

ABSTRACT

Title of Dissertation: THE DATAFICATION OF EVERYDAY LIFE:
CRITICALLY CONTEXTUALIZING THE
“QUANTIFIED SELF” IN PHYSICAL
CULTURE

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The contemporary moment has been characterized as that of the “Quantified Self” (QS); a time in which the body is increasingly subjected to meticulous measurement in the service of generating data that will maximize individual potential through self-improvement. The QS is most readily associated with fitness tracking devices like the Fitbit that quantify various aspects of physical activity (i.e., steps taken, distance walked, heart rate, caloric intake/output). While these devices are often taken up as an individual fitness or health choice, institutions, through efforts such as workplace wellness programs, increasingly utilize them to survey and manage their workers’ health. Widespread use of these technologies is often positioned as a panacea for institutional and personal betterment. In this dissertation, I critically evaluate this assumption, by examining the emergence, nature, and influence of the QS, through a contextualization of the quantification of the physically (in)active body. This is an important undertaking given that the preoccupation with statistical measurement and metrics has seemingly de-

emphasized the experiential and, often un-quantifiable, dimensions of physical activity. In light of these concerns, I seek to understand if these technologies are enhancing people's lives and allowing them to become technologically self-actualized, if they are alienating people from their bodies and physical activity while subjecting them to even greater scrutiny from others, or both.

This dissertation comprises three interrelated research studies, in which I draw on the theoretical tools of Foucauldian poststructuralism and sociomaterialisms. In the first study, I historically contextualize the QS, with a focus on how and why the physically (in)active body has been quantified. The second study is a sensory ethnographic study wherein I analyze women runners' fitness tracking practices to explore how fitness tracking shapes their experiences of embodiment and emplacement. Finally, in the third study I interview key informants in the workplace wellness industry and study documents from workplace wellness programs and proponents. By examining the sociomaterial conditions of self-tracking, both historical and contemporary, this dissertation highlights the politics of self-tracking and the contingencies that are required to produce 'self-evident' and factual data about oneself.

THE DATAFICATION OF EVERYDAY LIFE: CRITICALLY
CONTEXTUALIZING THE “QUANTIFIED SELF” IN PHYSICAL CULTURE

by

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Dedication

To the Toronto Maple Leafs, and (more importantly), my husband Zack Beauchamp: For being my home, wherever I go.

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Chapter 1: Introduction

“Humans make errors. We make errors of fact and errors of judgment. We have blind spots in our field of vision and gaps in our stream of attention. Sometimes we can’t even answer the simplest questions. Where was I last week at this time? How long have I had this pain in my knee? How much money do I typically spend in a day? These weaknesses put us at a disadvantage. We make decisions with partial information. We are forced to steer by guesswork. We go with our gut.

That is, some of us do. Others use data.”

-Gary Wolf, 2010, para. 1-2.

“Quantification is a way of making decisions without seeming to decide.”

-Theodore M. Porter, 1995, p. 8

The “Quantified Self”: Just a Phase?

By the time I had noticed the wide array of devices and practices intended to quantify the physically (in)active body, the movement called the “Quantified Self” had become too big to ignore. I read articles about the United States retailer Target giving a Fitbit Zip device to all of their 335,000 employees, with a goal of encouraging more physical activity (Chen, 2015). Since 2015, customers of the insurance company John Hancock Financial have been able to receive discounts on their health insurance premiums in exchange for access to their private Fitbit data, with a move in 2018 to only underwrite “interactive” (para. 1) life insurance policies that involve data collection through wearable devices and smartphones (Barlyn, 2015). In the days following the 2016 Presidential Election in the United States, Fitbit released a study based on the data they had gathered from their activity trackers stating that D.C. residents had lost the most

sleep the night of the election of all the states, perhaps due to the high proportion of Democratic Party voters in the District (Alexander, 2016). In 2016, the online pornography-sharing website Pornhub developed an exercise app called “Bangfit,” that paired pornography-viewing with a waist band that records the exerciser’s body movements and calories burned as he or she moves in alignment with the pornographic footage. Pornhub touts this app as “fight[ing] against our sedentary lifestyle,” (Pornhub, n.d.), which they cite among other factors as being caused by online pornography consumption. Oral Roberts University in Oklahoma announced that Fitbit usage by students would be mandatory and that students would be graded on their adherence to a 10,000 steps per day mandate, a decision that has been protested by those at the University (Chang, 2016). This topic became very real when my father bought a Fitbit Charge that tracks his steps taken, flights of stairs ascended, distance walked, and heart rate, and began showing me his resting heart rate graph (see Figure 1). As these examples clearly illustrate, technologies that quantify the body in order to build self-knowledge are gaining personal, as well as institutional, importance.



Figure 1: Michael Esmonde presenting his resting heart rate graph on his Fitbit app

Tracking information about the body has a long history. People have counted calories, kept a journal, tracked body weight, and worn pedometers for decades or even centuries, as is the case with journal and record-keeping. However, the ability to utilize devices, sensors, or apps that either do so for the user automatically, or that enable the user to keep track of such statistics, allows for the generation of ever-larger amounts of data on ever-minute aspects of people's lives and bodies. Online apps can be used to track one's health, fitness, sleep, weight, menstrual cycles, moods, productivity, and sexual activities (Lupton, 2016b). Within physical culture, devices like Fitbit, Jawbone, and the Nike Fuelband can track heart rate, steps, distance walked, and more. The goal of these devices is to make people more aware of their physically (in)active body so as to increase activity levels and improve fitness.

This dissertation focuses on what has come to be referred to as the "Quantified Self." I understand this term in two main ways. First is the self-identified "Quantified Self" movement, which is a loosely affiliated network of people who utilize the website QuantifiedSelf.com and attend conferences and meet-ups to discuss the use of technologies that measure and enumerate their bodies and lives (Lupton, 2016b). This movement is associated with founders Gary Wolf and Kevin Kelly, editors for *Wired* magazine, who preach "Self-knowledge through numbers" (Quantified Self, n.d.). Second is the "quantified self" movement (henceforth QS) more generally, which academics describe as the broader practice of "monitoring, measuring and recording elements of one's body and life as a form of self-improvement or self-reflection" (Lupton, 2016b, p. 1). I will use the term "QS" throughout this dissertation to refer to the general ethos of

quantification as a means for self-improvement, where people engaging in these practices can be regular technology users rather than adherents to any organized movement.

The ethos of the QS intersects with a broader mobile health, or m-health, movement, where wireless digitally-connected devices can relay health-related messages, track, measure, and record health-related activities, and nudge users to engage in more health-promoting behaviours (Lupton, 2012). As Miyamoto, Henderson, Young, Pande, and Han (2016) put it,

In a best-case scenario, mobile technology offers the possibility to deliver specialty care where it may not exist, reduce transportation burden, and move care away from traditional clinic and hospital-based care settings, allowing patients to be active participants in the management of their conditions wherever they may be, at times convenient to them. (para. 2)

Thus, the health goals for fitness tracking are to deliver personalized recommendations with regards to fitness, coaching and goal setting, and to enable self-management without the help of a personal trainer or repeated visits to a doctor. Fitness trackers are expected to encourage greater levels of physical activity by providing users with a greater awareness of their activity levels, by creating and sustaining social support networks through social media posts or online communities, by enabling users to fit in physical activity throughout the day rather than in large doses, and by creating visible ways to set goals and track progress (Al Ayubi, Parmento, Branch & Ding, 2014; Miyamoto et al., 2016).

The quantification of the self has been described as the practice of generating “small data,” or tracking and generating information about an individual user that is intended to act as a feedback loop of knowledge (Neff, 2013). “Small data” aligns with “big data,” as “[c]omputer scientists, physicists, economists, mathematicians, political

scientists, bio-informaticists, sociologists, and other scholars are clamoring for access to the massive quantities of information produced by and about people, things, and their interactions” (boyd & Crawford, 2012, p. 663). This “big data” includes, but is not limited to, government records, health records, genetic sequences, social media interactions, phone records, purchasing history, and any and all digital traces that are left by people (boyd & Crawford, 2012). The term “big data” that is often appended to such data sets refers less to the quantity of data, and more to computational power to make legal, economic, social, and technological claims (boyd & Crawford, 2012). Furthermore, “big data” can be thought of as an ethos or mythology regarding the human potential that can be unlocked through the generation and analysis of objective, accurate, and true data sets (boyd & Crawford, 2012).

What the rise of big data and small data alike means, of course, is dependent on who you ask. As boyd and Crawford (2012) have pointed out, discussions of big and small data often garner two perspectives. On the one hand, some view this increased access to new forms of self-knowledge as being the key to enhancing people’s lives by enabling them to manage their behaviours with technological efficiency. Through the insights that can be generated by the collection of data about oneself and one’s habits, including on a larger scale when institutions promote the use of such technologies and practices, more people can live healthier, better lives. More can be known, both about individuals and about ever larger groups. Knowledge, of course, is power.

On the other end of this techno-utopian and techno-dystopian spectrum are people who view these forms of self-management as irreversibly changing how people understand and experience their bodies, forcing them to view their body through a lens of

algorithms and numbers while downplaying the experiential, somatic, and visceral (Williamson, 2015). These forms of self-surveillance and self-discipline could, theoretically, crowd out feelings of pleasure, spontaneity, and joy from physical activity (Drew & Gore, 2016). Additionally, many have questioned the assumption that the generation of numbers is the generation of objective facts (boyd & Crawford, 2012; van Dijck, 2014). Instead, they argue that quantitative data requires interpretation and can be inaccurate just like anything else, thus highlighting the importance of other forms of knowledge in addition to these quantitative forms. Other critics of self-tracking and big data view these practices as an unequivocal invasion of privacy that will usher in discrimination based on intimate forms of data that should not have been accessed in the first place (boyd & Crawford, 2012; Lupton, 2012, 2013b, 2016b).

People on both sides can appreciate the ethical issues that arise due to these forms of personal and institutional data collection, such as the difficulties pertaining to informed consent, the potential for data to be stolen or used in problematic ways, and the pitfalls of directed marketing that result from big data collection (boyd & Crawford, 2012; Mittelstadt & Floridi, 2016). Regardless of one's side in this debate—if it is indeed wise to be on only one side of this debate—it is difficult to argue that we are not in the midst of a massive ontological and epistemological shift (boyd & Crawford, 2012).

In this dissertation I critically evaluate both of these perspectives on big and small data, with a focus on fitness tracking and how it has specifically impacted physical cultures. The question for me is not whether self-tracking has an impact on people's embodied and emplaced experiences of physical activity. I think that the answer to this question is an unequivocal yes.

This does not mean that I believe that the majority of people are self-tracking, or that one day everyone will be forced to self-track in one way or another. Indeed, there are many reasons to be cautious about overstating some particular impacts of self-tracking. First, many people do not self-track and have no interest in self-tracking (Lupton, 2016b). Second, even those who do have an interest in fitness tracking at one point do not maintain this interest forever, as many stop self-tracking within six months of purchasing a fitness tracker (Patel, Asch, & Volpp, 2015). This could be because studies, which have been widely reported in popular media (see Gonzalez, 2017), have suggested that fitness tracking does not lead to better health and fitness, nor does it lead to greater weight loss (see, for example, Jakicic et al., 2016). Finally, for those who do engage in self-tracking, there are numerous strategies of resistance to self-surveillance such as not caring about certain forms of data or not collecting all data points, all the time (see Esmonde, 2018, as well as Chapter 7 of this dissertation). Putting on a fitness tracker does not turn a person into a robot who can no longer think for themselves and can only follow the orders of code.

Despite these words of caution, it is important to take seriously the impact of self-tracking on physical culture. First of all, every person does not need to engage in fitness tracking practices for this to be an important area of study. Moreover, understanding the experiences of people who self-track for private reasons, as well as those who are pushed to do so (Lupton, 2016b), is a worthy endeavour. In addition to those who actively wear a fitness tracker or use health and fitness web applications (heretofore referred to as “apps”), I argue throughout this dissertation that the ontological and epistemological assumptions that undergird such practices have an impact on the daily lives of those who

no longer engage in these practices, and even those who never did. Here I am referring to the impact of datafication on understandings of the body and physical activity. As van Dijck (2014) points out, many aspects of life that were previously thought to be outside the purview of quantification, such as friendships, hobbies, interests, have been moved online through social platforms such as Facebook and Twitter, making them amenable to quantification through algorithms. Employee productivity, health care usage, and shopping habits are subject to quantification regardless of whether the individual chooses to view these aspects of their lives through such a lens. Datafication is emblematic of a broader belief that large data sets, when mined correctly, can yield objective truths about the world and can be a basis upon which to improve both the self and society (boyd & Crawford, 2012). Practices such as these represent a shift towards the quantification of everyday life, and this course cannot be reversed.

Of course, quantifying the body and physical activity has long been a practice by various stakeholders, making fitness tracking a slightly different site of datafication than friendships and sociality. However, the capacity to quantify the body continuously and automatically (Lupton, 2016b), and the widespread understanding of the meanings of these metrics (i.e., through the “10,000 steps per day” maxim), make this aspect of datafication relatively novel. “Life mining” (van Dijck, 2014, p. 200) is increasingly commonplace, and the use of step tracking and GPS watches is but one facet of this shift.

People do not need to directly wear a Fitbit to be subject to these exercises of social power through datafication. These data collection practices and the insights gleaned from them are steeped in normative values regarding what people should do and what they should aspire to be, particularly when those data sets are assembled for the

purposes of self-optimization, such as with a Fitbit or Apple Watch (Lupton, 2016b; Williamson, 2015). For example, the healthist expectation that health is equally available to all, and thus it is an individual failing if it is not attained or maintained, bolsters the belief that if one is disciplined enough—perhaps with the help of these devices— good health can be attainable (Lupton, 2013a, 2013b). Additionally, with a step tracker it is assumed that one is taking steps as their primary form of movement, an assumption that clearly excludes people with mobility issues (Elman, 2018).

In sum, datafication is not neutral. These varying practices have a substantial impact on how bodies and physical activity are being understood within the current moment. This impact is far from limited to those who personally wear a fitness-tracking device or use a specialized app.

The relationship between big data, self-tracking practices, and sport and physical activity is a vital one for Physical Cultural Studies (PCS) researchers to critically examine. Recent scholarship has explored many of these themes extensively, including the implementation of self-tracking in schools (Drew & Gore, 2016; Esmonde, 2018; Gard, 2014; Lupton, 2015a; Pluim & Gard, 2016; Williamson, 2015); in the workplace (Moore, 2018; Moore & Piwek, 2017; Moore & Robinson, 2016); and, personal self-tracking practices (Cohn & Lynch, 2017; Esmonde & Jette, in press; Fotopoulou & O’Riordan, 2017; Lynch & Cohn, 2016; Sanders, 2017; Smith & Vonthehoff, 2017). The implications of such practices on health and wellness, such as the commodification of personal information (Crawford, Lingel, & Karppi, 2015; Millington, 2016) and self-responsibilization (Lupton, 2016b; Millington, 2014), have also been considered. Additionally, the embodied impact of self-tracking has been studied, with scholars

arguing that self-tracking is a deeply personal, messy, agentic, and affective practice that can change how people experience their bodies and their sense of place (Didžiokaitė, Saukko, & Greiffenhagen, 2018; Pantzar & Ruckenstein, 2017; Pink & Fors, 2017; Pink, Ruckenstein, Willim, & Duque, 2018; Pink, Sumartojo, Lupton, & La Bond, 2018).

Research Questions

Despite this growing body of literature, there has been little attention to the interplay of gender, race, and social class in bodily quantification and self-tracking practices. As I will show in Chapter 4, the quantification of the body is steeped in social values and have classically hierarchized these identities towards the end of telling people what they should be (Vertinsky, 2002). Furthermore, while the materiality of such technologies has been explored to some extent (see Fox, 2017; Lupton, 2017; Pink & Fors, 2017), the materiality of gender in particular as it pertains to self-tracking has not been examined. Finally, the shift of fitness tracking towards health tracking, and how that shift is playing out in workplace wellness programs, has received scant attention. A deeper study of these issues is vital to understanding the mechanics of power within self-tracking and how these practices have changed as self-tracking has gained traction.

In particular, I explore the following research questions:

- 1) What is the historical precedent for the “Quantified Self” in physical culture?
- 2) How does the landscape of health care and workplace wellness in the United States make the quantification of the physical activity of employees “thinkable, sayable, and doable” (Miller & Rose, 2008, p. 3)?
- 3) Does self-tracking influence women’s embodied and emplaced experiences of running?

- 4) How do women runners engage with their self-tracking data? How do they resist the expected ‘feedback loop’ of data and actions in response to that data?
- 5) How might Foucauldian poststructuralist theories and sociomaterialist theories meaningfully come together as a lens for studying the QS in physical culture?

With these questions in mind, I draw on the theoretical tools of Foucauldian poststructuralism and sociomaterialisms—a framework I propose for the study of the socio-technical aspects of PCS, or a Physical Techno-Cultural Studies—and the methodological tools of Foucauldian genealogy, participant observation, interviews, and document analysis. I use these tools variously across the three sites of this dissertation: a historical account of the quantification of the body and physical activity; a Governmentality analysis of workplace wellness programs and their uses of fitness tracking; and, a sensory ethnography of women runners who self-track.

Dissertation Summary

This dissertation proceeds as follows. In Chapter 2, I provide a theoretical overview of this dissertation, putting forward what I refer to as a framework of Physical Techno-Cultural Studies. This framework draws on the tools of Foucauldian poststructuralism, particularly Foucault’s understandings of genealogy, biopower, surveillance, governmentality, and technologies of the self. I also look to sociomaterialisms, focusing on a Latourian actor-network-theory and articulation and a sensory ethnographic approach to emplacement and embodiment. This is followed by a discussion of the substantive literature that informs this dissertation, including research

on human-technology interactions and big data. I also discuss the literature that has examined personal and institutional uses of fitness tracking.

In Chapter 3, I provide the methodological framework of this dissertation. I start by describing my philosophical approach to qualitative inquiry, including a discussion of ontology, epistemology, paradigm, evaluative criteria, and representation. I then describe the specific procedures I undertook with each of the three studies that comprise this dissertation. I provide the research questions that inform each of these studies, in addition to focusing on the sample of the study, data collection procedures, and my modes of data analysis.

In my first results chapter, Chapter 4, I use the Physical Techno-Cultural Studies framework to provide a socio-historical-technical account of the rise of the Quantified Self, focusing on the tools that have been used throughout (the surveyed) history to reveal the secrets of the moving body through numbers. Based on the premise that the quantification of the body and physical activity began long before the Fitbit, I review several important periods of (primarily) U.S. history to better understand the precedent for bodily quantification. Throughout this discussion, I consider how tools, discourses, and measurements have come together to ‘know’ the physically (in)active body towards different political ends. I divide this chapter into three categories: programs of quantification, sciences of quantification, and industries of quantification. While these programs, sciences, and industries overlap and influence one another, it is useful to present them in series as they represent different goals for bodily quantification. I begin by examining two programs of quantification: The President’s Council on Youth Fitness in the President Eisenhower administration and the President’s Council on Physical

Fitness in the Kennedy administration, and Dr. Kenneth Cooper's jogging program, which rose to prominence in the late 1960s and 1970s. Next, I discuss the numerous sciences of quantification in physical activity. This is the most expansive part of the chapter, as I interrogate five scientific approaches to bodily quantification in physical culture: thermodynamics and the Harvard Fatigue Lab, anthropometry and somatotyping, physical activity epidemiology, kinesiology, and sport medicine. Finally, I consider the industries of quantification, beginning with the popularization of the weight scale in the late 19th century, all the way to the rapid commercialization of physical culture in the 1980s. Throughout this chapter, I focus on the technical context of these time periods, considering how different technologies have been used to quantify the body towards different ends.

I present my findings pertaining to workplace wellness in Chapter 5, which are based on interviews with key informants in the workplace wellness industry and an analysis of workplace wellness documents concerning wearable technologies. In this chapter I draw on a Foucauldian governmentality analysis to describe both the rationalizations and tools of government that are deployed to encourage employee wellness. First, using Rose and Valverde's (1998) four foci of investigation of laws and norms using a governmentality lens—subjectification, normalization, spatialization, and authorization—I examine the ways in which interventions into unhealthy workers and workplaces in the form of wearable fitness technologies are justified. Second, I consider the governmental technologies that discipline the unhealthy employee, describing the “connected ecosystem” of actors and technologies that play a part in the medicalization of everyday life as well as the algorithmic machinery that quantifies employees and their

movements. By highlighting these workings of power, it is my hope that workplace wellness programs can be appraised with a more critical eye so that they can be more ethically implemented without causing an undue burden on employees or unacceptably diminishing their privacy.

Finally, the results of my study of women runners who self-track are presented in Chapters 6 and 7. These findings are based on my sensory ethnographic methods of running interviews and sensory interviews. In Chapter 6 I survey the digital materiality of women's fitness tracking, with a focus on how gender and race influence how women move through space. To do so I draw on frameworks of emplacement and embodiment to illustrate how quantifying running over landscapes can change how runners experience place as well as their own bodies. In so doing, I emphasize that it is not only human intention that shapes running practices; the terrain, light, neighbourhoods, stop lights, and so much more are brought into the fold to assemble the quantified running body. I bring these insights to a case study of women's safety while running, illustrating how women navigate perceived safety issues and the role of self-tracking in their feelings of safety. Through these findings I argue that the production of digital data is a material practice that enmeshes human intentions, space, digital infrastructures, affects, gendered discourses, and more.

In Chapter 7 I examine self-tracking in practice, focusing on the gendered ways in which the women engaged with their fitness trackers and GPS watches, focusing on how they at times subvert and challenge gendered beauty ideals and data primacy. Drawing on a Foucauldian conceptual framework of surveillance, discipline, and technologies of the self, I describe four strategies of resistance to datafication: labelling some data as

excessive, not tracking every run or every day, invoking one's humanity and fallibility as a way of limiting disappointment from unfavourable data, and re-valuing feelings over data.

I intend for this dissertation to contribute to debates regarding big data, physical activity, and health. Through a Foucauldian and sociomaterialist lens, I can simultaneously interrogate the workings of discipline within self-tracking while also focusing on the specific ingredients of power that operate through self-tracking devices. Through my methods of analysis, I am able to illustrate how people use the devices in practice, rather than only the theoretical possibilities of their uses, and thus how discipline and surveillance operate in practice on the bodies of those wearing a fitness tracker as well as on the bodies of those who no longer do or who never have. My use of three case studies— historical, institutional, and personal—as a lens through which to understand the Quantified Self, in addition to the theoretical frameworks that I develop and deploy throughout this analysis, will extend the scholarship on the topic within the fields of PCS, science and technology studies, and the sociology of health and the body. Finally, it is my hope that my research can inform ethical discussions of how wearable fitness technologies can and should be used. As I have suggested above, the QS is far from a 'flash in the pan,' and it is incumbent upon PCS scholars to understand its impact and implications.

Chapter 2: Review of Literature

This review of literature begins with an overview of the theoretical framework of this dissertation, followed by the substantive literature that informs my research. I begin by introducing Physical Cultural Studies (PCS), and the British Cultural Studies-inspired centrality of radical contextualism and articulation that has been so central to PCS scholarship (Andrews, 2002; Andrews & Silk, 2016; King, 2005; Slack, 1996). This is followed by a consideration of the shortcomings of the centrality of human intention within the method of articulation (Slack & Wise, 2015). In response to these shortcomings, I describe how my proposed framework of Foucauldian poststructuralism and sociomaterialisms to explore, as Barad (2007) puts it, “the relationship between discursive practices and the material world” (p. 24).

In outlining my theoretical framework for Physical Techno-Cultural Studies, I begin with a review of poststructuralism and Foucault’s poststructuralist work more specifically. This is followed by a discussion of the specific Foucauldian tools that I look to in my dissertation: genealogy, biopower and surveillance, governmentality, and technologies of the self. After this review, I consider some of the recent challenges to poststructuralism that have come to the fore, namely from scholars who call for a greater attention to the role of the material in social life. In particular I describe a Latourian approach to actor-network-theory (ANT) and the concept of articulation, alongside Haraway’s concepts of cyborgs (2016b) and companion species (2016a). Finally, I discuss the insights of embodiment and emplacement as they relate to ANT.

In my review of substantive literature, I first discuss the discourses of datafication and dataism as they pertain to self-tracking. Following this, I further explore how privacy and surveillance are enacted within the QS, then I briefly review the literature on the QS in the workplace. Next, I discuss the literature on self-tracking in practice, from Foucauldian, new materialist, and place-focused perspectives. Finally, I discuss the gaps that remain in the literature, and how this project seeks to fill those gaps.

Theoretical Literature

Physical cultural studies and radical contextualism. This dissertation contributes to the scholarly tradition of Physical Cultural Studies (PCS), a field that centres on sociocultural aspects of sport, exercise, health, fitness, leisure, dance, and recreation. More specifically, Andrews and Silk (2016) describe PCS as a project that seeks to “explicate how active bodies become organized, disciplined, represented, embodied, and experienced in mobilising (or corroborating), or at times immobilising (or resisting), the conjunctural inflections and operations of power within a society” (p. 87). While definitional efforts have been contentious within PCS, Andrews and Silk (2016) have outlined eight main tenets of the PCS project. First, the empirical focus of PCS is physical culture and its interrelationship with “operations of social power” (p. 88). Second, PCS is contextual, often associated with the radical contextualism theory/method of the British Cultural Studies tradition (see Grossberg, 1997, 2010; Hall, 1986). This tradition will be further described below. Third, PCS is transdisciplinary. Fourth, PCS draws on the theories that are most appropriate to answer one’s research questions, rather than using theory as a way to get the answers that you knew in advance. Fifth, PCS is an inherently political project that seeks to characterize and challenge unequal relations of

power. Sixth, PCS predominately draws on qualitative methods. Seventh, PCS researchers must be self-reflexive and consider how politics are infusing their research. Finally, the PCS project is pedagogical in that its adherents should seek to teach students as well as the broader public through the diffusion of scholarship beyond the borders of the academy.

While I aim to engage with all eight aspects of PCS that have been outlined above, I want to take some time to delve deeper into the ways in which context has been conceptualized within PCS. Since PCS scholars do not subscribe to one particular methodology or method as is the case within some disciplines, a unifying approach to PCS inquiry is the centrality of establishing a thorough (albeit always incomplete) understanding of the context in which our topics of examination are part.

Radical contextualism and articulation. This ethos is pervasive within PCS and is one that I take up within this dissertation. There are many theoretical and methodological approaches to investigating social context within PCS research. One such contextual approach is radical contextualism, which is not radical in a political sense, although it is certainly political. Instead, radical contextualism refers to a reconstruction of the complex relationships between the practices, identities, significances, and effects that shape, interpenetrate, and surround the practices that are being examined. For Grossberg (1997), context represents the conditions of possibility for a given phenomenon, rather than the background that can be known in advance: “context is everything and everything is contextual” (p. 255).

Articulation is the method of radical contextualism (Andrews, 2002; King, 2005; Slack, 1996). As DeLuca (1999) puts it, “In a world without foundations, without a

transcendental signified, without given meanings, the concept of articulation is a means to understanding the struggle to fix meaning and define reality temporarily” (p. 334). To say that articulation is the theory/method of (physical) cultural studies is to view it as a process of testing out connections and always adapting them to the current moment, rather than those connections being an ontologically stable product. However, the theory/method of articulation is not a *fait accompli*; it is “a complex, unfinished phenomenon that has emerged and continues to emerge genealogically” (Slack, 1996, p. 115). It is therefore worth taking some time to consider this genealogy.

Slack (1996) traces the development of articulation to the work Karl Marx, Louis Althusser, and Antonio Gramsci. Marx’s dialecticism is most famously expressed in the following quotation from “The Eighteenth Brumaire of Louis Bonaparte”: “Men¹ make their own history, but they do not make it as they please; they do not make it under circumstance chosen by themselves, but under circumstances directly encountered, given, and transmitted from the past” (Marx, 1978, p. 595, originally published in 1852). Althusser’s concept of a “complex totality,” made up of multiple conflicting relationships and levels, including an ideological level, served to extend the work of Marx in productive ways beyond a focus on the economy. Gramsci’s concepts of ideology and hegemony have also been important in the development of articulation, whereby the beliefs of the dominating class come to be accepted as common-sense by subordinated classes. Hegemony is thus the product of a variety of beliefs, practices, and group interests that through struggle are brought together to produce what appears to be a consistent (and common sense) ideology (Slack, 1996). Together, these theorists

¹ Presumably women make history as well.

suggested ways of conceptualizing context as active, rather than passive, in constituting history, systems of thought, and the economy.

The concept of articulation arose in the 1970s, namely through the work of Stuart Hall, Ernesto Laclau, and Chantal Mouffe, out of concern for what was viewed as an economic reductionism within cultural studies, whereby the attribution of cause to the economy or class was felt to insufficiently address issues of domination and subordination (Slack, 1996). Laclau was one of the first theorists to work towards a precise theory of articulation (Slack, 1996). In *Politics and Ideology in Marxist Theory*, Laclau (1977) called for a re-thinking of articulation; instead of a rationalist perspective where ascertaining the “true” articulations is the goal, he wanted to shift to a view of articulations as relations that are unstable and non-deterministic. Subject positions emerge through conflicting discourses, where identities are always precarious and contingent (Laclau & Mouffe, 2001). This theorizing opened up space for considerations beyond class, such gender, race, and subcultures (Slack, 1996).

The application of articulation that is most well-known in cultural studies today is that of Stuart Hall. The goal of articulation for Hall was to understand the unity of various elements within a specific condition, never attributing cause to one aspect of a social formation—whether it be individual agency, the economy, or discourse. These unities are never guaranteed, nor are they guaranteed to *not* exist; they are produced within a particular context. Hall (1986) describes the theory of articulation:

A theory of articulation is both a way of understanding how ideological elements come, under certain conditions, to cohere together within a discourse, and a way of asking how they do or do not become articulated, at specific conjunctures, to certain political subjects. An articulation is thus the form of the connection that can make a unity of two different elements, under certain conditions. It is a

linkage which is not necessary, determined, absolute and essential for all time. ... You have to ask, under what circumstances can a connection be forged or made? So, the so-called 'unity' of a discourse is really the articulation of different, distinct elements which can be rearticulated in different ways because they have no necessary 'belongingness.' The 'unity' which matters is a linkage between that articulated discourse and the social forces with which it can, under certain historical conditions, but need not necessarily, be connected. (p. 53)

Articulations can be concepts, words, emotions and affects, institutions, practices, and more (Slack & Wise, 2015). Articulation is not only a noun to describe connections that have been forged already; it is also a verb that describes the work of assembling connections. This highlights the struggle that is involved in creating a semblance of unity, as there are always competing interests and challenges to particular articulations (Slack & Wise, 2015). The effects of articulation are very real; articulations make some practices and identities more thinkable than others. Some articulations, which Hall (1986) refers to as "lines of tendential force," are more entrenched connections that are more difficult to challenge. Hall (1986) offers the example of Western religious formations, which would be extremely difficult to detach from its political, ideological, and economic anchoring.

I have described radical contextualism and articulation not to set it up as the standard for PCS projects, but rather, to illustrate some of the issues with an anthropocentric approach to context (which will be described further below). PCS does not call for a singular approach that all adherents to the project must follow. I aim to contribute to the PCS project by engaging in core elements of PCS as outlined by Andrews and Silk (2016) above, while extending it to consider how we can most effectively study the entanglement of physically (in)active bodies and technologies. In what follows, I consider some of the shortcomings of human-centred contextualization efforts and put forward a framework for theorizing the more-than-human within physical

culture. This framework represents a contribution to PCS by extending understandings of context beyond humans.

Limitations of human-centred context. The theoretical framework that I will use in this dissertation must be able to give both humans and technologies their due, without over-privileging one side. A typical definition of technologies does precisely this, typically overrepresenting the role of humans and culture. For example, Shaw (2008) provides a typical example of a definitional effort of technologies: “the set of tools or ‘techniques’ that serve the requirements of any given culture” (p. 1). As this definition illustrates, technologies are often conceptualized as separate from humans, and as acting out the desires of humans as individuals or as a collective (Slack & Wise, 2015). Critics of this perspective argue that human culture has been attributed the sole ability to determine what technologies do: according to this thinking, technology reflects culture, and therefore as cultures change, so do technologies (Slack & Wise, 2015). If a technology were to disappear—for example, a gun—that culture would find another tool that could be used to similarly kill people, because the function that the gun performs has been deemed necessary by that society.

Along with many other scholars that I cite below, I take issue with numerous aspects of this approach to human-technology relationships. First, technologies do not always do what we want them to do. Technologies break. They sometimes never work in the first place. Perhaps they mislead. And even when technologies do what we wish for them to do, there are often unintended consequences. Take, for example, the production of greenhouse gases that results from burning fossil fuels. This effect cannot be explained by a cultural determinist perspective, as one must contend that the unintended effects are

somehow less real than the intended ones (Slack & Wise, 2015). A perspective is needed that can take both of these effects—enabling cars to move and producing greenhouse gases—as equally real. I do not believe that this perspective can be found within conventional framings of radical contextualism and articulation, which focus on human culture. While technology has been considered a vital part of context within PCS (Andrews, 2008; Andrews & Silk, 2016), I would argue that technology has primarily been perceived as a vehicle of human intention and a reflection of culture rather than an actor in its own right.

Instead, I view technologies as entanglements of human and non-human actors that are required to come together for a particular technological function to result. Kerr (2014) uses the example of a cyclist to illustrate this interdependency. While a bicycle can certainly be considered a technology, it is clear that a bicycle requires a cyclist in order to move forward. Instead of seeing cyclists and bicycles as separate, Kerr (2014) argues that a cyclist is an assemblage of human and non-human actants, all of which are required to complete a race or even to move from point A to point B. Technologies are not discrete things that exist separately from humans, as Haraway (2016b) argued so forcefully in “A Cyborg Manifesto: Science, Technology and Socialist-Feminism in the Late Twentieth Century.” Through the cyborg metaphor, Haraway (2016b) contends that any divide between humans and machines, nature and culture, the physical and the non-physical, is untenable. For Haraway (2016b), binary distinctions are material-discursive creations that can and should be imploded by a socialist-feminist politics, and indeed, that there is pleasure and hope in such an endeavour.

In considering the agency of technologies, I am attentive to the possibility of swinging to the other side of the determinist pendulum and taking up a technological determinist perspective. With this perspective it is posited that technologies are the drivers of social culture and human progress (Slack & Wise, 2015). Technological change, in other words, inherently leads to cultural change. I view this perspective as equally unproductive, and do not endorse it here. Focusing on the role of non-humans does not entail ignoring culture, language, or discourse; it means that these are no longer the centre of the analysis, or the only influences within an assembly of humans and non-humans. In what follows, I outline what I refer to as Physical Techno-Cultural Studies; the approach that I take in this dissertation to study relationships between humans and technologies in such a way that avoids both cultural and technological determinism. In many of these chapters I maintain a focus on humans and human concerns, as bringing the non-human into the frame was not always my goal with this research. However, considerable attention is given to the non-human in two of the four empirical chapters of this dissertation, in an effort to intervene in the anthropocentric emphasis of many discussions of physical activity and technology.

Towards a Physical Techno-Cultural Studies. I consider Physical Techno-Cultural studies to be a theoretical toolkit, meaning that I do not use every tool all the way through this dissertation. Some tools come to fore and some fade depending on my research questions and the lines of inquiry that I felt were most pertinent as I wrote up my findings.² In Chapters 5 and 7 I do not bring the tools of sociomaterialisms to my

² For example, in Chapter 5 I do not focus on the material and instead use Foucault's governmentality analysis. This does not mean that a material analysis would not have had value here; scholars such as Miller and Rose (2008) and Lemke (2011) have argued that governmentality in particular can be a material

analysis as Foucauldian poststructuralisms take centre stage, while in contrast Chapters 4 and 6 have much more of a material focus. I do bridge these theories throughout this dissertation, although that is not always the focus.

Building on the insights of PCS and radical contextualism, I propose a theoretical framework for a Physical Techno-Cultural Studies— a branch of PCS that can substantively theoretically interrogate interactions (or following Barad (2007), intra-actions) between humans and technologies. Physical Techno-Cultural Studies not only takes the role of technologies seriously, but even further, it considers non-human technologies as unquestionably connected to humans. Through this framework I seek to give both the natural and the social, matter and meaning, their due. Scholars have persuasively argued for a theory that brings together the insights of articulation with a Deleuzoguattarian assemblage (see Featherstone, 2011; Slack & Wise, 2015). Instead I choose to look to Foucauldian poststructuralism and sociomaterialisms as a framework for studying human-technology entanglement within physical culture, which I argue represents a similar attentiveness to power, social context, and the role of non-humans in social life.

Foucauldian poststructuralism. My thinking on the quantification of the body has been influenced by poststructuralism, which is characterized by a focus on language, power, and socially-produced subjectivities (Mills, 1997), and is often associated with theorists such as Michel Foucault (1980, 1990, 1994, 1995), Jacques Derrida (1976), Jacques Lacan (1977), Gayatri Chakravorty Spivak (1999), and Julia Kristeva (1984). By

framework. That may be a fruitful direction for future research, but it was not a direction that felt pressing for me within this document.

challenging the basic tenets of structuralism, such as the fixed structuring of language and overarching social structures that produce subjects, poststructuralist thinking offers a dynamic challenge to the stability of language and subjectivity (Weedon, 1997). Such theorists place a great amount of emphasis on the power of language to define and contest our social and political worlds (Weedon, 1997). Within poststructuralist thinking, knowledge is an outcome of power relations that limits what can be said or thought, often reinforcing those power relations (Foucault, 1980).

Given this focus on power, poststructuralism can be amenable to approaches that seek to give voice to the marginalized by highlighting alternative knowledges (Weedon, 1997). Feminist poststructuralism in particular is both empirically focused on gender and politically attentive to (hetero)sexist oppression in order to challenge it (McLaren, 2002; Weedon, 1997). By apprehending how norms and social practices shape bodily quantification practices, scholars can shed light on the ways in which power may be alternatively exercised to limit oppressive body knowledges, and, to instead encourage more empowering subject positions and interactions with digital fitness technologies.

In particular, in my dissertation I look to the theories and concepts of Michel Foucault. The work of Foucault has been utilized extensively within the sociology of sport and PCS (Andrews, 1993; Cole, 1993; Markula & Pringle, 2006), as well as within critical examinations of the QS (Lupton, 2012, 2016b; Sanders, 2017; Williamson, 2015). While Foucault eschewed labels and any characterization of his work in a particular way, for the purposes of this dissertation Foucault will be thought of as a poststructuralist theorist because of his rejection of Enlightenment assumptions of progress and universal values and truths as well as a criticality of humanism and the placement of an essential

human at the centre of analysis (Mills, 2003). Foucault's body of work can be thought of as spanning three phases: an archaeological phase, a genealogical phase, and an ethical phase (Mills, 2003).

Foucault's archaeological phase is characterized by an analysis of circulating bodies of knowledge and ways of knowing in a particular moment (Mills, 2003). Most representative of this phase are works such as *The Birth of the Clinic: An Archaeology of Medical Perception* (1994), *Madness and Civilization: A History of Insanity in the Age of Reason* (1999), and *The Archaeology of Knowledge and the Discourse on Language* (1972). Discourse, one of Foucault's most enduring concepts, can be understood in numerous ways: as "the general domain of all statements" (Foucault, 1972, p. 80), or all utterances that have meaning; as "an individualizable group of statements" (Foucault, 1972, p. 80), or groups of utterances that are regulated similarly to cohere in some way; and as "a regulated practice that accounts for a certain number of statements" (Foucault, 1972, p. 80), meaning the rules that shape what can be uttered and have meaning within a particular episteme or body of discourses (Mills, 2003). As Mills (1997) puts it,

A discourse is not a disembodied collection of statements, but groupings of utterances or sentences, statements which are enacted within a social context, which are determined by that social context and which contribute to the way that social context continues its existence. (p. 10)

In other words, discourse is not just anything that is said; it is a system of statements and thoughts, ideas and beliefs, that within a given social context will influence modes of existence. Relatedly, an episteme is a discursive formation in a particular place and time that governs what can be said (McLaren, 2002).

However, “social context” comes into sharper relief in Foucault’s genealogical phase, where he seeks to understand how knowledge becomes a vehicle of power (Mills, 2003). Often associated with works such as *Discipline & Punish: The Birth of the Prison* (1995) and *The History of Sexuality, Volume I: An Introduction* (1990), in his genealogical phase Foucault characterizes a shift in the exercise of power: from power over death to power over life; from repressive, centralized power in the hands of a sovereign, the state, or the law, to productive forms of what he terms biopower (to be expanded upon below). Rather than viewing power as concentrated, easily locatable, and repressive, biopower is diffuse, capillary-like, and productive of subjectivities and identities (Foucault, 1990). Power is not a noun or an ontological substance, but a verb: an action that brings about another action, such as guiding the conduct of others (Foucault, 2003d). As Foucault (1980) explains,

What makes power hold good, what makes it accepted, is simply the fact that it doesn’t only weigh on us as a force that says no, but that it traverses and produces things, it induces pleasure, forms knowledge, produces discourse. (p. 119)

This notion that power is not only “a force that says no” is, as Foucault says, a reason that it is so pervasive. Power produces identities, discourses, and forms of knowledge that people may find restrictive, pleasurable, or they may not think about them at all. Power is everywhere, and because of this, to resist power is not to put oneself outside of power; it is to reconsider how power is exercised (Markula, 2003). It is also important to note that power is distinct from domination as people within power relations always have the ability to resist or make moves (Foucault, 1990).

Due to Foucault’s consideration of power (and resistance) as diffuse and ever-present, some have criticized his work for seeming nihilistic, apolitical, and useless for

proponents of social movements, such as feminist movements (see McLaren, 2002). It is indeed the case that Foucault purposefully did not provide guidance on how to challenge the state of play due to concerns about reasserting universals which he so much opposed, suggesting instead that local challenges to disciplinary power be developed instead (Mills, 2003). While one might develop a sense of nihilism from reading Foucault's work, I would argue that it is far from apolitical. The fact that Foucault wrote that power is not possessed did not mean that power is distributed equally within networks. Foucault (1995) termed this disciplinary power, which is "the control, judgement, and normalization of subjects" (Markula & Pringle, 2006). Indeed, Foucault's work on sexuality and how knowledge shapes bodies was critical of how norms marginalize people, such as those characterized as outside the boundaries of normal sexuality (Foucault, 1990). Given the attentiveness of Foucauldian theorizing to unequal distributions of power, feminists have taken up Foucauldian theorizing to explore the construction of sex (Butler, 1990, 1993), beauty norms (Bordo, 2003), and the patriarchal control of women's bodies (Grosz, 1994).

Finally, in his ethical phase, Foucault explores how people become subjects within power relations (Mills, 2003). Within this body of work, which is most associated with *The History of Sexuality, Vol. II: The Use of Pleasure* (1985), and *The History of Sexuality, Vol. III: The Care of the Self* (1988), there is more of an emphasis on how people are active agents within power relations rather than simply being acted upon. Foucault (1985, 1988) examined how people acquire identities in systems of power through processes of control and dominance as well as processes of self-knowledge (McLaren, 2002). The concept of technologies of the self, which touches on the particular

modes through which people become subjects within power relations, will be expounded upon below.

Genealogy. In this dissertation I look to genealogy, which is a Foucauldian framing of historical analysis. This mode of analysis was developed from Nietzschean theorizing, that is used to understand the entanglement of “history, discourse, bodies, and power” (Markula & Pringle, 2006). Through this method, scholars examine the types of individuals that exist(ed) and the conditions in which individuals arise; in other words, an “ontology of ourselves” and the processes through which subjected knowledges come into play. Those undertaking a genealogical analysis seek to understand how knowledge becomes a vehicle of power, challenging the notion that knowledge is progressively built to ultimately attain truths (McLaren, 2002). Furthermore, similar to the insights of radical contextualism, any genealogical analysis must look to multiple contingencies and causes rather than positioning one force—such as capitalism—as the determining factor (Mills, 2003).

In “Nietzsche, Genealogy, History,” Foucault (2003b) traces his development of the genealogical method. He emphasizes *Ursprung*, or origin, where a genealogical approach does not seek pure origins or essential beginnings; *Herkunft*, or descent, where the analysis describes unstable assemblages and discontinuities rather than linear continuities or progress; and *Entstehung*, or emergence, which entails not assuming that the final form was the intent. Together, these approaches to historical analysis illustrates that historical coherency is a product of social construction, through uncovering “contingency, change, accidents, and even mistakes” (Markula & Pringle, 2006, p. 33) in historical processes. The purpose of a genealogical analysis is not to uncover “truths” or causal relations; it is

an “ontology of ourselves” that seeks to explore “the condition under which we, as individuals, exist and what causes us to exist in the way that we do” (Mills, 2003, p. 25).

Within this dissertation, I put into practice an ethos of genealogy to contextualize the emergence of the Quantified Self movement. Through this historicizing, I seek to expose “the connections, encounters, supports, blockages, plays of forces, strategies, and so on which at a given moment establish what subsequently counts as being self-evident, universal and necessary” (Foucault, 2003c, p. 249). I will trace the unstable and uneven ways in which the Quantified Self has emerged, and the contingencies that have allowed the particular manifestation of the Quantified Self that I am most interested in—wearable fitness technologies—to come to be.

Biopower. Given the focus within this dissertation on the ways in which power entangles with bodies, I make use of the Foucauldian theoretical tool of biopower; a tool that explicitly positions the body as an effect of power (Cole, 1993). With biopower, or power over life, power is located both within the bodies of individuals as well as across populations, in order to foster norms regarding life and how to live well (Foucault, 1990; Lupton, 1995). It is through biopower that biopolitical mechanisms, such as demographics and epidemiology that target the larger population, and disciplinary mechanisms, such as self-surveillance techniques that are applied to the individual body, enables the population to be subject to norms (Foucault, 2004). As such, Foucault (1990) describes biopower as “the subjugation of bodies and the control of populations” (Foucault, 1990, p. 140) so as to encourage the citizenry to take up modes of control and to manage themselves.

The productive aspects of biopower are important to dwell on here. In *The History of Sexuality, Vol. I: An Introduction*, Foucault (1990) challenges the idea that speaking about sexuality represents a challenge to sexual repression. An entire machinery of the school, the clinic, and more has come to make sexuality something that is talked about more than ever; a development that is far from removing sexuality as a site of power. A range of identities and subjectivities have come into being, such as the homosexual or the sexual deviant, and have been painstakingly characterized, investigated, and disciplined by psychological and medical experts. While the marriage relationship was classically the subject of intense focus and scrutiny, peripheral sexualities became the focus and these subjectivities were formed. Talking about the sexuality of children as something that must be stifled, for example, and constructing institutions around its control, produced identities around children's sexuality. In this book Foucault (1990) challenges the repressive hypothesis that is most associated with Freud, that by talking about sex and by confessing of one's sexuality sins one would free themselves from sexual repression. As Foucault (1990) writes, it is actually the reverse; by talking and confessing about our sexualities we become further subject to forms of disciplinary power.

Bodily quantification is undertaken towards numerous ends, but for fitness tracking in particular, the association between physical activity, health, and weight loss/maintenance is paramount. Drawing on Foucauldian tools such as biopower in *The Imperative of Health: Public Health and the Regulated Body*, Lupton (1995) persuasively argues that being healthy has become a moral imperative:

'Healthiness' has replaced 'Godliness' as a yardstick of accomplishment and proper living. Public health and health promotion, then, may be viewed as

contributing to the moral regulation of society, focusing as they do upon ethical and moral practices of the self. (p. 4)

Those who do not meet these standards of “proper living” are blamed for their individual failings, rather than taking into account any systemic issues that might create barriers to living well (Lupton, 1995). Crawford (1980) refers to this as “healthism,” where there is a preoccupation with individual-level influences on health to the exclusion of social, cultural, environmental, economic, and political barriers. Healthism has a significant role in the stigmatization of fatness and fat people, where being fat is frequently thought of as an individual failing that can be overcome with willpower (Rail, 2012). This dominant obesity discourse bolsters the QS movement, as knowledge through datafication is thought to be an indispensable tool in individual and societal efforts to reverse obesity.

Within an era of chronic disease epidemiology, as webs of causation have replaced the one agent-one disease model of infectious disease epidemiology, one’s health state is taken to be the sum of one’s health-promoting behaviours and risk-inducing behaviours (Susser & Susser, 1996). Modes of “proper living” involve constant assessment of one’s own health risks and taking proactive steps to minimize those risks to maximize one’s health (Petersen & Lupton, 1996). Harwood (2009) uses the term “biopedagogy” to bring together the Foucauldian concept of biopower that focuses on the regulation of both the lives of individuals and the population body, with the knowledges that inform people’s health and wellness behaviours. For Harwood (2009), biopedagogy is “the art and practice of teaching of ‘life’, of *bios* in this ‘biopower mode’” (p. 21). With regards to obesity in particular, Wright (2009) writes: “[B]iopedagogies not only place individuals under constant surveillance, but also press them towards increasingly monitoring

themselves, often through increasing their *knowledge* around ‘obesity’ related risks, and ‘instructing’ them on how to eat healthily, and stay active” (Wright, 2009, p. 4). Fitness trackers can be thought of as biopedagogical tools that, through datafication, teach the wearer how to be healthy (Fotopoulou & O’Riordan, 2016).

Finally, it is important to connect these modes of self-governance for the purposes of health with beauty ideals. Feminist scholars and sociologists of sport have long made the connection between conceptions of health and those of beauty, arguing that what is perceived to be beautiful, such as a thin, toned feminine body, is positioned as healthy as well (Bordo, 2003; Cole, 1993; Dworkin & Wachs, 2009). As Dworkin and Wachs (2009) put it, “The right kind of body reinforces not only privileged social locations, but types of moralities and the performance of citizenship” (p. 11). Therefore, the work that people are expected to undertake in order to be healthy is aligned with the work required to conform to dominant beauty ideals, and these ideals are incredibly divergent for men and women (Dworkin & Wachs, 2009). Women in particular are expected to undertake forms of bodywork that Cole (1993) long ago described as a “Taylorism of the body, manufactured within an ideology of limitless improvement, an ideology supported by science and its technologies” (p. 88). For Sanders (2016), fitness tracking is a form of body project wherein women are expected to work to attain normative feminine beauty ideals. I would argue that the biopedagogical work of fitness tracking can be understood as a form of digital bodywork, or, dare I say, digital-body work, where the body is turned into numbers that can be manipulated so as to conform to dominant health and beauty ideals.

Surveillance and Panopticism. How people come to internalize dominant norms and beliefs and apply them to themselves has been another significant insight from Foucault's work. Surveillance is an integral part of this exercise of power; a person under surveillance is not only more likely to act in such a way that conforms with expectations, but even further, they often internalize dominant beliefs and come to enact those norms because they feel that it is the right thing to do (Foucault, 1995; Markula & Pringle, 2006). As Foucault (1995) explains, "A stupid despot may constrain his slaves with iron chains; but a true politician binds them even more strongly by the chain of their own ideas" (p. 102-3).

The QS movement is a manifestation of the present discursive regime of biopolitical surveillance, as these devices are emblematic of the common-sense assumption that one should always be striving to be faster, fitter, and leaner by tracking pace, heart rate, and calories (Sanders, 2016). Extending the work of Foucault, Lupton (2012) uses the term 'surveillance society' to describe how in the modern, capitalist moment, self-tracking technologies enabling the monitoring, measurement, and recording of the citizenry are utilized with increasing ubiquity. Through health surveillance, those deemed to be at greater risk for disease are subject to further monitoring, which can now be done remotely through mobile health technologies. Haggerty and Ericson (2000) refer to the 'surveillant assemblage' as 'abstracting human bodies from their territorial settings' which are then 'reassembled into distinct "data doubles"' which can be scrutinized and targeted for intervention (p. 606). Many of the aspects of this digitized surveillant assemblage are similar to the forms of surveillance that have been characterized previously in public health, such as a focus on self-knowledge that is

expected to lead to better health (see Lupton, 1995). The difference, critics argue, is that mobile health technologies enable the collection of ever greater forms of data that can be scrutinized by both the subject of the data as well as other parties, such as doctors or employers (Lupton, 2016b).

Panopticism is central to the workings of surveillance. In *Discipline & Punish: The Birth of the Prison*, Foucault (1995) discusses the architectural Panopticon, a late 18th century innovation by Jeremy Bentham that was installed in prisons. A Panopticon is a structure where a central guard tower is surrounded by the cells of inmates such that a person standing in the tower would be able to see into each prisoner's cell. The key feature of a Panopticon is that the guards are able to see into each prison cell, but the inmates cannot see into the guard tower, thus creating a sense amongst the inmates that they are being perpetually watched even if no one is in the central tower. The goal of this surveillance is "to induce in the inmate a state of conscious and permanent visibility that assures the automatic functioning of power" (Foucault, 1995, p. 201). As Markula and Pringle (2006) write, "The omnipresent gaze of authority subsequently disciplines the subjects to survey their own behaviours in a manner that renders them docile: they become their own supervisors" (p. 43). While a Panopticon is a particular architectural feature, panopticism as a concept is a way of regulating societies that does not entail coercion or violence but instead empowers individuals to engage in self-surveillance to correct their behaviours to connect up with social norms. Surveillance and discipline are not confined to prisons or specific institutions such as schools, hospitals, factories, and the military; with Panopticism, surveillance and discipline are diffused throughout society (Foucault, 1995).

Fitness tracking can be said to create a Panopticon of sorts. Since self-tracking often has a social media component where other app users or members of social media networks are given a window into others' fitness data, the Panopticon is replicated through an inability to discern when one is being watched. While forms of lateral surveillance are enabled, when users gaze upon each other (Andrejevic, 2002), it is also important to note that the 'central tower' could be considered an employer or health insurance company with access to one's data, or any other powerful figure or institution that can hierarchically view the data.

Governmentality. In this project I will utilize the analytical tool of 'governmentality', a concept introduced by Foucault (2003a)— and further developed into the field of 'governmentality studies' (Miller & Rose, 2008)— to account for the complex workings of power relations in shaping the production and uses of wearable quantification technologies. For Foucault (2003a), governmentality is “an ensemble formed by institutions, procedures, analyses, and reflections, the calculations and tactics” (p. 244), of which biopower is one particular mechanism within this ensemble. Through this assemblage the population is regulated not through coercive means, but through “government at a distance” (Miller & Rose, 2008, p. 16). This government at a distance provides guidance on how individuals should conduct themselves—in other words, the conduct of conduct. To utilize governmentality as a theoretical as well as methodological framework is to trace assemblages of relations, practices, institutions, instruments, technologies, and more, that render particular beliefs thinkable and actionable (Miller & Rose, 2008). Lemke (2001) describes governmentality as “the semantic linking of governing ('gouverner') and modes of thought ('mentalité')” (p. 191). While this ethos

will be drawn on throughout this dissertation, I will use governmentality analysis in particular in Chapter 5, where I critically examine workplace wellness programs and wearable technologies in workplace wellness programs in particular.

Broadly speaking, government at a distance is administered through two main components: representations and interventions (Lemke, 2001). Representations of government, in the form of concepts, objects, borders, and arguments, act as justifications for the exercise of power in order to solve particular problems that have been identified (Lemke, 2001; Rose & Valverde, 1998). These rationalities are the ways in which something becomes problematized, as problems are not simply lying in wait of discovery. Instead, through a process of problematization, “they have to be constructed and made visible... Issues and concerns have to be made to appear problematic, often in different ways, in different sites, and by different agents” (Miller & Rose, 2008, p. 14). Issues in one place must be linked with issues in another to create common features and alliances. These rationalities—and they are always multiple— make something thinkable and amenable to programming.

Second, interventions through technologies of government are the ways in which problems become amenable to governmental involvement (Lemke, 2001). They are “persons, techniques, institutions, instruments ... devices, tools, techniques, personnel, materials and apparatuses” to administer the “conduct of conduct” (Miller & Rose, 2008, p. 16). Together, rationalities and technologies represent a “dual process of problematizing and acting on individual behaviours” as well as how these various actors “shape and manage ‘personal’ conduct without violating its formally private status” (Miller & Rose, 2008, p. 12). The instruments and techniques of governmentality can

include “actual instruments” such as “tools, scales, measuring devices, and so forth” as well as “ways of thinking, intellectual techniques, ways of analyzing oneself, and so forth” (Miller & Rose, 2008, p. 11). For Rose (1991), numbers and quantification are vital for both representations and interventions, as they play a role in the characterization of problems that need to be fixed, as well as in assessing if and how the interventions to solve those problems are working.

Governmentality is an appropriate framework for studying wearable technologies in physical culture. First, through an analysis of representations of government, the necessity for quantifying the body is called into question and examined in more detail rather than being positioned as self-evident. I do much of this work in Chapter 4 in my historical analysis of self-tracking, as well as in Chapter 5 in the context of workplaces in particular. Furthermore, by understanding self-tracking as a technology of government, the ways in which these technologies operate as intimate parts of peoples’ lives, as well as from a distance, can be better understood. Fitness tracking does the work of government, and through a governmentality analysis a greater context can be established as well as the specific modes through which these devices operate and the identities that are brought into being through these devices.

Technologies of the self. Foucault’s work has broadly explored how it is that humans develop knowledge about themselves, and how they become subjects. Sciences like “economics, biology, psychiatry, medicine, and penology” are not simply practices where facts are produced, but are “truth games” through which humans come to understand themselves (Foucault, 2003e, p. 146). In the essay “Technologies of the Self” Foucault (2003e) outlines four technologies that often function together: technologies of

production (which permit societies to produce things), technologies of sign systems (which permit the production of meaning), technologies of power (which shape the conduct of individuals), and technologies of the self. Foucault's concept of 'technologies of the self' has been utilized to gain insight into the agentic practices that people engage in to become subjects within power relations (Foucault, 2003e; Markula & Pringle, 2006).

Technologies of the self are not technologies in the common sense of the word, but rather social practices and techniques that

permit individuals to effect by their own means, or with the help of others, a certain number of operations on their own bodies and souls, thoughts, conduct, and way of being, so as to transform themselves in order to attain a certain state of happiness, purity, wisdom, perfection, or immortality. (Foucault, 2003e, p. 146)

Technologies of the self have been conceptualized as the techniques that allow people to align with disciplinary practices and technologies of power, a connection which Foucault (2003a) refers to as 'governmentality.' However, given how technologies of the self are how people act within power relations, it is equally important to recognize that they are also the means through which subjects resist disciplinary practices and create new discourses (Markula, 2003). Foucault (2003e) argues that to "take care of yourself" in the modern world is to "know thyself" (p. 149), and the act of self-tracking is one of the most intimate ways to know thyself. In this dissertation I use the concept of "technologies of the self" to examine how women use fitness tracking as part of their running practices.

Technologies of the self simply sounds germane to fitness tracking; in a literal sense, these are technologies that enumerate us. More than that, fitness trackers are a part of an assembly of tools that produce subject identities based on numbers in contexts that

value those numbers and identities. A fitness tracker in and of itself is also one way that people perform “operations on their own bodies and souls, thoughts, conduct, and way of being, so as to transform themselves” (Foucault, 2003e, p. 143).

Sociomaterialisms and the more-than-human. In addition to the insights of poststructuralist thinking, I am influenced here by the provocations of numerous scholars who have voiced a need to bring greater attention to the role of the materiality in social worlds. The material—matter, or non-human entities—is often treated as inert and fixed, pre-existing discourse and social influence (Barad, 2007; Butler, 1993). Instead of taking this perspective, I agree with sociomaterialist scholars that “materials do not exist in and of themselves but are endlessly generated and at least potentially reshaped” (Law, 2004, p. 161). In other words, there is not a distinction between independently existing matter and the constructed social; they are always becoming in entanglement (Barad, 2007; Haraway, 1997). For Barad (2007), matter “does not require the mark of an external force like culture or history to complete it. Matter is always already an ongoing historicity” (p. 151).

Numerous theorists have taken up this call to recognize the “ongoing historicity” of matter, theorizing the material through new materialisms (Coole & Frost, 2010), assemblage (Deleuze & Guattari, 1987), science and technology studies (Mol, 2002), vital materialism (Bennett, 2010), agential realism (Barad, 2007), material feminism (Alaimo & Hekman, 2008; Haraway, 1997), and actor-network theory (ANT; Callon, 1999; Latour, 2005; Law, 1987). While distinct in some ways in their main tenets, theoretical lineages, and political commitments, these theorists argue that there is no distinct social or material entity, but that they must be theorized as relational and

mutually constituting, if they can be theorized as distinct at all. I use the term “sociomaterialisms” (Lupton, 2016b) as an umbrella term for theories that emphasize the materiality of the social and the sociality of the material.

This challenge has been recently taken up within the sociology of sport and PCS. Millington and Wilson (2017) described the agency of sand dunes in the acrimonious exchanges between those seeking to construct the Trump International Golf Links in Scotland and the local activists who opposed it. Weedon (2015) explored mud running using the sensibilities of ANT, a related set of theoretical assumptions positing that the “social” has too frequently been limited to humans rather than networks of agency-exerting actants—a term for both humans and non-humans. Kerr (2014) similarly utilized ANT to highlight the role of non-humans in gymnastics. Esmonde and Jette (2018) analyzed academic literature on the relationship between obesity and the environment, arguing that the environment should be considered an actor that shapes human behaviours and health outcomes.

This emphasis on moving beyond the meaning of language towards the meaning of matter does not negate the insights of poststructuralist theories, as some have claimed (see Hemmings, 2010 for analysis of theoretical narratives). Indeed, as Barad (2007) points out, Foucault and Butler—two theorists who are particularly targeted as having taken discourse ‘too far’ and for neglecting the material—did indeed consider materialization as a process that “that stabilizes over time to produce the effect of boundary, fixity, and surface we call matter” (Butler, 1993, p. 9). Indeed, Lemke (2015) and Latour (2005) have also speculated on the materiality of Foucauldian thinking. Latour (2005) writes of Foucault:

No one was more precise in his analytical decomposition of the tiny ingredients from which power is made and no one was more critical of social explanations. And yet, as soon as Foucault was translated, he was immediately turned into the one who has ‘revealed’ power relations *behind* every innocuous activity: madness, natural history, sex, administration, etc. (Latour, 2005, p. 86)

Foucault powerfully illustrated the ways in which architecture—through the Panopticon in particular—is pivotal to the enactment of power. Scholars who are interested in the exercise of power—which for Foucault and Latour both is as an action or an effect rather than something that is possessed (Kerr, 2014)—have much to gain by considering the ways in which non-humans are implicated in diffuse networks of social power. In this way, the aim of my dissertation is to investigate the “tiny ingredients from which power is made” (Latour, 2005, p. 86), which entails an examination of the human and non-human.

In particular, I am drawn to the notion that discourse—which has often been thought of as occupying the domain of language and signs—is material. I find Barad (2007) persuasive in his regard:

Discourse is not a synonym for language. Discourse does not refer to linguistic or signifying systems, grammars, speech acts, or conversations. To think of discourse as mere spoken or written words forming descriptive statements is to enact the mistake of representationalist thinking. Discourse is not what is said; it is that which constrains and enables what can be said. Discursive practices define what counts as meaningful statements. . . . Statements and subjects emerge from a field of possibilities. This field of possibilities is not static or singular but rather is a dynamic and contingent multiplicity. (Barad, 2007, p. 147)

As Foucault (1972) argues, discourses are productive in that they produce subjects and knowledge practices. Building on these insights, it can be argued that discourses are enacted by both humans and non-humans through specific material reconfigurings of the

world. In other words, there is no distinction between the material and the discursive as *discourse is material*.

It would be disingenuous, however, to position poststructuralism and sociomaterialisms as without tension. For example, despite the attentiveness of Foucault and Butler to processes of materialization, their focus remains almost exclusively on the role of human social practices in materialization, thus reinscribing the social/material binary that they seek to challenge (Barad, 2007). Foucauldian examinations of human sciences have emphasized how human knowledge production practices come to construct knowledges and discipline bodies, whereas a Latourian (1987) examination of science in action places the focus on the networks of humans and non-humans that variously form alliances to establish scientific facts and challenge others. While poststructuralism and sociomaterialisms are far from incompatible (see Lemke, 2015), sociomaterialisms go considerably further than poststructuralism in specifically challenging human/nonhuman and social/material binaries. Both Foucault (1990) and theorists like Barad (2007) agree that power is not a social force external to subjects but is productive of those subjects through processes of representation and performativity. However, for Barad (2007) the forces that are part of processes of materialization are not only social forces, and the bodies that are materialized are not only human bodies.

In this dissertation I will bring the insights of Foucauldian poststructuralism together with sociomaterialisms in a productive tension. In particular, I look to a Latourian ANT (1987, 1993, 2005) and the insights of embodiment (Shilling, 2003) and emplacement (Casey, 1993; Ingold, 2000; Pink, 2009, 2011) to consider the materiality of

self-tracking technologies and the bodies that are enacted through quantification. Each of these perspectives will be expanded upon in what follows.

Actor-network-theory. Through actor-network-theory (ANT), separations between humans and non-humans, and the social and the technical, are viewed as effects of relations and networks rather than as inherently separate or explanatory in their own right. Associated with theorists such as Bruno Latour (1987, 1993, 2005), Michel Callon (1986), and John Law (1992), ANT can better be thought of as a toolkit or a sensibility than as a fleshed-out theory (Law, 2004). Through this sensibility, the use of ANT often entails tracing networks of diverse entities—a sociology of associations (Latour, 2005)—to characterize how they bring new actors and agencies into being (Müller, 2015).

To that end, rethinking conceptions of agency is vital to moving beyond a focus on the human. Instead of agency being something that is consciously thought out or possessed, agency is instead “making some difference to a state of affairs, transforming some As into Bs into Cs” (Latour, 2005, p. 52-4). When agency is making a difference rather than consciously exerting one’s will, the number of actors can expand considerably.³ Callon and Latour (1981) thusly define an actor as “[a]ny element which bends space around itself, makes other elements dependent upon itself and translates their will into a language of its own” (p. 286). To avoid making distinctions between human and non-human actors, ANT theorists often use the term “actant” (Latour, 1990).

³ It is important to not conceptualize this distributive agency as a call for a technological determinism (Latour, 2005). Technological determinism is the belief that technology is the base and the rest of society is the superstructure; in other words, a change in technology will cause a change in society (Slack & Wise, 2015). For Latour (2005), the recognition that objects can be agents must also be accompanied by two other contentions: that groups (such as women or the middle class) do not inherently exist without the work to make them, and that an actor exists in a network that is made to act (or not act) by others in that network. Otherwise, considering the agency of non-humans “is immediately reduced to a rather silly argument about the causal agency of technical objects, that is, a clear return to technical determinism” (p. 70).

Technologies—that quantify the body or otherwise— can certainly be said to be actors in this case. Latour (2005) distinguishes between intermediaries and mediators, positioning intermediaries as carrying meaning or force without changing anything, while mediators “transform, translate, distort, and modify” (p. 39). The difference between these two is significant, as matter has often been positioned as a mere intermediary that carries human meaning instead of changing or creating it. To put it in Latour’s (2005) terms, technologies are not mere intermediaries that faithfully execute human intention and carry only cultural significance, where the output is the same as the input. Instead, we can think of technologies as mediators that can transform, translate, and change the input into a different output. We can delegate human tasks to technologies, such as pedometers that count the number of steps that a person takes instead of a person needing to consciously count their own steps. As I will illustrate in my historicizing of bodily quantification, tasks such as step enumeration are delegated to technologies in large part because physical fitness is culturally-valued and the numbers are given social significance. However, it is important to recognize that technologies prescribe particular actions to us in turn (Latour, 1988). For example, wearing a pedometer and having around-the-clock feedback on their step count may play a part in a person’s decision to take the stairs instead of the elevator, or park their car further away from a building they are entering in an effort to increase his or her step count when they would not otherwise without this feedback. We delegate an infinite number of tasks to our smartphones, but in response we are prescribed to carry them around with us, keep them charged, and respond to texts and email on a constant basis in a way that is not possible with stationary

computers (Slack & Wise, 2015). ANT scholars are then tasked with tracing the networks to understand how they are built, how they are maintained, and how they change.

In proposing this sociology of associations, Latour (2005) has been particularly critical of what he perceives as the sociological impulse to treat power as “invisible, unmovable, and homogenous” (p. 86) forces that must be deciphered by the sociologist. For Latour (2005), this definition of social—as only occurring in face-to-face interactions between people, or being comprised of those “invisible, unmovable, and homogenous” forces—is limiting. Furthermore, he accuses what he terms “sociology of the social” (p. 9) of taking stable, pre-existing groups (such as nation, gender, class) as a starting point for the analysis, while a sociology of associations would entail tracing the controversies of the assembling of groups and never taking them for granted. Groups, and ontological categories in general, are outcomes of relations rather than their cause. A sociology of associations involves tracing networks with many mediators and no pre-defined social groups.

Articulation. As part of ANT, Latour’s (1999) concept of articulation distinctly differs from the articulation utilized by cultural studies scholars that I have described above. Latour’s understanding of articulation differs from the cultural studies approach to articulation that was outlined above. While both can be said to describe the connections between ‘things’ that enable a particular state of affairs, there are ontological differences between what is connected. For cultural studies, social and political forces (primarily of human making) are what create a given context (Slack & Wise, 2015). In line with Latour’s other work, articulation is about tracing the networks of humans and non-humans in scientific inquiry.

Articulation, for Latour (1999), is a way of resolving the incompleteness of many metaphors for the relationship between objects of scientific inquiry and products of scientific inquiry. In other words, a gap is often theorized between the real world and our reports and representations of it (Barad, 2007), although how this gap is understood differs depending on one’s ontological and epistemological positions. A parallelogram metaphor (Figure 2), for example, has the “state of affairs” (the reality being studied) on one axis and “biases and theories” of scientists and the context of science on the opposite axis, with the “resulting statement” being a line somewhere between those two axes (Latour, 1999, p. 134). Both the reality under study and the biases of scientists are said to influence the “resulting statement.”

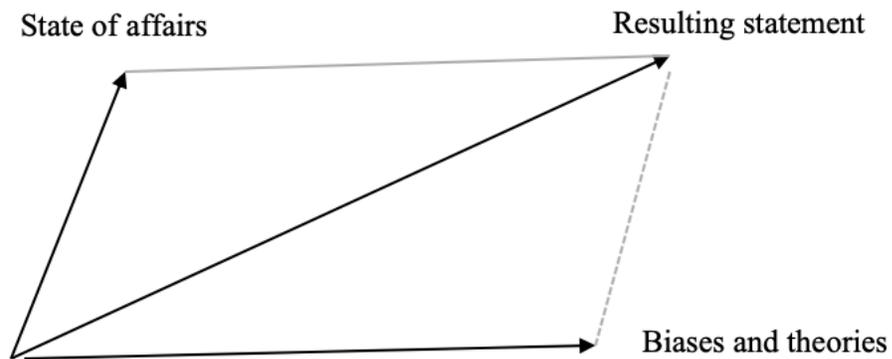


Figure 2: Latour’s (1999) parallelogram metaphor of the relationship between the empirical world, systems of beliefs, and statements (p. 134)

The weakness of this metaphor, Latour (1999) argues, is that it positions these axes of reality and the scientific work of humans as oppositional—reality is trying to speak but it is getting muddled by the human nature of scientists— making it impossible to focus on the two planes at once and their connections to one another. It assumes that if one

were to swing completely to the side of reality while progressively lessening the influence of humans in scientific inquiry, one could have an unadulterated view of the world. For Latour (1987, 1999), this premise is unconscionable given the necessity of humans in scientific inquiry. Science always has been, and always will be, an endeavour in which humans participate. Science requires notebooks, lab benches, journals, training programs, television programs, professional organizations, theories, paradigms, and infinitely more to become something other than screaming into a void. On the other hand, it posits that if one were to swing to the other side of “biases and theories,” science would be completely divorced from any material reality. This contention is also nonsensical, given that science has never been a complete fantasy with no basis in the material world.

Neither conception of science as unadulterated access to reality or as completely unmoored from reality is acceptable, and thus, the metaphor breaks down. The question for Latour (1999, 2000) is not about the weight of different poles, reality and human bias. Instead, it is to ask how scientists, lab equipment, professional organizations, and the objects of study work together to produce scientific findings.

Take, for example, Latour’s (2000) discussion of primatology. At a conference on the topic, primatologists were describing their work as giving their animals under study an opportunity to act in a particular way. For example, one scientist stated that she wanted to give sheep the opportunity to act like chimpanzees; not because she believes that they necessarily will act like chimpanzees, but if sheep are always assumed to act like sheep by researchers, they will not have a chance to show anything else. ‘Giving an opportunity to behave’ is different from imposing one’s biases on the animals; in a way, it is creating an artificial scenario that may allow sheep to illustrate a behaviour that

would not have been known otherwise because of biases about sheep. Science is, in many cases, creating artificial scenarios in the laboratory to give people, animals, bacteria, and atoms an opportunity to display a behaviour that can tell us something new about it.

‘Giving an opportunity to behave’ is also very distinct from socially constructing. No one would argue that through different scenarios sheep are socially constructed, or that they can become something else entirely because of the schemes of humans.

For Latour (1999), it is the work of scientists and scientific instruments that *creates the boundaries* of objects of inquiry, meaning the boundaries of what an object is, what it can do, and what an object is not, come to be drawn through these networks of assembled allies. For example, it was Louis Pasteur’s experimental work that put lactic acid ferments through various trials that allowed the process of fermentation to be understood. Pasteur created the specific conditions that allowed the yeast to illustrate that fermentation is a process of life by an organism, not the result of organismal death. Both yeast as we understand it and Latour’s labour could not exist, as it were, without the other. In other words,

The more *Pasteur* works, the more independent is the substance on which he works. Far from being a raw material out of which fewer and fewer features are conserved, it begins as a barely visible entity and takes on more and more competences and attributes until it ends up as a full-fledged substance! (p. 138)

Through alliances with lab equipment, medium for yeast growth, and sugar, the lactic acid yeast is enabled to work in particular ways that allow the picture of what yeast is and what yeast does to become clearer. In the above case of primatology, it is scientists who *give primates an opportunity to behave in particular ways* by setting the artificial scene (Latour, 2000).

A metaphor is needed to account for the work of yeast and primates and Pasteur and primatologists, as well as the glassware, the laboratory, and the scientists. The more work that these scientists, lab equipment, animal enclosures, and primates brought to the scene do, the more independent and known the objects of study become.

This is where the concept of articulation comes in. For Latour (1999), actants are humans and non-human entities that have the ability to act within a network: glassware, laboratories, scientists. Actants are connected with other actants that can modify networks, depending on how they are assembled. In the case of “science in action” (Latour, 1987), actants in a network are often spoken of as allies, since the contribution to scientific knowledge is an active process that requires the enrolment of massive networks of people, institutions, and things to make a case for one’s vision through “trials of strength” against competing explanations (Latour, 1987, p. 78). As Latour (1987) puts it, “Irrationality is always an accusation made by someone building a network over someone else who stands in the way; thus, there is no Great Divide between minds, but only shorter and longer networks” (p. 259). The difference between the claim that climate change is responsible for higher global temperatures, and the claim that climate change is a hoax perpetrated by inappropriately political scientists, is in many ways a question of networks (Latour, 2018). In a profile of Latour in the *New York Times*, Kofman (2018) describes Latour’s observation of the trials of strength in climate science:

Latour was struck when he heard the scientist defend his results not on the basis of the unimpeachable authority of science but by laying out to his audience his manufacturing secrets: “the large number of researchers involved in climate analysis, the complex system for verifying data, the articles and reports, the principle of peer evaluation, the vast network of weather stations, floating weather buoys, satellites and computers that ensure the flow of information.” The climate denialists, by contrast, the scientist said, had none of this institutional architecture. Latour realized he was witnessing the beginnings a seismic rhetorical shift: from

scientists appealing to transcendent, capital-T Truth to touting the robust networks through which truth is, and has always been, established. (para. 30)

In other words, the work of science is the work of recruiting allies and building unimpeachable networks that back up one's truth claims. The success of a network is apparent when those networks effectively disappear from view, because the networks of allies become so fully established that one does not need to provide support for one's claims by highlighting those networks. Latour (1987) refers to these forgotten networks as black boxes, such as the fact that human DNA is shaped like a double helix. Despite the numerous controversies that characterized the process of this scientific 'discovery,' "the commercial or academic networks that hold [truth claims] in place" become unproblematic and outside the frame (Latour, 1987, p. 3). Law (2004) describes this state of affairs as a moment when "the materiality of the process [of science] gets deleted" (p. 20).

Latour's (1999, 2000, 2004) concept of articulation is a useful one when examining how objects come to be known through scientific inquiry. While statements are thought to be true or false depending on the state of affairs surrounding them, an actant is known or unknown depending on whether it is, in Latour's (1999, 2000) parlance, articulate or inarticulate. Articulations are the relationships between actants that give meaning to each other; if something is said to be articulate, it suggests that it has many strong associations in large networks that enable people to know about it and make claims about it. For example, for the scientists such as Rosalind Franklin who were seeking to apprehend the structure of human DNA, knowledge about its shape moved from inarticulate to articulate as actants such as an X-ray crystallography machine were brought into this scientific network. The more articulations there are, the better an object is known. While Pasteur

has the ability to articulate—to conduct experiments that illustrate the boundaries of yeast and fermentation—it is not only humans like Pasteur who participate in this articulation. Articulation is a property of actants, where articulations serve to firm up the boundaries of an actant by giving it more allies (Harman, 2009).

As I will argue in Chapter 4, articulation can be used to understand how bodies come to be known as they are affected by different measurement tools that are brought into their networks. Throughout history the body has been articulated or known in different ways using a variety of actants or tools. Understanding why it is that people have sought to know particular facts of the body—such as its weight, height, or skull size—is as important as understanding the mechanics of how those things came to be known and the tools that made it possible. I suggest that Latour’s articulation brings the technical practices into the frame of social context, which would otherwise centre on cultural factors and human actors alone. For Latour, “things are not real by being less connected with others, but become more real the more they are linked with allies” (Harman, 2009, p. 80). In other words, the body itself can become more real as it is put through different trials with weight scales, measuring sticks, and Fitbits. Instead of only focusing on the cultural and historical contingencies of the quantification of the body, this frame brings the material body back into the analysis by highlighting the technological work that went into bodily quantification projects. Bodies are not inert, material things upon which discourse inscribes meaning (Barad, 2007; Butler, 1993). Bodies, technologies, and culture are all mutually constituted.

Cyborgs and digital companion species. In addition to the insights of ANT, I look to the work of Donna Haraway to better understand the relationships between humans

and digital technologies. Like many sociomaterialist scholars, Haraway (1997, 2008, 2016a, 2016b, 2016c) has sought to challenge dualisms and boundaries; between humans and non-humans (animals and machines in particular), nature and culture, physical and non-physical. Perhaps her most well-known metaphorical figure, the cyborg, is for Haraway (2016b) a tool for imploding these binary distinctions and the purity of categories such as human—and importantly for the political components of Haraway’s work, the category of woman. The cyborg, or cybernetic organism, represents “a hybrid of machine and organism” (Haraway, 2016b, p. 5), emerging out of a context of the cold war, scientism, and the military-industrial complex (Schneider, 2005). It is important to note that the cyborg figure does not only literally describe the interconnections between humans and machines, but more broadly, the “transgressed boundaries, potent fusions, and dangerous possibilities” (Haraway, 2016b, p. 14) that arise when different political possibilities for identity are sought. Haraway’s ontology is one of multiplicity and dynamism, where people and objects emerge through relationships that are always in flux (Schneider, 2005; Lupton, 2016b).

The use of Haraway’s cyborg metaphor to examine blurring of boundaries between humans and machines, natural and unnatural, and bodies and environments has been a topic of examination within the sociology of sport (see Butryn, 2003; Butryn & Masucci, 2009; Cole, 1998; Howe, 2011; Norman & Moola, 2011). With regards to athletes’ understandings of their relationships with technologies in particular, Butryn and Masucci (2009) have described an ambivalent relationship to technologies such as GPS devices, supplements, and specialized footwear, with many viewing it as at once as promoting high performance while simultaneously adulterating the purity of the sport.

Scholars have also considered the implications of technologies in Paralympic sport (Howe, 2011; Norman & Moola, 2011) and in doping practices (Cole, 1998). Lupton (2016a, 2016b) has used the cyborg metaphor to describe self-tracking in a way that moves beyond fixed boundaries of bodies, machines, and self-trackers, to consider ways that self-tracking might challenge negative norms and become a tool for activism.

More recently, Haraway has moved away from her cyborg metaphor (Schneider, 2005) towards that of companion species (2008, 2016a). While similarly challenging dualisms, the companion species trope is even more characterized by a “hope that human beings might encounter difference in ways that do not seek to incorporate, tame, resource, or annihilate it” (Schneider, 2005, p. 75). The politics of companion species is one of relationality, where “cohabitation, coevolution, and embodied cross-species sociality” are central (Haraway, 2016a, p. 96). In “The Companion Species Manifesto: Dogs, People, and Significant Otherness,” Haraway (2016a) writes of the relationships between humans and dogs, whose histories are inextricable from one another as they have co-evolved. In doing so she challenges human exceptionalism and individualism, illustrating our dependence on the more-than-human.

Lupton (2016a) has taken up Haraway’s (2008, 2016b) companion species metaphor to better understand the entanglement of humans with digital self-tracking technologies and data. On the co-evolution of humans with data-collecting technologies, she writes:

Humans move around and in data-saturated environments and can wear personalized data generating devices on their bodies; including not only their smartphones but objects such as sensor-embedded wristbands, clothing or watches. The devices that we carry with us literally are our companions: in the case of smartphones regularly touched, fiddled with and looked at throughout the day. In distinction from previous technological prostheses, mobile and wearable

devices are also invested with and send out continuous flows of personal information. They have become the repositories of users' communications with others, geolocation information, personal images, biometric information and more. These devices also leak data outwards, transmitting them to computing cloud servers. (Lupton, 2016a, p. 2)

This metaphor also highlights the liveliness of data, both in the ways that it is about human life, but also because they are constantly generated and have material effects on people's lives.

A feminist sociomaterialist analysis. Given the attentiveness to the material within sociomaterialist theories, it can be difficult to remain appropriately attentive to social power and inequality, which are vital topics within PCS. With regards to ANT in particular, critiques of the sociology of the social and a resistance to presuming that one can study a pre-defined group, have led to accusations of being an ill-suited tool for studying social asymmetry or inequality (see Roberts, 2007, for discussion of this debate). This critique is not without merit, as Latour himself has not been particularly attentive to sexism, capitalism, or other systems of inequality, by design (see Latour, 1987). As Haraway writes,

Correctly working to resist a 'social' explanation of 'technical' practice by exploding the binary, [science and technology studies] scholars...have a tendency covertly to reintroduce the binary by worshipping only one term—the "technical." Especially, any consideration of matters like masculine supremacy or racism or imperialism or class structures are inadmissible because they are the old 'social' ghosts that blocked real explanation of science in action... I agree with Latour ...that practice creates its own context, but they draw a suspicious line around what gets to count as 'practice.' They never ask how the practices of masculine supremacy, or many other systems of structured inequality, get built into and out of working machines... Systems of exploitation might be crucial parts of the "technical content' of science." (cited in Roberts, 2007, p. 43-4)

I follow Haraway in viewing politics as inextricably intertwined within technoscientific networks, and therefore aim to “[keep] looping through the permanent and painful contradiction of gender” (Haraway, cited in Schneider, 2005, p. 88).

Instead of viewing the deployment of ANT as inimical to my goals as a feminist technoscience researcher, I commit to three practices. First, to continually ask “how the practices of masculine supremacy, or many other systems of structured inequality, get built into and out of working machines” (Haraway, cited in Roberts, 2007, p. 44). This entails a conceptualization of gender, sex, race, and other identity categories as things that are forged, maintained, and always in process through intertwining material and semiotic practices (Haraway, 1997). I remain attentive to the fact that

Agency and power are not distributed equally throughout networks, and to understand stability and change in networks, to understand how networks privilege some possibilities and preclude others, we have to foreground the work of power in forging and breaking the relations and connections that constitute networks. (Slack & Wise, 2015, p. 146)

Second, I commit to reading Foucauldian poststructuralism and sociomaterialisms through each other to maintain a focus on disciplinary power. Third, I will engage in citational practices that keep feminist work in the frame (Hemmings, 2010). This does not mean that male theorists cannot be cited; indeed, much of the Physical Techno-Cultural Studies framework relies on two male theorists, Foucault and Latour. Instead, I view this as calling attention to the work of women and feminists in dismantling dualisms such as mind/body, nature/culture, male/female, and social/material precisely because women as well as other minority groups are so often associated with the less valued sides of these hierarchical binaries (Barad, 2007; Grosz, 1994; Haraway, 1997, 2000). Much of the foundation of science and technology studies has been laid by feminist scholars (see

Fausto-Sterling, 2000; Fox-Keller, 2010; Grosz, 1994; Haraway, 1988, 1997, 2016b; Harding, 1993), and I view this dissertation as a continuation of their work.

Embodiment and emplacement. Finally, I consider the insights of embodiment and emplacement with respect to the sociomateriality of the Quantified Self (Pink, 2011). The concept of embodiment emphasizes the ways in which the body and the mind are not separate but are inextricably intertwined, as all knowledge and agency occur in and through the body (Crossley, 1995; Csordas, 1994; Hockey & Allen-Collinson, 2007; Merleau-Ponty, 2010; Shilling, 2003). Through the concept of embodiment, it is also stressed that nature and culture are inextricably connected; the world gets under the skin to change our bodies, just as we through our bodies produce and change worlds (Blackman, 2008; Jette, Esmonde, & Maier, 2019; Jette, Maier, Esmonde, & Davis, 2017; Krieger, 2005). How technologies shape embodiment has been of considerable interest to scholars within the sociology of sport (see Butryn, 2003; Butryn & Masucci, 2009), as the blurring of machines and humans can certainly change what it means to be human, as well as embodied humanity (Lupton, 2016b). Within the sociology of sport and PCS, there has been considerable acknowledgement of the role of embodiment in research, as it is through the body that researchers come to develop knowledge and insights about the world and the practices occurring within it (Giardina & Newman, 2011).

Building on embodiment, scholars drawing on the concept of emplacement seek to look beyond the body to the interrelations between the body and its environments (Bale, 2003; Casey, 1996; Howe & Morris, 2009; Ingold, 2000; Pink, 2009).

Embodiment necessarily occurs within space; the body takes up space and produces spaces (Lefebvre, 1991). As Farman (2012) puts it, “Since embodiment is always co-

created alongside space, it must be noted, embodiment is always site-specific to the particular cultures, histories, and relationships that serve as catalysts to such production” (p. 19). In other words, embodiment cannot be understood outside of its relationship to space.

By extending the lens of research beyond the human body, emplacement scholarship takes seriously the active role that the environment plays in social life beyond simply being a passive container in which events occur (Pink, 2009). Emplacement scholarship recognizes that place is always dynamic and open—in a process of becoming—rather than conceptualized as static and contained. Pink (2011) encourages us to think of “places as composed of entanglements of all components of an environment. This includes geological forms, the weather, human socialities, material objects, buildings, animals and more” (p. 349). I view emplacement theories to be very much in line with the insights of actor-network-theory and other sociomaterialist theories, as they recognize the importance of non-humans in the topics that we study and seek to decentre human bodies and human intentions.

I look to the concept of emplacement in two particular ways. First, with regards to running in particular, which is the focus of Chapter 6, I seek to understand how moving bodies traverse terrain and engage with their environment. Nettleton (2015) has explored the co-production of place and running: “Runners are adept at and adopt techniques of footwork, gait and deportment in conjunction with terrain and, conversely landscapes shift and are eroded by the bodies” (p. 770). Like Nettleton (2015), I argue that runners “look *with* the [land]scape more than *at* it” (p. 774), meaning that runners see while they are running—from situated bodies that must take in the landscape as they move through

it, rarely stopping to look or looking without being attentive to their body which would risk tripping or running into something. Following Howe and Morris (2009), who suggest that a task that we are doing shapes how we perceive the environment, I examine women's running through urban environments, and how perceived particular elements of their landscapes.

Second, and given my interest in the role that wearable technologies play in perceptions of space, I view the Internet (and the wearable technologies that connect to online platforms) through a spatial lens. This perspective eschews binary thinking with regards to online and offline worlds, or the digital and the real (Albrechtslund, 2008; de Souza e Silva, 2008; Farman, 2012). Instead, I view these worlds as mixed or hybridized, as they mutually constitute one another. For Farman (2012), "The virtual serves as a way to understand the real and as a form of actualization that serves to layer and multiply an experience of that which is already realized" (p. 22). Mobility scholars studying the movement of people, things, images, ideas, and others (Jensen, 2011) have argued that the use of mobile devices such as smartphones transforms the way one moves through and experiences the world (de Souza e Silva, 2008; Farman, 2012; Ling, 2014; Rainie & Wellman, 2012). As de Souza e Silva (2008) contends, the connection that one experiences through a mobile device, where it is always on and always connecting the user to other people, platforms, devices, and infrastructures, transforms the experience of space by folding in more remote contexts into the present. In this case, the interaction between humans and the devices that are used to quantify the body occurs through an interface, such as through a web app or a reading on a device (Farman, 2012). Similarly, wearable fitness trackers occupy this mixed, hybrid space, in that by design they are

ultimately about human movement and mobility that is invariably emplaced. The GPS component of wearables, where one's walking, running, or cycling route can be tracked, viewed, and posted online to social networks, creates further interconnections between physical and cyberspaces

Embodiment and emplacement are mutually constituting, whether those spaces are digital or 'real.' For example, Farman (2012) describes his feelings of displacement and anxiety when the map on his phone was not locating him in the correct location as he stood outside his hotel in an unfamiliar city. Through this experience, Farman (2012) noted the extent to which his experience of place is shaped by mobile interfaces. As I will discuss in Chapters 6 and 7, and has also been noted elsewhere (Pink et al., 2018; Sumartojo et al., 2016), when a runner or cyclist's efforts have not been accurately captured by a GPS watch or fitness app, this can lead to intense feelings of displacement as if the running or cycling tour did not happen.

Mobility and digital connection are always enmeshed in networks of politics and power, where the freedom or ability to move, or the need or obligation to move, is not distributed equally (Jensen, 2011). The *raison-d'être* of fitness trackers like the Fitbit is to encourage people to move more. The disciplinary work of such devices, and the context in which people are differently enabled and constrained to move more, must be considered within any discussion of these devices. These (in)active bodies and places are sites of power and struggle, of course, which makes the experience of wearing a tracking device dependent on multiple, interlocking contexts.

I view the lens of space as a useful way to think through the aforementioned frameworks of Foucauldian theories and sociomaterialisms. Emphasizing space means

acknowledging the materiality of bodies, the technologies, and the worlds through which they both move. Wearable technologies do not merely exist as nebulous clouds where data is collected and stored; the Internet requires infrastructures such as undersea cables, towers, people to manage and operate it, buildings where data is stored, and more (Starosielski, 2015). Any consideration of data collection and storage must contend with these infrastructures and acknowledge their materiality as well as fallibility. Furthermore, Foucault has emphasized the ways in which space has been utilized as part of disciplinary structures, such as the panoptic structure of Jeremy Bentham's prison, or the layout of school dormitories (Foucault, 1990). The role that space—including the hybrid space of wearable technologies—plays in panopticism and surveillance is an important topic of scholarly interrogation.

Theoretical literature conclusion. As I have argued above, Foucauldian poststructuralism and sociomaterialisms can be variously used to study the relationships between physically (in)active bodies and technologies, whether they be centuries-old technologies or a fitness tracker. Foucault's work has shed considerable light on knowledge and power within the human sciences, which I view as central to my study of bodily quantification technologies throughout history. Complementing this is an exploration of how humans and technologies come together to know the human body, which entails examining the technical aspects of measurement. In discussing contemporary uses of bodily quantification for the purposes of running and workplace wellness in Chapter 5, I use Foucault's insights to better understand how disciplinary power that brings about a desire to 'be well' through fitness tracking is both accommodated and resisted by individuals as well as institutions. At the same time, I

describe how technologies, running bodies, and the environment are enmeshed as women in particular run through space.

I will now provide an overview of the substantive literature that forms a basis for this project. It is my intent that this literature be in continuity with the theoretical considerations noted above, as in many cases the literature draws on one or more of these theories and concepts to shed light on the QS and the quantification of the body.

Substantive Literature

In my review of substantive literature, I first discuss the discourses of datafication and dataism as they pertain to self-tracking. Following this, I further explore how privacy and surveillance are enacted within the QS, then I briefly review the literature on the QS in the workplace. Next, I discuss the literature on self-tracking in practice, from Foucauldian, new materialist, and place-focused perspectives. Finally, I discuss the gaps that remain in the literature, and how this project seeks to fill those gaps.

Datafication and dataism. It is important to spend some time unpacking the discourses that make the quantification of physical activity and the body to be self-evident: those of datafication and dataism. Datafication is “the transformation of social action into online quantified data, thus allowing for real-time tracking and predictive analysis” (van Dijck, 2014, p. 198). The QS relies on datafication to turn the body and physical activity into numbers, some of which lend themselves easily to datafication (such as the distance one has travelled) while others are more difficult to quantify (such as how one felt while they were running). Datafication is undergirded by an ideology of dataism (not to be confused with Dadaism, or anarchistic art), which represents the notion that large data sets are able to provide true, objective, and predictive insights into the

world that were previously impossible (boyd & Crawford, 2012; van Dijck, 2014). Data is positioned here as raw, pre-analyzed material that can be mined for facts about the past and the future (van Dijck, 2014). This perspective ignores the ways in which numbers and algorithms are profoundly social; how they are generated, for what ends, and how they are analyzed within specific contexts are all far from neutral. Interpretive frames always guide data analysis (van Dijck, 2014; Williamson, 2015).

Datafication and dataism are central features within the QS, and as such scholars have sought to understand how these discourses influence people's understanding of self-tracking practices. The "techno-optimism" (Ruckenstein & Pantzar, 2015, p. 406) of the Quantified Self (QS), as presented in the magazine *Wired*, where it has been heavily promoted, centres around four main themes: transparency of the self through access to numbers, optimization of health and performance with the help of those numbers, enacting a feedback loop of data and behavioural change, and biohacking through self-experimentation and manipulation (Ruckenstein & Pantzar, 2015). Smith (2018) has similarly argued that the naturalization of data collection on the self over time has led to forms of "data doxa" (p. 2) where digital data devices and platforms come to be seen as "normal, necessary, and enabling" (p. 2) in ways that limit people's ability for critique. Datafication is an important consideration throughout this dissertation, as the quantification of steps, distance, and running pace are one part of broader moves to quantify the body, physical activity, and health (Lupton, 2016b).

Privacy and the surveillance society. The degree of heightened surveillance and the greater potential for invasions of privacy are serious ethical issues for self-tracking. In this "Internet of Things," there is a

pervasive presence around us of a variety of things or objects – such as Radio-Frequency IDentification (RFID) tags, sensors, actuators, mobile phones, etc. – which, through unique addressing schemes, are able to interact with each other and cooperate with their neighbors to reach common goals. (Atzori, Iera, & Morabito, 2010, p. 2787)

This communication between devices is one aspect of the QS today that truly distinguishes it from past (but still present) efforts of self-tracking; the data that is collected is not truly private because it is being shared with other “things or objects” within vast networks.

As with other health and wellness apps, data can be collected on heart rate, step counts, health status, weight, and more, and it may be tied to identifying information as well as photos that a user has uploaded to track their progress (Huckvale, Prieto, Tilney, Benghozi & Car, 2015). The possibility that this data will be used for commercial purposes and unspecified third parties as well as the possibility that it will be hacked are relevant here (Lupton, 2016b; Rich & Miah, 2014). This is what Lupton (2016b) describes as an exploited form of self-tracking, where data is generated for purposes that are unknown to those who are generating the data. Millington (2016) refers to the practice of producing data through the consumption of fitness tracking devices as prosumption, which is an important topic to explore given that these data sets are valuable to third parties as well as the platforms through which they are gathered. Very little is known about the data that is generated through these devices, or how the companies that gather the data are securing and protecting it (Lupton, 2016b). In this dissertation I begin to answer some of these questions as they relate to workplace wellness programs.

However, the fact that others are watching is in many ways the point of the entire endeavour. While an important component of the “surveillance society” described by Lupton (2012) is that the citizenry is encouraged to take up increasingly digitized, automated, and pervasive modes of self-monitoring for the purposes of self-improvement, a key component to this concept is that this leads to an omnipresent sense that they are being watched by others. In addition to the ways in which people engage in self-surveillance through the use of self-tracking technologies, the forms of lateral surveillance that are enabled through those same technologies are a key component to the mechanics of power. Andrejevic (2002) describes lateral surveillance as “not the top-down monitoring of employees by employers, citizens by the state,” which is how surveillance is commonly understood, “but rather the peer-to-peer surveillance of spouses, friends, and relatives” (p. 481). With fitness tracking, the forms of lateral surveillance that are most enabled are message boards, online communities, and competitions where users can view the data of others for the purposes of competition, encouragement, or accountability. Millington (2016) refers to this as “Accountability 2.0” (p. 1193) where these online support networks—or, networks of people who might compete with you or evaluate you negatively for being sedentary—enable more people to view intimate aspects of your life through your fitness data.

The popular tracking community and social media platform Strava is one such example, where app and web users can track their activities using satellite GPS and share those activities with the community where users can follow one another, giving each other “Kudos” or encouragement for their achievements. Fitbit enables step competitions where people who may know each other but also may be connected through Fitbit friend

networks can compete with one another to see who can take the most steps in a defined period of time. I discuss the role of lateral surveillance in women's running practices in Chapter 6.

While many discussions of lateral surveillance paint a rather dreary picture, scholars such as Whitson (2013) and Albrechtslund (2008) contend that pleasure and play are important parts of these surveillance regimes. The nudges by fitness apps to share physical activities on social media, or the creation of challenges between users to see who can walk the most steps, serve to build in the ability for users to monitor the physical activity levels of others. Albrechtslund (2008) points to the more pleasurable aspects of what he calls "participatory surveillance," where people can make or sustain friendships, experience gratification from being gazed upon by others, and form subjectivities vis-à-vis their online and offline personas. Furthermore, "gamification" is the application of "playful frames to non-play spaces" (Whitson, 2013, p. 164), through leaderboards, badges, and point systems, is an important component of the pleasure that people experience when they use fitness trackers.

It is important to take the pleasurable components of gamification. At the same time, it is important to acknowledge gamification is not "politically innocent" (Williamson, 2015, p. 143) in terms of the value judgments that undergird the algorithms as well as the financial aspects of these information exchanges. Games are not only fun; they are games because they are embedded within cultural norms, representations, and narratives (Whitson, 2013). In this case, many of those narratives centre around self-responsibilization and neoliberal governance through the use of carrots as games, rather than sticks as risk discourse, while still accomplishing the same goal of altering

behaviours to be more in line with dominant health directives. In Chapter 5 I discuss more specifically how gamification and pleasure come to play a role in governance through Fitbit in the workplace.

In discussions of privacy and surveillance, it is vital to be attentive to the role of social power in shaping what data is collected and shared, and what data is accessible. Following Kennedy and Moss (2015) and Cooky, Linabary and Corple (2018), I consider data to be shaped by power, as well as being a form of power in and of itself. In the case of big data, a “big data divide” (Andrejevic, 2014) exists whereby access to big data sets is enabled for corporations, marketers, and the state, while activists and many academics enjoy little access to such data. While the spread of devices like Fitbits and Apple Watches might have a veneer of democratizing information flow, as surveillance is no longer just the property of those at the tops of hierarchies, Andrejevic (2002) cautions that “the result has not so much been a democratization of politics and the economy, but the injunction to embrace the strategies of law enforcement and marketing at a micro-level” (p. 494). While self-surveillance, top-down surveillance, and lateral surveillance are all enabled by self-tracking, opportunities to survey the activities of those who collect, manage, and market the data— “sousveillance,” or “surveilling the surveillers” (Mann, Nolan & Wellman, 2003)—are limited, if they exist at all. This uneven access and control over data and data collection platforms leads to what Cooky et al. (2018) describe as the “colonization of the self” (p. 10), which is a process whereby social and online media companies can access digital self-representations through our engagement with their platforms, such as through online searches, likes and favourites, and photo-posting and engagement. While users grant access to these companies by virtue of agreeing to the

terms of service, anyone who is uncomfortable with this degree of information being accessible to those companies is constrained in their ability to limit that access as they cannot use the platform if they do not sign away those rights.

Institutional self-tracking. In addition to examinations of the personal decision to wear a fitness tracker, in many cases people are encouraged (or even coerced) to wear a fitness tracker who might not have made this decision otherwise. This can occur within a workplace, in a physical education class, for one's health insurance, or for a public health campaign. These incentives can be financial, cultural, or social (Lupton, 2016b). The degree to which participation in these programs is truly optional differs, as in some instances one can opt out with no social or financial penalty, while in others, refusal to participate can result in penalties such as paying higher health insurance premiums (Schmidt, Voigt, & Wikler, 2010). Understanding the institutional infrastructures of the QS, such as within workplace wellness programs, is important for scholarly examination.

Wearable technologies fit into a broader context of workplace wellness programs, where employers seek to incite health-promoting behaviours amongst employees. Workplace wellness programs encompass a variety of approaches to disease prevention and health promotion that aim to raise awareness of (un)healthy behaviours, to bring about behaviour changes, or to stimulate health-promoting changes in the workplace environment (Pencak, 1991). According to the Centers for Disease Control and Prevention (2015),

A workplace health program is a health promotion activity or organization-wide policy designed to support healthy behaviors and improve health outcomes while at work. These programs consist of activities such as health education and coaching, weight management programs, medical screenings, on-site fitness programs, and more. Workplace health programs also include policies intended to facilitate employee health, including allowing time for exercise, providing on-site

kitchens and eating areas, offering healthful food options in vending machines, holding “walk and talk” meetings, and offering financial and other incentives for participation. (para. 5-6).

Broadly speaking, incentives within workplace wellness programs can be participation-based or attainment-based (Schmidt et al., 2010). Participation-based wellness programs offer incentives regardless of outcomes; for example, an employee can be reimbursed for a gym membership regardless of whether they attend the gym. In contrast, attainment incentives are based on achievement of particular metrics, such as smoking cessation or maintaining a BMI under 25 (Schmidt et al., 2010). Since the United States lacks a single-payer universal health care system, and employers are often those who pay for employee insurance, workplaces have a greater incentive to ensure the health of employees (Hull & Pasquale, 2018).

Given that the goal of many workplace wellness programs is to encourage employees to engage in more physical activity as part of a healthy lifestyle, the implementation of Fitbit and other similar wearable technologies is unsurprising (Ajunwa, Crawford, & Ford, 2016). However, simply giving employees fitness trackers is not enough. Proponents of wearable technologies in the workplace warn that wearable devices should be thought of as “facilitators, not drivers” of physical activity changes (Patel et al., 2015, p. 459). For workplaces, this means that programs must be carefully designed to promote more active living, rather than by assuming that trackers themselves will simply change behaviours. Research tentatively supports this suggestion, since Crowley, Pugliese and Kachnowski (2016) found that a workplace program that incorporated Jawbone UP devices without any collective competitions or incentives had no appreciable impact on employee step counts. The Health Enhancement Research

Organization (HERO) (2015) surveyed businesses who utilize fitness trackers, and found that individual (74%), team (71%) and departmental (35%) challenges were common, as well as usage incentives (59%) and setting usage organizational goals (48%). In other words, fitness trackers in the workplace are typically a part of larger programs that work to encourage employee movement, rather than assuming that wearing a Fitbit alone will do so.

While some research has been conducted to ascertain the effectiveness of wearable technologies in workplace wellness programs (see Crowley et al., 2016), given the extensive focus in recent years on individual bodily quantification efforts, there is a surprising lack of critical research on workplace wellness programs. The exception to this gap is the work of Phoebe V. Moore, who has explored bodily quantification efforts within the workplace to track employee productivity and agility (see Moore, 2018; Moore & Piwek, 2017; Moore & Robinson, 2016). For instance, Moore and Robinson (2016) analyzed the global effects of sensor-embedded devices that employees are increasingly wearing in the workplace, in a climate of increasing precarity, competition, and automation. They write that these technological developments are

part of an emerging form of neo-Taylorism which risks subordinating workers' bodies to neoliberal, corporeal capitalism. In the short term, quantification helps corporations and self-employed precarians to keep up with cutthroat competition. In the long term, this approach undermines life to capital to an unsustainable degree, destroying the qualitative outside, which both provides the basis for capitalism (as use-value, labour-power, consumer desire) and the basis for resistance. (Moore & Robinson, 2016, p. 2787)

In this climate, embedding sensors on employees as a means to increase their productivity turns them into numbers that can be analyzed, tweaked, or eliminated. However,

employees may also resist this quantification in other ways by subverting the data collection processes (Moore & Robinson, 2016). These possibilities for resistance were supported in Moore's (2018) examination of a case of corporate-led employee tracking initiative where employees wore Fitbits, their productivity was tracked, and they filled out surveys regarding their stress levels, productivity, and wellbeing. Participants resisted the initiative by withdrawing entirely, or by staying in and ignoring the data or questioning its validity (Moore, 2018). Aside from this one study of a company based in Rotterdam, Netherlands, it does not appear that any study of existing programs or their implementation has been undertaken.

The types of efficiency that are promoted through fitness trackers are slightly different than those discussed by Moore (2018), Moore and Robinson (2016), and Moore and Piwek (2017). Instead of directly measuring the outputs of employees, fitness trackers in workplace wellness programs seek to increase the efficiency of employees in a less direct way by making them healthier and thus less likely to miss work or work less productively due to illness (Ajunwa et al., 2016). Productivity is certainly a concern within these programs, as I will illustrate in Chapter 5, although the connection between productivity and wellness and the moral imperative to be well are inextricable from these programs.

Self-tracking in practice. Due to the deeply personal nature of this data on the body, physical activity, and the spaces that bodies occupy, questions have arisen about how self-tracking technologies and practices of datafication have the potential to change how people experience their bodies and space. Within critical scholarship these questions have a great deal of urgency, with scholars such as Williamson (2015) and Lupton (2012,

2013b, 2016b) expressing concern about the ways in which self-tracking represents our bodies in “flat, impoverished ways” compared to “the complexities of the affective embodied knowledge that constitutes a response to ascent a taste, a sound to the touch of skin” (Lupton, 2016b, p. 104). Given this emphasis on visualization and quantification over what can be felt and sensed, the body is positioned as something that must be read with external technologies as our own perceptions of our bodies are thought to be too subjective and flawed (Lupton, 2013b, 2016). In light of these concerns, it is important to ask what precisely happens when people engage in self-tracking.

Foucauldian considerations. Some research suggests that users’ understandings and experiences of their body and physical activity may indeed be impacted by the datafication of the body and panoptic regimes of digital surveillance. With regards to fitness tracking in particular, Drew and Gore (2016) studied a global 50-day pedometer challenge aimed at children in physical education programs, focusing on a classroom in Australia. The students in this study began to think of physical activity as a means to increase their step counts rather than as a pleasurable and embodied activity, illustrating how bodily quantification can indeed change how one thinks about their body and physical activity. Adams (2018) noted that “step-counting translates everyday walking into a health intervention” (p. 2), infusing mundane life tasks with a conscious step-counting effort. Through this process, self-tracking technologies “narrow the meanings we might make of our bodies... In so doing, they make life smaller, and constrain our abilities to imagine life differently” (p. 4). Aspects of fitness tracking itself, such as the specific data that is produced and the work that is necessary to produce this data, has also

become a topic of study. In field notes based on their auto ethnographic experiences of wearing a Fitbit, Fotopoulou and O’Riordan (2016) noted the following:

It seems that this tiny little piece of metal, gum and LCD screen has brought out an inner obsessiveness that I didn’t know about, a compulsiveness to keep logs tidy and up-to-date. I genuinely crave for clean diagrams. (p. 55)

The possibility of becoming obsessed with one’s digital data and orienting one’s life around “clean diagrams” without gaps in the data are issues that have come to the fore within critical discussions of self-tracking. Through the lens of Foucauldian poststructuralism, these scholars argue that health promotion messages and disciplinary power are shaping the most intimate parts of people’s lives. When one is wearing a fitness tracker it is not only when one is engaging in a discrete fitness activity, such as attending a yoga class, that dominant health discourses are shaping their experiences of their bodies; since walking is a constant in the lives of so many, these discourses become inescapable (Adams, 2018).

More recently, however, further examination of self-tracking in practice has called into question some of these techno-dystopian suppositions about the influence of wearable technologies. Instead of assuming that wearing a fitness tracker will invariably lead to particular effects, this research foregrounds the agency of users as they make sense of the data that they collect (Pink et al., 2017). Additionally, more research has been done on average users of wearable technologies instead of only those who align with the QS movement and take up self-tracking in numerous facets of their life with enthusiasm (see Didžiokaitė et al., 2017; Pink et al., 2017). As Gardner and Jenkins’ (2016) study suggests, the practice of self-tracking can be a deeply personal one that shifts in response to continued engagement with the device as well as numerous other

factors. In practice, wearable technologies are considerably messier than a simple Foucauldian disciplinary reading might suggest.

First, data will not automatically change how a person feels about his or her body because having access to data is not the same as finding it meaningful and striving to incorporate it into one's life. People do not always care about data. For instance, both Didžiokaitė et al.'s (2017) research on everyday users of MyFitnessPal and Niva's (2017) research on Finnish online weight loss portal users, their use of the digital resources was thought to be a temporary, rather than long term, practice. For the participants in Didžiokaitė et al.'s (2017) study in particular, they used a limited number of features on MyFitnessPal and disregard those they are not interested in. Similarly, in my observation of university students in a PE class, I found that many of the students did not look at the heart rate monitor data as they were collecting it, suggesting that one can lead a student to data, but they cannot make them 'drink' that data (Esmonde, 2018). Further research has similarly suggested that most users lack the sustained motivation to wear or use the devices and/or apps on a long-term basis (Goodyear, Kerner, & Quennerstedt, 2019; Kim et al., 2016; Miyamoto et al., 2016), with others questioning whether wearable devices succeed in motivating anyone who is not already motivated to be physically active (Patel, Asch & Volpp, 2015).

Furthermore, for data to be meaningful, a person must understand the data and be able to contextualize it within their own life. Pantzar and Ruckenstein (2015) show that this is far from a given, as in order for the heart rate monitor to move from the clinic to the everyday, new forms of knowledge about the body needed to be normalized and considered to be important to track. This was enabled by the linking of skills, images, and

material, which all become linked to daily practices. Without opportunities to make sense of data, or a belief that the data is important, these devices may not have much of an impact (Lynch & Cohn, 2015). As I illustrated within my own research (Esmonde, 2018), university students in a PE class do not often understand the numbers that are given to them by a heart rate monitor, and as such, do not consider this data in their running practices. Pantzar and Ruckenstein (2017) similarly use the concept of “situated objectivity” (p. 2) to consider how people’s expectations, cultural context, and experiences shape how they interpret and act upon their data within their lives. Gardner and Jenkins (2016) found that when confronted with an ECG and an EEG, participants at first found the data alienating. However, when given the time to make sense of the data on a personal level, they incorporated it into their bodily narratives. This suggests that the datafication of the body is not a static act but a process, a process that I explore in Chapters 6 and 7.

This is not to say that a Foucauldian reading of self-tracking is wrong. The fact that people do not behave in precisely the ways that they are expected to—by doctors or by their fitness tracker—does not mean that there is no power relationship there, or that the rise of fitness trackers within the context of dataism does not do disciplinary work on those who wear them and those who do not. Within Foucault’s work, resistance is built into any analytic of power (Foucault, 1990), making a Foucauldian reading of self-tracking even more appropriate. Furthermore, Foucault’s work provides a lens for analyzing the specific ingredients of power, from architecture within prisons and schools (Foucault, 1995) to the dynamics of the doctor-patient relationship (Foucault, 1994). This perspective can bring a lot to the table when analyzing the mechanics of power within

self-tracking cultures. In this dissertation I will contribute to this literature, by considering the modes of governance that enable and make sense of self-tracking in the workplace, as well as how women runners engage with and resist data collection practices.

Digital materiality. Moving away from a Foucauldian perspective, researchers have drawn on new materialist frameworks to theorize the more-than-human in self-tracking. As Lupton (2016a, 2016b) and others have argued, data is lively as it can exert agency within power relationships. The concept of “digital materiality” (Pink & Fors, 2017, p. 379) is a useful one for examining the interconnections between digital and material worlds, data and environments, humans and non-humans, which are always in a state of becoming. When the materiality of digital data and self-tracking is considered, how power works in and through these devices and the bodies that are subject to them can be further elucidated. For example, Pink et al. (2017) illustrated how the generation of mundane data has an affective impact on how people experience cycling routines by bringing together digital and material worlds, humans and non-humans. In doing so, they challenge the notion that self-tracking can easily be used as a motivator to be physically active; interventions using digital data must take into account its affective, generative aspects. Similarly, Pink et al. (2018) further examined how the materiality “broken data” (p. 1), which can be incomplete or inaccurate, is mobilized and repaired by self-trackers.

In light of the materiality and liveliness of digital data, it is important to ask to what degree personal agency is a factor in self-tracking practices. The Physical Techno-Cultural Studies theoretical framework calls upon us to consider precisely what agency means with regards to digital data collection, since agency is never the exerted by

humans alone. Lupton (2016a) asks this question provocatively by drawing on Mol's (2008) concept of eating an apple, which she translates to "eating digital data" (p. 3). One of the foci of Mol's work has been to understand the enactment of realities, which she understands through a lens of ontological multiplicity (Law & Singleton, 2004; Mol, 2002; Mol & Law, 2004). She has focused in particular on the disease of atherosclerosis, illustrating how a singular disease is enacted differently through networks of humans and non-humans (such as stethoscopes, microscopes, and angiograms) in different places within a hospital. This does not necessarily mean that any reality is possible or that the body is fragmented across these hospital sites; instead, the body hangs together through different strategies that bring unity to these different versions of the body and the disease. With regards to eating an apple, Mol's (2008) mundane example calls upon us to pose questions about the nature of subjectivity. One chooses to eat an apple, but once it has been chewed and swallowed, the individual has little control over what happens to it and is generally unaware of the digestive processes that they have initiated. With this distribution of agency within and outside the body in the form of the apple, what counts as the "I" in "I eat an apple" (Mol, 2008, p. 30)? At what point does the apple become part of that "I"?

Lupton (2016a) uses this example to better understand processes of data consumption and data production. By "eating digital data,"

Data are absorbed into the body/self and then become new data that flow out of the body/self into the digital data economy. The data-eating/emitting subject, therefore, is not closed off but is open to taking in and letting out digital data. (p. 4)

What are the boundaries of the body when considering the networks of humans and non-humans that enact the self-tracking subject? And how can we understand agency within these practices of data production and consumption, or prosumption (Millington, 2016), when much of the process of “eating digital data” is one of which people are unaware? Self-tracking connects the self-tracker to their fellow self-trackers, the company/ies that have access to this data within the digital data economy, the networks of infrastructure that collect and store this data, and more. This distribution of agency is important to keep in the frame in discussions of digital data and privacy, as there are many nodes within these chains that are vulnerable to data breaches and even mundane, legal uses of data that users may not be adequately informed about (Lupton, 2016a). In this dissertation I examine some of these themes, such as users’ perceptions of data privacy and safety, addressing an emerging gap in the literature with regards to fitness tracking.

Digital data and place. Finally, people’s lived experiences of place are importantly shaped by digital, location-based media. To illustrate the entanglement of digital and material worlds in how people more generally navigate and make sense of space, Farman (2012) looks to the Museum of London Streetmuseum app, which aligns pictures within the museum’s collection with various locations around the city of London where those pictures were taken, or the paintings depict. One can browse iconic images, such as the arrest of the suffragette Emmeline Pankhurst at the gates of Buckingham Palace, superimposed over the spot in which they occurred. As Farman (2012) notes, any divide between digital and material worlds is undermined as both are informing the app user’s experience of place and its historical context. Looking at these images, in this particular place, has a specific affective, sensory, and emotional impact that cannot be replicated

elsewhere (Farman, 2012). For instance, one could look at the image of Pankhurst while at home before travelling to London, an undoubtedly different experience than looking at the image while standing in the place of the photographer who took that image.

Extending this, the generation of running, walking, and cycling data through GPS-enabled watches and apps can similarly enrich and inform a user's experience of place as they move through it. Like Farman's (2012) contention that "embodied content is non-transferable across media and across situations" (p. 42), looking up the distance of a run on the MapMyRun web site before a run is an entirely different experience than having a GPS watch that provides that same information in real time during the run. Indeed, in a study of affective and spatial impacts on self-tracking while cycling, Sumartojo et al. (2016) illustrated how the practice of using the Strava app impacted their sense of place. Due to the app's division of spaces into segments where users would compete with one another to move through that space the quickest, some of the participants began to experience their runs and cycling tours as segmented along that same basis. However, it is through the entanglement of data and affect, self-trackers think through their environments based on metrics but also feelings of exhaustion, happiness, and hunger. In interviews with average users of self-tracking devices, Pink and Fors (2017) found that runners' engagement with data on topography entangles with their somatic feelings of running, both of which are important sources of information as they run and afterwards as well. In other words, examinations of space and data have highlighted that data collection is not an objective, external process but one that is 'lively' (Lupton, 2016b) and emergent, prone to breakages and leaks (Pink et al., 2016). In Chapter 6 I examine the digital materiality of data even further, highlighting how gender and race entangle with digital

data and place. The materiality of gender and race in self-tracking has received little attention, creating a gap that I seek to address here.

My Contributions to the Literature

The growing body of literature on the QS has provided significant insights into the discourses underpinning the rise of the QS, privacy and surveillance practices, pushed and coerced self-tracking through institutions, and self-trackers' engagements with their data. However, important gaps remain that I seek to address here.

This dissertation addresses several empirical gaps within the literature. First, while some efforts to historicize the QS have been undertaken (see Armstrong, in press; Crawford, Lingel & Karppi, 2015; Lupton, 2016b; Millington, 2018), a focus on the historical precedent for quantifying the body and physical activity has yet to be explored in-depth. In Chapter 4, I respond to this gap by examining several key periods of bodily quantification, between the mid-19th century until the 1980s. In doing so, I provide important context that challenges the presentism of discussions of the QS, where what is new about self-tracking is so often emphasized rather than the historical continuity of bodily quantification practices.

Furthermore, the literature examining the QS in the workplace, particularly from a critical perspective, is still incredibly sparse. Examinations of the topic have largely been limited to theoretical examinations (Lupton, 2016a; Moore & Piwek, 2017; Moore & Robinson, 2015) and studies of the efficacy (or inefficacy) of the implementation of trackers into workplaces (see Crowley et al., 2016). Moore's (2018) study of a Rotterdam firm's attempt to track employee stress, wellbeing, and agility appears to be the one study to date that has explored fitness trackers in use in the workplace. A critical examination of

these programs in practice, and the experiences and expectations of employers and wellness experts alike with regards to these programs, have yet to be examined in detail. By studying both the communications of Fitbit Health Solutions and those who have implemented Fitbits into their workplace wellness programming, the expectations of Fitbits in the workplaces, and the disciplinary practices within these programs, can be better understood.

Finally, this study contributes to the growing body of research that has sought to understand the uses of wearable fitness technologies in practice (see Pink et al., 2017; Lupton, 2017, 2018; Pantzar & Ruckenstein, 2017). In particular, I seek to provide a gendered analysis of self-tracking, focusing on gendered productions of space in Chapter 6 and gendered beauty norms in Chapter 7. Literature examining how one's positionality shapes their data collection and consumption practices is vital for an understanding of how power shapes and is shaped by self-tracking and thus for interventions into unequal relations of social power. When the entanglement of identities with data is not considered, the body is further abstracted; an issue for researchers who aim to bring the body back from the numerical abstraction that is so often associated with self-tracking.

In addition to the empirical gaps that are addressed within this dissertation, the theoretical and methodological choices that I have made represent further contributions to the field of PCS and the literature on the QS. Through the Physical Techno-Cultural Studies theoretical framework that I presented in this chapter, the ways that technologies and humans act together within a power relationship—not always in the ways that are wanted or anticipated—can be better understood. I contend that this theoretical framework can shed new light on self-tracking as a digital, material, and disciplinary

practice. Finally, the running study sensory ethnographic method that I draw on in Chapters 6 and 7 extends the physical within PCS, bringing a more sensory, embodied element to the interview method. Through this method I was also better able to examine the materiality of running-in-place, further lending to the proposed theoretical framework.

In light of these gaps in the literature, in this dissertation I explore the following research questions:

- 1) What is the historical precedent for the “Quantified Self” in physical culture?
- 2) How does the landscape of health care and workplace wellness in the United States make the quantification of the physical activity of employees “thinkable, sayable, and doable” (Miller & Rose, 2008, p. 3)?
- 3) Does self-tracking influence women’s embodied and emplaced experiences of running?
- 4) How do women runners engage with their self-tracking data? How do they resist the expected ‘feedback loop’ of data and actions in response to that data?
- 5) How might Foucauldian poststructuralist theories and sociomaterialist theories meaningfully come together as a lens for studying the QS in physical culture?

In seeking answers to these questions, the context and effects of self-tracking—as practiced by individuals as well as institutions—will be better understood. How I pursue these questions within each study will be described through a series of sub-questions that I present in Chapter 3.

These insights are vital for taking stock of how the quantification of everyday life is impacting people's experiences of physical culture. The ways in which surveillance and quantified norms operate to discipline bodies in physical culture is an extremely timely and vital topic of study. It is my hope to further elucidate the precise mechanics of how power operates through self-tracking in order to challenge inequality and promote social change towards a more equitable physical culture.

Chapter 3: Methodology and Methods

In this chapter I provide an overview of the methodological underpinnings of this project, and the specific method tools that I draw upon. Following Giardina's (2017) contention that PCS researchers should centre their philosophical commitments throughout the research process, I begin by outlining my philosophical approaches to qualitative inquiry, including a discussion of my ontological, epistemological, and paradigmatic approaches, and my understandings of evaluative criteria and research representation. Following this philosophical overview, I describe the methods of the three studies that comprise my dissertation: the socio-techno-historical context study (Chapter 4), the wearables in the workplace study (Chapter 5), and the fitness tracking while running study (Chapters 6 and 7). This includes the research questions, participant recruitment strategies, data collection strategies, and analysis methods that I drew on for that project.

Philosophical Approaches to Qualitative Inquiry

Ontology. Ontology refers to one's understanding of the nature of reality, specifically whether there is one true, objective reality, whether realities are multiple and constructed, or whether reality is somewhere in between (Lincoln, Lynham & Guba, 2011; Markula & Silk, 2011). A belief in one true reality that exists independent of the observer is referred to as a realist ontology, while a relativist ontology is a view of realities that are multiple, locally contingent, and co-constructed by researchers and participants. Qualitative research is often associated with a relativist ontology, and this project follows that tradition. However, the realities that I seek to explore are not entirely

dependent on how each observer constructs reality. Following the critical paradigmatic tradition that I will describe below, I subscribe to a historical realism whereby realities are shaped by social, political, economic, cultural, and technological values that crystallize over time (Lincoln et al., 2011). I view this as being in line with both feminist and PCS commitments, given that both emphasize the importance of context and social factors as they shape realities (Andrews & Silk, 2016; Haraway, 1988; Markula & Silk, 2011).

Epistemology. Stemming from one's understanding of reality is how one can generate knowledge about reality (or realities). This philosophical issue is that of epistemology, in which the relationship is examined between what we can know and what we can see, and the relationship between researchers and what is researched (Markula & Silk, 2011). An objectivist epistemology represents the view that researchers can apprehend reality and accurately represent it in their findings. At the other end of the epistemological spectrum is a subjectivist approach, where researchers do not have direct access to reality, nor do they have the ability to 'accurately' depict reality. A subjectivist epistemology emphasizes the viewpoint of the researcher and the situatedness of knowledge rather than positing that researchers have a "gaze from nowhere" (Haraway, 1988, p. 581). The epistemological approach taken in this project is on the subjectivist end of the objectivist-subjectivist continuum. Rather than attempting to characterize an objective reality, my goal is to describe a plurality of positions, viewpoints and experiences, from my particular standpoint as a researcher.

The researcher's attempts to situate themselves within the research is referred to as reflexivity, or "the researcher's scrutiny of the research experience, decisions, and

interpretations in ways that bring him or her into the process... includ[ing] examining how the researcher's interests, positions, and assumptions influenced his or her inquiry" (Charmaz, 2014, p. 344). Self-reflexivity will infuse every part of the research. It will be included in research memos, data analysis, writing up the research, and as part of the evaluative criteria to which the research is subject. Feminist scholarship often stresses self-reflexivity to counter notions of value-free research that have often espoused dominant perspectives while claiming objectivity (see Harding, 1993). Similarly, Andrews and Silk (2016) call for PCS researchers to bring the politics of the researcher that often inform research to the fore.

Paradigm. Paradigms are, in the Kuhnian sense (1962), the beliefs, habits, and tools that characterize a particular approach (Markula & Silk, 2011). This project draws on both critical paradigms and constructivist paradigms. Critical paradigms are often associated with neo-marxism and the Frankfurt School, as well as Louis Althusser, Antonio Gramsci, British cultural studies, and Physical Cultural Studies (Markula & Silk, 2011). Research within this paradigm is centred around transformation and emancipation from structural and historical oppression (Lincoln et al., 2011). As such, values are central to this type of research, as the researcher's voice is that of a "transformative intellectual" (Lincoln et al., 2011, p. 99) who is both an advocate and an activist. Critical research emphasizes that one's position in society impacts one's perspectives and knowledges, and thus objective research is not possible (or desirable). Alongside this approach is the contention that there are groups in society (however nebulous they may be) whose experiences are shaped by unequal and hierarchical social, economic, and political conditions (Harding, 1993). This research aims to highlight those contexts, to

give voice to subjugated knowledges, and to envision a more just and equitable world (Andrews & Silk, 2016; Grossberg, 1997; Hesse-Biber, Leavy & Yaiser, 2004). In line with these commitments is an attentiveness to the unequal power relationship between researchers and those that are researched, which involves working to prevent harm to the marginalized groups that are either studied directly or are implicated within a study (Hesse-Biber et al., 2004). Critical research is assessed based on its ability to stimulate action, to take into account the potential dangers of research on marginalized groups, and to challenge ignorance and oppression (Lincoln et al., 2011).

Constructivist paradigms seek to reconstruct multiple, and at times fractured realities (Lincoln et al., 2011). The goal of constructivist research is to produce individual or collective understandings of different experiences, weaving together multiple voices as a bricolage. Similar to the critical paradigm, constructivist approaches can be assessed by their ability to stimulate action and transformation, making the values of the researcher formative to any project. Both critical and constructivist paradigms contrast sharply with the positivist paradigm, which is associated with a singular reality, independent from the observer, a reality that is apprehensible by researchers, and quantitative experimental methods. While there can be considerable overlap between critical and constructivist paradigms, the main difference between the two is that “interpretive individuals embark on analysing the experiences of an individual directly, but critical researchers need first to reveal the oppressive ideological structures that limit the individual’s free and conscious actions” (Markula & Silk, p. 45). In the tradition of cultural studies, however, I would add that context should not be thought of as the starting point of a project, but rather, it is the product that is excavated throughout the research process (Grossberg, 2010)

Despite potential conflicts, I contend that this project can draw from both critical and constructivist paradigms. While there are certainly challenges to combining the critical paradigm that must acknowledge some sort of reality to make a case for structural oppression with constructivist paradigms that seek to highlight multiple realities, scholars have productively utilized similarly conflicting approaches, such as feminist theories with Foucauldian scholarship (see McLaren, 2002). Similarly, Denzin and Lincoln (2008) have argued that postmodern research can be transformative through the deconstruction of hierarchical metanarratives. I draw from a Foucauldian understanding of power that does not view power as possessed by groups or easily locatable, but rather as diffuse and relational. In this project I seek to draw on feminist and critical sensibilities to highlight multiple positions and realities—and the contingencies of those positions and realities—as they relate to technologies that quantify the physically (in)active body. My position as a researcher will be a part of the analysis, as knowledge is co-constructed along with the participants that seeks to bring to light oppressive aspects of these technologies along with a more liberatory vision for physical activity as it relates (or does not relate) to technologies. In line with the sociomaterialist and feminist technoscience theoretical approaches that I outlined in the previous chapter, this study will not only look to the roles of humans, but also non-humans in the assemblages that shape how the technologies as well as how they are utilized.

Evaluative criteria. Denzin (2011) has outlined three approaches to the evaluation of qualitative research: foundationalist, quasi-foundationalist, and non-foundationalist. When foundationalist criteria is used to evaluate research, it is done under the assumption that the same criteria should be used to evaluate all research,

whether it is qualitative or quantitative research: that there “needs to be, and can be, predetermined, permanent and applied to any form of inquiry regardless of its intents and purposes” (Smith & McGannon, 2018, p. 14). Tracy (2010) outlines eight universal criteria as indicators of rigorous, quality research: worthy topic, rich rigour, sincerity, credibility, resonance, significant contribution, ethics, and meaningful coherence. In most instances research is assessed based on its adherence to the principles of validity (internal and external), reliability, and objectivity. This type of evaluation is most often used in positivist quantitative research and post-positivist qualitative research (Markula & Silk, 2011). Despite many qualitative researchers not applying these standards to their own work, this is frequently how qualitative research is evaluated by funding agencies and found to be illegitimate (Denzin, 2011; Smith & McGannon, 2018).

Quasi-foundationalist approaches to evaluating qualitative research are based in many of the same principles, although they are altered somewhat to fit within the bounds of qualitative work. Lincoln and Guba’s (1985) framework for trustworthiness in qualitative research is considered a quasi-foundational example. This framework is made up of four components that closely approximate the foundationalist criteria: credibility (internal validity), transferability (external validity or generalizability), dependability (reliability), and confirmability (objectivity). Credibility could be achieved through extended exposure to the field to gain “thick description” (Geertz, 1973). Transferability involves giving the audience sufficient information about the particulars of a project so that they can ascertain the degree to which the findings would apply to other situations and contexts. Dependability refers to the degree to which the findings are found across different methods or researchers and could be extended through triangulation to

determine if the findings are similar across methods, sources, and researchers. Finally, confirmability does not refer to objectivity in a traditional sense, but rather the necessary degree of self-reflexivity on the researcher's part that illustrates an awareness of the ways in which researcher positionality influences the research project. Markula and Silk (2011) are critical of quasi-foundationalist approaches, arguing that these principles are still undergirded by aspects of realist and objectivist ontologies and epistemologies respectively, and that it is not the most appropriate criteria for many research projects.

Finally, a non-foundationalist or relativist approach to evaluating qualitative research looks beyond these traditional standards of rigor to create new ones, or to re-appropriate foundationalist and quasi-foundationalist concepts to fit the needs of the research project (Denzin, 2011; Markula & Silk, 2011; Smith & McGannon, 2018). This is the approach that I use here. Those taking a non-foundationalist approach would view evaluative criteria as socially constructed characteristics that do not inherently guide every researcher. Further, any universalist criteria would be viewed as a boundary-making practice that excludes forms of research that do not adhere to those principles. Taking a non-foundationalist approach to evaluative criteria does not mean that 'anything goes' in research. Instead, there is no one way to conduct and evaluate research that should be applied to all projects, as the criteria used should be open-ended and dependent on the philosophical underpinnings of the project (Smith & McGannon, 2018).

For example, instead of evaluating a project based on its validity or accurate representation of a singular reality, perhaps researchers could look to the impact of the researchers on a social cause, and how the findings were disseminated to a wider audience rather than being isolated in academic journals. The writing could be evaluated

based on the story it tells and how it evokes particular emotions in readers, rather than the writer's ability to write themselves out of their accounts or to outline all of their biases (Markula & Silk, 2011). Research can be evaluated based on its ontological, epistemological, and theoretical coherence (Smith & McGannon, 2018). Research based in a critical theory paradigm is typically evaluated based on the historical situatedness that it achieves, and how it stimulates action. Constructivist paradigms are similarly evaluated based on the stimulus of action as well as the authenticity and reconstruction of multiple truths.

I believe that the word "rigor" has a place in constructivist research, although there is no universal definition for this loaded term. Therefore, this research will be evaluated using non-foundationalist criteria. I consider thick description, extended engagement, reflexivity, and consulting numerous sources and methods as extending my ability to understand the numerous social worlds within a given empirical site. I also consider the political impact of research and evocative writing to be important ways to evaluate research as well. This approach to the evaluation of research is in line with the philosophical positions that I outlined above that undergird this research.

Representation. Finally, the process of writing up research is an important aspect of the methods to consider as it relates to the philosophical underpinning of the project. The process of writing in research is often considered to be unproblematic, as if writing can be an accurate representation of the research and its results. In this realist form of writing (Markula & Silk, 2011), the researcher is written out of the picture, as they were assumed to have not shaped the outcomes in any way. Sparkes (1995) describes scientific writing as "the style of no style": "The stripped-down, abstracted, detached form of

language; the impersonal voice; and the statement of conclusions as propositions or formula involves a realist or externalizing technique that objectifies through depersonalization” (p. 161). In this style, any account of who the researcher is or how that may have impacted the research was not considered relevant. It is dry and scientific, focusing on the specifics of the procedure and the noteworthy findings with a large degree of removal.

The crisis of representation undermined the assumption that researchers can objectively and accurately capture lived experiences through such scientific writing, making the link between the experiences under study in research and the research text a problematic one (Denzin & Lincoln, 2008). Different forms of writing that are more reflexive and take race, class, gender, and other identities into account, emerged. Researchers began to use the word “I” in their writing more, acknowledging that they saw, thought, interacted, and discovered. The authoritative voice of the researcher was also challenged, with calls for a greater emphasis on the voices of the participants—particularly when those participants are considered to be a part of marginalized groups (Markula & Silk, 2011). Furthermore, following Pink’s (2009) sensory ethnographic approach to representation, I seek (at times) to “invite...[the] audience to imagine themselves into the places of both the ethnographer and the research participants represented” (p. 42). In this dissertation and any manuscripts stemming from this project, I will ensure that situatedness of my particular research comes through in the text. Furthermore, critical research is assessed in part on its ability to stimulate action and to be attentive to power differentials between the researcher and those who are researched

(Lincoln et al., 2011). These criteria will also be considered in the write-up of this research, as politics infuse every part of the project.

Methods

I will now present the three independent but related studies that comprise this dissertation. Following Harwood (2009), I looked at multiple sites of the “quantified self,” emphasizing historical, institutional, and personal dimensions, to better understand how knowledge is produced around health and the body within specific socio-historical contexts. I examine three different sites: the historical quantification of the body in the United States, the institutional use of wearable technologies in workplaces, and personal uses of fitness trackers for runners with a focus on women runners. For each study, I provide an overview of the research questions, the site and sample of the study, the data collection procedures, and the mode of analysis.

Methods: Socio-historical-technological contextualization. The need for a historical context chapter was established during my comprehensive exams oral defense. A committee member described my contextual analysis of the QS—where I discussed healthism and neoliberalism, the “obesity epidemic,” the rise of big data, e-scaped medicine (Nettleton, 2004), and quantification technologies— as “presentist” (Andrews, personal communication, 2017). Once I realized that this committee member was right, I began sketching out a dissertation chapter that would look to the past to better explain the current moment of datafication. Given my theoretical sensitivities, I wanted to address the ways in which bodies have interacted with technologies, and in particular, the agency of technologies in shaping how people see themselves, the identities that they construct based on numbers, and what people can aspire to be.

In my genealogical analysis, I aim to better understand how discourses subject the citizenry to power relations (Markula & Pringle, 2006). To do so I trace the unstable and uneven ways in which the QS has emerged, and the contingencies that have allowed the particular manifestation of the Quantified Self that I am most interested in—wearable fitness technologies—to come to be. As I described above, the analytics of sociomaterialisms and Foucauldian poststructuralism are used throughout the genealogical investigation, as they provide insights into the connections between the various discourses, rationalities, and tools in assemblages of power and governance.

I began with this question: What is the historical precedent for the “Quantified Self” in physical culture? In particular, I examine the historical precedent to better understand the identities that have been created through the quantification of the body, and how these identities shape and are shaped by discourses of race, gender, class, and other axes of identity.

Data collection. Following these questions, I analyzed of documents, books, and journal articles that shed light on these questions. Textual analysis involves the examination of texts that have not been assembled (through interviews, for example) or written by the author, but has instead been written and collected by others (Markula & Silk, 2011). While the articles and books that I drew upon were analyzed by the authors who produced them, I assembled them towards particular research questions and applied a new theoretical framework.

My first impulse was to examine the history of fatness and obesity in the United States. Farrell (2011) and Schwartz’s (1986) treatments of the topic proved to be particularly instructive, as they pinpointed the mid-1800s as being a significant shift in

understandings of obesity, from approval to abjection. What followed was somewhat haphazard; I looked to the role of the cold war in the disciplining of children's bodies (Montez de Oca, 2013), anthropometrics and somatotyping (Vertinsky, 2002), the rise of physical activity epidemiology (Paffenbarger et al., 2011), the fitness boom of the 1970s and 1980s (Howell & Ingham, 2001; Kolata, 2003; Maguire, 2008), and the rise of quantification (Porter, 1995). Each text suggested new directions, which I followed. Over time, a picture began to form of a timeline that I could describe in this dissertation, and I began formulating an outline of this paper. I aimed to address these gaps in my reading, while also acknowledging that there was no way that I could paint a complete picture of such an expansive historical topic. In the end I opted not to present this history in chronological order, but instead by theme. This felt more attentive to a Foucauldian ethos, as a chronological timeline may imply more continuity and cohesiveness than I intend to convey.

Analysis. The quantified body is an assemblage of measurement devices, political norms, constructed categories, beliefs and morals, and myriad other constructs that are examined in this dissertation chapter. By examining the history of the quantified body, several things become apparent. The first is the work that is done—by humans and non-humans—to categorize and quantify bodies. Over time categories come to seem natural, or in Latour's terms, they become black boxes where the networks of allies that assemble as a particular form of knowledge are obscured (Latour, 1987). A second is that the use of numbers to interpret secrets about the body and the soul has an extensive history that bears on the practice today. While the devices that are associated with the QS may seem new, the rationale behind their use certainly is not. Finally, a dedicated examination of

the historical context of the QS contributes to an approach to scholarship that seeks to arrive at context rather than to begin with it as a backdrop (Andrews & Silk, 2016).

Throughout Chapter 4, I consider the relationships between bodies, technologies, and the impetus to quantify the body. I show how all of these have changed, and in many other ways, how they have not. I show how knowledges about the body have been deployed in different contexts of power, and the effects of these knowledges (Foucault, 2003a).

I took an iterative and abductive approach to historical contextualization that involved moving back and forth between reading, finding new sources, following hunches, writing, moving backwards, and moving forwards. My theoretical lens of genealogy and sociomaterialisms continually pushed me to move beyond a focus on human agency to consider the ways that humans are connected to non-humans, and how non-humans enabled each orientation towards the body. I considered the words of Haraway (2016) throughout my analysis. She writes,

It matters what matters we use to think other matters with; it matters what stories we tell to tell other stories with; it matters what knots knots knots, what thoughts think thoughts, what descriptions describe descriptions, what ties tie ties. It matters what stories make worlds, and what worlds make stories. (p. 12)

I bring this up because the nets that I cast in order to wrangle narratives are inherently partial and the product of choices. It is a choice to centre human agency, just as it is a choice to look beyond the agency of humans to consider the active role of non-humans. To assemble a history of the quantified self is to weave together a story that requires creativity as well as an understanding of the limits of that story. It is also, as Haraway (2016) points out, an inherently political process that *matters*. Whose stories are told, and

whose values are taken for granted, shape what are taken to be truths, no matter how provisional these truths may be.

Methods: Wearables in the workplace. This study of wearable technologies in the workplace was guided by the following research question: How does the landscape of health care and workplace wellness in the United States make the quantification of employee physical activity “thinkable, sayable, and doable” (Miller & Rose, 2008, p. 3)? In particular, I focus on the articulated goals of workplace wellness programs, the identities that are brought into being through these programs, how programs are assessed, and issues of privacy regarding data collection in workplace wellness programs.

Site and sample. To answer the questions above, I utilized document analysis and expert interviews with an eye towards collecting data that would answer the research question and sites of focus I described above. Collection of documents was ongoing throughout the project, with a concentrated search occurring at the beginning of the project. The primary source of data for this study was the Fitbit Health Solutions (FHS) web site, which provided significant insight into the political rationalities and governmental techniques of Fitbits in the workplace. This site features documents such as blog posts (21 documents), case studies (13), webinars (3), information kits (3), and informational documents and white papers (27). This web site suggested avenues for textual snowball sampling (Jette & Rail, 2013; Jette et al., 2016), particularly regarding documents that are linked on the FHS web site such as the Fitbit privacy policy and a Fitbit press release regarding their acquisition of Twine Health, a health coaching platform. In addition to these FHS documents, I conducted textual snowball sampling to gather documents that were referenced in the FHS documents. These included, but are

not limited to, the Fidelity Investments Annual Wellbeing Survey (Fidelity Investments, 2017) and the Springbuk white paper on Fitbit Wellness (Springbuk, 2018). Together, these documents paint a picture of the landscape of wearables within workplace wellness, processes of problematization that necessitate FHS, and the technologies of government that are put in place through FHS.

To add to these documents, I conducted expert interviews with four people who manage workplace wellness programs that have utilized Fitbit Health Solutions.

Approval for this project was obtained from the University of Maryland Institutional Review Board prior to the recruitment of participants. I solicited interviews with people whose organizations had appeared in documents on the FHS web site, and four agreed to participate (see Appendix A for the recruitment e-mail for this study). Of those recruited, Brandon⁴ works as a wellness broker for an insurance company, Laura works for human resources for a large, multinational company, Heather is a manager of employee wellness at a state-wide, public-sector employer, and Angela is the director of fitness-related programming for a state-wide, public-sector employer. All are based in the United States.

Data collection. Semi-structured interviews with open-ended questions were conducted to acquire in-depth knowledge about the landscape of wearable technologies in workplace wellness programs. These interviews were based on an interview guide (see Appendix B) with a series of topics that were discussed according to the flow of the conversation with each individual interviewee. In semi-structured interviews the interviewer is an active participant in the discussion and can probe for more information that arises in the context of the interview. I drew on an interview guide of open-ended

⁴ All names used are pseudonyms.

questions that sought in-depth knowledge from people who know a lot about the topic being explored (Markula & Silk, 2011). Interviews were conducted over the phone and lasted between 25 and 60 minutes. All interviews were audio-recorded and transcribed verbatim.

Governmentality analysis. As I began collecting the above data and read through it, a governmentality framework seemed like an appropriate approach for thinking through the data. This led to an iterative process of analysis where I read Foucauldian and Foucault-inspired texts alongside my data and sought out further data to answer new questions that arose from my readings. In Chapter 5, I present my findings in two main parts. I begin by considering the political rationalities that justify employers intervening in the health and wellness of employees through Fitbit programs, followed by the governmental technologies that were put in place to intervene from a distance.

Rose and Valverde (1998) have investigated the ways in which the legal complex has become integrated into techniques of government. In doing so, they highlight four foci for investigations of the legal complex using a lens of governmentality: subjectifications, normalizations, spatializations, and authorizations. Subjectifications are the multiple processes of “encouragement, support, and shaping of self-projects in such ways that in specific practices, these come into alignment with the diverse objectives of regulation” (Rose & Valverde, 1998, p. 548). In other words, there are many different forces that shape what legal subjects come into being, whether they be people who are born criminals or people who became criminals due to circumstances. Normalizations are the deployment of various modes of expertise—which in many cases conflict—that set up expectations for how to live. Spatializations are the practices that constitute what is a

“governable space” (Rose & Valverde, 1998, p. 549), for example, by governing the individual criminal as well as spaces of perceived criminality such as the park or the mall. Finally, authorizations are the mechanisms whereby the ability to exercise authority over others is granted, through both law and expertise. I consider these different techniques of government, not as they apply to the law in particular, but how they come to shape the implementation of FHS.

For Miller and Rose (2008), “doing and theorizing governmentality” (p. 14) entails asking questions about the power of authorities, the ends to which power should be exercised, the effects of the exercise of power, and how knowledge supports and informs these exercises of power. In this particular instance, I ask questions about how and to what ends “socially legitimated authorities seek to interfere in the lives of individuals” in various sites, including the workplace (p. 1). What knowledges support the authority of employers, insurance agents, and workplace wellness brokers to intervene in the health and wellness of workers? Why are these types of interventions deemed to be necessary? How are these workplace wellness interventions made possible, through wearable technologies in particular? How do the people who are targeted by these interventions work upon themselves, or indeed, resist change? How are these interventions justified in a climate where government interventions and other incursions into liberty and privacy are increasingly vilified? What actors are involved in these interventions, no matter how small? Broadly, these questions represent a move “from why to how” (Miller & Rose, 2008) that does not necessitate a causal explanation but rather an excavation of the web of actors that as a collective shape the conduct of individuals.

Methods: Fitness tracking while running. In my research on women runners who engage in self-tracking practices, I was guided by the following research questions:

1. Does self-tracking influence women's embodied and emplaced experiences of running?
2. How do women runners engage with their self-tracking data? How do they resist the expected 'feedback loop' of data and responses to that data?

In particular, I focus on the forms of self-surveillance and lateral surveillance that are enabled through self-tracking and the gendering of women's active bodies.

Site and sample. For this study, participants were recruited based on four main criteria. First, I recruited women to participate in this study. The rationale for this was in part to learn more about how women specifically might utilize self-tracking devices as part of their running practice. Additionally, I had concerns about running with men that I do not know in places that might be unfamiliar to me. I felt safer running with women, which largely informed this choice. Second, the participants had to be regular runners. I did not have any criteria beyond self-identification as a regular runner; the participants did not have to run a certain amount per week or be training for any kind of race. Third, prospective participants had to use a self-tracking device of some kind as part of their running. This could include a designated watch for self-tracking, as well as the use of an app on their phone such as MapMyRun or Runkeeper. Finally, as recommended by the University of Maryland Institutional Review Board, participants had to state that they did not have a previous or current history of heart disease or stroke, of having chest pain during exertion, or of using blood-thinning medication. While I generally did not talk to participants about this specifically, they had to check a box on their consent form to state

that they did not have any of these health conditions in order to be considered eligible to participate.

The first five participants were recruited through a running group in D.C., which I will refer to here as the D.C. Running Club. I e-mailed the leaders of this running group to ask if they would permit me to participate in runs with the group and to make announcements over the next few weeks to ask if anyone might be interested in participating in the study (see Appendix C for this recruitment e-mail). They welcomed me into the group, and I began running with the group intermittently in September 2017. Over the course of the next few months I recruited five women in this running group to participate in the study (see Appendix D for the recruitment script). Four of those runners I met through regular runs with the group, while the fifth was recruited through the D.C. Running Club listserv. The next five participants were recruited using social networks. I spoke with friends and colleagues and posted on social media (Facebook) to ask friends if they could re-post my call for participants, or if they knew of anyone that I should contact to participate in the study. Of the five participants that were recruited through social circles, four participants contacted me to participate, and I contacted one participant who had consented to share her e-mail with me through a mutual friend. See Appendix E for a table of the demographic data for all research participants.

Data collection. This research brings together two methods of data collection: a running interview and a semi-structured interview. I met participants at a location of their choosing for the running interview. After this was completed, we would walk together to an agreed upon location to conduct the audio recorded interview. I will discuss each of these data collection procedures in turn.

The running interview. This project is a form of sensory ethnography, which Pink (2009) describes as “ethnography that takes as its starting point the multisensoriality of experience, perception, knowing and practice” (p. 1). A goal of sensory ethnography is to better understand how people experience place, and the interrelationship between bodies, minds, and material and sensory environments (Pink, 2009). Sensory research, as its name suggests, focuses on the senses as interconnected, biographical, and cultural. Pink (2009) summarizes the entanglement of embodiment, emplacement, and power within sensory ethnography thusly:

Ethnographers and participants in ethnographic research are emplaced in social, sensory and material contexts, characterized by, and productive of, particular power configurations that they experience through their whole bodies that are constantly changing (even if in minor ways). ... The idea of place as lived but open involves the inevitable question of how researchers themselves are entangled in, participate in the production of, and are co-present in the ethnographic places they share with research participants, their materialities and power relations. (p. 33-34).

The goal of my research was to understand the participants’ “social, sensory, and material contexts” of their embodied and emplaced running practices, and how self-tracking plays a role in those contexts and practices.

To do so, I drew on a running interview method that allowed me to participate in and observe the embodied and emplaced running practices of the participants. The running interview method that I used in this study is a variation of the walking interview (Evans & Jones, 2011; Kusenbach, 2003; Pink, 2009; Springgay & Truman, 2018).

Walking interviews have received considerable scholarly attention in recent years, as researchers have walked, cycled, and toured with participants to gain a greater understanding of their relationships with place and space (Evans & Jones, 2011).

Through walking, “researcher and participant are more exposed to the multi-sensory stimulation of the surrounding environment” (Evans & Jones, 2011, p. 850). The idea that sharing in others’ steps can produce a sense of belonging alongside them and can be a way to participate in their practices of place-making, has long been a contention within ethnography (Pink, 2009). For researchers who are engaging in walking tours, the tour can be a natural “go-along” where the route is solely determined by the participant who would have been walking that route anyway (Kusenbach, 2003) to a route planned and guided by the researcher (Reed, 2002).

For this research project, the route was primarily determined by the participants, with some influence from me so that the meeting place would be accessible to me. Prior to the running interview, I was in touch with participants to schedule a time and place to meet them for a run. In many cases I would meet the participants close to their home or near their home, and we would run along a course that they were familiar with from their training runs. We ran in many places across D.C., Maryland, and Virginia; some I was familiar with beforehand, and many others I was not. When we discussed possible routes and distances beforehand, I encouraged the participants to choose a route between four and five miles (this is not my preferred unit of measurement, but I had to speak their language). In some cases, this meant that I was going along on a run that they would have been doing anyway, which was more common if that participant was not training for a particular race or was not especially committed to sticking to a training plan. This was the case for my run with Irie, when we did our running interview as part of the running group. In other cases, the participants were training for a race using detailed training plans, and they had to make time in their schedule to go on a slower, shorter run with me.

Natasha, for instance, runs 60 miles per week at a considerably faster pace than I would like to run. Natasha ran 5 kilometres in the morning to account for the shorter 4 mile run that we did together later that afternoon.

Before we set off on the run, I asked all of the participants to narrate their thoughts and actions to me over the course of the run. For example, I asked them to tell me about their decisions to cross the street, their thoughts about our surroundings, and their actions with their self-tracking watch (such as starting or stopping it, looking at it, responding to the data). This narration gave me greater insights into how the participants were using their watches, and how they were moving around space. After the running interview and semi-structured interviews were completed, I made some field jottings (usually using the Notes app on my phone) that were then turned into full-length field notes the next day. In my field jottings I was particularly attentive to how I felt while we were running, and on the participants' articulations of their experiences of place and of their sensory experience of moving through space.

Walking interviews (or in this case, running interviews) have a number of advantages. First, walking interviews as a sensory ethnography method facilitate discussions of place to a greater degree than do sedentary or traditional interviews where participants are asked to discuss place without the prompts that are common during a walking interview (Evans & Jones, 2011). There were many instances during runs where the participants and I would discuss landmarks around us, the weather, or how tired we were as we ran up a hill that richly informed my understandings of their experiences of running. Second, the data is also more spontaneous, since participants can respond to visual prompts in the environment rather than prompting from the researcher (Evans &

Jones, 2011). The unstructured nature of these discussions meant that participants could organically bring up topics that were relevant to them while running, instead of me needing to prompt them in the semi-structured interview. Furthermore, since I was able to go along with the participants on courses that they run on regularly, I got a better sense of the places that they were telling me about in the semi-structured interviews since I had seen many of them firsthand and they had just observed them as well. For example, when I ran with Elizabeth, I was able to observe that her Apple Watch and her Garmin watch produced different data from the same run. This prompted me to ask about how she differently values data during the semi-structured interview. While I do not cite my field notes in this dissertation as often as I cite the interview transcripts, the interviews were informed by what I observed on the run and thus aspects of those runs are presented throughout this dissertation. Third, walking interviews facilitate conversations between the researcher and participants. For example, the natural breaks in conversation that occur while walking are not thought to signal the end of the interview, making it easier for an interviewer to pick up the conversation again and continue with the interview (Evans & Jones, 2011). Running conversation naturally has breaks as well, so picking the conversation back up again with a person that you have never spoken with is easier in that context for this reason. Finally, the act of running with another person helped us to develop rapport that translated into a more productive semi-structured interview at the end of the run. Running can be an intense, visceral, surprising, joyful, painful, and exhausting experience. In some cases, our experiences with running were downright odd. On my first run, which was with Ruby, we had not been running for ten minutes when a man collapsed on the sidewalk in front of us and we had to phone an ambulance. I believe

that having shared these intense experiences with all of the participants allowed for greater rapport.

The semi-structured interview. After the running interview was completed, the participant and I went to a location of their choosing, typically a coffee shop, for the semi-structured sensory ethnographic interview. The location had an impact on the discussion. In one case we went to the participant's home where the interview is littered with discussions of that participant's cats. During another interview at a cocktail bar the song "All Star" by Smash Mouth was playing—which was reflected in several pages of the interview transcript as we discussed the song. The interviews were semi-structured, which are characterized by open-ended questions that seek in-depth knowledge from people who are thought to know a lot about the topic being explored (Markula & Silk, 2011). In semi-structured interviews, the interviewer is an active participant in the interview and can probe for more information that arises in the context of the interview. While the goal of the interview is determined by the interviewer, it is important that the participant feels that their views and experiences are listened to, and that they are doing most of the talking (Jones, Brown & Holloway, 2012). See Appendix F for the interview guide.

A sensory ethnographic interview in particular is "informed by the argument that sensory perception and empathy can produce ethnographic ways of knowing" (Pink, 2009, p. 380). To learn more about the ways that the participants understand their senses and the role that they play in running and self-tracking, I inserted questions on that topic into my interview guide and probed to learn more when those topics were brought up by the participants. Additionally, the running interview suggested points of discussion within

the interview as they relate to the senses, embodiment, and emplacement (Pink, 2009). The interview guide was altered over the course of the interviews in response to emergent questions and lines of interest. For example, after my sixth interview, I felt that I had learned a great deal about many of the micro-level processes of self-tracking, such as how often the participants looked at their watches, or what specific numbers they considered important or unimportant. However, I was not learning as much as I had hoped to about the more macro-level influences on the participants' experiences, such as the influence of gender or healthism in their self-tracking decision-making. In light of this, I added several questions to the interview guide to direct participants towards these topics, instead of hoping they would come up organically. This led to some very informative conversations in subsequent interviews. Interviews lasted between 50 minutes and 110 minutes. Verbatim interview transcription occurred over the process of data collection. This allowed me to begin analyzing the data and to think through the topics and questions that I should include in the interview guide, and to remove or reword questions that were confusing or irrelevant to participants.

Data analysis. As I began to read through my data, I saw several avenues of inquiry that I could pursue and write up. In the end, I wrote two chapters (Chapter 6 and Chapter 7) based on my field notes and interview transcripts, each of which involved a different kind of data analysis as they necessitated a different lens through which to view the data. I will start by describing the analysis that informs Chapter 6, where I drew on principles of new empiricisms (St. Pierre, Jackson, & Mazzei, 2016) and sensory ethnography (Pink, 2009) to discuss women's embodied and emplaced experiences of running with a self-tracking device. This is followed by an overview of Foucault's theory of discourse

that informs Chapter 7, where I describe women's experiences of and resistance to self-surveillance in their self-tracking practices.

A detailed, step-by-step description of the analysis that gives an illusion of objectivity is not in line with the ontological and epistemological underpinnings of these chapters.

Instead, the analysis was more theory-based (Markula & Silk, 2011).

New empiricisms and sensory ethnography analysis. Since my discussion in Chapter Seven was focused on the entanglement of matter and meaning, to borrow from Barad (2007), a different lens that is specifically attentive to matter was needed as I thought through the data. While one could argue that poststructuralist ways of thinking are not in line with even a loose framework for analyzing data (St. Pierre, 2011), numerous scholars drawing on sociomaterialist frameworks in particular have resisted the contention that analysis is a separate research activity at all, let alone that data analysis can happen with a step-by-step guide (Giardina, 2017; Lather & St. Pierre, 2013; St. Pierre, 2011; St. Pierre et al., 2016). Thinking through my data and saying something about it in my dissertation was thus in tension with the methods of the study, which were relatively systematic and emphasized text as data, with the theories that were illuminating my understandings of meaning and matter. As such, I avoided a systematic analysis here, but was instead guided by the insights of new empiricisms (St. Pierre et al., 2016) and sensory ethnography (Pink, 2009). Thinking through my data was a process that took over a year, from when I came up with the interview guide, to when I conducted interviews and constantly re-thought what I thought I knew, to the final write-up of my dissertation chapters in the fall of 2018—and likely beyond, as I defend my dissertation, revise it, and bring new articles to publication.

As Pink (2009) points out, analysis is typically a period of heightened treatment of the products of research, such as interview transcripts and field notes, that is performed away from the places and relations in which those materials were produced. Therefore, a goal of analysis within sensory ethnography is to read those texts in such a way that is evocative of the places and relations where the ‘data collection’ occurred. Indeed, as I read through my interview transcripts and field notes I was viscerally reminded of many of the sensory aspects of my research endeavours, from the cold, wintry air that whipped at my face as I ran with Elizabeth to the loud coffee shop that I sat in with Carrie that made the audiorecording difficult at times to understand. Pink (2009) and St. Pierre (1997, 2011) both contend that thinking through research is “corporeally informed” (p. 123), which I worked to keep in the frame as I wrote up my findings. I focused on the participants’ discussions of their senses and the role that they played in self-tracking while running through place, reading these aspects of my notes and interview transcripts through the theoretical lenses of sociomaterialisms, embodiment, and emplacement.

Foucault’s theory of discourse. To analyze the interview transcripts and running interview field notes in relation to structures of power, I looked to Foucault’s theory of discourse. While other forms of discourse analysis are practiced, such as post-positivist discourse analysis (Edwards & Potter, 1992) and a neo-Marxist critical discourse analysis (Fairclough, 2002), Foucault’s theory of discourse was most in line with the theoretical underpinnings of this project (Markula & Silk, 2011). The goal of this analysis was “examining the workings of discourse and power relationships” as well as “social practices that regulate the production and circulation of statements and perceptions of reality” (Markula & Pringle, 2006, p. 105). To this end, researchers utilizing this mode of

analysis aim to “excavate the discourses that systematically formed the interviewees’ knowledge... and to explore how these discourses *governed* the interviewees’ statements and perceptions” (p. 106). The focus is not on the syntax of the participants’ statements but on their situatedness within a particular historical, social, and technological context (Cheek, 2004). Language is not value-free or a direct reference to a singular reality but is instead productive of those realities within relations of social power (Markula & Silk, 2006).

Markula and Silk (2011) outline three phases of Foucauldian discourse analysis in research: first, the identification of themes; second, the analysis of the themes; and third, making connections between those themes to power relations (Markula & Silk, 2011). Foucault has offered some techniques of analysis: “To identify enunciations that are required, but also those that are concealed; To identify their effects; To identify who is speaking and the speaker’s position of power; To identify the institutional context” (cited in Markula & Silk, 2011, p. 109). As there is no single discourse that shapes how participants can think about their uses of self-tracking (Cheek, 2004), throughout the analysis I was attentive to multiple and conflicting discourses, rather than attempting to find a coherent essence of each individual participant’s experiences (Foucault, 1990).

Chapter 4: Assembling the Quantified Self: A Socio-Historical-Technical Examination of Bodily Quantification in Physical Culture

“Touch down every morning—ten times! Not just now and then. Give that chicken fat back to the chicken, and don’t be chicken again!” These lyrics, at the behest of U.S. President John F. Kennedy, were played for children in schools and on the radio to promote the President’s Youth Fitness Council exercise program (Wehner, 2014). Composed by Meredith Willson and performed by actor Robert Preston, both of whom were famous for their involvement in the Broadway musical “The Music Man.” The song would come to be called “Chicken Fat,” a simultaneously playful and shaming attempt to convey to children the importance of physical activity. The catchiness of the song and the memorable lyrics—“Once more on the rise, nuts to the flabby guys! Go, you chicken fat, go away!”—have made the song emblematic of physical culture in the United States during President Kennedy’s tenure. This song cannot be divorced from its context. At this time, the United States was in the midst of a cold war with the Soviets and fears that children (boys in particular) were becoming soft due to America’s consumer society, loomed large (Montez de Oca, 2013).

This song was revived in 2014 as part of the Apple iPhone 5s “You’re More Powerful Than You Think” campaign (Wehner, 2014). Set to the tune of “Chicken Fat,” the ad depicts exercisers swimming, running, lifting weights, and weighing themselves. With the help of the different sensors and health apps that are utilized throughout the commercial, viewers see the exercisers reaching their health and fitness goals. On the one hand, the ad attempts to juxtapose the old-timey song and the myriad self-tracking technologies that are on display, illustrating almost 60 years of technological progress.

On the other, the ad is emblematic of a remarkable degree of continuity in a particular ethos towards the body: pain is weakness, fat is worthy of mockery, and exercise is the antidote to both. Now, however, exercisers have the benefit of technologies that can count their reps, track their form, and help with (numerical) goal-setting. If knowledge is power, in this case, quantified knowledge of the moving body translates into physical power.

In this chapter I examine the broader “Quantified Self” practice of “monitoring, measuring and recording elements of one’s body and life as a form of self-improvement or self-reflection” (Lupton, 2016b, p. 1). Gathering data about one’s body and life is far from new. Indeed, the quantification of the body in physical culture has an extensive history, of which selected aspects will be presented in this chapter.

As the iPhone 5s ad suggests, digital technologies have been central to this modern formulation of the QS. The wearable devices, apps, computers, sensors, clouds, and more that have come to be associated with this movement are envisioned to enable the creation of personal digital archives that record human experiences— up to the point of “total capture” of all relevant information (Sellen & Whittaker, 2010, p. 70). As Sellen and Whittaker (2010) note,

Constructing such a diverse archive of personal information requires a range of technologies for its capture, management, and storage. Today’s advances in wearable sensors, networking capabilities, and massive increases in digital-storage capacity mean this vision is feasible, fueling enthusiasm for the possibilities offered by the technology itself. (p. 70)

Indeed, the possibilities for this collection of data have inspired considerable excitement amongst the QS movement’s adherents. The presumption that technological improvements are the equivalent of societal progress is very much present in these

discussions (Slack & Wise, 2015), as practitioners position the use of quantifying technologies as a new way of addressing social problems.

The purpose of this chapter is to destabilize the belief that the QS is an entirely new phenomenon. Rather, technologies (broadly construed) have been applied to bodies in order to quantify, hierarchize, shape, and improve physically (in)active bodies for an incredibly long time (Foucault, 1990, 1994, 1995). Furthermore, the impetus to quantify the human body, and the belief that this is a more trustworthy way of understanding the body as opposed to other forms of bodily knowledges, is not neutral (Vertinsky, 2002). This chapter examines this history from the mid-19th century onwards, providing context for the different ways that the body has been quantified in physical culture, and to what ends.

Instead of historicizing the quantification of the body through a purely chronological lens, I consider three important sites of quantification: programs of quantification, sciences of quantification, and industries of quantification.⁵ A program of quantification is a plan, whether it be governmental or private, that lays out what physical activities should be done to achieve particular ends. Sciences of quantification are the efforts within the academy to apply the scientific method to learn about the moving body through numbers. Finally, in my discussion of industries of quantification I explore how commercial products have made the quantification of the body available to much of the population, outside of institutions or the lab. While these sites overlap and influence each

⁵ The impetus for selecting these three sites of quantification came from a desire to organize this chapter in a different way than a simple chronology. I had identified each of the time periods and quantification efforts that I describe below as important in apprehending the history of quantification of the body, and I sought to categorize those efforts further based on criteria beyond chronology. This is where programs of quantification, sciences of quantification, and industries of quantification entered the frame.

other to a considerable degree, presenting quantification practices in this way can better establish continuities and discontinuities in the particular goals for quantifying the body that have been enacted throughout history.

I begin by examining two *programs of quantification*. First, I consider together the President's Council on Youth Fitness (PCYF) in the President Eisenhower administration and the President's Council on Physical Fitness Kennedy (PCPF) administrations (referred to together as the PCY/PF), against the backdrop of the 1950s, the 1960s, and the cold war. Second, I critically analyze Dr. Kenneth Cooper's jogging program, which rose to prominence in the late 1960s and 1970s. To contextualize jogging, I discuss neoliberalism and healthism. Next, I discuss the numerous *sciences of quantification* in physical activity. This is the most expansive part of the chapter, as I interrogate five scientific approaches to bodily quantification in physical culture: thermodynamics as utilized in the Harvard Fatigue Lab, anthropometry and somatotyping, physical activity epidemiology, kinesiology, and sport medicine. Finally, I consider the *industries of quantification*, beginning with the popularization of the weight scale in the late 19th century, and jumping forward to the rise of digital technologies in physical activity that occurred alongside the rapid commercialization of physical culture in the 1980s.

To conduct this historical sketch, I use the tools of Foucauldian genealogy and actor-network-theory. Together, these theory/methods form the basis for a Physical Techno-Cultural Studies that will be used to guide this historical overview. While the role of humans in quantifying the body is an inherent focus of this chapter, as it is indeed the quantification of the human body that I explore here, I do not make human intentions the sole focus. Indeed, using the Latourian concepts of articulation and networks (Latour,

1987, 1999, 2000, 2004), I illustrate the work (not just by humans) that has gone into knowing the moving body and reading into its ‘true essence,’ for multiple purposes and using different tools throughout history. Articulations are what forge connections between actants within a network and ultimately determine if we accept claims about the physically (in)active body or if we do not. As Latour (2004) puts it, the body is “an interface that becomes more and more describable as it learns to be affected by more and more elements” (Latour, 2004, p. 206). Latour (2004) uses the “training noses” in the perfume industry as an example of “learning to be affected” (p. 206). When one begins their training to discern scents, they make use of an odour kit of different scents, beginning with sharply distinct scents and progressively building towards smaller and smaller contrasts. Through this process, people are said to become a ‘nose’; they have acquired an ability to discern scents with great precision through a studied interaction between their body and the scent kit, illustrating how the kit becomes a part of the body. To become articulate, this nose must learn to be affected by different scents. I view the quantification of the body as similarly “learning to be affected” (Latour, 2004, p. 206); it is learning to be known through quantification.

I draw on a Foucauldian genealogical sensibility (Foucault, 2003b) to expose the situatedness of knowledge about the body and the accidents, fissures, and discontinuities through which these knowledges have been produced. I illustrate how efforts to know the body through quantification have not been a progressive, linear process, where over time we learn more and more about the body and can thus paint a more accurate picture. I illustrate that as new tools are developed and new data about the body is deemed essential, the body is thought to be inarticulate—unknown—in new ways. In this chapter

I do not necessarily ask whether these contentions about the body have been true or not, but rather, I seek to trace the networks that have been constructed through efforts to know the body in these different ways and towards different political ends. To know the body, it must be “affected” using various tools, or given different opportunities to show what it can do. A Latourian articulation is a particularly apt concept for this chapter, as it centres the ways in which scientists and other interested parties have sought to know the boundaries of an object of inquiry (Latour, 1999, 2000).

Over time, the tools and techniques that have come to inform how bodies are understood fade away, as if those categories and value judgments were handed down by god. Like the proverbial Latourian black box (Latour, 1987), where the networks of alliances that make up an object are ignored in favour of a focus on the input and the output, the work to construct such bodies through quantification is outside the frame. Here, I bring this work into the frame by opening the black box of bodily quantification to ask why, and using what tools, has the body been quantified within physical culture.

Programs of Quantification

I now turn to the first focus of quantification in this socio-historical-technical contextualization: programs of quantification. The first program that I consider is that put forward by the President’s Council on Youth Fitness (later the President’s Council on Physical Fitness). This iteration of this government initiative was implemented against a backdrop of the cold war and fears about American weakness compared to their Soviet (and European more broadly) counterparts. The second program discussed here is Dr. Kenneth Cooper’s jogging program, as popularized in the bestseller *Aerobics* and subsequent publications as well. I situate *Aerobics* in the context of neoliberalism and

healthism, as people were increasingly expected to take stock of their health risk factors and make lifestyle choices to minimize those risks (Lupton, 1995). Both of these programs are responses to anxieties about a lack of physical fitness, and a desire to know precisely what one must do in order to right the ship.

The President’s Council on Youth/Physical Fitness: The cold war and the “soft American.” Before discussing the President’s Council on Youth Fitness (PCYF) and its subsequent iteration, the President’s Council in Physical Fitness (PCPF), it is important to understand the impetus for forming such a committee. Following World War II and entering into the cold war, a particular set of anxieties arose in the United States about the country’s ability (or, inability) to defend itself. Part of this concern stemmed from the revelation that almost a third of draftees between 1950 and 1957 had failed their fitness exams to enlist in the military (Montez de Oca, 2013). Even worse were the 1953 results of the Kraus-Weber physical fitness tests that were administered to children. In the Kraus-Weber test, participants were asked to perform six items that would display strength and flexibility, including bending forward to touch the floor without bending the knees, sit-ups (with legs bent and with legs extended), leg lifts (while lying on the back and lying on the stomach), and reverse crunches. A failure to perform any one of these sub-tests would result in failing the test (Montez de Oca, 2013). In 1953 this test was administered to approximately 4,400 public school students between the ages of six and sixteen in the United States, and approximately 3,000 European students in Switzerland, Austria, and Italy (U.S. Department of Health and Human Services, 2018). These researchers found that U.S. children were considerably less likely to meet the minimum standards of the Kraus-Weber test (57.9 per cent of U.S. students failed) as compared to

their European peers (where only 8.7 per cent failed). Tests such as the Kraus-Weber test are designed to reveal the boundaries of an object (Latour, 1999), or in this case, to expose the essence of their abilities. Many people in America were not pleased about what these tests were thought to reveal.

These results were given considerable meaning. America's poor results in this test flew in the face of American exceptionalism rhetoric, challenging the country's (perceived right to) global dominance. In their presentation of findings, Kraus and Hirschland (1954) explained the results thusly:

The poor American showing can be explained by our high degree of mechanization obviating much physical activity. Since previous studies have shown that these tests represent minimum muscular fitness, and that falling below these levels predisposes to orthopedic and emotional difficulties, it is urged that the physical activities of our children be increased and that muscle tests be given at regular intervals, and made a part of the child's complete school record, to assure at least these minimum standards for our children. (p. 178)

Indeed, postwar culture was increasingly blamed for the weakness of Americans more generally, as in the minds of many, recent technological advances, increased national wealth, and the rise of consumerism, had led to the demasculinization of men and particularly the boys who were growing up in this climate (Montez de Oca, 2013). There was intense tension on these points, however. On the one hand, consumerism and technological advancement were representative of the freedom and prosperity that contrasted the United States with the Soviets, and were thus positioned as the keys to winning the cold war. On the other hand, they were also evoked as a barrier to winning this war because men and boys—white men and boys in particular—were perceived to be softening in response to these advancements (McKenzie, 2013; Montez de Oca, 2013).

Furthermore, it was primarily the middle- and upper-classes that were the site of this concern, as it was assumed that working classes were continuing to engage in physical labour and were therefore less predisposed to this ‘softening’ (Montez de Oca, 2013). Collectively these concerns came to be known as the “muscle gap” between Americans and the Soviets, a discourse cultivated by journalists, politicians, academics, doctors, and germane to this discussion, physical educators. Anxieties about capitalism, industrialization, and consumerism served as supports to strengthen the contention that American children are weaker and less fit than their European counterparts (Montez de Oca, 2013).

It is important to recognize the significance of metrics in the recording, testing, and establishment of goals, that were used to measure and hierarchize bodies (Montez de Oca, 2013). To turn the bodies of children into articulate bodies, in the sense that their physical fitness was known, they became enmeshed in networks of laboratories, tests, and thousands of other children both at home and abroad. With the Kraus-Weber test, a particular series of measurements—the ability to touch one’s toes and to do a push-up—determined a child’s degree of fitness. These tests asked participants to perform feats of strength that would illustrate the essence of their bodies: were they fit, or were they not? Were they predisposed to “emotional difficulties” (Kraus & Hirschland, 1954, p. 178), or were they not? In other words, the more work performed on the bodies of children by Kraus, Weber, and Hirschland, and the specific tests in the Kraus-Weber protocol, the more visible and known those bodies became to people who wanted to assess the impacts of the post-war economy on the bodies of children. By giving children’s bodies the opportunities to perform in particular ways that were thought to provide a window into

the true nature of their bodies, their essential weakness or strength could be elucidated (Latour, 2000). Scientists' actions—and the tools that they use—make individual and population bodies visible.

Scientific claims, according to Latour (1987), are the result of networks of allies that are assembled in order to make claims that can defeat other claims. The jump from the results of this particular fitness test, to the contention that Americans were increasingly unfit to defend the nation, was an immense one. There were dissenters, such as Springfield College professor of physiology Peter Karpovich, who maintained that if children were given a chance to stretch before performing the floor touching sub-test, they were considerably more likely to pass. Furthermore, when military officers were interviewed about the Kraus-Weber results by journalists, many contended that once military recruits began basic training, their fitness would generally increase to necessary levels (Kolata, 2003). It seems, however, that these efforts to quantify the fitness of American youth had already had a substantial impact. The networks that were assembled by Kraus, Weber, Hirschland, and numerous other stakeholders were apparently strong enough to win this feat of strength (Latour, 1987) against competing explanations.

The cold war and concerns about the national body led to an overhaul in how physical activity, and more importantly, inactivity, were addressed in United States policy. While president-elect, John F. Kennedy penned the infamous essay, "The Soft American," for *Sports Illustrated*. In it he signaled that "the President and all departments of government must make it clearly understood that the promotion of sport's participation and physical fitness is a basic and continuing policy of the United States" (cited in Howell & Ingham, 2001, p. 334). The discourse within this article was stark: "Our

struggles against aggressors throughout our history have been won on the playgrounds and corner lots and fields of America. Thus, in a very real and immediate sense, our growing softness, our increasing lack of physical fitness, is a menace to our security” (Kennedy, 1960, para. 10).

The Kraus-Weber results have been credited by many as the impetus for the founding of the President’s Council on Youth Fitness (PCYF) in 1956 during the Dwight D. Eisenhower administration, which addressed physical inactivity as a public policy issue (Bowers & Hunt, 2011). Through the PCYF, the goal was to publicize the importance of physical activity to America’s youth and to regularly assess their fitness. To this end, a nationwide pilot study was initiated in 1957 to implement a testing program amongst 8,5000 students between the ages of five and twelve (U.S. Department of Health and Human Services, 2018). While physical education has long been utilized to foster military readiness (Clevenger & Jette, 2017), in response to these concerns about the fitness of the population, physical education in particular took on significant meaning. For Eisenhower and the PCYF, there was a continued emphasis on fitness that takes into account the “total person” (p. 1499), including psychological, emotional, social, cultural, physical, and spiritual aspects of fitness (McKenzie, 2013). Exercise was positioned more as a by-product of sport participation than the cause to do so, and all kinds of activities—from sitting in a steam room to calisthenics— were thought to produce similar fitness effects. This was, in part, a response to fears that emphasizing one activity over another might alienate an advocacy organization or a sponsor (McKenzie, 2013). Furthermore, allowing room for play and the ability to choose between a variety of physical activities, from dance to competitive sports, was in part to avoid being compared to the Soviet

Union's nationalized exercise programs (Bowers & Hunt, 2011; McKenzie, 2013). Indeed, the spectre of the Soviet Union loomed large over these efforts to improve the physical fitness of America's youth; the state could not lead the way, but instead communities, non-profits, businesses, and other groups were to come together to bring about these changes to youth fitness practices (Montez de Oca, 2013).

As the Eisenhower administration shifted into the Kennedy administration, the PCYF shifted to the President's Council on Physical Fitness (PCPF), targeting all age groups. Kennedy instituted a national public service advertising campaign, state demonstration centres to publicize elementary and secondary school fitness programs that were models for other schools, and educational films (Department of Health and Human Services, 2018). Within the PCPF, there was a sense that the play-centred approach that had previously been employed, as well as the lack of quantifiable fitness standards for children and standardized fitness tests, had prevented previous efforts from being successful. While the definition-less approach to fitness gave exercisers a lot of freedom, it posed a challenge to those who were trying to put together health recommendations. In contrast to the emphasis on play and numerous routes to physical fitness that characterized the Eisenhower administration's efforts, the approach of the Kennedy administration was "utilitarian, systematised approach based on measurable performance standards" (Bowers & Hunt, 2011, p. 1497). In part, Bowers and Hunt (2011) argue, this was because of the involvement of corporations like General Mills, as quantifiable understandings of fitness were preferred over the more nebulous "total person" philosophy that was emphasized previously. Wheaties boxes, for example, had fitness ability charts that tracked how many push-ups and chin-ups a 14-year-old boy should be

able to do (McKenzie, 2008). These tools and directives, such as those found on Wheaties boxes and in the song “Chicken Fat” that opened this chapter, provided the path forward for those who were unfit to become fit.

The messaging of the PCY/PF did not target everyone, and those that were targeted were not all targeted the same way. First, the PCY/PF was primarily devoted to creating messaging for white, middle- and upper-class youth as it was assumed that a need for purposive physical activity was only a by-product of a life of luxury. In other words, McKenzie (2013) writes, “The physical labor required of many in the working class, both black and white, was presumed to provide enough activity to ensure fitness” (p. 30). The comforts that were thought to bring about this softness—such as access to a car, a television, a telephone—were also the comforts of the predominantly white middle class. Montez de Oca (2013) further emphasizes the assumptions in these fitness-promoting discourses, namely that masculinity was under threat— in part by homophobic fears of Soviet penetration and the ‘softening’ of the American populace, and in part by race mixing and nationalist threats. Femininity was derided except when it was put to the use of caring for others, such as mothers who were ensuring that their children were meeting fitness standards or girls who would become mothers in the future. With these assumptions in place, the average American became a pre-soldier, hierarchically inserted into institutions and practices that would prepare them for war.

Neoliberalism, healthism, and jogging. Moving on from the standardization of sport and physical activity in the shadow of the Soviets, the so-called “fitness boom” of the 1970s and 1980s (Maguire, 2013) occurred against a backdrop of significant political

and economic shifts that have come to be characterized as neoliberalism. Silk and Andrews (2012) define neoliberalism as

the morbidity of the social sphere, evidenced from the hegemony of a cynicism toward all things public and collective, the corollary of which has been the rise of a virulent contempt for the notion of social welfare provision; an equally pernicious and questioning attitude to its recipients; and an individualizing culture of surveillance, accountability, and resentment. (p. 6)

Previously, people were expected to compete in the labour market while the state would only provide a safety net “for those who *try* but fail and for those whose inability to try is confirmed to derive from ‘genuine’ disabilities” (Ingham, 1985, p. 46). As the social welfare consensus was dismantled, mass manufacturing declined, and the world was in the throes of a recession, this period was characterized by what Rose (2000) refers to as the “double movement of automation and responsabilization” (p. 1400). The state became less responsible for the health and wellbeing of its citizens than it was responsible for deregulating and privatizing the economy, with hopes that the market and philanthropy will fill that role (King, 2006; Silk & Andrews, 2012).

Indeed, as King (2006) points out, philanthropy is thought to be the superior way of addressing social problems as it “instil[s] civic and self-responsibility in the American people” (p. xxvii), in contrast to government programs that are vilified as fostering dependence, apathy, and a lack of enthusiasm amongst the American populace (Ingham, 1985). As the above discussion of the PCPF illustrated, concerns about the government taking on too large of a role in the management of the population was not new in the 1970s, although in this neoliberal context the concern was less about mirroring Soviet practices and more about fostering independence from the government and driving down government spending. From Ronald Reagan onwards, U.S. Presidents have initiated task

forces and initiatives to deepen connections between the private sector and communities, with hopes of fostering volunteerism and philanthropy amongst the populace. As King (2006) makes clear, it is not the case that volunteering and philanthropy are bad in and of themselves. Rather, this shift to different forms of governance that are not centred around the state, but rather, through diffuse networks and techniques that enmesh the state, the private sector, and many others, with a goal of advancing state interests. This “conduct of conduct” (Miller & Rose, 2008, p. 16) represents a different way of exercising power rather than a departure from power.

Lupton (1995) highlights two further developments in the 1970s that ushered in new forms of public health. First, critics pointed out the high costs and inefficacy of medicine as chronic disease rates were increasing while infectious disease rates were drastically dropping. Second, social movements were pushing for improved living conditions and bringing attention to human rights issues with regards to health. As a result, there were calls for a shift from disease treatment by medicine to disease prevention through public health.

Health promotion, a term coined in 1974 by Marc Lalonde, the Canadian Minister of National Health and Welfare, was expected to focus simultaneously on individual behaviours and environmental factors that shape health outcomes (Lupton, 1995). The United States soon followed with its first Surgeon General’s *Healthy People* report in 1979, which argued that “we are killing ourselves...[through] our own careless habits” (cited in Lupton, 1995, p. 51). Health moved from the clinic to the general public, such as schools, workplaces, stores, and more, as individual behaviours became the focus.

As a result of these shifts, in the 1970s there was an explosion in preoccupation with personal health, including jogging and exercise, holistic health, and self-care—although this is primarily the domain of the middle class (Crawford, 1980). Calls for individuals to take care of themselves were not new at this time, as Americans had been called upon, for example, to chew their food for excessive periods of time by Sylvester Graham, and to eat bland foods to not upset the body’s balance by Will Keith Kellogg, in the previous century (Gillick, 1984; Schwartz, 1986). As chronic disease epidemiology became the dominant paradigm, however, understandings of personal responsibility for health and wellness shifted once again. Crawford (1980) describes this neoliberal landscape as an “ever increasing personal effort, political attention, and consumer dollars are being expended in the name of health” (p. 365). Furthermore, through the medicalization of more aspects of life, medical concepts—which inherently focus on disease within the individual—come to shape how people view the world and their own bodies and health. Looking to Foucault, Crawford (1980) traces these beginnings in the shift during the late 18th century in understandings of health towards a medical gaze that penetrates the individual, becoming a science focused on individuals rather than more complex and interrelated causes. He writes, medicine “individualizes and compartmentalizes the problem, transforming it into its most immediate property: the biological and physical manifestations of the individual, diseased, human body” (Crawford, 1980, p. 373).

Crawford (1980) defines healthism as a preoccupation with health at the individual level, rather than viewing health as a status that is also influenced by factors outside of the individual such as culture, environment, the economy, or other considerations. When

these other impacts are acknowledged within healthist discourses, the solution nonetheless rests within individuals to resist or overcome those impacts. Crawford (1980) writes, “solutions are seen to lie within the realm of individual choice... [and requires] above all else the assumption of individual responsibility” (p. 368). When health is conceptualized in this individualistic way, it depoliticizes it while giving people the (false) impression that health can be controlled through self-discipline and self-care. By replacing political action with privatized, individual attention on self-care and self-responsibility, changes to a political climate that exacerbates health inequality are unlikely (King, 2006). The fact that some people are more likely to be able to make lifestyle changes than others—the middle class, who not only have the economic capital but also the perception of themselves as able to individually control their lives (Crawford, 1980; Savage, Dumas, & Stuart, 2013)—extends the focus on the individual shortcomings of those who are not healthy or who do not engage in health-promoting behaviours.

Physical activity has long been seen as a way of maintaining health, but at this juncture it became an even more important piece of the puzzle in preventative medicine and lifestyle politics. As evidence mounted that physical activity is linked to a decreased risk of chronic diseases, numerous actors pushed physical activity as preventative medicine. As Howell and Ingham (2001) put it,

Through exercising smart lifestyle choices, the individual becomes personally responsible for his or her own quality of own life. The language of lifestyle is one of independence and self-sufficiency; it signifies pleasure, freedom, success and mobility. In this sense, practises in physical culture provide personal freedom and the opportunity to share in the good life: To control one’s own future, to have individual control over one’s own destiny. ... To adopt Nike’s slogan of the times, ‘Just Do It’. (p. 337)

The connection between fitness and health is an important one, as is the belief that it is the responsibility of citizens to engage in a healthy lifestyle so as to avoid becoming a burden to others and the state. The epidemiological evidence for lifestyle factors bolstered the emphasis on prevention rather than treatment, and the view that illness was caused by poor (and preventable) choices rather than bad luck or genetics. Howell and Ingham (2001) describe this as a shift from causal factors to modulating ones, where a network of risks must be considered, balanced, and minimized. The connection between physical activity (jogging in particular) and health was especially clear to health insurance companies such as Occidental Life of North Carolina, who began offering discounted insurance rates to those who ran for at least twenty minutes, three times per week (McKenzie, 2013).

It is in this context that jogging—running at a steady pace for a prolonged period of time— went from a marginalized activity that few engaged in to be a national sensation. In the early 1960s, New Zealand track coach Arthur Lydiard had begun the practice of jogging as a way of helping athletes near the end of their competitive careers maintain their fitness. University of Oregon track coach William J. Bowerman, who had worked with Lydiard in New Zealand, and cardiologist Waldo Harris brought jogging to the United States with the publication of a small training manual entitled *Jogging* in 1967 (McKenzie, 2013). Jogging was popularized in the 1960s and 1970s by two separate groups, with distinct goals. The first group was middle-aged, middle- and upper-class, and largely white. They became interested in jogging, a progressive form of exercise where a slow and steady individual pace was emphasized rather than speed and competition, to maintain heart health. Jogging was thus conceptualized as a medical

intervention for the sedentary lifestyles that were increasingly plaguing Americans, and middle-aged Americans in particular (Latham, 2015). The second group was younger and decidedly more political, adopting jogging due to environmentalist concerns as a form of activism and wellbeing (McKenzie, 2013).

The popularization of jogging is most often attributed to Dr. Kenneth Cooper, author of the 1968 national bestseller *Aerobics* and founder of the previously mentioned Cooper Fitness Center in Dallas. Jogging and other forms of physical activity were certainly popular in the United States before the “fitness boom” and the “jogging boom.” However, what distinguished Cooper’s recommendations from other physical activity prescriptions was the specificity with which he described what activities one must do in order to bring about health benefits, with the support of scientific research. Cooper’s work emerged through the rise of both exercise physiology as well as military research on physical fitness (Gillick, 1984). An impetus to disseminate his findings outside of the U.S. Air Force, as Cooper (1988) explains in *Aerobics*, was that doctors had long been telling patients that they should engage in leisure-time physical activity, but there was no scientific evidence about what exactly should be prescribed. This book represented a turning point in physical activity practices and promotion, as it was subject to more specific recommendations by experts for the purposes of health as the end goal, rather than fitness for the purposes of defending the nation. However, this discourse was not entirely outside the frame; Cooper (1988) cites both President Kennedy’s (1960) patriotic appeal in *Sports Illustrated* that Americans take up exercise programs, as well as the Kraus and Hirschland (1954) Kraus-Weber findings, in the conclusions of *Aerobics*.

Consider the networks of allies from which this exercise program is assembled. The problem, as stated above, was that the body was deemed to be inarticulate in terms of our ability to know what we should do to the body, and with the body, to ensure its health. In *Aerobics* and his subsequent publications on the topic, Cooper (1988) applied scientific principles to exercise to determine how much of different activities such as walking, running, and skipping one could engage in so as to receive health benefits. In subsequent prints of *Aerobics*, it was described by Senator William Proxmire in the preface as “the distillation of four years of intensive study by top medical experts on literally thousands of men to determine the relationship of physical fitness to health” (cited in Cooper, 1988, p. xii). Following this initial effort, considerable research has sought to establish an answer to these precise questions— what exercise people should do, how much, how intensely— in order to accrue health benefits. As such, recommendations continually change, leading to a “somewhat erratic history of officially endorsed exercise prescriptions” (Maguire, 2008 p. 107). The body was learning to be affected towards these new physical and political goals, as exercising to accrue health benefits required networks of scientists, laboratory equipment, thousands of Air Force cadets, timers, distance measuring apparatuses, and spaces to discern what, precisely, that activity would look like. The ways in which this research was described by Senator Proxmire and others illustrates how strong these networks were perceived to be.

Cooper’s *Aerobics* program can broadly be described as follows. To begin, program participants would run as fast as they could without becoming short of breath for twelve minutes. After measuring the distance that was covered in that twelve-minute run, participants would look up their statistics in a table provided in the book, which would be

associated with a fitness category (very poor, poor, fair, good, and excellent) associated with their level of oxygen consumption (Cooper, 1988). The program itself uses a point-based system, where different activities such as jogging, swimming, cycling, walking, and handball are all associated with particular point values, based on the duration of the activity. Subsequent editions of the book would also include age-adjusted scales for the point system. After ascertaining their fitness level, exercisers would aim to achieve a particular level of points per week, building up to a maximum of 30 points. As Cooper (1988) explains, “I lay down no hard and fast rules about how to get your 30 points because, as each man has his own poison, so each man has his own antidote” (p. 51). Cooper’s point system is analogous to the 10,000 steps recommendation that is used today; it is through both that researchers and health promoters seek to tell exercisers precisely what they need to do to be healthy.

If a discussion of men’s poisons and men’s antidotes sounds exclusionary to women, that is because it was. These guidelines were for men only. But not for long! Four years after the initial publication of *Aerobics*, Cooper and his wife Mildred Cooper published *Aerobics for Women*, with a different set of standards for the fairer sex (Cooper & Cooper, 1972). In the preface to the follow-up, Kenneth Cooper admits that his “first book was really designed for young Air Force men” (Cooper & Cooper, 1972, p. 7), and that amendments were needed to address “women’s fitness needs, attitudes, and capabilities” (p. 7). Jogging was one of the first physical activities that made it socially acceptable for women to perspire, as women-directed physical activity had previously emphasized graceful, ballet-like movements that would not pose a health risk by causing women to exert themselves too much (McKenzie, 2013). Indeed, in *Aerobics for Women*

the authors acknowledge that while it has long been considered improper for women to exert themselves through exercise, “society is beginning to change its very rigid ideas about what constitutes appropriate ‘feminine’ and ‘masculine’ behavior” (p. 29). While this book was certainly forward-thinking in some respects, *Aerobics for Women* differs from *Aerobics* in significant ways, with more of an emphasis on exercise as a means to improve appearance being a more obvious distinction. Mildred Cooper (1978) extolls in the preface, “Beauty is *not* skin-deep. There’s a radiance and a glow in every woman who’s active—in the way she carries herself, in the way she looks, feels and lives” (p. 9). In another cringe-worthy passage, Mildred Cooper writes of “Elaine Peterson, a United Airlines stewardess and stewardess instructor” (p. 29) who competes in long-distance running events: “And you’ve never seen a better figure or lovelier legs—or at least Ken says *he* hasn’t!” (p. 29). A table containing calorie counts is included at the back of the book, for those on a “reducing plan” (p. 108). Unsurprisingly, there is no caloric values table in *Aerobics*.

There were also differences in the provided exercise recommendations, which were explained in a chapter entitled “You Are Not a Man” (p. 27). Cooper and Cooper (1972) explain:

As a result of the lab and field tests he has conducted on thousands and thousands of subjects, Ken has also come to the conclusion that women don’t need to develop quite the same level of fitness that men do in order to have the same protection and pleasure. In short, they can progress more slowly to a level that’s different from—but equal to—a level that men can achieve. (p. 26)

The fitness test for women was slightly different, as women were expected to have run a lesser distance than men in twelve minutes. Furthermore, women were not expected to build up to 30 points per week, but instead the standard was set to a maximum of 26.25

points. Special consideration was also given for exercise during menstruation and during pregnancy.

As the relationship between physical activity and health was coming to the fore, measurement tools were utilized to reveal the inner fitness of the body for the purposes of self-improvement and health optimization. At this point in the quantifying conjuncture, more than in any period before, space and place become central to bodily measurements. As the initial fitness test in *Aerobics* suggests, one needed to know a specific distance (and the time that one was running, with the help of a stopwatch) in order to make an initial assessment of their physical fitness. Tools of measurement—measuring tape, tracks with set distances, stopwatches, the sexed expectations that shape measurements—were brought into the exercise measurement networks to do the work of making the body's fitness more real, to follow Latour (1999, 2000, 2004). By measuring time (twelve minutes, to be precise) and distance, backed up by thousands and thousands of bodies who have been tested, people could be placed into very poor, poor, fair, good, and excellent categories of fitness. Prior to the work of researchers like Kenneth Cooper, the fitness of the body—and what one needed to do to become or maintain fitness—was, so to speak, inarticulate in this particular regard. To become articulate, in this way, was to assemble the right tools with the right knowledge to know what one's fitness level was according to the measurements set out in *Aerobics* (or indeed, *Aerobics for Women*), and to assemble further tools such as streets and trails of a known distance, timers, jumping ropes, swimming pools, and more, to accumulate enough points to achieve optimal fitness.

Sciences of Quantification

The programs of quantification that I described above are intimately connected to sciences of quantification. In this discussion, I consider efforts to quantify the moving body from the beginning of the 20th century onwards. Through this overview, I consider the different political ends to which networks were assembled to know the body in ways that were deemed important throughout history. As I illustrate, efforts to understand the moving body were initially centred around labour and determining what a worker's body could do. Within physical education, scientists of quantification sought to understand different types of physique and how those relate to mental, genetic, and physical fitness. In the latter half of the 20th century, as leisure-time physical activity was on the rise, the goal of sciences of quantification was to understand the health benefits of physical activity within the national body, how biological bodies move, and how to improve the performances of elite athletes (or prevent athletes from illegally improving their performances).

Before discussing these sciences, a word of caution is needed. In line with the genealogical frame of this history (Foucault, 2003b), I do not intend to convey a linear trajectory of knowledge production that progressively informs the correct bodily practices for a population. While I do indeed argue that these scientific knowledges played an important part in the popularization of physical activity and the need to quantify the body, they are far from the only reason that these practices were popularized. First, each conjuncture must be read beyond the sphere of science; political, economic, material, and social context is always entangled with science. As Schwartz (1986) puts it, “the scientific urge to weigh and measure the human body must be hinged to a popular faith in

that body as reliable index of the self within” (p.5), and what the “self” might be is a product of its time and space. Knowledge about physical activity that was generated through these sciences, particularly physical activity epidemiology, is far from the only reason that more people began to engage in leisure-time physical activity. Second, it is important to apprehend the ways in which these efforts to measure and mold the body are productive of subjectivities, rather than those subjectivities being *a priori* and the methods of measurement followed as we learned more. Measurement tools play a significant role in identity formation and in the practices that people engage in to align themselves with bodily norms, and that role must receive its due.

Thermodynamics and the Harvard Fatigue Lab. In the United States in the early 20th century, the body was understood through the lens of thermodynamics, or through its relationship to different forms of energy. As Schwartz (1986) contends, the body at this time must be a regulated body, and society “dealt with abundance as if it were a threat to the system, a moral as well as a physical danger” (Schwartz, 1986, p. 113). This was, in part, because the more one had to exert in order to move their body, the more (supposedly poisonous) uric acid was believed to be in one’s system: “A tired person is literally and actually a poisoned person,” Josephine Goldmark of the National Consumers League said in 1912 (quoted in Schwartz, 1986, p. 132). The body, in other words, was a machine that must be regulated by exerting tight control over what went into the body, and the energy that came out. Becoming fat and needing to exert more weight to move around was akin to poisoning oneself.

As body ontologies were shifting, so too were the tools that were brought into personal and scientific networks to know this body. So began the practice of counting

calories: to quantify the energy in the food that was consumed, the fat that could be gained from this food, and what activities would need to be undertaken in order to burn off this food (Schwartz, 1986). The goal of this for most was to avoid gaining weight, which was becoming of increasing concern at this time: “It assumed an appreciation of promises and futures—how long a walk it would take to burn off a chunk of chocolate, how many flights of stairs to climb off a piece of pie” (Schwartz, 1986, p. 134). As a balance of calories burned and consumed was the goal, an inarticulate body was one that did not assemble the necessary network of tools to ascertain this vital data. The calorie—or the amount of heat required to increase the temperature of one gram of water by one degree Celsius—is still a focus of dieters today. Through calorimetry, new tools were being assembled to tweak and perfect the body as an articulate machine.

While there was indeed a thriving physical culture of play and sport at the beginning of the 20th century (Maguire, 2008), many of the concerns about the body in motion—and the body’s appearance—centred on industrial labour rather than play and sport. Anxiety that machines were leading to the demasculinization of men did not originate post-World War II, but has been present since at least the industrial revolution. At the turn of the 19th century, “musculature was believed to be in peril” (Millington, 2018, p. 24) due to mechanization in the factory, and was a part of the impetus for people to purposefully sculpt their bodies using weights. Even more, industrialization provided the prevailing metaphor of the body as bodies were thought to be machines that could be tightly managed in terms of what went in and what would come out (Scheffler, 2011).

This emphasis on scientific management in physical culture was apparent in the Harvard Fatigue Laboratory, where biochemical, physiological, and medical research was

conducted on industrial fatigue in the 1920s and 1930s (Scheffler, 2011, 2015). In the late 19th century, scientific researchers began to argue that the body has a finite amount of energy, and that it can be depleted through labour. As a result of this belief, factories were expected to alter their labour practices to improve conditions—and time spent working—for labourers so as to not deplete all of their energy and cause early death. The prevailing knowledge on industrial physiology was that workers were like engines, and that like the principles of the conservation of energy, workers' energy could be depleted through excessive work. Through what has come to be known as the Taylorist ideology, however, it was suggested that workers simply needed to become more efficient; if they were examined in detail using stop motion photography, their movements could be perfected and productivity could increase exponentially (Scheffler, 2011).

The goal of the Harvard Fatigue Lab was to usher in a “science of man” (Scheffler, 2011, p. 50) to improve productivity and to address social problems. This lab was inspired by Claude Bernard's “milieu intérieur,” by steady state equilibrium in biochemistry, and by Viferdo Pareto's mathematical models of society that position society as a stable equilibrium where each interdependent part contributes to the overall functioning of society (Scheffler, 2011). Researchers at the Harvard Fatigue Lab were assembling networks to compete against differing explanations of energy, the body, and labour. In these experiments, the researchers tested the blood of exercising research participants to determine if they could reach a “steady state” or equilibrium while under stress (Scheffler, 2015, p. 393). The lab first used stationary bicycles for their research, later switching to a treadmill because they were better able to control the exertion of the participants to fine-tune their measurements. Furthermore, running was associated with

the working class at this time, which helped the researchers argue that their findings could relate to factory workers (Scheffler, 2011). At this time the body is learning to be affected through quantification in a new way; through scientific management and industrial science. Treadmills, stationary bikes, calorimeters, and more come together to help the body to illustrate the extremes it can handle, in the service of weight management and industrial productivity.

The research in the Harvard Fatigue Lab supported the notion that fatigue was a result of a lack of chemical equilibrium in the body, rather than resulting from a depletion of energy. Therefore, fatigue was a psychological issue rather than a physiological one: “Whereas energy was a finite quantity that was necessarily depleted by work, the treadmill studies of distance running suggested that individuals... could maintain equilibrium for long periods of exertion with no ill effects” (p. 50). The networks assembled by the Harvard Fatigue Lab scientists supported the Taylorist assertion that workplace conditions were of less concern with regards to productivity than refining technique and psychology. Fatigue was something that was experienced at extreme levels of exertion by elite athletes, not during mundane manual labour. Industrial reformers seeking to limit employees’ exertion and time spent working were losing support after WWI given the increased production needs at the time, and the research in the Harvard Fatigue Lab further weakened their cause. Manual labour was positioned as mundane labour that was unlikely to cause fatigue; therefore, industrial reforms were not needed (Scheffler, 2011).

Anthropometry, somatotyping, and the concept of normal. To better understand how numbers and quantification have been used to not only categorize the body, but

further, to tell people what they *should* be, I look to anthropometry. Anthropometry is, broadly, the method of “assess[ing] the size, proportions, and composition of the human body” (World Health Organization Expert Committee, 1995, p. 1). These measurements can encompass anything from height to arm span to head size to ear lobe width (Lombardo, 2016). This practice is widely observed today, for purposes such as occupational injury prevention and physical education (National Institute for Occupational Safety and Health, 2016). Here I focus on the connection between anthropometry and eugenics, which was at its height in the late 19th century until the mid-20th century.

Lombardo (2016) points to two important actors in the popularization of anthropometry: the Belgian mathematician Adolphe Quetelet, and Alphonse Bertillon. Quetelet organized the first statistical conference, the International Statistical Congress, in 1871. In his 1842 book *A Treatise on Man and the Development of His Faculties*, as well as his other published works, Quetelet sought to use anthropometric data from various populations to define and delineate group differences and calculate the average for that group: *l'homme moyen*, or the average man (Lombardo, 2016). This impulse to create a category of “normal” to which people should aspire led him to develop the “Quetelet Index” in 1832, which measures a person’s weight against their height squared. The Quetelet Index came to be known as body mass index, or BMI, in the 1970s (Eknayan, 2007). Bertillon is credited with connecting anthropometry to criminality, using anthropometric measurements in the late 19th and early 20th centuries to distinguish people as well as to classify who is more likely to become a criminal (Lombardo, 2016). Bertillon’s methods were replicated by Francis Galton, widely thought to be the father of

eugenics, who sought to distil the ‘essence’ of various groups, such as Jews, blacks, and criminals, for the purposes of promoting racial purity (Lombardo, 2016).

It is through eugenics that the quantification of the body becomes a tool for population control. While the previous epochs of bodily quantification were also about establishing norms and prescribing actions to align oneself with those norms, with eugenics the connection between meeting numerical goals and maximizing the potential of the population—while minimizing undesirables within the population—becomes clearer. These measurements were not politically neutral observations, despite the veneer of neutrality that so often accompanies quantification:

Statistics—first known as political arithmetic—calculated mathematical probabilities to assess uncertainty and to turn inferences into coherent wholes that were increasingly used in demographic interpretations. They encouraged the belief that uncertainty was decreased as the number of observations increased and led to state and nation-wide surveys of a variety of physical characteristics (as well as continued analogies between body shape and character). (Vertinsky, 2002, p. 101)

Indeed, it was through these “demographic interpretations” that actors sought to justify existing hierarchies based on race, social class, gender, ability, and more. The belief that the body is a reflection of the soul has deep historical roots, but the use of scientific rationality, rigorous standardized methods, and quantifiable results, to objectively decipher the body and character—and make connections to race, social class, sexuality, gender, and ability—was a development of the scientific revolution (Sismondo, 2010).

Of particular interest here is the practice of somatotyping, which was developed in the mid-20th century by William H. Sheldon, a professor at Harvard University, Columbia University, and the University of Oregon. The goal of this somatotyping project was to link the body and body types— endomorph (fat), mesomorph (muscular), and ectomorph

(slender) body types—with measurable classifications of temperament and criminality. Published in the *Atlas of Men* in 1954 these categorizations are based on 17 anthropometric measurements that are taken from standardized, nude photographs (over 1,175 photographs, to be precise) with pins inserted into the body. Photography is an important part of somatotyping as well as other eugenics efforts, as photographs are thought to best capture deviancy as well as to construct bodies that are deemed to illustrate the dominant traits of the idealized population (Vertinsky, 2002). Bodies were ranked as to how much they conformed to each of the body types, with 1 being a little, and 7 being a lot. A body type classification was three numbers, such as 7-1-1, which would represent the most extreme endomorph body. The mesomorph, and more specifically a 1-7-2 somatotype, was deemed ideal for men. Physical educators across the United States provided photographs to Sheldon, in addition to using these measurement systems themselves. These body types are still used in physical education today, although they are stripped of their psychiatric and criminality associations (Vertinsky, 2002).

While categorizing the body based on height and weight may seem common sense, these particular ways of doing so occurred in a context where the purity of the gene pool was a public health concern, and ways of weeding out the weaker elements of the gene pool were being sought (Rose, 2007). Anthropometry is an example of a normalizing technology, which includes a process of “classification, hierarchization, [and] identity production” (Cole, 1993, p. 78). These practices construct what is normal, and by extension, what is deviant.

Pins, cameras, photographs, and measuring tools were all actants that do the work of drawing out what was thought to be the inner essence of a person. These tools are

expected to tell people who they are, by measuring, quantifying, and classifying. Without these networks of tools and the particular ways in which they were articulated or brought together, the body was inarticulate in the sense that its internal nature, whether relating to morality, criminality, or intelligence, was unknown. Through photographs and measurements based on these criteria, Sheldon and those who shared his project would put the body in a position to be articulate; to show what it can do and what it can be.

Classifications and hierarchies are far from natural or self-evident; a considerable amount of work goes into creating what is considered “normal,” as well as various categories of bodies. These allies that were required to create these categories fade away over time, and the three body types become self-evident, rather than the product of considerable work by numerous actors. By opening up the black box, to borrow from Latour (1987), the work that it takes to create what is “normal” and what is “abnormal”, is illustrated.

Physical activity epidemiology. While the health, hygienic, and character benefits of physical activity have been espoused for millennia, attempts to quantify these benefits on a population level are more recent. Indeed, at the turn of the 19th century, it was thought that exercise in excess of moderation would cause undue muscular development of the heart that would lead to its progressive degeneration as the athlete aged (Whorton, 1982). “Athlete’s heart” was the spectre that discouraged many from working out too strenuously for fear of ultimately weakening the heart as well as the brain, since excessively large muscles were thought to require nourishment that would take away from the brain’s resources (Whorton, 1982). While studies showed in the early 20th century that athletes often lived longer than the average American man, this belief still

persisted (Whorton, 1982). It was not until the 1960s and 1970s, when the popularity of leisure-time physical activity increased exponentially, that the belief amongst the general population that working out too hard was a health risk gave way to the belief that working out is essential and that the harder one exerts themselves, the better (McKenzie, 2013).

Exercise prescriptions pertaining to women, however, were considerably different from those offered to men. As Vertinsky (1992) explains with regards to the late 19th century, menstruation was thought to be a significant barrier to physical activity participation:

Looked upon as an ‘eternal wound,’ an illness, and as a shortcoming, menstruation came to be seen as a process that required certain kinds of physical activity, suitable exercises in the open air, and the kind of sport that would be appropriate for physical renewal. Perceived as a pathological condition, however, it necessitated the exclusion of women from vigorous and competitive sports and from any physical exertion that the medical experts considered overtaxing. (p. 184)

Women’s reproductive systems, rather than their cardiovascular systems, were seen as the constraining factor for women’s sport and physical activity participation. As I illustrated above, discussions of the impact of menstruation on women’s ability to be physically active did not end in the 19th century but continued well into the 20th century in *Aerobics for Women*. Concerns about amenorrhea and infertility due to strenuous exercise persist today (Vertinsky, 1992). With regards to exercise and pregnancy, anxiety about women’s exertion during pregnancy has been long-standing, ranging from recommendations to rest while pregnant to exercising for the health of one’s baby (Jette, 2006, 2011).

While physical activity is a standard part of a doctor’s prescription today, for both men and women, it was not routinely recommended by doctors until the time between the

United States Civil War and World War I. The modern history of physical activity epidemiology is often traced to the 1940s, with an uptick in the 1980s that has continued exponentially ever since. The birth of physical activity epidemiology is credited to Dr. Jeremy Morris, who conducted the London double-decker bus study, and Dr. Ralph Paffenbarger, who is most known for his longshoremen and college alumni studies (Dishman, Heath, & Lee, 2013). Dr. Morris' study (published in 1953) illustrated a protective effect of occupational physical activity against coronary heart disease (CHD). The conductors in the London bus system, who were much more active than the drivers, experienced lower rates of, later onset, and less severity, of CHD. Dr. Paffenbarger studied the San Francisco longshoremen and graduates of Harvard University in the 1960s and 1970s, fuelling interest in physical activity as a preventative health tool. At this time, longitudinal cohort studies such as the Framingham Heart Study (1948), the Tecumseh Community Health Study (1957), the Aerobics Centre Longitudinal Study (1970), and the U.S. Nurses' Health and Health Professional Studies (1976) got underway, assessing amongst myriad other lifestyle factors how physical activity impacts morbidity and mortality. These longitudinal studies include ECGs, chest X-rays, urine and blood tests, lung function tests, anthropometric tests, and a variety of surveys on lifestyle (Dishman et al., 2013). Through large-scale cross-sectional and prospective cohort studies, these epidemiologists were assembling ever stronger networks—of X-rays, city blocks, buses, conductors, drivers, Harvard graduates, and longshoremen—to make the case for physical activity as a health-promoting behaviour.

In the 1980s, the importance of physical activity was getting more national attention, and apparatuses to gather information on the habits of the American population

were put in place. The Behavioural Epidemiology and Evaluation Branch (BEEB) of the Centers for Disease Control (CDC) was established to implement the Behavioural Risk Factor Surveillance System (BRFSS). The first statistics on the United States population's physical activity behaviours were gathered at this time. The American Heart Association released a position statement in 1992 stating that physical inactivity is a risk factor for CHD (Dishman et al., 2013). An entire machinery is required to collect, make sense of, and store this data. The materiality of this work—the computers, questionnaires, respondents—and the lines that are drawn to make inferences with the data, is obscured over time as criterion-referenced standards are established. Criterion-referenced standards can be thought of as networks that connect disease outcomes, risk factors for diseases, and criterion measures such as body fat percentage (see Jette et al., 2016). Each of these aspects of criterion-referenced standards are comprised of their own networks of tools, algorithms, populations, and discourses. Through these epidemiological efforts, the population body, and its relationship to physical activity, can be affected in such a way that they can be known, or articulate.

Physical activity epidemiology must be considered alongside another important epidemiological trend of the 20th century: the rise of the “obesity epidemic.” Particularly in the later period of the 20th century and the early 21st century, the contention that the global population is considerably more likely to be classified as obese than ever before, and that obesity is so directly related to chronic diseases that it should be considered a disease itself, has become a social and scientific truth (Gard & Wright, 2005; Rail, 2012; Saguy & Almeling, 2008). Epidemiology has played a significant role in the contention that people are fatter, and because they are fatter, they are at minimum at greater risk of

disease if not dead because of obesity itself (Gard & Wright, 2005). As researchers and public health practitioners illustrated that the weight of the American population had been steadily increasing, concerns about what this mean reached a fever pitch around the turn of the century that has remained unabated. For example, former United States Surgeon General Dr. Richard Carmona stated in 2004 that obesity is a greater threat to the American populace than terrorism (Rail, 2012); a statement that nicely encapsulates the type of measured responses that typically characterize “obesity” discourse. Interestingly, the first signs of the “obesity” epidemic came not from epidemiologists, per se, but from life insurance companies who were the first to gather data on population weight (McKenzie, 2013).

Furthermore, physical activity epidemiology has played a vital role in the rise of commercialized fitness, as it strengthened the rationale for engaging in such practices (Howell & Ingham, 2001). One cannot understate the importance of these scientific connections between physical activity and health. As Howell and Ingham (2001) observe, this scientific evidence undergirds important reports and recommendations such as the Surgeon General’s Reports, Healthy People 2000 and 2020, reports by the American College of Sports Medicine, the American Heart Association, and more.

Physical activity epidemiology can be understood as a biopolitical mechanism of population management (Rose, 2007). As death rates have stabilized, illness and death are no longer thought to strike at random or to be inevitable. Since death is happening later in life and more treatments for illnesses are discovered, “illness flies in the face of the ideology of human progress and rationality for it threatens social life, exposes the fragility of social order and erodes individual self control” (Lupton, 1995, p. 63). Public

health and health promotion practitioners utilize rationality and measurement to try to make sense of death and dying. And for individuals, lessons on how they can stave off death are utilized to address the anxiety of bodily decay. Physical activity epidemiology, alongside the thermodynamic understanding of the body that persists today, manifests in the form of “creative health accounting,” where “health is presented as a quantifiable, calculable and predictable status” (Maguire, 2009, p. 129) that allows for healthy, risk-reducing behaviours (such as physical activity) to cancel out the effects of unhealthy, risk-increasing behaviours (such as smoking or a high-calorie diet). Within this era of epidemiology, efforts to know the body are efforts to minimize risks, particularly health risks in this case (Petersen & Lupton, 1996; Susser & Susser, 1996).

Kinesiology. While the central space of kinesiology today is often thought to be the laboratory, its origins are in gymnasias as the physical educators sought to teach youth and university students about hygiene and physical activity (Vertinsky, 2017). Physical education (PE) departments in the U.S. have their roots in the Association for the Advancement of Physical Education in 1885 (Park, 1991), although they began to be institutionalized as major units within universities in the early 1900s. From its inception, physical education has been tied to medicine and health promotion (Park, 1995). The goal of these programs was to teach future physical educators how to apply science and hygienic concepts to enhance the body and mind (Park, 2012). PE was hygienic in that it was used to promote the health of the various body systems, such as the digestive, muscular, respiratory, and circulatory systems. Additionally, PE was educational in that it educated students’ bodies, minds, and social abilities (Park, 1998).

The sex-segregation of PE led to women taking on important leadership roles in girls' and women's PE. Sex-segregation also allowed girls and women a space to be physical and challenge their perceived physical inferiority. At the same time, this leadership came with the cost of arguing that girls and women needed a very different PE program than boys and men, and thus these programs tended to be non-competitive and emphasized tests to ensure girls' and women's health, thus reproducing discourses of feminine weakness (Vertinsky, 2017).

The shift from PE towards the laboratory-centred kinesiology of today has much to do with the cold war and the anxieties around “soft Americans” that were discussed above. As Vertinsky (2017) puts it, these fears within the academy led to a “surge of research to review the nature and role of exercise in physical fitness and its application in physical education and sports programs as well as remedial physical training in the military” (p. 145). While “the perceived need to do push-ups for the good of the United States” (Vertinsky, 2017, p. 145) waned, the desire to research physical activity from a scientific perspective did not. After the Soviets launched the first artificial satellite, Sputnik, in 1957, there was a preoccupation with the development of American science in the academy. Andrews (2008) and Twietmeyer (2012) have characterized this “post-Sputnik climate” (Andrews, 2008, p. 48) as pivotal to the turn from physical education to kinesiology. The seeming importance of scientific rigour in education increased due to a fear of losing the science race to the Soviets. In kinesiology, this led to what Andrews (2008) has termed “the rush to *science* and *subdisciplinarity*” (p. 48), or the increasing orientation towards biological and human sciences to the exclusion of social sciences, as well as the creation of subdisciplines.

This shift from PE to kinesiology is emblematic of the different ways in which the body can be articulated in a Latourian sense. With PE at the turn of the 20th century, the moving body was articulated through networks that were assembled by biological inquiries into differences between men and women, notions of hygiene and moral fortitude, gymnasia, and science of body systems. Gym equipment, stopwatches, world records, and more were assembled to position boys and girls, men and women, as possessing different capacities and needs in the gym. The ways in which the body was affected by these human and non-human networks shifted as the profession moved towards kinesiology, a science of subdisciplinarity. Laboratories, physical activity epidemiology, capitalism and communism, Sputnik and the space race, body sensors, and more were articulated to the bodies of American and European children to evaluate not only their athleticism but their athletic potential and what they could do to become healthier and fitter. These networks shifted substantially based on these allies that were brought together to affect the bodies under study.

While physical activity continues to be the focus within kinesiology, the topic is approached from a different perspective. Two figures are often credited with moving physical education as a field towards kinesiology: the former Harvard president, James Bryant Conant, and the University of California professor, Franklin Henry. Conant, author of a 1963 report titled *The Education of American Teachers*, put physical education departments on the defensive due to fears that they were not relevant or specified enough (Twietmeyer, 2012). On his footsteps, Henry (1964) addressed the field of physical education, stating that its focus needed to move away from the technical and the professional towards a theoretical, organized body of knowledge—namely, scientific

knowledge—of the moving body. Neither Conant nor Henry were the first to argue that physical education should embrace science, but in kinesiological storytelling, these are the two scholars who prodded kinesiology into being (Twietmeyer, 2012). This shift towards the production of scientific knowledge about the body is indicative of a perception amongst members of the academy that the moving body was inarticulate; the work of physical educators was not allowing the body to ‘show what it can do’ in a way that was felt to be most relevant. New networks needed to be assembled to know the body in new ways.

Today, teaching future physical educators is less the focus of kinesiology than developing research programs on the body from a scientific lens. Henry (1978) described the field as “the study in depth, as a discipline, of certain aspects of anatomy, anthropology, physiology, psychology, sociology and other fields” to the moving body (p. 15). Hatfield (2008) elaborated on the subdisciplines of kinesiology today:

The essence of kinesiology is the study of the moving body *with biomechanics, motor control/neural and metabolic processes arguably as essential core knowledge components* and the moving body being understood in the context of health, ergonomic, psychological (e.g., competitive sport and stressful military settings), philosophical, social, management, policy, pedagogical, and, more recently, genetic considerations. (p. 158; emphasis added)

As these definitions show, kinesiology is characterized by its “silos” of specialization (Kretchmar, 2008). The goal of this specialization, Kretchmar (2008) writes, has been to give kinesiology more academic legitimacy due to its scientific relationship to health and obesity, as well as to avoid the impression that the field is too narrowly focused on physical education, which has struggled to achieve legitimacy in its own rite due to the perception that it is only about play.

Sports medicine. Meanwhile, the scientization and quantification of the body was impacting elite sports in a significant way in sport and exercise science. Waddington (1996) defines sports medicine as “the more or less systematic application of the principles of medicine and science to the study of sporting performance, and the institutionalization of this practice in the form of professional associations, research establishments, scientific conferences, and journals” (p. 177). Two such professional associations, the British Association of Sport and Medicine, and the American College of Sports Medicine, were founded in 1953 and in 1954 respectively. While the origins of sports medicine have their roots in the late 19th and early 20th centuries, it is important to emphasize the discontinuity between those efforts and the work of sports medicine and sport science today. Namely, sport was initially a site of study for exercise science because athletes were believed to be interesting anomalies to examine. In other words, the goal was to discover novel physiological processes in outstanding subjects, rather than to apply them to improve athletic performance. Beginning in the 1950s and 1960s, the goal of sports medicine changed to essentially the opposite goal: to apply physiological principles to the athletic body to improve its performance (Hoberman, 1992). The body was learning to be affected by the principles of sport and exercise science to know it and change it in the pursuit of athletic excellence. Scientists were assembling networks of training regimens, drugs, and practices to improve the elite athletic body.

Waddington (1996) traces these shifts in the goal of sports medicine to several related developments. The first is the medicalization of life, where it is not only bodies that are already ill that are deemed to be in need of medical intervention, but

significantly, healthy bodies who might eventually become ill are also targeted for interventions. Sports became increasingly medicalized as well, in the pursuit of applying scientific knowledge to improve athletic performance. Second, Waddington (1996) describes a particular form of the politicization of sport, where relationships between the capitalist west and the communist east in particular came to influence the tenor of international sporting competitions. This is because, as Waddington (1996) describes, sport was thought to be

an extension of the political, military, and economic competition that characterized relationships between the superpowers and their associated blocs. ... winning of medals came to be seen as a symbol not only of national pride but also of the superiority of one political system over another. (Waddington, 1996, p. 181)

Thus, investing in the bodies of athletes—and germane to this project, the quantification of athletes' bodies—was for the United States an investment in capitalism. Finally, as sports became more commercialized, substantial material rewards were accessible to those who reach the upper echelons of success within their sport or event. Sports became more competitive as a result, given the rewards available, and getting an edge through sports medicine became more desirable.

Quantifying the sporting body for the purposes of enhancement, and to ensure a level playing field where no one has an unfair advantage, are two sides of the same coin. In order to determine what is an inappropriately high level of testosterone, for example, a standard has to be set as to what counts as the 'right' or 'healthy' level of testosterone that does not confer what is deemed to be an unfair advantage (Karkazis, Jordan-Young, Davis, & Camporesi, 2012). Similarly, in order to enhance an athlete's abilities through drugs or other practices, knowledge of natural levels of that substance, such as red blood

cells and erythropoietin (EPO), are important for developing techniques for enhancing those levels and administering any substance that would improve training and competition within the bounds of what is legal or what is (relatively) safe (Waddington, 1996). Ultimately, both of these efforts work to construct the ‘normal’ body, based on the same principles as were put forward by Adolphe Quetelet in the mid-1800s. In a Foucauldian sense, through the collection of population-level data for the purposes of public health, standards for normalcy and deviancy are established with the help of the myriad devices that bring these numbers into being: needles for blood collection, centrifuges, blood level testing protocols and tools, and more. As this information is deemed worthy of possessing— indeed, knowledge of an athlete’s hematocrit, or the proportion of their blood that is red blood cells versus plasma, white blood cells, and platelets is only noteworthy in the field of athletics when governing bodies decide that it is information that is necessary to prevent cheating— a machinery of surveillance is put into place in order to monitor bodies and assign them to normal and deviant categories. It is through these tests and assignments that categories of bodies come into being—or become articulate— in the athletic sphere. The more work that is done by scientists, blood, assays, and various measurements and standards, the more that the ‘right’ kind of athlete, and by extension the ‘wrong’ kind of athlete, comes into focus.

The politics of quantifying bodies for sports medicine are nowhere clearer than in instances of sex testing or gender verification. Sex testing has long been a field where beliefs about what is “normal” weigh on designations as to who is subject to athletic gifts, and who is subject to unfair advantage. As Schultz (2011) points out, sex testing of female athletes only began in the 1960s, when women’s sports were becoming more

prestigious and thus potentially subject to men infiltrating them in disguise. Furthermore, there was a particular degree of anxiety about African American and Soviet women's athletic successes, as they were perceived as symbols of "mannishness" (Cahn, 1994, p. 138) through their achievements on the international stage. Sex testing has undergone numerous shifts throughout the years, from visual inspections of external and internal genitalia (to prevent men from competing), to a chromosomal test to determine "true" sex, to today, where hormones are tested to determine whether a woman is intersex and in need of intervention to rid her of any unfair biological advantages before she can compete again (Karkazis et al., 2012; Schultz, 2011).

Many women have been unfairly excluded from competition because of these policies. Furthermore, feminist scholars have long argued that these investigations into sexual difference are what create sex binaries, rather than the other way around (see Fausto-Sterling, 2000). A considerable amount of effort goes into characterizing cut-offs, visual assessments, and standards for determining the difference between male and female, and too much testosterone and a 'normal' amount (Cooky & Dworkin, 2013; Karkazis et al., 2012). The 'truths' about sex and sex differences are assembled through networks of blood, needles, assays, laboratories, that construct the boundaries of the sexes. This not only makes the bodies of male and female athletes more 'articulate,' but even further, by investigating the role of testosterone in particular in providing an 'unfair' advantage to some female athletes (Karkazis et al., 2012), testosterone becomes more articulate as well. Furthermore, given the racial politics of sex testing, where non-white women are routinely targeted due to the perception that they are insufficiently feminine (Cooky, Dycus, & Dworkin, 2013) it is also worth noting that efforts to quantify bodies to

distinguish between appropriately feminine and inappropriately masculine are not neutral, racially or otherwise (Cooky & Dworkin, 2013; Schultz, 2011).

Industries of Quantification

Finally, I consider how commercial practices have shaped (and been shaped by) bodily quantification practices. Not all bodily quantification efforts require specialized tools that people must purchase or purchase access to, such as through a gym membership. However, the ways in which bodily quantification has been commercialized and sold is important to examine. Through the material practices that I examine here, the desire that people have felt to quantify their body is critically contextualized. This discussion starts in the mid-19th century with the popularization of the weight scale, although I also ask more generally why it is that numbers are perceived to be more valid than other forms of knowledge and how the standardization of weight and other units of measurement contributes to the perception that knowing one's weight is important. I then jump to the 1980s, to what Maguire (2008) has termed a "fitness boom," to examine the digital technologies that were popularized alongside the rise of health clubs as a site of physical culture.

The weight scale. Today, a weight scale is in most bathrooms across the United States, giving those people the ability to know their weight with relative precision (give or take a few pounds). Even if one does not own a weight scale themselves, they may step on a weight scale in another person's home or at the gym, allowing them to update themselves on this increasingly important number. Weight scales are essential for assigning people into weight groups, and along with tools for height measurement, BMI can be calculated to categorize people into underweight, normal weight, overweight, and

obese categories. The number on a weight scale can drastically influence how a person feels about themselves, as it is thought to be more an objective indicator of one's weight loss, gain, or maintenance, than the fit of clothes or a look in the mirror.

Before considering weight scales, it is important to delve into where the product of a weight scale—measures for weight such as kilograms or pounds—came to be.

According to Porter (1995), faith in the power of numbers as objective and standard measures stems from several developments in the 18th and 19th centuries. First, the Enlightenment period of the 1700s ushered in the rise of the scientific method, where systematic and empirical methods were thought to be more reliable and truer than unsubstantiated beliefs in religion or superstition (Sismondo, 2010). As Porter (1995) notes, quantification “implies the subordination of personal interests and prejudices to public standards” (p. 74). Related to this was the need to develop ‘neutral’ concepts that could capture rich ideas such as temperature or weight. The ability to replicate experiments in the controlled conditions of independent laboratories required standardized units that would ensure that the same practices were being undertaken regardless of the laboratory. Temperature, for example, is representative of molecular energy and is typically measured by the rise and fall of mercury— a concept that was previously thought to be immeasurable until experimental physicists did so (Porter, 1995). The need to establish uniform standards was not only an issue in laboratories. Taxation, economic development, and centralized government depended on standardization and the ability to ensure that land, food, temperature, time, and other units were unified across space. Industrialized work relations require clocks, which contradict diurnal rhythms. Discretionary systems of measurement—such as a ‘heap’ of

grain— are subject to social privileges and local negotiation, rather than uniform laws. By contrast, in order to establish commerce and industrialization, standardized units were needed that would seemingly take privilege and negotiation out of the conversation (Porter, 1995).

While these measurements may seem common-sense today, a considerable degree of work was involved in establishing those standards across space. For example, the formation of weight standards is the *raison-d'être* of the Bureau International des Poids et Mesures (BIMP, or the International Bureau of Weights and Measurements) in France, which is an intergovernmental organization that maintains that International System of Units. The unit that is used in many places around the world to assess body weight, the kilogram, was provisionally defined in 1795 and was commissioned as an international prototype in 1875. This international prototype was kept at the BIPM facilities, made of platinum-iridium that was kept in the same conditions to maintain the weight and purity of the prototype that were outlined in 1889 at the first General Conference on Weights and Measures. Interestingly, this kilogram—the unit of mass itself— has gained weight every year due to an accumulation of contaminants on its surface and could only serve as a reference mass immediately after it has been cleaned and washed (Bureau International des Poids et Mesures, 2006). As of 2018, however, “Le Grand K,” the nickname for the kilogram, has been retired in favour of constants that are available worldwide: the frequency of a resonance in cesium atoms, Planck’s constant, and the speed of light (Morton, 2018).

To put it in the language of Latour (1999), the more work that is done by scientists at the BIMP on the kilogram, and with cesium atoms, Planck’s constant, and the speed of

light, the more that it functions as an independent substance that has its own boundaries and meanings. As an actant, the kilogram has been articulated to numerous other actants that strengthen its independence such that references to “Le Grand K” or Planck’s constant are unnecessary to reference in order for a kilogram to exist or have meaning. The kilogram is quite articulate.

At a time when the logic of quantification was becoming ever stronger, the need to weigh one’s body, as well as the ability to do so, were enabling this practice to expand. The mid-18th century is as an important period for changes in thinking about body weight and fatness (Schwartz, 1986). Surprisingly given our current context, gluttony was previously associated with thinness because it was thought that gluttons ate food too quickly and that it would pass through their bodily systems without being absorbed. Therefore, thinness was not as socially valued at this time, as it was a sign of being sick. One of the leading causes of death was thought to be dyspepsia, or indigestion. Therefore, being gluttonous would make the body unable to digest what one ate, thus exhausting the mortal body and spending its life force. Cures for dyspepsia centred on restoring buoyancy. Due to this focus on the relationship between body weight, food, and health, the practice of weighing oneself with any regularity seems to have begun in the mid-1800s, although at this time Americans were more after a sense of lightness or buoyancy than they were seeking lightness in pounds on a scale (Schwartz, 1986).

In the late 19th century, gluttony was no longer associated with thinness and instead became associated with fatness. As dyspepsia gave way to nervous exhaustion—neurasthenia—as the primary issue afflicting the population, the primary cure also changed from restoring buoyancy to getting enough rest and grounding the body

(Schwartz, 1986). Farrell (2011) has similarly pointed to the fact that more people were experiencing sufficient wealth and leisure time, alongside jobs that required less manual labour and improved health care (and fewer wasting diseases), which resulted in fatness becoming the purview of more people than only the elites. The 1860s, according to Farrell (2011), was when fatness became a symbol of being out of control and stupid and being thinner became the look of the wealthy.

These attitudes are emblematic of something that has long been true: that the body is thought to be a window into the soul (Vertinsky, 2007). The so-called Protestant Ethic of self-control and self-denial that is indicative of one's destiny to go to heaven was supposed to be evident on and through the body (Weber, 1958). If the body was a moral project, avoiding becoming excessively corpulent was vital to this project, of which weight scales were becoming an increasingly important part.

Large weight scales were initially a technology for livestock, not people. Doctors did not begin recording patients' weights until the end of the 19th century, as life insurance actuarial tables began to suggest that there may be a connection between one's BMI and one's life expectancy (Crawford, Lingel, & Karppi, 2015). People began recording their own weights around this time as well, although in a very different way (Crawford et al., 2015). Stepping on a scale was until the 1920s a very public event, as body weight scales were initially located at pharmacies and fairgrounds. These scales would play loud songs as they read out the person's weight with large display numbers (Crawford et al., 2015).

While this practice continued, weighing oneself became a more private affair when domestic scales were introduced in the 1910s and popularized in the 1920s (Schwartz, 1986). This was not an insignificant shift. As Schwartz (1986) put it:

The shift from publicity to privacy, from the sociable to the personal, was a semantic shift from the third person to the second person and from the declarative to the subjunctive— from *what this person weighs* to *what you should weigh* and *what you could be*. (p. 165-6)

Weighing became a more private and intimate endeavour when one was expected to disrobe for a highly accurate reading, and the bathroom became the most common site for a scale. While weight scales are more often associated with women today, they were initially marketed to men as it was thought that women did not need to watch their weight as closely as they needed to be plumper for reproductive purposes (Crawford et al., 2015).

The idea that one's size is indicative of their internal nature of course has a long history (Vertinsky, 2002), but as the above illustrates, the connection between the two has been far from stable. As weight became a measurable constant through the work of numerous scientists and platinum, iridium, and cesium, it began to be applied to the body so that bodies could be measured in reference to one another and norms could be established as to what one *should* weigh (Schwartz, 1986). If the body is an actant in a network, a weight scale is another actant that affects the body and influences what can be known about it and the opportunities of the body to be affected (Latour, 2004). The body is articulated to numerous measuring devices that strengthen claims as to what the body truly is, whether it be fat, thin, normal, abnormal, buoyant, or grounded. As weights were becoming standardized and scientific rationalities were being applied to the body, the body could be articulated and known in new ways.

Digital technologies in the fitness industry. In addition to the changes in possibilities for the body that came along with the establishment of standardized weights and the popularization of bathroom weight scales, the rapid commercialization of leisure-time physical activity in the late 1970s and the 1980s had an important effect on bodily quantification practices. As I argue here, the commercialization of physical activity, the increased popularity of health clubs, and the changing bodily aesthetic towards ‘hard’ and muscular bodies (Maguire, 2008) set the stage for the QS through the popularization of digital bodily quantification. It is important to keep in mind that markets are not “universal entities or bodies, but rather as consisting of and being shaped by various discursive forms, material devices and practices” (Pantzar & Ruckenstein, 2015, p. 92). The markets for digital quantification devices such as sports watches and heart rate monitors are constructed through networks of technological advancements, discourses about the body and physical activity, and a desire to know the body in particular, numerical ways.

With the commercialization of physical activity, specialized equipment for working out became more commonplace. The 1980s were an unprecedented period of profit for those selling health and wellness clothing, equipment, media, and spaces—all industries that have only become bigger since. Fitness clothing and footwear was a boon at this time, with Nike Inc. increasing their profits from \$1.9 million in 1972 to \$870 million by 1983 (Howell & Ingham, 2001). The Sears catalogue is particularly illustrative of this change towards specialized equipment: the 1960 catalogue featured only one page of fitness equipment, while in 1970 the same catalogue featured several multi-page spreads

of exercise clothing and devices as Americans were spending \$175 million on exercise devices annually (McKenzie, 2013).

As more people were becoming physically active at this time (see King, 2006), more exercise equipment—including equipment that could digitally quantify one’s body—was flooding the market. Sports watches were first marketed in 1984, when Timex “took the clock off the finish line, and put it on your wrist” (Timex, n.d., para. 7) by marketing the Timex Ironman: a waterproof digital sports watch with buttons for time-keeping and laps. As the Timex text makes clear, being able to look down at one’s wrist to know their time can profoundly change the experience of running, much in the same way that weighing oneself daily is different from weighing oneself annually at the doctor’s office. Additionally, the design of a sports watch makes tracking one’s time easier than it had been with other technologies. The modern iteration of the handheld stopwatch, which dates back almost 200 years ago to when French inventor Nicolas Mathieu Rieussec created a stopwatch so that King Louis XVIII could time his horses, could have been used to a similar effect (Szondy, 2016). However, its design implies that it is used to time the activities of others, rather than to time the person who is doing the activity itself. Adding a wrist strap changed the function of the technology and made it an indispensable piece of athletic equipment for those who wanted to track the timing of their physical activities.

Similarly, heart rate monitoring made the move from the clinic to the athletic field in the 1970s, when scientist Seppo Säynäjäkangas invented the first portable electrocardiogram, in the form of a battery-operated fingertip heart rate monitor, to be used by the Finnish cross-country skiing team (Esmonde, 2018; Kolata, 2003).

Säynäjäkangas went on to found Polar Electro, who released the first commercially-available wearable heart rate monitor in 1978 and introduced the Polar Sport Tester PE3000 in 1984, a heart rate monitor with a computer interface that allowed athletes to view their training data on a computer (Kite-Powell, 2016).

Second, it was not only people's individual efforts to know about their moving body that led to an increased ability to quantify oneself, as the space of the health club became an important part of bodily quantification as well. By 1988, an estimated 10.05 million Americans belonged to health clubs (McKenzie, 2013). At this time, health clubs were increasingly making use of exercise machines such as treadmills, ellipticals, and targeted weight lifting machines produced by companies such as Nautilus and Universal (Maguire, 2008). This move is emblematic of the shift towards digital technologies and customization, as it was “during the fitness boom [that] *electronic* technologies became ever more apparent” (Millington, 2018, p. 33). While the increased use of exercise machines had many effects on gym spaces, such as creating a need for more space to accommodate the many large machines that targeted one activity or muscle group, most germane here is the inclusion of quantification technologies directly on machines such as treadmills, ellipticals, and stair masters, which facilitated bodily measurement during workouts (Maguire, 2008). Many cardiovascular workout machines have heart rate sensors on their handles, for example, to encourage exercisers to measure their heart rate mid-workout. Additionally, after inputting one's height and weight into a digital display, the machine can estimate an exerciser's caloric expenditure. This is all in addition to the measurement of distance and time that is commonplace on treadmills. With these machines, exercisers are given numerous metrics throughout their workouts as well as at

the end. Together, these changes meant that exercise equipment created standardized yet individualized workouts for exercisers, who simply needed to plug in some information about themselves—their height, weight, and age—and could select a program specifically designed for them in an individualized space (Maguire, 2008).

These exercise machines and the data collection practices that they enable represent important actants in networks of quantification of the body. Designated workout spaces have long been spaces of quantification, where the body is articulate in ways that align with discourses about bodily knowledges (Maguire, 2008). Weight scales are readily available in the locker rooms, illustrating the important connection between physical fitness and weight maintenance. Personal trainers measure the bodies of their clients using measuring tape to illustrate progress through inches gained or lost. Exercisers also bring numerous metrics into their assessments of their fitness and their bodies, whether it be body mass index, calorie counting, or activity tables that lay out what moves one should do in a workout.

Finally, along with the focus on lifestyle came a greater degree of attention to the results of physical activity, as time spent working out was expected to be marked on the body. Visibly strong muscles that had not previously been as fashionable amongst the middle- and upper- classes of white Americans were becoming more appealing (McKenzie, 2013). While there are gendered differences in the size of muscles that is deemed visually appealing for men and women, it was in this time period that the expectation that women lift weights and develop muscle definition (but not too much definition!) started to align with dominant feminine beauty ideals (Markula, 1995). Heart rate monitoring for athletes as well as people at the gym was emblematic of the fact that

the days of low-exertion physical activity were coming to a close and the prevailing wisdom about exercise was that the harder one worked, the better (McKenzie, 2013).

The popularity of digital and portable tools such as the sports watch and heart rate monitors is suggestive of the desire to know precisely what the moving body has done, as it is happening, and the response of the market to provide such a tool. While the “Ironman” moniker for the Timex sports watch implies that it is a product for elite athletes, I contend that the mass marketing of these devices is suggestive of a perceived widespread need to improve one’s performance through numerical self-knowledge. These networks of tools and objects—watches, heart rate monitors, exercise machines, gyms, workout spaces—turn the moving body whose inner workings are a mystery into an articulate body whose activities can be known and measured. This assembly of actants—heart rate monitors, calorie-counters, calorimeters, and exercise machines—are articulated to the exercising body to know it in this quantified way. These numbers can have a profound effect on one’s experience of physical activity, shifting the focus towards numerical goals and pushing oneself rather than haptic feelings of pleasure in movement. What the exercising body has done is expected to be known with increased precision so as to meet one’s fitness goals.

For example, heart rate is intended to be a measure of one’s exertion: the harder one is working out the greater their body’s need for oxygen and thus the harder their heart needs to work to deliver blood to tissues. To interpret heart rate data requires some literacy. Heart rate is often measured in beats per minute, although this number is often interpreted in the context of one’s theoretical maximum heart rate: one’s age subtracted from 220. For example, when I defend my dissertation on March 7, 2018, my heart rate

will likely be at my theoretical maximum: $220-30=190$. As I have written elsewhere (Esmonde, 2018), heart rate math is typically oversimplified to give an impression of bodily mastery, as bodies respond differently to a need for more oxygen that does not necessarily align with a neat heart rate table. Regardless, heart rate is taken for granted as a reliable indicator of one's exertion, with established "fat-burning zones" and "training zones" at 50-60 percent and 75-85 percent of maximum heart rate respectively (Kolata, 2003). An ethos of quantification in this regard highlights how one's perceptions of their exertion—how hard they are breathing, whether they can carry on a conversation—were no longer deemed accurate enough as indicators that one was working hard.

Even if exercisers did not find this approach to training and the body compelling by themselves, there can be a significant social and material impetus to do so. In a spinning class offered at a gym, for example,

An instructor may tell you to get your heart rate up to 65 percent of your maximum as you warm up and then to get it to 80 percent as you increase your resistance for the first "hill." That sort of advice only makes sense if you have a heart rate monitor, of course. (Kolata, 2003, p. 78)

In other words, to participate meaningfully in a fitness class, one would have to purchase a monitor themselves simply so they could follow along. I would personally be at a loss trying to determine what 65% of my maximum heart rate is on my own! This exercise accounting is also built into exercise equipment, with heart rate monitoring hand grips and tables of "fat-burning" and "training" heart rate zones on many exercise machines. Calorie-counting, in the form of an estimated caloric expenditure, is also a built-in feature on many exercise machines as well. These machines teach exercisers how to quantify their bodies, positioning this practice as the 'right' way to exercise (see Esmonde, 2018).

Knowing the ‘truth’ about the body—how hard you *really* worked, and what impact that work will have on getting you towards your beauty and fitness goals—was expected to be within an exerciser’s grasp if they purchased these technologies or used them in the gym. The exercising body without these technologies is inarticulate; the body is a black box that is moving and sweating and breathing hard but what is going on inside the body is unknown. Those using these technologies—actively by choosing to purchase them or engage them, or passively by using a machine that gathers the data regardless of one’s interest—are engaging in a process of recruiting tools that will help them to know their body towards these new ends.

Conclusion: Setting the stage for the "quantified self"

The quantification of the body to learn its secrets is, as this chapter has illustrated, far from new. Whether it be a weight scale, a calorimeter, measuring tape, a heart rate monitor, or even one’s ability to do a set list of physical tests—individual bodies and populations have long been placed under intense numerical scrutiny. Some reasons for this quantification have remained constant over the years. For instance, the belief that fatness is unsavoury and should be subject to personal or national intervention has resulted in the measurement of the body, physical activity, and diet since the mid-19th century. “Give that chicken fat back to the chicken, and don’t be chicken again!”—the song lyrics of the President’s Youth Fitness Council exercise program—continues to resonate today in iPhone advertisements precisely because the quantification of the body in its different forms is expected to yield the insights necessary to achieve one’s desired body weight. These methods of quantification reveal the truth of the body within an

episteme (Foucault, 1972) that valorizes scientific approaches to validity, as well as the path forward for conforming to quantifiable body and fitness norms.

I would argue that Fitbits and other fitness tracking devices represent a continuity of many of the themes that were discussed above. With the 10,000 steps recommendation, the use of a Fitbit as a tool for active living is a fitness program in and of itself that tells people what they need to do in order to accrue health benefits from physical activity. Fitness tracking is an extension of sciences of quantification, particularly the prestige of physical activity epidemiology. Despite a lack of initial evidence that 10,000 steps per day is indeed an appropriate threshold for health benefits, leading some to suggest that this number was selected arbitrarily (Cox, 2018), this number has become entrenched within American culture. Finally, step tracking and fitness tracking more generally is a global industry that is estimated to flood the market with 500 million wearables worldwide (Giddens, Leidner, & Gonzalez, 2017). All of these themes—the program aspect of fitness tracking, the veneer of scientific justification, and the industry itself—reinforce one another to make fitness tracking a self-evident practice.

This history of quantification illustrates the uneasy relationship that Americans have long had with technological progress. On the one hand, technology is positioned as the cause for the “obesity epidemic”; television, computers, industrial mechanization, and cars are thought to have resulted in a generation of “couch potatoes” who are not burning enough calories to maintain a healthy weight (Gard & Wright, 2005). For instance, technologies and consumerism were frequently pointed to as the cause for American youth’s underwhelming Kraus-Weber fitness test results. On the other hand, it is

technologies that are positioned as the saviour. Technologies can tell us what we need to do by giving us an exercise plan, they can tell us how close we are to doing that by telling us our weight, and they can make it more fun for us in the process by gamifying fitness. If you use a heart rate monitor, for example, you can reveal precisely how hard you were working while exercising and ensure that you are in the fat-burning zone in order to lose weight. Or, you can use a Fitbit that will encourage you to walk more throughout the day to avoid becoming sedentary because of your desk job.

The QS within physical culture can also be interpreted as a way of combatting uncertainty. Despite decades of obesity and exercise science, precise knowledge as to what physical activity one can do to be healthy, or to avoid overweight and obesity, are still elusive. The perception by researchers, Gard and Wright (2005) argue, is that the reason for this uncertainty is perceived to be an inability to precisely capture what people are eating and the physical activity that they are doing, leading to inadequate or misleading data. When people are tracking themselves, however, they can work to get closer to developing—and following—these recommendations. As recommendations get ever finer with regards to exercise intensity or steps taken, the need for people to utilize technologies that will give them the information they need to have an awareness of their ability to conform to dominant health directives increases along with the granularity of the recommendations. One needs a weight scale and a height measurer, of course, to determine their BMI. Now, with the 10,000 steps recommendation, one needs a pedometer, or better yet a fitness tracker, to assess this metric. Many fitness trackers today have heart rate monitors, which can not only be used to measure the intensity of exercise, but further, can be used as a metric of stress (Pantzar & Ruckenstein, 2015).

Aligning oneself with health recommendations requires quantification technologies, and fitness industries have been more than happy to provide these technologies for a price.

There are some differences in how these technologies have been deployed over time. First, leisure-time physical activity for the purposes of health and fitness has long been a fraught concept, as it was well into the 1950s that doctors were cautioning exercisers against working too hard and damaging their heart (McKenzie, 2013). Researchers primarily studied physical activity in the workplace (or for the purposes of the workplace) in the first half of the 20th century, as illustrated by the Harvard Fatigue Lab and early physical activity epidemiology research. As jogging became a popular national pastime, the approach to fitness remained slow and steady. This undercurrent has persisted within the active living movement of the late 1990s onwards (Orleans et al., 2009), although during the 1980s physical activity became an intense, consumer-driven affair for many exercisers. A hard, muscled body became evidence of one's self-righteous commitment to their health as well as their ability to consume gym memberships, clothing, fitness media, and exercise technologies such as heart rate monitors (McKenzie, 2013).

The rationale for quantifying the body has also shifted in some significant ways. As the work of William H. Sheldon shows, unlocking the secrets to the soul through bodily measurements furthered the agenda of eugenics. In other words, by identifying the righteous and the delinquent, this quantification pointed the way towards who should reproduce as part of the nation and who should be discouraged from doing so for the good of the gene pool. Following World War II, the goal of this quantification shifted away from benefitting the gene pool and identifying and weeding out undesirables (Rose,

2007) towards the security of the nation and winning the cold war. Quantification revealed who was fit and who was not and provided a (largely unclear) path forward for those seeking to become fit. Finally, as neoliberalism took hold in the 1970s and the 1980s, physical fitness became about individual health and lifestyle politics. Easygoing jogging and Kenneth Cooper's point system became less popular as hard bodies that had been produced in the gym became a symbol of consumptive power and an ethical commitment to being independent of the social safety net, physical fitness became a population imperative for health and beauty purposes. Quantifying the body at this stage was for the purposes of pushing the body towards perfection, by ensuring that each workout was an intense one. Not everyone subscribed to this hard bodies ideal, as a notion of "active living" would soon become the new buzzword where activities of daily living such as walking, cycling, and taking the stairs for a combined half hour per day were thought to be as beneficial as slaving away at the gym (Orleans et al., 2009).

Throughout this chapter, I have sought to contextualize how truths have been established about physically (in)active bodies. To do so, I drew on a framework that emphasizes both Foucauldian considerations of power and discipline alongside Latour's actor-network-theory. Specifically, I looked to Latourian insights into how scientific knowledge is produced through networks of actants that help objects, bodies, and more move from being inarticulate to articulate. To be articulate is to have strong networks of knowledges, measurement tools, and discourses that allow people to develop knowledge about what an object or person is and what they can be (Latour, 1999, 2000). This was never a purely human endeavour, as the body has become articulate towards different ends over the history that I sketched above through connections with tools of

quantification as well as tools that are not often associated with quantification, such as cameras or roads. The same tools can be used towards different ends, such as calorie-counting for the purposes of determining the steady state equilibrium of an industrial worker to calorie-counting in a spin class to ensure that you are following along with the recommended effort level called out by the instructor. These Foucauldian and Latourian tools together have enabled me to shift the focus of bodily measurement away from bodies and human knowledge, and towards the networks that bring those measured bodies into being.

When considering the rise of technologies such as the Fitbit, MyFitnessPal, and other devices and apps that are used to quantify the physically (in)active body, it is important to avoid the opposing pulls of technological determinism and cultural determinism. Technological determinism, in this case, would suggest that the impulse to track calories consumed, steps taken, flights of stairs mounted, and more, is the result of the existence and availability of technologies that do so. While the accessibility of such devices has undoubtedly contributed to the public perception that fitness tracking is an important endeavour, this does not tell the entire story. Many technologies are available without being taken up on a wide scale, both personally and within institutions. Nor, for that matter, does a cultural determinist account paint a complete picture that explains the resonance of fitness tracking in the United States and elsewhere.

As this historical overview has illustrated, while there is certainly an important cultural component to the impulse to quantify the body, the meanings that people place on quantification, and the ways that quantification practices categorize and hierarchize bodies, would not be possible without a wide array of technologies. Furthermore, the

belief that the next technology—be it a pedometer, a Fitbit, or something else—will unlock the mysteries of the body and enable us to use self-knowledge to live the “good life,” as Ingham (1985) puts it, is fuelled by the production of ever new technologies that give us new ways to know ourselves. In particular social, historical, and material contexts, people have been seeking the right networks of tools and knowledges to turn the inarticulate moving body into an articulate one.

Chapter 5: “From Fat and Frazzled to Fit and Happy”: Governing the Unhealthy Employee Through Wearable Technologies

In the spring of 2018, the unprecedented nine-day teacher strike in West Virginia received considerable attention. Amongst the numerous issues raised by the teachers’ union, unaffordable health insurance was a central concern. One issue related to health insurance was a proposal by the board of the Public Employees Insurance Agency that the Go365 app be implemented into the health insurance program. The Go365 program requires that workers wear a fitness tracking device, such as a Fitbit, and that the data from this device be submitted to employers. Workers refusing to comply with this program would face increased healthcare costs. As Wendy Peters, the president of the Raleigh affiliate of the West Virginia Education Association put it, “It was a complete, total invasion of our privacy” (cited in McAleve, 2018, para. 7).

This incident in West Virginia is indicative of the increasing ubiquity of fitness tracking devices, such as the Fitbit, in workplaces. Fitbits are one of an increasing number of wearable devices that track steps taken, stairs climbed, distance walked, calories burned, hours slept, and more. While it is unclear precisely how many workplace wellness programs currently incorporate fitness tracking devices, it is clear that wellness programs constitute a big business that is getting bigger. According to Fitbit Health Solutions (2015), 88% of CEOs recently surveyed reported that they currently have a health and wellness program in place. These programs are increasingly becoming a part of the branded identity of companies, with marketing messaging being part and parcel of the program (Fitbit Health Solutions, n.d.-v).

Fitbit Health Solutions (FHS) is a subset of the larger Fitbit, Inc. devoted to corporate uses of Fitbit devices in workplace wellness programs. As of 2016, over 1300 organizations were using FHS services (Power your people, n.d.-z) and it was estimated that 44 million wearable devices will be used in workplace wellness programs in the next few years (Fitbit Health Solutions, n.d.-aa). FHS is described as follows:

Fitbit helps corporate wellness leaders plan, track, manage and execute wellness programs that drive employee participation and deliver meaningful, valuable results. And, by offering a family of advanced activity trackers and a seamless experience from app to dashboard, the Fitbit Wellness solution can fit any company—regardless of size or culture. (Fitbit Health Solutions, n.d.-q, p. 2)

FHS performs numerous duties for employers. They provide Fitbits to employees, which can be fully or partially subsidized by employers, discounted by employers, or simply encouraged by a culture where Fitbit competitions are occurring. FHS also provides what they term “turnkey, easy-to-use software and services that integrate with leading health programs” (Fitbit Health Solutions, n.d.-q, p. 2), in the form of apps and the Fitbit Health Platform where employers can view employee data. The FHS web site offers white papers, programs, and recommendations for companies seeking advice on how to implement Fitbits into their workplace more effectively.

The goal of this chapter is to critically contextualize the emergence of wearable technologies in workplace wellness program. Drawing on the Foucauldian tool of governmentality analysis (Miller & Rose, 2008), I excavate how these forms of “government at a distance” (Miller & Rose, 2008, p. 16) come to be legitimized and utilized. I examine how truths are produced that position employees as unfit, and thus, as a problem, and the technologies that are involved in this problematization process. There is no function to identifying problems that are not amenable to solutions, and as such, I

also consider Fitbit's network of relations that come together to solve the problem of the unhealthy employee. This analysis is informed by an analysis of documents pertaining to Fitbit Health Solutions and workplace wellness more broadly, as well as expert interviews with

I begin by sketching the context of workplace wellness in the United States. In the presentation of the findings, I start by examining the political rationalities of wearable technologies in the workplace, focusing on processes of authorization, spatialization, subjectification, and normalization (Rose & Valverde, 1998). Finally, I explore the governmental technologies at play in these interventions into the workplace, providing insights into the landscape of workplace wellness, ethopolitics, risk and quantification, and issues of privacy and how it might be invaded by such programs. I conclude by weighing the benefits and the costs of wearable technologies in workplace wellness programs, along with recommendations for overcoming ethical issues with these technologies.

Situating Workplace Wellness in the United States

Initiatives by employers to engage their employees in recreational activities for the purpose of health and wellness have existed since the 17th century, although these efforts became more pronounced with the advent of industrial capitalism in the 19th century (McGillivray, 2005). The purpose of these interventions was to provide employees with more wholesome forms of recreation, as traditional working-class pastimes involving alcohol and cruelty to animals were deemed unsuitable for the production of morally and physically healthy workers. These employment-based efforts, in which team sports and social clubs were emphasized, were part of a broader “rational recreation” movement that

sought to instil appropriate health and wellness norms in the population (McGillivray, 2005).

In the 1960s and 1970s, wellness as a corporate organizational goal began to gather steam, and individualized fitness began to rival group sports in workplace interventions (Ajunwa, Crawford, & Ford, 2016). The logic of scientific management to increase efficiency within capitalist production was extended to a broader understanding of workplace efficiency (Hull & Pasquale, 2018). Because healthier employees are more productive, the goal for employees changed from not only mastering the discrete tasks of their job to also mastering their own wellness (Ajunwa et al., 2016). Workplace programs were still largely voluntary, however, and were relatively small scale as only the healthier employees were participating (Hull & Pasquale, 2018).

By the late 1970's and early 1980s, wellness and health promotion had become an American national goal. The first *Healthy People: Surgeon General's Report on Health Promotion and Disease Prevention* was released in 1979 and a year later the newly established Department of Health and Human Services was charged with developing extensive health and wellness promotion programming (Ajunwa et al., 2016). It was also during the 1970s and 1980s that individuals were being held increasingly accountable for their own illnesses (Crawford, 1980). As I described in Chapter 4, scholars have attributed this focus on individual responsibility for health to the dominance of an economic neoliberalization mindset in the wider culture, characterized by the deregulation of markets, welfare retrenchment, and the diminishing of state-sponsored services (Navarro, 2007). Lifestyle was increasingly viewed as a more important influence on health than the structural or environmental factors that had previously been

seen as a focus for government intervention (Crawford, 1980; Ingham, 1985). At the same time, health care costs were steadily increasing, and while the cause of these increases was attributed to many conflicting reasons, employers largely settled on poor lifestyle choices by employees as the main driver (Hull & Pasquale, 2018).

As scholars such as Navarro (2007) point out, however, the theory of neoliberalism is different from its practice. Despite the party line of austerity and a reduced role of the state in the lives of the citizenry, interventions and public expenditures—namely in the form of increased military spending—have swelled (Navarro, 2007). In the intervening decades, the number of interventions into people’s lives to call upon them to ‘be well’—from the state as well as from private actors—have only increased (Lupton, 1995).

Workplace wellness programs are but one example. These programs are most often based on an individualized model of health in which it is both appropriate and good business to encourage and incentivize health-promoting lifestyles. The basic assumption is that if employees have healthier lifestyles, productivity will increase and health insurance costs will decrease (Hull & Pasquale, 2018).

Today, 99 percent of large firms (with 200 employees or more) have some kind of workplace wellness program. The most common objectives of these programs are to reduce smoking rates and to promote weight loss through improved nutrition and fitness (Ajunwa et al., 2016). The focus on fitness is unsurprising given the perceived role of physical activity in preventing obesity amidst an “epidemic” of fatness, where one’s weight is a simple reflection of their caloric input through their diet and caloric output through exercise (Gard & Wright, 2005; Lupton, 2013a; Rail, 2012). To promote fitness goals specifically, 69 percent of programs at large firms include either on-site gyms or

reductions in gym membership fees, and 58 percent offer weight loss programs (Ajunwa et al., 2016). These are not the only goals, however, as financial, mental, and spiritual health have more recently entered the frame (Hull & Pasquale, 2018, Vander Schee, 2008).

Wellness programs can offer participation incentives, where employees receive health insurance premium reductions or other forms of reimbursement simply for participating in a program, or they can offer attainment incentives where these same benefits are only offered to those who meet particular targets related to health metrics such as BMI or cholesterol levels (Schmidt, Voigt, & Wikler, 2009). Ethical concerns have been raised about attainment incentives, as they often do not take into account social, economic, environmental, and cultural barriers to meeting health goals. As a consequence, attainment incentives can disproportionately benefit healthier and more privileged employees while disadvantaging those who need health support the most (Schmidt et al., 2009).

In the age of “big data,” ethical concerns about the potential unfairness of workplace wellness programs are increasingly joined by privacy concerns, as employers have access to ever more data points on their employees. As with any form of data collection that includes personal health information, there is apprehension and disagreement about appropriate data management and privacy practices, and a potential for data breaches. Particular worries arise because this data is profitable; it can be sold to pharmaceutical companies and data brokers who can generate predictive lists that are potentially valuable in many different kinds of markets (Ajunwa et al., 2016). Additionally, there is potential for discrimination. Employers could utilize data from

workplace wellness programs to identify employees that are less likely to be healthy and therefore more likely to be costly and find a way to terminate them. Given that weight, smoking status, and physical activity level are not protected by anti-discrimination laws, it is possible that there would be little recourse for such employees (Ajunwa et al., 2016).

The role that informed consent could play in allowing employees to protect their privacy or other interests may be limited. Informed consent has no real role to play when the wearing of wearable devices is a mandatory component of a mandatory wellness programs. But even where the device is not mandatory, employees who object to data practices may still find it difficult to decide against wearing a health tracking device if the incentives are high enough or if they have reason to fear some kind of workplace-reprisal.

Workplace wellness programs, whether they be for the purposes of promoting morality amongst the working class, or to maximize efficiency through the optimization of employee health, is a diffuse exercise of power to govern employees. How, precisely, does this management of employee health and wellbeing occur? How does automated data collection function as a governing tool? And how do people respond to these forms of digital management? Using a Foucauldian governmentality theoretical and methodological frame that I outlined in Chapters 2 and 3, I will examine these questions. In what follows, I present my findings in two main parts: first, the governmental representations, and second, the governmental interventions, of workplace wellness. I begin by considering the political rationalities that justify employers intervening in the health and wellness of employees through Fitbit programs. This is then followed by the governmental technologies that were put in place to intervene from a distance.

Political Rationalities: The Problem of the Unhealthy Worker and the Unhealthy Workplace

The problem of the unhealthy worker and workplace is not an objective problem that was waiting to be discovered by someone who happened to notice. Instead, this ‘problem’ emerges through processes of problematization that shape, construct, and present the problems that are in need of solutions. Miller and Rose (2008) note that “to understand what was thought, said, and done [means] trying to identify the tacit premises and assumptions that made these things thinkable, sayable and doable” (p. 3). Instead of trying to understand how ideologies or falsehoods are produced—about why workers need to prioritize their health when they should instead be focusing on something else, such as developing a class consciousness—it is through governmentality studies that scholars are encouraged to examine the production of truths and the consequences of those truths. In this case, I examine the production of the truth that workers and workplaces are unhealthy, and the consequence of needing interventions with Fitbits to address that problem. Using Rose and Valverde’s (1998) four foci of investigation of laws and norms using a governmentality lens—subjectification, normalization, spatialization, and authorization—I examine the ways in which interventions into unhealthy workers and workplaces in the form of wearable fitness technologies are justified.

Authorizations. Processes of authorization are what legitimize “disciplinary and bio-political authority” (Rose & Valverde, 1998, p. 550), thus enabling people, groups, and organizations to exercise authority over others, and delimit what is a reasonable exercise of that authority. The ways in which FHS positions employers as having the authority to influence the health behaviours of employees and to alter the workplace

environment requires multiple moves. First, it must be established that the employee population is unhealthy and in need of intervention. Second, it must be argued that employers in particular have a role to play in those interventions.

The need for interventions to correct the ill-health of the population has an incredibly long history, from the quarantining of lepers to cleaning up the filth of slums during the industrial revolution, to today, in workplaces where employees are deemed to be sedentary (Lupton, 1995). As the discourse of the “obesity epidemic” has only ramped up over the course of recent decades (Gard & Wright, 2005; Saguy & Almeling, 2008), the ill-health of the citizenry stemming from obesity—and the role of exercise to solve that in particular—has come to the fore. In an FHS document entitled “The State of Healthy Living and How Employers Can Help,” (Fitbit Health Solutions, n.d.-ae), the “state of healthy living” was painted in a dire light: “When it comes to our health and wellness, there’s room for improvement. 29% of US adults admit to being inactive. Over one-third say they aren’t getting enough sleep. And 36% are overweight.” They continue:

In fact, the Mayo Clinic found that less than 3% of Americans meet the basic qualifications for a ‘healthy lifestyle,’ as defined by meeting four qualifications. Moderate or vigorous exercise for at least 150 minutes a week. Not smoking. A body fat percentage under 20 percent (men) or 30 percent (women). A diet score in the top 40 percent on the Healthy Eating Index.

The lack of physical activity and resulting poor health of the population in the United States is continually established, and it is painted as getting worse:

In the 1950s, fewer than 15 percent of the adult population was obese. Today, over 35 percent of adults are obese. The only thing expanding as quickly as our waists is our level of stress. Anxiety disorders are the most common mental illness in the United States, affecting 40 million adults, or 18 percent of the population. Americans are more stressed, anxious, depressed and unhealthy than ever before. (Fitbit Health Solutions, n.d.-e, p. 2)

FHS has a particular incentive to highlight obesity and physical inactivity as issues plaguing employees today, as these are the problems that Fitbits are positioned as being particularly amenable to solving.

This sets the stage for the interventions, as the issues plaguing Americans are not exclusively out of the control of employers or employees. As FHS notes on their web page: “The good news? Many chronic conditions are preventable. That’s why investing in a corporate wellness program that drives healthy behavior change is good business” (Fitbit Health Solutions, n.d.-f). The notion that “many chronic conditions are preventable” is a vital part of the emergence of the contemporary neoliberal public health movement (Lupton, 1995), as problems must be made amenable to intervention. While there are many ways that one could address the problem of chronic conditions, such as interventions at the environmental or political level, the interventions that are being advocated here are focused on lifestyle. This is in line with the larger political rationalities of this conjuncture, where through neoliberal discourses, an “active entrepreneurship” is advocated, where “individuals are encouraged to strive to optimize their own quality of life and that of their families” (Miller & Rose, 2008, p. 79). Taking responsibility for one’s health, by engaging in health-promoting behaviours to avoid obesity and disease, is the expectation for productive citizens (Lupton, 2013b).

After the case is made that the health of Americans—and American workers— is in dire straits, the second move that must be made is to authorize employers to intervene in the lives of their employees. After all, the fact that such a large proportion of the population has been diagnosed with chronic illnesses that could have been prevented is not inherently a problem for employers. In this case, the connection between employers

and the health of their employees is made to be a financial one, since most Americans have employer-sponsored health insurance in the United States in the absence of a universal health care system (Blumenthal, 2006). In the same “Case for Corporate Wellness” (Fitbit Health Solutions, n.d.-f) pitch on the FHS web site, they note that

Business leaders recognize the burden of rising healthcare costs to their companies and their employees. Some companies attempt to shift the financial burden to employees in high-deductible plans, but that approach doesn’t address the underlying problem of growing utilization of healthcare services due to chronic illness.

In other words, unhealthy employees are expensive. Shifting the financial burden to employees might work in the short run, but it does not “address the underlying problem” of poor lifestyle choices that lead to chronic diseases. This was echoed by Brandon, a workplace wellness broker:

Brandon: So, what we recognized about three years ago was that three out of every 4 dollars that our clients spend on healthcare was to manage chronic illness. And as I’m sure you well know, most chronic illnesses are controllable, if you just eat healthier, move, and don’t smoke. And so, you know, we just looked at that, and said, we’ve got to do something about it.

For Brandon and other employers, the fact that employees are unhealthy is a problem that can be solved by encouraging a healthier diet and physical activity, and by discouraging smoking. Unhealthy employees are an unnecessary expense for employers, and it is therefore the prerogative of employers to do something about it. In a neoliberal context where the state takes on a decreasing role in the health of the citizenry, the view that sickness is the result of a failure to take responsibility for oneself and one’s lifestyle is a common one (Lupton, 2016b).

Spatializations. Spatializations are the practices that render spaces governable (Rose & Valverde, 1998). In a legal sense, this can refer to the processes that make criminals as well as criminal spaces governable, such as homeless ‘vagrants’ and the streets that they inhabit. In a physical activity sense, spatializations are the practices that position unfit people, as well as spaces of physical (in)activity—streets, workplaces, schools, parks, gyms—governable alongside them. As I discussed above, processes of authorization problematize unhealthy workers, but it is through spatialization practices that the workplace—and importantly here, employees’ lives outside of the workplace—come under the umbrella of employer governance and the need for Fitbits to increase physical activity is established.

First, workplaces are positioned as enabling unhealthy behaviours, as well as constraining healthy ones. Therefore, it is not only workers that are in need of interventions, but workplaces are as well. To illustrate this point, this passage from the FHS document “Bringing Wellness to America’s Workforce” (Fitbit Health Solutions, n.d.-e) is worth quoting at length:

Guilty of eating lunch at your desk, or sending emails to the person sitting next to you? You’re not alone. Statistics show that nearly 70 percent of full-time American workers hate sitting, yet 86 percent do it all day, every day—whether it’s at their desks, on the couch, or in the car, as fully 73 percent of Fitbit users surveyed commute by car. This sedentary lifestyle has serious health implications. It has been shown to double the risk of cardiovascular diseases, diabetes, and obesity, and increase the risks of colon cancer, high blood pressure, osteoporosis, lipid disorders, depression and anxiety. But sitting is only half the issue. The other side of the coin is stress. There’s a mounting body of evidence linking chronic job stress and lack of physical activity with being overweight or obese. Stress has been indirectly linked to inactivity and the consumption of too many fatty or sugary foods. It’s also known to affect the neuroendocrine system, resulting in abdominal fat, and may cause a decrease in sex hormones, which often leads to

weight gain. Recently, researchers discovered that employees working in the most high-strain conditions had almost one BMI unit more of weight than people who worked in more passive roles. Even employees themselves have reported their weight gain. Recent surveys have shown that 44 percent of American workers have gained weight at their current job. 26 percent gained over 10 pounds and 14 percent gained a whopping 20. (p. 5)

As the above illustrates, the fact that so many people in the United States have unhealthy lifestyles is tied to what they do (or do not do) while at work. For instance, healthy behaviours such as walking throughout the day are constrained during the many working hours of the typical full-time employee. The FHS document “The Definitive Guide to Staying Active at Work” (Fitbit Health Solutions, n.d.-p) highlights many of those same issues, as sitting at a desk all day, long commutes, eating lunch at your desk, and eating unhealthy foods while at work—lead to an increased risk of many chronic diseases and mental health disorders. Happy hours are also frequently targeted by FHS as an unhealthy aspect of workplace culture (Fitbit Health Solutions, n.d.-ag). Furthermore, the long-term impact of stress at work is also receiving increasing attention. As is noted in the “8 Awesome Ideas to Pump into Your Wellness Program” document (Fitbit Health Solutions, n.d.-d), “A recent Harvard Business School study found that workplace stress may contribute to \$125 to \$190 billions of healthcare costs each year—5 to 8% of our nation’s healthcare spending” (p. 3). In other words, a stressed worker is an expensive worker, and employers should intervene sooner rather than later to address this problem.

While some of the issues described above, such as eating unhealthy foods and sitting at a desk all day, are often positioned as behaviours that result from individuals who are not attentive enough to their health, there is some acknowledgement that there

are systematic issues that go beyond individuals not taking responsibility for their health.

This passage from FHS illustrates the importance of context in the U.S.:

Today, Americans work more than anyone in the industrialized world. More than the English and the French, significantly more than the Germans or Norwegians, and now, even more than the Japanese. Not only do we work more, we also take less vacation, work longer days, and retire later in life. And, when it comes to family-oriented workplace policies such as maternity leave and paid sick days, we lag far behind virtually all other wealthy countries. (Fitbit Health Solutions, n.d.-e, p. 2)

By pointing to policies that manage retirement, vacation time, maternity leave, and sick leave, FHS is highlighting the larger political and economic structures that disadvantage workers in the United States as compared to other countries with more generous social policies. Together, these concerns regarding the workplace itself, how people get there, and the policies that shape work in contemporary America, are in need of intervention. These moments of concern about policies and structural issues are rare, however, and individual behaviours are subject to a considerably greater degree of focus.

Another way in which the workplace is depicted as unhealthy is, somewhat paradoxically, that the reach of employers in their efforts to manage the health behaviours of employees is too limited. While workers admittedly spend most of their waking hours at work—which are fraught given the unhealthy behaviours that are common in the workplace—there are still many other hours in the day when employers have little control over employees that are rife with opportunities to engage in unhealthy behaviours. Through Fitbits, however, the domain of control that employers can exercise over employees is increased as people wear their Fitbits through the entire day and night.

FHS encourages employers to “Bridge the gap” between the workplace and employee lifestyle outside of the workplace:

There’s a divide between people and the healthcare system. Employers, health plans and health systems only have permission to interact with people at specific points in time. Let’s bridge the gap. Fitbit’s health technology has the hearts, minds and data on millions of users in our global community—and we’re with them 24/7. (Fitbit Health Solutions, n.d.-ah, para. 1-2)

In other words, the issue is not only that the workplace is unhealthy, but that employees make unhealthy lifestyle choices in their time outside of the office and employers have been unable to do anything about it. In an FHS webinar entitled “How Ohio’s Bus Drivers Got Healthier: A 24/7 Approach to Workplace Wellness” (Fitbit Health Solutions, n.d.-s), similar limitations facing employers who are hoping to foster healthy lifestyle choices in their employees is noted: “Health requires 24/7 care, but employees are under your guidance only 8 hours a day” (slide 3). By positioning the cost of employee ill-health as a burden to employers, and therefore making it an employer’s prerogative to manage the lifestyles of employees both inside and outside the office, the governable space of employee health grows. People are not only workers when they are at work; they are always workers whose behaviours impact the company bottom line. Wearable fitness technology has a unique role to play in this governance, since as the above webinar points out, “A wearable device is meant to be worn at all times. It works across your personal and professional worlds” (slide 6). While it has not been possible to monitor and manage employee health once they walk out the door of their workplace, with Fitbits, this is possible. The gap is bridged.

Subjectifications. For Foucault (1988, 1990, 2003e), people are not unitary, pre-existing subjects. Instead, through processes of subjectification, individuals come to

produce themselves as subjects within power relations. For Rose and Valverde (1998), “Subjects are constituted in a whole variety of ways in different legal contexts and forums. Each of these subjectifications has a history, each is differentially suffused by the norms and values of positive knowledge” (p. 547). Within the political rationalities of workplace wellness programs and wearable technologies within those programs, a number of subject identities are brought into being based on an employee’s health and an employee’s level of fitness.

First, employees can be placed into categories based into the constellation of health-related risk factors they possess, which in turn may then shape employee identities. Biometric screenings are a common practice within the workplace, as employers seek to stratify their employee population based on risk factors and to determine their employees’ health needs (Hyslop, 2018). As I discussed in Chapter 4, it is through decisions about what measurements to take, what the cut-offs are for different measurements to produce categories, and the larger perceived significance of those measurements, that identities come into being—for workers or employers. In a blog post on “How Biometric Health Screenings Benefit Your Employees” (Hyslop, 2018), this screening was positioned as a “benefit” (para. 1) for employees as they are free and can be administered at work rather than at the doctor’s office. Furthermore,

Employees’ biometric data can signal whether or not they are at risk for a number of chronic conditions, including diabetes, heart disease, and obesity, as well as potentially deadly cardiovascular events, like heart attack and stroke. Also, by participating in this kind of assessment, they can learn tips to create healthy habits and better manage their health (para. 8).

The purpose of biometric screening, according to Angela, was “looking for trends: Where do we have risk? Are these trends changing over time? Are we seeing improvements? Are

we getting worse?” Heather spoke about this with regards to research that her company did to understand the types of people who choose to wear a Fitbit in their interventions:

Heather: We were able to take a look at the people who wore trackers, and they spanned the population just the same as the general population. So, we had people underweight, overweight, obese, normal weight. You know, people with all different risk factors. It’s not just that healthy people are choosing to wear devices.

As this shows, employers assess their population to understand the weight categories of their employees, thus constructing identities based on body mass index (BMI) and related risk factors.

Second, numerous FHS documents create categories of people based on their previous experiences with physical activity and thus their motivation to participate in a wellness program. Nowhere is this more evident than in the numerous discussions of the four “fitness personas” that one could find in the workplace. To determine which fitness persona is most dominant within their workplace, workplace wellness organizers are encouraged to take a quiz regarding the company’s culture of health, with questions about how guilty people feel about doing happy hour, their outlook on facing challenges, what incentivizes employees the most, and how they might respond to a suggestion of an afternoon walk (Fitbit Health Solutions, n.d.-ag).

Based on their existing levels of physical activity as well as their motivation to be physically active, employees are categorized as “active athletes,” “motivated movers,” “concerned changemakers,” and “idle avoiders” (Fitbit Health Solutions, n.d.-ag, p. 3). Active athletes are described as “great leaders and motivators, and are constantly striving to be their best” (p. 3). Motivated movers require a little more engagement: they are “open to trying new fitness classes, especially when they’re easily accessible” (p. 3). The

first two types of subjects, active athletes and motivated movers, are described as possessing intrinsic motivation, meaning they are “driven by their internal values and desires. They find working out or competing in sports to be self-satisfying or stimulating—fun for its own sake” (Fitbit Health Solutions, n.d.-o, p. 2). In contrast, concerned changemakers “want to improve their health and fitness, but they need a little extra push to get started” (Fitbit Health Solutions, n.d.-ag, p. 3) while the hardest to engage (but not impossible!) are the idle avoiders, who “have a tendency to avoid working out, which may be due to a prior injury, medical condition, or a general reluctance to hit the gym. They probably aren’t ready to begin a new fitness routine. But you can help!” (p. 3). Both concerned changemakers and idle avoiders are thought to be extrinsically motivated to be physically active, meaning they “look outward for motivation. Fitting into a smaller size, winning a medal, or being cheered on by friends is what makes it all worth it” (Fitbit Health Solutions, n.d.-o, p. 2). While some employees need more help than others to become physically active, all are in need of some kind of push to increase their motivation.

For each of these personas, FHS has created a “playbook” (Fitbit Health Solutions, n.d.-ag, p. 3) for appealing to that particular type of employee, complete with tips on their motivation to engage in physical activity (intrinsic or extrinsic), how they might best be engaged, what incentives might work best, and what types of activity challenge will be most likely to get them moving. For example, in the Idle Avoiders playbook, those administering wellness programs are told that “Incentives are incredible motivators when it comes to employee health and fitness, particularly for extrinsically motivated Idle Avoiders” (Fitbit Health Solutions, n.d.-u, p. 2). Through the creation of these personas

based on how much an employee exercises and their motivation for doing so, FHS brings particular working subjects into being, in order to attempt to make them more amenable to change and influence in their exercise habits. It is important to emphasize, however, that while FHS is constructing a particular type of working subject through their profiling, there is no certainty that individuals will actually take up this subject position and be more amenable to change/influence of their exercise habits. While employees may not take up these identities themselves, it is possible that they will be viewed through this lens by their employer or human resources department, which can also have an impact.

These subjectivities are reliant on norms that suggest that physical activity should be a priority for everyone, regardless of their inclination to become physically active. As Hull and Pasquale (2018) point out,

Wellness programs ride on the back of broader social trends emphasizing the importance of being or becoming ‘healthy’ by participating in health markets, that is, not just by jogging, but by consuming gym memberships, yoga classes, nutritional supplements, and so forth. (p. 200)

The healthy employee subjectivity in a neoliberal context is rooted in self-reliance, self-improvement, and consumption of not only fitness trackers but many other trappings of physical fitness. The ways in which employees are made into workplace wellness subjects is summarized in FHS’s pitch to health plans: “Motivate members. Manage risk” (Fitbit Health Solutions, n.d.-ad)

Normalizations. In addition to processes of subjectification that bring different employee fitness identities into being, normalization processes contribute to the production of those categories. For Rose and Valverde (1998), normalization is “a kind of mobile and heterogenous transitional zone of conflict and alliance between different forms of expertise” (p. 549). As Lupton (1995) notes, “experts and their expertise... are

central to governmentality” (p. 10). Expertise is a vital part of FHS; both in terms of its reliance on expertise to make their claims, as well as by positioning themselves as health and wellness experts.

First, citations of academic research are incredibly common within all FHS documents, including blog posts. For example, in a blog post entitled “New Study Finds Diabetes’ Impact on Productivity” (Leyton, 2018b), a study that was recently published in the journal *Diabetes Care* was referenced to illustrate the issues posed by diabetes on the bottom line:

A recent *Diabetes Care* study of an Australian dataset detected that diabetes not only hurts productivity, but that it could be costing the country billions of dollars. This study was one of the first to quantify actual productivity losses associated with diabetes, specifically calculated by productivity-adjusted life years (PALYs), a measure using age-specific mortality rates and a productivity index attributable to diabetes. (para. 1)

Even if a particular study is not centred in a document or a blog post, research is often mentioned to support the need for workplace wellness programs or to show the effectiveness of particular initiatives. For instance, the document entitled “Help Employees Get the Most Out of Exercise” (Fitbit Health Solutions, n.d.-r) cited two studies in footnotes (one from the *British Journal of Sports Medicine* and the other from the *American Journal of Epidemiology*) to illustrate how exercise has been linked to lower risks of mortality and stroke. Some of the webinars hosted by FHS featured academics, such as “Motivating Physical Activity: The Roles of Fear, Guilt, Feedback, Incentives, Energy, and Meaning” which was presented by Dr. Ken Renisow from the University of Michigan. In this webinar, Renisow (2017) features numerous published journal articles to paint a picture of the literature on motivation as it relates to physical

activity and how employers can harness this research in their own programs. Collectively, this research illustrates the problem—that employees are not active, employees are unmotivated, and that inactive employees are expensive— as well as the ability of employers to draw on expertise to address other problems, such as a lack of employee motivation. Here normalization is a process where experts state the norm—whether it be what blood glucose level counts as diabetes or pre-diabetes, risk levels for different behaviours, and types of motivation that people possess to live an active lifestyle—which in turn justifies interventions to solve those problems.

Second, by utilizing the expertise of academic research as well as their own surveys of users, FHS in turn positions itself as a cultural intermediary that can dispense advice on wellness. By producing what they term “white papers” on numerous issues, such as “How Sleep Impacts the Bottom Line” (Fitbit Health Solutions, n.d.-t), “Motivation” (Fitbit Health Solutions, n.d.-w), “Social Connectedness: The Secret to Employee Health and Happiness” (Fitbit Health Solutions, n.d.-ab), and “The New Behaviour Change Model” (Fitbit Health Solutions, n.d.-x), FHS contributes to workplace health and wellness discourse as experts. All of the problems that are sketched out in these white papers—employees not sleeping enough, not being motivated enough, not being connected enough and therefore depressed, not being physically active enough—are all problems that have solutions that Fitbits can provide. For example, in the whitepaper “Social Connectedness: The Secret to Employee Health and Happiness” (n.d.-ab), FHS characterizes social isolation as a risk factor for employees, arguing that it is in the interest of employers to recognize this problem and to come up with ways to foster social connection in the workplace. The whitepaper reads, “From this report, you’ll learn

the science behind social connectedness, and how social behaviors impact our health and the workplace. You'll also receive key takeaways on driving social engagement in your wellness program" (p. 2). This is a standard position within an FHS whitepaper: first, scientific support is used to show that a behaviour or experience as health-promoting or health-inhibiting; second, this behaviour or experience is often linked to the "bottom line" by costing or saving employers money; and third, wellness programs (always including a Fitbit) are situated as helping to solve this problem. A straightforward problem, and straightforward solutions, are presented to make it clear to readers that a lack of sleep, a lack of social connection, or a lack of motivation are costing the company money and that they need to do something about it.

In summary. Through these processes of authorization, spatialization, subjectification, and normalization, governance in the form of intervening in the lives of employees to promote healthier lifestyle choices is "thinkable, sayable and doable" (Miller & Rose, 2008, p. 3). Collectively these FHS documents tell a story: Employees are unhealthy. They are unhealthy, in part, because they are not physically active enough. Workplaces themselves are unhealthy as they discourage physical activity and poor diet. Employee life outside of the workplace is also in need of monitoring as employers are less able to reach employees once they leave the office. Employees lack motivation to be physically active, although based on their differing fitness identities they need to be reached in different ways. Science proves this all to be the case and points us to the solution. As Lemke (2011) argues, "The discovery of a 'nature' of the population (e.g., rates of birth and death, diseases, etc.) that might be influenced by specific incentives and measures is the precondition for directing and managing it" (p. 6). By discovering the

“nature” of the unhealthy employee and unhealthy workplace, “directing and managing” workers and workplaces is the next logical step.

This story not only says that workplace wellness programs are needed, but even further, that the forms of data collection and increased engagement which are available through FHS are necessary to truly improve employee health. In particular, processes of spatialization that position employers as lacking access to employees when they truly need to reach them—outside of the office—tell readers that not only do they need a wellness program, they need an FHS wellness program that will allow them to engage their employees 24/7 rather than in the paltry hours of 9 to 5. The problems have been firmly established, and the solution along with it: give employees a Fitbit.

Governmental Technologies: The Medicalization of Everyday Life and Algorithmic Machinery

In what follows, I critically interrogate the ways in which solutions to the above problems are proposed and implemented. I first consider the many partnerships extending far beyond Fitbit Health Solutions that enable self-tracking to occur, using a metaphor of a “connected ecosystem” to describe how Fitbit’s connections to different health and medical sectors plays a role in the medicalization of everyday life (Crawford, 1980). Next, I discuss how Rose’s (2007) ethopolitics—an activism around health and fitness—infused the Fitbit wellness programs to position employees as active partners in their own health and wellbeing with an interest in governing themselves in the workplace and beyond. Third, drawing on the construct of algorithmic machinery, I describe how FHS and Fitbit wellness programs abstract employees as numbers and evaluate them in ways that are often opaque to the employees themselves. I explore how quantification through

Fitbits and other means serves to manage the risks of unhealthy employees, including the ways in which employees are quantified to illustrate the benefits of these programs.

Finally, I discuss issues of privacy as they relate to governance through Fitbit.

“A connected ecosystem”: The landscape of workplace wellness, Fitbit Health Solutions, and the medicalization of everyday life. Scholars of health and wellness have long noted the creep of medicalization into facets of everyday life (Crawford, 1980; Lupton, 1995). Increasingly, it is not only those who are already ill who are in need of medical attention and monitoring. Everyone has the potential to become ill, and thus everyone is called upon by the state, medical experts, and employers to assess their health risks and to take action to minimize them (Lupton, 1995). As Crawford (1980) argues, this medicalization of everyday life does not necessarily involve more interactions with medical professionals; instead, it is “the transfer of medical competence to the individual” (p. 366). People are expected to become experts about their own health and wellness, taking pre-emptive steps to avoid coming into contact with medical professionals. In this context, an increasing number of behaviours—diet, exercise, employment—are assessed based in their influence on wellness and illness (Crawford, 1980).

Fitbit Health Solutions represents an extension of this medical creep. It is not only that fitness tracking devices and programs turn everyday acts of movement into conscious health and wellness acts (Adams, 2018). As I argued above, through processes of problematization, workplaces have become medicalized spaces due to the unhealthy behaviours that are enacted there, that are thus in need of health interventions. There are multiple ethical ramifications, some of which I consider here, when a healthy lifestyle

becomes a part of an employee's job description, and the workplace becomes a site of health interventions.

The relationship between Fitbits, medicine, and health care, is an interesting and at times contradictory one. Fitbit, Inc. was founded in 2007, initially as Healthy Metrics Research, Inc. (Fitbit, n.d.-b), although they changed their name later that year to Fitbit, Inc. As the name change suggests, Fitbit has long walked a fine line between being a health care device and a fitness device. Here is Fitbit CEO James Park, explaining the company's framing of Fitbits as fitness devices rather than medical devices:

There is a dramatic difference in consumer acceptance and engagement when you say, "Hey, here is a medical device from Medtronic, go wear it," versus, "Here's a Fitbit, wear this instead." One is aspirational, the other implies that you're sick. Consumers just go in with a different mentality based on how it's portrayed and that is actually really, really important. (cited in Griffith, 2017, para. 7)

In other words, the "aspirational" Fitbit may do the same work as a medical device, but it does not imply that the wearer is sick. This sentiment speaks to the belief that if one 'aspires' to be healthy, they can do so by living an appropriate lifestyle.

While Fitbit, Inc. may wish to avoid being perceived as a medical device, as I will argue here, their association with workplace wellness firmly places them within the purview of health care and medicine within the United States. In what follows, I contextualize FHS within the broader landscape of workplace wellness, health care, and big data. Borrowing a term from FHS, I describe this landscape as a "connected ecosystem" (Fitbit Health Solutions, n.d.-ah). This label is apt both literally and figuratively. Fitbits are literally connected devices that link up people's bodies and movements with an online platform that collects data. But they are also figuratively part

of a connected ecosystem in which workplace wellness and American health care are intimately associated.

Health plans and health systems. FHS is entrenched within health plans and health systems in the United States that shape how it is regulated. Almost 56% of Americans in 2016 had employer-sponsored insurance (U.S. Census Bureau, 2018), meaning almost 200 million Americans' health coverage is delivered through their employer. Despite what Fitbit, Inc. CEO James Park said above about wanting Fitbits to seem “aspirational” rather than being associated with doctors and illnesses, FHS clearly positions itself as a health care provider and Fitbits as a health technology:

No matter where employees are in their health journey, Fitbit Health Solutions delivers an intuitive, engaging and motivating experience. From physical activity challenges and sleep tracking to diabetes and hypertension condition management, the Fitbit Health Platform enables continuous monitoring and insights to help drive health improvements. Surround employees with support from coaches, colleagues and family. Measure program results and population health outcomes. (Fitbit Health Solutions, n.d.-ac)

The connection between FHS and health care was further strengthened when Fitbit, Inc. acquired Twine Health, a “health coaching platform that empowers people to achieve better health outcomes and helps health systems, health plans and workplace health providers lower healthcare costs” (Fitbit, 2018a, para. 1). Twine Health has enabled FHS to position its products as healthcare products as well as fitness products.

Given Fitbit's position as a health and wellness tool, it is—at least in part—regulated by health care legislation in the United States. The Affordable Care Act (ACA), commonly referred to as “Obamacare,” is a wide-ranging health policy that was passed with the hopes of making health insurance accessible to more people, and preventing

discrimination based on health status. Notably in this discussion, the ACA has increased employers' ability to offer incentives to participate in workplace wellness programs, allowing employers to offer discount rates up to 30%, an increase from the previous maximum of 20% (Hull & Pasquale, 2018). According to the Fidelity Investments Annual Wellbeing Survey (Fidelity Investments, 2017), the vast majority of employers (between 72 to 80 % from 2013 to 2017) offer incentives, and the values of the financial incentives have been steadily increasing in that time as well. Some critics have expressed concerns about the connection between health insurance premiums and health behaviours; as Hull and Pasquale (2018) put it, "The law effectively enables harsh price discrimination based on whether the insured participates in the wellness program" (p. 193). Schmidt et al. (2009) argue that attainment incentives are more likely to benefit employees who are already healthy as they are more likely to have the time and ability to participate in a wellness program, adding further burden on those who could benefit from workplace wellness programs the most.

The fact that more employers are offering incentives, and increasingly competitive ones, means that health benefits are one way that employers can work to attract and keep desirable employees. According to Brandon, workplace wellness programs with numerous activities, benefits, and incentives are increasingly a part of the culture of workplaces:

Brandon: Well, I think we're spending more time at work. I think that employees are maybe expecting it in some regard. ...I think now it's more a situation where leadership and organizations are starting to really understand that it's more than just a job, we've got to really provide everything we can. Maybe it's a result of competitiveness, you know? In the Bay Area, where we live near, the workplaces, the environments, the culture, you know, what people are getting as far as benefits is just taken to the Nth degree, you know?

These benefits to the “Nth degree” create an arms race of sorts where certain kinds of employers offer more and more to entice and keep employees. Workplaces, it appears, shape other workplaces. However, cultural critics have pointed out that the increasing benefits that are provided to employees in the workplace has a downside: the creation of a “rise and grind” workplace culture where employees’ lives increasingly revolve around work and being at work (Griffith, 2019).

In addition to the ACA, the main public policies referenced by FHS are the Americans with Disabilities Act (ADA) and the Health Insurance Portability and Accountability Act (HIPAA). The ADA has influenced workplace wellness programs by ensuring that everyone, regardless of their ability, is able to participate in them or in a similar alternative. For Fitbit this represents a challenge since those with mobility issues will have little reason to participate in, for example, a company-wide step competition. According to Angela, her workplace was required to offer an alternative opportunity for participation if a person could not participate in step challenges: “We gave people opportunities to pick whether they wanted to focus on another area of their wellbeing. So, they could do nutrition, or sleep...” Whether a person with mobility issues would feel included in the program through this accommodation is a different question, as they would be engaging in a separate competition from everyone else.

FHS and employers who utilize Fitbits in the workplace must comply not only with the ADA but also with the Health Insurance Portability and Accountability Act, or HIPAA. HIPAA is often thought of as a health privacy law that prevents discrimination based on health-related information by limiting the conditions under which health information can be shared, including with employers. In 2015, Fitbit announced that they

support HIPAA compliance, which was an important step in asserting a place within the landscape of workplace wellness and healthcare (Fitbit, 2015). Despite the possibility of discrimination, HIPAA allows health group health plans to offer discounts to employees who participate in workplace wellness health programs and thus financially reward people who more closely adhere to dominant health directives (Hull & Pasquale, 2018). In the press release regarding Fitbit's acquisition of Twine Health (Fitbit, 2018a), Twine Health was described as follows:

A HIPAA-compliant connected health platform, Twine Health delivers an engaging and user-friendly experience to help people manage chronic conditions, such as diabetes and hypertension, and aid in lifestyle interventions, such as weight loss and smoking cessation, by making it easy for care teams of providers, coaches, friends and family to collaborate on care plans. (para. 1)

As noted earlier, however, HIPAA does not cover all health information, even if it is collected by a wellness program vendor, including data on weight and activity level (Ajunwa et al., 2016). This exclusion may work to the advantage of FHS. It may permit the company to walk a fine line between wanting to expand its customer base by promoting at least some of its services as a HIPAA-compliant health program, while still positioning its core product as a fitness device that falls outside of government regulations regarding health data.

Finally, it appears as if the Food and Drug Administration (FDA) may soon be playing a regulatory role in Fitbit's offerings as well. According to Fitbit CEO James Park, Fitbit is seeking US FDA pre-certification to screen for atrial fibrillation using Fitbit data. He explained this move: "The FDA recognizes that there is this potentially new class of devices that's not a consumer device and not a traditional medical device, but somewhere in between, and that there needs to be a new regulatory pathway" (cited in

Griffith, 2017, para. 8). Even as Fitbit strives to bridge the divide between medical devices and consumer devices, the path to consumer-grade health technologies remains ethically complex. In December 2018, the *Washington Post* reported that the FDA-approved Apple Watch app designed to detect atrial fibrillation is—according to Apple and the app itself—not supposed to be used by people with atrial fibrillation due to its inaccuracy (Rowland, 2018). The current lack of accuracy of consumer-grade self-tracking and medical devices, and the attendant false-positives and unnecessary interventions and stress that inevitably result, raises real concerns about the conditions under which these devices should be made available to consumers, including what claims should be made about their health value (Rowland, 2018)

Workplace wellness. In addition to the legal frameworks that shape Fitbit’s use in workplaces, it is also important to consider the landscape of workplace wellness more broadly and the different programs that coexist with wearable fitness tracker-centred programs. Workplace wellness is an incredibly broad field that encompasses not only physical health but also emotional/mental health, financial security, community involvement, social connectedness, job satisfaction, and spiritual health (Fidelity Investments, 2017). FHS acknowledges many of these non-physical drivers of employee health in their numerous documents and white papers. Unsurprisingly, however, FHS privileges the importance of physical fitness in all its materials. For FHS, the Fitbit is the center of a wellness program through which these other aspects of health and wellness are expected to be addressed. For example, one document suggests that the wellness benefits of community involvement can be secured by employees participating in a Fitbit competition to raise money for a local charity (Fitbit Health Solutions, n.d.-d).

Despite efforts by FHS to keep physical fitness at the heart of workplace wellness, responsibilities of and demands on workplace wellness programs continue to expand. All four interviewees agreed that the size and scope of workplace wellness has increased significantly in the past decade. In practice, the wide scope of workplace wellness means that physical fitness is far from the only thing on the agenda. Laura explains how this shifting focus operates within her company:

Laura: We come out every month with an email, and every month with a focus. And so, because there's so many months in the year, we're able to kind of switch around and maybe, you know, this month we're gonna focus on finance. And the next month we're going to focus on diet, and the next month we're going to focus on exercise.

Given the expanding scope of wellness programs, employers are increasingly likely to be interested in wearable technologies that go beyond the measurement of indicators of physical fitness. For example, Brandon mentioned that his company is considering a patch developed by Kenzen that monitors hydration levels and a device developed by Modjoul that monitors an employee's movements that may contribute to workplace back injuries. Fitbit, Inc acquiring of Twine Health is an indicator that companies recognize the need to develop devices and programs that go beyond physical fitness if they are to retain their share of the workplace wellness market. The upshot of this trend for employees is potentially disturbing. As more and more aspects of workers' lives fall under the purview of workplace wellness, and companies are stepping in to fill that gap, the reach of employers into the lives of their workers may expand in ever more problematic ways. Insofar as taking actions to promote health is part of an employee's job description, what happens when the relevant actions include not only being physically active and maintaining a desired weight but also getting enough sleep, being involved in the

community, being financially responsible, and emotionally stable? At some point the burden on, and intrusion into, the lives of employees is likely to become unacceptable, if is it not already. Even where physically activity is the sole focus, for example, if employees are already overworked in the workplace and at home, asking them to go for walks or runs without decreasing their work load may impose an undue burden that increases stress, and potentially worsens their health.

Corporate wellness partners. In the workplace wellness industry, FHS stands amongst many different groups who offer wearable devices and wellness services to industry. FHS advertises on its web site that one advantage it has over the competition is the extent to which it partners with “leading health and corporate wellness providers, plans and systems” (Fitbit Health Solutions, n.d.-y) such as Anthem, Castlight, Cigna, Humana, Virgin Pulse, Limeade, One Drop, Solera Integrated Health Network, and Vitality. These partnerships take different forms, but all serve to underscore the connection between Fitbits, fitness, and health care.

FHS partners with corporate wellness providers such as Virgin Pulse and Limeade to create online platforms that employers can use to connect with employees and gather and share health information. FHS also partners with consultants and employee benefits brokers who work for employers who do not have an in-house wellness department to create wellness programs. Perhaps most consequentially, FHS partners directly with health plans and systems at regional and national levels to improve health outcomes and reduce health care costs. FHS describes their partnerships with health systems as “increas[ing] patient engagement, reduc[ing] readmission and improv[ing] health outcomes” (Fitbit Health Solutions, n.d.-y). Angela, for example, spoke about her

organization's work with Aetna, a health care company that sells health insurance services. Employees were able to get discounts on their health plans if they reached a step minimum and participated in the entire eight weeks of the Fitbit program. Brandon works directly for a health insurance company and creates wellness programming for employer clients with a goal of indirectly reducing health care costs. Much of Fitbit's rationale is, indeed, that they can cut costs for insurance and health care systems. For example, in a Fitbit Wellness information sheet (Fitbit Health Solutions, n.d.-q), a study was cited by CDW Healthcare suggesting that "wearable technology could reduce hospital costs by as much as 16% over the course of 5 years" (p. 3). Finally, FHS partners with consultants and employee benefits brokers, who work between employers and FHS to create wellness programs. Brokers work with companies who do not have in-house employees who manage their workplace wellness programs.

Health care-adjacent businesses. Fitbit's "connected ecosystem" also includes numerous other businesses that perform tasks related to quantifying the bodies of employees. One area for corporate collaboration is biometrics testing, which FHS describes as "a general health check that measures physical characteristics, such as height, weight, blood pressure, and more" (Hyslop, 2018, para. 2). Biometric screenings are a series of standardized tests that apply quantified norms directly to the body. They are meant to illustrate the areas in need of surveillance, to assign people into different groups based on their perceived need to be monitored and to self-monitor, and to illustrate the effectiveness of programs designed to change people's behaviours. Angela's company routinely uses biometric testing. The testing is conducted by a company called Provant Health, "a next generation well-being provider whose proprietary technology

enables personalized services to improve the total health and productivity of employees” (Provant Health, n.d., para. 2). The practice of collecting biometric data further positions the workplace as a medical site. According to Brandon, supportive biometric data can help insurance brokers and employers negotiate lower rates with insurance companies.

When this biometric data as well as other forms of data on employees is gathered, it may go to one of the many data mining companies who make sense of the many numbers. Angela’s company uses a data warehouse, where

Angela: They pull in all of our data for us with our claims as well. And so, they do a little deeper analysis that can look at, you know, do we have job classes that are trending higher and higher risk? Or divisions or certain populations, specific populations.

The analysis of all the data collected on employees is sometimes in-house, as was the case in Heather’s company:

Heather: We have people on the data side, working with our health data team. Tracking, running reports, and tracking how we’re doing, moving everything forward.

Numbers must be read and interpreted like anything else to provide meaning to employees, employers, insurance agencies, and wellness experts. However, whether analyzed in-house or by data warehouses, the question remains whether employees are aware of all the data that is being collected about their bodies and their health care utilization, and all the ways the data is being used. Here again, the role for and meaningfulness of informed consent looms large. It seems likely that at least some employees may not approve of at least some of the uses to which their data are being put (Mittelstadt & Floridi, 2016).

Wearable fitness. Finally, in addition to the infrastructure for the collection, storage, and management of massive amounts of data, FHS is enabled by a context wherein the quantification of bodies is now an entrenched part of fitness culture. As FHS points out, when one is in the “connected ecosystem” of FHS they have “Data connectivity into 2,000+ of the Works with Fitbit compatible apps” (Fitbit Health Solutions, n.d.-ah). These apps enable users to count their calories, sleep, menstrual cycle, sexual activity, blood glucose, and infinitely more. In other words, FHS can provide a gateway to the quantified employee who manages all aspects of life through quantification and self-tracking. The medicalization of everyday life is bolstered by the collection of data on all aspects of life, and the meaning that is given to those forms of data and the bodies that are measured. The production of the workplace as a medicalized space is not only furthered through Fitbit use, but even further, all spaces occupied by workers are then medicalized due to the preponderance of smartphones and apps that collect data on a constant basis.

In summary. The “connected ecosystem” of Fitbit Health Solutions spans private and public sectors, as is typically the case within neoliberal modes of governance where expanding networks of modes of government better enable government at a distance (Ball, 2012). Through these partnerships, the use of Fitbit in workplaces is regulated, promoted, and supported. Policies in the United States enable employers to set up workplace wellness programs that get more buy-in from employees due to their incentive structures. FHS’s partnerships with various health sector companies pave the way for their inclusion amongst the numerous offerings for workplace wellness. Finally, biometric screening companies, data warehouses, and apps create a climate that enables

the collection and interpretation of data, a practice that must be supported in order for Fitbits to be easily integrated into office settings.

Wellness champions and ethopolitics. The institutions, businesses, and policies that support the medicalization of employee fitness are in an important relationship to biopolitical regimes that position the citizenry as duty-bound to participate actively in their own health. For Rose (2007), the twentieth century saw health become a key ethical value as people are no longer content to remain as patients, waiting to be diagnosed and treated. Instead, “actual or potential patients and their facilities and advocates, now became key actors in the economics, politics, and ethics of health” by taking an active interest in their health and wellbeing (p. 22-23). This is a move beyond avoiding illness or even recovering from illness, as it is now to maximize one’s health and lifestyle, by adopting “an active, informed, positive, and prudent relation to the future” (p. 25). Expectations of self-optimization are a part of the medicalization of everyday life as it places ever more aspects of life under the umbrella of health and wellness.

This is a shift, according to Rose (2007), in what people can hope to be and to what they can aspire. New subjectivities and identities are emerging through this biological activism of entitlement to a healthy life combined with self-responsibilization to do everything one can to attain that healthy life. The focus is not simply on risks to create a climate of fear, as there is also an “ethos of hope” (p. 27) where biology is far from determinate and people can act now to fight for a cure or prevent developing a disease in the first place through lifestyle modification. Particularly in light of advancements in biochemistry and genetics, biology is no longer considered to be destiny as one can supposedly alter their body up the molecular level.

Rose (2007) uses the term “ethopolitics” to describe “attempts to shape the conduct of human beings by acting upon their sentiments, beliefs, and values—in short, by acting on ethics” (p. 27) to connect with values of good government. This ethopolitics is “the politics of how we should conduct ourselves in relation to ourselves, and in our responsibilities for the future” (p. 27). It is this hope to be better that is a vital part of the conduct of conduct. Ethopolitics, for Rose (2007), is an activism of sorts where people organize around primarily biomedical conditions in order to lobby for research and treatment options because of their ‘right to life.’ For example, Jette et al. (2016) described the activist discourse surrounding First Lady of the United States Michelle Obama’s “Let’s Move!” youth campaign, where children with a ‘right to pursue their dreams’ were positioned as inspiring public and private partnerships with an eye towards spurring collective action that would empower children to become physically active.

Workplace wellness is enmeshed within these broader shifts in health and responsibility. Of course, the risks of a sedentary lifestyle—and the role that workplaces play in facilitating physical inactivity and eating unhealthfully—are a part of the frame, as I have detailed above. However, this is not only a warning to employers and employees of the consequences of a sedentary lifestyle. Instead, the creation of a healthy workplace is positioned as a uniting force that empowers people to take control of their work, their lives, and their health. Indeed, FHS defines workplace wellness as a participatory activity that is somewhat akin to a social movement: “The nature of a corporate wellness program—where a large group of people unite under a common goal of well-being— lends itself well to leaning on social connections” (Fitbit Health Solutions, n.d.-ab, p. 8). It is easy to mistake “a large group of people unit[ing] under a

common goal” as a social movement. In this case, the common goal that unites employees—and necessitates this form of social movement—is the desire for their health be taken seriously, and for their employers provide programming that will optimize their health.

Neither FHS nor the interviewees positioned fitness-centred workplace wellness programs as influencing the genetic or sub-cellular levels, or the “molecular” level, as Rose (2007) refers to it—although workplace wellness programs are increasingly offering genetic testing as a benefit.⁶ Instead, FHS is located primarily at the molar level, which Rose (2007) describes as “the visible, tangible body,” on “the scale of limbs, organs, tissues, flows of blood, hormones, and so forth” (p. 11). At this level, one seeks to improve themselves through diet and exercise. The goal, again, is not only to avoid risk, but to optimize the body at the molar level through ever finer bodily quantification: “Don’t let work get in the way of being your happiest and healthiest self! There are loads of ways to stay active during the work day, no matter the scenario” (Fitbit Health Solutions, n.d.-p, p. 1). Despite the challenges this rhetoric posits, one can still become their “happiest and healthiest self” through FHS programming. Perhaps this does not involve changes at the genetic or molecular level, although it is still the fine-tuning of the body in response to quantitative, personalized feedback.

I describe below three ways in which workplace wellness rhetoric mirrors the forms of ethopolitical activism that was characterized by Rose (2007). First, I discuss the use of empowerment discourse within FHS documents and the interviews, and how this creates

⁶ For example, in a troubling development, a bill was introduced to the U.S. House of Representatives in 2017 that would allow employers to penalize employees who decline to participate in genetic testing programs when the results are reported in aggregate (Hudson & Pollitz, 2017).

new subjectivities for fit and quantified employees. Second, I examine the concept of “wellness champions,” a construct that originated at Emory University but is positioned as a best practice within FHS documents. Finally, I consider the role of philanthropy within FHS programming, and the notion of self-improvement through fitness being connected to community and global betterment.

Empowering employees to be well. Much like Rose’s (2007) ethopolitics and Jette et al.’s (2016) observations of Michelle Obama’s “Let’s Move!” campaign, FHS draws on logics of empowerment to position employees seeking fitness opportunities as a collective akin to a social movement. However, given the nature of FHS documents and their intended audience (employers, wellness brokers, and health system managers) the empowerment of employees is expected to come from above, rather than below. Much of the discussion centres around how employers can empower their employees to become invested in their health and thus willing to organize their day around regular bouts of physical activity, not to mention a healthy diet and sufficient sleep. Empowerment comes from taking control of one’s activity, body, life, and health by overcoming barriers. In the press release that was issued after Fitbit acquired Twine Health, Fitbit CEO James Park was quoted:

When combined with *our decade-plus of experience empowering millions of consumers to take control of their health and wellness*, we believe we can help build stronger connections between people and their care teams by removing some of the most difficult barriers to behavior change. Together, we can help healthcare providers better *support patients beyond the walls of the clinical environment*, which can lead to better health outcomes and ultimately, lower medical costs. (Emphasis mine; Fitbit, 2018a)

Again, the language of medicalization of everyday life is unmistakable here, as empowerment to take control of one's life and health is expected to take place "beyond the walls of the clinical environment."

How, precisely, does this empowerment work? For FHS in particular, empowerment-oriented interventions are created with an eye towards arming employees with the knowledge that they need to be physically active, and a community that will enable physical activity and value it as a cause (Perkins & Zimmerman, 1995). Brandon summarized this empowerment approach:

Brandon: I think the overall goal is just to help people understand that physical activity is a necessity of their life. And that you have a desk job, you've got to make time for fitness. And so, trying to fire up office staff in the accounting office or, you know, attorneys' offices, and get people moving at lunch and educate, educate, educate. And then have some fun doing it.

This was supported in FHS documents, where knowledge and community support were described as key ingredients to empowered (and active) employees:

The idea here is to provide users with information and support *so that they can feel empowered and in control of their health* and supported to make decisions. It's not only a doctor who can help with behaviour change—it's a person's entire network which includes doctors, wellness & benefits leaders, health coaches, spouses, caretakers, and friends and loved ones. (Emphasis mine; Natvidad, 2018c, para. 4)

Since employees are theoretically forming their own communities to empower themselves, it is employers who want to provide information, support, and a network that all as a collective encourage physical activity. As these above quotations illustrate, the notion of being empowered with information implies that there is one right way to live one's life, and if one knows about it, their actions will fall in line with those

recommendations. With information and support, employees' lifestyles will line up with practices of good self-governance.

Empowerment rhetoric is common within FHS documents. In some instances, the importance of individualized programming was emphasized such that it can empower people differently based on their needs. Wellness organizers were encouraged to “remember that one size does not fit all” (para. 2):

Figure out how you can tap into everyone's intrinsic motivation. Bangor Savings Bank hosted “Beat Your Best” challenges, which encouraged individuals and teams to beat their own average step count from previous challenges. This gave everyone personal goals to work towards and *empowered individuals at every fitness level*. (Emphasis mine; Fitbit Health Solutions, n.d.-c, para. 2)

Similarly, empowerment is positioned as being the result of making wellness programs accessible to people of many different fitness level, so one does not have to be a marathon runner to contribute to their team and feel like they are being fit and active. I had the following exchange with Laura, who described the popularity of her company's Fitbit programming with many different types of employees.

Katie: Do you have a sense of the types of employees that it [a Fitbit] was most popular with?

Laura: Oh gosh, I mean, it was just universally. I'd say that all locations were into it. If people aren't into exercise entirely, then not really those guys. But because you can walk and get steps, it was great because you could have someone who wouldn't be able to run, let's say, they could still walk. And so, it really appeals to a wide array of people. Some were much more fit than others. But, you know, people felt very comfortable because if they were able to walk. Even if they had a disability, we had some people who were disabled who did it. *They felt empowered, I think*. [Emphasis mine]

By highlighting how inclusive the program is, as even disabled people were able to participate, Laura positions step competitions as empowering for people who would not

feel empowered to be active otherwise. At the end of the day, you do not have to run; you can walk.

Wellness champions. Empowerment is not spontaneous within these programs; it must be promoted and diffused through every level. Particularly in larger companies where programs may be managed by a central office that is separate from the satellite offices, a network of people that builds enthusiasm for step challenges and other initiatives may be needed. For Emory University, this is where “wellness champions” came to the fore: a “network of internal leaders... [who] ensure[d] that all participants were onboarded and that they understood the program’s benefits” (Fitbit Health Solutions, n.d.-j, p. 2). Angela’s workplace did something similar. As she explains,

Angela: We have about a hundred [representatives] throughout the organization. And we really use them to encourage activities on-site throughout the challenge. A lot of them organized either walking groups or encouraged walking or other activities in their department. We’ve got some that do lunchtime fitness in their conference room. They’ll pull up videos.

The function of these “wellness champions” or representatives is not only to ensure that people are aware of the program. As FHS explains,

Think of how your company—not just you—can empower your employees to take control of their health. Do you have a wellness & benefits team and a network of wellness champions? Ensure those teams have focused, discrete roles to foster a culture of wellness. (Natvidad, 2018c, para. 5)

In other words, wellness champions or representatives are to lead by example to create a “culture of wellness.” A team of champions can “empower your employees to take control of their health” through challenges, walking groups, and lunchtime fitness. FHS encourages wellness organizers to “Let Employees Lead” through a “network of wellness champions” (Fitbit Health Solutions, n.d.-j, p. 3). Through the language of

“championing” wellness and promoting empowerment, FHS encourages employees to become a community who fight for the right to wellness by “championing” their interests. Coworkers are expected to model good behaviour for one another such that these programs feel more like a social movement where wellness comes from the bottom up rather than being imposed from above.

Workplace wellness as community service. Finally, at numerous points throughout the FHS documents and interviews, workplace wellness programs were positioned as opportunities for community service and philanthropy, primarily in the form of connecting step-based challenges to charitable giving. Giving rewards in the form of charity donations to employees who participate in, or win, step challenges, is a common suggestion: “Change up the reward by making a donation to the charity of the winner’s choice” (Fitbit Health Solutions, n.d.-b, p. 3). In “8 Awesome Ideas to Pump into Your Wellness Program” (Fitbit Health Solutions, n.d.- d) it was suggested that this type of incentive is particularly appealing to millennials:

Get fit by combining wellness and service. This is something millennials are particularly engaged with. “We donated one school meal through a global anti-hunger charity for every 5,000 steps a person walked, and people loved it. I heard story after story about people who made themselves go for an extra walk before bed in order to earn another meal donation.” —Mark Goldberg, Latham & Watkins. (p. 5)

Heather’s employer donates to charities through step challenges as well, which she describes as something that employees enjoyed:

Heather: People felt really good about giving back. And one person even reported that, they said “I don’t feel like I have time to volunteer ‘cause I work two jobs, I have kids and grandkids I’m raising.” And they said, “But I feel like with every step I take, it’s like I’m volunteering because my charity of choice could get \$5,000.” So that was a neat thing about it.

This concept of doing good by walking well is similar to King's (2006) "doing good by running well." In King's (2006) research, physical activity-based fund-raising and awareness-raising events ("thons") are the way that activism around breast cancer (and numerous other diseases) operates in the contemporary neoliberal moment. Working on oneself is seemingly a short discursive step away from working to make the world a better place. As King (2006) notes, "In the post-welfare-reform era politicians frequently appeal to philanthropy and volunteerism as morally and economically viable solutions to newly created gaps in the social safety net" (p. xxvi). In this context, charitable giving is seen as a better way to provide services than the state, in addition to instilling character and civic responsibility in the citizenry who have become too dependent on the "'nanny' state" (p. xxvii). Being a good citizen is not joining radical movements that advocate for physical activity or health care as a right; instead, one should focus on their own health through Fitbit competitions and donate to charities to benefit both their own fitness and the lives of others.

In summary. Empowerment and feelings of self-efficacy are very important, and I am not questioning their value to workplace wellness programs in general. Indeed, it is true that workplaces are often high-stress climates that encourage hours of sitting to do work for someone else (Stringer, 2016). I would not argue that this is inherently better than any attempt to encourage more activity and self-efficacy amongst employees. However, the forms of empowerment discussed by FHS and the interviewees are largely individual rather than community-based. Some policy changes are recommended at times that would give employees more flexibility in their lives and more benefits. For example, "The New Behaviour Change Model" (Fitbit Health Solutions, n.d.-x) white paper

discusses how doctors telling patients what to do, and expecting them to do it, does not take into account the needs or interests of patients. This paternalistic medicine is not, therefore, equipped to handle chronic diseases. The blog post “Why Social Connectedness is Key to Employee Health and Productivity” (Leyton, 2018c) recommends that employers promote health through family-friendly policies such as flexible hours, parental leave, and floating holidays. However, these moments are rare. On the same page as family-friendly policies are recommended, the “New Behaviour Change Model” white paper suggests that employers should “Promote positive ‘social norms’ at work with initiatives such as healthy lunches or snacks, walking clubs, and company-sponsored races or marathons” (Fitbit Health Solutions, n.d.-x, p. 7). A culture that values marathons and healthy lunches seems to be advocated more than a culture that values parental leave and flexibility. Helping people to fit in a workout at lunch and to participate in a step challenge is the type of empowerment that is on offer through FHS.

This focus on individual behaviours to the neglect of structural, institutional, and socio-cultural factors that shape health is emblematic of a healthist orientation: “Healthists will acknowledge... that health problems may originate outside the individual, e.g. in the American diet, but since these problems are also behavioural, solutions are seen to lie within the realm of individual choice” (Crawford, 1980, p. 368). This neoliberal model of health, where individuals are responsible for feeling ‘empowered’ by overcoming barriers to healthy choices, places the responsibility with individuals—with some responsibility on employers to educate and motivate their employees—to be healthy (Jette et al., 2016).

Managing risk through quantification and algorithmic machinery. As I argued above, the quantification of bodies and the application of norms play a significant role in the production of the unhealthy worker who needs to be acted upon by employers, health care professionals, and fitness experts. Numbers—in the form of BMI, blood pressure, cholesterol, steps per day—are thought to be objective indicators of one’s failures and successes as a healthy (employed) subject. This was stated most succinctly here: “Here at Fitbit, we love statistics. . . . Because we know that every one of those numbers represents a major step toward improving employee health and wellness” (Fitbit Health Solutions, 2018b). In addition to helping to identify problems, numbers are an important part of the solution to these issues.

I use the term ‘algorithm’ here and throughout this chapter. An algorithm is how computers solve problems, so to speak; they are “a sequence of computer code commands that tells a computer how to proceed through a series of instructions to arrive at a specified endpoint” (Lupton, 2015b, p. 11). It is through algorithms that digital technologies can collect data on users, make sense of the data that is collected, make predictions about what users will do in the future, and make recommendations to users about how they should behave (Lupton, 2015b). Fitbits are reliant on algorithms to collect fitness data on those who wear Fitbits, to present the data in a digestible manner to wearers, to make predictions about wearers’ future fitness and differences between wearers and non-wearers, and to push wearers at strategic points to get up, walk around, and be more physically active. For example, to calculate basal metabolic rate (BMR), which helps to keep a running tally of caloric expenditure throughout the day, Fitbit uses the Mifflin-St Jeor equation, which is a CDC-approved equation that has different

calculations for males and females (Fitbit, n.d.-a). Aside from rare insights into such algorithms, the public does not generally have access to the algorithms that inform Fitbit's metrics. This is a form of "algorithmic authority" (Lupton, 2016b, p. 57) where an increasing number of decisions are being delegated to seemingly apolitical algorithms.

Despite the appearance of neutrality, algorithms are steeped on social values. As Williamson (2015) notes,

Designed around algorithms and physiological models expressed in computer code, these [fitness tracking] devices are increasingly augmenting, mediating and governing the ways in which individuals and social groups engage with their own bodies and health, and transforming the ways that people undertake physical activity. (p. 134)

Fitness tracking relies on standards of fitness, health, and beauty to which people are expected to conform. As Williamson (2015) states above, these algorithms can have material effects on how people see and experience their bodies in and through physical activity. My goal of using the term "algorithmic machinery" here is to draw attention to the social aspects of algorithms, and what they accomplish within Fitbit wellness programs through risk assessments of bodies and assessments of the programs themselves. Additionally, the word "machinery" also brings into the frame the many devices, technologies, and discourses that come together to bring these algorithms into being.

In this section I will examine the treatment of risk through the lens of algorithmic machinery. 'Risk' has been an important conceptual tool for characterizing the statistical likelihood that a particular event might occur. Lupton (2013c) specifically links risk to governmentality: "risk may be understood as a governmental strategy of regulatory power by which populations and individuals are monitored and managed through the

goals of neoliberalism” (p. 116-117). Numerous institutions, actors, experts, and statisticians come together to render risk calculable, measurable, and governable (Lupton, 2013c). Populations and individuals are analyzed based on their risk for negative outcomes, and are assigned to risk categories based on those calculations.

Governmentality aligns with risk discourse in that it encompasses coercive and direct strategies that are utilized to control populations, but also strategies that encourage voluntary compliance from the population to align with the goals of the state (Lupton, 2013c). Governmentality and risk operate simultaneously at the level of individuals and the level of populations. On the one hand, the focus is taken away from individuals so as to focus on the aggregate, but on the other hand, data on populations is in turn used to advise people about how they should live their lives (Lupton, 2013c).

Accounting for risk is not an activity of neutral counting. Within a healthist society, risks are primarily positioned as the product of one’s lifestyle choices, and a failure to avoid lifestyle risks is perceived to be a moral failing:

Lifestyle risk discourse overturns the notion that health hazards in contemporary society are out of the individual’s control. On the contrary, the dominant theme of lifestyle risk discourse is the responsibility of individuals to avoid health risks for the sake of their own health as well as the greater good of society. ... Those who are deemed ‘at risk’ become the sinners, not the sinned against, because of their apparent voluntary courting of risk. (Lupton, 1995, p. 90)

In response to one’s constructed risk level, one is expected to plan for the future to minimize or mitigate all risks as an act of personal responsibility (Lupton, 1995, 2013c; Petersen & Lupton, 1996). In the modern moment people are subject to a dizzying number of risk discourses, often leading to feelings of cynicism and anxiety (Beck, 1992; Giddens, 1991). Being assigned to a ‘high risk’ group can also have a negative impact on one’s health in and of itself (Lupton, 1995).

The risk of physical inactivity is intimately related to the purported risks of a modern, mechanized life. Fitbits and their associated algorithms are technologies that can help people to minimize their risks by assigning them to categories of risk based on their biometrics and behaviours, and by providing a path forward toward less risky behaviours. Millington (2018) argues that self-tracking technologies operate as tools for optimization through two logics: the logic of susceptibility, and the logic of enhancement. Susceptibility, as a notion of risk, involves “identifying and treating even asymptomatic problems” (p. 133), such as the treatment of obesity based on BMI even if one is not experiencing health problems that can be linked explicitly to obesity. With a logic of enhancement, there is no ceiling to how a person’s body, performance, or health can be improved. These notions of risk as they pertain to self-tracking are intimately tied to algorithms, as it is through algorithms that people are assigned to risk categories and their progress is tracked towards minimizing those risks.

To link risk and the algorithmic machinery of the Fitbit, I examine workplace wellness as a “risk assemblage in a web of [digital] surveillance, monitoring, measurement and expert advice” (Lupton, 2013c, p. 121). I first examine how quantification provides the path to fitness through the management of people’s risky behaviours while at work, as well as outside of work. Second, building on my earlier discussion of subjectification as part of processes of problematization, I will discuss how the creation of different risk-based identities of employees based on the quantification of their physical activity also works to shape the types of interventions that are deemed appropriate for targeting that classification of employee. Third, I consider the role of

quantification in the assessment of workplace wellness programs. Finally, I discuss privacy concerns with regards to the data that is collected on employees.

Quantification provides the path to fitness. At numerous points in the FHS documents, the quantification of the body is positioned as an empowering practice that allows people to take charge of their own health. They state: “Fitbit's mission is to help people lead healthier, more active lives by empowering them with data, inspiration, and guidance to reach their goals” (Fitbit Health Solutions, n.d.-m, p. 3). This self-monitoring allows people to utilize the information from Fitbits to take the initiative with their own care rather than waiting for another person to decode their data:

Before mobile health, consumers were shielded from their own data. They needed a clinician to decode and explain their own patterns and trends. But now with millions of mobile health apps, patients can start to act as the detectives of their own healthcare. They can start to identify how their behaviors and choices lead to specific clinical results. And with that information alongside the guidance of a care manager? Those patients can start to make the choices that will lead to better results. (Leyton, 2018a, para. 7)

People were previously “shielded from their own data,” but now that people can access it themselves, these “patients” can make choices that will lead to better health. The algorithms of Fitbits can present their data clearly and provide a path towards fitness and decreased health risks.

No statistic is as well-known as the 10,000 steps recommendation. FHS explains the scientific rationale for this particular number in a blog post titled “5 Ways Walking Can Help You Better Manage Diabetes”:

Researchers recently found the efficacy of 10,000 steps per day. They observed people who regularly walked at least 10,000 steps as part of their daily lives and had them lower their step count to 1,500 steps per day for 2 weeks. Tests then showed participants had increases in their fat levels and waist sizes, and showed

signs of muscle loss and lower cardiorespiratory fitness. Their bodies were also less able to respond to insulin. When they had resumed their normal activity levels, the negative effects were reversed—after just 14 days. (Natvidad, 2018b, para. 8)

This is an example of epidemiological risk, which is the practice of examining “disease in specified populations using statistical and screening techniques, linking illness and disease with their causal variables in the attempt to predict health outcomes at the population level and thus to better control them and reduce health risks” (Lupton, 2013c, p. 129). The connection between algorithmic machinery, which allows for step-counting, and risky behaviours and quantified risk, is clear here. With the 10,000 steps recommendation, Fitbit can give people a goal to attain that requires very specific tools that will count for them as they move toward this multi-thousand step recommendation. As I argued in Chapter 4, one cannot feasibly count or estimate 10,000 steps, and therefore a specialized tool—and industry behind it—is required. The algorithmic machinery of Fitbits enables the quantification of the body such that self-trackers can ascertain their precise activity level and work towards a step count that can increase fitness, decrease fat levels, and respond better to insulin.

It is not only steps that ‘patients’ should count. Additional forms of quantification of the body are also suggested so as to help employees assess their fitness level and conform to dominant health directives. For example, Fitbit recommends that employees track numerous health metrics:

Test your cholesterol every 5 years. Watch your waist circumference. Risks increase at 40 inches for men, 35 inches for women. Manage your weight. A body mass index (BMI) of 30 or greater puts you at risk of high cholesterol. (Fitbit Health Solutions, n.d.-af, p. 3)

As this excerpt makes explicit, the collection of personal health data is a practice of risk avoidance; testing one's cholesterol and watching one's weight are not just data collection practices, but risk-monitoring practices.

Finally, the quantification of time is presented as one solution to avoid unhealthy sedentary behaviours while in the office:

Consider setting a calendar alert to remind you to move every hour. If you have a Fitbit device, you can turn on your Reminders to Move so you can get a quick buzz on your device every hour to hit a certain step goals [sic]. You can use the opportunity to take a lap around the office or around the block, or even walk in place for a few minutes. (Natvidad, 2018a, para. 5).

My own research (Esmonde & Jette, in press) suggests that people setting timers to remind themselves to walk is something that does indeed occur in practice. While the quantification of one's own level of risk may not enter into the minds of those who set timers at work, practices such as these are part of the broader effort to quantify precisely the amount of physical activity that people should aim for in order to decrease their risk for morbidity or mortality. For example, in the blog post "The Secret to Health Isn't Standing— It's Moving" (Leyton, 2018c) research published in the *Clinical Journal of the American Society of Nephrology* was cited to support the contention that 2 minutes of walking for each hour of sitting with 2.5 hours of exercise each week can increase life expectancy. The belief that "self-knowledge through numbers" (Quantified Self, n.d.) can provide the precise path towards a better, healthier life through practices of "calculability, and quantification and measurement" (Lupton, 1995, p. 78) as they relate to risk, is central to the QS more generally.

Quantification creates identities. In addition to utilizing quantification to provide a path towards decreased health risk and better fitness, quantification also plays another

important role within FHS: dividing Fitbit participants into groups based on their number of steps. As I argued above, problematization processes mark certain employees as being in need of intervention due to unhealthy bodies and/or risky behaviours. Similarly, once step programs have been put in place to get employees moving, new identities are expected to be brought into being through the employees' use (or at times, non-use) of step trackers. While workplace wellness programs have long differentiated between active and inactive employees, the particular ways in which Fitbits quantify physical activity (namely through steps) represents a novel way that employee identities can be differentiated. As Lupton (1995) points out, "the category of risk is purely socially constructed, for nothing is a risk in itself until it is judged to be a risk" (p. 79). Without a step counter, and the algorithms through which it produces step counts and presents the data, characterizing some people as high steppers and some as low steppers would not be possible.

Since step counts are often publicized within a company, these are not private, personal identities. In fact, publicizing step counts is often encouraged. FHS recommends that companies "Make a leaderboard. Even if you have a digital way of tracking activity, use a whiteboard to recognize the most active participants. This is a fun way to engage both intrinsically and extrinsically motivated types" (Fitbit Health Solutions, n.d.-v, slide 11). Through quantification, using a points system or a leaderboard is possible, which will in turn create new identities for employees through quantification. As the Cleveland Cavaliers case study (Fitbit Health Solutions, n.d.-h) suggests, through step tracking a new type of employee is possible: the ultra-high stepper. Angela described these people as "super users," who were averaging about 17,000 to 18,000 steps per day. To appeal to

these particular employees, her workplace created the “Million Step Club,” where those in the club received a congratulatory email and their names were included in a company newsletter. As Millington (2018) contends, “Performance in relation to specific metrics might always be improved. What is the upper limit on steps per day?” (p. 133). With a step counter, people can not only minimize their risks through meeting recommended step counts, but even more, they can engage in enhancement practices where the sky is the limit.

Why does this matter? Since step tracking as a practice is oriented around the use of algorithms to translate bodily movement into step counts, these numbers can impact how people feel about themselves in ways that they may not have without this level of information. The goal for these forms of identification is for people to be inspired by their data and to aim to walk more than they did previously. However, just as there are high-steppers, there are also low-steppers. While step counting can make some people feel good about themselves and strive to walk more as a result, those with lower step counts may become demoralized and stop tracking and participating entirely. Brandon explained this issue:

Brandon: And you know, when we talk to those folks in that situation, that’s been the feedback. You know, just like, “Hey, what happened? I see you’re not in the program anymore.” They’re like, “Well, I felt bad.” Here’s the other thing, I felt so bad about this. “I feel like I’m letting my team down.” Like, okay, that’s not what we want to create here. It’s like, “Yeah, I know they’re being just really sweet about letting me be on the team and compete. But I feel bad, so I just quit.” I’m like, okay, that’s not what we want to achieve. And I said, well, “Were they saying things to you?” And they’re, “No, no. They never said anything. But I can see the numbers.”

As this quote illustrates, when people “can see the numbers” and they recognize that they are falling short of what their teammates are accomplishing, they identify as a low-stepper and may quit because they do not want to bring the high-steppers on the team down.

***“Data tells a story so we can sell the story”*: Assessing workplace wellness.** When a workplace wellness program is implemented, checks and balances are usually in place to ensure that the program was successful in meeting its aims in conjunction with being a good financial investment. Algorithms must not only solve the problem of the unhealthy employee; in this audit culture (Miller & Rose, 2008) they must also use these algorithms illustrate that it was Fitbits that made the difference between an unhealthy, risky employee and a healthy, risk-averse one. Business language is unsurprisingly common here, with discussions of the return on investment (ROI) and value on investment (VOI) being prominent amongst the expert interviewees and within the FHS documents. ROI, a directly measurable outcome, refers to the financial return on an investment. In other words, an assessment of ROI would entail measuring if the money that was spent on the program resulted in a proportionate savings in costs elsewhere. In contrast, VOI is the value received on an investment, which for wellness includes less tangible outcomes such as a boost in employee morale, more office camaraderie, increased productivity, less absenteeism or presenteeism, and talent retention (Squiers, 2016). While a particular company’s goals will influence the ways that they decide to evaluate their programs, it is generally accepted that both ROI and VOI are important in evaluating wellness programs. As Brandon put it when asked about how he perceives employers to differently value ROI and VOI,

Brandon: I think that it's a combination of both [ROI and VOI] ... I mean obviously, if you're doing the work and your biometrics are improving, then that's a really positive thing. Is it more important than the camaraderie and the teamwork? I don't know if it's more important. I think they're both important. I don't think one's more valuable than the other.

In other words, there are numerous ways that programs are evaluated, sometimes in ways that are more tangible such as biometric data while less tangible results such as camaraderie are important as well.

In line with the ethos of the QS, numbers play a central part in illustrating that workplace wellness programs are effective and worthwhile. Brandon states this quite clearly: "Data tells a story so we can sell the story." Data illustrates that programs work, and that "story" can be sold to various stakeholders; to health insurance companies to negotiate lower premiums; to employers who are potential clients; and to the employers with existing programs who are weighing whether they want to continue with a program or not. Data constructs risk and risk-decreasing behaviours.

Since many forms of Fitbit data are readily available to employers, such as steps taken, it is often used to illustrate the efficacy of programs. Steps are one of the first data points that Angela looks to at her company:

Angela: We certainly capture some objective information from the step counts. As I mentioned before, how many people are meeting the thresholds in terms of how much are people stepping? Participation, total participants who register, total participants who complete the program. And then looking at three months out and six months out, post-program, to see retention. So, how many people are still wearing a device and tracking consistently? And are they still maintaining—what are their step counts during six months out?

A case based on high step counts was made for the effectiveness of Fitbits in the Cleveland Cavaliers case study (Fitbit Health Solutions, n.d.-h): "By the time their

challenge came to a close, participants had recorded a cumulative 76.6 million steps—more than 38,000 miles—and created new healthy habits to take into the future” (p. 2). In the Consumer Technology Association case study (Fitbit Health Solutions, n.d.-i), the difference that the in-house treadmills made to distance walked was touted: “9.5 miles: average distance employees have walked per day since in-house treadmills were installed” (p. 3). In some cases, standout cases where individuals rack up extremely high step counts or work hard to improve are featured. An example from “2017’s Healthiest Employers: 5 Lessons and Trends” document (Fitbit Health Solutions, 2018a) illustrates how individual case studies can also be important in the evaluation of programs:

Kate Rawski is the Population Health and Wellness Manager at Medical Mutual. For their program, “Fitbit made sense because it enabled us to see whether there were improvements from [employees’] biometric data as a result of using the device.” What started as a tool to measure health outcomes became an everyday part of company life. Rawski said, “Now it’s become a culture. We’ve watched those employees grow from only achieving maybe 2,000 steps all the way to 8,000-10,000 steps [per day]. We’re not focused on the number of steps in our organization as we are on that culture of movement. We saw people be sedentary for hours and now they’re up moving for a 15-minute break instead of just sitting there.” (p. 5)

As much as biometric data and step counts play a part in assessing Fitbit programs, there is also this “culture of movement” that goes beyond numbers; it includes people who get up to walk during their work day who did not do so before.

As the above quote suggests, biometric data also plays a significant role in how Fitbits in the workplace are positioned as a worthwhile investment, and these numbers are prominently placed within FHS case studies. For example, in the Atlantic Packaging case study (Fitbit Health Solutions, n.d.-g) it was highlighted that “85% of people with high blood pressure improved their readings after the step challenge. 50% of employees with

high or critical triglyceride levels improved their numbers by the following year” (p. 3).

In the Pasco County School District, the biometric data of bus drivers became a source of concern and a Fitbit program was implemented. The results were touted in “2017’s Healthiest Employers: 5 Lessons and Trends” (Fitbit Health Solutions, 2018a):

Howard said, “Looking at our numbers from 2017 and 2016, we’ve seen our wellness program as a whole experience decreased risk levels of 33%, 26%, 22% and 16% for systolic blood pressure, diastolic blood pressure, total cholesterol, and blood glucose, respectively.” (p. 12)

Similarly, in the Kimberly-Clark case study (Fitbit Health Solutions, n.d.-n), biometric data was used to illustrate the effectiveness of the program: “About 50% of them decreased their waistlines while increasing their strength, flexibility and cardiovascular fitness” (p. 2). Risk categories are highlighted so as to show that Fitbits can decrease employee risk.

Related to improved biometric readings, reductions in health care costs that result from healthier employees are also used to show that Fitbit in the office is ‘working.’ According to the document “The ROI of Wearable Technology at Work” (Fitbit Health Solutions, n.d.-aa), based on pharmacy claims, labs, eligible employee medical claims, and wearable technology usage, employees who opted in to a Fitbit corporate wellness program cost 24.4% less on average in healthcare costs than a control group, nearly \$1300 per person. And, according to this study conducted by Springbuk (2018), the more of the program they used their tracker, the lower their healthcare costs were. FHS and other workplace wellness researchers gather data on this from companies as an aggregate, as well as from individual companies who use FHS and gather their own statistics. For

example, at Heather's company, they conducted an extensive study to assess the return on investment for fitness tracking.

Heather: So, there were all kinds of factors that they were looking at, indicators of health and indicators of expense. It showed in that period, there's people who wore devices were hundreds of dollars cheaper. ... Because even if we gave somebody a \$100 device or a \$130 device, we'd still be saving one or two hundred dollars on them.

In a case study of the Greater Dayton Regional Transit Authority (Fitbit Health Solutions, n.d.-k), they projected that the Fitbit wellness program would save \$2.3 million in healthcare costs by 2015. The Houston Methodist case study (Fitbit Health Solutions, n.d.-l) suggested that \$4.5 million was saved on health costs in 2015 through their Pick up the Pace program (p. 3). Expensive employees are what result from people not taking their risks into account and engaging in risk-minimizing behaviours. A Fitbit can theoretically intervene to bring about healthier, less expensive employees.

In sum, data is essential to the evaluation and implementation of these programs.

Heather explained thusly:

Heather: We were always looking at our data, we're always running monthly reports, you know, year to year comparisons. Every three years we try to have a really deep dive and make sure what we're doing is effective. And what they discovered is what we're doing is working and the more someone joins and participates, the better they do. So, we have our program stacked in a way that encourages you to participate in a lot of different programs that we offer, and then so basically now we have a whole brand plan around getting people to join and increasing dose. And so, we know that the people who engage are healthier and are being impacted.

The quantification of the body and how it moves infuses every part of the Fitbit program. People are quantified to identify if they are in need of intervention, they are quantified to assess how best to include them in Fitbit programming, they are quantified to provide a

path forward for fitness, and they are quantified to see if they are indeed more fit after participating in a program. In a sense, program participants are akin to research participants in that an intervention is tested on them to see if it will produce quantifiable outcomes.

While numbers and quantification are often pressed into service to prove the direct effectiveness of Fitbit programs, indirect measurements of program success are drawn upon as well. Interest is an important component in the evaluation of programs: did people like them, and would they participate again? These indicators of program success are quantified to make the point that the programs work. In the IU Health case study (Fitbit Health Solutions, n.d.-m), participant interest in the program made it a success: “The results were impressive—92% said they would continue to use their Fitbit device, and 96% said they would participate again” (p. 2). Laura said that the Fitbit program at her company was by far the most successful, describing it as “the most global program we’ve had, as far as the largest and biggest assessment. By far, it’s been a flagship event.” She adds, “When you set a team event, it fosters a lot of healthy competition. And just kind of energy.” While energy and camaraderie are not necessarily measurable, it does seem to be an important outcome for those coordinating workplace wellness events. Program participation is utilized as an indicator for employee interest in Fitbit programs, and FHS contends that employee participation is quite high in their programs as compared to other programs. According to FHS, wearable devices increase participation in wellness programs from 20% to 60-70% when implemented (Fitbit Health Solutions, n.d.-aa). Participation rates are touted in the case study, such as in the Houston Methodist

case study (Fitbit Health Solutions, n.d.-1) where it was reported that 90% of Houston Methodist employees participated in the Fitbit program.

These participation statistics are perhaps misleading, as it is not clear if they are counting initial participation or participation in the end. Brandon discussed this distinction:

Brandon: I would say that we initially start out with about 70% of the employee participation that participate in it. Which is really good. And then, you know, for the folks that we've had very early on, and I would say this is a pretty average score that, you know, we get 70% to join, and then we end up balancing somewhere between it seems like 25 and 35% of the people after a year, really sticking with the program. And I believe that I've read somewhere that 20 to 30% is pretty average. We've had a couple though that end up staying over 60%. Smaller companies, smaller organizations. So, I think, yeah, they're excited. But I think it all goes back to like any exercise program, how many times have people, the gym is just jam-packed in January, then by March we're back to normal, you know?

As Brandon points out, participating in a Fitbit program in the workplace is like any other fitness program; people are enthusiastic in the beginning, and then that excitement dwindles.

Furthermore, in practice, data does not always tell the story that can be sold, to paraphrase Brandon. Angela's program data illustrated that the average step counts had decreased over the years that the Fitbit program had been implemented, suggesting that it was generating less enthusiasm over time:

Angela: I think, um, this year we did see it go down a bit though. . . . So, this year 88% of people who took our post-program survey, said that they either agreed or strongly agreed that their step counts motivated them to be more active. But we were at 93% two years ago. I mean, it's still high. 88% said they were motivated by seeing the step counts. 88% is not a low number by any means.

Moreover, biometric data can be expensive to collect, and because of rules about aggregating data so as to prevent employers from having identifiable information about employees, the data may not necessarily be particularly informative for employers. I asked Laura if her company collects biometric data, and she said that they currently do not. She explained this decision thusly:

Katie: Do you gather any biometric data on employees to try to get a sense of what the needs are?

Laura: No. We have not. We did that one year, and we have not done it since. Um, it was very, um, expensive because we gave an incentive to people do it. And we didn't wind up, for privacy purposes, we didn't see people's—we saw aggregated results, not specific. And we just found that it's very hard to measure changes with your medical claims or anything like that, based on biometric screening. So, we forgo that. And I don't believe we'll do that again.

Biometric data is positioned as one of the best indicators of success of programs, but in practice, it is expensive to collect (both in the collection process as well as through the incentives that companies offer to entice employees to submit to biometric screening) and does not always illustrate the ROI of a program. Even Brandon concedes that the data does not necessarily sell the story—yet. He explains,

Brandon: The data, that really hasn't come into fruition entirely yet. But I'd rather have captured data for the last three years, even if we don't necessarily make that a part of the equation to the carrier for another two or three years, that we've been way ahead of the curve. That we've got really good historical data. You can see that the biometric scores are improving.

Brandon's statement suggests that while biometric scores are perhaps improving as a result of workplace wellness programs (including Fitbit programs), the data that he would like to have—that shows how effective the programs are in such a way that would

convince insurance companies to lower premiums— “hasn’t come into fruition entirely yet.”

The picture painted of assessments of programs differs between that of FHS and those who have implemented the programs. This is not interesting in and of itself, as it would be expected the FHS would want to suggest to potential customers that their products and services will have the desired effect. However, what I do think is important is that regardless of whether people are striving to meet the expectations of their employer—of recommended fitness levels, of biometric data, of participating excitedly in a Fitbit program—the assessment of workplace wellness programs does the work of government. The practice of measuring employees using these algorithms, and in some cases all employees regardless of their participation in a voluntary Fitbit program, against quantified standards of health and fitness inherently puts those employees’ bodies and lives in conversation with those standards of risk. Indeed, this type of thinking connects quite directly to my discussion in Chapter 4 on the quantification of the body to uncover its essence: in this case, the employee’s essence of health and their ability to (and interest in) meeting health standards. Science and numbers, it seems, can lead the way to a healthier workforce by assigning employees to different health and risk categories and making prescriptions based on their assigned categories. The good employees are the ones who either meet health and wellness expectations or who are willing to change in order to meet them, perhaps with the help of algorithms. In contrast, the less dedicated employees are not interested in changing to meet those standards. They are not a part of the large group of people who unite under a common goal of wellness, to harken back to

the ethopolitical work of wellness communities. When FHS presents that data, those employees are outside the frame entirely.

Privacy, opacity, and algorithmic machinery. Finally, how data is collected, used, and secured is an important consideration when describing how employees are governed through Fitbit wellness programs. While much of the discourse of Fitbit wellness is that of openness—people have access to information about themselves that has previously been unavailable or only available to health practitioners—there is a significant element of opacity. The majority of people do not read privacy statements which use off-putting, legalized language to describe what data will be shared and with whom (Introna, 2015). Unless employers supplement what is available in Fitbit’s privacy statements, it is unlikely that most employees appreciate the extent of the data that is being collected, or the full range of purposes to which the data may be put. The algorithmic machinery that provides employers with predictions about employees’ future behaviour as well as any potential third parties who have access to that data, is largely opaque. Predictions about what employees are likely to cost in terms of health premiums and which diseases they are at risk of developing are playing a significant part in workplace wellness programs today.

When I refer to issues of privacy, on the one hand I am referring to how people’s personal data is made available to others. The observation that self-tracking technologies have created a digital panopticon where people are subject to constant surveillance is not a new one (Lupton, 2013b, 2016b; Slack & Wise, 2015). However, it is truly worth emphasizing how invasive these forms of data collection can be and how little people may be aware of what happens with their data once it is collected, particularly when it is

being collected for more than personal, private purposes. In the case of workplace wellness programs, self-tracker data is variously made available to employers and health insurance companies and is also often shared with coworkers. For its part, FHS provides numerous software packages to employers that allow them “Access to group and individual real-time data to evaluate program participation and success” (Fitbit Health Solutions, n.d.-ac).

While privacy is always an issue with big data (Vayena, Salathé, Madoff, & Brownstein, 2015), it is a vital consideration within workplace wellness programs as the incentive to self-track comes from an external source, and personal data can be made visible to co-workers and employers. Lupton (2016b) refers to this as a mode of pushed self-tracking. If people are not given a choice about whether to participate in the program, the self-tracking is more than pushed, it is imposed.

Additionally, the data of self-trackers is part of the “global digital knowledge economy” (Lupton, 2016b, p. 102) where self-tracker data is packaged and sold (or stolen). Lupton (2016b) describes how data sets are often utilized for commercial or managerial value, often as a way to market to consumers or to learn more about the behaviours of those depicted in the data set. To put this data collection into greater context, it is now estimated that the typical American is subject to about twenty forms of data collection on a daily basis, most of which they are not aware (Lupton, 2015b). Furthermore, there are always concerns that data can be hacked, particularly health and medical information, which is typically deemed most valuable (Ajunwa et al., 2016; Lupton, 2016b).

Despite these important concerns, risks to data privacy are not much discussed in FHS documents for employers. The only time that issues of privacy came up in the FHS documents was with regards to sleep data, as Fitbits tell wearers how long they slept at night as well as the quality of their sleep. In “4 Challenges to Take Employees Beyond Steps” (Fitbit Health Solutions, n.d.-a), FHS encourages employers to hold sleep challenges where employees aim to reach a minimum time slept every night, rather than being rewarded for sleeping the longest akin to a step challenge. However, they cautioned that employees are likely to have privacy concerns about their employer having knowledge of their sleep patterns. The white paper “How Sleep Impacts the Bottom Line” (Fitbit Health Solutions, n.d.-t) goes further, giving employers tips on how to “Run a sleep challenge without being creepy” (p. 8). To not be “creepy,” employers should be more careful to aggregate sleep data such that employees who have “bad” sleep habits (p. 8) or who stay up late will not be directly shamed. Additionally, transparency is key: “Given the sensitivity around personal sleep habits, reassure employees that only aggregate data—not individual sleep information—is being recorded” (p. 8). It is striking that there is little acknowledgement elsewhere, with regards to other forms of data that are collected, that employees may feel uncomfortable with their employers or fellow employees having access to their personal information.

None of this is to say that FHS or Fitbit do not care about privacy; they have a detailed privacy statement and take myriad steps to safeguard the data to which they are entrusted (Fitbit, 2018b). Instead, I am arguing that issues of privacy are outside the frame within these documents, thus normalizing FHS and employers’ access to intimate data and dispelling the notion that this may be a concern.

In conversations with key informants, issues of privacy were more varied. In most instances, the possibility that employees would feel uncomfortable with data collection was dismissed. Laura explained it thusly:

Katie: Okay, so, um, people weren't concerned about data collection?

Laura: No, I mean, we did I think in the updates we sent out, we mentioned to people, we gave them a link to Fitbit's privacy policy. We reassured them that [our company] would never see anything but their steps. We were never gonna see their weight or anything like that. So, we did some reassurances like that to the associates.

As she explains, her company made a point to reassure employees that they would only look at their step data and not more personal health data such as weight, suggesting that there are limits to what data is observed by employers even though more data is gathered.

Heather similarly minimized the degree to which data was collected on employees:

Heather: We've run into no problems with it. I mean, [we only see] the number of steps you take in a day, it doesn't say when you took them, it doesn't say how you took them, it doesn't say where you took them. You know, we're not linking to people's devices in that way. And it's voluntary.

Since the data that is seen by program managers is limited, and participating is voluntary to begin with, privacy concerns are positioned as minimal. To address potential employee discomfort with their employer collecting this personal data, Angela describes how they limited what data was visible, as well as who could view it:

Angela: We did have access to individual step counts, active minutes. We never had their weight or anything that would be considered kind of health information that came from Fitbit. So, we just were up-front about who could see that. So, and we did limit it. As I said, Fitbit had a dashboard, but we could kind of have a super-administrator role, you know, give other rights to other people on the team. So, we tried to keep it limited to just a couple people on our team who had kind of that individual-level access to people's steps.

With regards to employees' feelings about data collection, their concerns seem to be two-fold. First, some employees do not want their employer to see their data: "Some people are concerned that they don't want [their employer] to see that information, and they think that they're looking, which we don't have access to any individual information." As she explains, they aggregate data and thus do not have individual data.

In my discussion with Brandon about privacy, it seemed as if only one employee had ever raised questions about others having access to data about them. He explained this case:

Katie: I also wanted to ask you about the privacy measures that you take, like what kinds of data you would have access to, and perhaps if any employees have raised any concerns about data collection.

Brandon: My first experience with that in a large group, a lady brought that up. And she goes, "So, I don't necessarily want anybody to know that I," how did she put it, "that I sat on my couch all weekend."

Katie: [Laughs]

Brandon: And so, I totally understand that, well, nobody else, I mean, all of your teammates are going to see that. She goes, "Yeah, I don't want people to see that." So, I think, I've never heard anybody that has, besides that one lady that really had an aversion to people seeing her steps as a reason not to participate. As far as the data that we collect, that Fitbit collects that we have access to, it's just your individual daily steps. It does share your name and what team you're on, and daily steps. And the things that your tracker, you know, steps and five or six different things that your Fitbit collects that we see. We don't collect sleep data. But, you know, as far as I know, that may be part of that, you know, 30% of the people, when we kick off our wellness program, maybe that's part of the reason why they don't join, because "I don't want anybody to know how active or inactive I am." And maybe that is part of the reason why they don't participate, I'm not sure.

The woman in Brandon's story is concerned about unflattering data that positions her as inactive, which suggests that not wanting others to see your data is something that inactive people might particularly feel. Second, Brandon concedes that others who share

this woman's concern may be choosing not to join wellness programs. In other words, a self-selection phenomenon maybe operating in which privacy concerns are not being voiced by wellness program participants because the only people who join such programs are those who are comfortable with others knowing how active they are. Third, Brandon does not view the data that is collected as particularly intrusive; it is "just" steps and "five or six different things."

As these quotes from wellness experts illustrate, data collection from Fitbits is positioned as generally innocuous. By limiting the data that employers can access, and describing that data as unobtrusive, these wellness experts largely dismiss potential concerns that employers are invading the privacy of their employees. It is important to note, however, that these data collection procedures do not exist in isolation. As the increasing use of data warehouses illustrates, employers are seeking all types of data to paint a picture of wellness and productivity within their workforce. While one data point such as an employee's weekly step count by itself may not feel invasive, taken together with other data points, employers may be able to make inferences about an employee's health status, risk category, or productivity that may feel incredibly invasive to that employee. Despite the seeming harmlessness of some of the data that is collected by Fitbits, it would be a mistake to conclude that wearable devices in the workplace pose no risks to important privacy interests of employees. How currently, and how in the future, wearable devices may harm these interests remains a significant issue.

Conclusion

Workplace wellness programs, which constitute roughly a \$6 billion industry annually, are becoming increasingly commonplace in the United States (Ajunwa et al.,

2016). Wearable technologies are becoming deeply enmeshed within these programs. Thirty percent of a large sample of employers surveyed in 2017 reported they planned to incorporate wearable technologies into their wellness program in the next year, while 23% stated that they were considering doing so in the future (Fidelity Investments, 2017).

It may seem common-sense to encourage employers to engage in healthier behaviours while at work and outside of work, particularly given that employers are responsible for a significant proportion of workers' health insurance. As I have shown, however, the narrative that employers should encourage healthier behaviours in their employees through workplace wellness programs, and moreover, that wearable technologies are the way to do so, emerges through the considerable work of stakeholders to bring the logic of quantification to the bodies of employees. Employee health must be understood to be under the purview of employers. The norms of physical activity and health must be established to which employees are expected to conform. Employees' lives outside of the workplace must be seen as equally governable as their lives while they are at work. Quantification plays a significant role in these processes, as it is through quantification that employees are assigned to risk groups, are targeted for interventions, and are placed on the path to a healthier life.

As the problem solidifies, so too do the solutions. A "connected ecosystem" of actors come together from a variety of industries to screen, mine data, track, incentivize, entice, empower, and encourage. Employees are not only acted upon, however; they are positioned as active participants in wellness, akin to activists within a social movement. These connections to medical industries and the placement of ever more behaviours as building towards or detracting from a healthy life represent the medicalization of

everyday life, to which Fitbit contributes significantly. Numbers and algorithms are not only part of the problematization process; they are the solution as well. It is through algorithms that employees can track their progress and ensure they are getting enough physical activity; how they are sorted into groups with associated fitness identities based on numbers; and it is how the programs are shown to work. Quantification functions as a biopedagogical technique (Jette et al., 2016) wherein employees are taught to scrutinize their bodies and lives to find ways to improve and self-optimize. While these incursions into employees' lives and the privacy issues that come along with them were rarely addressed by Fitbit Health Solutions, they exist and need to be addressed.

I want to be clear that I do not oppose workplace wellness programs *in toto*. The default of most workplaces is a climate where people are sitting all day with few food options aside from vending machines, where they are subject to considerable amounts of stress with little control over their working conditions. This state of play is no more revolutionary than a workplace where employers are encouraging employees to be healthy. Whether employers are promoting wellness in the workplace to improve their bottom line, because they legitimately care about employees and want them to be happy, or a little of both, the result is a workplace that has the potential to contribute to worker well-being. It is important to acknowledge that the default workplace, in which employers do nothing to promote wellness, is detrimental to employees. Giving people the tools to live healthier lives is a good thing.

There are a number of aspects of workplace wellness that I do take issue with, however. The logic of quantifying the body can be alienating to some employees, and through the incentive structures within many workplace wellness programs, people may

be pushed towards this practice who might not have been otherwise. Even if people choose to not participate in the programs, the “culture of movement” (Fitbit Health Solutions, 2018a, p. 5) that is engendered through these programs does disciplinary work to position these ways of viewing the body as legitimate over other understandings of the body. The bodies of employees are often abstracted and quantified regardless of their desire to participate in such endeavours and evaluated based on those metrics.

Furthermore, it remains an open question whether all employees should have a meaningful choice to use or reject personal tracking devices that are linked to their places of work. While the workplace wellness expert interviewees underscored the voluntary nature of the programs, it is important to point out that the possibility of lowering health insurance premiums is not an opportunity that every employee may feel that they can pass on. To the extent that participation in wellness programs is effectively non-voluntary, the more problematic all of these concerns become. Employees should be made aware of who has access to what tracking data and for what purposes, the possibility of potential invasions of privacy and any possible hazards such as data breaches that are associated with data collection and storage. Employees also should be made aware of the benefits of participating in these wellness programs, including the prospect of improved well-being and assistance in achieving personal fitness objectives (Ajunwa et al., 2016).

Additionally, these programs exist in a context of increasing job, economic, and health precarity. Workplace wellness programs may include flexible time policies, low-cost childcare and generous parental leave, efforts to give employees more autonomy, and other approaches that would help support workers, their families, and their physical and mental health. However, many of the FHS programs stop considerably short of these

larger goals, offering instead individualized solutions to the problem of poor employee health. If employees are given Fitbits, treadmill desks, and step competitions, the thinking goes, they can take responsibility for their own health and set themselves on a journey of self-transformation. Employees may enjoy these challenges, and live healthier (and happier) lives because of them. This should not be discounted. However, I worry about placing the burden of health at the individual level when there is so much evidence that interpersonal, environmental, organizational, political, and cultural influences shape health in equally important ways. Consider, for example, how the ways in which individuals are blamed for poor lifestyle choices that lead to “obesity” stigmatize a group that already experiences considerable employment discrimination (Lupton, 2013a; Rail, 2012).

The governmentality analysis that I conducted here illustrates how these interventions into the physical activity of employees have come to be, and how they operate to mark some bodies as “fat and frazzled” and others as “fit and happy” (Fitbit Health Solutions, n.d.-e, p. 1). A particular way of seeing the body, and a particular relationship of employers to employees, is emphasized within these documents and interviews that is worthy of attention and interrogation. By highlighting these workings of power, it is my hope that workplace wellness programs can be appraised with a more critical eye and can be improved so that they are more ethically and equitably implemented.

Chapter 6: Running Through Datafied Space: Engaging the Digital Materiality of Women's Fitness Tracking and Running Practices

Introduction

The locales in which jogging takes place are inseparable from the act itself. Any runner knows the feeling of looking up at a hill that they are about to climb; the feeling of uneven terrain of running trails and how it makes running seem precarious; the repetition of running around a track. Whether it is on a treadmill in the gym, on a remote trail, through your neighbourhood, or while exploring a new place, the entanglement of bodies and their environments is inescapably apparent through the act of running. By traversing hills, dirt, concrete, brush, and branches, runners are intimately aware of how place changes how their body moves and their embodied feelings as they move. Running depends on space, and in many cases, the experience of traversing through space is the reason that people run in the first place (Howe & Morris, 2009; Nettleton, 2015).

Scholars of emplacement have argued that spaces play an active role in social life, and that places are dynamic and always in a process of becoming (Casey, 1993; Ingold, 2000; Pink, 2011). Numerous sports scholars have examined the relationship between physical culture, bodies, and place (Bale, 2002; Barnes, 2009; Esmonde & Jette, 2018; Friedman & van Ingen, 2011; Glenney & Mull, 2018; Pink, 2011; Spielvogel, 2002; van Ingen, Sharpe, & Lashua, 2018; Vertinsky, 2004), and the relationships between running bodies and place in particular (Bale, 2004; Howe & Morris, 2009; van Ingen, 2004; Weedon, 2015). Sport and physical activity rely on space, whether those spaces are intended for such use, such as playing a hockey game on a hockey rink that has specific

parameters according to league regulations, or whether those uses subvert the intended uses of space, such as skateboarders who skate on hand rails and stairs (Glenney & Mull, 2018). Different spaces promote different goals for physical activity and sport, whether they are having fun, improving the body, displaying one's achievements for others, breaking records, or making money (Bale, 2003; Friedman, 2010).

When acknowledging the dynamism of space, it is important to also reflect upon how spaces are constructed differently depending on who is in them, and that people can have vastly different experiences of space depending on their identities and their sense of belonging within those spaces (Gupta & Ferguson, 1992; Soja, 2013). Scholars have noted how a “geography of women’s fear” (Valentine, 1989)—including fear and exclusion due to violations of space, sexual harassment, and even gendered forms of violence—have impacted women in public spaces (Gardner, 1995; Hille, 1999). Women who run in public feel many of these concerns acutely, as many engage in strategies such as telling people where they are going before they set out on a run, changing the time and place where they exercise, and exercising with another person or a dog, in order to feel safer (Gimlin, 2010; Wesely & Gaarder, 2004). Women negotiate a desire to be outside while engaging in an activity that they enjoy with fears (their fears or the fears of others) of violence, in many cases pushing back against the assumption that women should not move around in public (Wesely & Gaarder, 2004).

Drawing on the experiences of ten women who self-track while running, this project extends this literature on running, place, and gender by considering the role of fitness tracking and locative technologies in gendered embodiment and emplacement. As more runners use wearable tracking devices such as GPS watches and step trackers,

people's relationships with their bodies and environments are changing in important ways due to the decreasing distinctions between the virtual and material worlds with which runners are engaging (Farman, 2012; Pink & Fors, 2017). Through the production of maps that 'capture' the activities of the self-tracker to the collection of ever more data points on one's running and cycling endeavours, a spatial analysis of the digital materiality of self-tracking-in-place is a much-needed lens for research on the Quantified Self.

Jogging is often promoted as a health-promoting practice; the biological, social, and mental benefits have been expounded upon in great detail (O'Keefe & Lavie, 2013). Moreover, jogging is frequently positioned as an activity that is accessible to a wide range of people because runners need only shoes and a place to run to get started (for a Bourdieuan class analysis of physical activities such as jogging that would challenge the perception that it is an accessible sport based on cost, see Williams, 1995). Since much of the pleasure of running derives from moving through space (Howe & Morris, 2009), this paper seeks to understand if these pleasures are enhanced, supported, or undermined—or indeed, all of the above—by self-tracking devices. I also consider how gendered and raced inclusion and exclusion is negotiated within running spaces, with wearable technologies as a potential factor that shapes women and minority's feelings of belonging in public running spaces. The role of gender, race, and class in shaping self-tracking practices and experiences has been under-explored in the literature, creating a gap that I seek to fill here.

This chapter proceeds as follows. First, I provide a brief overview of the literature on jogging, embodiment, and emplacement, as well as the influence of wearable

technologies on running practices. The findings of this chapter are then presented as three main themes. First, I focus on how running data influences perceptions of space, illustrating the importance of self-tracking on the production of (running) space. Next, I explore how embodied feelings of running at a particular pace are shaped by self-tracking, challenging the presumption that collecting data on the running body is a disembodied act. Finally, I examine how self-tracking relates to gendered safety issues, arguing that women negotiate their feelings of safety in complicated ways, and that self-tracking technologies have a conflicting role to play in these negotiations. Throughout the analysis, I examine how it is that runners, places, and wearable technologies are enmeshed as networks of humans and non-humans; an ecology of people and things (Pink, 2011; Pink & Fors, 2017). This type of analysis is vital for understanding how self-tracking produces, and is productive of, relations of social power.

Digital Jogging Mobilities

Jogging sets itself apart from many other mobilities in that it is generally a practice where the goal is not to get from point A to point B. In most cases jogging is movement for movement's sake, and considerable meanings are drawn from the places that people travel along the way (Cook, Shaw, & Simpson, 2016). The sensory experience of running in place—the sights, sounds, smells, tactile sensations, and perhaps even tastes—is for many one of the lasting impressions of running, if not its *raison-d'être* (Allen-Collinson & Hockey, 2011; Hockey, 2013; Nettleton, 2015). For instance, van Ingen (2004) has explored the notion that landscapes can be therapeutic and healing for runners who are sexual minorities, by enhancing their feelings of health and wellbeing—much in the way that a vacation resort or the wilderness can be therapeutic. However, she

found that these messages about health are often rooted in healthism, placing the responsibility for health at the individual level and shaming those who are not considered healthy. This highlights the need for socio-spatial analysis of physical cultural spaces as space is not just a container for social relations but an active constituent of social life (Pink, 2011).

In this chapter I contend that spatial knowledge and measurement are integral components of many runners' practices. While running exclusively for pleasure with little regard for one's achievements, health, or fitness is certainly possible, in most instances people engage in running or jogging as a sport where running a measured distance (in a measured amount of time) is an important part of the activity (Bale, 2003). In this way, many runners consider the places that they run, the qualities of the terrain and the weather, the distance that they covered, and other pertinent information about place to be vital information that they consider before, during, and after running. This information can be made available to a runner through multiple media, such as (online) maps, driving a distance with one's car for the purposes of knowing the distance, an estimate of one's pace or distance with a stopwatch, and most germane to this study, a GPS watch or fitness tracker. All of these approaches have been utilized by participants in this study at different times.

Scholars have contended that wearable technologies can importantly change people's experiences of place (Pink & Fors, 2017; Sumartojo et al., 2016). As Pink and Fors (2017) contend, researchers need to study self-tracking technologies as they "participate as *part of* and as assembled or configured *with* everyday lives and worlds, rather than as a research technology or device that is *as separate from* the people and

environments it is deployed in” (p. 376). With this in mind, both Pink and Fors (2017) and Sumartojo et al. (2016) suggest that self-tracking while running and cycling can lead to perceiving the environment through the lens of the app. For instance, Strava users may perceive space through the segmented lens of the app, where terrain is divided into segments in which app users compete with one another for faster times (Sumartojo et al., 2016). Self-trackers may have more of an awareness of the metrics of spaces, such as the distance to get to certain places and the time it will take to do so (Sumartojo et al., 2016). Additionally, these researchers suggest that the production of maps through self-tracking apps is an affective experience that is intimately connected to what people are doing as they create those maps (Pink & Fors, 2017).

As these studies illustrate, running through space while fitness tracking is a digital and material practice. In this chapter, I seek to bring to the fore the body-environment through an analysis of embodiment and emplacement. St. Pierre, Jackson, and Mazzei (2016) observe that in the sentence, “I am running on the road,” the “I is not even separate from the verb or the object of the verb in the sentence” (p. 103), with I being a body, the verb being running, and the object of the verb being the road. Instead, they contend that I and run and road all exist together as “irunroad,” a “spatiotemporal relation without distinctions” (p. 103). Perhaps the “i-run-landscape-fitness tracker” is more apt here, given how bodies and their environments (if I can be permitted to say such a thing, as if they are separate) are so entangled with the digital technologies that the participants chose to wear. This redistribution of agency—the “i-run-landscape-fitness tracker”—provides an important perspective on the ways in which wearable technologies are becoming with runners in place. By framing this chapter through embodiment and

emplacement, I emphasize the ways in which the material and the social are intertwined, arguing that agency is not just the property of humans but of non-humans—including the environment—as well. The environment is not only a product of human intention, but acts in its own ways, too (Millington & Wilson, 2017).

It is important to note that the types of datafication (van Dijck, 2014) that are enabled through fitness tracking, as both embodiment and emplacement are quantified, occur within systems of power that importantly shape data collection practices. I follow Farman (2012) in his contention that

Maps are not simply representations of ontological reality; instead, they signify space in a very particular way that is designed to be read to fit with the current cultural hegemony. With mobile technologies, the ways that space is represented is a practice of lived space. The movement through space and the collaboration between material environment and representations of that environment inform an embodied meaning of space. (Farman, 2012, p. 52)

The production of maps through Fitbits and other GPS watches “inform an embodied meaning of space” that aligns with cultural hegemony, just like other maps. As I illustrate in my analysis, the participants’ perceptions of producing maps that signify where they are in space and time is a contested practice that brings safety concerns and identity to the fore. These maps are premised on the assumption that runners must have some kind of goal, whether it is to run faster, or further, over time. Moreover, the production of maps that are visible to others, as I argue here, is premised on the assumption that making this information available to others is not a safety issue. These assumptions will be troubled below.

Findings: Embodiment, Emplacement, and Entanglement

In what follows I present my findings on the physical situatedness of running and self-tracking, based on running and semi-structured interviews with ten participants. First, I examine how wearing a fitness tracker influenced the participants' emplacement, or impressions and uses of place. Next, I discuss how their embodied, somatic running experiences were influenced by wearing a fitness tracker. Finally, I explore how the participants' gendered and raced identities shaped their sense of safety while running, and while running with a fitness tracker in particular.

Training, tracking, and traversing. The practice of self-tracking can impact a runner's movement through the world in important ways. Below, I consider two such ways. First, I discuss how the participants start and stop their watches whenever they pause during a run, and how the increased focus on this practice impacts their experience of running. Second, I suggest some of the ways that the act of self-tracking can encourage runners to view space through a quantitative lens.

Starting, stopping, and broken data. In my discussions with the participants about place and space, the practice of starting and stopping their watch when they were stopped on their run—most often because of a traffic light or crossing the street—was most discussed. I also observed this practice repeatedly as I ran with the participants. For example, on my run with Natasha, I watched as she started and stopped her watch numerous times throughout the run. I described one such instance in my field notes:

[Natasha] says that we can start running right away, but if we do, she will have to stop her watch almost immediately because we are coming up to a pedestrian crosswalk. We decide to walk towards the crosswalk instead of starting and stopping. ...A moment into our run a truck exits a parking lot, causing us to pause briefly before continuing our run. I notice that Natasha has stopped her watch as

we stop, illustrating that she takes getting “accurate” data on the run very seriously. (Observation, January 13, 2018)

As this observation illustrates, our decision about when to start running was partly informed by Natasha’s data collection practices, as well as the run itself. Natasha even told me how important it was for her to stop her watch in the event that she fell while running, as she did not want her watch to continue running while she was not.

Many of the participants’ watches would pause their runs automatically if they did not move for several seconds, a standard feature on fitness trackers and apps and GPS watches that illustrates the importance of this practice for many runners. In most cases, however, the participants would stop their watches manually because either it would not stop otherwise, or it would stop eventually but it took too long and added unnecessary time to their run. This was the case for Amanda, who chose to manually stop her watch even though it stops automatically. I noted this during our run:

We run at a comfortable pace together, stopping relatively frequently for traffic lights. At one of the early lights, I ask Amanda if she pauses her GPS watch when she stops at a light. She says that it stops automatically, which we both agree makes things easier. However, she points out that it takes a few seconds to realize that she has stopped (5 seconds, she says), and it also takes a few more seconds to realize that she has started again (about 5 seconds). At the end of the run, the Garmin app gives her “credit” for the time where she was stopped, and her overall time spent running is even faster than initially calculated. (Observation, October 26, 2017)

As these cases show, stopping and starting one’s watch is a way of increasing the validity of their pace and time because they did not feel that time spent waiting after they were forced to stop should be counted against them.

The active role that the participants took in running data collection highlights the materiality of data, as it is not generated as a view from nowhere that accurately reflects a separate reality (Pink et al., 2018). The data that is generated from a GPS watch is the product of the environments where the data is collected, the material specificities of GPS watches and their ways of gathering data, and the actions of the human who is seeking to gather that data. There is no such thing as ‘raw’ data when these practices are taken into account. The belief that numbers are objective and reflect reality contributes to these efforts to make tracking a run ‘truer’ (boyd & Crawford, 2012), as well as an emphasis on high performance and a desire to always improve one’s running ability, play pivotal roles in this practice as well.

Due to the meaning that is attributed to timing a run in a way that is reflective of the ‘reality’ of that run, the participants described the distractions that accurate tracking often entails as having a negative impact on the joy that they experience while running. A number of participants (Myra, Tiana, Natasha, Karen, and Carrie) discussed the frustration of having to pause their watch at a stoplight as it forces them to keep their watch on the top of their mind or otherwise risk forgetting to pause or unpaue their watch. Carrie describes her experience of training for a half marathon with people who were training for a full marathon, and how she could not rely on their tracking if her tracking failed because they would be running different distances:

Carrie: There were times where I would be running with the marathon people and then I would be stopped at a stoplight and I would pause my watch and then I would forget to turn it back on. I would realize later, and have to kind of guess how long it had been off for, and then at that point I don’t know how long, or what distance I had been running. And that’s frustrating. So, yeah, that’s one thing that really annoyed me about it. It’s supposed to stop and start automatically because it’s sensing whether you’re moving or not, and that doesn’t work very

well. For the times where I'm running, and I don't know what distance I'm going to do [in advance] then that's when I get annoyed.

This annoyance from incomplete data, and the fear of gathering incomplete data, created a distraction for Carrie that made her experience less joy while running. Additionally, while running with Karen I observed that her running path decision was shaped by the status of the stoplights around her; she would choose her path based on red lights and her desire to not stop during a run. This further illustrates how self-tracking becomes enmeshed within route planning and execution (Pink & Fors, 2017). I would argue that this particular aspect of self-tracking makes participants more attuned to stoplights as part of their environment because it impacts their data collection practices.

Such instances where a run stops but a watch does not can be understood as “broken data” (Pink et al., 2018). As Pink et al. (2018) argue, data collection is “always interdependent with and contingent on human, bodily, sensory, emotional, environmental and other material circumstances that were not necessarily predictable or reliable” (p. 5). In this case, a fitness tracker's broken data results from the digital materiality of data—the interconnection between digital and material worlds—that lead to a GPS watch not tracking the run as planned. For the runners that I spoke with, the experience of broken data leads to a feeling of loss because the runner does not know the distance that they covered or other running statistics that they had expected to gather.

The quantified running trail. In other instances, the participants described their impressions of space as being mediated by the numbers that they saw on their watches. Like the segmentation of cycling routes that was described by the Strava app-using cyclists interviewed by Sumartojo et al. (2016), a constant influx of spatial data can

impact how runners view the spaces that they traverse through. For example, Natasha noticed how her understanding of space was mediated by precise measurements when she was unable to run due to an injury. She explained:

Natasha: Getting injured, I didn't notice how much of my life was actually revolving around just running. ...And when I don't have that in my life—I wasn't allowed to run. I was driving down the street and I was crying.

Katie: Yeah.

Natasha: I could tell you that it's 1.5 miles to that turn. And if you go down there, it's another 2 miles. Some people would call that obsessed, you know what I mean? It's the way runners think, right?

As Natasha says above, her experience of running with a fitness tracker has changed how she sees the spaces around her. “The way runners think,” she says, is to view the places she has experience running through as particular distances, as validated by her GPS watch. While this information is not available exclusively through a GPS watch—for example, one could use the MapMyRun web site to know the distance of a run before or after it takes place—the constant feedback from a watch can heighten one's awareness of this spatial metric. This may not happen to a person who does not look at their watch very often, but for Natasha, however, checking her watch on a consistent basis had this effect.

Wearing a Fitbit or another step tracker can have a similar impact by casting space through a lens of steps. This was most exemplified by Jane, who explained:

Jane: Every other week I go to an allergist to get an allergy shot. And so, I know exactly how many steps round trip that is from my office, and just stuff like that. Completely useless knowledge for anyone but myself [laughs]. I know how many steps it is to get to my office. Sometimes I'll try to guess if I'm doing it an unfamiliar walk. It's almost like a game.

In addition to thinking of established spaces that she has walked through repeatedly through the metric of steps, Jane stated that she also thinks of new spaces using the step

unit of measurement as well through a guessing game. Wearing a Fitbit can also alter perceptions of space by highlighting how moving around some spaces facilitates more steps than others. For instance, Myra described how her Garmin VivoFit made her more aware of the discrepancies in the size of classrooms in which she taught:

Myra: I also realize that when I first started at this new school, I had a bigger classroom. Because I was teaching biology, and the biology classroom is longer than even this space here. And so, I would be walking back and forth, 'cause the classroom is really long. And now I teach a support class, in a very small classroom, and anatomy in a larger classroom, but it's not nearly as long. And people are kind of situated a little differently. And so, there's less movement during the day because in my support class which I teach three days a week, or three times during the day, there's no place to really move.

While she likely had an awareness of the different sizes of classrooms, wearing a step counter brought this to the fore by illustrating the direct impact on her body as she moved throughout the day. As such, step counting influenced Myra's perceptions of space and how her body inhabits it as she teaches.

Distance can be assessed in numerous ways, whether it be a "five-minute walk," the precise distance in kilometres, metres, or miles, "far" or "close," and, as Jane's narrative illustrates, in the steps that it would take as measured by a Fitbit. As with any form of measurement, a step is not a neutral, self-evident unit of measurement. A step count requires the entanglement of bodies and environments; a step count cannot be measured without bodies because it is a measurement of how bodies move through space. Fitbit (2018c) explains how steps are calculated:

Fitbit devices have a finely tuned algorithm for step counting. The algorithm is designed to look for motion patterns that are most indicative of people walking. The algorithm determines whether a motion's size is large enough by setting a threshold. If the motion and its subsequent acceleration measurement meet the

threshold, the motion will be counted as a step. If the threshold is not met, the motion won't be counted as a step. (Fitbit, 2018c, para. 4)

As this shows, a Fitbit “step” is calculated from an algorithm that senses human movements that are suggestive of walking. A step is a distance that is the result of this algorithm, and it is tailored to the individual as people's steps are different lengths and therefore one person's step count might be a vastly different distance than that of another. This manifestation of digital materiality can shape how people experience the places that they move by turning their embodied movements into a spacialized metric.

The entangled embodiment of feeling and data. In the previous section the participants spoke about running data as if it is something that is incontrovertible and pre-existing. They travelled a particular distance, this thinking goes, and if data is being collected correctly it will reflect those facts of their run. While this perspective was certainly prominent within my discussions with the participants, a second perspective of data collection as an active and emergent process was also held by numerous participants (Sumartojo et al., 2016). To further highlight the contingency and materiality of data, I now consider how self-tracking entangles with runners' embodied, haptic running experiences as they interpret and act upon their data. Based on the narratives of the participants, I argue that self-tracking while running is far from a disembodied data collection endeavour. Instead, the participants described how their breathing, their pumping heart, and their movement through space all provided important context for their data, and was often the lens through which they interpreted their pace, distance, and time. I draw on Lupton's (2016a) metaphor of digital companion species, as we “live together” with data and we also “learn from each other” (p. 2).

“How I felt while I was creating that data.” Many of the participants felt a sense of personal connection to the digital outputs of their fitness trackers. They “live together” with their data. Amanda, who is worth quoting at length here, articulated this quite clearly when she was describing the interconnections between feeling and data:

Katie: How do you balance, on the one hand, how you feel, with the data that you get? How do you bring those together?

Amanda: Um, so it’s almost like a benchmark, right? ... Sort of remembering how I felt at a given pace is almost like a benchmark of my fitness level. Does that make sense?

Katie: Yeah, it does.

Amanda: Right, like, do I feel comfortable running an 8:45 pace? If I’m comfortable running an 8:45 pace, then yes, I can theoretically believe that I can run 26.2 of these miles this way. If I don’t, then it worries me a bit.

Katie: That’s really interesting, the way that perceptions and data which are thought to be—

Amanda: Right.

Katie: Removed from people come together for you.

Amanda: Right, well the thing is driven by you, right? ... I’m creating the data, right? *And so, there’s how I felt while I was creating that data.* [Emphasis mine]

In this extract, Amanda is showing how data production is an active process, and that the embodied experience of running is far from removed from data interpretation. Amanda states, “the thing is driven by you, right? ... I’m creating the data, right?” The data is created by her, and representative of her. It is not isolated or abstract, because she understands it through the lens of “how I felt while I was creating that data.” Her pacing data when she was training for a marathon could not be very meaningful without this feeling data.

Numerous participants articulated a similar relationship to their data and feelings, particularly with regards to how they put them in conversation with each other by checking in with their body as they interpreted their data. For Elizabeth, unexpected

numbers can be explained by considering her health status, the weather, or other important factors that might make running feel harder for her. Elizabeth described how she reads data that suggests she is going slower than she expects:

Elizabeth: As far as the pace, I think about: how hard am I breathing? How is my heart rate doing? Can I have a conversation with someone if I'm running with someone, or do I feel like I'm dying here? And then I look at the numbers and I'm like, okay, I'm running above a 9-minute mile. I should not be this out of breath. Why do I feel this way? Am I under the weather? Is it more humid today? Did I eat differently last night? The data is this gateway to, like, *what did I do that made this number be the way that it is?* [Emphasis mine]

In this way, data is material in that it is influenced by material factors such as humidity, illness, or food. Natasha similarly utilized feeling to figure out what numerical pace would be appropriate for different runs. This came up after she used the phrases “a good mile” or “a quality run.” She explained this distinction thusly:

Katie: How do you define a good mile? Or a quality run?

Natasha: ...So good runs usually, for me, are like, 7-something minute mile pace. When I feel like I'm challenged, and I'm breathing hard. And I feel like I can barely hold a conversation, like, I'm borderline. I've done some really, really cool runs with people last year, when we were doing 7-minute mile pace, sub-7-minute mile pace. That was amazing. We just don't talk. It's challenging, but it was amazing. So, it depends on fitness also.

...

Katie: Well it sounds like for you, a good mile, it's partly defined by numbers.

Natasha: Yeah.

Katie: But also, how you feel.

Natasha: Yeah.

As I suggested during the interview, Natasha understands her running through both feeling and data. On the one hand, she thinks about whether she feels challenged, if she is breathing hard, or if she can have a conversation. On the other hand, numbers are assigned to these feelings. These criteria are met for Natasha at a “7-something minute

mile pace,” and she feels even more challenged at a “sub-7-minute mile pace.” This follows Sumartojo et al.’s (2016) observation that self-trackers’ interpretations of their data and maps are profoundly shaped by what was happening as they were collecting that data, such as how fast they were going, the weather, and one’s energy levels all shaped the lens through which they viewed the data.

Conversation pace and race pace. A related set of concerns that were articulated by the participants centred around figuring out what different paces feel like to run, and thus what is an appropriate pace for them depending on their running goal—whether it be a race pace or a pace for a more relaxed run. This involved figuring out what numerical paces are comfortable, which paces are a push to run, and the development of a sense of what pace you are running. While Howe and Morris (2009) contend that runners who have trained at an elite level are able to know “what the ‘race-pace’ is simply by the ‘feel’ of the body; there is no need to rely on a stopwatch” (p. 313), I did not observe this on my runs with the participants. Instead, when I discussed the development of a race pace with the participants, many of them discussed their use of a fitness tracker as a way to help them to pace themselves during their races and to figure out how they should feel while running at different paces. This way of feeling their way through data is an entanglement of numerical pace data and embodied feelings. Elizabeth spoke about her process of figuring out what pace she can run at for an extended period of time:

Katie: You said something interesting about the way that you bring together the information from how your body feels, and from your watch.

Elizabeth: Uh huh.

Katie: And it seems like they’re kind of two pieces to a puzzle.

Elizabeth: Yes.

Katie: That you’re putting together.

Elizabeth: Absolutely. That paints the picture for me. That's why I don't know how people don't look down and see all of that. Having a sense of pace is something that you gain over years and years and years of running. But if you're early in running and you're feeling really out of breath, do you know that you should keep pushing yourself because that is your good pace and that you've proven over run after run after run that 9:08 is a pace that you feel really good? And yeah, you're feeling a little out of breath at that pace today, but that actually is the healthy pace for you? Or do you say, this is feeling really hard for me so I'm gonna go a lot slower. But then, I don't know. ... [The watch] helps you establish a routine at a pace that works for your body. And, like, I'm all about that with running. If 13-minute miles work for you, and that's where your body is comfortable, and that's where you settle in, as, those are the words my coach used to us. Like, "settle in at this pace." This is where you're going to stay. Then, then great.

Elizabeth uses her watch to "establish a routine at a pace that works for your body," whether it be 9:08 minutes per mile or 13 minutes per mile. This helps her to know if she should be pushing through the discomfort because it is a good pace for her that she has proven repeatedly during her runs, or if she should slow down because she is not feeling good that day. Natasha discussed a similar approach to feeling her way through the data. For her, the data that she collects on her pace helps her to establish for herself what it feels like to run at a particular pace:

Katie: When you very suddenly increased the data that you were collecting, was there anything that you didn't expect to care about, but because that number was there, you did find that you cared about it?

Natasha: ...I never knew about pace, like, how fast or slow I was going. And that was just really, really helpful, to start feeling the difference between a 7-minute mile, between 6:30 minute mile, a 6-minute mile. ... So just getting a feel for the different numbers, really, really helped.

Where feelings end and data begins is not a defined space, as feelings influence data here and data influences feelings.

The concept of digital materiality is a useful concept for theorizing the inseparability of digital and material worlds. Running data can be considered material in numerous ways, such as above when I described how data is material because it is influenced by the material world. Additionally, data can have material effects on what the body does. In this case, the entanglement of data and feeling was an important part of how the participants determined their “race pace,” or their target pace for an upcoming race. In order to pace themselves effectively, they needed to figure out what their goal pace would be for the marathon: a process that entangled feeling and data. Carrie discussed how she began to figure out how she should pace herself during a race with numbers, but it was feeling that allowed her to fine-tune those numbers:

Katie: How do you set those aspirational paces?

Carrie: That’s a good question. I think a lot of the time I just kind of pick a number and, like, “Oh, that sounds fast.” And then I’ll do that, and I’ll actually feel comfortable with that. And so, I go faster. I feel like I kind of pick a number out of thin air, but I think it’s probably informed by my previous performance. Say that I was, like, running 8-minute miles. I’ll be like, “if I’m doing a 10K I want to do 7-minute miles.”

Numbers, either picked “out of thin air” or that are informed by past performances, determine in part what her race pace will be, illustrating how data can shape the pace that a person chooses to run. However, they do not solely dictate her “aspirational pace” as she may also feel more comfortable than she had anticipated, and decide that she is going to faster. Elizabeth described a long process of figuring out what her race pace would be, which brought together many different kinds of runs and a developing sense of what she should feel at different paces. Elizabeth here describes how she came to establish her race pace:

Elizabeth: But finding your long run pace, you have to find a pace where your heart rate, where you can talk comfortably, and that you can maintain it over a number of hours. Like, doing a track workout or running 4 or 5 miles and being out of breath is manageable because it's short. But on those long runs, you cannot be huffing and puffing for 3 or 4 hours straight. It's just really hard on your body. So, that's part of the training too, is feeling that difference between the track workouts where you're absolutely at your max, max, heart rate. ...I would look at my watch at the end of every mile, and you know when you feel good and when you don't feel good. And I see where I feel good, and normally for the long runs, it was between, like, 9 and 9:15 per mile. So, then I sort of set that as my goal pace.

Similar to Latour's (2004) discussion of how through the use of an odour kit a person can progressively learn how to discern between subtle notes in a perfume, through the use of self-tracking devices, runners can develop a sense of their numerical pace and the distance that they have run. Through training, looking at data, and aligning it with feeling, "Acquiring a body is thus a progressive enterprise that produces at once a sensory medium and a sensitive world" (Latour, 2004, p. 207). The body senses with greater discernment the sensitive world through the lens of pace and distance. The entanglement of feeling and data as participants assess their running in real time is suggestive of the digital materiality of self-tracking, as the digital data that the participants spoke about in many cases aligns with material, embodied feelings of running.

Fear and resistance while running through dangerous space. Thus far I have considered how the participants understood their running spaces and their bodies in light of the data that they collect. Here I want to offer a case study of the interdependence of emplacement and embodiment, through an examination of how the participants' gendered and raced identities influenced their perceptions of safety while running through space. I

will place special emphasis on how wearable technologies figure into these understandings of safety as they run through space. Here I am speaking about fear of crime, rather than some of the other fears that pertain so space such as fear of injury. This is an important consideration given the ways in which social power influences data collection and access (Cooky et al., 2018), as well as how spaces (including running spaces) are not politically neutral in that they privilege some identities and forms of movement over others (Cresswell, 2010; Soja, 2013).

Here I begin by discussing some of the participants' concerns about running safety, followed by other participants' challenges to the expectation that women should be fearful of running and running alone in particular. This lays the groundwork for my discussion of two ways that self-tracking can influence women's perceptions of safety. First, drawing on Tiana's example, I argue that self-tracking can enhance a woman's feelings of safety by creating a 'record' of her whereabouts should anything dangerous come to pass. Conversely, Natasha was concerned that tracking using the Strava app could broadcast her location and running routine to people with dangerous intentions. With both of these possibilities for the relationship between self-tracking and spatial safety, I argue that it is important to have a multifaceted understanding of positionality, space, and self-tracking.

Running and spatialized fear. For many of the participants, running—alone in particular—is viewed as a safety issue, and one that has caused them to alter their behaviours so as to contain the threat. This exchange with Karen is emblematic of this type of response that I got to the question of whether safety concerns shape where or when they run:

Katie: Do you think that where you run or when you run is shaped by safety concerns?

Karen: Yes. Definitely. Definitely. I mean, obviously as a female, by myself, it's terrible, but it's a thing we have to consider. I don't run at night in my neighbourhood, and I live in a very safe neighbourhood. But I still don't run at night.

Myra echoed this, reiterating perceptions of “neighbourhoods” and how some are safer than others:

Katie: When you and I say, “safety concerns,” what specifically are “safety concerns.”

Myra: I want to go where people are in case something happens. I live by myself. I'm female. I'm only so tall and so big. And I just, I won't go in a neighbourhood that's, like, particularly transitioning, or, like, not gentrified. And I think, sometimes I feel bad about saying that, but, you know, you have to be aware of your surroundings.

This sentiment was shared by Tiana, Natasha, Myra, Karen, Elizabeth, and Carrie. The commonly discussed aspects of the environment that were discussed included darkness—from running early in the morning or in the evening or night—and “not gentrified” or unsafe neighbourhoods. As Pain (2000) points out,

While it is well documented that the social distribution of fear of crime tends to follow lines of power and exclusion, individuals may occupy different subject positions at the same time, and the relative importance of each shifts according to social and spatial context. (p. 374)

The fact that being “female” was implicated in these comments highlights the spatial dimensions of patriarchy (Hille, 1999; Pain, 2000). It may also be that women are more able than men to give voice to spatialized fear given expectations that men be stoic and unafraid (Pain, 2000). However, the evocation of “safe neighbourhoods” that they live in and the “not gentrified” neighbourhoods that they do not live in also signals a fear of the

“others”—likely racial minorities—who occupy those unsafe spaces and reproduces neighbourhood stigma and thus socio-spatial marginalization (van Ingen et al., 2018; Wesely & Gaarder, 2004).

While the majority of the participants spoke about issues of safety while running as an issue of being targeted as a woman, Tiana—an African American woman—spoke about safety in terms of people’s perceptions of her as a potential threat. As she explains here, she does not think that people view her as dangerous since she is a woman, but for her husband who is also African American, ‘running while black’ is a safety issue:

Katie: What about race? Does that shape how you feel while running?

Tiana: So, for me, not as much. For my husband, it definitely has. Like I remember once... he was running down by the monuments. And he was wearing tight running pants and a wicking shirt. ... and he had his phone on his arm. And he said he was running past a couple, a white couple, and he was running behind them, the first time. ... On the way back, he’s coming toward them, ... still in the same running clothes. Like, it’s very obvious he’s not wearing clothes that he would just be walking around in [laughs]. These are like—

Katie: It sounded like it was obvious. Yeah.

Tiana: And the guy, like, grabbed his wife and pulled her in close. And he almost wanted to stop and say, “Really? I’m in running gear.” Like, “What did you think I was going to do?” So, it’s something I think about for him, more. As like, a black male running.

Katie: Okay.

Tiana: Um, but not as for myself as much, as a black woman. I think my gender makes me less threatening.

This story highlights the need for people who are perceived to be “threatening” to dress in such a way that makes it obvious that they are running, rather than engaging in a criminal act (see Ray, 2017). As Tiana’s testimony shows, a lot of “things” come together to inform others that what we are doing is jogging. Our gendered, raced, and classed appearance, our clothing, our shoes, our comportment, our surroundings, our bodily

movements, are not always assembled in such a way to produce an obvious jogger-in-place. While being perceived as a jogger-in-place does not guarantee that one will be treated with respect (Wesely & Gaarder, 2004), it can minimize the chance that one will be suspected of criminality.

While Tiana did not feel that she was perceived to be dangerous or a criminal while running, her race and gender impacted her perceptions of safety in a different way: by being seen as a less sympathetic figure to white people in the event of an incident. She explained in a follow-up email after our interview:

Tiana: It didn't occur to me until we were talking but I typically wear a shirt or hat that has my undergraduate... or graduate ... school name on it. I fear that if something were to happen to me while running, there would be a stronger likelihood of someone helping me if they saw a university name. Without the university name I fear that my race and gender would make me appear “threatening” and stop the majority of non-diverse people from volunteering to come to my rescue. It pains me to say this because I don't believe that that a college name, or anything for that matter, should stop someone from helping a human being. Based on the way both male and female people of color are treated by the police and bystanders, having a brand that the white majority can identify with could make the difference between life or death. (personal communication, February 27, 2018)

As this quote illustrates, Tiana does not feel confident that the “white majority” would sympathize with her should she be in danger and thus takes steps—wearing brands that would make her more favourable to people who would not identify with her otherwise. Tiana is acutely aware that “the difference between life or death” is being appealing and unthreatening to the white majority, which she does not assume will come to her aid automatically.

Many women feel unsafe while they are running and these feelings shape when and where they are willing to run. While their sources of fear may be different—being targeted for a crime by appearing vulnerable or instead being targeted because they appear dangerous themselves—these perceptions played a significant role in their running experiences. It is not only perceptions of fear that they are describing, however. It is an assembly of human and non-human actors such as street lights, sunlight, ‘dangerous others,’ discourses of feminine weakness and male strength, streets, potential bystanders who would intervene—all come together to produce fear and safety while running as a woman.

***“I won’t live my life in fear”:* Running as defiance.** While all of the participants were aware that women are perceived to be in danger while running, not all of them felt that fear or changed their running practices because of that fear. In many cases, the participants were defiant in the face of this expectation that they be afraid. Several times, when I asked the participants if “being a woman” impacts when or where they run, they would respond similar to this exchange that I had with Ruby:

Katie: Do you think that where you run or when you run is at all shaped by the fact that you’re a woman?

Ruby: Um, good question. I would say for me, no. Because I always fight against that. In [the Peace Corps], you know, people were shocked when they knew that I went out running by myself in the early morning. And the first question I would always get was, “Why aren’t you afraid? Aren’t you afraid?” And I would say, “Why would I be afraid?” I want them to go into detail, and they never wanted to say why. No, nobody wants to go into detail. And I’m like, I won’t live my life in fear.

This sentiment—that others felt that they should be afraid but that they were not—was echoed by Jane, Amanda, and Irie. This did not make them immune to any fear while running, but they purposefully did not change their running practices to any great extent.

Sexual harassment did come up in these conversations as an issue that they were aware of but nonetheless the fact that they are on the move, and often at early times, made them feel more protected. This was illustrated in my conversation with Jane:

Katie: Do you think that being a woman impacts where you run or when you run?
Jane: Not in [City]. My parents were always a little bit nervous. And, I probably should care more, but at the same time, is someone really awake at 6 am waiting to be predatory? And probably the answer is yes, but I—I don't know. I've definitely had harassment and like, things happen. Nothing that anyone else hasn't had happen. But it just kind of comes with it. But it doesn't change the times that I go out or what I do or where I go. If I lived in a different neighbourhood, I think it would.

While Jane finds it regrettable that sexual harassment happens to runners, it is assumed to be a part of the experience and there is little that she can do about it and she does not want this to get in the way of her engaging in an activity that she loves. Finally, Irie discussed how strong she feels because of her workouts and how this gives her the confidence to move through situations without fear:

Irie: I feel safe in this city. And I'm a formidable person [laughs]. I walk down the street, I grew up in the city, so you have to be very aware.

Katie: Mmhmm.

Irie: And even in this city, sexual, that talk on the street, you know, street harassment, is so high.

Katie: Mmhmm.

Irie: So, like, I'm formidable. You know? Like, there is something here. So, you're coming to attack me, you must really be a very dangerous person [laughs]. Like I said, people attack all types of people of different sizes or whatever, but I weigh more than 90 pounds [laughs]. You know? I look pretty strong, so at least

that's what I tell myself. I feel like that's the way I walk in the world. And so, no, I don't.

The strength that Irie has built from working out makes her feel “formidable,” like a person who is less likely to be attacked because she could fight back. These forms of physical empowerment illustrate how strength-building can challenge stereotypes about feminine weakness and increase confidence while moving around the world (Velijia, Mierzwinski, & Fortune, 2013). These narratives of resistance illustrate how space is always being constructed in a mutually constitutive relationship to the bodies in those spaces. Running through a space is a different experience than walking through it. Feeling strong can change the production of space. The presence of “others” can, too.

Self-tracking and gendered and racialized safety. These narratives show that the sense that women should be afraid to run by themselves, in the dark, in dangerous neighbourhoods, with dangerous people who might sexually harass them or attack them— is a powerful one. Whether women personally feel this fear and substantively change their running practices in response to them or not, they are aware of the potential for danger while running. I argue that self-tracking is enmeshed within this context where women are feeling afraid or are encouraged to feel afraid, namely due to the fact that self-tracking keeps a record of their whereabouts. Two different understandings of the influence of self-tracking on running safety are worth noting here: that broadcasting one's location can increase safety, and that this same practice can decrease safety. I now consider the digital materiality of safety and self-tracking, as the agency of running environments entangles with digital environments.

Tiana took the first perspective when she said that self-tracking makes her feel safer when she is running because if something were to happen to her, her data could be pulled, and someone would know where she was. She explains:

Tiana: I guess maybe there's a little bit of comfort in that, if something happens, I have my phone. Not that the trackers [such as the Runkeeper organization] will call the police, but like, there's some sort of record.

Katie: Yeah.

Tiana: You know? A record...for, like, god forbid, something happens. Like, you know where you were. Or you can prove where you were not, I don't know [laughs].

Katie: Oh yeah. It could come to that, I guess.

Tiana: ...Then how you can sort of pull it out as you need it. ... But for myself and having it on myself, I think is helpful for anything, like safety. If something were to happen to me, and the app is tracking me, I know that it can pinpoint exactly where I was. Anywhere something happened, or where I stopped, and where my pacing all of a sudden slowed down. So, I think about that too, as a woman, running. Sometimes it gives me a little bit of comfort in that someone knows. Someone in the sphere knows where I am.

As Tiana stated above, she is very concerned about people perceiving her to be a threat or not viewing her as sympathetic because she is African American. While perhaps she cannot rely on people in her immediate vicinity, she hopes that the digital record of her whereabouts could help her if “something happens,” because “someone in the sphere knows where I am.” She was also the only participant to point out that self-tracking can illustrate that she was not somewhere, in the case of being accused of a crime. In this way, self-tracking represents a safety net that is non-discriminatory, unlike Tiana's other interactions with the world and places as she runs. However, I take Cooky et al.'s (2018) point that access to big data sets “is controlled by companies that privilege corporate, governmental, or private research entities interested in extracting Big Data, often towards capitalist gains” (p. 3). What happens once data is collected by corporations, and who can

view this data, is typically opaque. Whether this potentially life-saving information would be accessible to those who could help Tiana remains to be seen. It is certainly possible, as Fitbit data has been used to contradict alibis and to find the body of a female runner who went missing while she was running (Crist, 2018).

Conversely, Natasha contended that self-tracking has made her less safe by broadcasting her running routine—the places she runs, and when she runs—out to anyone who chooses to follow her on the Strava app. She explains her uneasiness with a particular person in France who had been giving her “kudos”—a congratulatory ‘poke’ on the Strava app—after she had left France and returned home to the United States.

Natasha: I also use Strava. And I got concerned about my safety, because there are core segments... that people who ran the fastest, they're on some leader board. And there's a leader board for women, and for men. If you run certain segments at a certain pace, you can go on and see who ran it, and who ran it faster or slower. And this person from France started looking me up when I was running in France. ... But now he gave me “Kudos” on runs I did in the United States. And I was like, no.

Katie: Yeah.

Natasha: So, that's why I made my account invisible... It's still visible to myself but not to my friends anymore, not to my followers, actually. I do find it a little bit stressful because everybody can see exactly... how many miles I'm running every week. When I'm running progressions, how fast, how slow, where exactly. I kind of find that, you know, disturbing, I don't know.

Katie: Yeah. ...What feels unsafe to you about people having access to that much data?

Natasha: Well, the thing is, you can see a lot... Usually you can only see people when you follow them, you can see what they're doing. But when you have certain course records, or certain times that you're competing with other people, they can actually click on you and they can see when you ran that segment. And who you were running with. That kind of worries me. I think you mentioned running as a female, sometimes, the last couple weeks I've been running more by myself in preparation for the marathon. And I don't need people to be able to see what time I run, especially when I run at 5:30.

The fact that people can see where she runs, and at a time where it would be secluded and thus more at risk, has changed her self-tracking practices because she is uncomfortable with people knowing so much about her runs if she does not know them. In particular, she worries about running in the same places at the same time in such a way that a person tracking her would get a sense of her schedule and start following her. I asked her later about whether changing her running place and time was something that had exclusively resulted from her experience with the Strava app. She explained:

Katie: So, if you didn't track, would you have the same concerns about running in the same place at the same time?

Natasha: Hmm, I always change locations. I mean, you can never predict when something is going to happen....

As this quote illustrates, this concern about people knowing her schedule did not originate with self-tracking. The sense that “you can never predict when something is going to happen” has long influenced her perceptions of safety while running. However, her use of an app that tells people that she runs in a particular segment of a trail at a particular time has exacerbated that feeling of being watched, as it expands the network of who can watch and the ease with which they can do so—including from France.

Tiana and Natasha's experiences show that safety is a fraught issue for women runners, and that self-tracking can intersect with those issues in conflicting ways. Apps that share a person's location in such a way that a follower could know their schedule and find them assumes that the person is not concerned about their safety in public— an assumption that the participants in this study show is a dubious one for many women. While anecdotal, in her interview Natasha stated that the men that she follows on Strava share considerably more information on the app than women do, potentially for this

reason. Social media apps are never politically neutral; they are produced by people in material worlds who possess a particular worldview. On the other hand, Tiana highlighted how her data could be used to find her if something should happen. This occurs in a context where Tiana does not trust that the people around her would help her, but perhaps the impersonal, ‘neutral’ collection of data, might not discriminate. Whether her data would be accessible is another question, as data access is far from democratic (Kennedy & Moss, 2015). Lupton’s (2016a) metaphor of “eating data” can provide some insight here. Drawing on Mol’s (2008) description of eating an apple, where actorship is displaced throughout the body and even beyond the body, Lupton (2016a) considers data collection to be a similarly distributive and opaque process. The participants “eat data,” so to speak, when they self-track while running. What happens while they are “eating that data” is in many cases beyond their control and knowledge. If they think to do it, they can minimize who can see their running data. But where else this data might travel, beyond one’s privacy preferences, is not readily accessible to users.

Discussion: Identity, Emplacement, and the Self-Tracking Runner

In this chapter I have explored how the sensory experience of running through place is shaped by fitness tracker use. Through an examination of ten women’s self-tracking practices as they relate to running and walking, I have argued that running data does not exist separately as a representation of the body and the external environment, but is instead an entanglement of bodies, data, and place. This data, along with the wind, weather, trails, cars, digital infrastructures, running bodies and other bodies, socialities, and more, are enmeshed together to produce the running environment (Pink & Fors, 2017). In this study of running and technologies I have looked beyond the insights of

embodiment to those of emplacement, considering them together. The world around us has a say in what we can do with it. Non-humans can hinder our ability to gather data, change our pace, and push us to run in different places and at different paces.

The ways that runners, landscapes, and wearable technologies come together are always in flux and in a state of becoming. The ecology of people and things, runners and running trails, distance and distance-measurers, affect and sociality, are unique place-events (Pink, 2011). Throughout this chapter I have argued that digital technologies are influential agents within these ecologies. As the narratives of the participants illustrated, the digital materiality of self-tracking can profoundly change how a runner experiences space, whether it is through encouraging them to view their running spaces through the metric of distance or steps, or by assigning numbers to somatic experiences such as the phenomena of “conversation pace.” Additionally, these practices of data collection can include forms of lateral surveillance (Andrejevic, 2002, 2006) where others are enabled to view the data of the participants, which can also alter their experiences of space. The digital materiality of self-tracked running bodies and running places is entrenched within an uneven digital context, where assumptions about a self-tracker’s willingness to share their location with other platform users, and access to this location data, privileges some but not others. Given women runners’ fear of violent men, or the encouragement to feel this fear while running, the sense that others are watching them can be a source of anxiety or comfort—depending on who is watching. The amplification of surveillance through self-tracking technologies may make some people feel safer, while others may view it as an opportunity for digital stalking.

Data collection is not a truth-capturing activity that perfectly reflects a runner's actions. If the above discussion of gendered fear is any indication, numerous forms of data are available to runners and they can choose to collect and share them or not. People can forget to turn on their watch. But to limit data collection to human interests and activities would be a mistake. Instead, I think of running data collection as a truth-constructing activity where steps, distance, and pace are built through interactions between human intentions, space, digital infrastructures, affects, gendered discourses, and more. When I use the term "construction," much like Latour (2005), I am not implying that this data is fake or not real. I mean to say that there are numerous humans and non-humans—measurements, digital materialities, and material discourses about gender, race, sport, and bodies—that build a datafied run. Running through datafied space as much produces these gendered, raced, and athletic identities and materialities as it is a product of them. As Latour (1999) argued with respect to the work of humans and non-humans in scientific research, it would be silly to view the scientific ideal as cutting out humans (and their biases) entirely. Science depends on humans who, along with non-humans, come together in networks to allow the objects of study to be affected. Similarly, the datafication of space and running bodies is not a way of cutting out humans from knowledge production practices. Networks of humans and non-humans come together to measure and quantify running through place.

Does the practice of self-tracking through place and space instrumentalize the environment, turning it into a gym of sorts where they select places to run based on specific, measurable goals that they have for their run that day? This is certainly true in some instances, as was the case for participants who assess their runs and their

environments through a quantified lens, potentially undercutting the therapeutic potential of landscapes that was discussed by van Ingen (2004). Additionally, the goal of producing ‘accurate’ data about a run can negatively impact a runner’s joy by creating stress about possibilities for “broken data” (Pink et al., 2018) and by creating a sense of being watched and potentially followed that creates a sense of fear. These are important considerations. However, in many instances the participants were excited about the datafication of space, such as Jane who saw it as a game to guess how many steps it takes to get from home to the allergist. Natasha and Elizabeth saw the datafication of their bodies and environments as necessary for training to achieve their desired marathon results, as they would not know how fast they should be running if they relied on feelings and perceptions alone.

The degree to which the datafication of running through place impacts joy depends on the individual runner, the places that they run through, and their goals. When running is understood through a competitive, performance-based lens—where running harder and faster is paramount—these forms of datafication can bring self-trackers pleasure because it helps them to bring their running more in line with those goals. Sumartojo et al. (2016) describe these forms of data collection as having a future-orientation, meaning they are working to create a body through training that can move through the world in particular, faster ways. Those who are not meeting their goals, or who view other aspects of running such as pleasure and beauty in the scenery as being more important than their time or pace, may find the datafication of their bodies and running spaces more alienating. This should be considered by public health practitioners and workplace wellness advocates who are seeking to encourage more physical activity through fitness tracking. While it

may be encouraging to some—perhaps those who would enjoy walking and running in the first place—it may be deeply disaffecting to others.

Chapter 7: “There’s Only so Much Data you can Handle in Your Life”: Accommodating and Resisting Self-Surveillance in Women’s Running and Fitness Tracking Practices

Note: This chapter was submitted to the journal *Qualitative Research in Sport, Exercise and Health*, receiving an accept with major revisions decision. This paper was also awarded the 2018 Barbara Brown Outstanding Student Paper Award (doctoral category) from the North American Society for the Sociology of Sport. While aspects of this chapter are redundant as they were presented in previous chapters, I felt that it would be beneficial to the committee to read this manuscript in its entirety. This chapter incorporates many (but not all) of the comments that I have received from reviewers.

In the spring of 2018, the fitness tracker manufacturer Fitbit introduced a new metric to their self-tracking slate: the menstrual cycle. Through what they term “female health tracking,” users will have access to “better body knowledge” of “the impact your menstrual cycle has on your overall health” (Kosecki, 2018, para. 9). “Female health tracking”—presumably a euphemism to avoid eliciting discomfort amongst the non-menstruating—adds to the already extensive forms of tracking that are enabled by fitness trackers: steps taken, distance walked, active minutes, heart rate, and more. The widespread use of Fitbits, as well as other fitness tracking devices such as Garmins and Apple Watches, is emblematic of the ‘Quantified Self’ (QS) movement, where participants utilize digital self-tracking devices to generate a broad range of data on their health and fitness for the purposes of self-improvement (Lupton, 2016b). The QS has emerged in a context of biopolitical surveillance where self-monitoring with a goal of

maintaining one's health and fitness is considered an ethical responsibility so as to avoid becoming unhealthy and thus burdensome to others (Ceyhan, 2012; Foucault, 2004). At the same time, gendered expectations for beauty and health have led to women becoming disproportionately represented amongst fitness tracker wearers (NPD Connected Intelligence, 2015) as weight loss and self-discipline for the purposes of beauty are often considered women's endeavours. In other words, "female health tracking" is only the latest in the trend to market tracking devices to women.

In response to these technological developments and practices in self-tracking more generally, considerable scholarly attention has been paid to how the ease of numerical data collection may change people's relationships to their body and their expectations for self-mastery (Lupton, 2016b). This privileging of data over feelings might lead to the instrumentalization and datafication of movement to the point where it is only about reaching numerical goals rather than pleasure or spontaneity (Lupton, 2012, 2016; Williamson, 2015). Indeed, research suggests that fitness tracking practices can lead to feelings of shame, competitiveness, and failure when wearers do not reach their goals (Drew & Gore, 2016; Fotopoulou & O'Riordan, 2017; Sanders 2017). The collection of digital data can have a profound effect on how runners make meaning from their running practices (Carlén & Maivorsdotter, 2017). However, much of the literature on the topic has focused on the *possibilities* for excessive discipline and self-surveillance, rather than examining the technologies in practice to apprehend if these possibilities are realized (see Lupton, 2012; Sanders, 2016). The fact that people increasingly have access to data about their bodies, fitness, and health does not necessarily mean that they want all of this data or are attentive to it (Esmonde, 2018; Didžiokaitė, Saukko, & Greiffenhagen, 2018). How

people resist quantification is an important topic that has been underexplored within the sociology of sport, particularly with regards to gendered expectations for self-tracking. Given the ways in which wearable technologies appear to be reshaping the landscape of physical culture, it is important for sociologists of sport to attend to how these technologies impact the experiences of those who wear them and whether these possibilities for discipline and rationalization for the purposes of beauty and fitness—to the point of joylessness—are realized.

To examine the gendered ways in which wearable technologies are utilized in fitness practices, I look to the experiences of ten women who identify as self-tracking runners to better apprehend how self-surveillance through a fitness tracking device is both accommodated and resisted. I utilized ‘running interview’ participant observation and semi-structured interviews to learn from these women how they act as agents within the QS and fitness culture. Drawing on a Foucauldian conceptual framework of surveillance, discipline, and technologies of gender, I utilize the method of Foucauldian discourse analysis to bring to the fore how these women are engaged in power relationships with their fitness trackers.

This paper is intended to contribute to empirical research that has sought to understand the lived experience of self-tracking (see Lynch & Cohn, 2015; Pantzar & Ruckenstein, 2017; Pink, Sumartojo, Lupton, & La Bond, 2017; Smith, 2017). Looking specifically to women’s running practices, I consider how feminized beauty ideals intersect with women’s experiences of fitness tracking, a topic that has largely been unexamined within the literature (see Sanders, 2017). In doing so, I also contribute to literature on the forms of resistance to self-tracking that people enact (see Nafus &

Sherman, 2014), specifically focusing on the strategies that women utilize to avoid conforming to the discourse of ‘techno-optimism’ (Ruckenstein & Pantzar, 2015) where self-optimization and feedback loops of behaviour change are emphasized.

In what follows, I provide an overview of the theoretical and substantive literature that informs this project, as well as the methods of this study. I then move to the findings of this study, where I detail four of the strategies that the participants utilized to resist forms of datafication and self-tracking. I conclude by considering if these strategies truly represent ‘resistance’ to self-tracking.

Theoretical and Conceptual Framework: Foucault, Surveillance, and (Quantified) Technologies of Gender

Due to his wide-ranging focus on the workings of power, the theorizing of French philosopher Michel Foucault has been utilized extensively within the sociology of sport (Andrews, 1993; Cole, 1993; Markula & Pringle, 2006), as well as within critical examinations of the QS (Lupton, 2012; 2016; Williamson, 2015). Foucault locates the body as a central site for power relationships and the reproduction of norms (Foucault, 1990; Markula, 2003). As Cole (1993) puts it, “the body is always already ‘in the grip’” of power and knowledge (p. 84). The concept of biopower, or power over life, locates power both within the bodies of individuals as well as across populations to foster norms regarding life and how to live well (Foucault, 1990). While there is certainly an external impetus to conform to norms to avoid moral opprobrium, a central facet of biopower is that the citizenry is encouraged to take up these modes of control and to manage themselves based on these norms. Surveillance is an integral part of this exercise of power, as a person under surveillance is not only more likely to act in such a way that

conforms with expectations, but even further, they often internalize dominant beliefs and come to enact those norms because they feel that it is the right thing to do (Foucault, 1995; Markula & Pringle, 2006). Scholars have linked Foucault's notion of surveillance to the rise of mobile health (often referred to as m-health), wireless digitally-connected devices can relay health-related messages, track, measure, and record health-related activities, and nudge users to engage in more health-promoting behaviours (Lupton, 2012). With the ubiquity of these technologies comes a seemingly inescapable expectation of self-examination and self-responsibilization (Lupton, 2012).

The QS movement is a manifestation of the present discursive regime of biopolitical surveillance, as these devices are emblematic of the common-sense assumption that one should always be striving to be faster, fitter, and leaner by tracking pace, heart rate, and calories (Sanders, 2016). Further, the QS movement is rooted in a discourse of dataism, which represents the notion that large data sets are able to provide true, objective, and predictive insights into the world that were previously impossible (boyd & Crawford, 2012; van Dijck, 2014). The 'techno-optimism' (Ruckenstein & Pantzar, 2015, p. 406) of the Quantified Self (QS), as presented in the magazine *Wired*, where it has been heavily promoted, centres around four main themes: transparency of the self through access to numbers, optimization of health and performance with the help of those numbers, enacting a feedback loop of data and behavioural change, and biohacking through self-experimentation and manipulation (Ruckenstein & Pantzar, 2015). The idea of a feedback loop is particularly germane here, as it is assumed that knowledge will always be acted upon because it is available. These notions of self-improvement and self-control through self-knowledge are reflected in fitness tracker

advertisements, suggesting that these are tools to living a better, healthier, happier life. Data is positioned as inherently more reliable than feeling (Crawford, Lingel, & Karppi, 2015).

Extending this work, Lupton (2012) uses the term “surveillance society” to describe how in the modern, capitalist moment, self-tracking technologies enabling the monitoring, measurement, and recording of the citizenry are utilized with increasing ubiquity. Through health surveillance, those deemed to be at greater risk for disease are subject to further monitoring, which can now be done remotely through mobile health technologies. Haggerty and Ericson (2000) refer to the “surveillant assemblage” as “abstracting human bodies from their territorial settings” which are then ‘reassembled into distinct “data doubles” which can be scrutinized and targeted for intervention (p. 606). Many of the aspects of this digitized surveillant assemblage are similar to the forms of surveillance that have been characterized previously in public health, such as a focus on self-knowledge that is expected to lead to better health (see Lupton, 1995). The difference, critics argue, is that mobile health technologies enable the collection of ever greater forms of data that can be scrutinized by both the subject of the data as well as other parties, such as doctors or employers (Lupton, 2016b).

A central concern within Foucault’s work is that of subjectification: how institutions, sciences, discourses, and people themselves work to “transform human beings into subjects” (Foucault, 2003d, p. 126). Foucault explored three main ways in which this occurs: through scientific knowledges, through “dividing practices” (p. 126) where people are divided into different identities such as mad and sane, and technologies of the self, wherein people turn themselves into subjects (Foucault, 2003d). As an

example of “dividing practices,” Cole (1993) has characterized “technologies of femininity” as the techniques, practices, and forms of knowledge that are “deployed to sculpt, fashion, and secure bodily shapes, gestures, and adornments that are recognizably female” (p. 87) in contrast to that which is recognizably male. While in some ways women’s participation in fitness practices can challenge male-female binaries by illustrating women’s strength, Cole (1993) contends that women’s fitness practices tend to reify feminized corporeal norms and the gendered status quo. In my examination of women’s self-tracking practices, here I argue that “dividing practices” are at play with regards to masculine and feminine body norms through technologies of femininity, as well as the division between fit and unfit bodies through quantification.

Finally, keeping in mind the productive aspects of power, I explore how these dividing practices both reproduce the self-responsibilizing and self-optimizing subject while also creating opportunities to resist self-tracking. Foucault’s understanding of power is considerably different from that of critical theory and hegemony (Markula & Pringle, 2006). For Foucault, power is not possessed by individuals or concentrated within the state; it is not “the renunciation of freedom, a transfer of rights, or power of each and all delegated to a few” (Foucault, 2003d, p. 137). Instead, as Foucault (1980) explains,

What makes power hold good, what makes it accepted, is simply the fact that it doesn’t only weigh on us as a force that says no, but that it traverses and produces things, it induces pleasure, forms knowledge, produces discourse. (p. 119)

This notion that power is not only “a force that says no” is, as Foucault says, a reason that it is so pervasive. Power produces identities, discourses, and forms of knowledge that people may find restrictive, pleasurable, or they may not think about them at all. Power is

everywhere, and because of this, to resist power is not to put oneself outside of power; it is to reconsider how power is exercised (Markula, 2003). In a power relationship, actors are able to make moves to challenge and deflect: “where there is power, there is resistance” (Foucault, 1990, p. 95). There are always cracks and fissures in power that leave room for challenges to dominant discourses. In the absence of this ability, that relationship would be one of domination rather than power.

Following Foucault, I would argue that it is vital to examine these fissures of power and how people use these technologies as agents. Numerous scholars have examined people’s lived experiences with personal data collection, suggesting that self-tracking is deeply personal (Pantzar & Ruckenstein, 2017; Pink et al., 2017; Smith & Vonthehoff, 2017), affective (Smith, 2018; Ruckenstein, 2014), contextual (Didžiokaitė et al., 2018), and messy (Pink et al., 2018). For instance, without opportunities to make sense of data, or a belief that the data is important, these devices may not have much of an impact (Lynch & Cohn, 2015). Pantzar and Ruckenstein (2017) use the concept of “situated objectivity” (p. 2) to consider how people’s expectations, cultural context, and experiences shape how they interpret and act upon self-tracking data within their lives. Gardner and Jenkins (2016) found that when confronted with an ECG and an EEG, participants at first found the data alienating. However, when given the time to make sense of the data on a personal level, they incorporated it into their bodily narratives. This suggests that the datafication of the body is not a static act but a process of negotiation.

I take a similar approach to studying agentic practices of self-tracking here, but with a feminist lens to examine the gendered norms at work that are both accommodated and resisted. While feminist sociologists of sport have illustrated the myriad ways in

which physical activity and fitness practices can discipline women into docile bodies seeking to conform to dominant beauty ideals (Cole, 1993), it is also important to consider how women are aware of these norms, find pleasure in these practices, and find opportunities to resist hegemonic ideals of female beauty (Markula, 2003). This type of analysis has not been applied within the sociology of sport on digital fitness tracking, a gap that this paper seeks to address.

Methods

Methodological considerations. In this paper I take an epistemological constructionist perspective, whereby the researcher and the researched co-create knowledge and that the researcher knows reality only through a situated lens rather than having an unfiltered or ‘true’ perspective on the world (Smith & McGannon, 2018). Throughout this paper I describe a plurality of positions, viewpoints and experiences, from my particular standpoint as a researcher (Markula & Silk, 2011). Stemming from this epistemological position, I take a non-foundationalist approach to evaluative criteria, where the criteria used should be open-ended and dependent on the philosophical underpinnings of the project (Smith & McGannon, 2018). I consider thick description, extended engagement, reflexivity, and consulting numerous sources and methods as extending my ability to understand the numerous social worlds within a given empirical site.

Participant recruitment. Prior to participant recruitment, ethics approval was sought and obtained through the institutional review board. Participants were recruited based on three main criteria. First, I recruited women only so as to explore the experiences of those who are more subject to expectations surrounding physical

appearance within biopolitical surveillance regimes. This was also due to my own safety concerns about running in isolated areas with male participants. Second, the participants had to consider themselves to be regular runners. Third, prospective participants had to use a self-tracking device of some kind as part of their running. This could include a designated watch for self-tracking or an app such as Runkeeper or MapMyRun on their phone.

The first five participants were recruited through a running group in [City], which I will refer to here as the [City] Running Club. I began running with this club intermittently in September 2017, and over the course of the next few months I recruited four women that I met in the group and one that I contacted through the [City] Running Club listserv. The next five participants were recruited using social networks and social media. Of the five participants that were recruited through social circles, four participants contacted me to participate, and I contacted one participant who had consented to share her e-mail with me through a mutual contact.

In all, ten women were recruited to this study, ranging from ages 26 to 45. Five self-identified as white (Ruby⁷, Natasha, Elizabeth, Karen, and Carrie), three as Asian (Amanda, Jane, and Myra), and two as African American (Irie and Tiana). All had completed a university degree (in many cases more) and considered themselves to be middle- or upper-middle class.⁸ The majority of the participants had completed a

⁷ All names used are pseudonyms

⁸ While the group that was interviewed is fairly privileged through social class and education (across varying axes, of course), these privileges align them typical fitness tracker users (NPD Connected Intelligence 2015). While these privileges allow them to work on themselves—their bodies, their souls, their sprints—in ways that are not available to everyone, I would argue that the expectation that people quantify their bodies for the purposes of self-mastery and health optimization is *not* limited to the privileged. These technologies of normalization are increasingly an expectation for children in schools, employees in the workplace, and as an incentive for health insurance purchasers (Lupton 2016).

marathon or a half-marathon at one point in their running careers, and most were actively training and participating in marathons or half-marathons at the time of the interview. Their uses of self-tracking devices ranged from data-intensive self-tracking both while running and going about their everyday lives, to casual use exclusively during runs.

Data collection. *Running interviews.* The running interview method that I used in this study is a variation of the walking interview (Evans & Jones, 2011; Kusenbach, 2003; Palmer, 2016). Researchers have walked, cycled, and toured with participants to gain a greater understanding of their relationships with place and space (Evans & Jones, 2011). Through this method, “researcher and participant are more exposed to the multi-sensory stimulation of the surrounding environment” (Evans & Jones, 2011, p. 850). For researchers who are engaging in walking tours, the tour can range from a natural ‘go-along’ where the route is solely determined by the participant who would have been walking that route anyway to a route planned and guided by the researcher (Kusenbach, 2003). For this research, I ran with participants along the routes that they typically ran. During these runs, I asked the participants to give me insights into their self-tracking practices by narrating their thoughts and actions, for example, their decisions to cross the street, their thoughts about our surroundings, and their actions with their self-tracking watch (such as starting or stopping it, looking at it, responding to the data). I captured my recollections through field jottings that were then turned into full-length field notes the next day. While my field notes are not directly reproduced in this paper, my observations during the run informed many lines of questioning during the audiorecorded interview and thus shape the findings presented here.

Walking interviews (or in this case, running interviews) have a number of advantages. First, walking interviews facilitate discussions of running practices to a greater degree than do sedentary or traditional interviews where participants are asked to discuss those practices without the prompts that occur while running (Evans & Jones, 2011). Second, since I was able to go along with the participants on courses that they run on regularly, I got a better sense of the places and the practices that they were telling me about in the interviews as I had seen many of them firsthand (Palmer, 2016). Third, walking interviews facilitate conversations between the researcher and participants. For example, the natural breaks in conversation that occur while walking or running are not thought to signal the end of the interview, making it easier for an interviewer to pick up the conversation again and continue with the discussion (Evans & Jones, 2011). Finally, the act of running with another person helped us to develop rapport that translated into a more productive semi-structured interview at the end of the run. Running can be an intense, visceral, surprising, joyful, painful, and exhausting experience that can lead to feelings of camaraderie.

Semi-structured interviews. After the running interview was completed, the participant and I went to a location of their choosing for the semi-structured interview. In semi-structured interviews the interviewer is an active participant in the discussion and can probe for more information that arises in the context of the interview. I drew on an interview guide of open-ended questions that sought in-depth knowledge from people who know a lot about the topic being explored (Markula & Silk, 2011). Interviews lasted between 50 and 110 minutes. The interview guide contained questions pertaining to the participant's running routine, their experiences of running, their specific uses of self-

tracking technologies, their engagement with data, their social media use, and their experiences of place while running.

Foucault's theory of discourse. I look to Foucault's theory of discourse, which is appropriate for the analysis of texts such as interview transcripts and field notes that were created by the author. (Markula & Pringle, 2006) The goal of this analysis was "examining the workings of discourse and power relationships" as well as "social practices that regulate the production and circulation of statements and perceptions of reality" (Markula & Pringle, 2006, p. 105). To this end, researchers utilizing this mode of analysis aim to "excavate the discourses that systematically formed the interviewees' knowledge... and to explore how these discourses *governed* the interviewees' statements and perceptions" (p. 106). The focus is not on the syntax of the participants' statements but on their situatedness within a particular historical, social, and technological context (Cheek, 2004). Language is not value-free or a direct reference to a singular reality but is instead productive of those realities within relations of social power (Markula & Silk, 2006).

The analysis did not follow a stepwise guide. Instead, I became close to the data by reading through transcripts and creating themes and connections in the data. As I was describing these themes and thinking through the types of resistance that I saw amongst the participants, I returned to the literature to connect those themes to power relations and the gendering of physical fitness practices and technologies. As there is no single discourse that shapes how participants can think about their uses of self-tracking (Cheek, 2004), throughout the analysis I was attentive to multiple and conflicting discourses,

rather than attempting to find a coherent essence of each individual participant's experiences (Foucault, 1990).

Findings: Accommodation and Resistance in Self-Surveillance

The purpose of fitness-tracking devices is to promote healthy behaviours, to push wearers to engage in more or better fitness practices, and to be more mindful of their health habits such as their diet or their sleep. While this is the expectation, I argue here that health and fitness data collection and analysis is considerably messier than that, as users simultaneously accommodate and resist these practices. In what follows, I look at some of the strategies of resistance that the participants employed to place some distance between themselves and their data. The first strategy is to label some data as excessive, and thus unnecessary and undesirable to collect. The second strategy of distancing oneself from the data involves purposeful decision-making about when they will track, and when they will not. Third, I discuss the strategy of invoking one's humanity and fallibility as a way of limiting disappointment from unfavourable data. Finally, I argue that the participants re-valued feelings over data in some instances to avoid digital tracking.

Strategy one: Labelling some forms of data as excessive. While all of the participants in this study consider themselves to engage in self-tracking, this does not mean that they individually care about all forms of data that are made available to them. In many instances, the participants have lines that they felt could be crossed as to how much data they were willing to collect about their running or their overall fitness. For example, Myra currently tracks only her distance when she runs. While she would

previously time her runs in an effort to become faster, she explains why she no longer does this:

Myra: I mean, I used to stop and start my watch regularly about five years ago. And now those things don't seem to matter much anymore. I think that stuff started when I started teaching, and going back to school and stuff... That just takes up so much more brain power [laughs] and energy that it's just not that big of a deal.

Here Myra is positioning her running as lower on her priority list than school or her job, and thus not worthy of extensive data collection and analysis. Carrie spoke similarly about the possibility of tracking steps, stating that "I would kind of like to track that, but there's only so much data you can handle in your life." Ruby also had a minimalist approach to the data she was willing to track, besides pace and distance. With regards to heart rate monitoring, which her watch does not do, she said "If I got [a watch that tracks heart rate] then I'd probably be excited and happy, but it wasn't anything I was going to pay extra for."

Self-tracking is a form of surveillance that creates quantitative data categories with associated identities: as a fast or slow runner who is above or below what is deemed an appropriate pace, as a high or low stepper by being above or below 10,000 steps, or as someone with a fit heart or a heart that has to work too hard based on how one aligns with heart rate recommendations. It is through statements such as these that the participants reject these processes of subjectification that occur through these particular forms of data collection. Myra does not identify as a runner who has a particular pace or time; Carrie does not identify herself based on the steps she takes throughout the day; and Ruby will not go out of her way to assess her fitness based on her heart rate.

In other cases, the participants specifically declined to track their caloric consumption because they were concerned about it becoming obsessive or unhealthy.

Carrie discussed the stress that she would feel if she became attentive to calories:

Carrie: I would only be somewhat interested [in calories] too. I think that can also maybe be a little bit stressful, because I don't want to mix thinking about calories and stuff with running too much. One of the things I like about running is I feel like I can just kind of eat whatever I want afterwards, and that's really nice. It's just stressful to kind of like think about that.

Natasha has a similar reason to avoid calorie tracking, which centred on her previous experience with an eating disorder:

Natasha: I was 15, and I did the stupid calorie counting. I don't want to go back to that.

Author: Yeah.

Natasha: And I work out so much, like, the concern is not 'How many calories I burn,' the concern is just that I get my nutrients and that I get my electrolytes. So, I don't start counting calories.

Author: Yeah. What did you not like about that, you said that when you were 15, and you don't want to go back to that?

Natasha: I was really unhealthy. I mean, I was skinny. I had an eating disorder. I don't want to go back.

Despite both Carrie and Natasha's contentions that because of their running they need to worry about eating too little rather than too much, thus obviating caloric restriction practices, both also acknowledged that they have felt pressure to lose weight to conform to dominant feminine beauty ideals. In this context where weight loss is always encouraged, calorie-counting alongside running might become unhealthy (Bordo, 2003). Their concerns about becoming obsessed with their diets illustrate how the body is always a site of struggle due to patriarchal power and commercialized beauty norms (McLaren, 2002, even as they admit that their running practice gives them leeway to not

worry about calories. Together with these stresses and pressures, women variously accommodate and reject the pathways to bodily perfection. The body is indeed a project (Markula, 2003), but how it is a project—and to what ends—is far from uncontested.

Strategy two: Choosing not to track every day. In addition to not tracking every metric that is available with a fitness tracker, some participants distance themselves from their data by declining to track every run, or track everything, every day. For example, Jane discusses how she does not always track her runs because worrying about her pace “zaps all the joy out” of running:

Author: Can you talk a little bit about how you make a decision about whether you’re going to track or not?

Jane: Yeah, so unless it’s a big training run, I feel like sometimes it like zaps all the joy out if you’re always worrying about your pace. And since it was a shorter run, it’s Sunday morning, I just didn’t feel like it was something that I needed to worry about. I just kind of wanted to go out and just enjoy.

Author: Does tracking stress you out a little bit?

Jane: Yeah, I think sometimes. I mean, making sure that you’re hitting your numbers and everything.

Going out and enjoying a run is harder for Jane when she has to worry about her data and making sure that she is hitting her goal numbers. While Jane does gather a considerable amount of data on her runs, she refuses to engage in this form of self-surveillance every time that she runs because she positions joy as important to her running practice in addition to tracking her progress through numerical self-surveillance.

A similar approach to not tracking every run was undertaken by Carrie. Carrie not only declines to track every run, but she also does not save every run to her Garmin dashboard so that disappointing runs will not be visible to her as she looks at her data. She explained this move to me:

Carrie: I don't always use it [my GPS watch] for my runs. I only do it for when I'm trying to do a run where I want to get a good time. Because I find it stressful sometimes if I want to just go out and have a relaxed run. ... I don't always save my runs, and that's because sometimes...I don't know how far I'm going to go, I'll go out and see what the day brings, kind of see how I feel. And in those instances, I'm just tracking the distance. And I just don't want to have a record of what my pace is.

Author: Yeah, yeah.

Carrie: So, when I look at my Garmin dashboard, I actually don't have that many runs 'cause unless I'm like, 'Oh, that was a good run,' or I feel like I put in a decent effort, I won't save it. I feel like just, overall, it brings pressure. ... I try to keep some distance from it as well so that I'm not constantly storing it.

By declining to save an unflattering run to her Garmin dashboard, Carrie illustrates how her aggregated data shapes how she comes to see herself as a running subject. Through the curation of her “data double” (Haggerty & Ericson, 2000), or a representation of her running body subjectivity, Carrie exercises agency by deciding what should be included and cared about versus what should be disregarded and thus not worried about. Through this practice she is better able to enjoy her less-structured runs because they will not figure into her “data double” on her Garmin dashboard. While these tactics of not tracking every day or every run do not make Jane and Carrie immune to these feelings of stress, they are one way that they can manage the degree to which they feel bad about their data.

In the case of collecting data on caloric consumption, the participants who chose to engage in this form of self-tracking—Tiana, Irie, and Jane—all said that they were inconsistent in this practice, largely because of the inconvenience of calorie-tracking rather than concerns about becoming obsessed with it. Tiana spoke about how her life gets in the way of tracking everything that she eats:

Author: When it comes to tracking your food, do you care about fully capturing everything? How do you think about that part of tracking?

Tiana: Yeah, I think I go in and out. Ideally it would be awesome to track every little thing. But sometimes, just because I'm so busy with work and school part-time, there's just no way I can remember every little thing I ate. ...I think for me too, it's just a good, at a high level, to understand, what are my fitness goals? Am I getting toward those goals? Do I need to be more serious about tracking? Or can I sort of guesstimate and be fine with just logging in the big things?

Author: Do you think you go through phases where maybe you're—

Tiana: Definitely. Like one week, I'm not tracking anything. The next week I'm tracking everything. Like, I had one piece of cheese. Whatever. But just the fact that it's there, I think is helpful. Sort of keeps it top of my mind.

On the one hand, Tiana contends that “ideally” she would track everything that she eats, illustrating the influence of technologies of femininity on her understandings of diet and exercise. On the other hand, she tries to be practical about it and do what she can, whether it be tracking every piece of cheese or to “guesstimate.” Either way, her fitness goals are at the top of her mind. This simultaneous accommodation of disciplinary practices (keeping calories at the top of your mind) alongside challenges to them (not always being serious about it) illustrates a process of subjectification wherein self-trackers identify as people who care about their health and strive to reach their goals, without becoming obsessive, vain, or too serious in a way that might also draw criticism.

However, this was not the only reason for pushback against calorie-counting. Irie explained why she does not want to lose a lot of weight, either through running or calorie-counting:

Irie: I just always want to be leaner. I always want to be stronger. I have come to realize I don't want to look like a prepubescent child, like some runners, you know? They look like children. You're like 40 years old and you have the body of a 12-year-old. I don't want that [laughs].

Author: [Laughs]. Exactly.

Irie: Right? So, that's also been a slow acceptance with working with my trainer, too. He's been very good at, like, 'You're an adult woman. This is what adult women look like. This is what a fit adult woman's body looks like.' So, he's been

very good at helping me get that body image [laughs]. ‘Cause, this is what it’s gonna look like.

Irie rejects the expectation that her body look like that of a “prepubescent child,” which she feels is a gendered expectation for women distance runners. Irie is also likely engaging in a racialized critique of white feminized beauty norms, suggesting that she does not feel the need to conform to white women’s beauty ideals and is instead making space for black women to be beautiful. Instead, she seems to be drawing on a discourse of ‘strong is the new skinny’ (Markula, 2003) to challenge this particular beauty and fitness discourse. However, as feminist critics have long pointed out, while the expectation that women be fit, strong, thin, and toned, challenges associations between femininity and weakness in important ways, it also creates an expectation that women work out in addition to avoiding excess weight gain, which is not much of an improvement from competing feminine beauty ideals (Bordo, 2003).

Strategy three: Acknowledging that they cannot be perfect. A third strategy that the participants draw upon to distance themselves from their data is to emphasize that they are human and cannot be perfect every day. Natasha explains this while discussing a time that she failed to meet her running goal: “The human body doesn’t work like a machine. ... You just have to be realistic.” Karen had similarly experienced irritation about not meeting her step goals, which had previously led her to walk on a treadmill before bed. She explains here how this focus on meeting her step goal had recently changed to a more relaxed approach:

Author: How do you think about your step goals?

Karen: I usually have no problem meeting them, just because of how active I am. But I have to say, over the last couple months, I’ve gotten a lot better with it. Before I was really tied to it. I had to hit my goal every day, and I would walk on

the treadmill before bed. And lately I kind of was like, no, I don't like doing that. ...I've gotten much more relaxed. Especially in the last, probably, 2 or 3 months.

Author: What do you think caused you to—

Karen: I don't know. I just got tired of looking at it. ...And, I kind of got to the point where I was like, I don't like that I'm disappointed that I didn't take 15,000 steps today. ... If I want to spend Sunday on the couch, I can spend Sunday on the couch and have a hundred steps [laughs].

While Karen concedes that she has felt “disappointed” for not meeting her step goal in the past, she felt tired of feeling bad about this and decided that she would not value this data as she had previously. Both Natasha and Karen are positioning this degree of concern with data as running counter to being realistic about your body's limits, or what is a reasonable expectation for yourself and your life. While they construct data doubles through self-tracking, they push back against what Haggerty and Ericson (2000) refer to as the abstraction of the human body by bringing their body, humanity, and fallibility back into the frame.

Tiana similarly discussed how exercising and tracking can lead to “obsessive” running and exercise to outweigh dietary choices:

Author: Do you know anybody like that [who is obsessive about tracking]?

Tiana: Um, yeah. I used to know a few people like that, that were very obsessive. But it was weird, it was like they were obsessive in some instances, like, they had to run a lot. But on the other side, they sort of negated that by, I think, over-carb load. ...I think seeing those people... was part of why that never appealed to me. Also growing up in a ballet dance company, oh my god. Body image, and what you eat was so insanely part of everyday life. Just seeing that, I think, really turned me off to ever being that obsessive about food and eating and what I could eat and couldn't eat. And having a bite of one thing only. It was sort of like, I don't live my life that way.

While Tiana does track her calories—sometimes consistently, sometimes not—she views the level of obsession that she observed in others as “weird,” unappealing, and “so insanely part of everyday life.” By declining to live her life in such a way that she is

overly restricted, Tiana illustrates the power of disciplinary norms, as well as the possibilities for resistance to those norms, however small (McLaren, 2002).

Strategy four: Valuing feeling over data. Finally, while data was given primacy over sensory feelings in many of the participants' running practices, in the case of calorie-tracking in particular, most of the participants declined to view their weight in this data-centred way. Instead, these participants invoked the importance of intuition when it comes to eating and body weight. Karen, for example, explains why she does not "care about calories":

Author: Do you use the calorie tracker at all?

Karen: I don't. I don't track calories. I never did. I eat when I'm hungry.

Author: How do you think about food in light of all of the running and activity that you do?

Karen: I actually, I think a lot of it has to do with how I grew up. ...My parents were never ones to talk about dieting. Dieting was never a word in our house. Just eat what you want, when you want it. And eat in moderation. So, I've never dieted. I've never tracked my food. I feel like if I'm hungry for something, if I'm craving something, that means my body needs it. ...

Author: So, in that aspect of your life, having numbers and statistics is unattractive to you?

Karen: Yeah, I don't care about calories [laughs]. You know? I've been able to maintain a healthy weight all my life.

Karen's opposition to dieting comes from an approach to eating that is rooted in trust in the body: "If I'm craving something, that means my body needs it." Similarly, Elizabeth also views food as fuel that can be taken in intuitively without tracking. She said this about her approach to food while she was training for her first marathon:

Elizabeth: I just would make sure that I was getting what I needed. And really, I did not track [food] at all. But, for me, my body weight, I just go by how my clothes feel. ...And my clothes fit exactly the same throughout all of my training.

I knew I never gained or lost a lot of weight. I felt my muscles change, but that was it. So, I didn't really worry about it past that point.

By thinking about her body weight in terms of how her clothes feel, rather than a number on a scale, Elizabeth was putting trust in her feelings over data.

This approach to eating and body weight seems at odds with their tracking in other facets of their life such as steps or running pace, where they did not position their bodies as being reliable in contrast to numerical data. This illustrates that numbers do not always have primacy; it depends on the context and the degree to which a person is willing to track all aspects of their life. Of course, this emphasis on feeling still relies on maintaining a slim runners' body and conforming to gendered bodily norms. At the same time, Karen and Elizabeth are challenging the notion that they should restrict their eating to maintain this body, as well as the normalization of calorie-counting as a disciplinary practice. Karen and Elizabeth do not need to construct a "data double" (Haggerty and Ericson 2000) so as to work on themselves; they rely on feeling instead.

Discussion

If the advent of "female health tracking" is any indication, women in particular are increasingly expected to digitally monitor their health and fitness for the purposes of self-optimization. As the narratives of these participants show, self-tracking can indeed cause women to feel bad about their appearance, feel inadequate—or victorious—because of their split pace, or to even walk around before bed to increase their step count. However, this particular picture of self-tracking does not tell the whole story. Sometimes, women come to believe their feelings are a better way of monitoring themselves than numbers. Sometimes, a particular metric is dismissed as irrelevant or excessive to track.

Sometimes, there are just limits to what a person is willing to feel bad about. There are certainly norms at work here that value running faster for longer, being thin, and being in control of one's body. However, there are also points of resistance; points where the participants pushed back and challenged the importance of those values and suggested alternative ways of being a female, running subject. This study sheds light on how self-trackers negotiate, accommodate, and resist these norms, all at once.

With this in mind, it is important to interpret these findings with caution. While the participants challenged some of the norms of running and self-tracking, I would argue that they were primarily challenging the *process* of self-tracking, namely studious data collection, rather than the *norms themselves* that value faster running times and a leaner body. In other words, their articulations of resistance did not convey “a consciously planned, critical resistance to sporting discourses” (Markula, 2003, p. 103). Indeed, many of the participants in this study were enabled to care less about their metrics such as steps and body weight because their frequent runs and other forms of activity made their data align with what dominant health directives demand without much additional effort. As Karen explained above with regards to her step goals, “i usually have no problem meeting them...because of how active I am.” Karen may also feel entitled to indulge in her food cravings, but as someone who claims that she has maintained a healthy weight all of her life, she is not subject to the same moral opprobrium that someone would experience if their body was deemed to be outside the boundaries of a ‘healthy’ body weight (Rail, 2012). Rejecting these additional efforts is considerably easier for those who already conform to the ideals that these tools are intended to help users achieve.

Additionally, while the participants may have rejected particular metrics and data collection efforts, they nonetheless do engage in self-tracking and consider it to be an important part of their running practices, their lives, or both. For example, it is *because* Carrie cares about the data in her Garmin dashboard that she selectively alters it by tracking some runs but not others. These participants do engage with knowledges of the body that emphasize self-monitoring for the purposes of self-improvement; either by conforming to those expectations, or by engaging with those expectations while deviating from them in a small way. Regardless of the degree to which each individual participant engaged with her self-tracking devices, the existence of the self-tracking devices themselves does disciplinary work (Lupton, 2016b). They have undergone a process of problematization wherein self-tracking is positioned as a technology of the self that can help them become faster, thinner, or both. While counter-discourses were offered to gendered expectations of slenderness and weight loss, they operated in a context where a slim, feminine body is the expectation, and many of them conformed to or desired to conform this body regardless of the degree to which they were willing to utilize data collection as a means to get there.

This study has some limitations that are important to consider when interpreting the findings. First, since many of the participants only engaged in self-tracking while running, as opposed to self-tracking as part of their everyday lives, the degree to which this study sheds light on everyday self-tracking practices and modes of resistance is limited. Second, the sample was limited to women who self-track in a metropolitan area within the United States. The self-tracking practices of people outside of the United States, or in rural areas, may be different than those depicted here.

Future research should consider the entanglement of racialized beauty ideals and self-tracking. As Irie's challenge to the expectation that she look like a "prepubescent child" suggests, intersecting identities play a role in the beauty ideals to which women aspire, which would likely impact one's self-tracking experiences. Furthermore, researchers could examine adolescent girls' uses of self-tracking. Young people would represent an important extension of this research because they have had a greater degree of immersion in digital worlds (Rich, 2018)

This push and pull of disciplinary power and the resistance, wherein the participants establish themselves as subjects who make choices about running, dieting, and data collection, illustrates the ways in which the QS is not a force of domination. While self-trackers have undergone this process of problematization and deemed this level of self-surveillance to be an important part of what they see as a healthy lifestyle, they do not accept discourses of quantification and self-monitoring entirely. They make moves. They deflect. They track, and they decline to track. They value bodily intuition and knowledges. They are kind to themselves. While Foucault contends that escaping power is not achievable, this study suggests some ways that the dominance of quantification can be challenged, and how alternative exercises of power can be possible.

Chapter 8: Conclusions

Looking Back, and Looking Forward

As Fitbits were starting to become a part of the national consciousness but before they had reached mine, I heard a Ted Talk where a speaker described his project of walking 10,000 steps every day for one month. This sounded like an absurd undertaking to me at the time, as I did not have a frame of reference for how many steps I took in a day myself. This number, and this goal, were entirely alien to me. Five years later, I asked the undergraduates in the Foundations of Public Health in Kinesiology class that I was teaching if they knew the recommended daily step count, and almost all of them dutifully responded back to me, “10,000 steps.” This number has pervaded societal consciousness; I suspect few can say where that number came from, or where they heard it. Many are, nonetheless, aware of it and accept it as truth.

It is not just automated step counting that is now commonplace, but also the quantification of sleep, stairs ascended, heart rate, menstrual cycles, and calories burned or consumed. With the help of thousands of quantifying web applications, people can quantify their work productivity, sex life, moods, blood pressure, and just about anything else you can think of (Lupton, 2016b). These web applications can be a database where people keep track of data they purposefully collect, such as caloric intake, or data can be automatically collected with no additional effort, such as the Health app on my iPhone that I realized years ago had been gathering my step data for months, without my knowledge. As I began writing this dissertation, I started to grasp just how much data was being generated, both on a population scale and on an individual scale, that had not been

generated previously or was being generated with greater ease than ever before. These developments were being positioned in some circles as the panacea to good health, and in others as locking the door and throwing away the key to Max Weber's iron cage of bureaucracy and rationalization. I felt as if it was perhaps not only physical culture that felt like it was changing, but perhaps culture as we know it.

I began this project because I wanted to understand why fitness tracking is common-sense in the United States today. In a governmentality sense, what is the problem that fitness tracking is thought to solve? To what ontological and epistemological paradigms about the body and physical activity is fitness tracking appealing? Is this a fundamental shift in how people are experiencing their bodies and physical activity? What might this shift mean? How does fitness tracking 'work,' in a Foucauldian and sociomaterialist sense?

As I spent two years working on this project, I realized that it is too easy to think that you are experiencing an unprecedented historical epoch that will forever change the world. As I argued in Chapter 4, many of these metrics, and reasons for finding those metrics worthy of attention, are not new. There has long been a belief that quantification will reveal the body's secrets: the secrets of the soul, as was the case with William H. Sheldon's somatotyping (Vertinsky, 2002); the secrets of human potential, which were sought in the Harvard Fatigue Lab; the secrets of the nation, which was the impetus for the quantification of children's bodies in physical education during the cold war and in physical activity epidemiology. The power to determine what numbers mean and their implications within society has long been the privilege of the powerful that has been infused with social norms (Porter, 1995). Numbers create differences between groups that

are frequently hierarchical, such as the suppositions of Kenneth and Mildred Cooper (1972) that women should aspire to different numerical goals with their fitness exploits than should men. These recommendations were infused with sexist stereotypes about women's inability to understand math and science, as well as frequent reminders that looking attractive to men is paramount.

One of the reasons that personal data collection and the quantification of the body that long preceded it are so powerful is that numbers are perceived to be neutral. The ideology of dataism is representative of beliefs that data and numbers are objective and that gathering more numbers will lead to knowledge about ourselves and about society that can bring about social change (van Dijck, 2014). As I have illustrated throughout this dissertation, data collection is not neutral, politically or otherwise. People collect data on themselves to align with particular goals, such as the ability to run faster, that are not universal across space and time. The running body was quantified in the Harvard Fatigue Lab so industrial scientists could theorize on how to maximize the labour of workers, in the context of Western industrial capitalism. Today, employers create incentives for their employees to wear fitness trackers out of a desire to cut costs because health insurance is most often sponsored by employers. In order to quantify the body, one requires a standard upon which to measure those numbers. Standards that bodies are measured against are not neutral when they are reinscribing sex and gender binaries in track and field (Cooky & Dworkin, 2013), just as they are not today when people measure their weights and heights to assign themselves to a BMI category in the workplace (Rail, 2012) or assign areas of improvement in their half marathon training. While the social value of numbers

and hierarchies are not new, they change across space and time and are thus important to apprehend, as I have done so here.

It is not only through norms that the quantification of the body is accomplished; it is as much a material practice as it is a discursive one. Throughout history numerous tools have articulated, in a Latourian (1999) sense, the inner secrets, desires, and capabilities of the body. Calorimeters, measuring tape, weight scales, heart rate monitors, fitness trackers, and more, have allowed the body to display what it is and what it can be. These measurement tools rely on an objectivist ontological understanding of the body and its movements: it is assumed that the body's movements are objectively real, and measurement tools give us direct access to those realities. However, following Barad (2007), I contend that a measurement apparatus—which for her includes the tool used to measure, the object that is measured, and myriad other social and material elements—produces phenomena rather than being passive instruments of observation that are selected by people. In the case of self-tracking, the body is typically believed to have objectively performed particular actions a specific number of times or to a specific degree, and it is through self-tracking practices that those actions are neutrally counted. However, my findings show that running data collection is messy; it is messy because it is the product of entanglements of bodies, environments, affects, and more. Take step tracking as an example. A step is a measurement that requires a body and an environment, most notably. When step data is collected, it extends bodies and environments to extensive networks of fitness trackers, algorithms, agencies, GPS satellites, memories, and more. The participants in the running study illustrated how producing quality running and step data requires work on their part, but humans are far

from the only ones who are working to produce running data. Fitness trackers, stop lights, GPS satellites, and app quirks all come together to produce a tracked run.

But as I have contended throughout this dissertation, the fact that much of fitness tracking is not new does not mean that aspects of the “Quantified Self” movement are not. First and foremost, the degree of access that others have to our data is indeed unprecedented, whether it is because we have social media platforms such as Facebook, MapMyRun, and Strava through which to share our data with others, or because corporations are capturing “big data” for their own benefits (Lupton, 2016b). The number of data points that are being collected on people, many of which might seem innocuous on their own but together can paint an incredibly intimate picture of a person’s life, presents numerous new ethical challenges (Mittelstadt & Floridi, 2016).

These new ethical challenges are often not being adequately addressed, as my examination of workplace wellness in Chapter 5 suggests. When asked about privacy issues with regards to Fitbit use as well as the other health data that is collected by employers, the workplace wellness experts that I spoke with positioned these forms of data as innocuous, without considering the larger picture of data collection of which step counts are only one part. The location data of self-trackers that is shared with social media app users and private companies may at times give people pause, as was the case with Natasha in Chapter 7, although these concerns are generally outside the frame and many self-trackers consent to these forms of data sharing without giving them much consideration.

It is also important to note that privacy is not only an individual endeavour, but one that is “networked” (boyd, 2012, p. 348). Data about an individual very often reveals

information about others as well, such as posting photos at the Taj Mahal that include hundreds of other tourists (boyd, 2012, p. 348). What your colleagues do as participants in a Fitbit program can have an impact on the health insurance premiums you pay, which Brandon illustrated in his contention that the data from Fitbits can be used to negotiate lower premium. “Eating data” is like eating an apple; some parts of these practices are conscious and purposeful, while many aspects of it are opaque and outside of our control (Lupton, 2016a).

Finally, much of the impetus for this dissertation was a desire to know what happens, personally, when people self-track in this current moment. I had previously examined this issue with a small participant observation study of a university-level jogging class at a large, public university (Esmonde, 2018). In this class the students were instructed to wear heart rate monitors—many of which did not work—and to record some of their recollections of their heart rate after the fact. As I argued following this study, while these observations were suggestive of some paths of resistance to self-tracking, I recognized that observing a class where many had little interest in the poorly-functioning heart rate monitors would provide little insight into the experiences of people who have fitness trackers that can keep extensive digital histories of their fitness exploits.

In the running study that I presented in this dissertation, I garnered considerably more insight into people’s practices of self-tracking. Through my conversations with the participants about their running practices, I learned about the emotional significance of self-tracking data. This significance is in large part enabled because it is believed that there is a straight, direct line between what the body does and what numbers say that it does. The contention that the body ran an objective distance at an objective pace, and that

self-tracking can and should provide direct access to these numbers, can lead to a great deal of stress when those numbers are not generated as planned. As Pink et al. (2018) have contended with regards to broken data, “Data is not necessarily accurate, complete or full aggregated representations of what individuals or societal groups have done, or able to predict what they will do” (p. 10). Broken data is illustrative of the materiality of digital data as well as its affective dimensions. One cannot understand self-tracking without considering the materiality of the practice.

The women in that study also illustrated how there are many paths of resistance to the recommendations from a self-tracker or GPS watch. By labelling some data as excessive, not tracking every run or every day, invoking one’s humanity and fallibility as a way of limiting disappointment from unfavourable data, and re-valuing feelings over data, these runners show that the word from a GPS watch is never the final one. However, as I have argued throughout this dissertation, it is not only the data collection practices themselves that do disciplinary work. The logic of dataism represents the ontological belief that numbers and data are objective and that they can directly measure humans, their behaviours, and anything else that is important to measure (van Dijck, 2014). Whether one is self-tracking or not, or they are self-tracking but paying attention to some numbers but not others, they are nonetheless enmeshed within and likely bolstering the ontological understanding the body and movement of which dataism is a product. Gendered and racialized beauty norms play a significant role in the bodies to which people aspire, and how they use quantification towards those ends. These *norms* were not generally contested by the participants; instead, they challenged data collection *practices* as being excessively onerous.

The goal of this dissertation has been to critically contextualize the Quantified Self for the purposes of better understanding the implications of dataism, datafication, and dataveillance (van Dijck, 2014). I come away from this research with deep ambivalence. On the one hand, I believe that fitness tracking amongst the general population will be less popular in the future, if the plummeting popularity of fitness trackers such as Fitbit is any indication (Fruhlinger, 2018). It is unlikely that the use of GPS watches and training apps will decline amongst people training for marathons and triathlons, as evidenced by the increasing popularity of the Strava app (Fruhlinger, 2018), although this is a relatively small proportion of the population. The difficulty of collecting extensive amounts of data on oneself, in terms of the work that goes into it and the amount of attention that would need to be afforded to it, makes it a practice that the less-committed are not likely to participate in for lengthy periods of time.

However, it would be disingenuous to treat self-tracking as if it is a contained practice that only has effects while a fitness tracker is worn. As evidenced by Natasha's memory of the distance of streets in her neighbourhood, numbers have a way of staying around. Data about steps, weight, BMI, and pace does not just disappear from people's minds. My students know that they should take 10,000 steps per day to maximize their health, even if they have never worn a step tracker in their lives. A former user may still reference a low or high step count from a day of walking or a day of sitting even if they are not in the process of collecting this data. The quantification of the body and activity does disciplinary work, whether one dutifully wears a Fitbit every day, whether they used to wear a Fitbit but no longer do, or even if they have never worn one at all.

This hints at what truly gives me pause: the ethos of datafication and the impact of numbers in our everyday lives. Fitness tracking is a symptom of the belief that numbers are a more credible way of knowing about the world than other ways of knowing, which might rely more in embodied feelings or social justice perspectives. It speaks to forms of scientism that privilege the scientific method and scientific apparatuses as the guarantors of truth, with numbers as a major organizing principle for society (Shaw, 2008). Numbers are neutral within this frame of thinking, as they naturalize racial, gender, and class hierarchies and (O’Neil, 2016). Numbers are what distinguish a healthy employee from an unhealthy one, and will also point the way towards their path to success.

In sum, datafication and the production of big data will touch people’s lives, regardless of whether they strap on a Fitbit. People are subject to quantification in numerous ways: through Fitnessgram in physical education classes in the United States that sort people into fitness categories (Jette et al., 2016; Pluim & Gard, 2016); when they purchase health insurance and life insurance and their personal statistics are placed into demographic tables to categorize them into risk categories; when they purchase clothes in standardized sizes and come to see themselves as a “size 6”; when they carry an iPhone with them throughout the day that keeps track of their steps. Much of physical activity is already a quantified endeavour, with distance, time, repetitions, weight lifted, and more, a part of people’s calculations. While there is indeed a difference between quantifying a discrete part of your bodily movement, such as tracking a run, and tracking every movement of your day through step tracking, this is a question of the degree of surveillance, rather than kind.

Furthermore, people's privacy will be violated in myriad ways with a goal of excavating the truths of their bodies, souls, and step counts. We are like a puzzle that can be put together through numerous data points that are collected on our whereabouts and consumption habits, most often without our knowledge or awareness. In late 2018 the *New York Times* published a story titled "Your Apps Know Where You Were Last Night, and They're Not Keeping it Secret" (Valentino-DeVries, Singer, Keller, & Krolik, 2018), illustrating the extent to which our personal data is collected and sold to advertisers, hedge funds, and retail outlets seeking to profit from these forms of knowledge. They point out that those with access to the raw data could identify a person's identity with little effort. These data collection efforts may not change how people individually understand themselves because they are not aware of it, but it is substantively changing how others with access to this data may view them.

When I set out to understand the "Quantified Self," I thought that I needed to understand one type of person: the people who extensively self-track. I started by trying to apprehend the historical precedent for these types of bodily quantification, finding that there have been considerable political and societal consequences to previous efforts to quantify the body and its movements. As I spoke with people who extensively self-track and people who very selectively self-track, I realized that the logic of numbers was playing an important part of many people's lives whether it is confined or widespread. Wearing a self-tracker for a defined period of time can nonetheless change how people view themselves when they are not wearing their tracker anymore. Finally, through an examination of workplace wellness programs, I began to see that employees are tracked and quantified long before they ever use a Fitbit through productivity and health

assessments that have long been commonplace. Wearable devices do extend the gaze of the health insurer and the employer in important ways, giving them a direct view of the health behaviours that employees engage in outside of the workplace. I still believe that the quantification of the body and physical activity has an incredible impact on people's lives, although now I suspect that much of this effect comes from less direct sources than I previously thought. Governing at a distance, indeed.

Theoretical Conclusions

In this dissertation I considered the significance of sociomaterialisms and Foucauldian poststructuralism in understanding the "Quantified Self," putting forward a theoretical framework that I refer to as "Physical Techno-Cultural Studies." With regards to the sociomaterialist influence within this framework, questions of the political and social relevance of focusing on non-humans have long plagued such theories (Ahmed, 2008), many of which I have grappled with (see Esmonde & Jette, 2018). My research has always been inspired on a desire to make the world better, and many of the concerns that I seek to address through my scholarship centre on humans. I doubt that I will ever fully decentre humans in my thinking and writing.

Regardless, I maintain that slightly shifting the focus away from humans, as I did through my Physical Techno-Cultural Studies approach, can yield useful insights. Theories that shed light on the interactions (or intra-actions) of humans and non-humans in quantifying the body, I would suggest, helped me to understand specific ingredients within the 'social.' Data collection is never a purely human endeavour, and taking that into account allowed me to examine contemporary and historical bodily quantification practices in a new light. My socio-historical-technical analysis of bodily quantification

highlighted how our relationships with technologies have fundamentally altered how we can understand our bodies, what we think that they should be, and how hierarchies are produced and legitimized. Throughout this history, socio-technical networks have been assembled to make claims about what the body is and what it can be. The body has been deemed to be articulate and inarticulate according to particular political goals. In my running study, I used sociomaterialist theories to explore the entanglement of humans and non-humans in self-tracking. A runner's experiences are intimately shaped by place (Howe & Morris, 2009), but the additional influence of a GPS watch or fitness tracker, as I illustrated, can further influence how people understand and experience their bodies as they run through place. In both of these instances, identities are reinforced through self-tracking, as was the case for Natasha who felt even more feminized through her safety concerns that were magnified by self-tracking. Identities are also solidified through self-tracking and quantification: people are obese, thin, fast, slow, fit, and unfit. This work is not done through diffuse, mysterious social forces. While not painting a complete picture of the actors involved (if that is even possible), I maintain that my approach to Physical Techno-Cultural Studies illustrated many of the key participants in the quantification of the body and the construction of identities. Understanding how technologies work helps us to describe their social impact.

Methodological Conclusions

In this dissertation I also sought to use methods that would allow me to better understand the role of non-humans in social worlds. This effort was primarily concentrated in my running study, where I employed sensory ethnography to bring together theories of embodiment, emplacement, and actor-network-theory. By placing the

senses and the role of place at the centre of the analysis, particularly in Chapter 7, I extended the “physical” of PCS to the interconnections between bodies and their environments. However, this research nonetheless relied on written data in the form of interviews and field notes, which I believe limited my ability to theorize on the senses (Pink, 2009). One might even accuse this project of being subject to ontological confusion, given the theoretical perspectives that I drew on that emphasize multiple realities and my more systematic methodological approach (St. Pierre, 2011). This charge would not be unfair; trying to apprehend the role of non-humans in bodily quantification or running, and basing all of one’s research on the words of humans, is somewhat limiting.

In the future, I want to think more expansively about the methodological possibilities of these theories. For example, I want to bring the lens of embodiment and sociomaterialisms to the theorizing process, as suggested by St. Pierre (1997, 2011). This aspect of research methodology has not been viewed through a physical lens within PCS, and I think that this would be an important way of extending this thinking. Other future directions include methods that allow the sensory to take centre stage, such as ethnographic methods, participatory photography (Byrne, Daykin, & Coad, 2016), and video. I would also be interested in exploring less traditional modes of representation, such as stories, poetry, and the audio/visual.

Future Directions

The gaps in the research that I identified when I began this project in the fall of 2016 were quite different than the gaps that remain today. There has since been an explosion of research on the QS, datafication, and embodiment. For example,

considerably more research has been undertaken to understand people's personal experiences with self-tracking, illustrating how the expectation that self-tracking produces a climate of discipline and control (see Lupton, 2015a) has not come to pass. Indeed, research on people's use of self-trackers illustrates that it is a very personal (Pink et al., 2017; Smith & Vonthethoff, 2017) and affective (Lupton, 2018; Smith, 2018) process. Furthermore, people do not always do what self-tracking devices tell them to do; in many cases self-trackers use them for limited periods of time and only take advantage of some of the features (Didžiokaitė et al., 2018; Niva, 2017). Data collection is a messy and material process that does not always yield expected results (Pink et al., 2018; Sumartojo et al., 2016). This dissertation contributed to this research, illustrating the personal and messy nature of data collection for women who run. In addition to these recent insights, some gaps in the literature remain that could guide future research on the QS.

First, I would contend that the entanglement of self-tracking and gender, race, class, sexuality, ability—and power more generally—has not been as well established within the literature. These are important topics of consideration as social power significantly shapes why and how self-tracking technologies are used, as well as the assumptions that are embedded within the technologies. For example, research can be conducted on how men use calorie-counting apps and workout apps as they work to build muscle and gain weight—an activity that goes against how it is assumed that users will use the technology, as it is presumed that users are attempting to lose weight. Additionally, the way that sharing photos and workout data can be different depending on one's social location is also an important topic of study. In two instances during my interviews (which

I did not happen to write about in this dissertation), I was told by African American women that sharing fitness photos and data can be a way of challenging the whiteness of fitness culture and asserting that they belong as fitness culture participants. These two examples illustrate how identity figures significantly into self-tracking, shaping who is included and excluded from the intended audience and how people find different ways to interact with digital health and fitness platforms.

Second, while personal data collection has received considerable attention, institutional sites of the QS continue to be a gap within the literature. In this dissertation I focused on workplaces in particular, illustrating the political rationalities and technologies of government that shape the state of play of wearables in the workplace. More research should be conducted to contextualize and understand the use of wearable technologies in workplace, particularly as it relates to the experiences of employees in such programs. As this dissertation has illustrated, the fact that self-tracking is expected to lead to a particular outcome does not mean that it will, and therefore examining personal experiences and engagements with data is a critical research endeavour. It is also vital to understand employees' views about the benefits of their workplace wellness program and of the wearable devices; whether they have concerns about privacy, discrimination, stigma, data misuse, or intrusion; whether they are aware of safeguards against these concerns or would like to see safeguards adopted; and whether, on balance, they think the benefits outweigh any risks or concerns. Finally, the management of employee data—both in the sense of how employers use that data and how it is physically stored and protected—is an important topic of consideration as there are numerous ethical issues related to employee privacy and discrimination in a context of big data.

Additional institutional sites beyond the workplace where wearable technologies are being integrated are also important future directions for research. As numerous scholars have pointed out (Gard, 2014; Lupton, 2015a; Pluim & Gard, 2016; Rich, 2018; Williamson, 2015), the use of fitness trackers in physical education classes is a vital site for study as little information is known about how young people make use of and make sense of such devices. Young people would represent an important extension of this research because they have had a greater degree of immersion in digital worlds (Rich, 2018). Additionally, schools represent a different site of disciplinary power than workplaces, thus necessitating a greater understanding of how power operates in this field (Jette et al., 2016). Research on young people's uses of digital health technologies, as part of school initiatives or on their own, would contribute to a greater understanding of how both age and institutions shape digital health technology use.

It is also important for scholars to explore how fitness tracking is shifting towards health tracking. As it has become more difficult to sell fitness trackers and some companies have folded, health tracking has come to the fore. For example, in 2018, Jawbone, the mobile technology company that previously produced a wearable fitness tracker, rose from the ashes of asset liquidation and rebranded itself as Jawbone Health (Johnson, 2018). As I quoted in the introduction to this dissertation, in 2015, Fitbit CEO James Park stated that Fitbit Wellness (now Fitbit Health Solutions) is the fastest-growing part of the Fitbit company (Chen, 2015). The alignment of fitness tracking with health tracking is a key area of exploration for understanding the future of fitness tracking.

Finally, I suggest that researchers should explore how self-tracking may be used to bring about social change and health equity. There are certainly issues with the collection of “small data” (Neff, 2013) and “big data” alike: the invasion of privacy; turning the body into numbers in a way that de-emphasizes pleasure, joy, and sensual aspects of embodiment and physical activity; and stress from not meeting one’s goals or conforming to dominant health directives, to name a few. However, this does not mean that I think that self-tracking does not have the potential to help to bring about a more just physical culture. There are significant and systemic barriers to health, and it is possible that self-tracking, digital health, and big data can play a role in lessening the burdens of those barriers—and not only at the individual level. For example, digital health platforms can be sites of resistive messaging, where being kind to yourself is emphasized over conforming to beauty norms. Little research has explored how new online applications and content, or the subversion of existing online applications and content, can be used to bring about social change by challenging health inequities and harmful messaging about health, beauty, and fitness. If digital health and fitness is a one-way path where there will only be more use of such technologies in the future, rather than less, it behooves researchers to examine how these technologies can be used to lessen health inequities and give voice to subjugated knowledges—if that is indeed possible.

Appendix A: Workplace Wellness Participant Recruitment E-Mail

Hi _____,

My name is Katie Esmonde and I'm a PhD student from the Department of Kinesiology at the University of Maryland. I'm researching the role of wearable technologies in workplace wellness programs, and I was hoping that you'd be willing to do an interview with me to talk about your work on _____.

If you're interested in participating in this study, we can set up an interview whenever is good for you. It would be done over the phone, audiorecorded, and last for roughly 30-45 minutes. Questions in the interview guide cover topics such as how wearable fitness technologies are or are not a part of workplace wellness, employee responses to these programs, program assessment, and workplace wellness more generally. If you are not interested in participating, would you possibly be able to suggest someone at your company who might be able to speak on this topic?

If you should choose to participate in this study, your interview will remain completely anonymous. I will give you a pseudonym and will not use the name of your company in any outputs from this study.

There are no direct benefits from participating in this research. However, I hope that, in the future, other people might benefit from this study through improved understanding of the uses and impacts of wearable technologies in fitness practices. There are no known risks to participating in this study. If you would like more information, or to see the consent form prior to agreeing to participate in the study, please let me know.

If you have any pertinent questions about your rights as a research participant, please contact the University of Maryland College Park Institutional Review Board Office. Their contact information is provided below. They have reviewed and approved this study. If you have any questions or are interested in participating in the study, you can contact me through e-mail.

Thank you so much for your time,
Katie

University of Maryland Institutional Review Board Contact Information:

**University of Maryland College Park
Institutional Review Board Office
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Appendix B: Workplace Wellness Interview Guide

Part 1: General Questions

1. Tell me about the role you play in your organization.
2. What kinds of education or work backgrounds and expertise help you to do your job?

Part 2: Workplace Wellness Questions

3. How would you define workplace wellness?
4. What is the wellness in workplace wellness?
5. Why do you think that businesses are bringing you in to create a workplace wellness program/why does your business want to have a workplace wellness program?
6. Have workplace wellness programs changed over time? If so, how?
7. Do you know of any laws or policies that influence how these programs operate?
8. Do you work with any organizations or businesses to help you manage the programs?
9. Do you think there is a role of fun or pleasure in a workplace wellness program? If so, what? If not, why not?

Part 3: Fitness Tracking

10. What role do wearable technologies play, if at all, in workplace wellness today?
11. Do you think that wearables have “taken off” in workplaces recently? Why or why not?
12. How did you first hear about wearables in workplaces? What did you think? Has your thinking since changed?
13. Do you have any experience working with wearable technologies in your work?
14. What do you think employees think about wearable trackers?

Part 4: Assessing the Programs

15. Do you have any assessments in place for your workplace wellness programs? If so, what?
16. What do you consider to be a successful workplace wellness program? What criteria do you apply/have you applied?
17. What role can wearable technologies play in successful programs?
18. What efforts are you aware of to illustrate the efficacy of workplace wellness programming?
19. Have efforts to illustrate the efficacy of wearables in the workplace differed at all from what you just described? If so, how?

Part 5: Employee Health

20. Why do you think it is important for employees to be well?

21. How have you understood the employees to experience these wellness programs?
22. How do you think employees feel about programs to improve their wellness? Do you think that they buy in? Why?
23. What do you think devices like Fitbits can do for employees?
24. Have any efforts been made to make any programs involving wearables more fun for employees?
25. Have employees resisted these programs at all? If so, how? If not, why do you think this has not happened?

Part 6: Addressing Issues and Concerns

26. What have been the biggest challenges to face workplace wellness programs?
27. What measures are you aware of that have been taken to minimize risks to the privacy of employees who wear these devices?
28. What has been done, if anything, to encourage employees to wear fitness trackers as part of a workplace wellness program?
29. Are there concerns that employees may feel pressures, financial or otherwise, to participate in a wellness program? Why?

Part 7: Final Questions

30. Do you have any last questions or comments for me?
31. Is there anyone else that you think that I should speak with to learn more about wearable technologies in workplaces?

Appendix C: Running Study Recruitment E-Mail to Running Group

Dear _____,

I hope that this email finds you well.

My name is Katie Esmonde, and I am a doctoral candidate at the University of Maryland, conducting research on women runners who use fitness tracking devices. I am currently recruiting healthy women for this research, and I was wondering if it would be okay if I came to a morning run to recruit participants.

The purpose of this research project is to better understand how women utilize wearable fitness trackers in their running practices. This study involves three parts. First, I will meet with participants to sign consent forms and establish a time and location to meet at a later date. Second, we will meet and go for a run at the location and distance of the participant's choosing. Third, following the run, I will conduct an audiotaped interview with the participant to ask about the run as well as their experiences of wearing a fitness tracker more generally.

Since running with a stranger would likely be intimidating, I was hoping to meet with the running group before and/or after a run in the morning to give anyone interested some information about the project. I would tell the group that I am a researcher who is looking for healthy women who are interested in participating in a study about fitness tracking devices. I would let everyone know that they have no obligation to participate in the research, and that they can halt their participation at any time.

I have attached a copy of the consent form and the script that I would use to explain the project to the group, in case you want to understand the project more or want to confirm any details about myself/the project.

Thank you for your time. If you have any further questions, please do not hesitate to ask!

Best,
Katie

Appendix D: Running Study Participant Recruitment Script

Hello. My name is Katie Esmonde and I am a doctoral student from the Department of Kinesiology at the University of Maryland, working with Dr. Shannon Jette. I would like to invite you to participate in a research project entitled “Exploring Uses of Wearable Fitness Technologies by Female Joggers.”

The purpose of this research project is to better understand how women utilize wearable fitness trackers, such as the Fitbit or Apple Watch, in their running practices. This study involves three parts. First, I will meet with participants to sign consent forms and establish a time and location to meet at a later date. The consent form notifies you of the study procedures, the potential risks and benefits to you, your rights as a study participant, and how all information collected will be kept confidential. Due to the added risk, if you have a previous or current history of heart disease or stroke, having chest pain during exertion, or of using blood-thinning medication, you will not be eligible to participate in this study.

Second, we will meet and go for a run at the location and distance of the participant’s choosing. I will be taking notes based on my observations immediately following the run.

Third, following the run, I will conduct an audiotaped interview with the participant to ask about the run as well as their experiences of wearing a fitness tracker more generally.

There are no direct benefits from participating in this research. However, we hope that, in the future, other people might benefit from this study through improved understanding of the uses and impacts of wearable technologies in fitness practices.

If you have any pertinent questions about your rights as a research participant, please contact the University of Maryland College Park Institutional Review Board Office. Their contact information is provided below. They have reviewed and approved this study.

If you have any questions or are interested in participating in the study, please feel free to let me know in person, or you can contact me through e-mail. I will send an e-mail out to the group with my contact information, the contact information for my dissertation advisor, Dr. Shannon Jette, and the contact information for the University of Maryland Institutional Review Board.

Thank you.

Appendix E: Running Study Participant Demographic Table

Name⁹	Age	Race¹⁰	Socioeconomic Status¹¹	Running Data Tracked	Additional Data Tracked
Amanda	31	Asian	Middle class	Pace Distance Time Average moving speed	N/A
Ruby	39	White	Middle class	Pace Distance Cadence Time	N/A
Carrie	29	White	Middle class	Pace Distance Time	N/A
Natasha	37	White	Middle Class	Pace Split pace Distance Time Elevation	N/A
Myra	41	Asian/Indian	Middle/upper middle class	Distance	Steps Sleep
Elizabeth	26	White	Lower middle class	Pace Split pace Distance Time Progress over time Elevation	Steps Active minutes
Irie	39	African American	Middle class	Pace Distance Time Heart rate Caloric expenditure	Steps Calories consumed (sometimes)
Jane	31	Asian/Korean	Upper middle class	Pace Distance Time	Steps Active minutes

⁹ All names used are pseudonyms

¹⁰ Self-identified race

¹¹ Self-identified socioeconomic status

					Calories consumed (sometimes) Sleep Floors ascended
Karen	45	White	Upper middle class	Pace Distance Time Heart rate	Steps
Tiana	31	African American	Middle/upper middle class	Pace Distance Time Progress over time	Calories consumed

Appendix F: Running Study Interview Guide

Part 1: Introductory Questions

1. Tell me about your running routine.
2. Tell me about why you got into running. When was that? Have your reasons for running changed at all since you started?

Part 2: Running Questions

3. What do you like about running? Why?
4. What do you dislike about running? Why?
5. Tell me about what a really good run would be like.

Part 3: Technology Questions

6. Before you got a fitness tracker, did you track your runs in any other ways? How?
7. Why did you start wearing a fitness tracker? When was that?
8. What were your goals for wearing a fitness tracker? Has your fitness tracker met the expectations that caused you to start wearing it? How?
9. Has your use of your fitness tracker changed at all?
10. Do you primarily track your runs? Or do you also use your fitness tracker for other parts of your life?
11. Is there anything about fitness tracking that has surprised you?
12. Has there ever been a time when your tracker did not work, or you did not have it? If so, how did that make you feel?
13. Why do you think that fitness trackers are popular with runners?
14. Why do you think that fitness trackers and other types of tracking are becoming more popular?
15. Do you think gender shapes how you self-track?
16. Do you think that gender shapes how people self-track more generally?

Part 4: Data Engagement Questions

17. Tell me what you look at on your watch as you are running.
18. How often do you look at your watch typically?
19. Do you ever change how you are running in response to the data that you receive from your watch?
20. What kind of data do you find to be the most interesting or important? Why?
21. Is there any data that your tracker gathers that you do not find interesting or important? Why?
22. Has there been any kind of data that you did not expect to care about, but now do? Do you feel any pressure to care about some numbers because they're there?
23. Do you use your fitness tracker to count calories or to track your weight? Why or why not?
24. What have you learned from wearing a fitness tracker?
25. How has learning those things changed anything about how you work out? Or how you move around?

26. How do you reconcile how you feel while running with the data you are getting from your tracker?
27. Do you think that tracking your runs impacts the amount of joy you experience while running? How?

Part 5: Social Data Questions

28. Do you post anything online about your running and your data?
29. Are you a part of any online communities for running? For fitness tracker wearing?
30. How do you think your use of tracking compares to that of others?
31. Describe someone, real or imaginary, who you think is too invested in their data.

Part 6: Running in Space Questions

32. Walk me through the places that you go during a typical run. Tell me about how those different places make you feel.
33. Do you think that where or when you run is impacted by safety concerns? Why?
34. Do you think that where or when you run is impacted by being a woman? If so, how? If not, why?
35. Do you think that the way that you track is at all influenced by gender? Why?
36. Do you think that wearing your fitness tracker changes how you feel when you are running? Can you give me an example?
37. Does wearing a fitness tracker change anything about where you run, if at all? Can you give me an example?
38. Has a fitness tracker changed anything else about how you run? Can you tell me more about that?

Part 7: Final Questions

39. Do you have any last questions or comments for me?
40. Is there anyone else that you think that I should speak with to learn more about wearable technologies for personal fitness?
41. What is your race/ethnicity, age, socioeconomic status?

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