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Data assemblages, sentient schools and digitised health and physical education (response to Gard)

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Michael Gard raises some important issues in his opinion piece on digitised health and physical education (HPE) in the school setting. His piece represents the beginning of a more critical approach to the instrumental and solutionist perspectives that are currently offered on digitised HPE. Few commentators in education, health promotion or sports studies have begun to realise the extent to which digital data surveillance and analytics are now encroaching into many social institutions and settings and the ways in which actors and agencies in the digital knowledge economy are appropriating these data. Identifying what is happening and the implications for the concepts of selfhood, body and social relations, not to mention the more specific issues of privacy and the commercialisation and exploitation of personal data, requires much greater attention than these issues have previously received in the critical social research literature. While Gard has begun to do this in his article, there is much more to discuss. In this response, I present some discussion that seeks to provide a complementary commentary on the broader context in which digitised HPE is developing and manifesting. Whether or not one takes a position that is techno-utopian, dystopian or somewhere in between, I would argue that to fully understand the social, cultural and political resonances of digitised HPE, such contextualising is vital.

Keywords: *Digital technologies; Health and physical education; Sociology; Critical theory; Self-tracking; Big data*

Introduction

In his article on digitised health and physical education (HPE), Michael Gard (2014) raises some important issues that require further reflection and discussion. Gard contends that a new era of HPE seems to be emerging in the wake of the digitising of society, in general, and the commercialising of education, which is incorporating the use of digital technologies. As he notes, few commentators in education, health promotion or sports studies have begun to realise the extent to which digital data surveillance and analytics are now encroaching into many social institutions and settings and the ways in which actors and agencies in the digital knowledge economy are appropriating these data. Identifying what is happening and the implications for concepts of selfhood, the body and social relations, not to mention the more specific issues of privacy and the

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commercialisation and exploitation of personal data, require much greater attention than these issues have previously received in the critical social research literature.

In this response, I seek to complement the discussion that Gard initiates by expanding on some of the important issues that he raises, providing further commentary on the broader context in which digitised HPE is developing and manifesting. Whether or not one takes a position that is techno-utopian, dystopian or somewhere in between, I would argue that to fully understand the social, cultural and political resonances of digitised HPE, such contextualising is vital. Researchers who are interested in HPE need to begin to engage with the literatures of digital sociology and media and cultural studies and identify how the increasing digitisation of HPE is taking place and what the wider issues may be in relation to this transformation. Gard focuses in particular on the possible implications for the work of HPE teachers, questioning what their role might be as digital devices increasingly take over as pedagogical technologies from traditional methods of human-to-human interaction in HPE lessons. Here I direct more of a focus on what the implications of digitised HPE may be for students and the personal digital data that are generated from their interactions with digital technologies.

Digital society and the digital knowledge economy

We live in what has become an increasingly digitised society, in which social relations, social institutions, concepts of selfhood and embodiment and spaces have become profoundly configured via digital technologies (Lupton, *in press*). In the wake of what is now often referred to as ‘Web 2.0’, people’s opportunities for communicating with each other and creating information online have proliferated. Web 2.0 (the ‘social web’) denotes the second iteration of the development of the Internet. It follows the more static Web 1.0, which allowed less interaction and content creation on the part of Internet users (Kamel Boulos & Wheeler, 2007; Lupton, *in press*). In the past decade, such features as social media, wikis, blogs, content hosting services such as YouTube, podcasts, search engines and ubiquitous mobile media (smartphones and tablet computers) that can connect wirelessly to the Internet have transformed users’ engagement. While websites in the Web 1.0 era were often designed simply to provide information to viewers and were infrequently updated, Web 2.0 platforms and websites are the sites of constantly updated information creation, tagging, sharing and commentary by many different users. The term ‘prosumption’ is now often used in media and communication studies and digital sociology to refer to the combination of content creation and consumption that occurs simultaneously when people interact with digital technologies (Beer & Burrows, 2010; Ritzer, 2014). Discourses referring to the sharing ethos (John, 2013) and participatory democracy (Beer & Burrows, 2010; Ford, Jenkins, & Green, 2013) afforded by Web 2.0 and networked culture emphasise the continual circulation of information between digital platforms and sites.

Some commentators contend that the Internet is now moving towards Web 3.0 (or the ‘Internet of Things’) in which ‘smart’ objects embedded with sensors will be

more easily able to exchange information with each other independently of human intervention (Andrejevic & Burdon, *in press*; Miorandi, Sicari, De Pellegrini, & Chlamtac, 2012). New digital technologies are expanding into an increasing number of arenas, both public and private. Digital data are collected on people using software and sensor-embedded devices. Mobile and wearable devices such as smartphones and fitness trackers, public spaces and increasingly private environs are becoming fitted with digital sensors that are able to monitor the behaviours, geolocation and movements of people. Some social theorists have begun to refer to the ‘sentient city’ (Thrift, 2014) or ‘sensor society’ (Andrejevic & Burdon, *in press*) to denote this spread of digital tracking and monitoring technologies.

The digital data that are constantly created from the social web, smart objects and sensor technologies, including data that are routinely generated as part of people’s interactions with digital technologies and those that they deliberately create (such as blog posts, YouTube videos, social media status updates, comments on others’ updates, using self-tracking devices) may be aggregated to configure mass digital data sets, often referred to as ‘big data’ (Kitchin, 2014; Manyika et al., 2011). People are now encouraged, obliged or coerced into using digital devices for monitoring aspects of their lives to produce personal data that are employed not only for private and voluntary purposes but also for the purposes of others. These data have begun to be appropriated by a range of actors and agencies, including commercial, managerial and governmental (Lupton, 2014). The convergence of these technologies and practices has resulted in people becoming data subjects or assemblages that are fluid and dynamic, constantly changing in response to new data flows (Kitchin, 2014; Lupton, *in press*).

As critical social researchers have emphasised, digital data are not neutral and objective truths, but rather the products of human decision-making and technological design features that are deeply imbricated within cultures and commercial imperatives (Cheney-Lippold, 2011; Mackenzie & Vurdubakis, 2011; Ruppert & Savage, 2011). Digital data—whether they are the ‘small’ personal data that people collect from self-tracking or big data sets—have become increasingly commercially valuable and appropriated by the digital knowledge economy. The growing commodification and commercial value of digital data sets, and their use in these domains are blurring the boundaries between small and big data, the private and the public. The Internet empires—the likes of Google, Apple, Amazon and Facebook—now have major control over the ways in which knowledge is generated and accessed (Andrejevic, 2013; Franklin, 2013; Kitchin, 2014; Van Dijck, 2013). As I will go on to discuss below, these developments have major implications for digitised HPE.

Digital health and fitness technologies

Digitised HPE fits into the broader scope of digital health and fitness technologies. Health and fitness is a major commercial target of digital developers and entrepreneurs. Tens of thousands of apps related to health promotion and physical fitness are now available for downloading (Kamel Boulos, Brewer, Karimkhani,

Buller, & Dellavalle, 2014). People who are already physically active and engaged in sporting and fitness pursuits are among the most enthusiastic adopters of self-tracking devices. In 2013, 61% of the wearable technologies market was occupied by sporting and physical activity personal tracking devices (ABIResearch, 2013).

At the elite sporting level, athletes and sportsmen/women are now frequently monitored and measured using sophisticated technologies. Many physically active amateurs enjoy the opportunity to track their progress using devices and platforms such as Fitbit and Jawbone wearables and platforms such as Strava and Runkeeper. Apps for mobile devices and their associated platforms such as Ubersense, Dartfish, Silicon Coach and Coach's Eye are used at both elite and amateur levels. These apps allow people to record their activities and instantly analyse their performance on their mobile devices using such features as slow motion replays, diagrams and comparisons with elite athletes and accessing drills from professional coaches. Many of these apps and devices promote their ability to collect data that are otherwise invisible to the human eye or not readily accessible using more traditional and non-digitised forms of personal data collection. As the developers of the Coach's Eye app put it on their website: 'We approach every sport with this mindset "Seeing is believing", and you can't change what you can't see' (Coach's Eye, 2014). Their app promises to allow users to engage in 'seeing things invisible to others' and in so doing gain an advantage on competitors.

Digitised HPE represents a small niche market for digital health and fitness apps, but one that is rapidly growing. Gard refers in his article to the move towards collecting data on student fitness and health indicators and using these data to evaluate teachers' performances. He notes that these data may be considered one form of big data. Dataveillance, or the systematic use of data to engage in the surveillance of people, is rapidly expanding as digital technologies that are able to monitor individuals proliferate (Andrejevic & Burdon, *in press*; Rosenzweig, 2012). As wearable devices and sensor-embedded environments proliferate into more social domains, including schools, opportunities to collect ever-finer-detailed data on children are emerging. Sleep patterns, diet, heart rate, brain function, blood glucose levels as well as physical movement can now be easily collected on individuals throughout the day and night. These tracking devices are now frequently being used on children, from *in utero* into infancy and on into the school years. Indeed, schools in some countries are becoming pre-eminent dataveillance sites, using CCTV cameras, RFIDs and fingerprint biometric technologies to track students' movements and activities and learning and predictive analytic software to monitor and predict their progress and achievements (Selwyn, 2014; Taylor, 2013; Williamson, 2014).

Apps such as Coach's Eye and Ubersense are beginning to be advocated in HPE circles (Trout, 2013), as have other health and fitness apps (Cummiskey, 2011). Mosier (2014) advocates for physical education teacher training to incorporate showing trainee teachers the best ways of incorporating digital physical activity monitors into their curricula by encouraging them to monitor their own body metrics with such devices. Gard refers to 'The PE Geek', an Australian teacher, Jarrod Robinson, who has developed an extensive business around promoting digitised

HPE. He runs a website (The PE Geek, 2014), Facebook page and Twitter feeds sells resources such as apps and training videos that he has developed and travels locally and internationally giving seminars for HPE teachers on how to use digital technologies. Other HPE teachers promoting digital technologies on their own blogs include the Physical Education Teacher (2014) and ThePhysicalEducator.com (2014).

Some self-tracking apps have been designed specifically for HPE teachers for use with their students. The Polar GoFit app with a set of heart-rate sensors is expressly designed for HPE teachers as a monitoring tool for students' physical activities during lessons. It allows teachers to distribute the heart-rate sensors to students, set a target zone for heart-rate levels and then monitor these online while the lesson takes place, either for individuals or the class as a group. Active Globe (2014; developed by Jarrod Robinson, the PE Geek) is a platform that enrolls schools to collect physical activity data from their students that enables them to participate in a virtual international trip. They select a departure point somewhere in the world and a destination and work to generate enough physical activity points to reach this destination as both an individual and a group effort. The activity can be logged manually or uploaded from the custom pedometer or the Runkeeper, Fitbit or Moves digital tracking devices. Each student has their personalised page on the platform that presents their activity data, showing the total distance they have covered and comparing their achievement with their class members and other students using the platform, resulting in a class ranking and a global ranking measurement.

Issues worth exploring further

A number of important beliefs, values and practices are converging to configure digital HPE. These include the digitisation of society and social life in general, the increasing value that is accorded to digital data and the capacity of new digital technologies to produce detailed continuous data to monitor and measure human bodies and social behaviours. These technological changes are taking place in a sociocultural and political context in which, as many critical scholars in education have pointed out, there is a strong focus on self-responsibility for health and well-being as part of a neoliberal orientation to governance (see, for example, many of the chapters in the recent volume on health education edited by Fitzpatrick & Tinning, 2014).

Numerous health and fitness mobile apps and wearable devices are designed to encourage users to take up, continue or intensify their health- and fitness-promoting activities (Lupton, 2012, 2013; Rich & Miah, 2014; Ruckenstein, 2014). They adopt the techniques of 'persuasive computing' in attempting to encourage users to take up health-enhancing behaviours (Purpura, Schwanda, Williams, Stubler, & Sengers, 2011). The use of these types of digital devices in schools conforms to the biopedagogical ethos of HPE. When digital technologies are introduced into the ethos and practices of self-responsibility, digital data become represented as key forces in behaviour change, or in contributing to the reflexive monitoring self

(Lupton, 2014). As noted above, we are witnessing major transformations in the ways in which personal information about and modes of embodiment of all social groups, not only school students, are digitised and moving from the realm of the personal to the public. The ability of new forms of mobile and wearable digital devices with sensors to track personal data means that these data are now portrayed as offering a pedagogical function. Discourses of self-knowledge and self-awareness, as developed via collecting detailed digital data on oneself, are prevalent in discussions of the benefits of digital monitoring. This knowledge is represented as offering opportunities for self-optimisation and control over the vagaries of life (Lupton, 2012, 2013, 2014; Rich & Miah, 2014; Ruckenstein, 2014).

In this context, the type of information about school students' bodies that can be generated by digital technologies has become highly valued. Digital devices are represented as rendering previously hidden aspects of bodies visible; as affording the type of close monitoring and surveillance of students' bodies that was previously not possible; and as producing information that is portrayed as scientifically accurate and neutral by virtue of its digital nature. These data on bodies and behaviours are then presented as ideal information to support persuading students to engage in health-related activities and improve their physical fitness and sporting prowess. Underpinning this model of behaviour is the notion that presenting people with 'hard data', such as those offered by digital technologies, will lead them to make a rational decision based on better knowledge of the self.

There are significant political and ethical implications of the move towards mobilising digital devices to collect personal data on school students. I have elsewhere identified a typology of five modes of self-tracking that involve different levels of voluntary engagement and ways in which personal data are employed. 'Private' self-tracking is undertaken voluntarily and initiated by the participant for personal reasons; 'communal' self-tracking involves the voluntary sharing of one's personal data with others; 'pushed' self-tracking involves 'nudging' or persuasion; 'imposed' self-tracking is forced upon people and 'exploited' self-tracking involves the use of personal data for the express purposes of others (Lupton, 2014).

Digitised HPE potentially involves all five of these modes. In the context of the institution of the school and the more specific site of HPE, the previous tendencies of HPE to represent paternalistic disciplinary control over the unruly bodies of children and young people and to exercise authority over what the concepts of 'health', 'the ideal body' and 'fitness' should mean can only be exacerbated. More enthusiastic students who enjoy sport and fitness activities may willingly and voluntarily adopt or consent to dataveillance of their bodies as part of achieving personal fitness or sporting performance goals. However, when students are forced to wear heart-rate monitors to demonstrate that they are conforming to the exertions demanded of them by the HPE teacher, there is little room for resistance. When certain very specific targets of appropriate number of steps, heart-rate levels, body fat or body mass index measurements and the like are set and students' digitised data compared against them, the capacity for the apparatus of HPE to constitute a normalising,

surveilling and disciplinary gaze on children and young people and the capacity for using these data for public shaming are enhanced (cf. Drew & Gore, 2014).

Furthermore, not only are teachers able to access these personal bodily data to determine whether students are participating at a high enough level and compare students' performances with each other, but also on some platforms and apps, students are encouraged to compare their data with others as part of a competitive endeavour, as in Active Globe, and thus to participate in self-surveillance and the surveillance of others. It is here the pushed self-tracking can easily slide into imposed self-tracking (Drew & Gore, 2014; Lupton, 2014), given the lack of choice offered to students about their participation in reflexive self-monitoring. HPE curricula already rely on strategies of shaming and the marginalisation and stigmatisation of certain types of bodies (fat, inactive and non-muscular) as part of their biopedagogical strategies (Drew & Gore, 2014; Fitzpatrick & Tinning, 2013; Leahy, 2013; Rich, 2011). The opportunities offered by digital devices to monitor, measure and compare personal bodily data contribute to even more intense forms of surveillance, normalisation and potential 'Othering' of students whose data do not conform to set expectations. While some students may well appreciate and enjoy being able to participate in such monitoring and surveillance practices, using the data generated on their activities and sporting performance to enhance their participation and bolster their confidence about their prowess, other, less talented or enthusiastic students may find these practices shaming, restrictive or coercive, limited as they are to pre-determined imposed and restricted measures of performance and fitness.

The unquestioning valorisation of digitising HPE as expressed by advocates fails to recognise the sociocultural and political dimensions of digital society. The increasing role played by corporate entities in supporting and funding HPE programmes and initiatives has been noted by critics (Powell, 2013). As Gard observed in his commentary, the roll-out of digital devices as part of HPE programmes is yet another point of entry for HPE to be commercialised and corporatised (Öhman, Almqvist, Meckbach, & Quennerstedt, 2014; Vander Schee & Boyles, 2010). Both the devices and software used and the digital data that they generate are commodities. Given that these data are digitised predominantly via commercial apps and platforms, it is difficult for teachers or students to exert ownership and control over these data and keep them private.

What Beer (2009) has referred to as 'power through the algorithm' also requires acknowledgement. We are now moving towards a new form of neoliberal governance: that of algorithmic governance, in which the algorithms used in software exert increasing authority over human decision-making and knowledge construction (Andrejevic, 2013; Cheney-Lippold, 2011; Crawford & Schultz, 2014; Totaro & Nino, 2014). Schools are operating and teachers are conducting their work practices in this context of algorithmic governance (Selwyn, 2014; Williamson, 2014), often without fully realising how the data they generate are taken up and used in by other actors and agencies and what the broader implications are of becoming imbricated within digital knowledge systems.

There are also concerns about the privacy and security of these data to consider. As legal and cultural studies scholars are beginning to demonstrate, the data analytics that are configured as part of the digital knowledge economy, both in terms of the information they generate on past behaviours and that involved in predictive analytics, can have significantly limiting effects on the individuals or social groups that they target as requiring interventions (Crawford & Schultz, 2014; Polonetsky & Tene, 2013). We have been alerted to the ways in which national security agencies are engaging in dataveillance of citizens (including surveillance of people's mobile phone metadata and the information they upload to social media networks and apps), as revealed by the former National Security Agency contractor Edward Snowden in his leaking of classified documents from mid-2013. Recent reports have been published on the lack of security and privacy of the data that are generated by the use of apps, including those used for health and fitness purposes (Andrejevic & Burdon, *in press*; Kamel Boulos et al., 2014; Sarasohn-Kahn, 2014). Given these revelations, schools and teachers need to think carefully about what kind of digital technologies they are introducing into their classrooms and what happens to the often very personal data on students' bodies that are generated by these technologies. They need to interrogate and reflect on issues of who can access and use these data, how data from diverse data sets may be joined together to provide extremely detailed data assemblages (and sometimes also identifying previous anonymous details) on individuals and to whom these data may be sold for profit.

Concluding comments

All this is leading to new or alternative ways of thinking about and experiencing health, physical fitness, sport and education. We know little as yet about how schools, teachers and students are participating in, accepting or alternatively resisting the digitisation of HPE and negotiating the data assemblages that digital technologies configure for them. Research into how and why digital technologies are being used and how the digital data that they generate are appropriated for the purposes of other actors and agencies requires far more investigation from social researchers.

It is not difficult to imagine a scenario in the near future in which school students will be nodes in the Internet of Things, generating and exchanging data with other smart, data-generating humans and objects. Their smart homes will document their sleeping, food consumption, Internet use, study and movement patterns, while their wearable self-tracking devices will monitor their physiological details, their schools will monitor their geolocation, food purchasing or consumption habits, social encounters and learning informatics and the wider built environment in which they move will document their activities and geolocation. All of these data sets could potentially be integrated with each other, configuring detailed data assemblages on students that continually monitor and measure them and compare them with norms. In this scenario, digitised HPE would simply be one element of a vast dataveillance network around young people.

In his piece Gard identifies some of the issues that need attention. To add to his commentary, I would contribute the following questions: What will participating in what might be described as a ‘sentient school’ [following Thrift’s (2014) concept of the sentient city] be like for teachers and for students who are participating in the apparatus of digitised HPE? How are the ‘small’ or personal data that are generated in digitised HPE translated into big data? What are the pleasures and comforts of the numbers that are generated by dataveillance analytics for students and teachers in HPE, and what are their discomforts and discontinuities? How much choice (if any) will students be offered in participating in digital data assemblages as part of HPE? What underpins the motivations and decisions of the corporate entities that develop and market digital devices and software directed at HPE? How might the disparate digital data sets that are collected on children by schools start to be combined (such as learning analytics with physical activity, geolocation and school meal data), and with what effects? Should teachers and students be trained to interrogate the ways in which the sensor society and algorithmic authority now shape concepts of education, embodiment and health? What measures should schools put in place to identify and manage the dataveillance in which they are engaging and to protect their students’ personal data? These questions and others constitute a research agenda in critical HPE studies that has only just begun.

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