

# Digital fitness: Self-monitored fitness and the commodification of movement

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## Abstract

This article moves beyond a history of domestic home video fitness programs to explore digital fitness with specific attention to the self-monitored fitness ‘movement’ and the hardware and software that facilitate its proliferation. The research in this area is currently conducted through preliminary small scale studies, alongside some flawed but still (inadvertently) useful undergraduate and graduate projects. Popular cultural interest is burgeoning, with the popularity of the Fitbit suite and the iWatch surging through an array of commentaries on blogs, YouTube videos, tweets and Facebook posts. This theoretical paper links digitisation with fitness to explore the balance between self-monitoring and surveillance, motivation and shaming. The Fitbit is an example of this self-monitored fitness ‘movement’ that reveals the ambivalence of quantifying steps and stairs while managing a volatile neoliberal working environment.

**Keywords:** quantified self, self-monitored fitness, commodified self, self-surveillance, iWatch, Fitbit

Digital media are mobile media. For regional and remote communities lacking infrastructure for health, leisure, fitness and sport, digital platforms can deliver podcasts, YouTube videos, applications and digital connectivity to a range of locations with access to the internet (Brabazon et al., 2015). While some geographic locations may not encase the cycleways, pathways, lighting or safety for walking, running, cycling or skating on the streets, digitization can deliver fitness opportunities to the home, school, university or workplace, or while on the move. This movement matters. Rachel Aldred and Katrina Jungnickel recognise ‘the sociological significance of mobile places’ and ‘mobile place-making’ (2012, p. 523). While much attention in sociology has focused on identity and / in place, how selfhood is managed on the move remains both a potent and under-theorised area. This paper takes on Aldred and Jungnickel’s challenge, with specific attention to the emerging—and mobile—terrain of self-monitored fitness. When the body moves, meanings adhere to it. When that movement is monitored, the meanings are available for analysis.

Analogue ‘aerobic’ videos in the 1980s ensured that a session could be played at the convenience of the user, delivered through home-based technology such as the video recorder or DVD player. With laptop computers, tablet-based platforms and smart phones, the

mobility of these programs has increased, delivered whenever and wherever a user presses ‘play’. From step aerobics to strength training, from walking programs to yoga and meditation, movement and motivational plans can be delivered to users, regardless of their location. This just-in-time exercise and fitness slots into and through the work and leisure schedules of the user.

Often these programs are marketed through a celebrity photograph and name on the iTunes banner. Jane Fonda’s aerobics programs in the 1970s were the successful originator of this model. One of the reasons for her success was Fonda’s personal and professional commitment to fitness (Fonda 2011), and her use of voice and voiceover through the popular songs selected for the album and videos. When the celebrities have deployed personal trainers and fitness experts, these sessions work well. Jerri Hall’s yoga is located in this category. A modern failure is Kim Kardashian’s ‘Fit into your jeans by Friday’ (Kardashian 2011). With Kardashian dressed as if for a sadomasochistic ritual rather than an exercise class, the session is awkwardly choreographed and the voiceover poorly phrased. Step classes require very concise and timely instruction. Kardashian is more focused on posing, pouting and posturing. Therefore the celebrity fitness subgenre poses its challenges. Now that personal trainers have become celebrities through such programs as *The Biggest Loser*, disintermediated digital fitness routines have emerged. Jillian Michaels (2009) and Michelle Bridges (2015) provide clear examples. These celebrity trainers reveal challenging issues and concerns for participants. The nature of literacy—including body literacy—is that forgetting is part of the drive to competency. In other words, we rarely remember the effort required to learn the alphabet or times table. The resultant literacy and numeracy is applied in daily life. We forget the intensity of the early driving lessons when conducting our daily commute. Similarly, once fit, it is easy to forget the pain and difficulty in reaching this state. The deep and difficult challenges in moving a large body, often lacking strength and flexibility as much as fitness, is lost to these trainers. In Michelle Bridges book *Powerful Fitness*, the first exercise she teaches readers—on page 14—is a handstand (2015). This exercise requires strong wrists, elbows and shoulders to develop the alignment of the joints, high rotational flexibility in the shoulders and excellent balance. The developmental program required before this handstand can be successfully executed is unmentioned and denied. The question is how to motivate and support the inactive to move, to build foundational cardio fitness, strength and flexibility. For even experienced exercisers, to turn to the first exercise in a book and see an unreachable goal is both debilitating and disconcerting.

These fitness ‘leaders’ offer digital materials to analogue exercisers, regardless of their location. This is celebrity fitness. The advantage of these digital applications and some of the exercise videos is that men and women who are embarrassed to engage in public fitness can move and improve within the privacy of their own home. Walking and yoga sessions are located on a continuum of fitness (Wise and Hongu 2014, p. 1), providing an entry point for most fitness levels. Podcasts and audiobooks on walking can accompany a walk through physical space. The company Gaiam provides a range of levels in their digital, visual programs, from the simplest of stretches to complex, high strength movements. Rodney Yee and Wai Lana offer a range of sequences for all fitness levels. Such diversity is important, as it is crucial to establish multiple entry points into fitness. Commencing a program to improve health and physical mobility can be intimidating and painful. Physically, there are actions and positions that cannot be achieved. Confidence can be lost. The key is to find a basic, simple and motivating session that can scaffold further movement and abilities. As Zoe Harcombe confirms, ‘we must be open to the idea that (quite logically) people are not, for example, overweight because they are sedentary, but they are sedentary because they are overweight’ (2010, p. 26). This is an important inversion. Assumptions about ‘normal’ mobility, movement and bodies are profoundly damaging and inhibiting of motivation, not only for men, women and children with impairments, but for those with health conditions that limit the scale and scope of mobility. Further, as we all age, the capacities of our bodies transform. Therefore, customised, flexible, digital fitness applications can produce, encourage and enable this range of movement cultures.

This article moves beyond a history of domestic home video fitness programs to explore digital fitness with specific attention to the self-monitored fitness ‘movement’, and the hardware and software that facilitate its proliferation. The research in this area is emerging, currently being revealed through preliminary small scale studies, alongside some flawed but still (inadvertently) useful undergraduate and graduate projects. Popular cultural interest is burgeoning, with the popularity of the Fitbit suite and the iWatch surging through an array of commentaries on blogs, YouTube videos, tweets and Facebook posts. ‘Fitbit Studies’ has an opportunity to reveal much about bodies through both the movement and the monitoring.

While recognising and studying this proliferating digital hardware, software and information about fitness and health, there remains a paradox. While the benefits of exercise are clear, in terms of improving health and longevity, it is still difficult to motivate the sedentary to move, particularly with regularity. In other words, there is an awareness that

exercise will increase health, but this recognition is not sufficient to implement a change in behaviour. Rationality, logic, causality and predictability—the bedrocks of positivism and empiricism—are not the best guides through this research puzzle and problem. Such connections between consciousness and motivation are made even more complex when displacing the word ‘health’ and considering ‘wellbeing’ or ‘wellness’. Studies have shown that the relationship between ‘exercise’ and ‘wellbeing’ is not causal (Kerr and Van den Wollenberg 2007). However, there is evidence linking increased physical activity with a reduction in diseases such as diabetes, hypertension and obesity (Warburton et al. 2010).

A new pathway to manage this disconnection between consciousness and behaviour is ‘self-monitored fitness,’ that is part of the wider ‘quantified self’ movement. My theoretical work in this article links digitisation with fitness to explore the balance between self-monitoring and surveillance, motivation and shaming. Basically, I ask why people do not behave in their own best interests and if targeted and customised fitness information can intervene in this paradox. To commence this inquiry requires an exploration of the movement towards a ‘quantified self.’

### **Quantified self**

Considering the relative newness of the phrase ‘self-monitored fitness’, it is important to recognise a phrase that is similarly young, even if in digital terms it comes across as a grandfather: the quantified self. It is no surprise that the phrase ‘quantified self’ was first summoned by *Wired* magazine editors, Gary Wolf and Kevin Kelly, in 2007 (Wolf 2009). After this initial usage, a Quantified Self website was established, together with Quantified Self Labs. There is a Quantified Body podcast. As Wolf disclosed, the goal is to track ‘every facet of life, from sleep to mood to pain’ (Wolf 2009). This tracking is also mapped, particularly through geosocial networking interfaces such as Foursquare, Facebook and RunKeeper. The statistics of life—at least with regard to the body and emotional state—are logged through weight, height, heart rate, diet, fitness and mood. Services such as Map My Walk connect analogue movement with digitised tracking and mapping. The Fitbit Surge reveals the walking or running journey through Google Maps. Other areas of life, such as finances can also be logged. These hyper-individualised data collectors also collectivise and share this information with others, becoming known by the collective noun ‘Quantified Selfers’ (Choe et al. 2014).

The intricate intellectual rub emerges when this quantified self becomes a commodified self. This personal data has commercial value, targeting particular advertisements and

featured links through Google and Facebook. The customised digital landscape transforms the World Wide Web into the narrow, personalised portal. This is self-tracking, life logging and constructing a database of personal analytics. Note the language within the commentary of Kay Connelly et al. (2012, p. 1): ‘anyone can be a consumer of quantified self-management technologies’. Firstly, the pervasive generalisation that has accompanied histories of the internet, web and digitised platforms—that ‘everyone’ and ‘anyone’ can participate—is present in this statement, ignoring the intricate and volatile sociology of digitisation. The audience (consumers) of disparate hardware and software must be studied, not assumed. Different groups use platforms in different ways. Similarly, the literacies required to use digital interfaces, whether sonic or visual, are frequently forgotten by the already competent. It is assumed ‘everyone’ is online, ‘everyone’ has a smart phone and ‘everyone’ can use it. But further, the language has moved from a ‘user’ of quantified self-management technologies to a ‘consumer.’ The quantified self splashes into the commodified self.

The rise (and rise) of the quantified self in the last decade has a very precise context. Its initial usage in *Wired* magazine emerged just as the Global Financial Crisis erupted. Its popularity jugged from a period of austerity (Blyth 2015), scarcity (Mullainathan and Shafir 2014), zombie capitalism (Harman 2010) and the precariat (Standing 2011). In this context, the quantified self bounces between self-surveillance and narcissism, through to the ‘excuse’ (or mask) of eHealth in a time when public funding is either threatened or in decline. In an environment of little control—with an array of macro-cultural fears such as climate change, terrorism and the global financial crisis—Chris Till realises the costs and consequences of this hyper-measuring of the self. He argues that

a thermodynamic model of the exploitation of potential energy underlies the interest that corporations have shown in self-tracking and that ‘gamification’ and the promotion of an entrepreneurial selfhood is the ideological frame that informs the strategy through which labour value is extracted without payment. (2014, p. 446)

Labour value is a complex concept, politically, socially and economically. Karl Marx’s double freedom—all workers have to sell is their labour, but it can be sold to any capitalist organisation (1990, 874–5)—is compromised through the labour value now extracted via ‘leisure time’ and the commodified self. The (ironic) gift of data generated by consumers who have purchased the hardware to enable its collection is that post-Fordist diversity and customisation is disciplined into a standardisation of steps, bodies and movements. This is

digital labour where ‘the forces at work ... coerce people into accepting the necessity of engaging in such productive activities for little or no pay’ (Marx 1990, p. 449). The key word in this interpretation is ‘coerce.’ This is not the coercion suffered through the moving assembly line or the brutality of textile mill masters. This is the coercion of deep and profound pressure—and surveillance—of bodies, gender, age and shape. In Althusserian terms, the ideological state apparatus is doing its job very well (Althusser 1970). The abuse, attacks and judgement are focused on the self rather than the state. The repressive state apparatus is not required. As the self-surveillance increases through the quantified self ‘movement,’ the coercion and self-questioning is internalised. Online dashboards establish normative expectations that are carried on the body and updated to the phone. What makes the power alignments so intricate in this case is that the citizen / user / consumer has chosen to purchase the wearable device that monitors, evaluates and ranks them. They have bought the instrument that surveys and commodifies them. They have consented to—and encouraged—their own oppression.

With the radical transformations to the economy and workplace, it is no surprise that the economic value to be extracted from leisure is being realised by businesses. Physical exercise is linguistically tethered to work through such phrases as ‘working out’. It is attached to institutionalised education via a ‘fitness class’. However the commodification of leisure is a form of re proletarianisation (Gray 2015; Brabazon and Redhead 2014), to squeeze value out of non-working time. The gamification elements of the quantified self—through badges supplied for achieving goals—increases the objectification of the activity. Therefore, not only is work measured through key performance indicators (KPIs), performance management and time sheets, but productivity is also evaluated in leisure time. This is an issue of metacognition which, at its most basic, is defined as ‘the knowledge and control an individual has over their thinking and learning activities’ (Ming Tang and Kay 2014). Gamification strategies can provide motivation to improve and transform. Achievement badges provide another form of engagement with the interface. They can be provided for distance, climbing, weight loss and gain or reaching specific targets for blood sugar or heart rate. These are extrinsic rewards and their value has been questioned in the literature (Munson and Consolvo 2012).

The gamification methods deployed in quantified self and self-monitoring fitness sites include leaderboards that list the achievements of ‘friends’ and graphic material to show individual progress. UbiFit has a garden whereby fitness is represented by the growing of

plants. Fitbit permits social interaction, allowing users to find friends and join communities that share a geographical location, an interest or occupation. Healthy Together is a mobile application that pairs users to exercise together and which rewards the pairs with badges for success. All these strategies create goals and record (and often reward) outcomes. This is important. As Yu Chen, Jiyong Zhang, and Pearl Pu confirm in their research, ‘social accountability has been shown to be effective in helping users to achieve goals’ (2014, p. 221).

One sociologist is building a distinctive pathway through this ambivalent terrain of the monitored / surveyed self. Deborah Lupton has offered the first sociological sweep of the quantified self (2014a). This project is inserted into her wider research into *Digital Sociology* (2014b) and *Fat* (2013). In her research on the quantified self, she locates different modes, such as private and pushed self-tracking. Private self-tracking is the collection of information to build consciousness and self-awareness. Pushed self-tracking is delivered from another agency or agent. It is a motivated information flow, to persuade an individual to change their behaviour. Workplace fitness tools and programs are part of this movement. Software can remind workers to stretch, stand and walk. Most importantly, fitness—an often abstract formation—can be visualised.

Information is irrelevant unless interpreted. Data must be connected with goals to develop motivation and intervention in the daily behaviours of life. Motivation and change are very difficult to summon, create, sustain and maintain when considering health and fitness. Nations with a proliferation of obese citizens live in obesogenic contexts. That means that while individuals are blamed for excessive body fat, high calorie food and sedentary tasks punctuate workplaces, homes, schools and universities. As Brian Wansink shows (2011), it is the myriad of choices and decisions about food each day that creates obesity. Therefore his argument is that the choices must be removed from the environment to assist in the reduction of an individual’s weight. If food choices are reduced, weight reduces with them. Motivation is increased by necessity, because the availability of food—an obesogenic context—is reduced.

In terms of physical activity, rather than food, studies have been conducted to understand how motivation operates for particular populations. The remaining key research problem is that if there is a popular cultural consensus that exercise improves health, then why is it so difficult to nudge citizens towards movement? Jochen Meyer and Andreas Hein have offered a strong answer to this troubling question. They probed the consciousness of personal

behaviour in either increasing or mitigating health risks. While they attempted to study how to encourage heart healthy behaviours, upon dissemination of self-monitoring devices, their research subjects focused on shorter term, visualised and realisable goals:

Our participants were very interested in healthy living and had probably an above-average degree of knowledge on that issue. The intention to live heart-healthy was generally understood and appreciated. Nevertheless our goal and guidelines were not particularly appealing to them. They found little motivation trying to live more heart-healthy in general, and were much more focusing on increasing daily activity. Moreover, the participants suggested goals such as weight control or increasing fitness. Therefore we conclude that general goals for healthy living must be broken down into concrete and actionable sub-goals that are personalized to match the individual user's needs and that may well change with time. (2013: Para 47)

While this is a conclusion resulting from a small study focusing on heart health, there is a much larger point being made here. Words such as 'wellbeing' and 'health' are ambiguous to the point of uselessness. The quantified self—and the platforms and interfaces to enable it—develop the creation and visualisation of proxies. Steps are measured. Intensity levels are measured. Stair climbs are measured, alongside the conventional weight and height. But these measurements and clear goals, such as 10,000 steps a day are realisable and useful for participants.

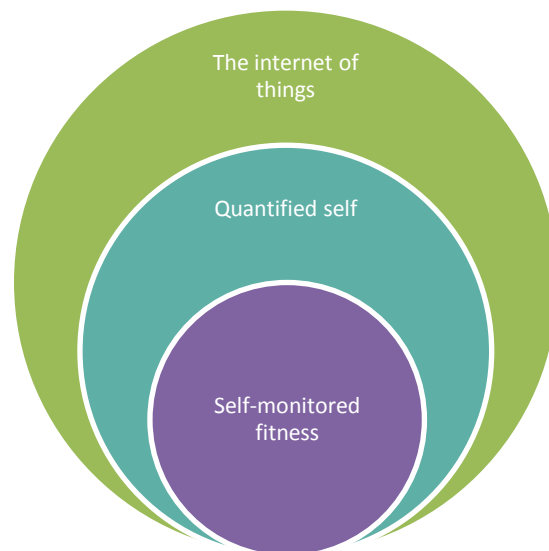
The quantified self—and self-monitored fitness that emerges from it—adds another layer to the measurement of health proxies. The quantified selfers share the numbers with a community of trackers. The encouragement and competition creates both support and gamification elements. This strategy can be deployed in specific workplaces with annual 'fitness challenges' as part of a wellness program, geographically dispersed interest groups or healthy cities projects. This is a communitarian project at its best, and a ruthless commodification of a neoliberal self at worst. As Lupton has described, 'self-tracking may be theorized as a practice of selfhood that conforms to cultural expectations concerning the importance of self-awareness, reflection and taking responsibility for managing, governing oneself and improving one's life chances' (2014a, p. 12). Within this discourse, an individual becomes responsible for 'life choices,' dispensing with the mitigating contexts of work, family or location. A neo-liberal, libertarian and anti-statist foundation is assumed. Within this discourse, an individual is free to make decisions and is therefore held responsible for the (poor) choices. Context and environment are displaced, to focus on 'the individual' making



choices about food, exercise and—as a consequence—obesity. The wider cultural changes, such as unstable and sedentary work, digitised, home-based leisure, screen cultures in education, and a fear about personal safety are all major points of consideration, beyond an individual's 'choice'.

Instead of understanding this changing environment, it is easier to blame and shame. An atomised, rational, responsible and quantified self is well-informed to make the best choices. The quantified self platforms and interfaces can provide that information to assist those choices. Feedback is available, either directly from the device or via Bluetooth-connection to a computer or mobile phone. The question remains, how do wearers respond to this information? Is it motivational? Is it shaming? The answers to these questions must be multiple in terms of motivation. Enthusiasm and achievement are matched with disappointment and self-loathing.

While self-monitored fitness is nested into the quantified self-movement, the quantifiable self is part of the wider culture that is often encased in the phrase, 'the internet of things' (Couturier et al. 2012). Referring to the link between machines, via sensors, the goal is to develop wide-ranging data sets that provide information for change. This could be for disintermediation, reducing the layers or tiers between producers and consumers. Data can also be shared to simplify purchasing choices through prior patterns (Kellmereit and Obodovski 2013).



**Figure 1** Visualising the relationship between the internet of things, the quantified self and self-monitored fitness

In 2008, the number of devices on the internet exceeded the number of people online (Swan 2012). Since this year, the burgeoning objects that are findable, readable and controllable have expanded. Embedded microprocessors monitor and manage buildings, transportation vehicles, networks and personal tracking, particularly for health (Swan 2012). Data then moves to personal dashboards. These rankings are shared through social media. Again, the next stage is the pivotal one. In response to the information on this dashboard, how does the user engage with this information? Is it consumed passively? Are changes made to behaviour? These questions are part of a wider investigation of interface culture. Kai Kunze, Masakazu Iwamura, Koichi Kise, Seiichi Uchida and Shinichiro Omachi have described this moment of connectivity as ‘activity recognition for the mind’ (2013 p. 105). In other words, the interface allows movement to be both counted (quantified) and visualised. This mobile-sensing technology incorporates an array of movements, including the counting of steps and the effectiveness of sleep, as measured by a lack of movement. Smart-phone applications such as RunKeeper activate geosocial networking that digitally represents analogue walks and runs. This means that while the infrastructure for physical movement cultures—such as tracks, pools and parks—in a city, town or region may be limited, a digital net can be cast over the space to reveal pathways for health and fitness. RunKeeper also allows a virtual cheer squad of friends following the runner during the run. This support is delivered to the runner via a mobile phone or iWatch.

The smartphone matters to this discussion. They can run complex applications, are connected to the internet and are able to wirelessly deliver information on the behaviour of their owners. This transforms eHealth into mHealth, with the caveats that the individuals receiving information will not have the expertise to decode or understand it, in terms of diagnosis (Ghezzi et al. 2014).

This alignment between the quantified self, self-monitored fitness and geosocial networking—the internet of fitness rather than things—can create productive opportunities for both tourism and livability in a city. This relationship can reveal towns and cities as pathways and routes into physical activity. However, the monitoring of the self does not inevitably or intrinsically lead to increased physical activity or indeed social change of any kind. However, through the additions of these geosocial mapping applications, the pathways through both a tourist and residential landscape can be highlighted, mapped and transformed. Stefan Diewald, Andreas Moller, Luis Roalter and Matthias Kranz recognises the value of using ‘fitness routines in everyday trip planning’ (2014, p. 383). These researchers are

operating in the space between tracking movements and changing movements, recognising that logging information is not sufficient to create an interpretation that inspires a shift in behaviour. They explore the value of a trip-planning application, logging the current steps in the day, estimating the number of steps to reach the goal for the day, and then constructing a fitness route to reach that goal. This project ensures that self-tracking information is in context, either to encourage active tourism, create an awareness of a local neighbourhood or to experience a different environment. It is an expansive activity, moving the gaze from down to the mobile phone's screen to the horizon.

The mobile phone delivers information on the move. It is the key interface for mHealth. While the definition of mHealth is still unstable, the word refers to the use of mobile devices to record, track and monitor patients / citizens / consumers outside of a doctor's surgery or hospital (Khorakhun and Bhatti 2014). The challenge is that—as revealed earlier in this paper—the challenge is that 'health' is a profoundly ambiguous state that transforms radically when considering social variables such as age, nation of residence or occupation. It is also reliant on a series of proxies—often supplied through the interfaces of the quantified self—to signify health. In other words, taking (and recording) 10,000 steps in a day signifies fitness. A measurable variable connotes wider fitness and health. The accuracy of this target and the relationship between the proxies and the reality of health are more difficult to determine.

Once more the status and value of the information and its interpretation must be questioned. Research is at an early stage. A new mode of 'quantified self' is being studied, emerging through graduate research projects that are typically under-funded and under-theorised, but with fascinating trajectories for future study. Viorela Tarachiu investigated not only the wearing of a Fitbit Zip, a small pedometer, but expressing 'mindfulness' through a writing task each evening. The researcher confirmed that the combination of quantified and qualified self—Fitbit step counts and journaling—'increased levels of physical activity' (Tarachiu 2014, p. 1). Therefore, aligning information and interpretation, data and reflection, had the greatest transformation in behaviour. The measurement was only one part. The self-awareness about the movement leads to an increase in physical movement.

Considering the subtlety of this small study and the innovative pedometer that created the data for this investigation, it is of value to explore the hardware that has moved the quantified self from a minoritarian pursuit for the *Wired* magazine audience and into a popular cultural

artefact. The Fitbit is the popular cultural part of the quantified self-movement that has enabled the creation of self-monitoring fitness cultures, with a wide and increasing audience.

### **Fitbit culture**

Fitness is a commercial enterprise. Gym memberships are major commitments for individuals and families. Home-based equipment and fashionable exercise programs such as Zumba are sold through infomercials. The goal of these programs is to match fast food with fast exercise. These programs do not recognise the importance of motivation to fitness, and the difficulties—physically and emotionally—in moving from inactivity to activity. Buying an elliptical trainer does not mean it is used.

The greatest challenge in creating a fitness regime is standing up from the lounge suite and beginning movement. Indeed the first ten steps—from the television to the front door—are the most difficult in terms of motivation. The reason that these first few steps are so difficult is that physical, emotional and social barriers align into a bundle of fear, self-loathing and judgement. It is uncomfortable to move a larger body through physical movements. While aerobic fitness does increase relatively quickly with sustained training, the first few sessions are very difficult and arduous for the body. The sweaty, straining body is not an attractive site/sight. There are also emotional concerns such as the fear of failure (again) and embarrassment. Thirdly, there is the social pressure of surveillance, particularly in gyms, where the overweight are judged rather than supported. Therefore, avoiding these social pressures and carefully preparing and stepping into a fitness routine is the key. If attending a group fitness class, then it is difficult to keep up with the group. If following a digital program provided through an application or a Polar Watch, it can be saddening if particular movements are not possible. Therefore, a basic and cheap exercise regime of gradual improvement, focusing on the (quantified) self rather than a group of exercisers, is a way to break one pattern of behaviour and commence another.

The issue is how to reach a level where a greater array of movements—particularly sustained movements—is possible. This is enabling fitness. The best way to build fitness is to be fit. While, at best, walking is a primary means to create base-line fitness. For men and women on wheels or with a frame rather than self-standing legs, accessible physical fitness programs are even more challenging to find and deploy. An array of programs based on walking, particularly as part of self-monitored fitness programs, are available. Walking is an accessible movement, attracting people within a wide spectrum of abilities (Graham 2012). Walking for fitness can assist weight maintenance and loss programs, develop the strength of

bones and muscles and manage high blood pressure and diabetes. The nature of self-monitored fitness is that it is motivational to increase incidental movements, building fitness through increments. It encourages the use of stairs rather than an elevator or walking to the shops or workplace, rather than using a car.

One target that has proven popular is 10,000 steps a day. This is a challenging figure. Incidental movements alone cannot achieve it. Therefore a change in behaviour—involving sustained walking for a 60 minute period—is required. The measurement of steps is useful because it can track daily efforts and improvements. Very basic technology—a pedometer—is the only implement required. The pedometer—as the name suggests—measures steps. By tracking steps per day, a gradual progression to 10,000 steps can be activated.

An early form of pedometer is believed to have been invented by Leonardo da Vinci to assist in the development of maps (Cooper 1965, p. 101). The mechanism of the pedometer was developed by Abraham-Louis Perrelet in 1780 (Chapuis and Jaquet 1956), being introduced to the United States by Thomas Jefferson in 1789 (Madison 1973, pp. 265-72). The modern version of the pedometer that targeted 10,000 steps as a daily goal was invented by Yoshiro Hatano (Tutor-Locke et al. 2008). The digitised version of a pedometer is termed an activity tracker. It is an accelerometer and worn on either the trunk of the body or the arms, and it not only measures steps but also duration, frequency and intensity. Some activities are better recorded than others. Most models of the Fitbit do not measure cycling. Lance Dalleck confirmed that the weakness of pedometers and accelerometers is that even though they measure steps effectively, energy expenditure and intensity have proved more challenging (2013). In regard to these impediments in measurement, studies differ in their view of how successful pedometers and accelerometers are in increasing the level of physical exercise. Many studies are small and conducted by graduate students. They will be reported and discussed in this article. A proto-Fitbit study by Dena Bravata in 2007 confirmed that pedometers are ‘associated’ (rather than cause) an increase in physical activity. Bravata also reported a reduction in blood pressure and the body mass index. She was not able to report on the long-term intervention and impact of the pedometer (2007). While accelerometers are increasing in their features and cost, pedometers remain the cheapest exercise equipment available. Now that the market has proliferated, there is a product to match the needs of an exerciser, or would-be exerciser. The smart phone and its array of applications add to the value of the pedometer / accelerometer, transforming exercise into a program with a target.

The best known digital pedometers / accelerometers are produced by Jawbone, Nike, Withings, Fitbit, BodyMedia Basis B1 and DirectLife. They offer an intimate alignment of analogue and digital, human and computer. The mid-2010s has been the moment for these digital devices, based on the proliferation of smartphones in the market. But other variables are also important. The popularity of Facebook, particularly as a meta-networking interface that links other social networking options, means that a large segment of the population is now accustomed to (over)sharing information. Therefore, hardware such as the Fitbit can now be studied, not only by how it works but why it is now becoming popular.

Fitbit was created in 2008 by James Park and Eric Friedman. The goal was to integrate fitness into daily life beyond a gym. Andrew Miller realised:

We're now able to study the fitness tracker as more than just a personal data-gathering tool; we can now treat it as a social and cultural artefact. We can embed trackers into new kinds of socio-technical systems, ones far different from those we'd construct for lab studies or feasibility deployments. And we can begin to study how fitness trackers might help people manage their everyday health as individuals and communities. (2013, p. 24)

Instead of studying 200 college students in the United States and pretending that the results are generalisable, new data sets are available involving millions of people who release private data into the digitised public domain and also discuss their struggles and achievements. Through [www.fitbit.com](http://www.fitbit.com), an array of publicly available statistics and commentaries are revealed to understand how thousands of people negotiate fitness in their lives. Researchers do not require surveys and interviews to source deeply personal information such as weight and exercise (Lee 2013, p. 197). Instead, participants invent a nickname and disclose information that they are comfortable sharing with others. The Fitbit dashboard allows users to reveal only the parts of the personal data they are comfortable to share. The quantified self—measured by the Fitbit—is matched by a qualified self, discussing problems, strategies and opportunities for improvement and change. No longer are proxies required or Survey Monkey answers delivered from one university student to another. Actual data is recorded and personal commentary about that information is publicly available.

Digitisation and miniaturisation have transformed the pedometer. Objects such as the Fitbit demonstrate the impact of hands-free computing. Hardware improvements, including battery longevity, are increasing the usefulness of these implements. They are 'portable, wearable,

placeable, consumable, and implantable’ (Trickler 2013, p. 197). The cliché of the ‘sedentary lifestyle’ is now matched by wearable technology that measures even the smallest step. Such a pairing demonstrates the ambivalence of digitisation. Gaming and computing encourage a sitting culture where the mind is active and stimulated, but the body does not move. The Wii transformed this sitting culture, adding bodily movement and senses to gaming practices. Yet this is not only a problem of digitisation. Urbanisation has increased, involving people living in more compressed spaces. Therefore leisure opportunities in green spaces have been reduced. Further, commuting distances and times have increased, with sitting time also extending through cars and public transportation. This immobility has impacted on health through a decline in physical activity.

At this point, an intervention is required. One task of this article is to question the easy causality of health and fitness, movement and sickness. It is important to problematise both words: ‘sedentary’ and ‘lifestyle.’ Digitised technology is an enabler of a leisure environment of sitting and also offers strategies to increase physical fitness. The physical work required for men and women in the home and workplace has reduced from the accurately labelled ‘labour-saving devices.’ These washing machines and automated vacuum cleaners reduce the physical activities in the day. Similarly, the word ‘lifestyle’ should be questioned (Maycroft 2004).

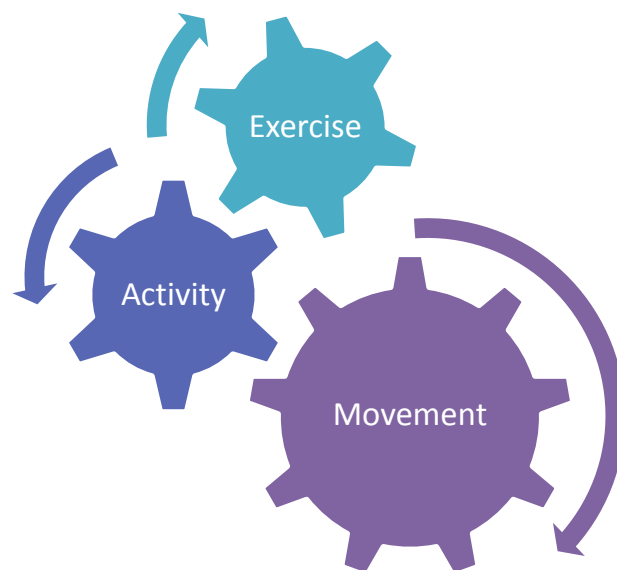
Recognising this context, it is a challenge to increase the capacity, ability, time and motivation for physical activity. The working day for many occupations is anchored to emails and meetings. Our time is not within our control. Noting this cultural shift, an array of monitors and applications has been developed for this purpose. One such device is Lumoback, that addresses incorrect posture, and the Bandu Watch, which monitors stress. To change movement behaviours during a working, school or university day is more complex. A plan is required. The assumption of the quantified self-movement and the self-monitored fitness companies and the communities that support them is that the measurement of these variables provides the impetus and motivation to change. Information creates change. Nike’s Fuel Band and the Fitbit suite are examples. A longer history is derived from the Polar Watch that measures heart rate and—in later models—assembles a ‘fitness plan’ for the user, with a specific weekly target for fat-burning, fitness and maximal performance.

This is wearable computing that offers simple and everyday interfaces to connect an analogue body to digital environments. The iWatch is the archetype of this principle. With the conventional watch losing its timekeeping functionality, replaced by mobile phones,

Apple has reconfigured and reimaged the watch as a health keeper rather than a time keeper. This is ‘the internet of things,’ offering profound costs and benefits. To enact change in behaviour requires intrinsic and extrinsic motivation, which is provided by these devices. Yet the measuring and collecting of this data is shared through social and geosocial media. At this point, the challenges to both privacy and commodification emerge.

This is the moment where social media transforms into transactional media. It is important to recognise the distinctiveness of social networking when carrying health data as collected through self-monitoring devices. Kristen Daly recognised the scale of this influence, affirming, ‘a new situation where health can be integrated into and change our self-identity, our social relationships and our relationships with our communities both local and global, on-line and in-person to a much greater extent than in the recent past’ (2015, p. 35). Health discussions can be triggered by media connectivity, reducing isolation and building confidence. The health informatics examples where online communities have assisted the support and care of individuals are powerful, with convincing case studies encircling Parkinson’s disease and dementia.

We return to the key question of this article: how the monitoring of movement creates a motivation for change. Three eight letter words can enable change: movement, activity and exercise. But motivation requires a very complex mixture of intrinsic and extrinsic motivation. An array of fitness ‘bucket lists’ have appeared, visualised through Pinterest pins. These are motivational, but revolve around conventional standards of attractiveness, including, for women-users, being slender and possessing a flat midriff.



*Figure 2* Conceptualising the relationship between exercise, activity and movement



Health is a cascading discourse. Increasing movement can enable a greater array of activities, which then provides the opportunities for formal and informal opportunities to exercise, either alone or with others. Yet how to create that moment of and for intervention remains the challenge. Michelle Obama—and from the office of the first lady—created the Let’s Move initiative. The goal was to change life patterns to insert movement into the day, whether gardening, walking or dancing.

Cultures of accountability are based on instruments of measurement (Wood 2014). The Fitbit has entered popular culture with an array of commercials. Their research, which is obviously commercially driven, has reported that wearers increase their step-numbers by 43 per cent and that the average Fitbit wearer logs 6,000 steps a day (Wood 2014). The accuracy of this data is less important than a consideration of the cultural arrival and proliferation of the Fitbit. It is an object that channels the challenges and aspirations of daily life. It also provides a pathway into the wearable technology culture, opening the body out to digital interfaces. Mikel Delgado—asking ‘How fit is that Fitbit’ (2014—realised that the company had transformed the market, claiming 50 per cent of the sales of wearable fitness devices. The wearability does matter as it inserts an awareness of fitness into daily life. On some models, a buzz on the wrist indicates when a goal is reached. On other models the number of steps achieved are recorded, interspersed with personalised motivational—if cheesy—phrases. The data fed to the smartphone means that on the first screen, Fitbit reports the number of steps required to reach the target. These reminders are significant, alongside the expectation that a goal such as 10,000 steps could be reached. Delgado reported:

Reasonable goal-setting was critical to engagement, including allowing primary goals (such as steps per day) and secondary goals (steps per week). Participants who received reminders to exercise reported being more likely to follow through, but the reminders had to be specific to the individual’s goals, not just ‘hey, exercise more today!’ Receiving virtual rewards (such as ribbons and badges) was not motivating, and participants found them gimmicky. People were also hesitant to share their exercise reports via social networks due to embarrassment or fear of boring people with posts about their exercise goals. (2014, p. 6)

There are many reasons for Fitbit’s success, which adhere to the Bauhaus principle of form following function, while also presenting an array of goals. Short term goals are mapped: the number of steps and stairs, and longer term goals such as losing weight are also tracked. The importance of live feed means that an instant recognition of achievements is delivered to the

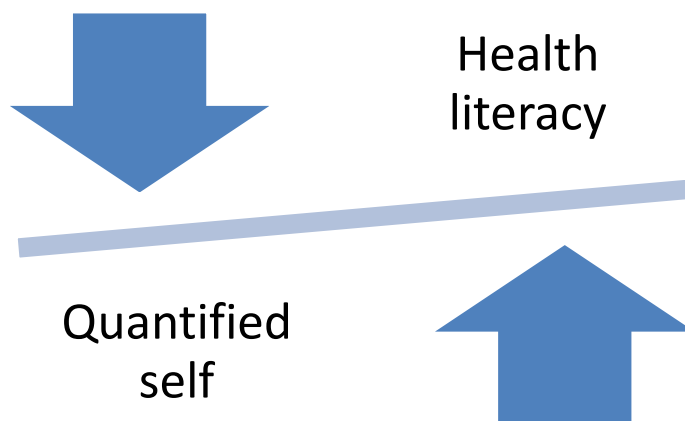
device and the mobile phone. There is instant gratification for ‘working out.’ The key question remains: is this gratification motivating?

### **Fitness literacy**

Health literacy is an important and emerging phrase. It carries policy momentum. The U.S. Department of Health and Human Services released the National Action Plan to Improve Health Literacy in 2010. The term was defined as follows:

The skills of individuals are an important part of health literacy, but health literacy is not only about individuals’ skills. Health literacy in the U.S. reflects what health systems and professionals do to make health information and services understandable and actionable. Professionals, the media, and public and private sector organizations often present information in ways that make it difficult to understand and act on. (US Department of Health and Human Services 2010, p. 5)

Health literacy requires an understanding of the body, but also the reading and writing (encoding and decoding) required to connect information to lived experience. The body is inserted into a health system. Yet health literacy is most frequently applied to organisations and professionals. The quantified self is of a different order. It is ‘bottom up’ rather than ‘top down.’ The link between these two forces—health literacy and the quantified self—is fitness literacy.



*Figure 3* What is the relationship between the quantified self and health literacy?

This article concludes with two emerging studies of fitness literacy. While distinct in origins and outcomes, they offer the trajectories for future research. The challenge in understanding self-monitored fitness is that the early studies in this area are completed by upper undergraduates and postgraduates or are guides through the hardware. For example, Megan

Kelley in her senior thesis, completed a study involving a sample size of 166 undergraduates, made up of 60 men and 106 women. She sent a survey, via email to undergraduate students in March 2014. The response rate was 13 per cent (2014, p. 14). Kelley confirmed that the gender split of her returned surveys was not even representative of Claremont McKenna College (2014, p. 15), let alone the wider population:

I find some evidence of an effect of mobile use on weight but the effect goes in the opposite direction. This suggests that mobile users tend to be heavier than non-mobile users. I further find no evidence of an effect of wearable use on users BMI levels, and also find that neither mobile usage, nor wearable usage have an effect on respondents' self-reported health measures. (2014, p. 8)

Overweight people join Weight Watchers. It does not mean that Weight Watchers causes obesity. Causality was assumed in Kelley's study where a casual relationship actually existed. As she reported: 'Students (both males and females) with lower self-rated health (i.e., higher poor-rate health and lower excellent-rated health), and higher BMI levels (i.e., BMI and overweight) are currently using mobile [monitors] more than their non-mobile counterparts' (2014, p. 20).

The researcher went on to argue that 'this trend seemed surprising, as casual empiricism suggests that mobile adopters would be more likely to represent healthier individuals relative to non-mobile users' (2014, p. 24). The point is that casual empiricism is wrong. Empiricism is wrong. She missed a step in her interpretation. Information is not analysis. Data sets are not research. The motivation to create a change has led to the desire to find a solution to a health and fitness concern. If there was not 'a problem', a solution would not be required. The Fitbit is one option to enable that solution.

Conversely, Meghan Butryn, Danielle Arigo, Greer Raggio, Marie Colasanti and Evan Forman conducted a study of 'midlife' women. This study confirms why the sociology of health and self-monitored fitness requires subtlety and care. Conducting a three month test, they realised the 'critical need to develop physical activity promotion programs that are effective for maintaining behaviour change and use intervention methods that are broadly disseminable' (2014, p. 2). Thirty-six women started, four withdrew and four were lost to follow up. The study revealed significant weight loss in the study's subjects, with the Body Mass Index of the group decreasing from 31.8 to 30.9 (2014, p. 4). This group showed a distinctive result to Kelley's study. Other groups, such as the elderly, would similarly present

different results (Brabazon 2015). Another group of undergraduates that were studied revealed that ‘overall the results indicate that more Fitbit usage could lead to higher motivation to exercise, awareness of one’s activity level. They also reported feeling healthier, more satisfied with Fitbit, and were positive about recommending others to use Fitbit’ (Shih et al. 2015 p. 5). What all three diverse studies share in terms of results is that the Fitbit was a motivation for men and women who wanted to change their fitness level.

Does awareness lead to change? Perhaps. Does consciousness create motivation? Perhaps. Most of the early studies confirm that the Fitbit has raised the motivation of users. For children, men and women who may lack the resources for a personal trainer, supportive family and friends or a safe environment that makes exercising outdoors possible, the Fitbit carries digital solutions to analogue problems. It can overlay digital pathways, networks and possibilities over analogue bodies and landscapes that are demeaned or discarded. For small cities, towns and regions, the digital infrastructure and support can make up for other environmental challenges. Fitbit cultures add meaning to walking.

The Fitbit is not a proxy for fitness. The number of steps taken in a day may increase health but it will not (alone) reduce obesity. The knife and fork always works faster than a treadmill. The Fitbit is a sign of a desire to make changes through measurements and find a pathway—through self-monitoring—to a different future. It is one step. But it is a measured one.

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