged data on their users. Specific non-telephony wearables were introduced by Garmin with its Forerunner in 2003 and the Fitbit Tracker in 2009, which recorded distance and speed, heart rate and step counts[3]. Typical contemporary devices have built-in sensors such as an accelerometer, gyroscope and magnetic sensors but also a multicore processor and built-in wireless communication (such as Bluetooth or Wi-Fi), allowing them to connect to a smartphone or directly to the web[4].

Their use has exploded in the last decade, rising from about 70 million units sold in 2014, to 120 million in 2018 and 190 million by 2022. Although wearables can come in many forms (eyeglasses, shoes or clothes), ~90% are wrist borne, either as smartwatches or wristbands and even jewellery like the Oura rings[5]. In the UK, 17% or 6 million adults wear the devices with a similar number wanting or expressing a desire to own one[6].

In the context of health wearables, typical data metrics collected includes step count, heart rate, sleep patterns, blood pressure and other metabolic measurements (see figure 1).

The wearables themselves are only the interface, they have no value as such, except as a desirable accessory for the user, a hook for those interested in the true item of value, the data. Of course, use of the data is not a one-way process. One of the attractions for those engaged in wearable use is

[1] Schwab, 2015
[2] Morandi, 2012
[3] Piewek, 2016
[4] Yu Lu, 2017
[5] Richter, 2018
[6] Feldman, 2017

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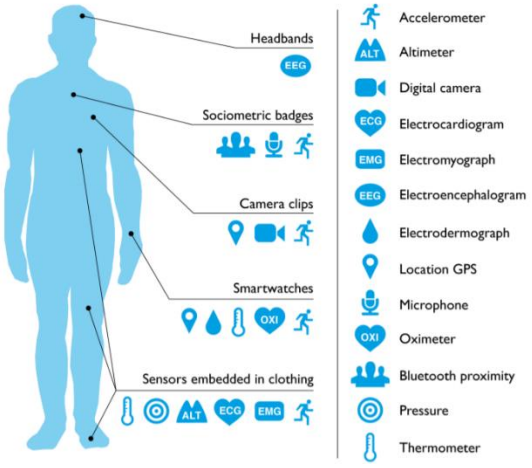
the way data is packaged and presented back in easily understood metrics and indicators and interest in this is likely to grow with the rise of the Quantified Self (QS) movement, an idea based on self-discovery via personal analytics[7].

Figure 1: Wearable Metrics
Piwek et al., 2016



The combination of metrics captured, produces a "rich tapestry of social and behavioural fingerprints" that provides insight into people's lived experience, and frees research into these and the related health impacts from the confines of the laboratory and doctor's surgery[8].

Furthermore, when allied with high-powered computing and data analytics, the data from wearables can increasingly develop models to identify markers of elevated risk for premature mortality or morbidity, or even identify 'digital phenotypes' – how our interface with technology can be prognostic or diagnostic for certain illnesses or diseases[9].

Onnela & Rauch divide data captured by wearables and smart devices into two groups: passive (the information we have been discussing – sensor data that does not require user involvement), and active (data that requires users to actively answer or engage with) and how these interact and interplay. Such a division of information neatly describes the way risk information is captured in the sphere of life underwriting (active information equates to the answers provided on an application form) and how new data (in the form of passive sensor information) could be used to validate and enhance decision-making on risks.

These two final facts, prediction/modelling of risk and the use of technology to enhance well-established methodologies are why the life insurance industry has become awakened to the potential of wearables[10].

Life insurance

It could be said that actuaries are the original data scientists, using and extracting accurate data to predict or interpret the world with methods derived by the likes of Edmund Halley and James Dodson in the late 17th and 18th centuries. In the intervening years, these tools have become fine-tuned with the introduction of more accurate life/survival tables based on age, gender and smoker status. However, the fundamental premise of all this is an assumption that, subject to these factors, an individual applicant presents an average or standard risk priced for by these assumptions. Allied to this, is the underwriting process, where insurers ensure that all applicants are individually assessed and analysed in a methodical manner[11].

The essential underwriting methodology has remained little changed for decades. An applicant completes a lifestyle and health questionnaire that gathers key information proven to have relevance in the risk assessment of mortality and morbidity. Any applicants deemed to have potential elevated risks may undergo further assessment via analysis of reports from their general practitioners or medical examinations. While the basic essential method remains the same, how it's done and processed has undergone radical transformation, particularly the move online and the assessment of risk by embedded algorithm-based underwriting rules engines (URE)[12] like Hannover Re's hr | ReFlex or hr | QUIRC. Such is the success of these UREs that typically, most UK life offices assess 60-80% of applicants without human intervention.

However, if we are honest, these innovations represent more of a fine-tuning of processing efficiencies rather than

[7] Piwek, 2016
[8] Onnela 2016
[9] Jain, 2015
[10] BearingPoint Institute, 2020
[11] Black & Skipper, 2000
[12] Batty & Kroll, 2009

any fundamental paradigm shift in risk assessment[13]. The traditional underwriting approach remains a 'one and done' process with no opportunity for either the insurer or insured (apart from cancellation of the policy) to alter the terms of their contract. However, with the rise of InsurTech and more specifically wearables there is now opportunity to access a wider pool of less traditional data sources and utilise new analytic capabilities[14].

Leveraging wearables and 'continuous underwriting'

Why are insurers so interested in wearables and related data to the extent they will subsidise the cost of such devices? There are three broad strands that we can identify as motivators:

- to incorporate new or improved underwriting data in evaluating risks
- to improve engagement with the insured
- to encourage or increase healthy lifestyle behaviours in order to head off early unpriced-for claims, attract and retain healthier lives

It does appear a host of insurers have become awakened to the potential wearables, the data and ways to improve the underwriting process. In China for example, a life insurer has 1.5 million policyholders uploading activity data and in the UK, a life insurer has provided heavily subsidised smartwatches to individuals who achieve and maintain certain activity points and health status[15]. A South African-based insurer offers a lifestyle product that emphasises the whole healthy lifestyle ethos and encourages positive behaviour with reward nudges in the form of free cinema tickets, coffee and discounted gym and food[16]. These examples have had demonstrable success, with physical activity rates increased by 34% overall and even higher for certain cohorts, such as the obese or those with existing illness[17]. Such success is important, as increases in exercise decreases body mass index and blood pressure, both key indicators of risk in the traditional underwriting process. Indeed, a study by Smirnova 2019 showed that declining physical activity was 30-40% more accurate in its predictive power of premature mortality than smoker status or the presence of pre-existing disease like stroke or cancer.

One issue for insurers is what do with the information? Currently, once underwriting terms have been issued and accepted the contract is fixed. This is where the concept of 'continuous underwriting' has arisen, clients who promise to provide their data, engage in wellness programmes and agree to have their health metrics constantly monitored get further rewards in the form of fluid and changeable premium rates or access to special deals. Engagement is further improved if the user's data is packaged back to them as easily understood and 'gamified' metrics[18].

Typical metric or summary data from a wearable

Some advocates have recently proposed that the alliance of InsurTech, Big Data analytics and sensor data such as wearables will lead to a complete revolution in life insurance, doing away with underwriting altogether in the traditional sense, moving instead to an 'Ask it never' concept. This idea does away with asking an applicant any questions, instead basing risk assessment entirely on their digital footprint data[19]. This author remains sceptical of such a goal: while such a method does have a place, there is nothing quite like asking people a direct question. Indeed, a study conducted by one reinsurer using classic actuarial mortality analysis, compared and combined new data (in the form of step counts) and old data and traditional risk metrics (body mass, blood tests and personal health history). The study showed that the 'best' model was one that was a hybrid of old and new, whereas one solely based on new methodology performed only marginally better than one based on traditional approaches.

[13] Batty & Kroll, 2009
[14] BearingPoint Institute, 2020
[15] The Economist, 2019
[16] McFall & Moor, 2019
[17] The Economist, 2018
[18] Asimakopoulos, 2016
[19] McFall & Moor, 2019

That said, in terms of potential for cost reduction, for certain demographic segments an 'ask it never' approach could have merit.

Issues and concerns

Using wearable data is not without concerns or issues. One key attraction of its use is the better engagement between insurer and insured, yet a number of surveys show that 32 % of users stop wearing these devices after six months, and 50% after one year[20]. Of critical importance is ensuring that rewards for engagement are clearly spelt out.

What about accuracy: are all devices the same? Xie and colleagues showed that key measurements performed by the common devices (sleep, steps, distance and heart rate) had reasonable equivalent accuracy but there was much variability in energy consumption as measured by calories.

There are also concerns about user bias: wearable uptake is focused on 'digital natives', with half of users being between ages 18 and 34 and although use is fairly even by sex, users tend to come from higher socio-economic groups, with a third coming from households earning greater than USD 100,000 per year[21]. This may not be a huge concern as the insurance buying population is heavily drawn from this demographic, but if insurers want to close the 'protection gap' and extend their offering to wider society, they need to consider how to subsidise and democratise access to wearable devices.

Finally, of paramount importance is ensuring that the security of such detailed invasive personal data as captured by wearables is strongly maintained not only because of a legal and moral duty to protect such information, but also to prevent catastrophic financial damage to brand and reputation that a breach or leak of such data would cause.

Conclusion

The life insurance sector and the underwriting profession have seen only marginal and evolutionary change in recent decades. However, the advent of the fourth industrial revolution, where the physical and digital worlds intersect has huge possibility for disruptive change. The industry is making tentative and successful steps to bring the use of one technology born from this revolution, that of wearables, into its practices. In the near immediate future however, the likely recipe of success is a melding of the statistical modelling and analytical capabilities from its traditional methods, with the opportunities brought from the new, rich and vast seam of data that is generated by devices such as wearables.

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[20] Piwek, 2019
[21] Marr, 2016

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