



DATA BODIES AND DIGITAL HEALTH: BIOPOLITICS IN THE AGE OF AI AND WEARABLE TECHNOLOGIES

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Abstract

The rise in the number of wearables, mobile health apps, and AI-driven analytics has turned the human body into an ongoing stream of data. This paper will present a thematic review of how technologies such as wearable health tracking devices recontextualize and extend the Foucauldian biopolitical power relations, which involve the management and optimization of living populations and bodies. Based on scholarly work from digital sociology, surveillance studies, and studies of science and technology, the paper will explore how the processes of self-tracking, dataveillance, algorithmic governmentality, and surveillance capitalism combine together and create a concept of the "data body" — the digital representation of the physical self which is constantly monitored, predicted upon, and acted upon by various commercial and institutional stakeholders. In this paper, the current academic discourse related to the matter will be analyzed thematically, the context of AI-powered wearable health technologies will be situated in the historical trajectory of biopolitical governance, and the core tensions that are involved will be outlined. It will be shown how AI and wearables do not just extend biopolitical governance that occurred in the twentieth century but intensify it and turn it more personal.

Keywords: *biopolitics; digital health; wearable technology; artificial intelligence; self-tracking; dataveillance; surveillance capitalism; algorithmic governmentality*

1. Introduction

The human body has been the topic of political attention for generations. States and institutions have long endeavored to watch, quantify and govern the biological life of communities, from the hygienic reforms of nineteenth-century European towns to public health campaigns of the twentieth century. Michel Foucault identified this transition as the emergence of biopolitics, a kind of power wielded not through the sovereign right to murder, but through the regulation and improvement of life itself: birth rates, health, longevity, and the biological health of people (Foucault, 1978). While disciplinary power operated on the individual body through enclosure, timetabling and surveillance within institutions such as the prison, the school and the factory, biopower operated at the level of the population as a whole, deploying statistics, epidemiology and public health administration as its principal instruments (Foucault, 2003).

More than forty years after Foucault initially expressed this idea, the technological context in which bodies are watched, measured and governed has changed almost beyond recognition. The modern individual is increasingly carrying, wearing, or otherwise attached to a variety of sensing devices – smartwatches, fitness trackers, continuous glucose monitors, smart rings, sleep trackers, and increasingly, implantable and ingestible sensors – that produce a continuous, granular stream of biometric and behavioral data. This data is no longer simply recorded, but processed, pattern-matched and acted upon by artificial intelligence and machine learning systems capable of predicting future health states, flagging deviations from statistical norms and generating individualised recommendations or interventions in something close to real time. And where formerly stood the clinic, the census and the public health office, now stands the wrist, the pocket and, through cloud-based analytics, the data centres of technological companies. In this paper we address the question of what happens to biopolitics, as a technology of power and as an analytical tool, in these situations. It begins from the observation that self-tracking and wearable health technology are rarely, if ever, ideologically neutral instruments of self-knowledge. Rather, as extensive scholarship in digital sociology and surveillance studies has argued, they are implicated in broader rationalities of neoliberal self-governance, with the commercial logics of data extraction that Zuboff (2019) terms “surveillance capitalism,” and with new, distinctively algorithmic forms of governmentality in which populations and individuals are increasingly known, sorted and acted upon through predictive data profiles rather than direct clinical or bureaucratic encounter (Ajana, 2017; Lupton, 2016).

What is significant about this change is that it represents a number of key departures from the classical model of bio-politics as articulated by Foucault. First, whereas twentieth-century biopolitics was primarily implemented through centralized state institutions—ministries of public health, national statistical offices, hospitals—today’s data-driven biopolitics is highly decentralized and dispersed across a variety of private commercial actors: device manufacturers, app developers, insurers, employers, platform companies, all of whom have a commercial stake in acquiring and monetizing bodily data. Second, whereas earlier biopolitical techniques operated at the level of the aggregate population, using statistical categories such as birth rate or life expectancy, contemporary AI-driven systems increasingly operate at the level of the individualised data profile, generating personalised risk scores, recommendations and interventions calibrated to a single body's unique data trail. Third, and perhaps most importantly, the disciplinary and biopolitical functions that Foucault understood to be analytically distinct – the former working on individual bodies, the latter on populations – seem to converge and blur ever more within a single wearable device, which disciplines the individual wearer’s quotidian conduct (via step counts, activity reminders, and sleep scores) and feeds an aggregated data stream that is analysed, modelled, and monetised at the level of populations.

These trends pose serious problems that this study tries to answer through a critical, literature-informed review. In what ways do self-tracking and AI-enabled wearable technologies represent a truly novel configuration of biopower, and in what ways do they expand and intensify age-old biopolitical rationalities under a new technological guise? What are the mediating mechanisms – dataveillance, algorithmic governmentality, surveillance capitalism and neoliberal responsabilisation – that link the tracked body to

the exercise of power over it? And what are the practical, ethical and regulatory ramifications of this transition for individuals, health systems and societies more broadly? The paper does not produce new empirical data but seeks to address these questions by bringing together and critically synthesizing an interdisciplinary body of scholarship – drawing from digital sociology, science and technology studies, surveillance studies and critical data studies – to develop an integrated conceptual account of biopolitics in the age of AI and wearable technology, and to identify the key lines of debate and tension that run through this literature. The rest of the paper is organized in the following way. Section 2 describes the detailed objectives of the review. 3. A survey of the relevant literature associated with the core problems of the paper is given. The conceptual methodology used is described in Section 4. 5. The results of the thematic synthesis are presented structured by the main biopolitical mechanisms found in the literature, with a summary table and a schematic of a conceptual framework. Section 6 reflects on the broader implications and conflicts that this synthesis poses. Section 7 concludes.

2. Objectives of the Study

1. To critically examine, through a synthesis of existing interdisciplinary literature, how wearable technologies and AI-driven health analytics extend, intensify, or transform Foucauldian biopolitics and its associated mechanisms of power (discipline, dataveillance, governmentality, and responsabilisation) in the specific context of digital health.
2. To identify and conceptually map the key tensions — between empowerment and control, personalisation and commodification, and voluntary participation and structural coercion — that characterise the contemporary relationship between data bodies, digital health technologies, and biopolitical governance, so as to inform future ethical and regulatory debate.

3. Review of Literature

The literature reviewed below has been selected for its direct relevance to the intersection of biopolitical theory, self-tracking/wearable technology, and digital health, and is presented in approximate chronological order to convey the development of scholarly thinking on this topic.

Foucault (1978), in the first volume of *The History of Sexuality*, introduced the concept of biopower as a form of power that emerged in the eighteenth and nineteenth centuries and that took “life” — the biological existence of individuals and populations — as its object, operating through two interrelated poles: an anatomo-politics of the individual body (discipline) and a biopolitics of the population (regulatory control through birth rates, mortality, health, and longevity). This foundational text remains the primary conceptual anchor for nearly all subsequent scholarship on digital self-tracking and biopolitics, including each of the studies discussed below.

Nafus and Sherman (2014), in an influential ethnographic study of the Quantified Self movement, characterised participants' self-tracking practices as a form of “soft resistance” to dominant, aggregable

modes of institutional and commercial data collection. Their study found that Quantified Self practitioners often used data in highly idiosyncratic, personally meaningful ways that resisted straightforward incorporation into standardised commercial or biopolitical frameworks, complicating any simple reading of self-tracking as purely and uniformly disciplinary (Nafus & Sherman, 2014).

Till (2014) examined the phenomenon of exercise self-tracking through a labour-theoretic lens, arguing that the Quantified Self movement effectively transforms exercise — traditionally understood as a leisure or health practice — into a form of value-generating labour, whereby the biometric data produced through physical activity is captured, aggregated, and monetised by fitness technology companies. Till's analysis is frequently cited as an early and influential articulation of the argument that self-tracking devices convert bodily activity into a commercially exploitable data resource.

Ruckenstein (2014), examining practices of personal analytics, introduced the influential concept of the “data double” — a digital, data-based representation of the self that circulates independently of, and is sometimes granted more authority than, the lived, embodied person from whom the data originates. Ruckenstein's analysis draws attention to the way in which self-trackers develop reflexive, sometimes intimate relationships with their own aggregated data profiles, a dynamic with direct relevance to the biopolitical governance of digital health subjects.

Lupton (2016) in *The Quantified Self: A Sociology of Self-Tracking*, provided one of the most comprehensive sociological treatments of self-tracking culture to date, explicitly framing contemporary self-tracking as an instantiation of a “biopolitics of the self” in which the body is rendered amenable to continuous management and monitoring in ways that echo and extend neoliberal rationalities of individual responsibility for health outcomes. In a related article, Lupton (2016) further distinguished several distinct “modes” of contemporary self-tracking (private, communal, pushed, imposed, and exploited), demonstrating that the degree of individual consent and autonomy involved in bodily dataveillance varies considerably across different technological and institutional contexts.

Ajana (2017) in “Digital Health and the Biopolitics of the Quantified Self,” examined the ideologies and rationalities underlying the Quantified Self movement in explicit dialogue with Foucauldian biopolitical theory, arguing that self-tracking technologies are increasingly enrolled by governments and healthcare systems seeking cost-effective solutions to healthcare provision by shifting responsibility for health monitoring and management onto individual citizens themselves. Ajana's analysis is particularly significant for its explicit theorisation of how state and commercial actors jointly benefit from, and actively promote, the biopolitical logic of self-quantification.

Sharon (2017) offered a more nuanced and partially corrective account, arguing that critical scholarship on self-tracking for health had become polarised between overly celebratory accounts (emphasising empowerment and personalised medicine) and overly deterministic critical accounts (emphasising surveillance and biopolitical control), and proposed a values-based framework — centred on autonomy, solidarity, and authenticity — for evaluating self-tracking practices without collapsing into either extreme. Sharon and Zandbergen (2017) extended this analysis empirically, showing that many self-trackers actively

resist purely reductive, quantified accounts of their data, seeking instead more “qualified” and situated forms of self-knowledge.

Smith and Vonthethoff (2017) examined the everyday practice and experience of “datafied health,” exploring how individuals make sense of, and sometimes push back against, the numerical representations of their bodies generated by self-tracking devices, and highlighting the embodied, affective dimensions of data-driven health practices that purely structural biopolitical accounts risk overlooking.

Zuboff (2019) in *The Age of Surveillance Capitalism*, though not focused exclusively on health or wearable technology, provided an influential and widely cited account of how digital platform companies extract “behavioural surplus” from users' data — including, explicitly, bodily data such as heartbeat, sleep, and movement patterns — for the purposes of prediction, monetisation, and behavioural modification. Zuboff's concept of surveillance capitalism has since become a central reference point for scholarship examining the commercial, as opposed to purely governmental, dimensions of biopolitical data extraction in the wearable technology sector.

The World Health Organization (2021) in its guidance on the ethics and governance of artificial intelligence for health, formally acknowledged many of the concerns raised in the preceding critical-sociological literature at the level of international health policy, identifying privacy, surveillance, data ownership, and the potential for AI systems to reinforce existing health inequities as key ethical challenges requiring active regulatory attention as AI becomes further embedded in health systems worldwide. The inclusion of this policy document alongside the preceding academic literature illustrates the extent to which biopolitical concerns first articulated within critical sociology have migrated into mainstream institutional health governance discourse.

4. Methodology

This paper adopts a conceptual, literature-based methodology rather than an empirical or data-driven research design, consistent with its aim of synthesising and critically interpreting an existing body of interdisciplinary scholarship rather than generating new primary data. The approach taken is best characterised as a critical, theoretically framed narrative review, in which Foucauldian biopolitical theory serves as the interpretive lens through which the selected literature is read, organised, and synthesised. This methodological choice reflects the nature of the research question itself, which concerns the conceptual and theoretical implications of a rapidly evolving socio-technical phenomenon rather than a discrete, empirically measurable outcome. The literature underpinning this review was identified through a targeted search of academic databases and publisher platforms (including Sage Journals, Taylor & Francis Online, Springer, and relevant institutional repositories) using search terms combining “biopolitics,” “quantified self,” “self-tracking,” “wearable technology,” “digital health,” “dataveillance,” and “surveillance capitalism.” Priority was given to foundational theoretical texts (most notably Foucault's original formulation of biopolitics) and to frequently cited, peer-reviewed scholarship within digital sociology, science and technology studies, and critical data studies published between 2014 and 2021, a period

corresponding to the mainstream commercial emergence of consumer wearable technology and the early scholarly response to it. Institutional policy documents were additionally consulted where they directly addressed the ethical and governance dimensions of AI in health. The analytical procedure followed in preparing this review involved three stages: first, close reading and summarisation of each selected source with particular attention to its central argument regarding the relationship between data, technology, and bodily governance; second, thematic coding of the reviewed literature according to the specific biopolitical mechanism(s) each source primarily addressed (disciplinary self-surveillance, dataveillance, algorithmic governmentality, surveillance capitalism, or neoliberal responsabilisation); and third, synthesis of these themes into an integrated conceptual framework, presented in Section 5, intended to represent the cumulative process by which embodied biological life is rendered into data, processed algorithmically, and thereby folded into contemporary structures of governance and commercial value extraction. As a conceptual review, this paper does not report statistical results, sample sizes, or effect sizes; the “results” presented in the following section should accordingly be understood as a thematic and conceptual synthesis of the reviewed literature rather than as findings derived from original empirical data collection.

5. Results

The reviewed literature converges on five recurring, interrelated mechanisms through which AI-enabled wearable and self-tracking technologies articulate with biopolitical governance of the body. These mechanisms are presented individually below and are then integrated into a single conceptual framework (Figure 1) and summarised comparatively in Table 1.

5.1 Self-Surveillance and the Internalisation of Disciplinary Norms

The literature consistently identifies self-tracking as a technology of the self through which users voluntarily internalise disciplinary norms — step targets, sleep scores, calorie budgets — that were historically imposed through external institutional supervision (Lupton, 2016). Unlike the classical Foucauldian disciplinary apparatus of the school or the factory, however, this surveillance is self-administered and often experienced as empowering or pleasurable rather than coercive, complicating any straightforwardly repressive reading of the phenomenon (Nafus & Sherman, 2014; Sharon & Zandbergen, 2017).

5.2 Dataveillance and the Production of the “Data Double”

A second recurring theme concerns dataveillance — the continuous monitoring of individuals through their data traces — and the resulting production of a “data double”: an aggregated, algorithmically legible representation of the body that circulates, is analysed, and is acted upon independently of the lived body itself (Ruckenstein, 2014). Smith and Vonthethoff (2017) note that individuals frequently experience tension or dissonance between their embodied self-knowledge and the numerical representations generated by their devices, suggesting that the data double does not simply mirror the body but actively reshapes users' self-understanding and health behaviour.

5.3 Algorithmic Governmentality and Predictive Power

The integration of artificial intelligence into wearable and digital health platforms introduces a further, more recent development: the shift from descriptive self-tracking toward predictive and prescriptive algorithmic governance. Where earlier self-tracking devices primarily reported past behaviour (steps taken, hours slept), AI-enabled systems increasingly generate individualised risk scores, early-warning alerts, and behavioural nudges based on predictive modelling of future health states. This represents what may be termed “algorithmic governmentality” — a mode of governance operating not through explicit rules or norms but through continuously updated, opaque statistical models that shape the field of possible action available to the user (Ajana, 2017; World Health Organization, 2021).

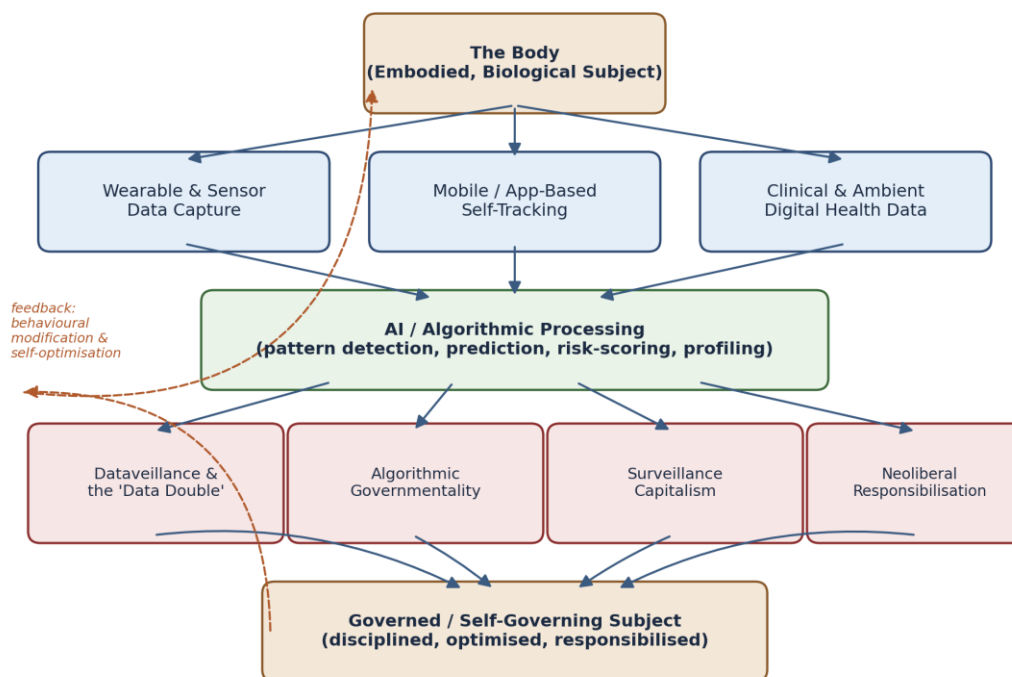
5.4 Surveillance Capitalism and the Commodification of Bodily Data

A fourth theme concerns the explicitly commercial dimension of data-driven biopolitics. Zuboff's (2019) concept of surveillance capitalism draws attention to the fact that bodily data generated through wearable devices constitutes a valuable commercial asset — “behavioural surplus” — extracted, aggregated, and monetised by technology companies largely outside users' awareness or meaningful control. Till (2014) similarly frames the biometric data generated through fitness tracking as a form of unpaid or under-recognised labour value, appropriated by fitness technology companies for commercial gain.

5.5 Neoliberal Responsibilisation of Health

A final, cross-cutting theme concerns the way in which self-tracking and AI-driven health technologies are mobilised, both by commercial actors and by resource-constrained public health systems, to shift responsibility for health outcomes onto individual citizens. Ajana (2017) argues explicitly that this “responsibilisation” dynamic is convenient for governments seeking to reduce public healthcare expenditure, since it recasts structural and systemic health determinants as matters of individual data-informed choice and self-management.

Figure 1: Conceptual framework linking embodied data capture, AI/algorithmic processing, and biopolitical governance mechanisms



Source: Author's conceptual synthesis, developed from the literature reviewed in Section 3.

As Figure 1 illustrates, embodied biological life is captured as data at the point of the wearable device, mobile application, or ambient clinical sensor; this data is then processed algorithmically to detect patterns, generate predictions, and produce individualised risk or performance scores; and the resulting outputs feed into (and are simultaneously produced by) four interlocking biopolitical mechanisms — dataveillance, algorithmic governmentality, surveillance capitalism, and neoliberal responsibilisation — which together act back upon the originating body/subject, producing a governed, self-optimising subject whose future behaviour is, in turn, captured as further data. This circular, self-reinforcing structure distinguishes contemporary data-driven biopolitics from the more linear, institutionally centred biopolitical model that Foucault originally described.

Table 1: Comparative summary of biopolitical mechanisms identified in the reviewed literature

Mechanism	Key Source(s)	Core Characteristic	Relation to Classical Biopower
Self-surveillance / internalised discipline	Lupton (2016); Nafus & Sherman (2014)	Voluntary, pleasurable monitoring internalised norms	often self-against numerical
			Individualises and privatises disciplinary power historically exercised by institutions

Mechanism	Key Source(s)	Core Characteristic	Relation to Classical Biopower
Dataveillance / “data double”	Ruckenstein (2014); Smith & Vonthethoff (2017)	Continuous data-based representation of the self that circulates independently of the body	Extends population-level record-keeping to a continuous, individual-level data trace
Algorithmic governmentality	Ajana (2017); WHO (2021)	Predictive, opaque statistical models shape available fields of action	Replaces explicit disciplinary norms with continuously updated probabilistic governance
Surveillance capitalism	Zuboff (2019); Till (2014)	Bodily data extracted and monetised as commercial “behavioural surplus”	Adds a commercial, extractive logic largely absent from state-centred classical biopower
Neoliberal responsibilisation	Ajana (2017); Sharon (2017)	Structural health determinants reframed as matters of individual data-informed choice	Redistributes the locus of biopolitical responsibility from the state to the individual

Taken together, the thematic synthesis presented in this section indicates that AI-enabled wearable and digital health technologies do not operate through any single biopolitical mechanism in isolation, but through the simultaneous and mutually reinforcing operation of self-surveillance, dataveillance, algorithmic prediction, commercial data extraction, and individual responsibilisation — a convergence that distinguishes the contemporary “data body” from earlier, more institutionally bounded objects of biopolitical governance.

6. Discussion

The thematic synthesis presented above points to a central and recurring tension running through the literature on data bodies and digital health: the same technologies that enable unprecedented forms of personalised health insight, early disease detection, and patient empowerment simultaneously function as instruments of continuous surveillance, commercial data extraction, and individualised responsibilisation

for health outcomes that are frequently shaped by structural and social determinants well beyond any single user's control. This is not a straightforward story of either liberation or domination; as Sharon (2017) and Sharon and Zandbergen (2017) demonstrate, self-trackers themselves actively negotiate, resist, and reinterpret the data generated about their bodies, suggesting that the biopolitical power exercised through wearable technology is neither total nor uncontested. At the same time, the structural asymmetry between individual users and the technology companies that design, own, and profit from the underlying data infrastructure — an asymmetry central to Zuboff's (2019) account of surveillance capitalism — means that the degree of genuine user agency within this system should not be overstated. The introduction of artificial intelligence into this landscape appears to mark a qualitative, rather than merely incremental, shift in the character of biopolitical governance. Classical Foucauldian biopower operated through relatively legible, if often coercive, mechanisms: the census, the clinic, the public health campaign. Algorithmic governmentality, by contrast, operates through statistical models whose internal logic is frequently opaque even to their designers, and whose outputs — a risk score, a recommendation, a behavioural nudge — arrive without the kind of transparent justification that characterised earlier disciplinary or biopolitical interventions. This opacity has direct implications for questions of accountability, contestability, and equity, particularly given documented concerns regarding algorithmic bias and differential model performance across demographic groups.

A further implication concerns the blurring, noted throughout the literature reviewed above, between the individualising function that Foucault attributed to discipline and the aggregating function he attributed to biopolitics proper. A single wearable device today performs both functions simultaneously: it disciplines the individual wearer's daily conduct in real time while also feeding an aggregated dataset used for population-level modelling, product development, insurance risk assessment, and, in some jurisdictions, public health surveillance. This convergence suggests that the analytical distinction between disciplinary power and biopolitics, while historically and theoretically important, may require further conceptual refinement to adequately capture the operation of power in thoroughly datafied societies. Finally, the reviewed literature points toward important practical and policy implications. If AI-enabled wearable technologies are to deliver on their promise of improved health outcomes without simply intensifying surveillance, commodification, and inequitable responsabilisation, meaningful governance frameworks — addressing data ownership, algorithmic transparency, informed consent, and equitable access — will be required (World Health Organization, 2021). The conceptual synthesis offered in this paper suggests that such governance efforts should attend not only to data privacy and security in the narrow technical sense, but to the broader biopolitical rationalities — self-surveillance, dataveillance, algorithmic prediction, commercial extraction, and responsabilisation — through which bodily data is rendered into an object of governance in the first place.

7. Conclusion

This paper has offered a conceptual and critical review of the ways in which AI-enabled wearable and self-tracking technologies extend, intensify, and transform Foucauldian biopolitics in the domain of digital health. Drawing on an interdisciplinary body of scholarship, the paper has argued that the contemporary

“data body” is produced through the convergent operation of self-surveillance, dataveillance, algorithmic governmentality, surveillance capitalism, and neoliberal responsibilisation — mechanisms that together represent not a simple continuation of twentieth-century biopolitics but a distinctly individualised, commercially entangled, and algorithmically mediated reconfiguration of it. As wearable devices and AI-driven health analytics become further embedded in everyday life and in formal healthcare provision, sustained critical and regulatory attention to the biopolitical dimensions of bodily data — and not merely to its technical accuracy or clinical utility — will be essential to ensuring that these technologies serve, rather than subordinate, the interests of the individuals whose bodies they render into data.

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