
Article:
Williams, R.G., Weiner, K., Henwood, F. et al. (1 more author) (2020) Constituting practices, shaping markets: remaking healthy living through commercial promotion of blood pressure monitors and scales. Critical Public Health, 30 (1). pp. 28-40. ISSN 0958-1596

https://doi.org/10.1080/09581596.2018.1497144

Constituting practices, shaping markets: remaking healthy living through commercial promotion of blood pressure monitors and scales.

Abstract

Commercial actors play a key role in promoting public health agendas as they move into space previously occupied by the state-sponsored health sector and welfare state. This paper examines how marketing of digital self-monitoring devices promotes public health. Existing self-monitoring research often separates or compares positions of commercial actors and users, using a discourse lens to examine commercial actor 'expectations' and 'promises', and user research focusing on 'practices'. The research on which this paper is based moves beyond this divide, examining commercial and user worlds through a practice lens. We draw on the research's first stage which examined self-monitoring device marketing, arguing that marketing can be understood as constituting self-monitoring practices. Much literature on self-monitoring focuses on novel networked devices, resulting in potential over-emphasis on change and innovation. Taking cases of well-established bodily monitoring (weighing and blood pressure), we set self-monitoring within a longer history. We draw on Shove's practice theory which attends to histories of practices and evolutions in practices' required elements: materials, meanings and competences. Commercial companies are shown to rework well-embedded practices as they constitute the practice elements of self-monitoring. They thus keep in play continuities and novelty, maintaining connections to health while moving away from clinical associations. We argue that, in constituting self-monitoring practices as 'shared', 'aesthetic' and 'enjoyable', commercial actors address implicit resistances to negative connotations of 'individualised', 'responsibilised' consumer-citizens implied in neo-liberal health promotion agendas, widening the self-monitoring market and promoting public health by creating more desirable 'lifestyle' practices.

Introduction

Commercial actors often share messages with state-sponsored public health, promising to support healthy eating and active lifestyles through new products and services (Herrick, 2009; Meershoek & Horstman, 2016; Powell, 2014). Some of the most recent examples of this relate to digital devices for tracking fitness or other relatively new measures of bodily action and experience (Lupton, 2013). While such digital self-tracking or self-monitoring is attracting scholarly attention, there is more to be done to understand how commercial actors in this sector relate to public health agendas, specifically. There are many new commercially-marketed technologies for monitoring and managing chronic conditions such as diabetes or asthma (Kenner, 2016), and novel devices associated with telecare (Pols, 2012) but, in this paper, we are interested in the marketing of new digital devices in the large and well-established areas of weight/BMI and blood pressure (BP) monitoring.

Self-care is a core theme in public health agendas that emphasise individualised responsibility for healthy lifestyles (Petersen and Lupton, 1996). This has been met by sustained critique in the social scientific literature over several decades, often through a Foucauldian lens. Self-monitoring is seen as having the potential to further embed surveillance and discipline in everyday life (Fotopoulou and O'Riordan, 2016; Lupton, 2013; Rich and Miah, 2014). However, the literature has tended to separate the positions taken up by commercial actors and users. Commercial productions have been analysed for their 'promises' and their underlying logics or values – including the appeal to data sharing and collective goods (e.g. Adams and Niezen, 2015; Berg, 2017; Millington, 2016; Sharon,

2017). Other work addresses user 'practices' (e.g. Pantzar and Ruckenstein, 2014; Smith and Vonthethoff, 2016; Sharon and Zandbergen, 2016). Within this user-focused literature, it has been suggested that the values encompassed in such practices may be rather diverse (Barta and Neff, 2015) and include forms of 'soft resistance' to commercial agendas (Nafus and Sherman, 2014). The research on which this paper is based seeks to move beyond any simple dichotomy between commercial and user worlds by examining both through a practice lens. This paper draws on the first stage of the research which examined the marketing of self-monitoring devices and argues that marketing can, itself, be understood as constituting practices of self-monitoring for health-conscious living.

The choice of case studies is clearly important in shaping our arguments. While there has been some acknowledgment that health self-monitoring predates 'networked' digital devices (Lynch and Farrington, 2018), the majority of scholarship on self-monitoring has focussed on wearable devices, including devices for tracking steps, heart rate, posture and sleep (Pantzar and Ruckenstein, 2014, Schüll, 2016; Millington, 2016; Berg, 2017), as well as novel apps promising to estimate heart rate, oxygen saturation or BP through smart phones (e.g. Faulkner, 2018). In regulatory discourse, the concept of mHealth reflects this interest in *mobile technologies*, but in the literature it brings a risk of over-emphasis on novelty, change and innovation. Relatively few authors have examined longer histories of self-tracking, though Crawford et al.'s (2015) account of scales and O'Riordan's (2017) discussion of diaries are notable exceptions. Our paper examines forms of monitoring established long before digital devices were available, seeking to track transformations associated with new digital devices in the context of these longer histories.

In order to account for these histories, we draw on Shove et al.'s (2012) conception of 'practices' as embedded social forms that emerge (and die) over long periods during which they must be constantly renewed and reproduced. While self-monitoring scholarship has started to look at user practices, the application of 'practice theory' in Shove's terms is novel. For Shove and her co-authors, practices are constituted by three elements: meanings, materials and competences. Changes in any of these results in a potential re-configuration of the practice. Here, we seek to understand how the different elements are brought together in monitoring BP and weight/body mass index (BMI). Key material elements include digital automated BP monitors (BPMs) and weighing scales. These have been available in standalone form for many decades, but are now appearing in 'networked' forms that have the potential to synchronise and share self-monitoring data, though they are not wearable or highly mobile. In terms of the meaning of monitoring, both BP and BMI have had clear links to the clinic, where their validity and use are well codified (see for example, World Health Organisation classifications of normal and abnormal BP measurements, or its definitions for obesity). Both figure in disease prevention repertoires for diagnosing and classifying hypertension or obesity, and identifying cardiovascular disease and diabetes risk. Yet checking weight has some different meanings, linking to judgements about physical appearance, fitness and beauty (as discussed later).

In this paper, we examine how commercial proponents of self-monitoring are re-constituting established monitoring practices in the context of the digital. Commercial companies selling digital BPMs and scales are shown to rework established practices as they simultaneously invoke new meanings and competences in promoting devices for self-monitoring. In so doing, they keep in play continuities as well as novelty, maintaining a connection to broader concepts of health while

disavowing more explicit clinical associations. We argue that, in constituting self-monitoring practices as aesthetic, enjoyable and shared, commercial actors seem to address the negative connotations of the individualised and responsibilised consumer-citizen, thereby broadening the market for self-monitoring devices and promoting public health through more desirable 'lifestyle' practices.

Situating practice theory

There is an emergent interest in applying a 'practice theory' lens to public health (Maller, 2015). So far this has focused on everyday practices such as smoking, eating or drinking (e.g., Twine, 2015; Blue et al., 2016; Keane et al., 2016; Supski et al., 2016), practices typically framed as problematic. We focus on those associated with promoting BP or weight monitoring where commercial actors might be portrayed as 'allies not foes when it comes to improving health' (Millington, 2016: 405). Drawing on Shove et al. (2012), we examine self-monitoring as a social practice integrating 'materials' (technologies and objects), 'meanings' (the ideational and affective) and 'competences' (skills and technical knowledge). Elements of meaning, materials, and competences may change - for example through a transformation in an object's design, or the way a new practice is bundled with existing practices, which may, result in their 'mutual adaptation… destruction, synergy or radical transformation' (Shove et al., 2012: 8). The centrality of objects or non-human actors alongside immaterial elements speaks to practice theory's partial origins in Science and Technology Studies. This commitment to the 'stuff' of practice also gives space to analyses that take seriously the material design and scripting of objects (Akrich, 1992; Watson, 2008). In tracing practice histories, as we do for scales and BPMs in the next section, we can see how material developments, meanings and competences are co-constituted as practices change over time.

Any analysis of self-monitoring through a practice theory lens must acknowledge that home-based self-monitoring for health occurs in spaces already infused with meaning: a sense of family life and privacy (Twigg, 1999; Authors, 1). Self-monitoring practices also exist in relation to clinical standards, and political expectations of self-monitoring's role in cost-saving and patient empowerment (Lupton, 2016). Yet Shove et al. (2012: 55) also argue that 'Elements of meaning [may be] quite literally mediated' through advertising and marketing materials for particular products. This is illustrated by Shove and Pantzar's (2005) work on the emergence of Nordic Walking where proponents of Nordic Walking, including sports associations, government agencies and equipment producers, helped to break the link between walking with sticks and infirmity or comedy, aligning it with more desirable meanings of fitness and sociality. This work insists on the role of both producers and consumers in transforming practice, finding an interplay between these, and between new materials, meanings and competences that may play out in different ways according to national context (Pantzar and Shove, 2010). In addressing markets for new BPMs and scales in the UK we focus on how *producers* attempt to re-constitute the practices of which these devices are part in awareness of existing meanings and practices. In the remainder of the paper, we provide an analysis of the devices themselves and their marketing materials to show how devices, meanings and competencies are brought together to constitute changing practices. We start with a broad historical overview of weighing and BP monitoring practices.

Contextualising the devices and their histories

Contemporary scales and BPMs are part of a long list of objects that have travelled from clinic to home. This section considers historical changes across materials, meanings and competences to understand how these devices have been part of practices constituted differently at different times, laying the ground for our analysis of the constitution of current digital weight and BP monitoring. The systematic measurement of weight was not embedded into general practice until the end of the 19th century. Requiring systems of weights and specific bodily positioning, large early machines required training and use of a second pair of hands to get a measure deemed accurate. Knowing the weight of children subsequently became part of good parenthood in the middle classes for whom measuring children's weight highlighted their continued health, or slippage into illness, though the expense of having scales at home excluded many (Bivins and Marland, 2016). Outside clinics, scales appeared across public spaces in the early 1890s in America and in Europe. Penny scales offered users sweets, songs and games, 'bundling' together – in Shove et al.'s (2012) terminology – leisure practices with weighing. The meaning of weighing had changed by the 1920s when public weighing became seen as embarrassing and the market for home-use scales expanded (Crawford et al., 2015), helped by advertising that associated weighing with achievement of feminine adult bodily ideals. By the 1940s, insurer actuarial tables distinguished ideal weight/height ranges for adults – and created the body mass index (BMI) as a new measure (see Gilman, 2010).

Another distinct history can be traced for BPMs. From the 1850s onwards, physicians were attempting to design BP measurement devices (Lawrence, 1979). By the twentieth-century, physicians were using the familiar arm cuff and pressure meters with a stethoscope to hear the patient's pulse (Booth, 1977). Automated BPMs designed in the 1970s opened the practice up to untrained users, apparently bypassing the human observer, 'the most fallible part of the procedure' (O'Brien, 1996: 1569). Yet these machines were also held to allow people to "feel more in charge of [their] care" by allowing for BP monitoring at home (British Heart Foundation, 2015), a practice promoted in part through studies on the clinical utility of home BP monitoring to bypass white coat hypertension (e.g., Parati et al., 2010). Faulkner (2018), recently highlighted the emergence of new types of BP device in the form of apps that claim to estimate BP through a smart phone camera. He suggests these technologies are framed discursively in ways that attempt to avoid regulation as medical devices by framing the practice as 'recreational' rather than diagnostic or overtly medical. Yet even medically certified devices can now be made portable and networked.

Both BPMs and scales, then, have travelled from the clinic to the home, carrying clinical measures into domestic and everyday life. They have also changed significantly. Evolutions in design enabled use with fewer competences than earlier more cumbersome iterations, allowing for the proliferation of different meanings tied into notions of privacy, parenthood, patient responsibility and leisure. In the rest of this paper, we explore continuities and innovations in practice encompassed in the marketing of currently available BPMs and scales. This market is diverse. Cheaper standalone digital objects generally offer fewer functions – measuring simply weight, or storing a handful of BP readings on the device. Networked (and more expensive) digital devices can send data to proprietary smartphone apps and cloud servers from which users can see and share data from numerous time points, and can calculate BMI as a function of both height and weight.

Methods

In this analysis, we engage with the physical objects, their packaging, user manuals and broader marketing materials to uncover the changing materials, competences and meanings of BMI and BP monitoring practices. In January 2017, we undertook searches of three large UK distributors, including the first two pages of upper arm BPMs and of digital scales on Amazon and all of the more limited number of products available through Argos (a general high street store) and Boots (the largest high street pharmacy chain in the UK). This yielded an initial sample of 69 BPMs from 33 separate brands, and 156 scales from 45 brands. Of these, we selected 7 BPMs and 7 scales to ensure a manageable amount of material for analysis. These two sub-samples (figure 1) were purposively selected to ensure representativeness of price, connectivity options, and manufacturers. Because of the material we intended to collect, we included only objects that had a manufacturer with its own website through which we could obtain user manuals. Using these subsamples, we produced a dataset comprising webpage text, images and video. We also undertook an exhaustive exploration of manufacturer websites for depictions, descriptions and adverts of sampled products; we thus included instructional videos, user manuals, advertising material, and sales webpages.

Informed by Shove et al.'s practice theory lens and the literature on self-monitoring and health technologies in the home (Authors, 1), we undertook a thematic analysis to identify and analyse how commercial actors create markets and 'recruit' practitioners (Shove et al., 2012), by explaining the materials, competences and meanings of self-monitoring. We were particularly attentive to differences between standalone and networked devices, and found that while both produced a rich set of visual and textual data, there were more marketing materials and instructional content for the networked devices, suggesting, perhaps, that more established devices and practices require less explanatory work. We undertook an iterative analysis of the data set, attending particularly to the integration of materials, meanings and competences. Key emergent themes of 'aesthetic,' 'enjoyable' and 'shared' practices were prevalent in the data set - a re-working that seems to move away from an explicit clinical agenda towards a more domestic-oriented one. However, we also show how the separation from the clinic is only partial, with connections to family doctors, in particular, remaining an option, especially in the case of networked BPM devices.

Self-monitoring as an aesthetic practice

Through promoting new products commercial actors constitute practices of self-monitoring as an aesthetic practice - with devices being offered as desirable objects that people will want to own and display in their homes. This is unsurprising as marketing actors have always acted on the understanding that objects of any kind are more than simply functional items and that they reveal something of household 'criteria of judgement and taste, as well as the strength of [their] material resources' (Silverstone et al., 1992: 23). Medical sociology has also alerted us to people's disinclination to have medical technologies at home where they signify ill health or make the home feel like a clinic (Oudshoorn, 2011). Thus devices with clinical associations are vulnerable to user resistance if marketing actors do not recognise this. Here, we analyse how scales and BPMs are enrolled in practices of household aesthetics, and consider how attempts made to portray networked BPMs, in

particular, as far from the clinical associations of more traditional monitors, are only partial, leaving open the possibility of their on-going clinical relevance.

Salter's standalone *9037* scale, is explicitly framed as relatively customisable, available in seven colours to 'Add a ray of sunshine to your bathroom... [and] liven up any bathroom, with a range of shades to suit your own personal tastes' (Salter, 2017). Describing basic bathroom scales as means of conveying 'personal tastes' indicates producers' recognition that these devices are brought into broader identity projects.

Aesthetic concern is still more pronounced amongst networked scales. A Beurer *BF800* distributor website describes its 'elegant', 'perfectly designed' appearance, depicting a smiling woman hugging her scale (Amazon, 2017a). *BodyCardio* boasts a 'revolutionary design' (Withings, 2017a), while a Qardio (2015a) press release proclaims: 'Most scales are ugly, utilitarian designs... It is no surprise that they are hidden away in closets, behind doors and under beds' whilst *QardioBase* is 'for design-conscious living, with high-end materials and a sleek minimalist design... a luxury element of modern design that is beautiful, durable and warm to the touch, you will want to showcase your QardioBase in any room'.

There is no reference here to associations between scales and weight monitoring. The text suggests that consumers would *want* to display these objects were they not 'ugly', disregarding other reasons for hiding scales – e.g., associations with overweight, feelings of embarrassment or shame (Bivins and Marland, 2016). By linking scales to aesthetic meanings (sleek, minimalist design) and competences (design-conscious living), producers might be understood as constituting weight monitoring as having little to do with 'health'-related concerns such as overweight or obesity. However, there remains a tension here. While the text suggests that *QardioBase* is attractive enough for 'any room', in most depictions of subset products, scales are located in bathrooms and bedrooms which, as Twigg argues, count amongst the most private spaces in the home's 'ordering of privacy' (1999: 394). This suggests there may still be a sense in which the practice of weight monitoring is understood as needing to be hidden from public view, with practitioners seeking to avoid family surveillance.

In the case of BPMs, as the design aesthetic is offered as a distinctive alternative to a clinical one. More traditional automated BPM designs, like Braun and Omron's, are representative of most available monitors – including an upper-arm cuff linked to a portable unit, fitting into a medical aesthetic '[d]riven by logics of expedience, cleanliness, standardisation… [and] less focused on preserving comfort and sensory enjoyment than on the efficient execution of specific functions' (Angus et al., 2005: 171). This aesthetic is evident here among cheaper monitors which are provided with a storage case in which users are advised to store products. Omron's (2016) user manuals note devices should be kept in the case when not in use. These objects are not for display.

However we see differences in the depiction of networked devices which suggest consumers will not simply *use* devices, but find them attractive. Withings' BPM boasts a 'welcoming, unclinical design' (Withings, 2017b). In one advert, a visibly smiling man uses the device (Withings, 2014). This is quite distinct from A&D's much cheaper standalone *UA611* where an accompanying video (A&D, 2011) depicts individuals with neutral, rather than smiling, expressions. Qardio (2016a) features media reviews of *QardioArm*, which is available in various colours: 'Whoever thought a blood pressure

monitor could look cool? Qardio did.' and 'Finally, a blood pressure monitor you will actually love'. The hyperbolic use of 'love', and the ability to personalise colours, might be understood as an attempt to disrupt clinical associations of BP monitoring.

In summary, whilst once both scales and BPMs had utilitarian designs, even when sold for domestic use, new products are promoted with reference to aesthetic display, especially expensive networked models. This can be understood as an acknowledgment of user resistance to the clinical aesthetic entering the home and, in the case of scales, an attempt to disassociate with more mundane meanings – monitoring for overweight and associated feelings of shame and embarrassment. However, we have suggested that this attempt is only partially successful as scales are portrayed in the most private of domestic spaces, suggesting there is still something to be hidden from view.

Self-monitoring as an enjoyable practice

Linked to the aesthetic meaning attributed to weight and BP monitoring is their constitution as 'enjoyable' practices. In this section, we show how these practices are constituted as elements of people's daily routine, rather than as part of a strategic pursuit of numbers and 'facts' about weight and BP. Once again, there is a distinction between standalone and networked devices which are placed into different kinds of practice.

Descriptions of standalone scales stop short of explicitly affective language to describe how users will interact with their devices. However, such language is common in relation to networked versions. For example, *QardioBase* can display facial expressions instead of numbers, indicating progress towards a goal weight which is intended to 'create a friendly, encouraging, non-judgemental user interface… [and] experience you would look forward to every morning' (Qardio, 2015b). A Qardio press release (2016b) writes people are 'tyrannised by the readout on our bathroom scale'. *QardioBase* offers 'a more human experience… a friendly face to let you know how well you are doing against your personal goals'. Here, *QardioBase*'s makers can be understood as responding to punitive meanings typically associated with scales as they constitute new weighing practices as humane and caring. Withings (2016) takes a slightly different approach, seeking to make *BodyCardio* part of consumers' routines by offering daily weather forecasts 'to encourage you to use the scale before you get dressed every day'. This 'bundling' of weighing with dressing casts weighing as quotidian rather than threatening.

Whilst transformations in meanings of weighing practices appear limited to expensive networked scales, data from across sampled BPMs reveal attempts to re-constitute BP monitoring. As Faulkner (2018) suggests in his analysis of mobile apps promising to estimate BP, monitoring can become 'recreational'. In engaging with clinical recommendations that people should 'relax' to measure BP, commercial proponents start to transform relaxation from a necessary state (competence) into an experiential outcome (meaning) of measuring.

The European Hypertension Society suggests users should relax before measuring. Its home BP monitoring protocol advocates '5-min rest, 30-min without… caffeine intake or physical exercise… Seated position in a quiet room, back supported, arm supported... Subject immobile, legs uncrossed, not talking and relaxed' (Parati et al., 2010: 782). Such standards describe an ostensibly competent reproduction of practice. Sampled user manuals echo this. Whilst sitting, arm resting on the table and

legs uncrossed, A&D BPM users should '[r]elax for several minutes before… Remain still and keep quiet during measurement' (A&D, 2014). Braun's app relaxation feature even lets users play soothing sounds (Apple, 2017).

A re-constitution of practice can be seen with *QardioArm*'s . The app's slideshow feature 'helps you relax during your measurements aiding higher result accuracy and turning blood pressure time into an enjoyable moment' (Qardio, 2016a). Notions of 'blood pressure time' and an 'enjoyable moment' suggest a transition from competence to meaning, as practitioners ring-fence time to 'enjoy' self-monitoring. Relaxation becomes a pleasurable outcome of monitoring, not just something done to take a competent measure. Kinetik's website images depict an older woman sat on a sofa measuring her BP, her arm holding a magazine next to a cup of tea (Kinetik, 2016), invoking a practice related to comfort and relaxation (Burnett, 2012: 69). Such depictions invert the idea that somebody needs to relax to monitor (competence). Instead, one might monitor to relax (meaning). A previously clinical practice becomes a leisure practice.

Before using a BPM, people may already have practices associated with the materials and competences required for BP measuring. Sofas might be sat on to drink tea or read magazines. A new practice must find a place, becoming 'bundled' with other practices (Shove et al., 2012). Proposing such bundles can be a way for self-monitoring's commercial proponents to encourage the practice. Linking weighing to dressing encourages everyday weighing. Networked scales relate to personal goals in explicitly 'friendly' ways. Yet these versions of practice also include tensions: clinical protocol suggests that the arm should be supported and tea drinking should be avoided during measurement. In seeking to re-constitute existing practices, and draw monitoring into tighter relations with everyday activities in the home, commercial actors move further from versions of the practice typically promoted in public health.

Self-monitoring as a shared practice

The final re-working of monitoring practices relate to the ways in which monitoring is 'shared' between multiple actors and objects. All but two scales (Duronic BS701, and Salter 9037) have multi-user functionality. All devices that calculate BMI require users to input their height and gender into a profile. Scripting multiple users into the device explicitly accommodates multiple household members. Indeed, one of Salter *Stow-a-Weigh*'s distributor websites explains why the device allows this: "With 4 users able to track their progress… the whole household can embark on a healthy regime!" (Amazon, 2017b).

Networked scales allow not just device but also data sharing. For example, Beurer's *BF800* forwards data to a proprietary app and server. Through the capacity for practitioners' readings to move in this way – to be 'lively data' (Lupton, 2016) – it becomes possible to see a family member's weight, or share one's own weight with others. Withings' *BodyCardio* is advertised to 'the whole family' on the product webpage (Withings, 2017a), featuring a white, nuclear family queuing at home. The father, on the scales, looks at his result. The smiling woman peaks around his shoulder to look. Two children wait in line to weigh, the youngest shrieking with excitement. An instructional video (Withings, 2016) describes the object as 'a scale for the whole family'. We are shown someone scrolling through the

related app interface, revealing individuals' avatars. He selects Delia, a 6-year-old girl, making visible her weight, height, heart rate and steps, as well as the option to 'set up a weight goal' for her.

BPMs also offer multi-profile functionality. All but one (A&D *UA611*) offer multiple profiles. Here too, networked objects allow data sharing. A *QardioArm* press release describes distributed work enabled by Apple Watch compatibility:

> *easily share or follow the heart health of your family or friends… you can receive a notification every time a person you follow takes a measurement… checking on a loved one's health condition is as easy as checking the time, no matter where they are. (Qardio, 2015c)*

Multi-profile functionality allows for one user to observe another's data and perhaps even set goals for that individual. While sharing weight within a family seems to represent a continuity with long-established norms of good parenting (Bivins and Marland, 2016), sharing BP reading regularly in this way appears novel. Less surprising perhaps is the material script to send data back to the clinic, given the clinical history of BP. Omron, Qardio, Braun and Withings all suggest that users may share data with doctors via their apps. Omron, for example, notes that 'Email sharing functionality allows users to send blood pressure readings directly from the app to their family, caregiver or physician' (Omron, 2015).

The constitution of weight and BP monitoring as 'shared' practices shifts the meaning away from a notion of individualised responsibility for self-care towards one that acknowledges, and promotes, a more distributed practice that is entangled with familial care. While this is already presaged in parents weighing children, here there is a suggestion that weight and BP readings may also be shared between other family members. At the same time, where data sharing extends to doctors, as in the case of BP, the clinical relevance of self-monitoring is retained. The competences also vary – from good parenting to new duties for good patienthood.

Discussion and conclusion

In this paper, we have explored the relationship of commercial actors to public health agendas with a focus on digital self-monitoring. Eschewing a focus on more novel wearables and measures like heart rate and steps, we examined this relationship through an exploration of the devices and marketing materials in two well-established areas - weight/BMI and BP monitoring. We examined the history of these before going on to examine contemporary versions through close analysis of devices and marketing materials in the UK.

Seeking to move beyond the divide between commercial 'representations' and user 'practices', we have drawn on work from Shove et al. (2012) to argue that commercial activities can be understood not simply in terms of promises, but as themselves engaged in constituting practices through the simultaneous production of materials, meanings and competences. We have argued that, by constituting self-monitoring as aesthetic, enjoyable and shared, commercial actors can be understood as re-working practices previously associated with doctors and attempting to situate them as everyday, associated with familial care, rather than surveillance. We have shown how they attempt this through making devices look less clinical, with emphasis on a more domestic design aesthetic, by

de-emphasising numbers and facts in favour of encouragement and fun, and by bundling weighing and BP practices in with quotidian practices such as getting dressed, checking the weather (scales), having a cup of tea, and relaxing (BP).

Our findings contribute to the wider literature on public health and practice theory, as well as the narrower literature on self-monitoring. Our analysis contributes directly to debates in critical public health regarding the role of digital self-monitoring. Policy depictions of self-monitoring frame it as a means of 'self-care' performed by responsible individuals keen to reduce risk and maintain their health in the future and it is this framing of self-monitoring as an 'individualised responsibility' and its associated disciplining *logic* (Lupton, 2016) that is so often the focus of critique. Our analysis of digital devices and marketing materials for weight and BP monitoring shows some different meanings and a wider distribution of competencies between materials and people beyond the individual. This leads us to argue that commercial actors constitute the practice in a more nuanced way than critique would suggest. Commercial proponents can be understood as reworking self-monitoring practices away from both the more 'individualised' and 'responsibilised' consumer-citizen of the much-criticised neo-liberal agenda. Individuals can now share responsibility in a context that is framed to look as much like care as it does surveillance. Furthermore, anxiety and guilt-inducing framings of self-monitoring that might be inferred from public health agendas are reworked into enjoyable practices in which purchasing different devices presents opportunities to furnish the home with pleasing objects or take a moment to relax.

These ideas support the work of Pols (2012) on the 'warming' of cold technology, as commercial proponents of self-monitoring attempt to change how people experience weighing or other monitoring. However, we have also suggested that there remain tensions and contradictions in how these practices are being constituted, with elements of more traditional versions of public health as self-discipline remaining visible. Schüll (2016) has argued that a growing emphasis on de-quantification, (replacing numbers with emoticons) is intended to make readings meaningful *and actionable*. When competences such as interpreting a reading are delegated to the devices the successful practitioner is no longer required to possess an intimate interest in, or knowledge of, their health (see also Schüll, 2016; Millington, 2016). However, they are still expected to act. The emplacement of scales in private areas of the home maintains a link with weighing's more functional aspects - the monitoring of (most typically) overweight itself linked closely to feelings of shame and failure when goals are not achieved. In these ways, the link to the more responsibilised consumer-citizen is not so much broken as made more implicit and palatable.

Our use of practice theory was not solely to further a more materialist analysis of devices, but also to allow for the exploration of continuities as well as novelty in the wider practice. In part this was facilitated by the choice of case studies, where practices of both weighing and BP monitoring could be shown to have long histories. In contrast to the literature on wearables, we suggest that these cases draw attention to the importance of domestic space for self-monitoring and to the family context. For example, in the existing literature, 'sharing' is often understood as a new discursive resource for companies seeking to promote self-monitoring and the use of health platforms (Ruckenstein and Schüll, 2017). It has also been shown that it may be an important commitment of members of Quantified Self communities (Barta and Neff, 2015), and an element of what Lupton (2016) calls 'communal' self-tracking. In our own analysis, we have suggested that data sharing is also associated

with embedded practices of familial care – especially parents' care for young children – and that these may be extended to include monitoring of partners and adult children, keeping an eye on ageing parents even when they live far away. This can be identified both in the material potential of devices that allow for several different users or for data sharing by email, and in the depictions of monitoring practices as involving family members inside the home. The option to share weight data between family members may of course also constitute weighing as a somewhat coercive practice in a very local sense, a form of lateral surveillance (Andrejevic, 2002) where we monitor each other rather than expect to be monitored by an external authority.

Other references to past versions of monitoring practices are also apparent in our case studies. Rather than offer a new measure to which people can attach their own meanings, as Pantzar and Ruckenstein (2014) found for heart rate, in both our cases companies react to as well as re-work established meanings, materials and competences. The portrayal of weighing as fun for all the family recalls previous types of scales which were located in public spaces and promised amusement. Unlike the BP apps explored by Faulkner (2018) the BPMs we examined are still presented as certified medical devices, while scales incorporating BMI nod to measures associated with clinical concern with overweight and its health risks. Networked BPMs that enable sharing data with family doctors may constitute a more clinical meaning than the emphasis on relaxing and tea drinking suggests. As Kenner (2016) argues in an analysis of asthma apps, data sharing may reinsert traditional caregivers back into the self-monitoring 'care loop.' In this case such opportunities for relaxation may even endanger the accuracy of the readings from a medical perspective, despite the capacities of the device. Thus more clinical features may represent tensions with appeals to aesthetics and enjoyment – suggesting possible contradictions within commercial versions of monitoring.

We started by showing how the literature on self-monitoring as a new field has shifted from accounts of commercial 'promises' to more fine-grained studies of user practices. Emerging research had some unexpected findings, drawing attention to variation between user groups, the possible specificity of Quantified Self communities and a diversity of meanings. We argue that a practice theory lens has helped us to identify diversity and tensions in the commercial versions of weighing or taking BP and attend to continuities. Yet we have also shown that these are very different for weight and BP monitoring as a practice. Literature on self-monitoring risks generalising across such different cases. Self-monitoring or self-tracking using wearables with devices intended for use by a single user (what Lynch and Farrington (2018) call 'personal medical devices') is likely to be different from devices placed in the home for use by different household members. Selling devices for monitoring measures already known to people is a different proposition from introducing devices for new measures like heart rate. The histories and meanings of particular measures matter. Weight comes with a diverse set of associations, for example with beauty and fitness as well as the kinds of physical health that attract the attention of doctors. BP is also established as part of ageing and pregnancy and thus relatively familiar to consumers, but it is still closely tied to clinical medicine. Our analysis of devices and marketing materials also showed distinctions within our cases where networked versions were more likely to be constituted in relation to aesthetic, fun or sharing than non-networked, cheaper versions. Rather than describe 'self-monitoring' or even BP or weight monitoring as a practice it may be important to reintroduce specificity about what is being monitored, how and why.

Figure 1 – subset details

Brand	Model	Price (GBP)	Connectivity
BPMs			
A&D	UA611	20.40	Standalone
Kinetik	BPX1TL	24.99	Standalone
Omron	M3 Comfort	39.49	Standalone
Omron	M7 Intelli IT	57.35	App synchronisation
Braun	BP6200	66.65	Standalone, optional app
Withings	Wireless	79.99	Functions through app
Qardio	QardioArm	94.21	Functions through app
Scales			
Duronic	BS701	11.99	Standalone
Salter	9037	9.99	Standalone
Salter	Stow-A-Weigh	18.97	Standalone
Omron	BF508	42.49	Standalone
Beurer	BF800	59.99	App synchronisation
Qardio	QardioBase	122.92	App synchronisation
Withings	BodyCardio	129.95	App synchronisation

References

A&D (2011) *Upper Arm BP Monitor Usage* [video] Available online: https://www.youtube.com/watch?v=jgeZVEJJm6Q (accessed 11/5/18)

A&D (2014) *UA611 manual*. Available online: https://www.aandd.jp/products/manual/medical/ua611_en.pdf (accessed 11/5/18)

Adams, S. & Niezen, M. (2016) Digital 'solutions' to unhealthy lifestyle 'problems': the construction of social and personal risks in the development of eCoaches, *Health, Risk & Society*, 17:7-8, 530-546.

Akrich, M. (1992). The De-Scription of Technical Objects. In: Bijker, W. and Law, J. (eds) *Shaping Technology/Building Society: Studies in Sociotechnical Change*. Cambridge, Massachusetts: MIT Press, 205-224.

Amazon (2017a) *Beurer BF800 sales webpage*. Available online: https://web.archive.org/web/20180511070505/https://www.amazon.co.uk/Beurer-BF800BLK-Diagnostic-Bathroom-Bluetooth/dp/B00FXOQZV6 (accessed 11/5/18)

Amazon (2017b) *Salter Stow-A-Weigh sales webpage*. Available online: https://web.archive.org/web/20160413054039/http:/www.amazon.co.uk:80/Salter-StowAWeigh-9147-BK3R-Analyser/dp/B0030EPISM (accessed 11/5/18)

Andrejevic, M. (2002). The work of watching one another: Lateral surveillance, risk, and governance. *Surveillance & Society,* 2, 4.

Angus, J., Kontos, P., Dyck, I., et al. (2005). The personal significance of home: habitus and the experience of receiving long-term home care. *Sociology of Health and Illness*, 27(2) 161–187.

Apple (2017) App Store: Braun Healthy Heart app download page. Available online: http://web.archive.org/web/20170710090658/https:/itunes.apple.com/gb/app/braun-healthy-heart/id950818871?mt=8 (accessed 11/5/18)

Barta, K. and Neff, G. (2015) Technologies for Sharing: lessons from Quantified Self about the political economy of platforms. *Information, Communication, Society* 19: 518-531.

Berg, M., 2017. Making sense with sensors: Self-tracking and the temporalities of wellbeing. *Digital Health*, *3*.

Bivins, R. and Marland, H. (2016). Weighting for Health: Management, Measurement and Self-surveillance in the Modern Household. *Social History of Medicine,* 29(4) 757-780.

Blue, S., Shove, E., Carmona, C., et al. (2016). Theories of practice and public health: understanding (un)healthy practices. *Critical Public Health,* 26(1) 36-50.

Booth, J. (1977). A Short History of Blood Pressure Measurement. *Proceedings of the Royal Society of Medicine*, 70, 793-799.

British Heart Foundation (2015) *I've Got My Blood Pressure Under Control.* London: British Heart Foundation

Burnett, J. (2012). *Liquid pleasures: A social history of drinks in modern Britain*, London: Routledge.

Crawford, K., Lingel, J. and Karppi, T. (2015). Our metrics, ourselves: A hundred years of self-tracking from the weight scale to the wrist wearable device. *European Journal of Cultural Studies*, 18(4-5) 479-496.

Faulkner, A. (2018) Blood informatics: negotiating the regulation and usership of personal devices for medical care and recreational self-monitoring. In Lynch, R. and Farrington, C. (eds.) (2018) *Quantified Lives and Vital Data: Exploring Health and Technology through Personal Medical Devices*. London: Palgrave Macmillan. pp. 203-228.

Fotopoulou, A. and O'Riordan, K. (2016) Training to self-care: fitness tracking, biopedagogy and the healthy consumer. *Health Sociology Review*, 26 (1). pp. 54-68.

Gilman, S. (2010). *Obesity: The biography*. Oxford: Oxford University Press.

Herrick, C. (2009). Shifting blame/selling health: Corporate social responsibility in the age of obesity. *Sociology of Health and Illness*, 31(1) 51-65.

Keane, H., Weier, M., Fraser, D., et al. (2016). 'Anytime, anywhere': Vaping as social practice. *Critical Public Health,* 27(4) 465-476.

Kenner, A. (2016). Asthma on the move: How mobile apps remediate risk for disease management. *Health, Risk & Society*, 17(7-8) 510-529.

Kinetik (2016) BPM products webpage. Available online: https://web.archive.org/web/20160206175417/http:/kinetikwellbeing.com/blood-pressure-monitors/ (accessed 11/5/18)

Lawrence, C. (1979). Physiological Apparatus in the Wellcome Museum: Early Sphygmomanometers. *Medical History*, 23, 474-478.

Lupton, D. (2013). Quantifying the body: monitoring and measuring health in the age of mHealth technologies. *Critical Public Health*, 23(4) 393-403.

Lupton, D. (2016). *The Quantified Self*, London: Wiley.

Lynch, R. and Farrington, C. (eds.) (2018) *Quantified Lives and Vital Data: Exploring Health and Technology through Personal Medical Devices*. London: Palgrave Macmillan.

Maller, C. (2015). Understanding health through social practices: performance and materiality in everyday life. *Sociology of Health and Illness,* 37(1) 52-66.

Meershoek, A. & Horstman, K. (2016). Creating a market in workplace health promotion: the performative role of public health sciences and technologies. *Critical Public Health*, 26(3), 269-280.

Millington, B. (2016). Quantify the Invisible: notes toward a future of posture. *Critical Public Health*, 26(4) 405-417.

Nafus D. and Sherman, J. (2014) This one does not go up to 11: The Quantified Self movement as an alternative big data practice. *Int. J. Commun.* 8:1784–94

O'Riordan, K. (2017) *Unreal Objects: Digital Materialities, Technoscientific Projects and Political Realities.* London: Pluto Press.

O'Brien, E. (1996). Ave atque vale: the centenary of clinical sphygmomanometry. *The Lancet,* 348, 1569-1570.

Omron (2015) *New Upgraded Omron Wellness Mobile App Integrates With Apple Health* (February 11th) Available online: https://web.archive.org/web/20150319044617/https:/omronhealthcare.com/2015/02/new-upgraded-omron-wellness-mobile-app-integrates-with-apple-health/ (accessed 11/5/18)

Omron (2016) *M3 Comfort manual*. Available online: https://www.omron-healthcare.com/en/support/manuals/download/m3-comfort-instruction-manual-hem-7134-e-en (accessed 11/5/18)

Oudshoorn, N. (2011) *Telecare Technologies and the Transformation of Health Care.* Basingstoke: Palgrave Macmillan.

Pantzar, M. and Ruckenstein, M. (2014). The heart of everyday analytics: emotional, material and practical extensions in self-tracking market. *Consumption Markets & Culture,* 18(1) 92-109.

Pantzar, M. and Shove, E. (2010). Understanding innovation in practice: a discussion of the production and re-production of Nordic Walking. *Technology Analysis & Strategic Management,* 22(4) 447-461.

Parati, G., Stergiou, G., Asmar, R., et al. (2010). European Society of Hypertension practice guidelines for home blood pressure monitoring. *Journal of Human Hypertension*, 24(12) 779-785.

Petersen, A. and Lupton, D. (1996) *The New Public Health: Discourses, Knowledges, Strategies*. London: Sage

Pols, J. (2012). *Care at a Distance: On the Closeness of Technology*, Amsterdam: Amsterdam University Press.

Powell, D. (2014). Childhood obesity, corporate philanthropy and the creeping privatisation of health education. *Critical Public Health*, 24(2) 226-238.

Qardio (2015a) *Qardio introduces two new products at CES*. (January 5th) Available online: https://web.archive.org/web/20180511070745/https://www.getqardio.com/news/qardio-unveils-new-products-qardiobase-qardiomd-ces/ (accessed 11/5/18)

Qardio (2015b) *Qardio launches QardioBase smart scale & body analyzer.* (September 22nd) Available online: https://web.archive.org/web/20170710085520/https:/www.getqardio.com/news/qardiobase-smart-wireless-scale/ (accessed 11/5/18)

Qardio (2015c*) QardioArm is first medical device to work on Apple Watch! (*April 22nd) Available online: https://web.archive.org/web/20160617043540/https:/www.getqardio.com/news/medical-device-apple-watch/ (accessed 11/5/18)

Qardio (2016a) *QardioArm product webpage*. Available online: http://web.archive.org/web/20160829064319/https://www.getqardio.com/qardioarm-blood-pressure-monitor-iphone-android/ (accessed 11/5/18)

Qardio (2016b) *Qardio launches QardioMD, a digital platform for doctors.* (May 14th) Available online: https://web.archive.org/web/20180511101825/https://www.getqardio.com/news/qardio-launches-qardiomd-digital-health-doctors/ (accessed 11/5/18)

Rich, E. and Miah, A. (2017) Mobile, wearable and ingestible health technologies: Towards a critical research agenda. *Health Sociology Review* 26:84–97

Ruckenstein, M. and Schüll, N.D. (2017) The Datafication of Health, *Annual Review of Anthropology*. 46:261-278.

Salter (2017) 9037 scale product webpage. Available online: https://web.archive.org/web/20180511065704/http://www.salterhousewares.co.uk/salter-glass-electronic-digital-bathroom-scale-black.html (accessed 11/5/18)

Schüll, N.D. (2016). Data for life: Wearable technology and the design of self-care. *BioSocieties*, 11(3) 317-333.

Sharon, T. (2017) Self-tracking for health and the Quantified Self: re-articulating autonomy, solidarity, and authenticity in an age of personalized healthcare. *Philos. Technol.* 30:93–121

Sharon, T. and Zandbergen, D. 2016. From data fetishism to quantifying selves: Self-tracking practices and the other values of data. *New Media Society* 19: 11: 1695 – 1709.

Shove, E. and Pantzar, M. (2005). Consumers, producers and practices: understanding the invention and reinvention of Nordic walking, *Journal of Consumer Culture,* 5(1), 43-64.

Shove, E., Pantzar, M. and Watson, M. (2012). *The dynamics of social practice: Everyday life and how it changes.* London: Sage.

Silverstone, R., Hirsch, E. and Morley, D. (1992). Information and Communication Technologies and the Moral Economy of the Household. In: Silverstone, R. and Hirsch, E. (eds) *Consuming Technologies: Media and Information in Domestic Spaces*. London: Routledge, 13-26.

Smith, G. & Vonthethoff, B. (2016) Health by numbers? Exploring the practice and experience of datafied health, *Health Sociology Review*, 26:1, 6-21

Supski, S., Lindsay, J. and Tanner, C. (2016). University students' drinking as a social practice and the challenge for public health. *Critical Public Health*, 27(2) 228-237.

Twigg, J. (1999). The spatial ordering of care: public and private in bathing support at home. *Sociology of Health and Illness*, 21(4) 381–400.

Twine, R. (2015). Understanding snacking through a practice theory *lens. Sociology of Health and Illness*, 37(8) 1270-1284.

Watson, M. (2008) The Materials of Consumption, *Journal of Consumer Culture*, 8(1) 5-10.

Withings (2014) *Withings Wireless Blood Pressure Monitor* [video] Available online: https://www.youtube.com/watch?v=NxFxPUjS3_U (accessed 11/5/18)

Withings (2016) *Body Cardio Demo* [video] Available online: https://web.archive.org/web/20161007043759/https://www.youtube.com/watch?v=qZVJsnFkFWM (accessed 11/5/18)

Withings (2017a) *BodyCardio product webpage*. Available online: https://web.archive.org/web/20170511051928/https:/www.withings.com/uk/en/products/body-cardio (accessed 11/5/18)

Withings (2017b) *Withings homepage*. Available online: http://web.archive.org/web/20170611093720/https:/www.withings.com/us/en/ (accessed 11/5/18)