

# **The London School of Economics and Political Science**

*What's in a Number? A multimethod study of self-quantification's role in shaping selfhood*

Svetlana Smirnova

A thesis submitted to the Department of Media and Communications of the London School of Economics and Political Science for the degree of Doctor of Philosophy, London, September 2020

**Declaration**

I certify that the thesis I have presented for examination for the PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

The copyright of this thesis rests with the author. Quotation from it is permitted, provided that full acknowledgement is made. This thesis may not be reproduced without my prior written consent.

I warrant that this authorisation does not, to the best of my belief, infringe the rights of any third party.

I declare that my thesis consists of 100,516 words.

## **Statement of use of third party for editorial help**

I can confirm that my thesis was copy edited for conventions of language, spelling and grammar by Dr Cory Hitt and Dr Lou Harvey.

## Acknowledgment

I took pride in undertaking this research, joy in completing it, and recognition of the good fortune of having financial provision, exceptional intellectual guidance, emotional and practical support of mentors, colleagues, and friends. The paragraphs below are written in recognition of those without whom this milestone would not have been achievable.

First, of all I would like to express my sincerest gratitude to the participants who made this study possible. Thank you for being generous with your time, for your effort, and for your insights. This work would not have been written without generous funding support from the School, for which I am grateful.

I would like to express my deepest gratitude to my supervisors Professor Nick Couldry and Dr Alison Powell for their unwavering support, intellectual guidance, and practical suggestions. I would also like to thank them for being genuinely invested in my intellectual development, my research, and my wellbeing as an academic and a person. Thank you both wholeheartedly!

I would also like to extend my deepest appreciation to my long-term mentor Professor Ellen Helsper. There is no other scholar I have learned more from than I did from you. Thank you for always finding time, advice, and words of support. Thank you also for including me in your intellectual pursuits and for teaching me endless numbers of things.

I wish to express special thanks to Professors Sonia Livingstone, Lilie Chouliaraki, and Shani Orgad, who helped me unreservedly while under no obligation to do so. Sonia, thank you for giving me practical advice, honest feedback, and an opportunity so rare that to this day I cannot believe I actually got to do that! Thank you, Shani, for being supportive and kind, for your willingness to take me along on your research journeys, and for believing in my research abilities! It has made a huge difference to my perception of myself as a scholar. Thank you, Lilie, for your invaluable guidance, mentorship, and for always making time for me.

I am grateful for the feedback provided by Professor Bart Cammaerts and other faculty members during numerous research events and presentations. Thank you for challenging me and making my work better.

Special thanks to Professor Giddens for taking an interest in my work, for providing feedback on my chapters, and for being supportive and generous with his time.

My gratitude to my family and my friends cannot be overstated. My colleagues-turned-friends – Miriam, Tijana, and Jun – neither my research nor my life would be the same if you were not contributing to it. My most loved and admired friends – Darja, Yana, Kat, Ilya, Tim, Regina, Bob, and Lena – thank you for being unconditionally nurturing, supportive, understanding, and loving. It is a privilege to go through grad school (and life) knowing that you have fallback support with no questions asked. I am indebted to you forever.

The contribution of my parents cannot be overstated. Their love and support have carried me through many difficult patches.

Finally, my husband, thank you from the bottom of my heart for creating the conditions for me to work, for making sure that I don't forget that work is not everything, for listing and criticizing my arguments, and for making sure there is always coffee in our house. This is a milestone I would not have been able to achieve if it wasn't for you.

To any future reader, I thank you for your curiosity and interest in this work, I hope you enjoy looking through this work as much as I enjoyed writing it.

## Abstract

This dissertation explores self-tracking – a process of self-quantification for health and wellness via mobile applications and wearable devices – in relation to reflexivity and selfhood. The dissertation answers the following research question: how does self-tracking contribute to our sense of the self? The study argues that self-tracked data is becoming a new source for self-construction and ethical self-evaluation.

The study draws on a multi-layered conceptual framework that incorporates cultural, reflexive, privacy, and ethics axes. The development of the tool was influenced by the works of Charles Taylor, Margaret Archer, William Sewell, and Julie Cohen, as well as critical scholarship on self-quantification. Methodologically, the study employs a longitudinal design that combines a set of two interviews and a four-week, solicited diary.

The research is set in the United Kingdom. A four-cluster sample consisting of casual trackers, semi-professional athletes, individuals living with chronic health conditions, and healthcare professionals was recruited for the study. In total, 50 participants took part in the study, resulting in a rich dataset of 45 diaries and 95 interviews.

The research uncovered the centrality of moral metaphors and moral emotions (i.e. shame, pride, and guilt) in descriptions of the practice; tensions between symbolic representations and everyday practices; the multiplicity of higher-order reflections on the practice; and a sense of unease in relation to informational privacy. Those findings are significant because they call for scrutiny of the arbitrary benchmarks, inaccurate measurements, commercial interests, and obscure data flows that underlie a deeply meaningful practice.

The dissertation makes two original contributions. Methodologically, the study proposes rigour-enhancing strategies for solicited diaries. Substantively, the study argues that self-quantification shapes selfhood in complex ways, rather than simply providing additional information to those who engage in the practice. The study also adds rare longitudinal insights to the field.

The research is positioned in and contributes to the critical interdisciplinary space dedicated to examining the practice of self-tracking.

## Table of Contents

<b>Chapter 1– Introduction .....</b>	<b>9</b>
<b>A Personal Note .....</b>	<b>9</b>
<b>Brief Introduction to Topic, Argument, and Tools .....</b>	<b>10</b>
Research Set-up.....	14
Conceptual Framework and Methodological Design .....	23
<b>Meet the Self-trackers .....</b>	<b>25</b>
Outline.....	29
<b>Chapter 2– Comprehensive Review of Literature .....</b>	<b>31</b>
Literature Landscape: Currents, Arguments, and Tensions .....	33
<b>Self-tracking as Culture .....</b>	<b>33</b>
Self-tracking for Health and Wellness: Frames and Values .....	34
Self-tracking as a Grounded Everyday Practice .....	42
<b>Self-tracking and Reflexivity .....</b>	<b>46</b>
<b>Privacy in Self-tracking.....</b>	<b>53</b>
<b>Ethics of Self-tracking .....</b>	<b>66</b>
<b>Conclusion .....</b>	<b>74</b>
<b>Chapter 3 – Conceptual Framework: Four-Axis Heuristic for Understanding the Self in Quantification .....</b>	<b>76</b>
Introduction: Requirements for the Analytical Tool .....	76
Conceptualizing Culture: Symbols and Practices .....	78
Reflexivity Axis: From Subjectification to Reflexive Personal Projects .....	83
Conceptualizing Privacy .....	94
Ethics and Moral Frameworks of Self-tracking .....	108
<b>Conclusion .....</b>	<b>118</b>
<b>Chapter 4– Research Design &amp; Evaluation .....</b>	<b>122</b>
<b>Introduction: Aims, Argument, and Outline .....</b>	<b>122</b>
<b>Analytical Details: Research Design &amp; Methodological Rationales.....</b>	<b>123</b>
Solicited Diaries as Research Methodology: Brief History & Variants .....	123
Qualitative Interviews: Literature & Rationale .....	129
Rationale for Complimentary Methodological Combination .....	131
<b>Descriptive Details: Data Collection, Study Procedures, and Analysis Strategy .....</b>	<b>133</b>
Data Collection Procedures.....	134
Study Procedures: Diary & Interview Guides .....	138
Data Analysis: Original Rationale & Conceptual Links .....	145
In Practice: Overview of Data Analysis .....	148
<b>Evaluative: Data, Procedures, and Participant Experience .....</b>	<b>150</b>
Evaluation of Procedures & Participation .....	152
Credibility & Consistency .....	159
Reflexivity & Positionality .....	161
<b>Conclusion .....</b>	<b>162</b>
<b>Chapter 5 – Self-tracking as Culture: Symbols and Practices of Self-quantifiers.....</b>	<b>166</b>

<b>Introduction .....</b>	<b>166</b>
Discussion and Conclusion .....	196
<b>Chapter 6 – Reflexivity.....</b>	<b>199</b>
Reflecting of Self-tracking: What It Is and Why It Matters .....	199
<b>What is self-tracking? .....</b>	<b>201</b>
<b>Life-course Transformations as Motivation to Self-track.....</b>	<b>204</b>
<b>Reflecting on Tracking in Relation to the Idea of “Healthy Body” .....</b>	<b>210</b>
<b>Dimensions of Reflexivity: Learning about Oneself .....</b>	<b>213</b>
<b>Meaning and Significance of the Practice .....</b>	<b>226</b>
<b>Summarizing Thoughts, Links, and Conclusions .....</b>	<b>231</b>
<b>Chapter 7 – Privacy &amp; Self-tracking: Unease as an Alternative Conceptualization of Informational Privacy.....</b>	<b>234</b>
<b>Introduction: Setting the Scene .....</b>	<b>234</b>
<b>Thinking Differently, but Feeling Uneasy: Taxonomy of Privacy Attitudes.....</b>	<b>237</b>
Conceptualizing Privacy as Unease .....	249
<b>Privacy in Everyday Life: It’s Complicated.....</b>	<b>251</b>
Conflicting with Other Values & Roles .....	252
Privacy Throughout Time .....	255
Privacy Harms: Reflections and Experiences .....	258
Data Sharing & Protection .....	264
<b>Discussion and Conclusion.....</b>	<b>265</b>
<b>Chapter 8 – Meta-Ethics and Morality of Self-tracking: Emotions and Metaphors of Self-quantification .....</b>	<b>269</b>
<b>Data as a Source of Moral Self-evaluation .....</b>	<b>273</b>
Comparative Domains with Moral Connotations.....	281
<b>Guilt, Shame, and Pride: Moral Emotions of Self-trackers.....</b>	<b>286</b>
<b>Ethics and Identity.....</b>	<b>294</b>
<b>Perceptions of Self-tracking Practice.....</b>	<b>299</b>
<b>Deceptive Bodies, Truthful Devices.....</b>	<b>302</b>
<b>Data as Resource of Self: New Horizon .....</b>	<b>307</b>
<b>Chapter 9 – Discussion: What do the findings add up to? .....</b>	<b>310</b>
Summary and Significance of Core Argument .....	310
Axes of Culture and Privacy .....	313
Axes of Reflexivity and Meta-Ethics .....	318
Methodological Contribution: Future of Solicited Diaries .....	322
Why was the Study Necessary? .....	325
<b>Chapter 10 – Conclusion : Final Reflections .....</b>	<b>327</b>
<b>Limitations of the Study .....</b>	<b>330</b>
<b>Future Research Recommendations .....</b>	<b>332</b>
<b>Policy and Design Recommendations .....</b>	<b>334</b>

<i>Appendices</i> .....	338
Appendix 1 – Participants Details .....	338
Appendix 2 – Example of Record Keeping, Key Words, Databases, and Search Strategy .....	339
Appendix 3 – Recruitment Poster .....	340
Appendix 4 – Entry Interview Guide.....	341
Appendix 5 – Informed Consent Form.....	345
Appendix 6 – Socio-demographic Survey .....	346
Appendix 7 – Free Association Exercise .....	347
Appendix 8 – Diary Instructions and Layout.....	348
Appendix 9 – Diary Email.....	350
Appendix 10 – Email Reminder Examples.....	351
Appendix 11 – Exit Interview Guide.....	352
Appendix 12 – An Example of Coding Framework .....	357
Appendix 13 – Free Associations Exercise Analysis .....	358
Appendix 14 – Limitations of Devices Summary .....	360
<i>References</i> .....	361

## Table of Figures

Figure 1: Recruitment poster used to attract participants to take part in the study .....	137
Figure 2: Free Associations Exercise filled out by a participant .....	139
Figure 3: Free Associations Exercise Template.....	139
Figure 4: A diary template for computer and mobile screens.....	141
Figure 5: A participant filling out his diary (as captured by the participant himself) .....	155
Figure 6: One of the methodological issues in data collection, as captured by one of the participants .....	156
Figure 7: An image of a commercial for a popular consumer device captured by a participant during the time of the study .....	171
Figure 8: Images included as a part of reflexive diary by one of the participants.....	175
Figure 9: Examples of associations given by participants.....	188
Figure 10: Association "Part of Me" as presented by a participant .....	193
Figure 11: George's Reflection of the Meaning of Self-tracking .....	219
Figure 12: The word cloud represents positive and negative emotions (size proportionate to number frequency of use) reported by the participants .....	287
Figure 13: A section of sentiment analysis (simple frequency count) conducted using R .....	287



## Chapter 1– Introduction

### A Personal Note

The study presented in this dissertation has grown out of my long-term interests in health, wellness, and safety behaviours in relation to the digital media. Back in 2015, when this dissertation was started, the practice of self-quantification for health and wellness – with its promises of personalized, more inclusive, and more agentic healthcare – was beginning to capture the public imagination and to receive widespread attention in popular and academic discourses. Research efforts focused on quantification were dynamic, edgy, and fast-growing. The devices and applications I purchased in an effort to experience self-tracking were sleek, fun, addictive, and most of all, made me feel good about myself. Feeling more in control of my own health, fascinated with the futuristic devices that were rumored to hit the marketplace in the months to come, and captivated by the public health discourse about the future of data, made self-tracking for health and wellness an appealing subject for my academic project. The euphoria and drive lasted long enough for me to read every academic article even tangentially related to the topic for three years.

The optimistic fascination with the practice came undone when testing yet another tracker. I ended up malnourished, irrationally exasperated to walk 10,000 steps a day, and feeling low when my device told me I had yet again not met my goal – that I had not slept enough, exercised enough, stood enough, had drunk too much coffee but not enough water, had eaten too much carbs but not enough protein, that I needed to try harder with breathing exercises and meditations – in short, that I failed to be my optimal self almost every day. It was then that the critical analyst in me and the person who had got to the fittest state in her life clashed, the latter eventually giving way to the former. However, it was the tangible benefit the latter gained, and

the sense of achievement that came from self-tracking, which made the practice so appealing and thus difficult to critique. Improved diets, weight loss, and improved athletic performance for some self-quantifiers were highly visible and undeniable benefits of the practice. At the same time, practices' pseudoscientific backing, lack of data-flow privacy and transparency, analytics and personalization limitations, and commercial interests – which affect many – are impossible to overlook. Despite mounting evidence of the various problems embedded in self-quantification, the practice – and by proxy new commercial players and powerful interests – is clearly shaping the ways people think about themselves and reaching far beyond their perception of personal fitness and health. These tensions are impossible to reconcile without intense scrutiny. This complexity has drawn me in and thus the present study was conceived.

### Brief Introduction to Topic, Argument, and Tools

This dissertation explores the practice of self-tracking – a process of self-quantification with the help of digital devices – in relation to selfhood via the notion of reflexivity. The research focuses on a specific type of self-quantification – life-logging for health and wellness – and examines the use of wearable devices and mobile applications. The study is set in the United Kingdom (UK), where a variety of consumer wearables devices – ranging from smartwatches and fitness bracelets to smart clothes and jewellery – are available. Most generalist tracking devices record data on physical activities (e.g. steps taken, heart rate), sleep, calorie consumption, and stress, and some devices collect information on mental states, posture, and breathing. Twenty-seven percent of the adult population in the UK owns a wearable device (Statista, 2020). The realm of mobile applications is booming, with over 300,000 health applications available for quantifying various aspects of one's physical and mental health, fitness routines, and healthy habit-building (IQVIA Institute, 2017). Twenty-five percent of individuals

18 to 54 years of age, and 7% of those over the age of 55 have a fitness or health app on their mobile device (Statista, 2020). Today, the practice – in its numerous variants – is equally adopted across all socio-economic segments on the British populous.

In the last decade, the subject of quantification for health and wellness attracted significant scholarly attention from sociologists, medical and legal researchers, media and science and technology studies scholars, computer and data scientists, and design and human–computer interaction scientists. The extant literature is rich: it boasts a multiplicity of methodological and epistemological perspectives and offers findings that are specific to devices, populations, discourses, and practices. The types of studies range from autoethnographies with niche tracking devices, to population surveys that examine the prevalence of the practice, to critical discourse analysis of promotional materials, and to interviews with various segments of self-quantifiers. The analysis in phenomenological, constructivist, technological-determinist, feminist, structuration theory, and new materialist theoretical traditions informs the literature today. At the same time, many of the earlier studies draw inspiration from the works of Michel Foucault – especially in relation to the technologies of the self, governmentality, and care for the self – shaping the current state of knowledge about self-quantification.

This research is set against a background of the neoliberal squeezes in healthcare; the relentless strive for personalization, individualization, and optimization with predictive technologies; the rise of computational and algorithmic powers; the diminishing costs of sensors that are used in the production of wearables; and increase in the value of data; hyper-scrutiny of everyday life; and the immense power of Silicon Valley to shape policy and commercial discourses. These impulses have resulted in a celebratory imagination of self-tracking for health; tech evangelists in particular vowed to transform and personalize healthcare in a cost-efficient

way, while glamourizing and individualizing the pursuit of health maintenance. In light of this, since this research project has started in 2015, the practice has extended beyond adoption by individual actors, to shaping organizational behaviours (e.g. Target and Barclays wellness programmes), as well as health-focused efforts of nation states (e.g. in 2019, Singaporean authorities partnered with Fitbit to give free tracking devices to all its residents; the UK National Health Service [NHS] maintains a library of accredited tracking applications). The aforementioned dynamics shape not only socio-cultural environments, but the core of human subjectivities themselves.

The main question this dissertation aims to address is: how does self-tracking contribute to our sense of the self? The concept of selfhood is fuzzy, making it hard to define and examine empirically. There are extensive debates and, indeed, subfields of literature, arguing about the origins, presence, shaping, development, and mechanisms that underlie the self. Given those complexities, this dissertation chooses to employ the notion of reflexivity and internal dialogue of Charles Taylor and Margaret Archer as a way of examining self-construction. The dissertation thus focuses on exploring how and by what means self-tracking can shape our sense of the self by examining what we say to ourselves about ourselves based on the data given to us by tracking devices. And subsequently, this dissertation explores how we use such self-talk to inform our actions, judgments, self-perceptions, and self-constructions.

To address the main research question of the study and to capture how self-tracking informs selfhood, a multi-layered conceptual tool and a multi-method methodological tool were designed. The conceptual heuristics consists of four interrelated axes – cultural, reflexive, privacy, and ethics – with each serving as a lens for examining the phenomenon of self-tracking. Each of the axes operates with its own set of theories and concepts. Methodologically, the study

combined solicited diaries with a set of two interviews in order to capture reflections as they happen and over time, as well as to probe into issues of interest. Based on existing literature and on a hypothesis that different groups of users might perceive and reflect on their practices differently, four sub-groups – causal trackers, individuals living with chronic health conditions, athletes, and medical professionals – were recruited for the study.

Using the aforementioned tools in combination with a multi-layered analytical strategy, the study gathered participants' reflections about the practice of self-tracking and uncovered mechanisms through which it shapes our self-perception and self-construction. To briefly illustrate, the study identified the centrality of moral metaphors and moral emotions – anger, pride, and guilt – for the people who chose to engage in quantification. It showcased a conflict between the practices' symbolic representations in commercial discourses with everyday practices of self-quantification. The findings cluster along the thematic axes, building toward the same argument. This led to a new conceptualization of the practice in relation to selfhood (that moves it beyond the simple additive view), a novel conceptualization of informational privacy, a series of new findings in the dimension of meta-reflexivity, and a discovery of paradox of use – that is, awareness of the limitations of the practice does not deter users from engaging in it and thus drawing self-evaluations based on it.

In sum, this dissertation argues that self-tracked data is becoming a new resource for self-construction and self-evaluation and that data is coming to operate as a new ethical framework, similar to that of a religion or a philosophical movement, with moral and cultural values and codes embedded in it. This argument calls for further scrutiny of the actors involved in shaping the practice, as well as further examination of the ways in which actors adapt it to their own needs. The dissertation makes original methodological and substantive contributions.

Schematically, the dissertation offers a set of rigour-enhancing techniques for the solicited diary methodology employed herein, and proposes a new conceptualization for selfhood in relation to data.

The dissertation was inspired by the arguments of scholars working in the field of Philosophy (Charles Taylor), Sociology (Margaret Archer, William Sewell), Media & Communications (Tamar Sharon, Mina Ruckenstein), Privacy (Julie Cohen, Beate Rossler), and Linguistics (George Lakoff), as well as in dialogue with contemporary critical research on self-quantification spearheaded by Deborah Lupton, Dawn Nafus, Gina Neff, Kate Crawford, and many others. Drawing on the work of critical scholars, the dissertation finds its home in the critical camp working against the grain of over-celebratory, simplistic narratives promoted by administrative research and commercial discourses about self-quantification (e.g. Melanie Swan, Kevin Kelly, Larry Smarr). This dissertation contributes to the interdisciplinary space that is seeking to make sense of the practice.

The rest of the Introduction provides greater detail about the following issues: the epistemological position of the study; the conceptual and methodological designs; the study's rationale and necessity; the participants who took part in the research; and an outline of the dissertation's narrative arc. These are presented in subsections in such a way that helps to shape a narrative about the study from its conception and positioning, to contributions and their significance.

## **Research Set-up**

At the core of the study lies a question about the ways in which self-quantification constructs and moulds human subjectivities. Originally, self-quantification, self-surveillance and self-tracking underlined the development of bureaucracy, epidemiology and public health,

commerce, and medicine (Hacking, 1985; Foucault, 1973; Lupton & Petersen, 1996; Porter, 1995). The impact of self-tracking is especially visible in late 19<sup>th</sup>- and 20<sup>th</sup>-century medicine. For example, the cure for vitamin deficiency-related illnesses (e.g. pellagra and scurvy) resulted from dramatic self-experimentation and detailed self-surveillance (L. Altman, 1986), as did the discovery of vaccination side effects (e.g. yellow fever, oral polio vaccines) and the description of bodily elimination processes (Weisse, 2012). In earlier periods, self-tracking was mostly practised by medical professionals, athletes, career bureaucrats, and experts and was related to specific life-course periods, such as pregnancy or early parenthood. On the technical side, scientists have been working on wearable devices since 1960 (e.g. head-mounted displays, calculator watches), but were restrained by the physical size and the processing capacity of these devices (MaRS Market Insights, 2014). Thanks to minimization, high-speed processing, and the affordability of sensor-based technology, self-tracking gained momentum between 2007–2008. Just two years later, questions about self-tracking were included in the United States (US)-based Pew Research Institute's health survey for the first time. Today, more than 441.5 million people globally use wearables, while various fitness tracking apps were downloaded 656 million times in the second quarter of the 2020 alone (SensorTower, 2020), making devices and application key players on the efitness, mhealth, and wellness market.

A recent estimate showed that 18 million Britons use some kind of wearable device (the number of users doubled from the time when this research project started in 2015). Forty percent of wearables users in the UK are in the lower income group, while the rest is split equally between middle- and high-income segments of the population, and the practice is adopted across all age groups (Statista, 2020). The current market is dominated by five companies – Apple, Xiaomi, FitBit, Samsung, and Huawei – with wearables produced by Garmin, Jawbone, Nike, Microsoft,

and others holding 34% of the market (Statista, 2020). The functions of trackers vary, but most focus on calorie monitoring, sleep quality and duration, activity intensity, timing and location, and diet. The less mainstream fitness trackers include posture coaches (e.g. *Lumo*, *Alex*), water consumption tutors (smart bottles) (e.g. *Moikit*, *Hydro Coach*), breathing trainers (*BellaBeat* *LEAF*), and multifunctional jewellery (*OURA*), smart mirrors, and clothes with embedded sensors.

On the side of mobile applications, in 2016, the IQVIA Institute (2017), a US-based commercial healthcare data analytics company, estimated that more than 318,000 healthcare applications, mostly focusing on fitness, lifestyle and stress, and diet, are available via Google and Apple Store, 90% of which are free for users, with only 36 apps accounting for more than half of all downloads (IMS Health, 2015, p.1). The functions of health apps vary from providing information about fitness and health conditions to tracking behaviours (relying on both self-reported data and data collected via sensors, microphones, and accelerometers). For example, the *Anti Snore* app emulates the sound of a flying mosquito (prompting the sleeping body to instinctively move around) when the microphone detects snoring above the pre-determined decibel level (Behar et al., 2013). A wide range of intimacy trackers rely on noise levels and movement patterns to produce statistics about self-trackers' sexual experiences (Lupton, 2015b). A nationwide cross-sectional survey of health apps in the US revealed that two out of three mobile phone owners obtained at least one health app, with 40% owning more than five health-related applications; of those two-thirds, 65% used their application(s) at least once a day (Krebs & Duncan, 2015, p.4). In the UK, Kantar Media, a market research company, estimated that the total value of paid-for health apps, free fitness apps, and self-tracking devices ranges between 360–601 million US dollars (USD; Kantar Media, 2014). That same study (a nationwide survey of 2,000 people over 16 years of age) concluded that over 4.3 million Britons use free or paid health and



fitness apps. In addition, the UK NHS promotes a range of health and fitness apps that focus on the reduction of alcohol consumption, popularizing of strength and flexibility training, enhancement of healthy eating, jogging, and calorie tracking (NHS, 2020).

In essence, in less than a decade, self-tracking became a prominent health and wellness activity and a fast-growing industry. On top of significant financial gains, mass uptake, and the powerful players involved, the industry has developed a recognizable, persuasive narrative that valorizes self-optimization, personalization, prediction, and self-management of health (for more detail, see the Chapter 2, the literature review and Chapter 5, on culture). At present, the industry is poorly regulated in both privacy and medical validation respects (see literature review in Chapter 2, Chapter 7 on privacy, and Chapter 6 on reflexivity for more details). More importantly for the purposes of this research, self-tracking took centre stage in the realm of the self-knowledge, self-presentation, and socialization activities. This observation shaped the study. The next section provides definitions of key terminology, details the position of the research in the field, and explores the dissertation's research questions.

### *Definitions, Rationales, Research Question, and Position in the Field*

Self-tracking is the process of continuous data collection, storage, and analysis of various aspects of one's life, ranging from diet, sleep, and gait, to finances, productivity, and moods. The promise of self-tracking activities is to provide comprehensive and 'true' knowledge of the self (inevitably resulting in a better life). This premise vividly manifests in the commercial discourses surrounding self-tracking (see Crawford, Lingel & Kappri, 2015). For example, the first 3D self-tracking mirror claims to tell "the honest naked truth" and "so much more" (Naked, 2015). Self-tracking initially became popular after 2008, when Gary Wolf and Kevin Kelly of *Wired Magazine* established the Quantified Self (QS), a community dedicated to logging their own lives, developing

methods to do so, and sharing their findings (Barta & Neff, 2016). The recent boom of self-tracking activities is enabled by: 1) the emergent industry of wearable devices that rely on inexpensive micro-electro-mechanical systems sensors (Lee & Finkelstein, 2014); and 2) the growing availability of quantification applications on mobile platforms (Lupton, 2013). The proliferation of health discourses and the neoliberal idea of the self as a project served as fruitful grounds for the self-tracking boom. The tracking devices range from smart jewellery and wrist-band fitness trackers, to smart watch and DNA kits, to intelligent sports bras, to mobile applications that record anything from productivity to budgets, and others instruments which assist with stress relief and enhancing focus.

This study focuses on a specific sub-set of self-quantification: self-tracking for the purposes of fitness, wellness, and health. In this dissertation, the terms “self-tracking”, “self-quantification”, and “life-logging” are used interchangeably. Fitness tracking was chosen for four main reasons. First, on the micro-scale, a recent survey of literature revealed that diet, weight, and exercise (all health-related activities) are the most tracked behaviours (En & Pöll, 2016). Combining this finding with the observation about the prevalence of prevalence and novelty of the practice makes it a desirable contender for scholarly scrutiny. Second, the study was inspired by the literature on selfhood, and therefore it was vital to select a practice that brings into sharp relief a dimension of the self – in this case, mostly corporeal – that is linked directly to our sense of the self, rather than capturing external issues, such as geolocation or budgets. Third, the practice of self-tracking for health and wellness has a strong celebratory narrative inspired by the industry. Despite unverified claims made by commercial actors, this narrative is already shaping personal, organization, and even state behaviours, thus inviting critical scrutiny. In particular, it raises questions around the medicalization of everyday practices (i.e. sleep, sport, diets) and the

practice's impact on how healthcare is perceived. Finally, the neo-liberal shift in the British healthcare system reframed personal responsibility and self-reliance as the ultimate strategies for achieving health (Petersen & Lupton, 1997). The initiation of healthcare data reforms (i.e. the now-defunct *care.data*) and the publication of a flagship document, *Personalized Health and Care 2020: A Framework for Action* (2014), the UK government indicated that personal health data and participation in self-surveillance would play a major role in the future of every Briton. To capture this, the study will contextualize self-tracking practices in relation to broad social changes, such as a rise of personalized healthcare and the intensification of surveillance.

Chapter 2, the literature review, provides a detailed critique and synthesis of the arguments within existing literature, but for the purposes of outlining the problematic of the research question, some of the key points from the current research are presented below. To start from the broadest perspective, significant critical insights for understanding self-tracking come from the field of social theory (the classic works, of course, are not concerned with digital data or self-tracking directly). Those works provide a backdrop against which self-tracking is positioned. Social theory scholars inquire into how data obtained its 'pre-factual status' and examined assumptions of neutrality, truthfulness, and agnosticism, values, power, and biases (Bowker & Star, 1999; Crosby, 1997; Gandy, 1993; Gitelman, 2013; Porter, 1995), as well as how those play out in the context of selfhood (Foucault, 1987, 1988; Hackling, 1982; Rose, 1991).

Next, self-tracking is of interest to scholars of sociology, media and communications, and science and technology, who are primarily shaping the field of knowledge about the practice. The scholars affiliated with those fields work on both theoretical and empirical planes, on a large variety of issues, and with a wide range of conceptual and methodological tools. The literature review is largely dedicated to synthesizing findings from those scholars along thematic clusters.

Critical perspective colours most of those research efforts. For illustration purposes, the scholars have pointed out issues with data interpretation and meaning-making, described the variability of engagement in self-quantification by various groups of users, scrutinized and critically evaluated commercial discourse, derived a taxonomy of users, and examined motivations and beliefs associated with the practice (see multiple works by Lupton, Gorm & Shklovski, 2016; Fiore-Gartland & Neff, 2014; Pantzar & Ruckenstein, 2015). Altogether, the scholars affiliated with those fields painted a detailed picture of self-tracking that reveals tensions within the practice, issues with engagement and analytics, problems of meaning-making based on the data, and differential expectations from various groups of stakeholders.

Computer scientists and scholars working in the realms of human–computer interaction shaped available knowledge about device use and abandonment, engagement in the practice over time, and issues with current data visualizations and analytics, as well as covering issues with sensors, data flows, and material dimensions of the practice (Hepworth, 2019; Fawcett, 2015; Lazar et al., 2015; Robsky et al., 2015). Such scholarship also includes validation studies that – to date – have found a lack of scientific evidence for the health claims the devices are making, issues with validity and the reliability of measurement, and widely inaccurate tracking results, and draw attention to how the evaluation of sensors and algorithms is obscured by commercial companies and prevents scrutiny (Behar et al., 2013; Hoy, 2016; Lee & Finkelstein, 2014). In the realm of apps, a recent analysis of ethical concerns in health application production uncovered a breadth of serious problems, ranging from partisan affiliations with pharmaceuticals (apps are used as branding tools and a point-of-sale), the publishing of inaccurate and unverified medical information, and encouragement of self-diagnoses (Chen, Cade & Allman-Farinelli, 2015; Haasteren et al., 2019; Krieger, 2013).

The perspective of the political economy of data and labour contributes scholarship that focuses on new data-related challenges (Boyd & Crawford, 2012), data commodification, and processes of the reconfiguration of data divides and bridges (Barta & Neff, 2016; Esposti, 2014). Studies have shown how companies are pushing their employees and customers to use self-tracking devices. The main insight from the field is that the benefits of self-tracked data collection are not equally distributed (e.g. individuals have little say in issues of design, algorithmic analysis, and data use) and that the self-tracked data is then used to reward and punish specific health behaviours (Lupton, 2016a; Moore & Robinson, 2015; Passanante Elman, 2018). In brief, scholars have shown how self-quantification as a data practice comes to shape individuals' life chances, including hiring, healthcare availability, insurance, and other, related issues, as well as how it contributes to negative issues such as exclusion, discrimination, and other inequalities.

Health and fitness self-tracking is of paramount importance to scholars of surveillance and privacy, including legal scholars. As the literature review illustrates, in the Australian, US, European Union (EU), and UK contexts, data protection regimes remain wanting. In particular, the regulations do not subject self-tracked data, much of which shares attributes with sensitive medical data, to the necessary levels of safeguarding (i.e. the data is regulated under consumer electronics regimes instead of a medical umbrella). The regulatory gaps make individual consumers vulnerable to unknown and unpredictable privacy violations, as well as potential health threats. In addition, most of the self-tracking tools' health claims are rendered unexaminable and are obscured by the lack of transparency and the absence of the possibility for external validation of health claims (Behar et al., 2013). The studies revealed that – at present – individuals are both concerned and under-informed about how their data is being collected, re-combined, analysed, and used (Cohen, 2012; Patterson, 2013).

Lastly, practice-oriented and non-academic literature also contributes to the discourse about self-tracking. The overarching theme of such literature is the celebration of data and self-tracking potential for the improvement of biomedicine and public health (Smarr, 2011; Swan, 2012, 2013). The main argument of the grey literature rests on the assumption that self-tracking and quantification has the potential to result directly in positive behaviour changes, personalized healthcare, and optimization of the medical systems. Popular discourses also celebrate cooperation between industry and governments for healthcare delivery (HSCIC, 2015). Those discourses, while lacking critical edge, shape how the general public perceives the new data environment and the practices of self-tracking, hence potentially contributing to the how the practice shapes the sense of the self.

To summarize, the literature indicates that health technologies lack regulation, verification of claims, and legal oversight, and that they are plagued with various issues related to validity, reliability, and prediction. The practice brings significant financial benefits to commercial actors who make use of personal data, leaving self-trackers exposed to further harms. Yet, the practice is taken up with seriousness and dedication by individuals from across different socio-economic spectra, suffering from various health conditions, and engaging in quantification for a multiplicity of reasons. This raises the question about the practice's contribution to our sense of the self. While various individual studies have attempted to illuminate the nexus between the practice of self-tracking and selfhood, a study from the perspective of selfhood was yet to be published at the time when this dissertation was initiated.

Based on the observations of the literature, this dissertation asks: how does the practice of self-tracking for health and wellness via applications and wearables contribute to our sense of the

self? More specifically, this dissertation seeks to illuminate mechanisms through which the practice contributes to the processes of self-construction and self-evaluation.

The dissertation tackles the research question from the perspective of critical scholarship. This is the case for three main reasons. First, the work was inspired by observations made in the critical literature, specifically concerning agency, creativity, and resistance to the adoption of self-quantification (Fiore-Gartland & Neff, 2015; Pink et al., 2016; Sharon, 2016; Sharon & Zandbergen, 2017). Second, the study owes its intellectual legacy to critical scholarship that was used in the construction of the conceptual tool employed in the study. Third, the study works against the grain of the uncritical celebratory premises promoted by commercial discourses today. This affiliation shaped the design, implementation, and analysis of the study, which are detailed in the next section.

### **Conceptual Framework and Methodological Design**

To meet the core goal of the dissertation, a conceptual and a methodological tool were designed in line with the demands imposed by the research question and in consultation with the existing literature. On the conceptualization front, it was vital to derive a flexible and multi-layered heuristic device in order to: 1) accommodate the multiplicity of existing selfhood-focused theoretical perspectives and arguments about self-quantification; 2) enable movement among various levels of analysis; and 3) promote the examination of reflexive thoughts of the participants continuously, over time (a detailed rationale is provided in Chapter 3, on conceptual framework).

Therefore, a conceptual tool consisting of four interrelated, but independent axes was designed. The axes are concerned with cultural, reflexive, privacy, and ethics dimensions of the practice, with each playing a key role in shaping and maintaining the sense of the self. More

specifically, self-construction was judged to require specific conditions (i.e. space for consideration, non-intervention – i.e. privacy axis); resources to draw upon (e.g. values, symbols, practices, language – i.e. culture axis); comparative standards (e.g. moral frameworks, ethical standards – i.e. ethics axis); and mechanisms (e.g. self-talk, self-analysis, reflection – i.e. reflexivity axis). Each axis operated with a set of its own concepts, provided analysis at different levels, and played a particular function in the analysis as a whole. For example, the axis on culture provided an overall picture of the phenomenon, preparing the ground for an in-depth analysis, while the chapter on ethics draw attention to details – such as linguistic features and sentiments – that were overlooked in the existing literature. Below, a brief overview of each of the axes is provided.

The cultural axis employed a double-layered conceptualization of culture as symbols and as practices, proposed by William Sewell (2005). This conceptualization helped to examine self-quantification for health and wellness at two different levels, while at the same time capitalizing on the comparative possibilities such conceptualization promoted. The development of the reflexivity axis drew from the works of Margaret Archer and Charles Taylor to conceptualize introspection as internal dialogue that enables self-evaluation and self-construction. The lens of reflexivity employed such concepts as personal projects, strong evaluators, and radical reflexivity. This conceptualization also shaped the methodological design, necessitating a longitudinal perspective and a tool capable of capturing constant, in-the-moment, and unrestrained reflections.

The privacy axis was designed with in view of arguments developed by Julie Cohen, Beate Rossler, and other scholars who examined the role of privacy in self-construction. This axis deals with a specific type of privacy – informational privacy – and after ruling out the



current conceptualization of privacy in the context of self-tracking, proposes a direction of inquiry which leads to a novel way of thinking about privacy. The ethics axis employs concepts from linguistics, sociology, and philosophy (drawing on the works of Charles Taylor, Judith Butler, and Paul Ricoeur) to examine norms and comparative domains through which self-tracking shapes self-evaluation. This conceptualization also shaped the types of analysis used in this study, requiring the addition of sentiment and metaphor to the original analytical strategy.

The methodological design of the study was shaped by the conceptual need to generate and capture unrestrained personal reflections, while also being able to probe into specific issues of interest to the core research question. To meet those needs, a design that incorporates a set of two in-depth interviews with a solicited, open-ended, digital diary was employed. The interviews allowed for inquiry into specific areas of interest to the project (e.g. how an app or a device were selected, or how data is typically analysed) and facilitated further clarifications on the points raised in the diaries. Diaries, by contrast, were employed to understand how participants reflect on and evaluate their practices and how their attitudes and opinions developed and changed over time. Based on the existing literature, it was hypothesized that different groups of trackers might understand the practice differently owing to their specific experiences and professional roles. Therefore, four separate groups of people were recruited to take part in the study. The following section introduces the participants, whose voices will be heard throughout the dissertation. Additional details about the participants are presented in Appendix 1.

### Meet the Self-trackers

A total of 45 people completed the study (with another 5 dropping out at different stages; for details, see Chapter 4 on methodological design). The sample was designed to include four types of self-quantifiers, as it was theorized that insights from different groups of participants

about tracking practices would differ in a meaningful way amongst them, thus aiding theory-building. The biggest cluster was made up of casual self-trackers: individuals who engaged in the practice for reasons that were unrelated to their professional or health identities. The other three groups consisted of medical professionals (e.g. pharmacists, dentists, generalist and specialist nurses, public health professionals), professional and semi-professional athletes (e.g. basketball, triathlons, fencing), and people living with chronic health conditions (e.g. depression, HIV, eating disorders).

A little less than half of the participants (19) used exclusively mobile applications to track themselves, while the rest used either a wearable device or a combination of a wearable and an app to track their health and wellness. In addition, those who performed in athletic competitions (Evelyne, Zoe, Li, Roy, Margaret) reported using more than one wearable: one device was for everyday use and leisure, and the second or third device was used for specialist training related to their activity of choice. Some participants reported also using multiple mobile applications, combining digital and pen-and-paper tracking, and using spreadsheets. While the majority of the participants actively chose which apps or devices to use, some received theirs as a gift or found out that they had been automatically tracked by their phones, which in turn became adopted as their default mode of tracking.

To make the introductions more memorable and concise, the participants are presented in their respective clusters. Some of the participants are mentioned twice in different clusters, as during the study it became obvious that they met more than one set of selection criteria and that both of these narratives shape their self-quantification practices.

**Li, Aurora, Margaret, Roy, Gabriel, Evelyn, Emma, Zoe, and Roman** professionally or semi-professionally competed at national and international levels in different athletic events.

**Paul** is an exception in this group, and did not partake in professional sporting activities, but as a bodybuilder, he follows a strict regime of diet and exercise similar to that of athletes. The sports they engaged in range from triathlon, Tough Mudder competitions, and martial arts, to professional basketball and fencing, to cycling and running. For many of these participants, their athleticism formed a significant part of how they thought about themselves. The participants in this cluster described how training routines and competitions dictated part of their everyday lives, as well as their life trajectories – from education to careers. At the time of the study, Margaret, Li, Paul, and Zoe were either recovering from injuries and returning to sports or were trying to reach the peak of their physical fitness to take part in upcoming competitions. The activities of participants in this group were frequently supported by professional coaches and advisors.

**Nancy, Melissa, Tilly, Hillary, Martina, Willow, and Alistair** comprise the medical cluster. Willow and Melissa are nurses in the early part of their careers, while Hillary had retired from her nursing career at the time of the study. Nancy was a specialist nurse, who is also a public health professional with the UK NHS. Tilly was in the midst of her dental training, Alistair was a pharmacist, and Martina joined the Eating Disorder Unit at a medical facility in a position related to mental health support. The medical professionals were included in the study because based on the existing literature, it was hypothesized that their professional identities would, at least in part, shape their perception of self-quantification. They also contributed insights about the acceptability of new health data in their professional sphere. An individual who was both a medical doctor and a high-profile public health professional joined the study, but was forced to drop out due to extreme time pressure, and her data is excluded from the analysis.

**Grace, Alistair, Lisa, Melissa, Emma, Hannah, John, Zara, and Sean** all reported having a long-term health condition. Some of these conditions were active, whereas others were in remission. These health conditions ranged from HIV, chronic fatigue syndrome (CFS), and diabetes, to Crohn's disease, cancer, bulimia, anorexia, migraines, and depression. Wherever possible, the narrative of the dissertation avoids attribution of the health conditions to specific informants. The participants in this group were included based on two sets of findings from the existing literature. First, people living with chronic health conditions (e.g. diabetes, aging, mental health) are a demographic of focus for researchers working in the self-tracking realm; and, second, self-tracking in commercial discourses is advertised as potentially shaping the development of personalized medicine. In the study, the participants living with chronic health conditions were able to offer insightful, original points that came through in their personal health journeys. Unfortunately, Sean dropped out without completing the study, but his narrative is powerful and informative, and available data was included in the analysis.

The rest of the participants belonged to the cluster of casual users – among whom the reasoning for tracking, experiences, length of tracking, and socio-demographic characteristics varied. **Katie, Will, Peter, Joan, Vanessa, Florence, Rose, Aaron, Vijay, Dawn, Carla, Maureen, Helen, Emmanuel, and Grace** are younger participants within the age ranges of 18 and 35 years old. They all had at least an undergraduate degree, with at a significant minority being educated to a graduate level, including one to PhD level. Their careers differed from scientists and researchers, to police officers, civil service, tech workers, and students. **Jerome, George, Mark, and Eloise** are middle-aged participants, most of whom have children and careers ranging from freelance and charity work, to construction and a job in the City of London. George is also a photographer. **Nathaniel, Lydia, Victoria, Camilla, and Mary** are older

participants who have retired from their original careers, with some working freelance or taking up new callings (e.g. in the case of Camilla, as an artist). Those participants enjoyed active lifestyles that included activities such as walking, as well as blossoming social and domestic lives.

In the flow of the dissertation, the life stories of each of the participants unfold, providing personal experiences and thoughts shaping the work's core argument. This dissertation would not be possible without the time, effort, and willingness to share that the amazing participants demonstrated. The next section provides a roadmap of the dissertation.

## Outline

The dissertation unfolds as follows. First, a review of the relevant literature is presented. The review is organized along the four aforementioned dimensions of the conceptual tool. Each of the sections summarizes the available findings, identifies the gap in existing research, and signals the theoretical direction the analytical heuristics takes. The review is followed by two chapters that detail the conceptual and the methodological designs, respectively. Each of the chapters presents a rationale for the selection of the specific concepts or designs, their function in the study, and their position vis-à-vis existing knowledge and literature. In addition, the methodological design chapter presents specific details on each of the tools, summarizes reflections on the study, evaluates the quality of the collected data, and reflects on the successes and failures of the design. This chapter also discusses the analytical strategy employed in the study.

Subsequently, the four chapters that follow present empirical findings and unfold in the following order: culture, reflexivity, privacy, and ethics. Each chapter presents findings in a narrative fashion. Along with the new insights, each chapter's contribution to the field and to the

overall argument of the dissertation are discussed. The dissertation proceeds with a discussion chapter, which examines core findings and their significance, and presents a section that weaves together the core findings in a new way and discusses their significance. The Conclusion briefly summarizes the main features of the study and its key findings, reviews the limitations of the study, and presents recommendations for policy, design, and future research.

## Chapter 2– Comprehensive Review of Literature

Few would disagree that data has become a new frontier of human lives. There are multiple terms that are used to describe this new societal condition, such as dataism, datavelliance, and datafication (see for example van Dijck, 2014; Mayer-Schoenberger & Cukier, 2013). These terms imply various epistemological and ontological origins of the emerging paradigm. An overarching point of agreement, however, is that new social, economic, and historical conditions are driven by data generated by innumerable human activities in our online and offline lives. Self-tracking undeniably contributes streams to that data environment.

The aim of this chapter is to present a comprehensive review of literature on self-tracking across various disciplines, theoretical orientations, and research foci. To that end, the chapter synthesizes and evaluates existing arguments, pinpoints tensions, and discusses the gaps in existing scholarship. The chapter also highlights key scholars and core texts on the subject. The chapter predominantly focuses on summarizing and appraising the arguments and the evidence produced by the academic community in the form of peer-reviewed journals, books, and conference papers. The main argument of the review is that while the literature on self-quantification is maturing, leading to the establishment of core narratives, including from the critical scholars, the practices' contribution to the construction of selfhood has been partial and mostly addressed through a single lens (i.e. the works of Foucault and the scholars who followed his thought). To make an original contribution, the review identifies multiple theorization opportunities that will lead to the development of conceptualization of selfhood through an alternative lens of reflexivity inspired by the works of Charles Taylor and Margaret Archer, amongst others. This conceptualization in turn examines how self-tracked data contributes to our sense of the self.

The literature on the topic is vast and dynamic, with scholars from different fields which frequently are not in dialogue with each other contributing to the same research efforts. In schematic terms, computer scientists and human-computer interaction (HCI) scholars focus on questions of the design, adoption, and use of tracking in everyday life. Medical scientists examine the use of technology in support of their practices, compare the output to gold standards in medical research, and conduct validation studies against medical-grade devices. Media scholars and sociologists provide diverse research output touching upon themes of culture, sociality, politics, and economics of quantified data, tracking use in everyday life, and ontologies of datified practices. Legal scholars are concerned with issues of privacy, governing frameworks, and data protection.

The existing literature examined in this chapter was searched using the London School of Economics (LSE) catalogue, Google Scholar, flagship journals in digital health, media, and communication, and digital and health sociologies, and major aggregated databases (i.e. Web of Science, Scopus, SAGE), as well as back-end citation of academic articles. The literature from the past 20 years (2000–2020) was searched in a systematic manner using terms and combinations of words identified as relevant to the study, such as “self-tracking”, “self-quantification”, “life-logging”, “self-tracking AND privacy”, “culture\* and self-quantification”, and “self-tracking and reflexivity” (for an example of record-keeping, see Appendix 2). The search was limited to the English language. Capitalizing on the iterative nature of the process of the research design, the review is presented according to four main themes – culture, reflexivity, privacy, and ethics – as such scholarship informed the development of the four conceptual heuristic axes presented in the next chapter. Having arranged the review in a thematic way also



serves to clarify each chapter's individual contribution to the overarching argument of the dissertation.

### **Literature Landscape: Currents, Arguments, and Tensions**

A crude Google Scholar search for the term 'self-tracking' reveals that more than 11,100 academic articles (plus another 1,220 for the term 'self-quantification') have been published since 2007 (August, 2020). This represents a greater than three-fold increase from May 2015, when the same search was run at the start point of this review. While this measurement cannot be taken as anything more than anecdotal evidence, the volume of publications and thus interest in the phenomenon are impressive, as is the range of fields engaged in the study of the practice. The following sections map out the academic literature concerned with self-tracking. Each section discusses the main theoretical contributions, scholars, and arguments across relevant clusters, as well as positions each of the sub-fields in relation to the present inquiry. The research direction and position of the dissertation was inspired by the work of critical scholars such as Debora Lupton, whose voluminous and diverse contribution to the field deserves a special mention; Tamar Sharon, Gina Neff, Dawn Nafus, Jamie Sherman, and Natasha Dow Schull, whose writing helped to identify original points of entry; and the innovative research perspectives of Veronica Barrasi, Julie Passanante Elman, and the Citizen Lab based in the University of Toronto, the creativity of which was inspirational.

### **Self-tracking as Culture**

The studies concerned with the cultural dimension of self-tracking can be broadly categorized into discursive-analytical and subject-centred empirical, with conceptualization at the level of discourse and human action, respectively. Methodological approaches to studying the cultural dimension of self-tracking are diverse, ranging from surveys and experiments to

interviews and ethnographic research. Overall, those efforts have resulted in rich and tightly woven scholarship.

The following sections review the literature on the cultural dimensions of tracking and identity the tension on which the conceptualization of self-tracking as culture is built in this dissertation. The review proceeds in two steps that reflect the landscape of the relevant literature. The first part of the review focuses on arguments related to the discourses and values underlying the practice, and the second part synthesizes arguments and findings about how self-tracking is positioned and performed in everyday life.

### **Self-tracking for Health and Wellness: Frames and Values**

The first cluster of studies focused on exploring the actualization and valorization of the underlying cultural ideals, as well as on uncovering values that were left out of the mainstream discursive frames of self-tracking (Goffman via Markham, 2013). Current framings are important to understand because they circulate widely in the popular discourses colouring the practice in everyday life. Those arguments are also important because: '[self-tracking] is endowed with meaning by wider discourses on technology, selfhood, the body and social relations that circulate within the cultural context in which the practice is carried out' (Lupton, 2014, p.78). As such, the reviewed studies examine meanings given to/by the practice. In sum, exploring what kind of values are promoted by the quantification is instrumental for understanding how health, wellness, happiness, sociality, and other concepts are constructed by and enacted with the practice.

The section focuses on three types of discourses most relevant to the study: the dominant commercial discourse (e.g. self-optimization, self-responsibilization, healthism); discourses around specific issues (e.g. aging, device abandonment, pregnancy and sexual health); and

alterative discourses circulating in the popular culture. The conclusions are derived from deconstructing and analysing cultural artefacts – data, devices, and visualizations – and commercial and media discourses surrounding self-tracking.

On a historical timeline, self-tracking fits within a wave of quantification of all areas of life – the trend that values granular control, prediction, metrization, rationality, objectivity, and scientific reasoning (Bowker & Starr, 1999; Gitelman, 2013; Mayer-Schonberger & Cukier, 2013; Porter, 1995; Suchman, 1994; van Dijck, 2014). In practical terms, the practice offers to record both measurable metrics (e.g. sleep, calories burned) and previously unmeasurable metrics (e.g. moods, aging, brain activity), enabling action based on the collected data. The overarching theme in popular literature is the celebration of data's and self-tracking's potential for the improvement of biomedicine, public health, and personal wellbeing, as well as happiness more generally (Swan, 2012, 2013; National Information Board, 2014). The main argument of the popular, celebratory discourse rests on the assumption that self-tracking and quantification will result directly in positive behaviour changes, the achievement of one-size-fit-all ideals of health and wellness, personalized healthcare, and the optimization of global medical systems. Popular discourse also celebrates cooperation between industry and governments for healthcare delivery (HSCIC, 2015). This take on quantification has been extensively problematized in academic literature, both in studies of self-trackers and beyond (Ajana, 2017; boyd & Crawford, 2011; Dow Shull, 2016; Kitchin, 2014; Ruckenstein & Pantzar, 2017) on the grounds of neoliberal ideology, assumptions about ideal and achievable states of happiness, health, and the body, as well as power-exercising.

The practice's affiliation with the dataistic paradigm crystalized in the now-famous motto of the Quantified Self movement (an instigator of the self-tracking practice more generally):

“self-knowledge through numbers”. From the official discourse of the movement, it can be gleaned that since its inception, it valorized rationality, truth, measurability, transparency, and objectivity, calling the practice “everyday science” and using the scientific language of trustworthiness, validity, reliability, baseline, measurements, and averages (QS, 2020; see also Ruckenstein & Pantzar, 2015). In line with those observations, Fiore-Gartland and Neff (2015) proposed a six-valance taxonomy that underlies the practice from the perspective of the users: self-evidence; actionability; connection; transparency; truthfulness; and discovery. More generally, self-quantification discourse made a claim to scientific backing and associations – for example, most of the applications and wearables devices contain page references to health authorities, such as World Health Organization and British Heart Foundation, and narratives of sciences, including nutrition, kinesiology, and psychology. Researchers found that those frames are promoted by the use of scientific language and by companies recruiting scientists and academics, to appeal to their audiences (Belli, 2016; Berg, 2018; Katz & Marshall, 2018; Thomas & Lupton, 2015; Wade, 2018). The following sections add substance and examples to the brief synthesis outline above.

Crawford and colleagues (2015) made an initial effort in studying how the practice is framed by analysing how devices are marketed to the general public and thus what values are elevated by self-tracking via examining Jawbone and FitBit commercials. The authors argue that wearables were presented as all-knowing devices: understanding the users better than they understand themselves, making users better people, and helping users to lead not only healthier but better lives (for interesting examples, see also Lindner, 2020). Similarly, in an ethnographic study of annual technology tradeshow, Dow Schüll (2016) examined commercials which were used to sell wearables via frames of taking control and personal empowerment. In the paradigm

of brain training and cognitive ability metrication (the activity trackers' claim is impossible to "feel" or understand subjectively), the researchers showed that values of "optimization" and "enhancement" of the brain are valorized with the vocabulary of "regenerating, rebooting, recovering, reserving" (Katz and Marshall, 2018, p.66) against the impacts of age-related declines, while constructing brain training as a part of specific aging subjectivity. Similarly, the values of "self-optimization" and "civility" were uncovered by Millington's (2016) analysis of commercial discourses of digital posture. While in the realm of sleep tracking, Williams and colleagues (2015) brought to the surface implicit values valorized by the sleeping applications: "self-optimization", "self-responsibility", and a solution to healthcare austerity in the UK and elsewhere. Williams shows how wakefulness is celebrated and sleep is pushed towards something to be managed in the service of efficiency both at work and at home under the rule of the neoliberal regime (Williams, Cobey & Gabe, 2013). In his earlier work, Williams (2005; 2007) showed how sleep norms are socially and culturally grounded and that they are subject to change through periods of time and across the globe – something tracking devices do not account for.

Scholars exploring different research avenues have shown how commercial discourses circulate and recirculate in different realms, therefore establishing their dominance. For example, researchers (Lyall, 2019; Clawson, et al., 2015; Lazar et al., 2015) who conducted studies of device abandonment and the reused wearables market concluded that even on the second-hand market, the core messages of optimization and better self-knowledge do not lose their appeal. Lyall summarizes: "the messages put forward in wearable marketing [...] implicitly create then solve the 'problems' [Millington, 2016] presented by busy late-modern lifestyles – lives in which individuals allegedly separated from deeper 'knowing' or 'harnessing' of their bodily capacities.

The fact that the second-hand market reflects these messages, while also incorporating user's personal experiences, is significant" (2019, p.119). Similarly, Berg (2017), who conducts a discourse analysis of the marketing materials, guides, and blogposts of two wearable rings, concluded that: "it became clear that the same arguments, words, metaphors and phrases emerged over and over again, and the reoccurring narratives seemed to be, if not rehearsed, then at least firmly bounded with an interpretive repertoires" (p.3). These findings were echoed in Salmela and colleagues' (2019) recent study of a tracking ring.

Furthermore, in commercial imagination, self-tracking is linked not only to better health, but to a life better lived. To illustrate, an LVL Wearable Hydration Monitor (i.e. a hydration tracking device; now defunct) commercial contains the following line in reference to the water intake: "LVL gives you the data and tells you how much you need to get balanced *in life*" (*emphasis mine*), thus casually equating being properly hydrated to achieving life balance. FitBit's 2016 commercial suggests that using the device makes 'for life better lived'. Similarly, Jawbone – another tracker producer – produces commercials (2015) that suggest that by using the device, a person can "be one *glass of water better* today" to achieve "the better version of you out there". While there is indisputable scientific evidence that exercise can positively contribute to individual health, just knowing one's heart rate, the actual number of steps taken, or hours of sleep banked (the service that these devices actually provide) is unlikely to make life better lived. The companies that currently dominate the market of consumer tracking have a main, shared narrative: self-tracking makes you a better person who will lead a happier life.

Overall, in popular culture, self-tracking has promoted values of 'true' self-knowledge, responsible citizenship, control, actionability, and making better choices in order to enhance one's wellbeing, but it does not stop here. Those frames fit easily with discourse of neoliberal citizenship

and link to all-consuming datification. The self is positioned not only as known, transparent, predictable, and optimizable, but as having an ethical and moral obligation to iterative betterment, self-care, self-control, and self-responsibility. In addition, the discourses promote personal responsibility for health and wellness over structural solutions that can be used to address the shape of healthcare and address health inequalities. Indeed, the notion of self-care and – unsurprisingly – arguments developed in this category of literature commonly employ concepts of power, ideology, biopolitics (Ajana, 2017; Hepworth, 2019; Lindner, 2020; Sanders, 2017), biopedagogy, technologies of the self (Fotopoulos & O’Riordan, 2017; Rich & Miah, 2017; Williamson, 2015), healthism, self-optimization and gaze (Catlaw & Sandberg, 2018; Charitsis, 2016; Clarke et al., 2010; Cederstrom & Spicer, 2015; Dow Shüll, 2016; Turrini, 2015), and the broad concept of neoliberalism. As such, problems and responsibilities are individualized and presented as a moral pursuit.

Despite the prevalence of standard neoliberal-toned framing and messaging, alternative frames also exist in public imagination. For example, parody commercials uploaded to *YouTube* clearly present an alternative to the mainstream narratives of self-tracking. For example, one clip satirizes FitBit classic *Find Your Fit* and *All the Fits* commercials by showing a person sleeping and napping while wearing a tracking device. Captions in the parody commercial include: NapFit, StillNappingFit, and DeepSleepFit. These are clear comic references to a range of “fits” – DaddyFit, DateFit, ThisFit, SlowFit, RowFit – that the tracker promises to achieve. Another parody commercial suggests that tracking has gone too far by advertising a device for the achievement of regularity in bowel movements. Alternatively, a New Zealand-based parody commercial advertises trackers for their ability to “change the way you obsess and worry about your health”. It shows a tracker user hitting a body-sized rock while checking her statistics on the

jog and another tracker who, by posting his personal bests on Facebook, is “shedding his friends as well as his kgs”. The commercial proceeds by showing judgmental motivational messages to the users and the female tracker admitting that she hates her FitBit, which in turn electrocutes her. In the final scene, she digs a hole to bury her device, which in turn sends her a message “You call THAT digging?”, and a narrator concludes that: “FitBit takes no responsibility for the fatalities caused by FitBit”. Finally, users of Strava (an application for competitive cycling or running), resorted to making up new vocabulary, such as “stravasshole”, to show how the self-tracking app ruined the social element of cycling by introducing competitions. The videos captured cyclists no longer yielding to each other on the road, no longer stopping or helping out others to navigate the terrain, and not helping other cyclists get medical help. The parody commercials are critical of many elements of tracking, including promises of making you healthier or more active, the devices’ ability to bring you closer to others, and the device as a non-judgmental support system. These media products can be viewed as a site of contestation of governing meanings and symbols, as such discourses arise in response to the dominant cultural framing of the practice. Those frames align well with the individual practices of everyday life discussed in the following section. Such frames have imbued the practice with alternative values that do not align with reductionism of numbers and technological determinism of the mainstream discourses.

Ultimately, as the field has progressed, a more nuanced picture of underlining values has emerged along various dimensions of the practice – for example, an issue caused by designing trackers around socially constructed gendered norms. The Apple Health Kit did not include any tracking options related to women’s health until 2015 (Perez, 2015). Early wearable devices were designed for men, as devices were expected to be attached to belts and left in pockets rather



than being stored in purses, as most women would do because of the relative lack of pockets on women's clothes (Eveleth, 2014). Another issue surrounded sexual tracking: namely, intimate health-tracking apps have been shown to gender their users in multiple directions, including by what is measured (e.g. sexual stamina, competition, and promiscuity score were available for men; while ovulation, pregnancy calendars, and sexually transmitted disease metrics were available for women) (Lupton, 2015b). Similarly, reproductive health apps have been shown to embed heteronormative as well as racial assumptions (e.g. all babies are blond, no variations for same-sex couples) and gender biases (e.g. pink as the predominant colour in design, an overwhelming focus on conception) (Barassi, 2017; Epstein et al., 2017; Lupton, 2015b; Gambier-Ross et al., 2018). For example, Lupton and colleagues (Thomas & Lupton, 2015; Thomas, Lupton, & Pedersen, 2018) – via a critical discourse analysis of fertility apps – argued that apps prescribe specific gender behaviours, such as expecting men to be uninterested and uninformed about pregnancy and childrearing, while positioning women as being both at risk and as performing a thrilling task. Touching on a related topic, in a longitudinal study of British mothers, Thornham (2019) showed the damage that the metrization of breastfeeding can lead to for parents (as well as what it misses by selective measuring). Similar critiques have been levelled at the Western-centeredness and ableism of the practice. To illustrate, the researchers have demonstrated how able-bodiedness is valorized (e.g. steps as the dominant and often the only unit of measurement of activity) and disability is depoliticized via purely nominal inclusion of disabled users (i.e. only in commercial materials) (Passanante Elman, 2018). There are also a number of western-centred assumptions (e.g. Americanized food databases, only white symbols for children and beauty apps (Elias & Gill, 2018; Sanders, 2017). The normative push of the beauty complex is also intensified by self-surveillance: Sanders argues that just like health

magazines, health and beauty norms have been “conflated” and “co-articulated” (2017, p.52). The assumptions of social comparison and competitions have been met with criticism by the users (Depper & Howe, 2017; Williamson, 2015).

To this point, the following picture emerges. Self-quantification is sold on the premises of limited discursive rationales: those focusing in particular on objectivity, self-optimization, self-knowledge, and self-betterment; and those values linked to individual responsibility by way of empowerment and promoted as a main solution to structural issues in healthcare, as well as personal moral responsibility. These discourses re-circulate on multiple levels. The mainstream discourses are contested and nuanced both by the users, especially those users engaging in specific types of tracking, and in popular media.

### **Self-tracking as a Grounded Everyday Practice**

The second cluster of studies focused on the how’s and why’s of tracking from the users’ perspective. The studies uncover cultural values by asking questions about practices, such as why measuring is important; why some measurements are ignored while others are prioritized; why social functions of platforms are (not) used; and how devices are used in everyday life. Those themes were of special interest to scholars interested in the behavioural aspects of tracking for understanding types of use and engagement with data (Asimakopoulos, Asimakopoulos & Soukkers, 2017; Bode & Kristensen, 2015; Epstein et al., 2016; Sjolint, Constantiou & Trier, 2015); user experience overall and across socio-demographic groups (Lyll & Robards, 2018; Pettinico & Millne, 2017; Puri et al., 2017); and self-tracking’s role in everyday life and health routines (Ancker et al., 2017; Didziokaite, Saukko & Greiffenhagen, 2017).

While most of the studies in this cluster are qualitative, exploratory, and engage with small samples, they report overlapping findings. First, self-trackers’ everyday practices differ

from those prescribed by and imagined in commercial discourses and by tracking devices. Grounded in everyday life, the practices are more versatile, creative, and community-focused, thus going against the grain of biopedagogy, neoliberal selfhood, and normativity. Second, tracking activities are neither straightforward nor taken at face value by the users, with its objectivity frequently questioned by users and no action resulting from the collected data, challenging the assumptions of healthism and medicalization. Third, self-tracking is not as permanently adopted a practice as governmentality and power frameworks would make it out to be. To showcase those narratives, some of the most relevant and interesting existing research is reviewed in the text below.

In the realms of self-trackers living with chronic health conditions, the studies covered health issues ranging from fertility (Costa Figueiredo et al., 2017; Gambier-Ross et al., 2018), bipolarity (Matthews, Murnance & Snyder, 2017), and Parkinson's disease (Riggare et al., 2019), to endometritis (McKillop, 2016), childhood diabetes (Lee & Dubovi, 2020), and Multiple Sclerosis (Ayobi et al., 2017). The researchers showed how against the background of individualized disease manifestation and unique symptoms and conditions flows – which makes those states rarely generalizable and volatile – quantification's main promise of prediction and optimization gives way to “self-stabilization” (Matthews, Murnance & Snyder, 2017) and to a celebration of the lack of change rather than self-enhancement and optimization. The studies also show how the practice – advertised as individualistic and personalized – results in community formation and challenges group practices (e.g. for actors involved in support in schools and families) and in communities coming to form social dynamics far from individualization. The studies of trackers with chronic illness also revealed the emotional burdens associated with the practice, such as obsession and fixation, hyper self-scrutiny, and holding the self to an

impossible normative standard. All of those findings go against the promises of self-quantification. The studies also showed that self-quantification does not fit neatly as a part of personalized medicine or healthcare regimes and that healthcare professional and patients have different expectations about their data being used, with participants reporting that their efforts get ignored or dismissed, with positive outcomes reported only case-by-case bases (Ancher et al., 2017; Schwennwsen, 2017; Riggare et al., 2019). As such, practices that are supposed to be enabled by the promises of the Silicon Valley are divorced from reality, with clinicians not being able to use the data. Finally, studies have found that disaggregated daily data is a focus of attention for trackers, as users engage almost exclusively with their day-to-day data points (e.g. Lee & Dubovi, 2020).

To pick up on the reported failures, long-term engagement with wearables is necessary for the practice to have any disciplining effects. Yet, a study found that only 1/5 of devices were used after two months, with 45% of people not planning to use the device in the future (Lazar et al., 2015, p.639). A more comprehensive study that involved 711 users wearing tracking devices for a year showed an exponential drop in device use, with 74% of people using it after the first 100 days, and only 16% after 320 (Hermesen et al., 2017), with the decline rate at about 2% a week. Trying to explain those trends at the conceptual level, Gorm and Shklovski (2019) – who also conducted a longitudinal photo elicitation study over a five-month period – concluded that self-tracking is better described as an episodic rather than as a continuous practice. Those findings signal that linear engagement with trackers is not as prevalent. Furthermore, researchers have explored how interacting with devices changes over time (Lin & Windasari, 2019), arguing that users' behaviour over time clusters alongside beliefs in personal efficacy and the level of personal engagement. Another study of 65+ users (Kononova et al., 2019) who were engaged in

the activity for short, long, and non-user terms showed that the engagement differed along various lines and changed over the period of time; for example, in the beginning, the activity was motivated by curiosity, but engagement in the long term requires a non-trivial amount of effort.

The studies of device abandonment similarly paint a picture of non-permanent and non-linear engagement (Clawson, et al., 2015; Lazar et al., 2015; Lyall, 2019). For example, Clawson and colleagues (2015) studied 1,600 Craigslist posts for the reselling of devices in order to understand the use of devices in the long run, finding that tech was abandoned if it was not purchased or used. The rationales included changing activities, health status, not meeting expectations, upgrading, and peer pressure. The authors divided rationales into types of abandonment such as “happy abandonment” when the use of tech was successful in reaching the personal goal, “evolving use”, or “social switching”. In another study, (Lazar et al., 2015) where the participants had an opportunity to buy any tracking devices with funds provided, 80% of devices were abandoned within two months because of difficulties of maintenance, data not being useful, and participants not fitting into their perception of the self. Moreover, Attig and Franke (2020) in a state-of-the-art article showed data inaccuracies and perceived uselessness were important factors in the abandonment (Attig & Franke, 2020).

Another group of studies that looked at the routine use of devices illustrated the role of agency in how practices are adopted and how everyday use results in unexpected behaviours. For example, frequently cited studies by Barta & Neff (2015), Fiore-Gartland & Neff (2015), Nafus & Sherman (2014), and Lupton (2016b) showed how users reflected on and engaged with the practice critically, rather than relying on guidelines from their tracking devices for both analysis and interpretation. Alternatively, in the *Dear Data* project (Kienle, 2019), two artists took a feminist stance against prevailing gender norms toward data collection in the way

that they visualized their lives – for example, as a week of doors/smells – going against the grains of number, choosing visualization over quantification, and introducing biases to data purposefully skew the data, thereby showing the data to be imperfect and refusing to collect some data (e.g. a week of smiles to strangers). Other researchers showed how users saw quantification as going against athletic solidarity (Depper & Howe, 2016) or used it in empowering way of capturing invisible, yet unexpected experiences, such as microaggressions, in everyday life (Dow Schull, 2019). In the ethnographic realms, grounded in everyday life, the work of Sara Pink (Pink & Fors, 2017a, 2017b, Pink, Sumartojo, Lupton, La Bond, 2018) with various colleagues stands out. The researchers show the amount of work and how data is given meaning by those who use it, as well as everyday contexts. They explore the work of intermediation, such as “repairing” “broken data”, giving meaning to “mundane data”, such as addressing issues of inaccuracy or incompleteness, or breakage, as well as how data is made meaningful by improvisation, rituals, and its connection to mundane environments.

### Self-tracking and Reflexivity

This section focuses on reflexive thinking in relation to self-quantification devices and practices. The issues of motivation, self-tracking uptake, limitations and benefits of devices, understanding of data visualizations and trends, and personalization of goals received attention in empirical studies, especially among scholars concerned with device design and use. The goal of this section is to synthesize findings about people’s understanding of their own activities; the literature review is thus circumscribed to the subject-focused studies rather than looking at the device-validation, intervention studies or at how the devices are adopted within institutions (e.g. medical establishment, insurance companies). As the review unfolds, the gap in examining higher-order reflections becomes recognizable, as most of the existing studies focus on the first-level

reflections. In addition, a need for examination of how the practice fits into individuals' lives and perceptions of the selves also becomes visible.

The main argument in the literature reviewed in this section can be summarized as follows: against the grain of techno-utopian and commercial imaginations and discourses of neoliberal selfhood, biopower, biopedagogy, and the like, those who engage in self-tracking in everyday life do not do so in an uncritical or wanton way. Indeed, empirical studies show the critical and creative ways in which people adapt their tracking practices (i.e. this does not negate the power pulls which still structure quantification practices). Yet, the critical reflection that enables such use does not cover various aspects of the practice equally (e.g. one might be concerned with the device accuracy, without questioning where their 10,000 steps goal comes from). The material dimensions of devices, use, and adoption, including over time, as well as device abandonment, have received more attention from both researchers and users, while metrics, truth claims about the practice, data actionability, and analysis were less popular as objects of reflections. These issues are discussed in turn.

Multiple ethnographies and qualitative studies examined how individuals view and interact with tracking technology. For example, a range of qualitative studies analysed participants' thoughts on the material dimensions and especially limitations of tracking devices, such as unattractive design, not being waterproof, inaccuracies and non-editable data, poor integration within the data ecosystem, requirements for charging, non-functional button sizes. These are especially prevalent issues mentioned when offering device-design recommendations based on the findings (Hermesen et al., 2017; Kononova et al., 2019; Pingo & Narayan, 2019; Shih et al., 2015). Using participant reflections, the researchers also explored modes of how and why people engage with tracking devices over time, how such engagement changed to serve different goals, and how

differing behaviours were advanced (Choe et al., 2014; Gorm & Shklovski, 2019; Fritz et al., 2014; Lazar et al., 2015; Li, Dey & Forlizzi, 2011; Kristensen & Ruckenstein, 2018). For example, Epstein and colleagues (2015) suggested a five-mode heuristic of tracking adoption over time, accounting for lapsing and resuming of the practice. Rooksby and colleagues (2014) put forward a typology of tracking including self-quantification as fetishized, documentary, and diagnostic as a main aim of the practice. In addition, researchers studied and imagined types of resistant use enabled by devices (Schüll, 2019; Barta & Neff, 2016; Nafus & Sherman, 2014). For example, Sanders (2017) suggested playful self-invention to combat the gendered nature of tracking, and Howell and colleagues (2018) suggested using self-tracked stress data for collective bargaining for improving working conditions. In sum, the relationships between self-trackers and their devices are adopted creatively and they are re-negotiated and change over time; the practice itself is also a subject to critical reflections.

However, higher-order issues involved in the practice – such as the derivation of metrics and goals, truth claims, the actionability of data, and wider societal frames embedded in the practices – are less scrutinized. To start with, the reflections on tracking goals and metrics, and therefore truth claims of the applications and devices, are less frequently commented upon in studies and are likely to be less challenged by the users. To illustrate, a study of goal attainment with self-tracking devices found that the default settings (e.g. 10,000 steps or an eight-hour night's sleep; i.e. general recommendations for an average member of the public) remained unchanged by the majority of users despite the awareness that these were not the numbers derived from a personalized health assessment (Sjoklint et al., 2015). This argument is further strengthened by the omnipresence and universality of such benchmarks across commercial trackers, such as the 10,000 steps figure – an estimate arising from a single study more than five decades ago (Ajana, 2017;



Lindner, 2020). Studies found that users trust devices' recommendations (Didziokaitė, Saukko & Greiffenhagen, 2017). Even when the participants did not trust the accuracy and questioned the universality of the wellness goals, suggesting that they can lead to over exercising, injuries, and eating disorders, the metrics themselves remained believable (Goodyear et al., 2017; Pingo & Narayan, 2019; Howe & Depper, 2017; Gambier-Ross et al., 2018). As a synthesis of the literature below argues, this trust is misplaced.

An analysis of ethical concerns in the production of health applications uncovered a range of serious problems, ranging from the partisan affiliation with pharmaceuticals (apps are used as branding tools and a point-of-sale), the publishing of inaccurate and unverified medical information, and the encouragement of self-diagnoses (Krieger, 2013). Similarly, empirical evaluations of self-tracking applications, including weight loss (Chen, Cade & Allman-Farinelli, 2015; Haasteren et al., 2019; Mercer et al., 2016), which developed trustworthiness checklists and evaluated the quality of advice, metrics, and behavioural interventions, concluded that goals were not adequately backed up by science, sponsorships were not disclosed, sources of information on which the application's work is based are not cited, and major behaviour change techniques were missing. Even in realms where the suitability of measurements have been established, problems persist. For example, researchers are in agreement that the concept behind sleep-tracking apps is solid, as it mirrors other medically validated proxies for sleep measurement, including actigraphy (i.e. technical and validation studies are the most extensive cluster of studies in sleep-tracking at the moment; Arriba-Perez, Caeiro-Rodriguez, & Santos-Gago, 2018; Bhat et al., 2015; Behar et al., 2013; Bianchi, 2017; de Zambotti et al., 2016; Sathyanarayana et al., 2016). However, the way sleep is presented – over one uninterrupted long period – does not accurately capture actual sleep patterns that involve interruption, naps, or sleep abnormalities. In short, while self-trackers

recognize issues such as device inaccuracies or the poor fit of fitness goals, those issues do not necessary affect how devices are used or the how much importance is placed on their outputs.

The issue of the metrics is closely linked to that of truth claims made by the practice via prescribing normative states against which individuals are tracked (this issue is explored fully in Chapter 5, on culture). For example, various studies (Belli, 2016; Howell et al., 2018) have shown how the limited and categorical tracking of emotions is (e.g. few rigidly determined options, inability to add categories) promoted a one-size-fits-all variant of “happiness”.

Researchers also highlighted how tracking metrics, visualization, and proposed actions promote corporate, neoliberal, and austerity agendas by valorizing individualistic solutions and self-responsibilization (Fotopoulou & O’Riordan, 2017; Owens & Cribb, 2017). Data visualization in tracking ecosystems presents a perfect example for how truth claims are gamified, how they enchant, and how they preclude examination. In a critical study of data visualization in the Fitbit system, Hepworth (2019) explored political data presentation, noting that it can exploit cultural narratives and promote specific behaviours, such as competition, encouraging comparison, and not acknowledging margins of errors. In other studies (Pingo & Narayan, 2019; Rivers, 2020), researchers reported that participants experienced gratification from seeing their data and commented on how understandable graphs make their practice easy to understand and engaging. Along with other scholars (Charitsis, Yngfalk & Skalen, 2019; Whitson, 2013), Hepworth argues that visualization and metrication are meant to elicit emotional responses and to promote engagement without allowing scrutiny. She concludes: “FitBit depicts false certainty across multiple visualizations that users cannot modify, combined with its use of proprietary algorithms, the decisions-making if which is both unknown and unalterable for users” (Hepworth, 2019, p.334).

The need for self-trackers' reflections on the truth claims made by the devices and on the tools that devices employ becomes even more pertinent given the lack of oversight (Baker, 2020) and the lack of transparency in how metrics are used in devices, as well as the absence of clarity regarding information flow (Gilmore, 2016; see also section on privacy). Recent studies have shown the extent to which tracking metrics are culture-specific, as well as prescriptive of gender and class norms. For example, a rare study from a non-Anglo-American background (Mills & Hilberg, 2020) – exploring digitalization and quantification as solutions for stress and mental health issues solutions in India – argues that self-quantification imposes North-based solutions that promote individualization, ignoring cultural and historic factors. Similarly, Esmond and Jette (2020) tapped into how socio-economic standings of the middle class are codified in the practice of self-tracking, with assumptions of sedentary lifestyles, the availability of desks, offices, lunch breaks, and yoga practices at work. Gendered and ableist assumptions have also been highlighted by researchers (Barassi, 2017; Elise & Gill, 2019; Elman Passanante, 2019; Lupton, 2015).

Overall, when it comes to truth claims, debate about self-quantification ignores major determinants of health, such as living standards and financial, educational, and temporal resources (Terris, 1999, p.162). It assumes “a healthy body can be biologically specified” (Metcalf, 1993, p.31), thus prompting the creation of categories for what constitutes “normal” and “abnormal”. This frames health-guarding practices, as a moral issue, as Williams states, “medicalization turns the moral into the medical, whilst healthization turns health into moral” (2005, p.144). Under such conditions, individuals who cannot or chose not to comply with health norms come to be viewed as lazy, uninformed, morally deficient, and even deserving of pain (Lupton, 2013; Huisman & Oosterhuis, 2014). In stronger terms, and in the words of Agamben, “on a daily basis by pseudo-scientific representations of the body, of sickness and health, and by medicalization of ever wider

spheres of life and of the individual imagination” (Agamben, 2016, p.210). Yet, the gap in how self-quantifiers understand and respond to wider social issues embedded in tracking – such as ‘healthicisation’ (advances lifestyle explanations to issues) and medicalization (promotes medical causes and interventions for non-health related issues) (Williams, 2005; Conrad, 1992) – remain underexplored, as they are subject to higher-order reflexivity.

Finally, a major issue that is rarely subjected to reflections by participants is the way they make pragmatic use of their data. Fawcett (2015) accurately diagnosed this issue, arguing that the hardest work of making sense of the numbers is left to the users and the ability of this sense-making is embedded in wider discourses: “most QS apps do little more than present attractive graphs of their user’s data and depend on him to spot patterns and correlations- or assume that only trends are interesting” (Fawcett, 2015, p.255). Multiple studies have shown that self-trackers do little with their data, including historic data, because it involved effort- and knowledge-intensive processes that are further obscured in the process of design (Baker, 2020; Didziokaitė, Saukko & Greiffenhagen, 2017; Karapanos et al., 2016; Lazar et al., 2015). To that end, researchers (Owens & Cribb, 2017) differentiated between the deliberative and substantive autonomies self-tracking enables, arguing that giving motivation and information should not be equated with enabling health action, which is still dependent on structuring factors such as availability of resources. Those findings call for further investigation of what kind of action self-trackers engage in based on the data they collect on themselves and whether there is a difference between different clusters of trackers, such as chronically ill individuals, athletes, and casual users.

To summarize, in their 2017 piece, Rapp and Tirassa provocatively argued that the self has vanished in self-tracking practices. They attributed this oblivion of the self to the way in which external corporeal metrics and behavioural change action came to signify the self. Yet, empirical

studies show that to at least some extent, the practice feeds into our sense of selfhood by means of shaping self-judgment and self-perception. This review of the literature showed that to capture the extent to which the practice contributes to the sense of the self, those higher-level reflections on tracking should be subjected to scrutiny. This goal is pursued in this dissertation via conceptualizing reflexivity as an internal dialogue which is necessary for self-construction.

## Privacy in Self-tracking

The salience of informational privacy for health and wellness self-quantification is evident from the blossoming scholarship dedicated to the topic. The following sections provide an overview and evaluation of legal, technical, and material regimes that govern wearables and tracking applications worldwide, as well a synthesis of relevant arguments on self-trackers' privacy perception, attitudes, and actions. The review is drawn from sub-sets of literature from computer science and HCI studies, legal research, and privacy-focused, social-scientific studies. Given the limitations of the available literature, the findings are teased out of small-scale surveys, a range of experimental, policy, and qualitative studies, and, for the purposes of capturing the cutting-edge findings of an extremely dynamic field – conference papers.<sup>1</sup> The review proceeds in a funnel manner, moving from wider issues (i.e. legislative, organizational and design, device, and individual levels) to those that feed directly into the conceptualization and design of the study.

### *The Infrastructure of Privacy: Three Levels of Analysis*

#### Macro Level: Legislation and Regulation

Three main issues shape and add complexity to the legislative regimes governing the streams of self-tracked data: its fuzzy definition; the fast-changing commercial and technological dynamics

---

<sup>1</sup> It is vital to note that some of the reported technical and legal issues might have been addressed by the time the dissertation is completed in June 2020. Every effort was made to update the literature review as the new studies became available.

of the field; and the international nature of the data flows. The interrelations of these three issues make effective governance challenging at best. First, in terms of the definition of self-tracked data across the United States (US), Australia, and Canada (the European Union's position is more nuanced, but that has consequence in practice), self-tracked health data falls under the umbrella of the consumer, rather than medical data, as it is not considered to be feeding directly into diagnosis, cure, mitigation, or treatment of illnesses<sup>2</sup> (Food and Drug Administration, 2019, p.2; for critical review see Newman & Kreick, 2015; Katuska, 2019). Self-tracking data is also considered to be generated automatically rather than intentionally and is thus excluded from protection under the content law (Langley, 2015). Such data has also been considered from the intellectual property perspective, as well as from the perspectives of criminal, contract, and cyber security laws (Colonna, 2019), to no avail. As such, self-tracked data is not afforded a high level of protection, as personal healthcare data would be under the *Health Insurance Portability and Accountability Act* (HIPAA) in the US or the *Therapeutic Goods Act* (1989) framework in Australia (Daly, 2015; Langley, 2015; Katuska, 2019). In the Canadian context, there are no specific guidelines governing health and wellness data collected by wearables, and existing regulations – the *Personal Information Protection and Electronic Documents Act* (PIPEDA) – came into power in 2000 before the proliferation of wearable devices (Trosow et al., 2017). Based on Langley's work, Gidaris (2019) more recently argues that much of the American framework is applicable in Canada and no substantive protection is offered by the Office of Privacy Commissioner of Canada. The *General Data Protection Regulation* (GDPR), which is an enforceable framework that has governed data protection in the European Union (EU) since May 2018, affords a level of protection

---

<sup>2</sup> In the US, the use of devices and tracked data by 'covered entities', such as healthcare providers, business associates, and health plans, triggers HIPPA protection for such data (see Newman & Kreick, 2015; Katuska, 2019). This does not apply to the vast majority of the users.

for the health-related data of EU citizens and persons residing within the EU. However, the framework allows for self-quantified data processing with explicit consent of the user (for a review, see Leibenger et al., 2016) – effectively not providing protection for self-tracked data.

Second, the pace with which self-tracking technologies develop, the mixed nature of data flows, the invisibility and perpetually morphing uses of such data for novel purposes, and commercial dynamics present further challenges for the regulators. For example, when the manufacturer of Zeo, a sleep training and tracking headband, went bankrupt, all of its customers lost access to their data – thereby also losing the usefulness of their data (Van den Bulck, 2015). When market mergers and acquisitions occur or when companies go bankrupt, users' data can be sold as a part of fund recovery, but users are not given an option of moving, removing, or saving their data, if they are at all notified (Hilts, Parsons & Knockel, 2016; Kim, Lee & Choe, 2019). To showcase the scale of the issue: during the time of the study, FitBit and thus the data of 28 million users came to a definitive acquisition agreement with Google (Business Insider, April, 2020). At the time of writing, the sale was under review by the American Department of Justice precisely because of the nature of the data part of the sale.

The mixed nature of data and its multipurpose uses also create challenges that have yet to be addressed. For example, as a part of their use agreement, tracking applications ask for permissions to access data that is frequently not collected for the primary purposes of their functioning. This can include viewing contacts and network connections, accessing microphones, phone cameras, and picture libraries, as well as email addresses and text messages. The extent of permission-gathering varies, an analysis of 30,000 apps (La Porta, 2019) revealed that 62% of them wanted access to pictures, 55% to the phone camera, and almost one-quarter to microphones. Fitness and wellness apps were the fourth-most 'data-hungry' type of applications, only after social

networking, weather, and shopping applications. Furthermore, the tracking applications share data they access with an unlimited number of other parties, underlining the issue of informational privacy even further. For example, a study of medical applications found that apps that did not provide any geolocation services would record and share users' locations with third parties every three seconds (Papageorgiou et al., 2017). A complex study of 24 popular health apps found that the data was shared with 55 developers, parent companies, and third-party services, and up to 237 unique fourth party partners (Grundy et al., 2019). To aggravate the issue further, the same sharing practices apply to accredited health apps against existing regulations. A recent study (Huckvale et al., 2015) of 79 health application approved by the NHS and included in their application library for use by the general public uncovered that most of the apps transmitted a range of data, including identifiable and health information, without specifying what is shared or with whom. Another challenge for the regulators is that data collected for one purpose might be repurposed at a later date (McDermott, 2017). For example, in wellness programs, the data can be used to further commodify the labour of employees by making their health data available for purchase (Gidaris, 2019; for further problematization of quantification as labour, see also Moore & Robinson, 2015; Oravec, 2020; Till, 2014).

Third, a major hindrance arises from the trans-border nature of the data flows. A comprehensive global regime to govern international data streams is missing, making it hard to decipher which legal regime should apply when, as well as rendering unclear which involved entities the legal regimes should apply to (for a review, see Colonna, 2019; Newman & Kreick, 2015; Katuska, 2019). This results in an array of issues. For example, even if there is a national law to dictate specific behaviours in relation to tracked data, the companies located outside this national jurisdiction are frequently not compliant with domestic regulations. To illustrate, Hilts



and colleagues (2016) conducted an experiment requesting their data from various tracking companies, and out of nine requests made, three remained unreturned, violating Canadian legislation. Alternatively, the multiplicity of parties involved in data use, transfer, storage, and processing makes the distribution of liabilities and thus regulations difficult (Colonna, 2019). The absence of a strong international regime also means that there is an absence of effective monitoring of international flows of data, as well as an international body that could facilitate the development of such a regime (L.Kong, 2010). Furthermore, the lack of political will and self-interest creates challenges to establishing an effective global regime. Sedgewick (2017) gives a persuasive account of how EU–US data exchange relations undermine the privacy of people globally owing to lobbying efforts from the US administration and tech giants (which the US regime – with weaker privacy protection mechanisms – the global default). Indeed, the EU’s more powerful GDPR has been criticized as restrictive and positioned as hindering global digital trade (Yakovleva & Irion, 2020). In sum, even though critics and governmental agencies have acknowledged the existing issues at this level, at present, the self-tracking industry relies on non-binding guidelines and self-regulation – via the consent and notice regime – to deliver protection via self-certification of compliance with international trading rules over stronger measures (Leibenger et al., 2016; Reijneveld, 2017). The short-fallings of the consent and notice regime are outlined in the following section.

### Meso Level: Organizational & Device Design

At the organization level, self-tracked data is governed by a consent and notice regime. The regime assumes an informed and explicit agreement for data processing from the user. Privacy policies and terms and conditions are the cornerstones of this regime. The regime has been largely

recognized as flawed, as it forces individuals to shoulder the burden of responsibility for privacy protection without giving them the workable tools, information, or support to do so in practice.

To specify, both terms and conditions and privacy policies are known for their length, incomprehensiveness, complexity, legal jargon, and poor formats, and are used to safeguard companies against legal action, not individual privacy (Aimeur, Lawani & Dalkir, 2016; McDonald & Cranor, 2008; Obar & Oeldorf-Hirsch, 2016). In the context of self-tracking, researchers found that even with the loose guidelines, up to half of the companies did not publish privacy policies (Goyal, Dragoni, & Spognardi, 2016; Privacy Rights Clearinghouse, 2013). When companies did publish their policies; they were not available in English; privacy links were broken; manufacturers displayed multiple versions of terms and conditions; and information was omitted about data retention and sharing with third parties. Furthermore, companies were not planning on notifying users about data breaches or access to their own data; they lacked privacy contacts; they did not respond to requests for additional information; and asked for payment to make corrections in personal information (Hilts et al, 2016; Sunyaev et al., 2015; Papageorgiou et al., 2018). Even in the NHS-approved app library (consisting of 79 approved applications) one-fifth of the apps did not have privacy policies (Huckvale et al. 2015). A UK-based survey study found that – from a user perspective – at least half of the self-trackers self-reported that they did not read privacy policies (Leibenger et al, 2016); in reality, that number is likely to be much higher. Even with protective GDPR regulation and high awareness of the framework (a recent survey found that 95% of self-trackers surveyed were aware of the governing regulation), more than half of self-trackers did not believe that it would offer more protection in real terms (Fietkiewicz & Ilhan, 2020).

Adding to the flawed notice and consent regime is the privacy paradox<sup>3</sup> that governs the privacy actions of individual users. This is the tension between self-perception as private and a privacy-oriented subject, which nevertheless acts in clear contradiction to the users' own beliefs. To illustrate, in an experiment concerning the role of privacy in the choice of BitCoin wallets, the order of options, inclusion of reassuring but irrelevant information, and small incentives (i.e. pizza to share with friends) resulted in more participants choosing the less private option (Athey, Catalinin & Trucker, 2017). There is no reason to believe the context of self-tracking is different. Steinfeld (2015), in an experiment that employed an eye-tracking technology to study privacy policy reading patterns, concluded that if policy was presented by default, it was more likely to be read and to be read more carefully. The issues that underpin the inconsistent privacy behaviours are wide-ranging and prevalent. For example, the researchers showed that asymmetry of information, decision-making biases, defaults, transactional barriers, minor frictions, pushed decision-making, framing, loss aversion, discounting of future risks, and the different presentation of privacy policies result in unfavourable privacy decisions by users (Acquisti, Brandimarte & Loewenstein, 2015; Leibenger et al, 2016; Smith, Dinev & Xu, 2011; Solove, 2013; Willis, 2014). Privacy behaviours in the realm of self-tracking are not an exception. To illustrate, Hilts and colleagues (2016) showed in their extensive experiment that even if self-trackers went out of their way to learn more about their data, its accuracy, processing, and sharing, the companies do not make it simple. The researchers were sent clearly incomplete personal data requests, sent data in unsecure or unreadable formats, did not disclose who the data was shared with, did not respond to requests, and even suggested that data acquisition and correction might merit a fee from the user. Hutton and colleagues (2018) evaluated 64 mass-market apps along four privacy dimensions (e.g.

---

<sup>3</sup> For a systematic review, see Barth and de Jong (2017), who classified 35 various theories that have been used to date to explain the paradox.

access, consent, notice) and found that not only did applications across the spectrum perform poorly on multiple privacy indicators, but health and wellness indeed performed worse on privacy indicators than other types of tracking applications (i.e. productivity and timekeeping), by sharing data with others by design and having poor notice procedures. Similarly, a study of the data accessibility (Kim, Lee & Choe, 2019) of 45 wellness apps found that while nominal access was granted to the users, the format and granularity hindered proper access and use of the data; additionally, some apps did not allow users to access their data at all (for example, see Wilson-Barnao & Collie, 2018, on intimate tracking). In short, the users shoulder the burden of privacy protection in an environment that discourages protective action.

At the design level, researchers found that a lack of privacy-friendly environments (e.g. absence of privacy training, lack of security protocols, unfamiliarity with regulations, reliance on bigger companies for authentication), the low priority of privacy protection, and the commercially undesirable increase in time and production costs associated with privacy protection limited computing power (Austen, 2015; Balebako et al., 2014; Ching & Singh, 2016; Ostherr et al., 2017). A Fitbit-based commercial study complained of the “dearth of guidance” that can enable companies to provide appropriate protection to health data, as well as the lack of diversity in those who design the protocols (De Mooy & Yuen, 2017, p.3659). A more extensive interview and observation study with smart tech designers revealed that designers and members of the industry believed that it is the consumers’ responsibility to be aware of the risks in sharing data and that their default assumption is that the users will happily part with privacy for the sake of convenience (Wissinger, 2018). Research with the users contradicts the industry narrative, suggesting that users believe they should own their data and that users were not happy to exchange privacy for service (Kim, Lee & Choe, 2019; Ostherr et al. 2017). In sum, at the organization and design levels,

companies who discount privacy protection, seeing it as an expense, are thus forcing the users – who already have a limited number of viable ways to protect their privacy – to shoulder the burden of protection.

### Micro Level: Devices & Everyday Life

At the device level, privacy-related issues fester. Technical literature (and comparative studies with other types of data) should be consulted for an in-depth overview of types of vulnerabilities of tracking devices and environments, as well as the attacks and hacking techniques that can be used for malicious access to data (see Alam, Saxena & Jain, 2017; Cusack et al., 2017; Cyr et al., 2014; Goyal et al., 2016; Hilts et al., 2016; He et al., 2014). Overall, all mainstream devices share both a similar structure – a battery source, Bluetooth port, power button, various sensors, a gyroscope, global positioning system (GPS), accelerometer, and connectors – and the infrastructure on which data transmission and analytics relies (i.e. the device itself or an app, the connecting communication infrastructure, and the storage space, such as a cloud). The characteristics above are shared among the tracking devices, making them vulnerable to similar issues (Goyal et al., 2016). The argument holds for the software side of tracking, such as data storage, encryption, and transmission. The privacy challenges that users encounter can be divided into two categories: 1) unintentional vulnerabilities, such as lack of encryption, weak protection during data transmission, and lack of control over data sharing; and 2) malicious attacks, such as data harvesting and spoofing. The text below showcases some consequences of both types of issues.

In the realm of malicious violations, Classen<sup>4</sup> and colleagues (2018) engaged in the comprehensive study of the FitBit ecosystem (which includes the device, the app, communication

---

<sup>4</sup> The computer scientists who study privacy vulnerabilities often submit their reports to the commercial entities, and thereafter, issues are patched to address the highlighted problem. This makes some of the problems obsolete, while

between the two, and the FitBit cloud). They found that even the leading device on the market can be exploited and its data accessed, that firmware that disables security mechanisms can be uploaded, and the device reprogrammed to various ends, including spying and monetary gains. Similarly, Fereidooni and colleagues (2017) injected false data of 80 million steps taken per day to demonstrate how the data can be manipulated and endanger the user's privacy, not only at the device level, but also in the server, compromising the integrity and veracity of the data. Other studies were successful in data spoofing by introducing unrealistic data points (Cyr et al., 2014; Hilts et al., 2016). Other attacks can include battery draining, hijacking, and brute force hacks that can give the offending party access to passwords and data (Ching & Singh, 2016).

The malicious attacks present ever-increasing risks, including risks to life itself, especially given the rise of implantable technologies, which can provide automated responses based on the data, such as insulin pumps or ingestible sensors (N.J. Fox, 2017; Klugman et al., 2018). Some devices, which do not share data with the users, such as vibrators (Wilson-Barnao & Collie, 2018), are even more risky. Furthermore, given that self-quantification data is now being used in corporate wellness programmes and courtrooms, this could have major implication on an individual's benefits, life-chances, and compensation levels (Olson, 2014; PwC, 2016; Alexander, 2017; Charitsis, 2019; Passanate Elman, 2018).

The unintentional privacy vulnerabilities are extensive and equally damaging. The most obvious issue is the lack of encryption. Encryption is a form of data protection that converts plain text data into a format that is unreadable to third parties. An encryption key helps the receiving party to decode text back into a readable format. A lack of encryption makes data vulnerable to tampering, access, and harvesting by third parties. For example, on top of tracked data, emails,

---

potentially giving rise to other issues (see Zhou & Piramuthu, 2014 on advanced patching suggestions of Rahman et al., 2013).

messages, and contacts can be harvested from smart watches (Ching & Singh, 2016). Alternatively, He and colleagues (2014) study of 22 medical and fitness applications found that at least half of the applications sent their data in a text format, including sensitive information, such as personal medical numbers, making them an attractive and easy target for third-party collectors. Alam, Saxena, and Jain (2017) and Hilts, Parsons, and Knockel (2016) similarly concluded that some brands of wearables also store and transmit stored data insecurely. Many companies do not notify the users about the conditions of their data storage at all (Adhikari et al., 2014).

A lack of encryption jeopardizes informational privacy via two routes. First, it allows third parties to monitor users' data without revealing themselves. Second, it makes devices vulnerable to so-called man-in-the-middle attacks, which include a third party standing in the way between an app and a relevant brand's server, potentially interfering with the data processing. This allows not only collecting data and profiling of users, but also data tampering, including injecting, alerting, or deleting user data without their knowledge. Devices were found to collect more granular data than they display to the user without notifying them or giving them any decisional power in that regard (e.g. data collected every minute, but shown to the user within 5-minute instalments; location collected within millimetres; Cyr et al., 2014; Hilts et al., 2016). Alternatively, the permanence of the Bluetooth's MAC address (a unique identifier assigned to a device which in theory should be constantly changing to prevent privacy violations) causes issues of third-party data collection, as the owner's device will respond to other Bluetooth-enabled devices even if it is already collected to the owner's app (Cusack et al., 2017). The researchers are concerned that it does not take expensive or sophisticated devices to collect data via Bluetooth, and thus it is easy not only for the manufacturers to track each individual specifically, but for any third party with a Bluetooth scanner to access the same data about individuals, track them, and sell

the data without notifying the users (Filkins et al., 2016; Goyal, et al., 2016; Hilts et al., 2016). In sum, the variety of issues compromising the informational privacy of self-trackers at various levels are wide-ranging, with the industry having a stake in exploiting them. There is merely a patchwork of existing laws addressing these issues, making it impossible to effectively regulate and legislate.

Scholars in this field agree that self-trackers are aware that data is being constantly collected and used by companies. This, however, does not mean that data collection is uncritically accepted by the users. Issues of distrust, fair use, and an inability to take protective action were raised by researchers across domains in everyday life (Acquisti et al., 2015; Turow et al., 2015; Ward et al., 2018). In one of the earliest contextual studies of self-tracking, Patterson concluded that in self-tracking contexts, users responded to the issues related to privacy with a “combination of resignation, cynicism, and fear” (Patterson, 2013, p.48), which might not reflect lack of concern per se, but does signal a defencelessness against informational and power asymmetries.

As expected from general privacy literature (Westin, 1967), not all self-trackers are equally concerned with the privacy of their data, and individuals’ attitudes and knowledge are not uniform across the types of data, sharing parties, and time. Privacy attitudes also differed within the self-tracked data types (Bietz et al., 2016; Gabriele & Chiasson, 2020; Prasad et al., 2012). For example, a survey of tracking-specific attitudes found that about one-third of respondents did not have any privacy concerns and that “most participants expressed only minimal privacy concerned related to their use of a fitness tracker” (Zimmer et al., 2018, p.9). Across numerous studies, users resorted to a set of rationales for their modest concerns about privacy, describing it as currency for services rendered and not objecting to companies using their data to improve products (Motti & Caine, 2015; Zimmer et al., 2018). Some scholars rightly pointed out that this is a false choice if functionality is hindered, if use is made impossible, or if the burden of opting out (e.g. losing



medical coverage or having to pay higher premiums) is too high for it to be a true choice (see Klugman et al., 2018; Passanate Elman, 2018; Wissinger, 2018).

On the other side of the spectrum are users who worry about their data. However, this generalist awareness and concern does not translate into a clear understanding of privacy-related issues. Earlier studies found that self-trackers underestimate the amount of data they share with companies and lack knowledge about the conditions of data storage, sharing, and retention, as well as privacy policies, data protective regimes, and what they can do to minimize unwanted privacy invasions (Goodyear et al., 2017; Gorm & Shklovski, 2016; Lupton & Michael, 2017; Patterson, 2013; Spiller et al., 2017; Vitak et al., 2018). For example, there is a persistent belief reported across the studies that major fitness corporations would not use their data, despite that being explicitly stated, which directly contradicts the terms and conditions (Kim et al., 2019; Ostherr et al. 2017). Recent studies suggested that while self-quantifiers might know about their data being used and believe that harm can come from it (e.g. ovulation data used by an employer for human resources planning or an individual being denied entry to a country based on their geolocation history from their tracker), they also think that such scenarios are unlikely to affect them personally (Alqhatani & Lipford, 2019; Gabeiele & Chiasson, 2020). Another study highlighted that users also reported the gratification in the privacy trade-off from being “seen” by the market and having their special needs met (Ruckenstein & Granroth, 2020).

Finally, a limited number of studies touched upon the emotive dimension in their discussions of privacy via concepts as dis/trust, anxiety, worry, and hope. Pink and colleagues (2018) conducted an ethnographic study of everyday living with data and elucidated their theoretical insights based on concepts of trust, hope, and anxiety to illustrate how everyday action is made possible. Similarly, the concept of data anxiety in relation to the privacy of data appeared

in other studies (Lupton & Michaels, 2017; Pink et al., 2018). Ostherr and colleagues (2017) found in a qualitative study that in the self-tracking context, researchers are less trusted than commercial corporations – accompanied by an irrational belief that companies will protect their data.

In sum, available research shows that self-trackers are aware of privacy to different degrees. Their attitudes to privacy vary; they are not well positioned to predict risks associated with data use; and they might be open to incentivized data sharing in various environment at the expense of their privacy. The findings at the levels of the organization, device, and legislation – juxtaposed with findings at the level of individual users – result in a number of unresolved tensions that current research does not account for. For example, how do individual self-trackers settle and work around privacy issues with which they are familiar? How do their attitudes change as the practice develops over a period of time and as data accumulates? How do privacy attitudes in this realm differ in comparison to others? Finally, and most relevantly to the overall purpose of this project, considering privacy issues in the contexts of selfhood, identity, and everyday life: how do attitudes to privacy in professional or other personal roles, such medicine or parenting, inform privacy attitudes in the context of self-tracking? In addition, due to the independently occurring events in the period prior to and during the study, such as the election of Donald Trump and the Brexit vote, further insights develop. Answering these questions requires a new way of approaching privacy, and the conceptualization chapter details the method used in this dissertation. The conclusion section of this chapter rounds up the review by examining ethical issues in self-quantification for health and wellness.

### Ethics of Self-tracking

This sub-section reviews the literature that touched upon the ethical dimension of self-tracking. Understanding the ethical dimension of self-tracking is vital because it shapes how we

perceive and evaluate ourselves. To date, the ethical and normative side of tracking has been examined mostly through the study of power frames used to present the practice – governmentality, healthism, biogeology, and technologies of the self – as well as values that underlie such frameworks (see culture sub-section for more details, also Lupton, 2019). From the perspective of values, the synthesis of scholarship on culture illustrated what is most valorized – rationality, self-control, moderation, and objectivity – and what is presented as normative. However, these frameworks – from the position of theory – are unlikely to account for ethical and normative demands made by quantification in everyday life. Furthermore, in her recent piece, Dow Schüll argued that self-tracking: “lacks punitive dimension of disciplinary technology” (2019, p.911). However, against the grain of this argument the enforcement of what is perceived as normative occurs by shaping personal emotional responses and self-evaluations in relation to the practice, as well as manifesting in the language which is used to describe tracking of the self. This literature review approaches ethics from linguistic and emotional dimensions – as was dictated by the data collected during the study – both of which have been examined by scholars in a non-systematic manner to date as detailed below.

A discussion of ethical and normative dimensions of tracking was initiated by four empirical studies. On the subject-centred front, Gorm and Shklovski (2016) focused on a corporate wellness programme, and Lupton and Smith (2017) engaged with the general audience. Both studies presented empirical findings from ethnographic observation and qualitative interviews. In terms of conceptualization, the studies presented quotations from their participants and, in the case of Gorm and Shklovski (2016), include an indicative link with literature concerning “moral accounting”, while Lupton and Smith’s participants discussed tracking as contributing to becoming a “much better person”. The authors do not go so far as to develop a

conceptual framework for the ethics dimension, but their efforts present an excellent starting point for developing a conceptual tool that illuminates self-tracking as a moral endeavour. On the discourse-centred front, Ruckenstein and Pantzar (2017) critically examined the metaphor of the ‘Quantified Self’ as presented in *Wired Magazine*, and Pink and colleagues (2018) explored a concept-metaphor of tracking as ‘broken data’ to show the work that goes into living with data. Those studies draw critical attention to the way the practice is framed in linguistic terms and to discourses used to describe quantification.

The main strands of research on the ethical dimension of self-tracking can be summarized as follows: first, tracking relies on pre-design categories rather than registering the actual states of the respondents (e.g. emotion tracking registers only a limited number of ways one can feel), with normative ideals – which are socio-historically grounded – inbuilt into the process of data analysis (Belli, 2016; Catlaw & Sandberg, 2018; Gross et al., 2017; Howell et al., 2018). Second, those falling outside prescribed norms, however debated these are by science, or those refusing to engage in self-quantification, are treated as suspect and punished along social and economic lines (Gorm & Shklovski, 2016; Elman Passanante, 2018; Lupton & Smith, 2017). Third, the general ethos of the practice is that of normative self-fixing, presented as self-advancement and betterment of the self. A study of critical designers who challenged the stereotypes summarized the latter points as follows: “technologies putatively designed and used to promote health were also more subtly engaging in affirming and perpetuating hegemonic beauty norms, thinness in particular, resulting in feelings of not measuring up” (Gross et al., 2017, p.325).

More specifically, when it comes to the emotional dimension of the practice, the accounts fell into two categories. The first category focused on frustrations caused by the material dimensions of the devices and the practice. In this category, the users expressed emotional

reactions to poor design, drained batteries, lost or inaccurate data, unfitting analytics, the burden on their time and mental resources, and the steep learning curve involved in the practice (e.g. Epstein et al., 2017; Fawcett, 2015; Lee & Dubovi, 2020; Mopas & Huybregts, 2020; Shih et al., 2015). For example, the participants reported discomfort of wearing the device and demotivation due to data saturation as one of six reasons for leaving their devices behind. What's more, 5% of the participants experienced a "guilty conscious" and reported obsessive behaviours that contributed to their abandonment of the device (Attig & Franke, 2020). In another study, Lupton (2019) captures how Australian self-trackers struggled with the burdens and labour that tracking activities involve. Similarly, researchers reported feeling both harassed and enchanted by a novel tracking ring they were trying out, describing the joys and tensions that wearing it created and even ascribing it as having an agency of its own (Salmale et al., 2019). In addition, some scholars concluded that emotive reactions can result from engaging with data visualization in which newly established relationships with their bodies or even internal organs (e.g. heart) manifest (Kennedy, 2018; Pantzar & Ruckenstein, 2015).

The second category focused on emotional states, such as virtuosity, gratification, or motivation, experienced in relation to the practice itself. In this category, the emotive reactions had to do with the performative dimension of the practice. To illustrate, a study of older people's experiences using tracking devices showed that when a participant who had a valid personal concern against self-tracking (e.g. privacy, misuse, misrepresentation) and refused to wear a tracking device, he was perceived by his family as refusing to engage in self-care, leading him to feel guilty (Urban, 2017). Similarly, in a study of "virtuous play" (i.e. brain training; Wade, 2018), an activity not backed by scientific evidence, aging individuals who chose to engage in the practice were perceived as virtuous, while those who did not were met with criticism.

Comparably to aging, in the studies focused on people living with chronic health conditions, negative emotions were frequently reported in a frame of moral accounting (Gorm & Shklovski, 2016; Sysling, 2020), under the auspices of which collecting one's data – as well as high and low numbers – might signal virtuosity, laziness, self-moderation, moral goodness, or moral valance (Sysling, 2020; Ancher et al., 2017; Riggare et al., 2019). Furthermore, the studies discuss anxiety, obsession, and demoralization as a part of the practice as (Gross et al., 2017; Mopas & Huybregts, 2020) and show “liberation” by elements of resistance such as “running naked” (by a participant who purposefully left their devices at home) to counter the oppressive tendencies. Another study (Coorevits & Coenen, 2016) reported that the users concluded that tracking was no longer fun because of the awareness it brought to their activities. Emotional reactions were also noted in other contexts, such as social engagement (Spotswood, Shankar & Piwek 2020; Smith & Treem, 2017; Smith & Vonthethoff, 2016). In sum, the idea that “the data offer validation of personal worth” (Ruckenstein & Schüll, 2017, p.268) was both embraced and resisted with visceral reactions.

What is missing in the existing scholarly framework is a systematic examination of what Costa Figueiredo and colleagues (2018) called the “emotional load” of the data itself: how participants feel and talk about their data and their relation to it. In Costa Figueiredo and colleagues' (2018) work, this manifested in five different types of positioning to personal fertility data, which included guilt, despair, frustration, obsession, stress, and anxiety – both positive and negative emotions. Similarly, Urban's study of older people (2017) showed how some of the older people developed a fear of numbers being too high and too low, further causing anxiety for some, but also pride and delight for others. The available research shows that emotions from both sides of the spectrum both – positive and negative (e.g. see a study of anxiety, hope,

ambiguity, and uncertainty by Lomborg, Langstrup & Andresen, 2020) – arise in the data context, and also that the reactions are powerful enough to affect one's self-esteem (Mopas & Huybregts, 2020). Some recent studies explored how self-quantifiers respond to strong emotional reactions, showing that the participants challenge what they see as normative and reframe pre-designed goals to manage stress, anxiety, and disappointment (Gorm & Shklovski, 2019; Esmond, 2020). This gap in scholarship, however, remains, and thus a systematic examination of emotions reported in relation to data is overdue.

In the discursive realm, studies related to the ethical dimension of tracking are rare, yet insightful. Throughout the study the notion of discourse is treated in the critical tradition with the main premise that language is both constituted in and constitutive of the social world, and therefore has the ability to shape perceptions, actions and non-discursive practices. This view of discourse is important for the study because it draws firm connections among text, discourse as practice, and social practice, and calls for the unmasking of opaque power structures (Gill, 1996; Fairclough, 2011; van Dijk, 1993; Wodak & Mayer, 2011). Existing studies are associated with metaphor and critical discourse analysis. The former has a lengthy history in media studies of data in order to conceptualize arising phenomena, such as data (e.g. 'information superhighway' and 'data is the new oil', to 'the cloud', and 'drowning in data'; Puschmann & Burgess, 2014). Metaphors are sense-making devices that help people to orient themselves in new or complex situations. As language structures, metaphors might be used to draw parallels and contrasts, or to explain various dimensions of a new phenomenon in terms of a familiar domain. In terms of moral actions, metaphors also delimit our understanding of our obligations, rights, and duties in relation to the self and others (Johnson, 1981). In the tradition of metaphor analysis, Ruckenstein and Pantzar (2017) explored the meanings of the "Quantified Self" (QS) as a metaphor by

examining articles published in *Wired Magazine* (referred to as an embassy of the Californian ideology by Healey & Woods, 2016), aiming to help to identify matters of significance for the movement. The authors highlighted four main values – from transparency to biohacking – promoted by the ontological metaphor of the QS; however, their work was contradicted by Didziokatie and colleagues (2017), who found that values did not actualize in real life. Dow Schüll (2019) mentions in briefly metaphors her piece including self-tracking as a digital mirror, self-portraiture, and an “algorithmic mosaic” (p.917). Kristensen and Ruckenstein (2018), in their study of Danish self-trackers, touched upon a comparison made by one of their participants, which compared tracking to adventures (p.3630). Finally, there is a theoretical notion of a concept-metaphor of “broken data” that is used to signify the “repair” work people engaged in order to make the practice function for them (Pink et al., 2018).

Continuing a trend of critical analysis, Baker (2020) showed how the language of lists, measurements, and tracking associated with the practice implies scientific discourse and predisposes the users to trust the practice. Lyall and Robards (2018) delineated repertoires which users employ to speak about the practice (i.e. as a toy, tool, and teacher; the practice being entertaining, instrumental, and pedagogic). In a theme-specific study of parenting apps for both mothers and fathers, Lupton and colleagues (Thomas, Lupton & Pedersen, 2018; Thomas & Lupton, 2015) conducted a critical discourse analysis of tracking apps aimed at pregnant women and parents, showing how deeply ingrained traditional gender norms and expectations are in this area of tracking. Finally, aiming to capture the emotional dimension of tracking, Mercer and colleagues (2015) produced a one-word summary about how people feel about tracking. It is unclear, however, how that summary was derived, but the textbox included positive (e.g. exciting), negative (e.g. challenging, annoying), and neutral statements.



As the synthesis of the available literature makes clear, some of the key empirical work has touched upon the ethical dimension of the practice via examining the values, language, and visceral reactions arising in response to self-quantification. However, an explicit examination of the ethical dimension of the practice is largely absent. To address this gap, the dissertation takes the position that selfhoods are both shaped by the practice and agentially negotiated by those who engage in self-quantification. This underlying assumption necessitates a focus on active introspection. That is, the ethics axis views selfhood in relation to practice from the perspectives of reflexivity, second-order reflexivity, and embedded normativity. To aid this effort, the conceptualization for the ethics axis draws from the works of scholars concerned with the role of language in self-construction and is built on the assumption of similarity between natural language and data.

Finally, to draw a broad methodological observation across the four planes, this literature review reveals a marked lack of purposefully designed, longitudinal studies in this field. A number of studies have explored views of self-trackers engaged in the practice over time (Fritz, Huang, Murphy & Zimmermann, 2014; Li, Day & Forlizzi, 2011; Sharon & Zandbergen, 2016). Yet, previous studies predominantly employed cross-sectional strategies (e.g. interviews, focus groups, surveys, discourse analysis), rather than longitudinal strategies to uncover the tracking-related aspects of individuals' behaviours and attitudes. Alternatively, studies that explored self-tracking practices with longer timeframes bracketed them using semi-predetermined cycles of technology use (Gorm & Shklovski, 2016; Nafus & Sherman, 2014), rather than employing a truly longitudinal strategy. A study conducted by Fiore-Gartland and Neff (2015) is an exception, yet it cannot be classified as a continuously longitudinal study. Although it employed participant observations and interviews over a period of time, it did so in an episodic manner and did not gather data from the

same subjects over a period of time. Utilizing this opportunity and in line with the demands of the conceptual tool detailed in the next chapter, this study aims to address this analytical gap by contributing original, longitudinal insights to the field of self-quantification.

## Conclusion

This chapter presented a synthesis and evaluation of the most relevant, up-to-date literature concerned with self-quantification for health and wellness. By doing so, two objectives were achieved: first, along four topical narratives of the review, four gaps in literature and the respective points of theoretical entry were identified, setting up the conceptual framework for the study (see next chapter for details). The gaps that the study seeks to fill are as follows: in the cultural dimension, this dissertation will provide an examination of the -quantification as practices and symbols in parallel and in comparison, grounding the examination in everyday life. In the realm of reflexivity, the study examines second-order reflexivity about the practice, rather than looking at more basic reflections on the practice, aiming to help position self-quantification in the participants' lives in longer terms. With regards to privacy, the dissertation will detail the tension between personal privacy beliefs and privacy action in the context of self-tracking. Finally, in the realm of ethics, by conceptualizing the self as active and reflexive at multiple levels, the dissertation uncovers the ethical norms and standards embedded in the practice, as well as agentic reactions to those.

Second, the review of literature helped to position this dissertation in the academic landscape. Inspired and driven by the arguments of critical media scholars, this dissertation contributes to critical interdisciplinary effort dedicated to examining the practice, especially aligning with the works of scholars focusing on data, human agency, power, and selfhood. This has two implications: 1) the dissertation assumes that self-quantifiers are active agents who are

capable of critical evaluation, reflection, and adoption of technologies; 2) the dissertation is sceptical of celebratory and deterministic claims made in mainstream framing of the practice, without negating the discourse that some self-trackers benefited in various ways from collecting data on themselves. This positioning in the field invariably colours the schedules that were used for data collection, the theories that were employed for theorization, and the analytical strategies used. The following chapters present the conceptual and methodological tools that was employed to study self-quantification practices.

## Chapter 3 – Conceptual Framework: Four-Axis Heuristic for Understanding the Self in Quantification

### **Introduction: Requirements for the Analytical Tool**

The aim of this chapter is to establish the theoretical ground for the study by developing an analytical framework for examining selfhood in the context of self-quantification. The main goal of this analytical tool was to enable an answer to the core question of the study: how does self-tracking contribute to our sense of the self? The complexity and multi-layered nature of self-tracking as a phenomenon, the interlocking gaps in knowledge highlighted in the literature review, and the ambiguity of (and thus inability to directly examine) the notion of the “self”, dictated a set of features necessary for an analytical heuristic to be functional. Six main requirements for the analytical tool are detailed below.

First, owing to the multi-layered nature of the practice evidence in the review of literature, the tool needed to enable a fluid transition among different levels of analysis. It needed to be able to capture and describe the broader picture of what self-tracking is and what it might constitute to the users, while being flexible enough to hone in on the issues of conceptual interest or inherent contradictions of the practice. Second, based on the diversity of arguments made in the literature, as well as theoretical and methodological approaches used by other scholars, the analytical frameworks needed to be able to tackle the phenomenon from multiple independent angles in order to ensure the necessary rigour and richness of the proposed analysis. Third, dictated by the main research question, the analytical tool needed to be able to uncover if and why the practice has a deep personal meaning for the participants, thus requiring it to include a set of concepts that deal with the self and self-construction. Fourth, since the study focus assumed that self-quantification for health and wellness is at least in part a reflexive data practice, the tool should be able to focus on

how data-based introspection unfolds in everyday life. Fifth, while the study's original inspiration lies with the work of Michel Foucault and the theory of subjectification, as the field advanced and the project matured, an alternative approach that allows more focus on agency and critical and reflexive use of data in self-construction has become necessary. Finally, since the study's goal is to understand self-tracking from the perspective of individual, rather than that of organizations or policies, a conceptual tool needs to be grounded in everyday life to facilitate the study of what people do on daily basis over a period of time.

With a view of the aforementioned requirements, an analytical tool that combined four independent, but interrelated axes, which inter-react with and inform one another, was developed. The heuristic device contains the following axes: cultural; reflexive; privacy; and ethics. The elements of the heuristic device are broadly demarcated for analytical purposes only and operate at different conceptual levels. Overall, the cultural and privacy axes capture the phenomenon on the macro- and meso- levels, while the reflexive and morality axes illuminate the subjectification processes at the level of individuals. Designed in this way, the conceptual framework allows us to capture and theorize how self-quantification contributes to self-construction by means of introspection in different areas of life –cultural, ethical and moral, reflexive and meta-reflexive, and privacy. To be sure, these dimensions do not cover all aspects of self-quantification in relation to the self, with social, historic, and political-economic forces acknowledged and assumed as foregrounding and shaping forces of the axes selected for the analysis. Excluded dimensions, especially related to the political economy of data and platforms, occasionally emerged in the analysis, but were not given equal prominence because an analytical tool had to be selective to be effective. Based on the discussed analytical tool, the main argument of the dissertation is developed.

The chapter proceeds as follows: each axis of the analytical tool is detailed in dedicated sub-sections; the discussion includes key concepts, key roles, theoretical underpinnings, the scholars on whose ideas the analysis is built, and the lens' individual contributions to the overall heuristic device. The final section examines how the four analytical axes inform one another, presents the initial discussion of the original theoretical contributions of the study based on the proposed conceptual framework, and sketches the requirements for the methodological tool necessary for meeting the study's goals.

### **Conceptualizing Culture: Symbols and Practices**

As illustrated by the literature review, the cultural aspects of self-quantification have been subject to extensive scrutiny. Researchers have critically examined discourses surrounding self-quantification – the values it promotes, the frames and language employed for its presentation, and the inclusion and exclusion it perpetuates. Conceptual and methodological approaches in this area are equally diverse. For example, Lupton (2014), in her article 'Self-tracking Cultures', reviews a number of different theoretical lenses with culture-related concepts, from Foucauldian governmentality to those of HCI, the body, and inequalities. Phenomenological, ethnographic, and mixed-method research efforts have explored how self-tracking practices are engaged in everyday life and experienced by various groups, and what kind of adaptations, creative applications, and hindrances make or break the practice for people in the flows of their day-to-day existence. The studies analysed and evaluated broad frames, such as data fetishism and dataism, healthism and medicalization, biopedagogy and governmentality, in which quantification discourses are couched.

In sum, the research on the cultural aspects of tracking resulted in a complex picture of discourses and everyday actions, both of which – as resources on which self-construction is

based – are pertinent to the development of selfhood. The researchers are critical of the pervasive discourse of unrelenting self-optimization, the possibility of total transparency and self-knowledge, self-responsibilization and the individualization of care, and the truthfulness and objectivity of corporeal and psychometric data.

The multiplicity of findings revealed both the incongruence of and the tension in the literature: discursive messages and individual actions do not align with each other. Tamar Sharon (2016) expanded on this issue in her critical piece about core values that presently buttress self-tracking. She argues that the conceptualization of everyday life tracking activities occurs predominantly in the realm of speculation and theory, rather than being grounded in what people actually do. She explains that claims about self-tracking and underling values “are taking place in a highly theoretical and even speculative vacuum, certainly in the case of the promises being made, but also, often, in the case of the anticipated fear” (p.106). Thus, she concludes, opportunities for novel inquiries and conceptual perspectives are missed. Similarly, James Gilmore (2016), in his highly cited piece, concluded that “to look at the relationships between everyday life and technology though *either* critique or phenomenology is a *false* choice, one that fails to take into account the politically complex motivations of institutions and individuals in acquiring, prescribing, and using these technologies” (original italics, p.2534). Sharon’s and Gilmore’s critiques call for a conceptualization of culture from a theoretical position that brings together the dimensions of practice and symbols at the same time. Pressing into this tension presents an opportunity to sketch out a coherent picture of self-tracking as a cultural phenomenon and its contribution to the construction of the self.

Therefore, the first axis of the heuristic device explores self-tracking from the perspective of culture. For the purpose of precision, in this axis, cultural aspects of self-tracking are broadly

defined as individual and collective understanding and interpretation of self-tracking artefacts and practices, as well as the practices themselves (including the routinized ones).

The cultural aspects of self-quantification for health and wellness are important to investigate for three reasons. First, it is not the process of recording and analysing personal statistics, data, or tracking in itself, but the process of interpretation and meaning-making by actors that gives those practices of self-quantification meaning, explain its perceived importance, and bring the underlying cultural, social, and normative values to the surface. To specify, what we measure and value are defined by cultural and social structures, among other things (Katz & Marshall, 2018 via Lomborg & Farsden, 2016); for example, Pantzar and Ruckenstein (2015) showed how heart rate – a less precise measure of athletic performance than lung capacity – came to be valorized in self-quantification. Second, both symbols and habitual everyday action are resources which help make self-construction possible (Cohen, 2013; McNay, 1992; Taylor, 1989). Third, the cultural lens is broad enough to describe the general shape and pattern of self-tracking as a phenomenon and to highlight potential points of tension requiring in-depth exploration.

### *Concepts and Practical Approaches for Analysis*

The main line of the conceptualization and analysis of the axis on self-tracking as culture is based on the dual theorization of ‘culture’ proposed by American sociologist William Sewell Jr. (1992; 2005). In his attempt to theoretically clarify the concept of culture – which, to date, includes over 150 definitions (Spencer-Oatley, 2012) – he argues that there are two core meanings of the term: “culture as theoretical category and culture as concrete and bounded body of beliefs and practices” (Sewell, 2005, p.156). This dissertation works with the latter of the two definitions. Sewell conceptualized the idea of ‘culture’ as an autonomous from other spheres of life’s “dialectic of system and practice” (Sewell, 2005, p.169). In this conceptualization, unlike in similar



theoretical frames, the processes of meaning-making and human practices in everyday life are complementary and presuppose each other, rather than serving as two competing analytical frameworks for understanding culture.

Using Sewell's two-fold approach to culture provides a unique analytical window onto self-tracking (i.e. combining and considering in parallel meaning-making processes and actual everyday action). This is the case for three reasons. First, using Sharon (2016) and Gilmore's (2016) purely theoretical accounts is more likely to suffer from issues related to speculation about what is happening, and using Sewell's two-fold approach tackles this issue. Second, using Sewell's approach in practice requires constant comparative examination between the symbolic dimension of tracking and a variety of human actions, thus emphasizing tensions and safeguarding against overgeneralizations. Thirdly, Sewell's definition acknowledges the role of both individual action and agency and the limitations and affordances of material structures and institutions; acknowledging the political-economic dimension of cultures, he argues that the constraining nature of symbolic systems "cannot be accounted for by the systems' semiotic qualities alone, but must result from the ways semiotic structures interlocked in practice with other structures – economic, political, social, special, etc." (2005, p. 167). These are helpful in constructing a nuanced picture of self-tracking as a cultural practice.

In Sewell's dual conceptualization of culture, the culture-as-system aspect relies on shared symbolic meanings, which helps individuals navigate the world, is governed by an internal logic, and – although it exists as an open system – has a sense of coherence. Sewell postulates that culture-as-system is an autonomous, coherent, and loosely integrated set of meanings and practices susceptible to transformation. This conceptualization is especially suitable for this study because it helps account for contradictions and conflicting meanings and values embedded within self-

quantification by allowing for the use of discontinuities and tensions as knowledge-generating points. In practical terms, analysing the symbolic dimension of culture involves scrutinizing shared and bounded cultural meanings and their influences on human action (Sewell, 2005, p.160), as well as focusing on media discourses that are among the most powerful meaning- and symbol-generating institutions today (Couldry, 2003).

The second aspect of Sewell's conceptualization – culture-as-practice – focuses on actors' "practical activity" (p.161), which is based on symbolic meanings but presupposes agentic action with individuals acting in their own interests. Such an approach to analysis illuminates the kinds of everyday practices that are enabled by self-tracking (e.g. healthy living, surveillance, sport achievements, extension of the clinical gaze); constructs the taxonomy of actors participating in it; and explores how participation is enabled or resisted. The approach for analysing practices is less clear from Sewell's work (e.g. what constitutes a practice as a unit of analysis? How should it be analytically approached? Are some practices more important than others?). To circumscribe the analysis, it is helpful to use Nick Couldry's (2012) context-independent question that points to the media practices of interest: what are people doing that is related to media? This conceptualization covers all kinds of routinely performed actions related to, guided by, directed towards, and directly involving media – in this case, mobile applications or wearable devices (Couldry, 2012; 2014). In the context of self-tracking, this may include any action taken by the user: gathering, generating, analysing, and sharing data; engaging with phones and tracking devices (i.e. adjusting settings or checking personal statistics); syncing self-tracking devices with each other and with other technologies; developing health plans based on collected data; and using data for decision-making, among others. These also include routinized action as informative of cultural practices (Ortner, 1984).

In practical terms, to explore self-tracking as culture, the analytical lens chosen for the study will examine the phenomenon from both a symbolic and a practice-based perspective. Using Sewell's conceptualization enables us to explore what kinds of meanings and readings are produced by the *culture of self-tracking* (as a plural – “cultures”; i.e. bounded, specific, grounded in space and time). For example, what does it mean to be a self-tracker? How does this type of subject fit in a particular cultural context? How does a self-tracking subject interact with others? What kinds of meanings are dominant and oppositional, and what conflicts occur inside a seemingly coherent culture? The cultural axis is the layer in which the media plays a key role, as they generate truth-claims and promote particular meanings of self-tracking which are then adopted or contested by the people who use technologies. For example, it was the media in the 1990s that positioned gym memberships, exercise videos, health pills, and shampoos as health-related commodities (Burrows et al., 1995). Similarly, by producing specific types of meanings, the media helped to position self-quantification in the discourse of health and self-knowledge, as opposed to that of personal technologies.

To summarize, the main objective of the conceptualization via Sewell is to consider everyday tracking practices and values in combination and to explore how those contradict and align with each other. By looking at action and symbolic meaning together, new possibilities for empirical research might arise. Furthermore, given that this is the broadest of lenses in the heuristic device, the findings in this chapter are also going to be used to set up the rest of the analysis.

### **Reflexivity Axis: From Subjectification to Reflexive Personal Projects**

The theory of subjectification was originally intended to be the foundation of the study, yet the research moved away from a purely Foucauldian project to focus on reflexive processes that enable subjectification in relation to self-quantification. However, to chart the project's intellectual

trajectory, a brief summary of Foucault's argument – which inspired this research in the early stages – is presented below, followed by an examination of theories of reflexivity employed in the study.

The subjectification theory was formulated by prominent French philosopher and historian Michel Foucault as a response to the shortcomings of his own early work. He dedicated his later works, in particular *Two Lectures on Power* (1976), *The Subject and Power* (1982), *Technologies of the Self* (1982), and an interview titled *The Ethics of Care for the Self as a Practice of Freedom* (1987), to the issue of subjectification. In these writings, Foucault moves away from treating individuals as disciplined objects and docile bodies, to conceptualizing them as self-making, reinventing, and destabilizing subjects. Currently, the subjectification theory is at the core of philosophic (e.g. de-subjectification, resistance) and sociological debates (e.g. biometrics, self-surveillance). Given the interaction between power and subject, it is not surprising that Foucauldian thought became a predominant direction in the theorization of self-tracking.

Contrary to the alternative theories of selfhood (e.g. psychoanalysis, self-presentation, symbolic interactionism), the theory of subjectification rejected the existence of an autonomous, *a priori* existing self (Foucault, 1984, p.121). In *The Subject and Power* (1982), Foucault states that “there are two meanings of the word ‘subject’: subject to somebody else by control and dependency; and tied to his own identity by a conscience or self-knowledge” (p.781). Hence, subjectification can be conceptualized as the process of shaping, constraining, enabling, and holding together a subject; this process involves constant self-conditioning and shaping of the self by wider discursive, socio-economic, and political forces. Foucault's earlier works indicate that the latter range from scientific discourses and dividing practices (i.e. mad/sane, sick/healthy) to

the discipline and shaping of conduct. The techniques of self indicate the abilities of an individual to discover and act on the ‘truth’ about the self; as Foucault states:

...techniques which permit individuals to effect, by their own means, a certain number of operations on their own bodies, on their own souls, on their own thoughts, on their own conduct, and this is a manner so as to transform themselves, modify themselves, and to attain a certain state of perfection, of happiness, of purity, of super natural power, and so on (Foucault, 1993, p.203).

Foucault’s understanding of the techniques of the self arose from the examination of Greco-Roman practices of care for the self (i.e. internal code for better life, not guided by morals, not enforced, focused on action over thought) and early Christianity techniques of confession (i.e. external moral code, constant monitoring, examination of thought over action). By examining two of these variants, Foucault shows how self-knowledge, which used to be just one of the components of care for the self, came to dominate the entirety of processes related to the self. The Greco-Roman version of the techniques of the self focused on self-knowledge through moderation, discipline, and memorization of rules of action, including regulations on nutritional, sexual, and personal conduct (Foucault, 1993); these were pre-conditions of a good life, with better self-knowledge resulting in a pleasurable life, higher social standing, and fitness to rule. In the monastic variant, new techniques of the self arose requiring permanent verbalization, confession, and bearing witness in order to examine one’s ‘true’ thoughts and objectives. Monastic practices mirror modern techniques of the self, as both mandated the truth-telling as a part of the subjectification process. The elements of both variants can be identified in the practices of subjectification in self-tracking. On the one hand, self-quantification promises a better, healthier, and longer life; on the other, it makes a particular notion of the “truth”, which is a central reference point of self-knowledge. As such, self-tracking – if considered as a subjectifying force – thus produces truth-claims about the

self without acknowledging the underlying biases of categorization, classification, and analysis, stemming from the social nature of these processes.

Scholars who followed in Foucault's footsteps, such as Nikolas Rose, Lois McNay, and Ulrich Bröckling, enriched the theory by addressing its theoretical and empirical shortcomings. For example, McNay advanced the theory by drawing attention to the overemphasis of its corporeal focus, its non-historic-social grounding (e.g. difference in disciplinary regime for gendered bodies), cryptonormativity (i.e. presenting his position as value-free while operating in a particular value framework), and the social dimension of shaping of the selfhood. Rose (1989, 1999) developed the idea of an obligation to be free and its role in the constitution of the subject. This contributed an additional tension – the perpetual process or self-management, as an obligatory technique of self – to our understanding of the modern subject. These were empirically explored by A. Elliott (2013) and Bröckling (2016) in relation to the beauty industry, employment, citizenship, and communication practices.

Finally, it is important to acknowledge Foucault's conceptualization of power and its role in subjectification theory. Power is conceived by Foucault as a set of relations, a network, not an object to be possessed or a dominating institution. Being relational, power is never absolute. Indeed, the lack of possibility of reversal, struggle, or freedom, would turn the subject a passive object of power (1984, p.114). As such, power and resistance are in dialectic relation with each other. Where there is power there are possibilities of resistance; power might not be equally distributed between two parties, but one side is never powerless or devoid of resistance (1982, p.794). Furthermore, power is viewed by Foucault as an ability to produce social change, to influence the behaviour of others with a tactical purpose: "to govern, in this sense, is to structure the possible field of actions of others" (Foucault, 1982, p.790). This conceptualization implies

the necessity of the subject to be free, to have options for action, and a range of possibilities to proceed (see also Agamben, 2009; Deleuze, 1990; Lazzarato, 2006). Those considerations reinforced my already planned attention to the process of reflexivity, which enables subjectification in practice. The next section draws upon the works of Charles Taylor and Margaret Archer to conceptualize and operationalize the notion of reflexivity to construct the reflexive axis of the heuristic tool.

### *Reflexivity as a Subjectification Tool: Internal Dialogue*

Many of the existing conceptualizations of reflexivity (e.g. Beck, Giddens), while being theoretically informative, provide little indication of how the process can be studied empirically. Both Charles Taylor (1985; 1989), in his work on agency, and Margaret Archer (2003; 2007), in the corpus of her work on the same subject, provide a potential blueprint for exploring reflexivity through language. Although the objectives of their individual theoretical projects vary, for the two scholars, reflexivity *via* language came to represent a key component in their conceptualization of agency. Archer argues that that reflexivity as manifesting in the universal processes of self-talk remains a goldmine for empirical research, while Taylor investigates reflexivity with the objective of positioning the self in relation to moral action.

The reflexivity axis thus helps to examine the element of becoming and resistance in the processes of subjectification. To that end, the axis of reflexivity will help to answer the following questions: what do we say to ourselves about ourselves based on the information that is given to us about ourselves by tracking devices? Subsequently, how, if at all, do we use such self-talk to inform our actions in regards to the practices of self-tracking? There are three main concepts drawn from Archer and Taylor that have analytical power for the present study: individual/life-course projects; radical reflexivity; and weak/strong evaluators.

Archer is interested in how individuals form their own life projects with their values as a backdrop for action. Throughout her career (and with a nod to Taylor), Archer was interested in the pragmatics of how one carries oneself through life. While her earlier book, *Structure, Agency and the Internal Conversation* (2003), examines reflexivity (introspection) in line with psychological theories of self-knowledge and the structure/agency debate (e.g. Mead, James, Peirce), her more recent publication, *Making our Way through the World* (2007), attempts to situate reflexive practices within the context of modernization (against Beck, Giddens, Bourdieu). Archer conceptualizes reflexivity as an individual's ability to hold internal deliberation and formulate personally valuable objectives through self-talk (2007, p.3). Such internal conversations are contextually grounded, universal, and language-dependent. The main result of mulling over in one's head is the formulation of a personally important project (i.e. what is most cared about by an individual), which, in turn, leads to particular types of action. For Archer, reflexivity is a mediating link between structure and agency. Archer's conceptualization does not valorize agency exclusively; as a critical realist, she acknowledges that pursuits of projects are limited by constraints of socio-cultural and economic environments, as well as by the ability to design a self-as-a-project (p.7). In short, Archer envisions reflexivity as a mediator between personal projects and the cultural and social constraints that individuals face, and assumes that language is vital for formation of the self. For the purposes of this project, it is 1) the mechanism of reflexive thought and 2) the idea of personal project that are pertinent.

The most fruitful part of Archer's inquiry for this study is the lens of reflexivity as internal dialogue that she applied when exploring agency and social mobility. The questions that Archer posed here include: what kinds of questions do we pose to the self? How are such questions answered? How are constraints understood? What are the strategies for working



with/around actual constraints (2007, p.63)? This idea of internal conversation, as presented in Archer's corpus of work, is especially suitable to this dissertation, because instead of operating at the levels of theory (as other social theorists concerned with reflexivity have), Archer succeeds in operationalizing the concept. This account is not without limitations, however. For example, self-talk excluded experiences that are not easily articulable (e.g. phenomenological experiences of one's own body or experience of calories eaten). The idea of personal projects is used to ground self-tracking in the narratives of the participants' lives. In this study, Archer's contributions are used as lenses that help make sense of quantifiers' practices and self-understanding – for example, in the exploration of the idea of reflexivity in relation to both the body and the role of instant feedback (that self-tracking devices provide). We now turn to the concepts borrowed from Taylor's work.

In his philosophical papers on human agency and language, Taylor defends the argument that “reflection is not just a matter, where it is not calculation of consequences, of registering the conclusion that alternative A is more attractive to me, or draws me more than B. Rather the higher desirability of A over B is something I can articulate if I am reflecting as a strong evaluator. I have vocabulary of worth” (1985, p.24). Reflexivity for Taylor is a matter of deep self-evaluation, the quality of life we want to lead, and modes of being as a particular type of subject. For him, reflexivity is not about goal-oriented action or instrumental rationality. Using the notion of desire and worth as a starting point, Taylor puts forward a hypothesis about two different types of evaluations: weak and strong. Under the condition of weak evaluation, individuals' actions are based on a surface comparison of potential outcomes from various desired actions (i.e. instrumental rationality). He uses a choice between two types of dessert and two holiday destinations to demonstrate how weak evaluation operates at the level of desirability.

To be a weak evaluator in this scenario involves weighing two options purely at the level of personal desirability; for example, choosing to vacation in the south just because it is more appealing.

Strong evaluation, on the other hand, involves value rationality based on the consideration of worth, rather than desirability. Strong evaluators have to engage in a 'second order' reflection by thinking about the worthiness of potential actions and "the qualities of life they represent" (p.27). In the above example, second-order reflexivity results in an individual taking a different standpoint on his potential actions – it is no longer about choosing between the two, but also about considering eating a dessert from a moral standpoint (i.e. as a person struggling with weight issues, what kind of life would I be leading by eating a dessert?). In the process of unfolding his argument, Taylor persuasively illustrates how humans use language in the processes of self-explanation, self-clarification, self-articulation, self-experience, and self-evaluation (Taylor, 1985). Indeed, if Taylor is to be believed, human emotions and actions cannot be experienced without our self-interpretation through language. This is especially vividly illustrated in the discussion of subject-referring properties of human experiences, such as fear, pride, disdain, and shame (p.55). These experiences cannot be understood from the objectivist point of view because: 1) fear, loss of dignity, and shame may be experienced without an actual cause; and 2) to truly understand such experiences, deeper evaluation and articulation of our wants and actions against the background of our values are needed. For example, one can say that he is "ashamed of something", but only further articulation and self-explanation of the experience that lead to the feeling of shame (which incorporates evaluation of the values of specific actions) would give a grasp of the situation. In short, language, including emotion language (i.e. used to articulate and clarify our feelings), makes self-interpretation and the

majority of human experiences possible. The importance of emotions is conceptualized in the sub-section on ethics, but the centrality of language for the processes of subjectification and self-evaluation remains important for the analytical mission of the conceptualization of reflexivity.

The final concept useful for the understanding of self-tracking is that of radical reflexivity, as developed by Taylor in *Sources of the Self* (1989). Rejecting the naturalistic thesis of the innate sense of good, Taylor focuses on uncovering how frameworks for qualitative discrimination for what is considered valuable, moral, and positive for oneself in social contexts have changed throughout time by way of ruptures, conflicts, and evolution. To focus on the processes of self-tracking, the concept of *radical reflexivity* was selected. Radical reflexivity represents the awareness of the surrounding world, a full presence, a unique experience, and experience of one's self (1989, p.127). The notion is important because it presupposes individualism and an ability to experience the world differently from everybody else. It is achieved through the process of disengagement from lived experiences to intense self-exploration. This shift towards inwardness resulted in the 'discovery' of human agency, with its capability for action and self-shaping. The tools of this radical turn are especially pertinent for this study. The Puritan tradition of the impossibility of redemption through mediated belief promoted intensive self-examination (Taylor, 1989, p.184). Different strands of religious movements had different foci – the Quakers discussed their spiritual journeys; the Methodists, their relationships with God; the Puritans, the sins and accounts of everyday life (Janesick, 1999, p.509) – but most of these new practices were oriented inwards, towards the self. Similarly, diaries, autobiographic confessions, and novels became the sources of moral sentiments (Taylor, 1989). In other words, self-recording played a major role in the constitution of a modern self.

In the case of self-tracking, Taylor's concept of radical reflexivity prompts the question of what self-tracking adds to our understanding of ourselves as self-shaping agents. By making individuals aware of their bodies, self-tracking as a practice introduces new values into the processes of everyday life (such as sleeping, cleaning, walking) that might have previously been unimportant (Ruckenstein, 2014). Just like the sources of the self described by Taylor (i.e. nature, God, sentiments), self-tracking technologies offer promises of betterment, such as a healthier, fitter, and more controlled life. However, Taylor's work also prompts an inquiry of what is considered 'good' for the modern self, thus instigating an investigation into the qualitative values of our frameworks. For example, it helps to illuminate how a monophasic sleep culture comes to dominate over its biphasic variant (e.g. *siestas*) or napping culture (Japanese's *inemuri*) (Williams, 2005, p.108). Alternatively, it allows for an exploration of current societal predispositions that place health and fitness together with consumerism at the centre of a socially acceptable value system. This side of inquiry will highlight what is absent from self-tracking frames. This knowledge might align with Rose's perspective, which inquires into who shapes self-tracking discourse, who benefits from it, and how it comes to shape individuals.

Taylor's positioning of the self as agents stands in contradiction with the Foucauldian position. For example, in *Governing the Soul* (1989), for Rose, reflexivity is not a force enabling resistance or agentic action, but a thickly veiled tool of power. As such, in Rose's analysis, reflexivity as a force is subjectifying, not liberating. In his work, Rose traces the development of the science of psychology and shows how self-control mechanisms imposed from the outside come to dominate professional, personal, and family domains. Rose argues that experts, scientists, and professionals shape our subjectivities by pre-determining and guiding our choices, leaving no space for agentic resistance. Indeed, self-reflection only strengthens the grip of power. For Rose,

practices of self-knowledge and self-examination are not the sources of the selves, but tools used for governance, because they are imbued with interest-driven discourse (e.g. psychology, medicine). When discussing how the modern selves are shaped, he concludes that “the unceasing reflexive gaze of our own psychologically educated self-scrutiny” (1989, p.213) is just another tool of governmentality (i.e. the conduct of the conduct; the concept is explored in the following section). His argument crystallizes in the examination of how self-regulation (which is based on constant self-reflection) substituted the act of confession, which used to serve as the ‘freeing’ (i.e. only from the perspective on monastic Christianity) technique of self. Bröckling applied Foucauldian analysis to explore neoliberal citizenship, in agreement with Rose – arguing that individuals are conditioned to see the self as a creative, contract-making, risk-taking project armed with a main tool – reflexivity. Only by being reflexive can one move the project of the self forward in the neo-liberal marketplace that penetrates all spheres of life (2016, p.5). In short, in the Foucauldian tradition, reflexivity is enslaving, while for Taylor and Archer, it is emancipating.

Conceptually, Taylor’s position is more agreeable for scholars approaching the subject from the critical perspective, because it does not conceptualize individuals as completely independent or passive (unlike Archer in some parts of her argument on reflexivity). This is the position with which this study aligns itself, because even more descriptive studies of self-tracking are producing discourses concerned with resistance to the dominant data collection, use, or interpretation practices. Giving prominence to Taylor’s and Archer’s interpretations of reflexivity does not mean ignoring or dismissing key Foucaultian arguments; indeed, Taylor himself in his essay *Foucault on Freedom and Truth* (1984) engaged critically and productively with Foucault’s conceptualization of power and subjectivity. On the contrary, by offering a divergent analytical avenue (via self-talk) as a starting point, engaging with Taylor and Archer results in an opportunity

to enrich already existing discussion in the field. Although the unfolding analysis will challenge some of the Foucault-inspired perspectives, Foucault's conceptualization of power will be useful to understanding the "doing" of data as well as why and how data comes to matter.

In sum, in this study, the conceptualization employs Archer's analysis of self-talk and personal projects and Taylor's conceptualization of reflexivity. This enables us to probe into how reflexivity works through self-talk in the context of self-tracking (which serves as external feedback about ourselves) and to examine what kind of self-directed projects we engage in with self-tracking devices. By grappling with Archer's idea about the link among values, reflexivity, and action, Taylor's argument that agency goes beyond instrumental action, "but rather the openness to certain matters of significance" (Taylor, 1985, p.105), draws attention to what kinds of values come into play in the context of self-tracking (e.g. is privacy versus utility) and how one acts on such values. By paying attention to the normative and cultural, values the links among layers of the conceptual framework can also become visible. Finally, the need to tap into the internal dialogue about the practice shaped in a major way the design of the study by calling for a tool that promotes unrestrained reflection over a period of time – this demand is met by a methodological design that incorporates solicited diaries.

### **Conceptualizing Privacy**

The first two sections of the chapter established how cultural and reflexive dimensions of the practice are conceptually framed in relation to the self, clearing the way for a lens in the absence of which no construction of selfhood is possible: privacy. This section outlines the conceptual underpinnings that informed the lines of inquiry about the privacy dimension of the self-quantification. This section also circumscribes a specific type of privacy which the study operationalized and justifies its importance for individual selfhood. In doing so, this section

arrives at the core task that the empirical chapter on privacy needs to achieve in order to advance the current field of knowledge about the relations between selfhood and self-quantification.

Privacy as an issue has been subjected to extensive academic and legal scrutiny, most famously starting from Warren and Brandeis's article (1891) on the right to be left alone. The contributions of early scholars concerned with informational privacy dates back to 1960s and 1970s – law and governance professor Alan Westin's (1967) and social psychologist Irwin Altman's (1975) work still influence privacy thought today (Bennett, 2011; Margulis, 2003). The debates about data privacy in the context of self-tracking unfold against the backdrop of wider debates about the concept of privacy. On-going deliberations about the definitions of privacy, its intrinsic and extrinsic values, status, best practice for governance, roles, injuries and harms, proxies for measurement, and protection mechanisms are burgeoning (Calo, 2011; Cohen, 2012, 2019; Margulis, 2003; Rössler, 2005; Hildebrandt, 2013; Nissenbaum, 2010; Smith, Dinev, & Xu, 2011; Friedland, 2014; Gandy, 2012; Zarsky, 2003).

The privacy literature is vast to the extent that for the concept to be analytically useful in the context of self-quantification, further specification is required. Multiple attempts were made to separate different types of privacy into overlapping, but self-containing, analytical lenses (cf R. Clarke, 1997; Kang, 1998; Solove; 2008; Finn et al., 2013). The taxonomies of privacy vary, ranging from Roger Clarke's (1997) four types classification to Kang's (1998) three clusters of privacy, to a classification with six types of privacy in Solove's (2008) work, to, most recently, Finn and colleagues' (2013) seven types of privacy typology. All of these taxonomies separate informational privacy from other types of privacies (e.g. personal, behaviour, solitude, decisional). Informational privacy is a type of privacy most directly relevant to self-tracking, as data are treated as information flows in everyday life. Informational privacy is broadly defined as

“the ability to determine for yourself when others may collect and how they may use your information” (Sloan & Warner, 2013, p.2), including decision-making about data collection, analyses, storing, and processing by others. Personal information does not have to be sensitive, just attributable to a person directly or indirectly (Kang, 1998). In recent years, informational privacy has received sizable attention from a variety of fields because of the ever-increasing, unpredictable, and future-oriented challenges resulting from novel capabilities for data collection, processing, and uses.

In the datafied society, the issues related to informational privacy are distinct and enhanced by structural factors, as well as technical, legal, and commercial dynamics (see core texts by Nafus, 2016; Neff & Nafus, 2016; Lupton, 2016b). This is the case because the dangers associated with informational privacy are mostly invisible, are unlikely to be directly experienced or recognized by individuals, involve multiple actors, and rely on correlation and prediction analysis; this also involves unpredictable data uses in the future and the non-uniform nurture of self-tracking data streams (Bartow, 2006; Solove & Citron, 2019; Crawford & Schultz, 2014; Solove, 2006; Zarsky, 2003). These include a range of life-chance limiting activities, both individual and in groups, such as discrimination, sorting, assessment, evaluation, and re-identification (Lyon, 2015; Magnet, 2011; Gandy, 2012). Finally, unlike other types of privacy, informational privacy harms revolve around commercial actors as well as state actors (Friedland, 2014).

### Three Points of Consideration

The starting position for the consideration of informational privacy in the context of self-tracking is based on three pivot points. First, privacy is vital for the human ability to shape and re-shape the self. Second, as the literature review makes evident, in the context of self-tracking,



asking questions about data ownership, care for personal privacy, or incentives under which data might be shared yields a picture of privacy attitudes that lacks coherence. In addition, some studies have observed an increasing emotional response to privacy issues. Third, given the complexity of self-quantified data streams, even the most flexible theories of privacy, such as privacy as contextual integrity and the privacy paradox, provide limited insights about privacy attitudes and the actions of self-trackers. The following sections briefly expand on each of these three points, and culminate in the conceptualization of privacy employed in the dissertation.

### Informational Privacy as a Precondition for Selfhood

Many surveillance and privacy scholars, whose work is considered classic – including Foucault (1987-88), Deleuze (1990), Rose (1989), Haggerty and Ericson (2000), Gandy (1993), Lyon (2015), Zuboff (2019) and others – developed detailed, powerful, and divergent accounts of how surveillance operates in contemporary societies. Their relative conceptualizations of the nexus of power and surveillance as modulation, governmentality, surveillant assemblages, information/surveillance capitalism, and social sorting have been debated, expanded upon, and employed across the social sciences. For the purposes of this dissertation, the overarching element that all those framework share is relevant: contemporary societies are characterized by increasing surveillant infrastructure; hyper surveillance of everyday life that is normalized, individualized, and granulated in nature; as well as self-reinforcing, self-correcting, and self-disciplining surveillance that is obscured and presented under the values of convenience, optimization, self-care, and the betterment of life – all this comes at a cost of informational privacy. In other words, modulation “configures life [and the self] by tailoring its conditions of possibility” with the purpose of prediction and redefinition of oneself (Chenney-Lippold, 2011, p.169).

The arguments of three scholars – Julie Cohen, Beate Röessler, and Marjore Lanzing – are particularly important for illuminating the relationship between informational privacy and selfhood in the context of self-tracking. Röessler’s and Cohen’s work touches upon influences that state and commercial actors have across various domains pertinent to selfhood, while Lanzing (2016; 2019) uses their works to initiate a discussion about the damaging effects of undermined informational privacy on the human ability to form selfhood, specifically in the context of tracking.

Cohen (2013) persuasively shows that informational privacy is vital for the formation of our agentic selves. Relying on the philosophical and legal works on selfhood, she argues that privacy enables the formation of subjectivity via creating an opportunity and the space for social shaping and agentic play to interact in everyday life. Those relationships in turn promote self-making. She elaborates: “privacy’s goal, simply put, is to ensure that the development of subjectivity and the development of communal values do not proceed in lockstep” (2013, p.1911). For Cohen, privacy is a necessary condition for the development of subjectivity. She concludes that the lack of privacy limits the “scope for self-making” (2013, p.1911). She also argues for the conceptualization of privacy as a dynamic rather than static concept – this idea will shape how attitudes to privacy are operationalized and analysed in the study.

In line with Cohen’s argument, Röessler (2017) – in her recent work – demonstrated that informational privacy is constitutive of both human rights and selfhood. Its absence makes personal autonomy, domestic liberties, and the ability to control our own self-presentation impossible. She argues: “we can live autonomous lives only if we can be certain that it is more or less up to us who has what kind of knowledge about us [...], we are protected in our informational self-determination” (2017, p.192). Similarly, Kupfer (1987), using Goffman’s

work on “total institutions”, showed that privacy underlies second-order autonomy (i.e. self-reflection, knowledge, evaluation, criticism) and thus the formation of the self. It is autonomy that allows individuals as actors to reflect upon life choices and act in alignment with their own values, without manipulation of either the resources or rationales (Susser, Rössler & Nissenbaum, 2019). The literature review has shown how actions of commercial companies that violated individual informational privacy resulted in visible repercussions to life-chances. For example, fitness trackers’ data is being used for determining the level of health insurance deductibles, dispensing medication automatically, or in the courts of law as a part of evidence (Charitsis, 2019; Oslon, 2014; Passanate Elman, 2018; see also Bowker & Star, 1999; Gandy, 1989; Kang, 2015; Lyon, 2015; Magnet, 2011; Solove, 2006; Pasquale, 2014). In short, surveillance becomes a pre-condition for life-sustaining transactions, such as employment or medical help, and tracking enables health monitoring at a granular level. The arguments made by Cohen and Rössler and colleagues further the case for exploring such invisible strings.

Using the works of Rössler and Cohen, Lanzing (2016) argued that while self-tracking technologies can enhance some aspects of self-understanding, they present challenges to autonomy by way of violating informational privacy. In a schematic form, she argues that an autonomous agent should be able to make choices and act independently from the interference of third parties, but when an agent is forced to see himself or herself through the eye of another, it affects his or her perception of the self, regardless of whether the data is being used or not. She then argues that the narrative of self-control and self-improvement mask the de-contextualization of data extraction, further limiting the individual’s capacity to run their own lives independently of interference. In her more recent work, Lanzing (2019) links informational and decisional

privacy via the concept of hyper-nudging, the process that undermines personal autonomy even further.

Collectively, those scholars argue that informational privacy is a vital precondition for the existence of autonomous selfhood, as well as democratic societies, human rights, and liberal democracies more generally (Susser, Rössler & Nissenbaum, 2019). At the same time, the new iteration of capitalism – data capitalism (Myers West, 2019) – is dependent on violating informational privacy *en masse*. The lack of informational privacy reduces the individual's ability to construct himself by shaping both resources and opportunities for interaction between structural and agentic forms, as well as to do so independently of influences by others. In sum, while self-tracking might enhance some aspects of individual's fitness and health, by compromising informational privacy, self-tracking potentially contributes to limiting individual subjectivity and thus deserves thorough attention in the context of this dissertation.

### Frameworks for Privacy in Self-tracking

The second important consideration arises from the literature review. Existing research has probed into self-quantifiers' privacy opinions and actions, touching upon data ownership, privacy knowledge, privacy harms, willingness to share data, and other issues (e.g. Lupton & Michael, 2017; Patterson, 2013; Spiller et al., 2017; Vitak et al., 2018). Many of the reported findings are inconsistent, including those on the willingness to share, the extent of caring about privacy, and privacy knowledge. What is clear is that the users are aware of their data being used by multiple actors, but fail to grasp the extent to which – and the ways in which – their data is being used. They underestimate the amount of data they share and the probability of harms that might affect them from their data being used; they over-estimate the level of protection and the amount of control they have over their own data; and they trust companies not to act in privacy-

violating, ways despite evidence of such behaviours declared in terms and conditions. Those tensions result in inconsistent privacy behaviours and give an opportunity to develop descriptive and explanatory frameworks. Yet, much of the empirical work at present is done in a somewhat a-theoretical manner (e.g. Abdulmajeed & Lipford, 2019; Gabriele & Chiasson, 2020; Leibenger et al, 2016; Motti & Caine, 2015). Of the theories that have been employed, the privacy paradox, contextual integrity, and Lupton's heuristic of tracking variants stand out as particularly fruitful. These are discussed in turn.

Lupton (2016) proposed a taxonomy of tracking (private, communal, pushed, imposed, and exploited) where variants both highlight a range of power imbalances and capture the extent of potential informational privacy violations. Pushed, imposed, and exploited variants merit the most privacy concerns from third parties, as they leave the least freedom for negotiation and might lead to the most drastic privacy violations (for expanded analysis, see Lupton, 2016b, Chapter 5). A recent study (Paluch & Tuzovic, 2019) in the domain of persuasive marketing developed Lupton's 'pushed' tracking variant for the health insurance industry in Germany. The authors studied consumer perception, reaction, and ways of popularization of persuaded self-tracking, finding that their informants sceptical of both practices of persuaded data sharing and the principles that underlie the idea (i.e. choosing to pay more in premiums over breaking social solidarity and contributing to rising inequality). In a study that is not focused on privacy specifically, the research team found that people living with chronic health conditions were judged and that they judged themselves on the amount of data they were disclosing to their health providers, who called them 'lazy' or 'obsessive' (Ancker et al., 2015). In the exploited and imposed variants, where there is no option but to comply with tracking demands, privacy would be experienced differently. Scholars of the political economy of labour are especially

relevant in this space in relation to digital labour and corporate wellness programmes (Charitsis, 2019; Passanate Elman, 2018). The privacy research in this taxonomy remains in the nascent state; in addition, the heterogeneous nature of the outlined streams makes it challenging to put forward a coherent conceptual framework. It would be hard to use the same explanation for data sharing from a person who does so of their own volition, versus one who is forced to wear a tracker by her place of work.

The idea of the privacy paradox has been popular in attempts to illuminate the tension between personal privacy attitudes and behaviours. The privacy paradox suggests that individuals' privacy actions and privacy are in contradiction each other (i.e. individuals regard themselves as private, but take no steps to protect their data). A systematic review concluded that at least 35 theoretical explanations that include conceptualizations of users as rational decision-makers and account for irrational behaviours, such as social pulls, gratification, and habits, can be grouped under the privacy paradox umbrella (see Barth & de Jeon, 2017). In studies of self-tracking behaviours, this framework takes the form of exploration of the privacy calculus, which in simple terms means that users are weighting the risks of disclosures against the perceived benefits of such disclosures as a main mechanism of decision-making. According to another meta-review, privacy calculus is one of the foremost explanations of privacy paradox behaviours (Gerber, Gerber, & Volkamer, 2018). Such studies revolve primarily around discussions of willingness to share data, privacy attitudes, data sensitivity, perceived threats to privacy, incentivized data sharing, norms around data disclosure, data ownership, and actors involved in the practice (Buchwald et al., 2017; Fietkiewicz & Illhan, 2020; Talebi, Hallam & Zanella, 2016; Wieneke et al., 2016; Williams, Nurse & Creese, 2017).

For example, von Entreß-Fürsteneck and colleagues (2019) employed the idea of privacy calculus in view of disclosing personal self-tracked data in the health insurance context. In surveying self-trackers, they studied both sides of privacy calculus (risk and rewards) and found that people assess privacy risks without a view of their health status. Alternatively, a robust survey study (Li et al., 2016) using privacy calculus theory developed and tested a model that predicted the adaptation of wearables in relation to privacy concerns. In another survey study, Fietkiewicz and Ilhan (2020) found that regardless of the attitudes towards privacy protection offered by GDPR, the trackers did not affect the use of technology. While all of those research efforts were productive, the idea of privacy calculus suffered from well-known issues, such as assuming that a user is a rational agent, a level and transparent informational playing field with commercial entities, predictable data uses, and the ability to act when one's own interests are undermined. As the literature review and previous research shows, this is not the case for self-quantification. Some studies also incorporated contextual factors (whom data is shared with, purposes) and personality traits (emotional factors, institution-based trust) in their designs (Maltseva & Lutz, 2018; Prasad et al., 2012), but because of the diversity of ways in which privacy is operationalized, the findings suffer from the impossibility of drawing generalized conclusions.

Finally, the lens of privacy as contextual integrity was also employed to illuminate tracking practices. The framework was designed to provide normative, moral, and political accounts of existing and new technologies. The main thesis of the framework is that informational norms of individual contexts guide information flows and determine the state of privacy: "it is preserved when informational norms are respected and violated when informational norms are breached" (Nissenbaum, 2010, p.143). There are three strengths that

make the framework a fitting contender for illuminating informational privacy. First, the framework relies on the assumption that most contexts have a set of well established, context-relative informational norms – thus avoiding using the novelty of environment argument; instead, the framework tasks the reader with identifying relevant norms in analogous contexts (Nissenbaum, 2010). Second, the framework makes cultural and contextual agnosticism a starting point of analysis.

Third, since the conception of the framework in 1997, it has been continuously used in empirical case studies to analyse privacy implications in the context of Facebook’s Newsfeed and Application features (Hull et al., 2011), Blogosphere (Grodzinsky & Tavani, 2010), the Cloud (Grodzinsky & Tavani, 2011), Google services (Zimmer, 2008), and social networking sites (Sar & Al-Saggaf, 2014), biometric measurements (Norval & Prasopoulou, 2017), and Nissenbaum herself applied it to data flows such as Radio-Frequency Identification (RFID) tags, public records, and data mining (2010, 2011). The framework has also been employed by computer scientists to develop technical solutions that warn individuals of data over-sharing on social networking sites (Criado & Such, 2015). Finally, Nissenbaum, along with her colleague Heather Patterson, used the framework to discuss self-tracked data in the context of employment. Their call for more research in the area was taken up in practical settings by Chung and colleagues (2017), who focused on the empirical analysis of privacy in wellness programmes from the perspective of administrators and users, findings that only a small percentage of employees were concerned about privacy.

In her work with 21 self-trackers who used FitBit, Patterson (2013) picked up on many privacy issues ahead of the curve – a lack of regulation, poor notice and consent policies, granular data collection, de-contextualization of data flows, and the erosion of social norms – which are



currently being explored in the literature. She also recommended accommodating contextual information flow preferences. In Patterson's later work with Nissenbaum, they apply privacy as a contextual integrity framework to self-tracking, noting that:

...privacy requires the appropriate flow of information, which means flow that meets legitimate expectations [...] are characterized by context-specific norms of information flow that not only are enriched in the practices and convention of a given context [...], but that also support important ethical and contextual values (2016, p.81).

They explore privacy as of trackers devices in the context of employment, providing recommendations for policy and architecture solutions. Running through the taxonomy, they face numerous challenges, including defining attributes and transmission principles of heterogeneous self-tracking data. For one, self-tracked data generated by tracking devices has mixed attributes. Even the most basic trackers and mobile applications generate data of a mixed nature: quasi-medical data (e.g. heart rate, number of steps, stress levels, sleep patterns, calories in and out, length and heaviness of menstrual periods, levels of pain); semi-social data (e.g. weekly step competition charts, likes and cheers, general comments, competition in sexual competence); partial lifestyle habits data (e.g. smoking, alcohol consumption, medication regimen); geographic data (e.g. geo-positions, routes, elevation gains); material (e.g. wearing of sports equipment); and communications data (e.g. texts, alerts, calls). The aforementioned streams of data have different qualities (e.g. unstructured qualitative, structured quantitative, images). These data also help to achieve different goals: to enable fitness action, to socialize, and to compete. As such, the core attribute of self-tracked data lies with the endless amount of permutations of sub-streams that make up individuals' self-tracking data streams, which makes delineation of common data attributes as well as transmission principles difficult. To address this, Nissenbaum and Patterson (2016) suggested a systematic differentiation of self-tracking technologies according to input modalities, information types, device forms, and others (p.81).

The proposed taxonomy in the context of self-tracking is unconvincing for three reasons. First, it violates the main organizing principle of taxonomies: mutual exclusivity, both within and between categories. The principal of mutual exclusivity is at the core of what makes a classification conceptually useful. To illustrate, a single device can produce different types of information simultaneously (e.g. Apple Watches can receive texts and track step counts), include both automated and manual sensing, or be assembled from more than one form (e.g. wearable jewellery functions only in combination with a mobile phone), thus making the classification unusable. Second, the authors suggest that “the type of information in question could vary from case to case” (2016, p.84). While that claim is true, in practice, such a single sub-stream for analysis, while ignoring parallel sub-streams that are a part of the self-tracking process under investigation, results in under theorization. Third, the originality and usefulness of the CI framework is that it rests on the analysis of contexts, not data types (a dichotomy the framework tries to move away from). Thus, the framework does not allow researchers to cut dataflow into sub-streams. This delineation prevents Nissenbaum and Patterson from engaging with this tension in a meaningful way, distances the authors from the practice as it happens in real life (i.e. people at work engage in competitions as well as give their data to employers), and inhibits theory-building and generalization by resorting to reporting on idiosyncratic cases.

Finally, as noted in the literature review, a limited number of studies touched upon the concepts related to emotive states in relation to privacy, such as trust in corporations (Maltseva & Lutz, 2018). Privacy researchers in other domains as well as in self-tracking noted trust, fear, resignation, and anxiety as emotions affiliated with the practice. Spiller and colleagues (2018), for example, relied on the idea of ambivalence via Solove’s idea of ‘nothing to hide’. Ostherr and colleagues (2017) rely on the notion of trust, finding that surprisingly, people were more resistant

to sharing data for scientific research than sharing with corporations, despite evidence of data breaches. Cheung and colleagues (2016) studied privacy attitudes of early adopters of technologies and concluded that they were concerned about informational privacy of their data; risk-tolerant and scientifically minded individuals were concerned about the uses and misuses of their data, rather than being unconcerned by the nature of adopting technology early. Similarly, Patterson (2013) also noted a sense of fear, resignation, and ambivalence in relation to privacy. Finally, most recently developing their on earlier work on trade-off fallacy (Turow et al., 2015), as well as research on despair, cynicism, and resignation by other authors, Draper and Turow (2019) discussed the sense of resignation in relation to privacy of the data as a reaction to powerlessness in their ability to control the use of their data by commercial actors and how it can be overcome to develop into “collective anger that might encourage institutional change” (p.1834).

The findings of these studies reflect Solove’s observation, aptly summarized by Bartow as “people feel uneasy about privacy violations and may change their behaviours to avoid scrutiny or its consequences, but ultimately the main trajectories of their lives remain logistically undisturbed” (2006, p.57). Thus a new approach to understanding informational privacy in relation to the context of self-tracking is needed, which can accommodate contradictions in behaviours without offering numerous competing explanations. The approach – developed through a review of selfhood and reflexive practices – must capture emotional stasis of the individuals, which accounts for both individual behaviours as well as structural factors, and which acknowledges power imbalances. To that end, a variety of questions need addressing – for example, questions on the perception of data ownership, should people be tracked for the good of society, where does information go according to the users, would users be willing to exchange it

for the perks, and how the perception of privacy changes through time. This should facilitate the painting of a more complex picture of privacy attitudes and identification of what users who act differently might share and how their personal attitudes are affected and transform over time.

### **Ethics and Moral Frameworks of Self-tracking**

As illustrated by the review of literature, ethical tensions arise in the processes of self-construction in the context of tracking. To examine this point and its implications for the project, positioning the subject in the centre of the examination is necessary. Yet, the self-quantification boom positioned technologies at the centre of defining selfhood in the digital age. For example, Lupton characterized new identities as follows: “the digital cyborg assemblage is the body that is enhanced, augmented or in other ways configured by its use of digital technologies that are worn, carried upon or inserted into the body, continually interacting with these technologies in dynamic ways” (2015, p.165). Similarly, Clarke and colleagues (2003) who the framework of biomedicalization, conclude their work with a discussion of techno-scientific identities (via Rabinow), advocating that there is a new type of identity developing in the backdrop of biomedicalization. Their definition is more complex, as they suggest that it is not the technologies that are new, “but rather that technoscietific applications to bodies allow for new ways to access and perform existing (and still social) identities” (2003, p.182). However, in those works, technology appears to be still simply additive to selfhood or used for creating new typologies – but not *identities* – of the self (e.g. low/high risk, sick/healthy). Additive conceptualization of data fails to capture the complexity of self-construction. Therefore, a different way of conceptualizing selfhood in relation to data is needed.

To understand how tracking can be conceptualized differently, we need to engage in an exploration of how tracking and data inform personal selfhood in everyday life. To build a tool

for the exploration of the ethical dimension of self-quantification from a perspective of a self-quantifier, the dissertation draws on three strands of literature: philosophical, linguistic, and sociological writing about selfhood (Butler, 2005; Giddens, 1991; Taylor, 1989; Ricoeur, 1992); the sociology of emotions (Turner, 2009; Turner & Stets, 2006; Tangney, Stuewig, and Mashek, 2011); and moral psychology (Johnson, 1981; Lakoff & Johnson, 1981).

### *Ethical Frames and Self-tracking*

Building on Charles Taylor's *The Sources of the Self* (1989), a philosophic and historic work, the dissertation raises the question of whether data is becoming a source for ethical judgment of the self and others, as well as a new organizing principle of everyday life. The empirical chapter on the ethics of self-tracking draws further on the works of Taylor, whose arguments have informed the overall approach of the dissertation. Taylor's reflection is connected to his earlier work *Human Agency and Language* (1985) and the works of American philosopher Henry Frankfurt, *Freedom of Will and Concept of a Person* (1971). The core argument of these works is that the defining characteristics of humanness are our ability to reflect on, evaluate, and act in line with our bigger understanding of ourselves as a particular type of subject. In Frankfurt's terms, "lack of the capacity for reflection or [...] mindless indifference to the enterprise of evaluating his own desires and motives" (Frankfurt, 1971, p.13) is a feature of a wanton (i.e. lacking capacity for higher-order reflection and evaluation, e.g. a young child) rather than a human. To put it in simpler terms, to be fully human is to have the capacity to evaluate the desirability of one's own wants and act in accordance with them. This schematic representation of Frankfurt's complex argument about second- and first-order desires and volitions is reductionist, but it helps us to focus attention on the human capacity for self-evaluation. Based on Frankfurt's argument, Taylor then distinguishes between weak and strong evaluations in his piece 'What is Human Agency?'

(1985): the former is circumstantial and focused on outcomes (e.g. choosing among restaurants), whereas the latter is concerned with the moral worth of possible desires (e.g. not acting vengefully is chosen because it is noble, even if retaliation is possible).

These debates inform the volume *The Sources of the Self* (1989), in which Taylor explores the link between various historic narratives (i.e. Christianity, the Age of Reason, Romanticism, Modernism), their relative moral principles (which he refers to as “goods”), and selfhood. Taylor defines goods as “anything considered valuable, worthy, admirable, of whatever kind of category” (Taylor, 1989, p.92) and distinguishes between constitutive and “hypergoods”. The former can be defined as moral sources “which empower us to do and to be good” (p.93) – for example, love or courage. The latter provide a structuring framework for the ordering of constitutive goods and enable people to judge and weight them (p.63), such as universal justice and equality for contemporary societies. Taylor also notes that while goods do come into conflict with one another, they do not refute each other’s value. In his closing discussion of the modern era, Taylor suggests that goods are no longer as set as they used to be in previous eras, owing to the demise of strong moral sources, such as religion. Craig Calhoun (1991), an American sociologist who commented on the book soon after its publication, suggested that Taylor’s tension about competing moral goods and the absence of a universal moral source in the modern era can be successfully used to advance our understanding of present moral conditions.

These theoretical observations have their parallel in sociological literature grounded in everyday life, as exemplified by the works of Anthony Giddens and more recently by the works of Anthony Elliott and Ulrich Brockling. *Modernity and Self-identity* (Giddens, 1991) illustrates theoretical points particularly clearly. Giddens (1991) shows how constantly changing socio-cultural and knowledge conditions drive perpetual revision of one’s own selfhood – including

that of the body. Elaborating on Giddens' argument, Elliott (2013) argues that 'chronic' revisions or reinvention in various areas of life – careers, persons, and places – make constant self-transformations a mandatory part of modern selfhood. When considered as an enabler of diets, detoxes, and weight loss – all features of perpetual reinvention of the self – self-tracking fits easily into the new, dynamic cultural imperative of constant reinvention of the self. In a similar vein, self-quantification can fit easily with what cultural sociologist Brockling (2016) called the entrepreneurial self (a type of subjectification governed by a business logic, including optimization and self-responsibility). In parallel with Taylor's philosophical argument, those sociological works showed a lack of stable, shared ethical principles, as evident from the pressure of constant self-revisions, changed social relations, and the rise of pressure of constant self-invention, self-transformation, and adaptability.

Inspired by these theoretical observations, empirical analysis is necessary in order to understand how self-tracking fits within wider personal narratives; what kind of ethical values, as well as higher moral frameworks, are embedded in the practice and how they compete with and are ranked against other prominent moral values; as well as how data is used in processes of chronic self-revisions. Such analysis will help to position self-tracked data in the modern organizing framework of values. To understand the new framework, an access point for analysis is needed. The following section argues for a discursive point of entry: by analysing how we speak about tracking, including the metaphorical language, as well as reflections with the view of others, the role of self-tracking as a practice for the development of selfhood becomes clearer.

### *Resources for Self-construction*

Two philosophers, Butler (2005) and Ricoeur (1992), persuasively showed that language is a fundamental resource for the construction of the self and that self-construction is a social and

relational process, with other actors being an unalienable part of resources on the basis of which self-identity is formed. Their arguments inspired an examination of data as language and data as playing a role in presenting an account of the self to others.

In his complex volume *Oneself as Another* (1992), philosopher Paul Ricoeur conceptualizes selfhood as a multimodal entity of a subject that speaks, acts, narrates, and judges herself (for a discussion, see Venema, 2002). He develops his understanding of the interrelation of ethics (which in his understanding, encompasses morals) and selfhood in the Aristotelian tradition. Therefore, Ricoeur's analysis is guided by the idea of the "good life": the ultimate goal of human existence. In schematic terms, Ricoeur conceptualizes the idea of ethical selfhood as: 1) one's ability to act, narrate, evaluate, and direct one's own action; 2) the ability to hold others in esteem "as myself" – recognizing agency and reflexive abilities of others, thus acknowledging mutual respect and accountability; and 3) striving for distributive justice (p.172). Ricoeur goes on to illustrate that these processes take place in the context of teleological aims (i.e. how we are) and the deontological moment (i.e. how we are meant to act normatively). He shows that human beings share an onerous "task of having-to-be" (p.327) and inhabit bodies that are both intimate and at the same time open to the world. Ricoeur develops a set of complex arguments on selfhood. However, the most salient point for this study is that selfhood is always constructed in relation to and in the presence of others in oneself (i.e. through their presence in the process of an iterative introspection with oneself).

In *Giving an Account of Oneself* (2005), American philosopher Judith Butler shares one of Ricoeur's aims in exploring the narrative-giving dimension of selfhood. Both authors draw on works of Levinas, Nietzsche, and Foucault and attempt to position ethics and morality in selfhood. Butler's starting point is Nietzsche's idea of giving an account of the self in response to



an accusation by another and out of fear. She criticizes this view as limiting and shows that while an account of oneself is always given in response to an inquiring other, “conjured or existing” (p.21), an inquiry – not accusation – is not a primary condition for self-presentation. Butler develops Foucault’s argument that self-subjectification is not possible outside of existing “regimes of truth”, which in turn delimit possibilities of the kind of subject one can become by combining it with the notion of “recognition” of the other. She then shows that all accounts of selfhood are relational and are built with the help of shared resources that are outside of an individual’s control, such as language and social, cultural, historic, and normative structures. These are inescapable, shared with others, and embed structuring norms and moral codes by way of “recognition” that we must give to the other before an account of the self can be given (2005, p.7, 17, 26). Thus, Butler shows how the self cannot stand apart from cultural, linguistic, and social conditions and moral norms. Butler concludes that “morality is neither a symptom of its social conditions nor a site of transcendence of them, but rather is essential to the determination of agency and the possibility of hope” (2005, p.21). To put it differently, our resources of self-reflection, self-evaluation, and self-presentation are not free of morality, ethics, social norms, and cultural codes, and thus morality and ethics are presupposed in selfhood construction. In relation to self-tracking, this begs a question about which kinds of ethical codes we use to evaluate the self. The overarching point of agreement with Taylor, Butler, and Ricoeur’s conceptualization of ethical selfhood is that it is relational; outward-oriented; constructed based on shared resources and in relation to others; and goes beyond simple self-fulfilment. In this dissertation, self-tracked data is examined as such a shared resource.

### *Operationalization: Metaphors and Emotions*

To this point, ethics was discussed as an abstract concept raising the question of how ethical action, attitudes, and behaviours can be studied in real life. In order to be able to study the ethical frameworks, specific tools are needed. Those can be drawn from discursive analysis. The need for this analytical avenue came to light after the data collection was completed and was dictated by the unexpected qualities in data. The tools chosen for analysis were thus guided by the grounded theory via examination of the linguistic features of the body of the collected data (Glaser & Strauss, 1967). Given the prevalence of various linguistic forms (e.g. metaphors, similes, comparisons) and reported emotional states in relation to tracking, metaphor analysis and sentiment analysis became necessary tools for advancing the understanding of the role of self-tracking for self-construction.

In building his argument against the marginalization of moral psychology as lacking normative guidance, Mark Johnson (1981) draws on his and his colleague, American linguist George Lakoff's, earlier work *Metaphors We Live By* (1980). This volume solidified the position of the metaphor analysis as a way of accessing realistic schemas that people use to think about and reflect on complex events and features of life. Metaphor analysis was then adopted, criticized, and further developed by scholars of linguistics, while making a lesser impact on scholars of psychology, social care, political science, and education (Ignatow & Mihalcea, 2017). The main utility of the metaphor is that it allows us to understand new, complex, and more abstract domains in relation to domains that are more familiar or concrete (Hampson, Hicks & Watt, 2017). The main benefit of analysing metaphors is that they are relatively free from the effects of self-representation and are able to uncover individual and collective patterns of thought (Schmitt, 2005). This is possible due to the fact that "because communication is based on the

same conceptual system that we use in thinking and acting, looking at language is one way that we can find evidence of what the system is like” (Gatti & Catalano, 2015, p.150). In relation to moral action, Johnson argues, metaphors delimit our understanding of our obligations, rights, and duties in relation to the self and others. The metaphors can uncover potential meanings of data for participants, such as belonging to a particular group; being a source of truth and guidance; and strict adherence to a particular regimen. By examining the source domain, we can extrapolate what is considered appropriate or inappropriate, moral or a-moral, and good or bad.

Moser (2000), a prominent German scholar who wrote widely on metaphor analysis, asserts that ‘the self’ is a strong candidate for metaphor analysis because it is hard to speak about the abstract concept. Exploring the kinds of domains and vocabularies in which self-tracking is discussed is helpful for understanding which moral codes and ethical values underlie the practice. From existing methodological and empirical literature, it can be inferred that metaphors do not always exist in full or pure form (Schmitt, 2005), and other linguistic forms, such as comparisons, similes, and clichés, might be equally as revealing (for example, Hampson et al., 2017).

In a different vein, tools drawn from the sociology of emotions were vital for developing a framework to understand the emotive dimension of the reflexive self. This field has been developing since the 1970s and has been shaped by contributions from different academic disciplines. There are no agreements on major debates regarding emotions’ nature (biological, cultural, structural, situation, behavioural, and neurological aspects of emotions); the directedness of emotions (self, others); and the timing of cognitive appraisal (sequential nature of appraisal and emotional experience; Turner, 2009; Tangney, Stuewig, & Mashek, 2011). The terminological debate on definition and differentiation among sentiment, affect, mood, emotion,

passion is also ongoing, with some scholars using the terms interchangeably and others distinguishing amongst them (see for example Wetherell, 2012). In addition, multiple perspectives have developed in relation to the individual, cognitive, and social functions of emotions (Ahmed, 2004; Damasio, 1994; Hochschild, 2012; Elias, 1982; Merleau-Ponty, 2012; Taylor, 1989). For example, a dramaturgical framework based on the work of Goffman and symbolic interactionists conceptualizes emotions as performativity, while a biological framework focuses on the role of emotions in biological and social evolution (for a comprehensive overview of key debates, see Turner, 2009). These epistemological differences shape the current research landscape. A rich set of psychology- and philosophy-led literature on “affect” is also of note; however, in order to circumscribe the analysis in this thesis and to avoid conceptual confusion, the broad term “emotion” is used throughout and the analysis focuses on a specific type of emotion – moral emotions. This entry point, over one proposed by affect-related theories, was chosen, because the concept of moral emotions – those that arise “when reflecting on one’s self and evaluating the self in reference to values and standards” (Tangney et al., 2007, p.21) – is the most directly linked to the ideas of self-reflexivity and self-construction, the key focus of this study. Moral emotions are present both at the point of deliberation (i.e. self-reflection) about an action to take and upon an action is completed (Tangney et al., 2007). Further, the framework of moral emotions emphasises the cognitive dimension of emotions aligning with how emotions are conceptualized in the literature on which this study draws. In other words, moral emotions play a vital part in the processes self-construction,

To specify, there is a general agreement in sociological literature that some emotions are universal (i.e. fear, sadness, anger, and happiness) and that there are biological mechanisms underlying emotional responses. Guided by the grounded theory approach and based on

analytical need, the analysis focuses on universal moral emotions (further discussed in chapter 8, on meta-ethics and emotion). This theoretical viewpoint, however, does not negate that emotional expressions themselves are culturally dependent and constrained. Jonathan Turner, an American sociologist who dedicated his career to the study of emotions, expanded and complexified universal emotions by positioning them on intensity scales and showing how different permutations of primary emotions make up other emotions. To exemplify, a combination of anger, fear, and sadness in different proportions would result in guilt, shame, or alienation (Turner & Stets, 2006). Most emotions reported by the participants were focused on oneself and one's own actions, and therefore, a theoretical lens of individual emotional appraisal – rather than theories that look at emotions as sanctions and assessments from the outside (i.e. emotions as power, social recourse, currency of exchange) – was employed in the study.

In sum, analysing how self-tracking is spoken about and which life domains it is compared to would help to decipher which ethical codes are embedded in self-tracking as an activity (i.e. based on norms of the source domain). Exploring which kinds of emotions (positive or negative, high or low intensity, moral or a-moral, oriented to the self or others) dominate the linguistic corpus of the interviews and diaries would contribute to further conceptualization of data as a resource for self-construction. The analysis thus will move beyond conceptualization of tracking as an instrumental practice and re-conceptualize it as an ethical action that links to multiple dimensions of our selfhood. Examining self-tracking as a source of the self also helps to illustrate that it is not an inward-looking activity that focuses solely on self-fulfilment (Taylor, 1989, p.507), but that is oriented towards other human (being a parent, athlete, citizen) and non-human actors (being a pet owner, gardener).

## Conclusion

This chapter detailed a four-axis (i.e. culture, reflexivity, privacy, ethics) heuristic tool that was designed based on the gaps in existing literature and in line with the main research question of the study. The analytical heuristic will be used in the dissertation as a framing and sense-making tool to understand how self-tracking contributes to our sense of the self. Each axis employs a theory or set of concepts to create a theoretical filter through which data is analysed and conclusions drawn. Overall, each of the four axes tackles self-quantification for health and wellness from different – but complementary and interrelated – angles, summarized below. This multi-layered design allowed the study to derive original insights about the practice in relation to selfhood.

The cultural axis uses William Sewell's (1992; 2005) dual conceptualization of culture as symbols and as practices to derive a picture of self-tracking as grounded in the realities of everyday life. The proposed conceptualization of culture is necessary because it promotes constant comparative analysis between popular, commercial discourses that frame self-quantification with actions in which self-trackers actually engage in their everyday lives. This in turn helps to avoid theorization about the practice in a vacuum which is unconnected to everyday life. Conceptualizing self-tracking as culture in this way helps to achieve two goals: to produce a broad picture of the phenomenon upon which other axes then elaborate; and to examine how self-quantifiers derive meanings from their practices and data.

The reflexivity axis draws on concepts from the works of Margaret Archer and Charles Taylor to hone in on how the practice of self-tracking plays out in participants' minds and in relation to their understanding of the self. The axis combines the concepts of internal dialogue (Archer), personal projects (Archer), strong evaluators (Taylor), and radical reflexivity (Taylor)

to examine how self-quantification contributes to the shaping of the self via self-talk and to self-evaluations that go beyond its instrumental function, thus calling attention to examining the ‘goodness’ of the practice overall. This conceptualization also calls for a methodological tool that is capable of capturing unguided self-talk and reflections that develop over a period of time.

The privacy axis delineates a specific type of privacy that enables self-construction (via Cohen, Nissenbaum, and Rösseler) and is most relevant to the context of self-tracking: informational privacy. In the literature review, three flexible contemporary frameworks of informational privacy (privacy paradox; Nissenbaum’s contextual integrity; Lupton’s five-prong taxonomy of privacy) are examined and ruled out as informative for the conceptualization of self-tracking. This results in the need for a new analytical framework. The axis on privacy proposes a range of directions that require examination in order to derive a new conceptualization of informational privacy in the context of self-tracking. The new framework needs to be flexible in order to account for internal contradiction and changes in attitudes and behaviours over time.

The ethics axis was designed based on philosophical and sociological works of self-construction and self-evaluation via Taylor, Butler, and Ricoeur, with language used as an entry point to analyse ethical and normative dimensions of self-quantification. The core assumption of the framing is that language is a shared resource that is employed for self-presentation and self-evaluation. Combined with the type of analysis – metaphor and sentiment analysis – dictated by the needs of the corpus of the data, this axis examines what kinds of evaluation frames and values are embedded in data and how those operate in everyday life.

Each of the four axes are independent, but inform one another. For example, the culture axis identifies the main tensions and lays the groundwork for the rest of the analysis. The

reflexivity and ethics axes interact by examining how the participants speak about themselves, others, the values embedded in quantification, and their own practices. The axis on privacy links to that of reflexivity by sharing the assumption about resources for self-construction. The points of interaction are identified in each of the empirical chapters.

Each of the four axes of the analytical tool helps to illuminate a specific dimension of the main research question – how does self-tracking contribute to our sense of the self? The cultural axis focuses on values and resources for self-construction; the ethics axis is concerned with normativity and comparative standards embedded in the practice; the reflexivity axis deals with mechanisms that make self-shaping possible; and the privacy axis examines the conditions that enable self-deliberation. The proposed heuristic also allows to make an original contribution to the fields of Media and Communications, digital sociology, and critical data studies by showing how self-tracked data and the practice of self-tracking contribute to our selfhood on multiple planes (i.e. becoming a resource with which self-construction happens; serving as a new domain for self-evaluation; being a subject of deep reflections; causing visceral reactions). The heuristic tool also enables a new conceptualization of informational privacy.

Finally, the need to illuminate each of the four axes of this complex heuristic made demands on the methodological tools used, thus shaping the design of the study. Those conceptual requirements also shape the original methodological contribution of the study by drawing attention to the need for methodological innovation in the study of digital practices. Broadly, the heuristic required a combination of tools that promote unrestrained reflection over a period of time, but which also allow us to probe, inquire, and ask for clarification on specific issues. This crystallized in a methodological combination of solicited diaries and interviews – the design that is defended and detailed in the following chapter.



To summarize, the dissertation examines the notion of selfhood in relation to self-quantification for health and wellness. The core research question the study examines is – how does self-tracking contribute to our sense of the self? A four axes analytical heuristic devices – concerned with culture, reflexivity, privacy, and ethics dimensions of the practice – was designed to elucidate a respective aspect of the main research question. Conceptual demands, in turn shaped the methodological design of the study detailed in the next chapter.

## Chapter 4– Research Design & Evaluation

### Introduction: Aims, Argument, and Outline

The objectives of the chapter are as follows: 1) to detail the study's methodological choices and to assess the quality of collected data; 2) to evaluate how the research design and analytical strategy enhanced understanding of self-quantification practices; and 3) to showcase solicited diaries' ability to illuminate people's data practices. To this end, the methodological rationales are presented, the study's instruments and procedures are described, the collected data is examined, and the participants' and researcher's experiences during the study are discussed. The chapter draws on methodological literature from the fields of human geography, psychology, nursing, education, sociology, public health, media, and communication, as well as the researcher's reflexive diary kept during the fieldwork.

To answer the main question of the study – how the self-tracking practice contributes to our selfhood – a research design that combines four-week, open-ended solicited diaries with a set of two in-depth interviews was used. The core argument of the chapter is that the research design generated a high-quality, rich, and original dataset. The design enhanced the original theoretical contribution of the study by providing insights that cross-sectional studies would not be able to capture and opening new analytical avenues.

The chapter unfolds in three sections: analytical, descriptive, and evaluative. The analytical sub-sections present a concise review of the literature, an overview of the study design, and methodological rationales. The descriptive sub-sections offer an account of the study procedures (i.e. sampling, recruitment, schedules, analysis strategies). The links between methodological and conceptual frameworks are highlighted in this section. The evaluative section provides an assessment of data quality, evaluates the fit of methodological and analytical

procedures, and presents reflexive thoughts on participation in the study. The main shortcomings and successes of the study are discussed. For the purposes of enhancing methodological transparency, all study materials are included in full in the methodological appendices.

### **Analytical Details: Research Design & Methodological Rationales**

The main goal of the study is to understand how the self-tracking practice contributes to selfhood. The conceptual framework of the study, discussed in the previous chapter, consists of four interrelated axes. The objective of the study requires iterative deliberations, enhanced self-disclosure, and access to insights that are hard to verbalize (e.g. personal reflexivity) on the part of the participants, and also demands an ability to explore meaning-making through conversation and direct probing. Given the constraints, a multi-method research design crystallized as a way to gather data. The design combined: a) a semi-structured entry interview; b) a four-week, solicited diary; and c) a semi-structured, in-depth exit interview. The diaries aimed to capture individuals' reflections, thoughts, and feelings about self-tracking and data. The interviews focused on uncovering motivations, uses, constraints, and views on various aspects of the practice (e.g. privacy, cultural value). The sub-sections below present a brief overview of each tool and methodological rationales for their use in the study. The section concludes with a rationale for the methodological combination and order of the research phases.

### **Solicited Diaries as Research Methodology: Brief History & Variants**

Solicited diaries were initially used in the 1920s-1930s in time-use studies. In the UK, time-budget studies were spearheaded by the BBC as a part of their audience research and later supported by national research bodies; in the US, time-budgeting logs of homemakers were used by the Department of Agriculture (Paolisso & Hames, 2010). Originally, diaries were used to

explore expenditure, time-use, and daily activities, as well as to track illness symptoms and health-related behaviours (Corti, 1993; Verbrugge, 1980). In addition, During the Second World War, food diaries became an essential tool for evaluating the nutritional needs of military personnel (National Academy of Science, 2003). Lastly, the use of diaries in psychology and psychiatry dates back to the 1960s–1970s (Mackrill, 2008; Wheeler & Reis, 1991). Today, both qualitative and quantitative diaries are used to explore issues ranging from human experiences, emotions, and psychological states and selfhood, to behaviours, adaptation to illness, and media consumption.

There are multiple classifications of diary types: original purpose (i.e. solicited/unsolicited); structure (i.e. ranging from structured to open-ended); modes of delivery (e.g. pen-and-paper, audio, digital, email); and contingency (i.e. time-, event-, signal-dependent) (for an overview, see Bolger, Davis & Rafaeli, 2003; Sheble & Wildemuth, 2009). Diaries have been used as a self-standing way of gathering data (Furness & Garrud, 2010; Verbrugge, 1980) or in combination with other methods, such as interviews (Bornat & Bytheway, 2012; Williamson, Lemming, Lyttle, Johnson, 2015) and focus groups (Couldry, Livingstone, Markham, 2010; Meth, 2004). In short, diary methodology is an umbrella term for a range of research tools – both qualitative and quantitative – that are employed for continuous data collection throughout a period of time.

A brief presentation of varied empirical designs is helpful for illustrating what diary methodology encapsulates in practice. On the one hand, researchers interested in participants' priorities and voices are best served by open-ended, qualitative diaries. For example, Paula Meth, who studies everyday experiences in the Global South, conducted a study of experiences of violence with underprivileged women in Durban, South Africa (2003). She used open-ended

diaries for a period of one month, in which her participants reported when, whom, how, and what women were scared of. Unrestrictive guidelines, informed by her feminist stance, allowed Meth to solicit intimate accounts of witnessing and/or experiencing, rape, murder, and arson, as recorded in the participants' own words. Similar designs were used by researchers exploring women's experiences undergoing breast cancer treatment (Gonzalez & Lengacher, 2007), living with chronic illness (Bernays, Rhodes & Jankovic Terzic, 2014), and everyday experiences of sexuality (Kenten, 2010).

On the other hand, researchers interested in the frequency of behaviours, levels of pain, or mood changes throughout time are better served by semi- or fully-structured designs. For example, Kathryn Waddington, a psychologist who studies emotion, conducted a multi-methodological study (2005) that included event-contingent diaries (closed- and open-ended questions). By employing this design, Waddington was able to capture 273 instances of gossip, evaluate their durations, and estimate an average number of "gossipers", while simultaneously gathering personal qualitative insights into how gossiping was experienced. This strategy helped to shed light on the complex nature of gossip's functions in the work environment. Clayton and Torne (2000) used a similar design in their study of maternity care experiences.

Finally, structured diaries (especially popular in psychology and health studies) are useful for researchers seeking insights through the frequencies of occurrences, statistical modelling, and interrelationships between two quantified variables; they are especially useful for studying intra- and inter-personal variations and change through time (Wickham & Knee, 2013). For example, a team of researchers conducted a structured pictorial diary study in Tanzania and Gambia for a period of 12 months. They used a drawn taxonomy of domestic spending that was set against the local currency to establish household spending patterns (Wiseman, Conteh & Matovu, 2005).

Alternatively, Schwebel and colleagues (2002) ran an accident diary study for children, and Sorensen (1991) conducted a study of stress buffers for adolescents (both categorized qualitative entries post-collection). Frequency data was useful for understanding children's accidents and adaptation strategies in light of gender differences and, in the case of Sorensen, facilitated the development of a taxonomy of stress buffers.

### *Benefits and Drawbacks of Diaries*

There are multiple advantages of using solicited diaries in research. First, the absence of a researcher at the time of completion creates an opportunity for participants to express themselves in a less constrained manner. This absence enhances participants' control of their own narrative, levels of disclosure, and the pace at which they want to proceed. In addition, it gives participants control over priority-setting and modes of self-expression (Bartlett, 2012). For example, participants can recount traumatic experiences (Meth, 2003) without the tension, shyness, or embarrassment that the presence of a researcher might have engendered. Alternatively, participants can more easily engage in non-socially acceptable disclosures, such as narratives of hopelessness of people living with HIV (Bernays et al., 2014) or lack of support for cancer patients from families (Gonzalez & Lengacher, 2007).

Second, diaries allow access to unobservable events and routinized behaviours (e.g. reflexivity, emotions, routinized actions) and to spaces where observation would not be possible or ethical (e.g. sleep, sexual habits) (Bartlett, 2015; Elliott, 1997; Harvey, 2011; Kenten, 2010; Paolisso & Hames, 2012; Stopka, Springer, Khoshnood, Shaw & Singer, 2004). These internal states and thoughts, as well as a range of behaviours that are difficult to observe, inform selfhood and identity in everyday life. Third, the continuous, organic, and in-the-moment nature of diary writing is a unique benefit of diary methodology. Therefore, unlike other tools – including those

that aim to gather data through time, such as repeated surveys or interviews – diaries are capable of capturing thoughts and reflections about processes evolving over time as they are occurring. Thus, diaries lend a unique vantage point to researchers exploring processes (e.g. transition through life stages, learning phases, moving in and out of different states) or time-dependent cycles (e.g. spending cycles or illness) (Wiseman et al., 2005). Furthermore, this chapter illustrates that the tool's ever-increasing relevance stems from its ability to capture unique insights about data practices in everyday life.

The main limitation of the diary methodology is its burdensome nature (Filep, Turner, Eidse, Thompson-Fawcett, & Fitzsimons, 2018). From a participant standpoint, diaries are onerous because they require time, resources, and commitment, and rely on self-motivation and self-discipline for completion (Alaszewski, 2006; Sheble & Wildemuth, 2009). From a researcher's point of view, costs are incurred from data digitalization and transcription needs, as well as data cleaning and management. In addition, the intensive nature of inquiry might make it difficult to recruit and retain the diarists (Johnson & Bytheway, 2001; Toms & Duff, 2002). Another limitation is the skills required for participation (e.g. literacy, ability to construct a narrative) and the potential bias associated with self-selection (Corti, 1993). However, given recent technological developments, issues of literacy can be addressed by employing audio, video, or photo diaries (Bartlett & Milligan, 2015). Issues of data hoarding, falsification, and non-compliance can also be partially addressed with the help of technology. The final limitation of solicited diaries is that they are always written for a specific audience (e.g. researchers, medical doctors) (Elliot, 1997); therefore, diaries are selective and not immune to self-editing, censorship, and positive self-presentation (Harvey, 2011; Kenten, 2010). Recent studies,

however, have capitalized on the performative element of diaries and used it to add analytical value to their findings (Couldry, Livingstone & Markham, 2010; Latham, 2003).

The established methodological literature and recent proliferation of diary studies (for example, see Hyers, 2018 for citation graphs in sociology and psychology) fuel methodological debates about solicited diaries as a research tool. Nevertheless, even the up-to-date literature exposes some critical gaps. Drawing on the methodological literature and lessons learned from implementation of this study, Chapter 9, offering a discussion and conclusions, suggests procedures that would enhance rigour in the implementation of diary procedures and data analysis.

#### *Methodological Rationale & Conceptual Requirements for Diaries*

Answering the research question of the study required a tool capable of generating rich data, stimulating iterative engagement, and promoting self-disclosure. Those needs made solicited diaries – specifically open-ended, unstructured diaries – a well-fitting technique for data collection. First, diary-writing enables a non-linear and minimally constrained introspection and self-expression (e.g. using non-textual materials, participant-set priorities, voices, expressions) (Meth, 2003; Sheble & Wildemuth, 2009). Second, given their temporal nature, diaries are well positioned to capture how thoughts and processes changed over time. Third, diaries can subject routinized behaviours to scrutiny (e.g. interactions with data and devices) that otherwise remain unilluminated.

This diary design aimed to aid theory-building efforts by generating a unique dataset.

Alternative research tools potentially suitable for the purpose of the study include participant observation and ethnography. Both of those tools generate a rich set of qualitative, longitudinal data needed for answering the research question. Yet, both such tools would only



illuminate observable dimensions of self-tracking practices – types and frequencies of interaction with devices, data analysis practices, and social elements of tracking.

Given that diaries are a time- and resource- intensive method of data collection, striking a balance in design was vital for ensuring its successful use in the study by minimizing the burden of participation and safeguarding from high attrition rate, while maximizing the quality and richness of data collected. The specifics of the diary format and implementation used for this study is explored in the Descriptive Section of this chapter and the methodological appendices. The next sub-section explores methodological rationales for in-depth interviews and their combination with diaries.

### **Qualitative Interviews: Literature & Rationale**

Qualitative interviewing has a long history of use in scientific research. The tool has undergone both paradigmatic and pragmatic shifts, moving away from being a variant of surveys to becoming a self-standing methodology grounded in traditions opposing positivism (Platt, 2012). The methodological literature on the typology of the interviews, implementation, and analysis is vast (for a comprehensive review and practical guidance, see Gubrium, Holstein, Marvasti & McKinney, 2012; Kvale, 1996; Maxwell, 1992). Researchers have devised multiple taxonomies for classifying interviews as data-gathering tools. Those typologies include classification by structure (from structured to open-ended); modes of delivery (see Deacon, Pickering, Golding & Murdock, 2007); conceptual purpose (e.g. ethnographic, topical, life histories; Rubin & Rubin, 2012); audiences (children, elite, vulnerable populations; see Kvale, 2007); and the number of co-present individuals and their nature (episodic versus longitudinal). More specifically for the goals of this study, interviews are already widely and successfully

employed for eliciting insights about self-tracking (Li, Dey & Forlizzi, 2011; Nafus & Sherman, 2014).

The main assumption of interviews is that participants are active meaning-making agents, capable of articulating feelings, thoughts, and priorities (Gubrium & Holstein, 2012). Therefore, their main strength is that it enables researchers to explore a range of divergent accounts and experiences (Neuman & Robson, 2012; Warren, 2002) and explore meaning-making, beliefs, and feelings (Arksey & Knight, 1999). In terms of limitations, interviews are resource-intensive, skill-dependent, have low ecological validity, and discriminate against less articulate, shy participants, and those with non-native language skills.

#### *Methodological Rationale & Conceptual Requirements for Interviews*

The conceptual demands of the study required a tool that promoted rapport- and trust-building with the participants for the subsequent stages of the research and that would be best able to capture the meaning-making processes of the self-quantifiers, making interviews a fitting choice for the study. First, interviews are well suited for “learning the meaning that the participants hold about the problem or an issue” (Creswell, 2009, p.175). Thus, in this study, the interviews would be helpful for inquiring about personal and data routines, motivation to engage in tracking, probing into personal opinions and amassing a range of perspectives and beliefs couched in personal experiences and everyday life, as well as for illuminating meaning-making about self-quantification practice. Second, interviews allow researchers to capture participants’ voices and the ways in which they speak about a phenomenon (Neuman & Robson, 2012). This is vital for illuminating how people relate to their trackers and their data. Third, interviews are a flexible tool that can accommodate different entry points into a discussion (which is likely to differ for all participants). Flexibility of the tool is especially helpful when unexpected or new

materials surface, leading to further probing and enrichment of data. Finally, interviews are beneficial for seeking clarifications and elaboration on points made in diary accounts.

The obvious alternative for collecting rich qualitative data was focus groups. However, the study focused on individual thoughts and opinions, rather than opinion formation or the social dynamic of a group (Fontana & Frey, 2005; Wilkinson, 2004), making interviews the preferred tool. In addition, this study delves into potentially sensitive health issues that might raise concerns around intimacy and confidentiality in a group setting. Interviews have their shortcomings, however. Given the sampling frame of the study, interviews were expensive to conduct, and the quality of the data can be expected to be uneven; however, the extended time for fieldwork and flexibility in implementation allowed us to minimize those disadvantages.

In practical terms, the semi-structured interviews were both entry and exit discussions, as such a structure ensured systematic collection of data without hindering personalization. In addition, the flexibility required the building of trusting relationships with participants. Further particulars, including dimensions of questions and structure, are discussed in the Descriptive section of this chapter.

### **Rationale for Complimentary Methodological Combination**

As previously discussed, answering the research question calls for both personal reflections over time and direct questioning and probing of the participants – and thus a multi-methodological research design. In order to generate a rich dataset, the tools have to be combined in such a way that amplifies their respective strengths and minimizes their weaknesses. The underlying rationale for combining the two qualitative methods is “complementary design” (Greene, Caracelli & Graham, 1989), as opposed to triangulation, expansion, initiation, or development designs. Complementary combination seeks to use findings from one method to

elaborate, enhance, or expand the conclusions from another method. Complementary design is most effective when two methods are implemented interactively and build upon one another (Greene et al, 1989; Hammond, 2005). An iterative implementation approach was carried out in both the data collection and analysis stages. In terms of data collection, the process was staggered (Creswell, 2009) as an interview-diary-interview structure, where each stage informed the one that followed. For example, the entry interview was used to set up the diary writing, and findings from both the entry interview and the diary were used to guide the exit interview.

The data collected with each of the two methods was treated as equal and subjected to the same type of analysis. First, each of the methods provided a unique, yet complementary, angle to explore the reflexivity processes of the participants in relation to their self-tracking practices. Second, it was not possible to know in advance which of the two methods would yield richer data, as previous studies illustrated that participant insight varies in the manner of reporting and in the specificity of details provided across methods (Hislop, Arber, Meadows & Venn, 2005; Milligan, Bingley & Gatrell, 2005). Third, because of the sensitive nature of the study, there was a possibility that some issues would be addressed more in the diaries than the interviews, as had happened in the study of the HIV participants who were willing to engage in socially inappropriate self-talk while presenting brave faces in the interviews (Bernays et al., 2014). Finally, the diaries provided access to longitudinal data that could only be partially captured by the double layer of interviewing. In sum, the iterative implementation of this methodological combination assured that the two data streams advance each other's insights and produce a rich dataset. The next section outlines practical details of the study materials, procedures, and data analysis.

## Descriptive Details: Data Collection, Study Procedures, and Analysis Strategy

The goal of this section is to present an account of the design decisions made and to detail the data collection and analysis procedures. The sub-sections below elaborate on core methodological choices in chronological order.

Methodological literature stresses the importance of pre-testing of the research design and protocols. This is especially significant when diaries are part of the research design (Corti, 1993), as underlying issues are likely to be compounded over time, and the resource- and time-intensive nature of diaries makes these more challenging to address after the data collection is under way. Streamlining of the interview guides was also vital in order to ensure that the narrative line of interviews is preserved, but flexibility of implementation remains unhindered (i.e. subgroups of questions can be asked in order of relevance, depending on the material covered in each personal diary). The design was pre-tested twice. The initial pilot focused on diary-delivery platform selection and testing. The second, proof-of-concept, pilot focused on streamlining and evaluation of the study's materials and procedures. Six participants were recruited to take part in the trial run of the study. The pilot took place between 4 October and 23 November 2016. During the pilot, minor changes to the study design were introduced. The interview guides were refined for coherence (questions were organized in sub-sets and re-ordered). For the diaries, writing prompts were shortened and simplified. The data analysis strategy was piloted and used in preparation of the analytical framework to be used on the corpus of data. The pilot did not necessitate any major conceptual or methodological changes, and therefore the data from the pilot was reanalysed upon study completion and included in the main dataset. Given the conceptual demands of the study, transcription and data analysis preceded

each new stage of the study for every participant. The data analysis strategy was piloted and implemented on the whole corpus of the data.

## **Data Collection Procedures**

### *Sampling*

The goal of the study was to understand how self-tracking contributes to individuals' sense of self via introspection and reflexivity. Thus, it was critical to recruit participants with a range of experience and diverse insights about their self-quantification practices. To meet this objective, a criteria-based purposive sampling strategy was used. This non-random sampling strategy is partially driven by a set of criteria which were predetermined, yet flexible enough to accommodate changes occurring during the fieldwork (Mason, 2002; Patton, 2002).

The existing literature on self-tracking indicates that individuals engage in self-tracking for different purposes, for varied periods of time, and with different levels of motivation. A comparison along standardized socio-demographic characteristics (i.e. age, gender, geography, education) might have been informative (Flick, 2007), but would not have fully served the needs of the study. The analysis of data from the pilot crystallized the main conceptual sampling criteria as “a type of user”. Based on the existing literature, four core user types of interest for the study were identified: (1) casual users; (2) professional/semi-professional athletes; (3) individuals living with chronic health conditions; and (4) medical professionals. No additional restraints on age, gender, or socio-economic status were imposed, but the overall sampling strategy strove for a diversity of individual characteristics.

The principal and biggest sub-group of the sample is “casual users” – those individuals who engage in self-tracking for no other reason than the activity itself. They have personal goals and motivations, but the practice does not constitute a necessary feature for their sense of identity

or everyday functioning. Within this core subgroup, the sample aimed to achieve maximum variation among the participants (e.g. age, duration, sex, motivation), because this would best capture a wide range of experiences of selfhood construction (Miles & Huberman, 1994). Identifying similarities, overlaps, and shared experiences enabled conceptualization of self-tracking as a phenomenon across dimensions of privacy, culture, reflexivity, and ethics. The other types of users were selected for sampling because it was hypothesized that they would provide diverse accounts of reflexive practices. For example, for athletes, data and self-observation constitute an integral part of their professional identity (i.e. frequently aided by professionals) as well as their personal reflexivity. Individuals living with chronic health conditions might experience self-quantification differently because of the need to monitor themselves as part of their medical regimens. Finally, medical professionals are doubly positioned in the data environment both as individuals, who collect their own data, and as professionals who are making vital decisions about others based on their medical data. This duality might create interesting, potentially conflicting views on self-quantification.

The minimum number<sup>5</sup> of participants to recruit was set at twenty, and the recruitment was set to continue until it was no longer useful to include new people because of the limitation of resources or because the new insights became scant. The “hard” limitation on the sampling strategy was that participants had to reside in England, in order to ensure that the researcher could meet with them in person for two rounds of interviews, and that they have been engaged in any form of digital tracking of any aspects of their health and wellbeing. During the fieldwork, face-to-face meetings with each participant proved to be unfeasible, and therefore some of the interviews took place via Skype and telephone. In addition, two participants resided outside

---

<sup>5</sup> No “desirable” number of participants was set prior to initiation, as longitudinal methodologies make recruitment and retention of participants more unpredictable and challenging compared to their cross-sectional equivalents.

England, but were invited to take part in the study because of the unique nature of their personal experiences.

### *Ethics, Recruitment, and Replacement of Discontinued Participants*

The study's focus on potentially sensitive health issues and engagement with human participants required an ethics approval from the university. All participant-facing forms and the study's procedures were reviewed and approved by the Department of Media and Communications prior to the start of the study. The participants were treated in accordance with the four main ethical principles of autonomy, beneficence, non-maleficence, and justice (Kent, 2000). To that end, all participant-facing materials (e.g. recruitment poster, study brochure, follow-up emails) stressed the voluntary nature of participation, outlined the study's procedures as transparently as possible, included a discontinuation clause, presented information about potential harms, highlighted the reward system for participation, and offered to share the findings with the participants (Deacon et al., 2007; Miles & Huberman, 1994; Neuman & Robinson, 2012). Furthermore, to ensure mutual trust, all data storage, access, and analysis procedures were outlined in the informed consent forms (Miles & Huberman, 1994).



The participant recruitment poster (see right, and also Appendix 3 for a full resolution image) was tailor-made by the university's Design Unit in accordance with the researcher's guidelines (e.g. include aim, procedures, contact information). Online forums, social media platforms, word-of-mouth, and physical posters were used to recruit the participants. To reach participants with medical expertise, NHS forums frequented by medical professionals were used.

Longitudinal studies present unique challenges and are time-intensive for both researchers and participants. Therefore, to ensure rigour in the data collection, special steps were taken. First, a staggered data-gathering schedule was used, with up to five participants engaging in the same stage of study at the same time. This enabled continuous – but flexible – recruitment and prevented the researcher from becoming overwhelmed. Second, a standardized protocol for replacement and data use from informants who discontinued their participation was established. For each participant who dropped out, a replacement participant, either with similar characteristics or with characteristics that could further enhance the diversity of the sample, was recruited. The data from the individuals who discontinued their participation would be used for analysis, unless a former participant requested otherwise.<sup>6</sup>



**Figure 1: Recruitment poster used to attract participants to take part in the study**

<sup>6</sup> n.b. due to limitation of time and resources, the data of only three participants who dropped out was used, as their insights made unique points not covered by other participants.

## Study Procedures: Diary & Interview Guides

### *Entry Interviews*

The protocols for each research stage were developed in accordance with their individual methodological and conceptual aims. The entry interviews were the first point of contact between the researcher and the participants. The main aim of the entry interview was to gather contextual information about each participant, their tracking preferences, motivations, and habits, as well as to initiate a discussion about broader issues related to quantification. The interview's core methodological aims were to build a trusting mutual relationship and to provide diary training. To meet those objectives, a four-part, semi-structured guide was employed (see Appendix 4 for details). The guide includes a narrative probe, four sets of questions, a free association exercise, and a diary-requirements discussion and software training. All interviews were recorded using a digital voice recorder.

Each interview started with an icebreaker and a detailed explanation of the study procedures (including completion of informed consent forms and socio-demographic surveys, both in Appendices 5-6). The entry interview was quasi-narrative in structure, as the first part was driven by a narrative probe,<sup>7</sup> formulated as follows:

*Can you please tell me about the role of health in your life from your childhood until now? You can tell me anything you think relevant: things about diet, why you decided to track, what health looks like for you (any personalized points from initial conversation, email communication, and prior to interview communication were used to build rapport further)*

---

<sup>7</sup> The original probe used in the proof-of-concept pilot included the phrase “the role of *health and body*...”, as tracking those two dimensions are directly connected to self-quantification. However, the participants of the pilot struggled to produce a single narrative around the probe, either veering between the two strands in their narratives or talking about the two parts in turn. Thus, it became clear that the initial conceptualization of health and body as a single point of departure is double-barrelled. Since the main point of interest is self-tracking for fitness and health, the body section of the probe was removed and included via layered questions. When the concept of body or body relations came up in a narrative, it was explored with focused follow-up questions.

The narrative part of the entry interview was followed by probing questions about various aspects of the participant’s life. Those were broadly divided in the interview guide into four parts: *You as a Person* (e.g. health history, current activities); *You and Others* (e.g. current health influences, wider social circle); *Your Routines* (e.g. exercising, diet, health literacy, health goals); and *You and Self-Tracking*. The final section focused directly on self-quantification: apps and devices, motivation for adoption of tracking, tracking history, and how participants interacted with their data and devices. Together, responses to questions in those four parts painted a detailed picture of each participant’s reasons for tracking and his or her routines – how tracking fitted into the wider narrative of their life, the reason for their initial interest, the kind of health dimensions tracked, and their attitudes towards self-quantification.

**Figure 3: Free Associations Exercise Template**

The interview also included a free-association exercise. The participants were asked to think of four things or ideas they associate with the term “self-tracking” and to draw or write out their thoughts on the exercise sheet provided (see Appendix 7; on the left an empty template; on the right an example as filled out by a participant). Each of the associations was then discussed in turn. Typically, the free-association exercises

are buttressed by the psychoanalytic tradition and have been used in research for unravelling unconscious connections, anxieties, and participant-centred framing of the phenomena under study (Holloway & Jefferson, 2009). However, in this study, the tool,

**Figure 2: Free Associations Exercise filled out by a participant**

but not its underlining theoretical paradigm, was adopted. Employed paradigm-agnostically, the exercise was used: 1) to brainstorm discussion points that had not been covered by the interview guide; and 2) to safeguard thematic analysis of data that followed from imposition of findings by questioning.

Existing literature indicates that a clear protocol, as well as participant training, impacts the quality of data generated by the diary phase of a study (Iida, Short, Laurenceay & Bolger, 2012; Stone, Shiffman, Schwartz, Broderick & Hufford, 2003). Therefore, the final part of the entry interview was dedicated to diary platform training and discussion. Diary procedures, schedules, and expectations were reviewed, stressing the open-ended nature of reflections. To alleviate anxiety associated with participation in research, the informants were assured that writing style, grammar, spelling, and tone would not be evaluated and that their contribution, however large or small, would be valued.

#### *Implementation Details for Solicited Diaries*

The conceptual goal and the privacy requirement of solicited diaries shaped their format and the mode of delivery. Since the diary aimed to collect rich, diverse, and unguided reflections about self-tracking as a phenomenon, the researcher's guidelines were kept to a minimum. The participants were given the following instructions:

In the space below please write *anything you find relevant, important, or interesting about your experiences with self-tracking*. There are no right or wrong answers. If you would like to make multiple entries about the same day please use *the same box* [...].

The participants were asked to write as much or as little as they liked. In order to decrease the participation burden and accommodate different levels of interest in the study and different reflexive styles, the minimum required number of entries was set at once a week. At the

beginning of each of four weeks, participants received an empty, seven-day, digital notebook (see Appendix 8 for layout and instructions; the layout is also illustrated in Figure 5, above) via a personalized web link delivered to their email inboxes. Existing

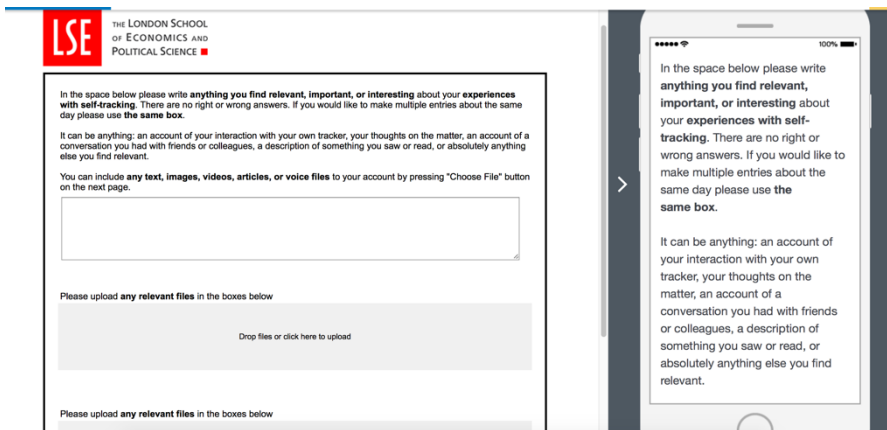


Figure 4: A diary template for computer and mobile screens

literature indicates that participants have varied preferences for recording their reflections (Couldry, Livingstone & Markham, 2010), and since self-tracking is a sensory experience that generates artefacts as part of the tracking process, the participants were encouraged to attach files that moved beyond text. Each of the daily entries consisted of a free-text entry textbox and two “attach files” buttons (i.e. for files in video, photo, audio, or text attachment formats). Each participant also received a “test” diary in order to familiarise themselves with the digital environment prior to the start of the study. Personal entries were submitted digitally at the end of each seven-day period.

The diary’s objective was to capture reflections and not to log daily events (i.e. a feature frequently employed by researchers to reduce recall bias); therefore, giving a more stringent writing requirement would potentially result in an undue burden without enhancing the quality of the data. At the start of the diary period, all participants received a list of possible discussion

starting points (see Appendix 9). However, the prompts list stressed that these were just suggestions, not guiding questions.

The study touches on potentially sensitive issues of illness and wellness, and earlier diary studies have reported that potential harm might come to participants if their privacy was violated. For example, Meth (2003) reported how one participant was endangered by an abusive partner who discovered her diary. Similar issues were discussed by Wiseman, Conteh, and Matovu (2005) in their diary study of expenditure by polygamous households. Therefore, it was necessary to ensure the participants' privacy would be protected both from data mining (e.g. emails) and unintended access by others (e.g. pen-and-paper). Consequently, a survey platform – *Qualtrics*<sup>8</sup> – was used to implement the diary portion of the study. The platform offered the following privacy safeguards: the data was stored on the university's servers; and access was possible only via an individualized link delivered to participants' personal inboxes. The platform also offered other benefits: non-textual modes of entry; automated reminders; and easy data export procedures. It was also shown to be user-friendly by the pilot, was adapted to be used across devices, and was free to use. Given the conceptual need of the study to capture personal multi-modal reflections, and in light of the budget constraints for the study's implementation, the platform was judged to be an optimal tool.

#### Diary: Data Management and Participant Communication

The piloting of the diary procedures revealed two issues that needed to be addressed: data management and participant communication. Diary design was challenging to implement because the tool amassed a large volume of unstructured data that needed to be monitored, managed, and cleaned prior to the analysis. In order to meet that challenge, systematic data

---

<sup>8</sup> N.B. Although GDPR recommendations had not come into force at the time of the study, the platform is GDPR-compliant

labelling, weekly data collection check-ins, and concurrent data cleaning were introduced after the pilot. The participants were also asked to return their diaries weekly. Upon submission, a new link to the following week's diary notebook was sent to the participant. Staggered weekly notebook release helped to make data collection manageable, minimizing backfilling and empty submissions, as well as helping to anticipate issues before they developed (e.g. some participants asked to pause and resume diary writing due to unexpected circumstances).

Methodological literature stresses the importance of trust and communication for enhancing the quality of diary data, ensuring continuous participation, and keeping the core theme of the study in focus (Shelbe & Wildemuth, 2009; Woll, 2013). The pilot revealed that participants had different communication and diary-writing preferences. Some liked to be nudged with writing reminders, while others did not. Therefore, an individualized reminder schedule (with customized numbers of reminders per week or day, and custom times of each reminder) was prepared for each participant at the entry interview stage. The email reminders (see Appendix 10 for an example) were delivered via email, between 0 and 3 times per week, and asked participants to consider whether they had anything to share and included a link to the diary to ease their access. The participants were also encouraged to ask questions or raise concerns. Communication protocols contributed to a low attrition rate in this study.

### *Exit Interview*

The final stage of data collection consisted of exit interviews, which were employed to deepen the insights about data and self-tracking practices and to ground the findings in the wider social context. In order to accomplish their function, the exit interviews were divided into two parts, with personalized and semi-structured questions, respectively.

The first part of the interview was personalized and based on questions arising from diaries and entries, with probes for additional information and clarifications. For example, in the realm of personalized questioning, if a participant discussed a new type of device in her diary, the exit interview included targeted questions to learn more about it, or if a participant included a multimedia piece without commentary, she was asked for her reasoning for attaching the materials. The questions were structured with a reference point to a specific instance raised in the diary or during the first interview and a probe for further comments or clarification. As such, the participants elaborated on incidents they mentioned, recounted feelings reported in their diary, discussed non-textual materials, and provided additional reflections.

The second part of the interviews was semi-structured, with questions derived from the literature on which the conceptual framework was designed. The interview guide contained interpreting and probing questions to develop insights from the diary data; specifying questions were used to follow-up on meaningful, but not fully developed discussions; and structuring questions were used to transition between different sections of the interview (Neuman & Robson, 2012). The interview schedule (see Appendix 11) consisted of six sub-sections resembling dimensions of the conceptual framework: social and cultural; reflexivity; normative; material; motivation; and historic dimensions of tracking, respectively. The exit interview also included future-oriented questions about perceived social implications of tracking, possible risks associated with data and data privacy regulations, and benefits of self-tracking and health data for research and healthcare. An effort was made to deepen insights on particular topics, rather than preserving the ordering and internal structure of the interview guide's sections.

Finally, in order to identify potential points of improvement in the methodological design and become sensitized to the potential points of failure, at the beginning of each exit interview,



the participants were asked to reflect on their diary-writing experience and provide recommendations for what they would change. The question addressed both the conceptual and technical dimensions of the design. The participants were asked to comment on the overall diary experience, their favourite and least favourite part of diary-keeping, and how they found the digital platform (for further discussion, see the Evaluative section of this chapter). The interview concluded with a debrief of their participation in the study.

### **Data Analysis: Original Rationale & Conceptual Links**

The main objective of the study is to explore how self-quantification contributes to our sense of self via personal introspection and reflection. To that end, a data analysis strategy that helps tackle the intricacies of the analysis of reflexive thought was designed. The core analytical strategy of thematic analysis was supplemented by a metaphor analysis, sentiment analysis, and the parallel use of qualitative longitudinal, quantitative content, narrative, and discourse, and non-textual material analyses. The original analytical strategy used in the proof-of-concept analysis – a combination of narrative, thematic, and critical discourse analysis – was not able to fully advance the links between the conceptual and methodological frameworks of the study. As the data was accumulated and thematically analysed, new demands on the types of analysis became obvious (e.g. frequent mention of emotions, participants changing their minds on an issue), necessitating adjustment of the analytical strategies. Each specific analytical strategy was used on the whole corpus of data to meet specific objectives, dictated either by the data collected or by the predetermined objectives of the study. An analytical rationale is followed by a discussion of how analysis was implemented in practice. It is vital to note, that in presentation of analysis, throughout the dissertation participants' quotes are presented with emphasis (in italics)

on specific words and phrases; this choice was made to highlight the section of quotations that were of particular significance to the development of arguments and the narrative.

The core analytical technique necessitated by the goal of the study, the volume of the data, and the diversity of topics covered is thematic analysis. Performing thematic analysis enabled ordering and reduction of data, identification of the dominant themes and sub-themes, and a broad-strokes description of self-tracking as a phenomenon (Braun & Clarke, 2006; Fereday & Muir-Cochrane, 2006; Joffe, 2012; Lapadat, 2012). These included recurring ideas and reflections, points of disagreement, and divergent and convergent experiences typical for different sub-sets of participants. For example, thematic analysis enabled determination of self-tracking's salient features, its main functions, and the benefits and annoyances that are relevant to the participants. Basic manifest quantitative content analysis was at times used to complement thematic analysis. Content analysis was primarily used as a descriptive tool and relied on counting a number of instances a term or an item occurred in the corpus of data (Deacon et al, 2007; Riffe, Lacy & Fico, 1998). For example, content analysis helped to establish predominant cultural references and the number of participants who shared an opinion on a particular issue.

Techniques of narrative analysis were used for gaining insights into individual self-trackers' experiences through the stories told about themselves during the research. Narrative analysis was deployed to bring out the social, cultural, and material conditions of participants' meaning-making processes, as well as to identify competing normative pulls in their personal stories (Bamberg & Georgakopoulou, 2008; Riessman, 1990, 2000; Roberts & Shenhav, 2014). For example, the discussion in Chapter 7, on informational privacy of self-tracked data illustrates how the professional dimensions of identities – being an athlete, a nurse, a parent – compete with personal dimensions, resulting in conflicting or even contradictory views on the same issue.

Alternatively, in Chapter 8, on the meta-ethics and morality of tracking, narrative analysis helped to illuminate how the demands for specific self-presentation (e.g. see the case study of Aaron, his weight loss, and gained athleticism) might push some self-quantifiers to act in unhealthy ways in their perpetual pursuit of health. Techniques from qualitative longitudinal analysis, as developed by Johnny Saldana (2003; 2016), were used to enhance the narrative analysis. For example, qualitative longitudinal analysis sensitized the researcher to the points of divergence and continuation in personal narratives as they developed through time.

Analytical techniques associated with discourse analysis were used to illuminate ways in which the participants talked about their data and self-tracking practices (Gill, 1996; Fairclough, 2011; van Dijk, 1993; Wodak & Mayer, 2011). The original analytical strategy, designed prior to the data collection, focused on the analysis of issues of power and inequality. However, as the project progressed and data was collected, the analysis was refocused in a linguistic direction to examine how the stories were told. This layer of analysis relies on the premise that linguistic features (words, verbs, genres) are consciously and unconsciously selected and thus deserve critical scrutiny (Fairclough, 2011).

The final empirical chapter of the thesis draws heavily on metaphor analysis in the linguistic and philosophical tradition of George Lakoff and Mark Johnson (1980). The main utility of the metaphor is that it allows us to understand new, complex, or more abstract domains in relation to those that are more familiar or concrete (Hampson, Hicks & Watt, 2017). The main benefit of analysing metaphors is that they are relatively free from the effects of self-representation and are able to uncover individual and collective patterns of thought (Schmitt, 2005). This may be due to the fact that “because communication is based on the same conceptual system that we use in thinking and acting, looking at language is one way that we can find

evidence of what the system is like” (Gatti & Catalano, 2015, p.150). In relation to one of the core concepts of the study – the self – Moser (2000), a prominent German scholar who wrote widely on metaphor analysis, asserts that the term is a strong candidate for metaphor analysis because it is hard to speak about the abstract concept. In practical terms, the corpus of literature was analysed for the presence of metaphors. Metaphors were then classified depending on their comparative domain (religion, accounting, body, machine, obsession, and 13 others). Finally, sentiment analysis was also used in Chapter 8, the final empirical chapter, to explore which emotions dominated and where they were largely absent from the participants’ discourses. In simplistic terms, sentiment analysis relies on counting the frequencies of occurrence of emotions in the corpus of data. A *Tidytex*t package for data analysis in an analytical software titled R was used. After all counts were automatically highlighted, each instance was manually reviewed to ensure that all attributions were correct and those used by the researcher were deleted. To summarize, a combination of analytical strategies was used on the corpus of data dictated by both the conceptual needs of the study and the data itself.

### **In Practice: Overview of Data Analysis**

Dictated by the iterative demands of the study, the processes of data transcription, cleaning, and analysis immediately followed the entry interviews. *NVivo*, a data analysis software, was used to organize the data. In order to manage large volumes of data, individual “cases”<sup>9</sup> containing socio-demographic information, interview transcripts, diary entries, and non-textual material were created for each participant.

A 20-theme coding framework was developed based on the pilot data. The number of themes grew to 27 during the study, owing to the refinement of the categories (for an example

---

<sup>9</sup> i.e. the equivalent of a personal file in *NVivo*.

see Appendix 12 on coding framework). To validate the new coding framework, pilot data was reanalysed after the coding was fully completed. The only core conceptual node (i.e. “data capitalism”) was unaccounted for in the original coding scheme. This indicates that even the initial coding scheme could accommodate most of the data well.

Overall, the nodes can be divided into six categories: substantive (i.e. containing substantive information for the study); methodological (i.e. containing reflections on the procedures and study design); observational (i.e. containing information gathered during the interview); factual (i.e. any kind of data submitted by the participants from their trackers or their health histories); “for close text analysis” (i.e. fragments of text that might be telling if analysed with narrative- or discourse-analytic tools); and “interesting stories” (i.e. unexpected stories from the participants that are likely to inform unexpected conceptual developments). Each node was given a title and a precise description of what was coded under it, in order to increase the trustworthiness of the consistency of coding. For example, a node titled “achieved goal feelings” included the following description: “this node contains any description of how one is feeling when s/he reports achieving a personal tracking goal”.

Some nodes were driven by the interview schedule (deductive), while others were formed directly from a discussion with the participants (inductive). Inductively-formed nodes were derived from information that arose organically in the flow of discussion; for example, “morality of food”, “morality of tracking”, and “feeling & eating”, which were popular points of discussion that were not prompted by specific interview questions. Deductively-derived nodes had their origins in interview questions and were frequently concerned with factual information (e.g. “what I track”, “new practices”, “routines”, “health history”), or driven by the interests of the researcher (e.g. should everybody in society track? Who would benefit most from tracking?).

While the inductive/deductive distinction is not absolute, it helped to safeguard the analysis from “finding” only themes that were presupposed by interview questions, and it opened avenues for unexpected directions of questioning. The next section presents an overview of the data collected to enable the reader to evaluate its depth and quality.

### Evaluative: Data, Procedures, and Participant Experience

The study took place between 16 November 2016 and 20 July 2017. This subsection focuses on the methodological aspects of evaluation only. In total, 50 people (30 women and 20 men; age range 18-67) took part in the study (including 6 participants in the pilot), with 5 dropping out at different phases. The drop-out rate of the study was low (10%), despite the effort- and time-intensive nature of participation. The profile of participants who dropped out did not exhibit a pattern. Two high-powered participants with extreme career commitments, one chronically ill participant, and another two other participants whose reasons for discontinued participation were unknown did not complete the study. Multiple efforts were made to reconnect with each of the participants who had dropped out.

A quarter (22/95) of the interviews took place via Skype or phone (2); the rest were conducted face-to-face. Of the face-to-face interviews, one-third (25) took place at the LSE; the rest took place at the participants’ places of work, coffee shops, homes, and/or hired conference rooms in order to reduce the burden of participation. Interviews (apart from 8 shorter ones due to busy schedules and a single recorder failure) lasted between 37 and 76 minutes. The timeframes exclude briefing, diary training, and debriefing sections, as a conscious decision not to record these for the purposes of generating “off the record” data was made prior to the study. A little under half of the informants were based in London (27), with others residing in major cities

including Bristol, Manchester, Nottingham, Newcastle, Edinburgh,<sup>10</sup> and smaller dwellings in Yorkshire, Cambridgeshire, Oxfordshire, and Hampshire, among others.

The majority of the participants each submitted 4 weeks of diaries, with 9 people submitting diaries for fewer weeks (only 3 people for 2 or 1 week). For diaries, as expected, writing length and style varied greatly among the participants (Elliott, 1997; Couldry, Livingstone & Markham, 2010). The longest diary featured daily entries and amounted to over 10,600 words over a 4-week period; the shortest diary totalled about 100 words per week. Some participants (e.g. Camilla, Vijay) used diaries for logging their activities (i.e. how many steps they took, how long they exercised for), mixed with a brief commentary about their feelings or the overall state of their day. Others (Zoe, Will) used diaries to reflect on their tracking practices, as well as the media and social environment in which their tracking was positioned. Yet others (Margaret, Victoria) used diaries for meta-reflections and intertwined their personal narratives. Two participants expressed a preference for keeping the diary in their own way: one participant kept a pen-and-paper diary,<sup>11</sup> and the other emailed her diary in every week (owing to not finding the platform user-friendly).

The diaries were enriched by the inclusion of non-textual materials including 160 images, as well as links to videos, talks, news, training plans, and snippets of personal tracked data. Those materials (e.g. newspaper clippings, data, personal reports) provided information about environments – gyms, trails, sports competitions, foreign airports, digital spaces – as the background against which the participants engaged in self-tracking and were used to scaffold personal reflections.

---

<sup>10</sup> Two participants resided in Scotland but were recruited for the study because of the salience of their cases.

<sup>11</sup> The participant reported high technical proficiency levels, but did not want to use the software for undisclosed reasons, which the researcher suspects revolved around lack of hardware/Internet access at home.

One of the successes of this methodological design is that it generated rich, detailed qualitative accounts of participants' self-tracking practices that provided insights into the dimensions of the conceptual framework. Another indication of the high quality of the data collected is that the design brought to light themes not previously considered by the conceptual framework. These included conceptually important themes, such as “feelings about data”, “morality of tracking”, and the relationship between “tracking and food”. For example, one of the participants discussed self-tracking from the lens of religion, thus bringing out the idea of tracking as a moral and normative pursuit. Other personal anecdotes detailed the lengths they went to in order to meet their tracking goals. Unanticipated themes in discussions about tracking prompted a refinement of the original analytical framework, thus advancing theory-building and solidifying my conceptualization of tracking as a non-trivial and deeply meaningful pursuit that goes hand-in-hand with anxiety and personal fulfilment. In addition, as hypothesized, the longitudinal nature of the design allowed for analysis of how participants' opinions were formed, changed, contradicted, and abandoned over time, similarly aiding the theory-building effort. For example, in the course of the study, one participant eventually became disillusioned with tracking, and another gave up the practice altogether. Such processes would have not been captured by cross-sectional designs.

### **Evaluation of Procedures & Participation**

For the purposes of evaluation, a set of special nodes was created to capture participants' comments about their involvement in the study. This section is based on those comments, as well the researcher's diary kept during the fieldwork.

As a part of evaluation of the study, the participants discussed the experiences of taking part in research. Overall, the participants' experiences were reported to be overwhelmingly



positive. Some reported that diary-keeping had become a chore; others stated that they enjoyed the experience and that it had made a positive impact on them, such as creating space to open up and heighten their awareness of themselves. For example, one of the participants explains: “[...] *I learned a lot from it myself* and I was able to sort of put into words a lot of things that I was thinking and feeling about myself, so it was a *really interesting experience* [...]” and “[I] found the process of diary writing interesting, as I’ve been able *to reflect more on my experiences in a way that I might not usually be able to*”.

Some participants reported that they had a lot to share either because they were accidentally exposed to or were strategically looking for opportunities to think and talk about tracking. For example, at the beginning of the study, one of the participants was invited to join multiple competitions which he humorously reported in the diary. Another participant expressed concern that she wrote too much, potentially diluting the usefulness of information. During the exit interview, she said: “*I don’t have trouble finding things to say*, some days I think I had too much to say and it was probably too much information and that might not mean a big deal”. On the other hand, some participants reported that they “ran out of steam” by the last week of the study, and felt like they were not “doing good work for you [the researcher]” or that they had little more to contribute at that point. Indeed, one of the reflexive participants concluded his diary as follows: “so the 4 weeks are up. I don’t feel like I have done your study any justice. *All my tracking just happens each day so I don’t really think about it*. It has just formed a part of my daily life”. He then developed his thoughts into an elaborate account of living in a surveillance society. Finally, some participants felt that they were oscillating between different extremes:

Sometimes I felt I didn’t write enough, then I started getting *little bit heavy* with you with some of my thoughts on sort of people who are especially in the club I will tell you yeah people who are growth overweight and people who are starving and there is a lot of thoughts about all of that

Another cluster of participants reported that life events – both the boon and bane of longitudinal studies – including exams, competitions, illnesses, work, and school crunches, prevented them from prioritizing diary writing, regardless of their wish to do so.

As expected from the diary literature, and regardless of my assurances, the style and grammar of the diary were still a concern for participants. One person provided a curious self-observation on how she settled the issue. She stated:

At first I was confused like, should *I be really formal because this is like LSE* or should I be like, you know like, and then I was like, “come on Katie, you are not going to edit this like an essay”, so I just thought it will be better for you to see my self thinking which doesn’t entirely makes sense but do you know what I mean? I just. *It feels really nice to get it all out, but it feels like a real diary, but not really.* It is nice to focus on something, *I have really enjoyed it.*

The quotation above indicated multiples points of tension that participants in diary studies face: worries about personal style; the solicited diary being like a real diary, “but not really”; and the potentiality of exposing thoughts that are not fully formed.

Finally, some issues that arose during the study indicated that taking part in the study might had put an undue burden on the participants. For example, one of the participants who eventually dropped out stated that “I have been hopeless at the diary writing – and I am getting worse as I get more guilty. The guilt of not writing in the diary is far worse than the guilt of not doing enough steps. *In fact each time I look at my watch/ phone data I am reminded that I am not doing the diary...*”. Another concern is about study participation affecting the level of engagement with self-tracking devices. Three participants reported that if it had not been for the study, they would most likely have given up the practice. One of the participants living with a chronic health condition reported:

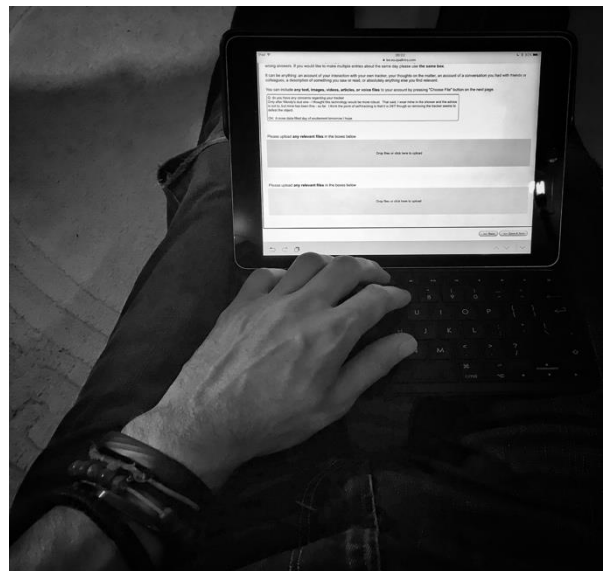
The study has had some *unintended consequences already*: I'm quite sure I probably would not have done much self-tracking had I not had to fill in the diary this week. *This is a cyclical behaviour that comes up every time I'm going*

*through a depressive episode.* Knowing there is an outside observer has pushed me to do it.

In the future, to further alleviate the anxiety of participation, the researchers might want to consider additional communication strategies that continuously reassure the participants that their writing skills are not assessed and that there should not be any guilt or undue burden involved on their part.

#### *Four Lessons Learned*

From a technological standpoint, participants' experiences varied. While some participants reported that it was “all quite straightforward, easy to do”, “pretty easy to pop it in”, and “I did it from my iPad, [...], that is usually you know more difficult, but it was very, very easy”, others, especially those with technical expertise (Carla, John, Roman) believed that the interface was not user-friendly and called the platform “a terribly clunky piece of software”. One of the participants was so frustrated with the platform that she volunteered to design a better piece of software herself.



**Figure 5: A participant filling out his diary (as captured by the participant himself)**

There are two technical issues reported by the participants and identified by the researcher: issues with reviewing their data; the diary's reliance on the Internet; and the lack of systematized routes to provide commentary on non-textual materials. First, the participants pointed out that they were unable to easily review their previous entries. As one of the participants summarized the issue: “it would be nice to see what you have written for the day and take it and update it a bit”. This issue did not come up in the pilot. Indeed, two options, the

“back” button and an interactive calendar (both of which were intended to allow for such review), were enabled from the start of the project. The issue was not raised until later in the study. Upon investigation, it became clear that of the two options, only one allowed the participants to review their data, while the other gave them an extra box to provide additional reflections, but no access to previous entries. This technological hiccough might have potentially constrained the reflexive processes.

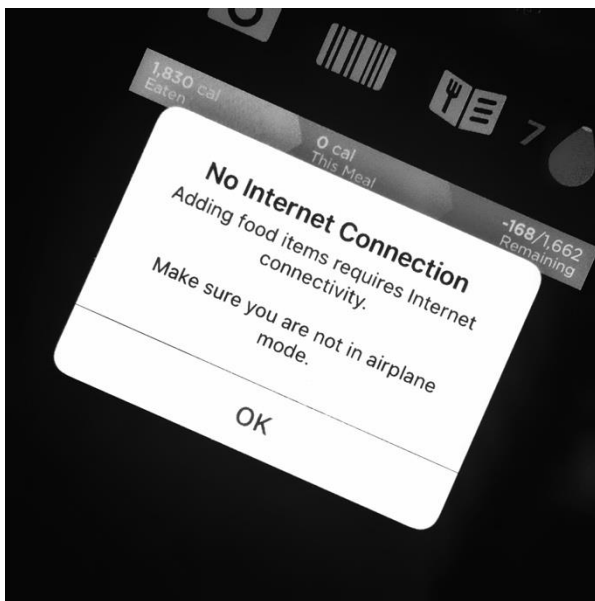


Figure 6: One of the methodological issues in data collection, as captured by one of the participants

Second, the software only worked with an Internet connection. Since most self-quantification practices rely on an Internet connection and a functioning mobile device, the issue of running out of data or not having a reliable Internet connection was not anticipated, but it was raised by participants from underprivileged backgrounds. One participant reported: “I haven’t got internet access at home so I would have to be out somewhere and, on some days, trying to remember what I did on previous days exactly and it is quite

difficult sometimes”. Another captured a similar experience in a picture that he attached to the diary (see Figure 6 above). Other participants who shared accommodation cited hostile social attitudes towards technology at home. This might be indicative of some reflective opportunities being lost. However, it is also telling that even those without a stable Internet connection or available personal hardware still engaged in tracking; they described the allowances they had to make to maintain the practice (see Chapters 5-8).

The participants had only a few comments on the interviewing procedures, probably because it was a face-to-face encounter and a mode more familiar to them.

Such comments were helpful in indicating problematic probes. To illustrate, the term “tensions” was rephrased as “frustrations and rewards”, and a question about “how a healthy body feels” was restated as “on a healthy day” for people living with chronic conditions. From the researcher’s perspective, based on the fieldwork diary, as the study progressed, I gained more confidence as an interviewer. This allowed me to be guided less by the interview schedules and ask questions in a more organic manner.

The issues discussed in the following paragraphs are applicable for future research efforts and contribute to methodological literature on diary studies. Two conceptual issues presented an opportunity to contribute to enhancing the rigour of data collection and analysis procedures of solicited diaries. The first lesson learned is an improvement related to gathering and analysing non-textual materials, and the second contribution is an analytical strategy that incorporates the time dimension of the study explicitly from the conception through data collection to data analysis. In the study, the ability to add non-textual files bore fruitful results and aided individual self-expression, as indicated by both the volume of non-textual materials generated by the diaries and the participants’ comments about them. One of the participants explains: “I mean the *picture uploading thing is really important* because sometimes I will try to record it after running when *I am still breathing heavily and I don't want to write and I just take a picture* and upload it so I think that is actually a convenient one”. Another concluded her reflection during the debriefing period by stating: “I also liked how you let me *put pictures on that was my favourite bit*”.

The discussion of non-textual materials brought out some of the most salient findings (e.g. critical view of commercial discourses, research that participants conduct). However, this

also resulted in one of the major pitfalls of the interview-diary integration and design implementation, as the participants were not asked to comment in a systematic way on the non-textual materials they had included. At the data analysis stage in preparation for the final interview, the researcher only asked questions about images/links if they were pertinent from her perspective. This clearly led to a loss of potentially relevant insights – for example, questions such as why one image was attached over another, why a particular snippet of data mattered more, and how a specific news clipping made its way to the participant’s diary might have been useful for illuminating how the participants prioritize, how they gain health knowledge, and what reflexive processes happen in relation to their media consumption of the topic.

The second lesson that can be learned from the study has to do with the way the longitudinal data collection and analysis of qualitative data are implemented. The longitudinal nature of data collection is often presented as one of the major benefits and driving forces behind the use of the tool (Meth, 2003; Shelbe & Wildemuth, 2009), yet it is common in literature that cross-sectional data analysis is used exclusively on longitudinal data (Jacelon & Imperio, 2005; Milligan et al., 2005; Gonzalez & Lengacher, 2007; Harvey, 2010). This shortcoming cannot be attributed to individual researchers; even the most precisely executed studies often suffer from this shortcoming, but there are also exemplary works that have made use of temporalities exceptionally well (see Broom & Tovey (2008), Furness & Garrud (2010)).

In practice, at the start of the study, a few participants started as tracking enthusiasts, but by the final interview, their optimism about tracking and its usefulness had fizzled, or their position with regards to privacy changed through time in response to global politics and personal experiences. For example, a participant explains: “I think I am *definitely in the different place since we first did this on FitBit*, because I was *genuinely using it still and enjoying it*, but now,

literally it is because I wrote all the diary entries and analyzed it? Like why am I using this? *And now I am not using it so I feel like I am coming at it from a different perspective*". Given the choice of not to intervene during data collection, those transformations through time remained un-reflected upon by the participants. Looking back, it would have been interesting to probe into these changes as they unfolded by asking the participants to reflect further in their diary entries or interview. Furthermore, having an analytical procedure for identifying and analysing such changes beforehand would also enhance the trustworthiness and accuracy of accounts of change.

The ways of addressing the issues of time and non-textual materials are further tackled in Chapter 9 of the dissertation. Such a discussion enables the study to make an original methodological contribution and to further the argument for wider adoption of diaries in social science research with the procedural rigour enhanced.

### **Credibility & Consistency**

Lincoln and Guba (1985) defined four main criteria for ensuring rigour in qualitative research: dependability, transferability, credibility, and confirmability. Creswell and Miller (2000) in turn linked these criteria to empirical procedures and classified them according to their focus (participant, researchers, research community) (2000, p.126). Most of these strategies play a role exclusively during the analysis and presentation of findings, for which they have been criticized by Morse and his colleagues. They argued that "focusing on the strategies to establish trustworthiness at the end of the study, rather than focusing on processes of verification during the study, the investigator runs the risk of missing serious threats to the reliability and validity until it is too late to correct them" (2002, p.14). Therefore, steps were taken to enhance the validity and reliability throughout the study.

To meet the truthfulness (credibility) criteria, 5 safeguarding mechanisms were introduced. First, in order to make sure that participants' thoughts and reflections were presented as they were given, the number of in-text quotations was maximized (Clayton & Thorne, 2000; Creswell & Miller, 2000). Second, accounts that do not fit the general narrative (e.g. participants reporting that tracking does not contribute to their lives) were showcased and discussed. Third, for the purposes of transparency and peer evaluation, extensive appendices include all materials used for the study. Fourth, to establish the trustworthiness of analytical procedures, all analytical decisions are as explicit, detailed, and transparent as possible. Finally, I iteratively modified the sampling and data analysis procedures (adding unexpected themes, taking out conceptual lenses that did not illuminate the data) in order to make sure that the conceptual and methodological frameworks were linked.

To remain rigorous in procedure, Lincoln and Guba's criterion of dependability (i.e. findings are consistent) were combined with Morse and colleagues' (2002) self-corrective mechanisms. First, strict procedural guidelines were developed for each stage of the study (e.g. recruitment, drop-out replacement, transcription). Second, the study was conducted by a single researcher using standardized interview and diary tools. In addition, the interview was transcribed and analysed by a single researcher. Third, all procedures for data collection and analysis were piloted. Fourth, training procedures for diary completion were introduced, and constant communication was maintained with participants to make sure that any issues could be addressed in a timely manner (Stone & Shiffman, 2002).

Confirmability is enhanced by multi-methodological as well as explicit discussion of all of the study procedures. Finally, based on the methodological details and rationales provided,



other researchers can replicate the design (transferability criteria) to generate rich and varied accounts on the topics of their interest.

### **Reflexivity & Positionality**

At the conception of the study, the researcher engaged in critical introspection in order to be more aware of how personal sociocultural “baggage” might shape ways in which the research was conducted (what follows is written in a first-person narrative to avoid awkwardness in reporting of details). For example, I reflected on my attitudes towards self-tracking and my socioeconomic position. I ended up with a portrait of myself as a privileged, health-conscious, white woman with higher education and a family background of health professionals. Taking a number of health-focused courses as a part of my undergraduate degree significantly shaped my personal and research trajectories. I have consciously decided to try out as many apps and devices as possible throughout my PhD in order to understand the participants better, and found the experience to be gratifying. I was surprised to discover my own unawareness of how my self-as-a-person influenced my self-as-a-researcher. This became especially clear when during one of my supervisions, I wondered out loud why anybody would value anything above health. My supervisors gave epistemically different responses that made me aware of my own singular framing of the issue and the importance of reflexive journaling. The reflexive journal included notes on interview settings, participants’ personal comments, and the interview power dynamic; for example, I accidentally upset a participant by praising her commanding presence – a quality I personally admire in women – just to find out that this is an image she is trying to avoid. This record of behaviours and environments that might have affected the research process (Neuman & Robinson, 2012; Probst, 2015) allowed me to produce a more transparent account of the study’s processes.

During the study, I realized that the ability to relate to the participants as individuals made a big difference to the data quality collected. It was easier for me to relate to the participants with whom I shared experiences, who in some regards were like me – young, women, health-conscious, and students. Some of the other interactions felt artificial and unnecessarily formal. This revelation arose from an experience of tension. At multiple points during fieldwork, I felt like a “licensed” voyeur, having “permission” to observe personal pain without being able to help. The tension became especially pronounced when I spoke with people living with chronic conditions, caring for others, or experiencing painful transitions through life stages. For example, I could not keep my composure during an interview with a chronically sick participant, whom I did not recognize upon our second meeting. On another occasion, I did not have the vocabulary to ask questions of a transgendered participant, who helped me out with humour and kindness. Another time I was unable not to cry when one of my participants did as she told a story of her family. When I interviewed two individuals from disadvantaged socioeconomic backgrounds, I experienced a sharp power imbalance. This manifested when one of the participants started an interview with a prepared and rehearsed narrative about himself.

I learned from these experiences, and I will carry them with me throughout my career. Such experiences added an intersubjective dimension to my reflections (Finlay, 2003). Finally, the study was made better by the participants’ questions, which prompted me to summarize the main findings of the study to date and made me reflect on my motivation to self-track and to study the phenomenon.

## Conclusion

This chapter provided an overview of the study design and implementation, the methodological rationales, and an evaluation of the data collected. This chapter also discussed

how the links between the conceptual and methodological frameworks were forged. This chapter argued that the study design was appropriate and rigorous. Finally, the lessons learned from the running of the study provide a fruitful ground for the researchers in the future.

The fit of the methodological design for the purposes of answering the research question was demonstrated by 4 outcomes. First, the high-quality, extensive, and rich corpus of data collected during the study as exemplified by high-quality diary data, almost universal completion of interviews, and a collection of non-textual artefacts. Second, the design helped to uncover dimensions of the practice not accounted for by the original conceptual framework, thus generating genuinely novel insights about the practice. For example, diaries and free-association exercises were especially helpful in eliciting insights that did not have roots in existing studies. To illustrate, these techniques promoted discussion about tracking as an ethical exercise and as emotional experience (see the empirical Chapters 5-8). In addition, similarly to Bernays and colleagues' study of people living with HIV, diaries helped to uncover "ideas beyond normatively acceptable narrative boundaries" (2014, p.638), such as a religious lens on self-quantification.

Third, unlike cross-sectional alternatives, the design allowed us to capture individual reflexive thoughts, to trace their development over time, and to explore how opinions and behaviours in regards to tracking changed. For example, the participants rebuffed points they had made earlier on, or found new insights throughout the course of the study. Finally, the study's success is partially showcased by a low attrition rate and self-reported satisfaction from taking part in the study.

The above points signal the design's (especially the solicited diary tool) unique value for illuminating people's data practices. This argument makes a powerful case for wider adoption of

solicited diaries as a research tool across various fields interested in data and data practices. To facilitate this methodological popularization, some improvements to the implementation and data analysis are required, as even cutting-edge diary studies leave space for methodological improvement. This chapter reviewed lessons that have been learned from implementing the research design. Two points are most vitally for future studies: first, protocols and systematic procedures for elicitation, discussion, and analysis of non-textual materials included in the diaries must be set and tested as part of the data analysis strategy rather than being added *ad hoc*. Second, to enhance rigour in data collection and the quality of data analysis, it is necessary to supplement cross-sectional analytical data strategies, such as thematic analysis, with those that explicitly take into consideration the temporal dimension of the studied processes. At present, with rare exceptions (for excellent examples, see Broom & Tovey. 2008, Furness & Garrud, 2010), the same analytical procedures are applied to diaries as to interviews or focus groups. This inevitably leads to a loss of benefits associated with longitudinal data – a rationale that is frequently used to justify the diary methodology (both of those suggestions are developed in Chapter 9 of the dissertation).

The chapters that follow use the collected dataset to make a number of arguments in relation to self-quantification. The first empirical chapter provides a broad overview of attitudes towards self-quantification and explores what the participants do with their data and devices, as well as values that underlie the practice. The second empirical chapter focuses on what self-quantification means to different participants, how it enables their personal life projects, and how it is practised in everyday life. The third empirical chapter deals with issues of informational privacy, the tensions that privacy-related issues cause for self-trackers, and how attitudes towards

privacy change over time. The final chapter relies on metaphor and sentiment analysis to draw out ethical dimensions of self-quantification as perceived by the trackers.

## Chapter 5 – Self-tracking as Culture: Symbols and Practices of Self-quantifiers

### Introduction

As evidenced by the review of literature, a significant scholarly effort went into exploring cultural aspects of self-quantification for health and wellness. Schematically, existing research falls into two broad trends – exploring how and why self-quantification is practised and experienced by various social groups, such as the Quantified Self movement, the cycling community, women of child-bearing age, or the general public (e.g. Barassi, 2017; Fiore-Gartland & Neff, 2015); and critically examining how commercial discourses and devices’ designs – valorized values, underlying assumptions, frames – are used to promote and position mobile applications and devices for self-quantification (e.g. Crawford, Lingel & Karppi, 2015; Passanante Elman, 2018).

The analytical tool laid out four axes for analysis, examination along which will help to establish how self-quantification shapes our sense of the self. The line of argumentation developed in this chapter focuses on resources – values, symbols, practices, and language – upon which self-shaping in the context of self-quantification relies. The findings buttress the broader point made in this dissertation as they illuminate the critical, reflexive, and agentic capabilities of the self-trackers in relation to their practice in everyday life.

The goal of the chapter is two-fold: 1) to untangle the complex and diverse meanings of self-quantification among participants and to explore how these develop and exist in relation to users’ everyday practices; 2) to sketch a coherent picture of self-tracking as a cultural phenomenon, as well as to build a foundation on which further empirical chapters would be developed. The main argument that the chapter puts forward is as follows: self-quantification for health and wellness is presented and sold to the general public on the grounds of specific cultural

values – more recognizably iterative betterment of the self, self-optimization, empowerment, autonomy, and self-responsibility – and if those values define and circumscribe the culture of tracking, it is likely that such values are internalized and thus would go unscrutinized by the users. Therefore, if this idea holds true, empirical analysis is expected to find: 1) little variation and critical analysis in discussions of symbolic meaning of tracking; and 2) see personal data practices to align in support of achieving the dominant values.

However, as the analysis uncovers, the empirical conclusions challenge the dominant commercial narratives. The analysis shows that self-tracking as cultural practice is dynamic, an arena where contradictory values compete, and are a subject to critical scrutiny by the users. Furthermore, the dominant values promoted in the commercial discourses do not straightforwardly translate into practices in everyday life. As such, cultural values dominating commercial discourses (e.g. repertoires from realms of neoliberal selfhood, healthism, empowerment) are a subject of critical contestation and agentic action.

Analytically, the chapter predominantly relies on thematic, quantitative content and discourse analyses of interviews and diaries, as well as on the analysis of associations from the free associations exercise (see Chapter 4, on methodology). The latter helped to elucidate the discursive frames and symbolic meanings participants use to think about self-tracking (Hollway & Jefferson, 2009; Joffe, 2011). In total, 168 associations were collected and analysed. Less frequent references (commercialization, consumerism, personal brand, nerd culture and technology, navel-gazing, social media platforms, and family) were especially telling, as they highlight the diversity and competing symbolic meanings and framings to which we will return later in the chapter.

The rest of the chapter is divided into two sections – aligning with Sewell’s (1992, 2005) two-fold approach to culture – which focus on symbolic meanings and practices of self-tracking, as well as presenting a comparative analysis. Each of the sub-sections presents empirical findings and contextualizes them within existing scholarship. The discussion and conclusion section summarizes the analytical points made throughout the chapter: self-tracking culture is not neatly bounded, values promoted in commercial discourses are a subject for critical scrutiny from the users, and everyday practices do not easily align with values found in commercial discourses.

### *Symbolic Dimension of Self-tracking*

#### *Media Artefacts and Critical Reflections of the Users*

As previously shown, the commercial discourses that promote self-tracking devices are buttressed by cultural values of self-reliance, empowerment, self-optimization, and self-discipline. Such discourses’ shared promise is the betterment of life and of the self. The interviews and diaries explored cultural aspects of tracking and its underlying values in two ways: 1) by asking to include in diaries any media artefacts about self-quantification the participants found relevant to them and having a discussion about how tracking is presented in contemporary popular culture; and 2) by promoting discussion about semiotic and symbolic meaning of the practice and the participants’ personal understandings of what self-quantification means and represents. To give a concrete example, the participants were asked what kind of people, in their opinion, self-track and what they initially think when observing somebody engaging with their tracking device or mobile application.

At least a quarter of the participants recalled upon questioning or brought up independently a specific piece of news or a media artefact, from both online and offline sources, concerned with self-quantification – including adverts, TV series, magazine article, movies,



recent criminal cases from the news, user scandals, consumer comparison tests, new technology reports, and biographies of self-tracking gurus and inventors. In addition, tracking was contextualized with media materials, such as documentaries and television programmes dealing with issues of diets, healthcare, and lifestyle. The topics of the factual reports and news-like artefacts varied. For example, the participants talked about potential unintended outcomes and unexpected issues surrounding self-tracking devices such as *WeVibe* (see Hern, *The Guardian*, 2017): the high-end Bluetooth-enabled intimate toy collected data about users' body temperatures and setting preferences without users' knowledge and had a number of vulnerabilities that would allow hacking by third parties. Another discussed theme concerned potential uses of tracking devices for the future of the justice system after newspapers covered a court case where a murdered was convicted with the help of data from a *FitBit* device (see Alexander, *The Telegraph*, 2017). The safety of certain devices – in light of news reports of them exploding on people's wrists and causing burns – as well as surveillance at work (i.e. NHS and a big consultancy first rolling out internal trials was covered in the press at the time of the study) and the future of healthcare based on personalization of vitamins and at-home kits for DNA testing were amongst other topics discussed by the participants based on the news stories they had seen or read. Those examples illustrate how self-quantification and wearables are entering the general public's imagination.

Another set of media artefacts was derived from popular culture – books, films, TV series, comic strips, and reality TV – containing equally diverse themes for discussion, ranging from the ethics of using data to limits of and resistance to medical authority. To illustrate, movies such as *The Bourne Identity* (2002) and *Apollo 13* (1995) were used as examples. The plot of the latter revolves around astronauts rebelling against being over-monitored by their doctors.

Netflix's hit adaptation of the dystopian *Black Mirror* (2016) series dramatizes and raises debate about the role of new technologies in social life, and a dystopian comic strip, *Lazarus* (2013), premises the rise of all powerful family-corporations dividing the population into castes and behaving like feudal states, with one family's wealth arising from a growth of gene-altering technology and their ability to alter their own genetics favourably. Emma, who brought up *Lazarus* in her response about the societal impact of tracking, concludes: "[the comic strip] really puts to question what is going to happen, *can we build a human being from information, data*, because it is kind of moves the plot, is about how self-tracking this family *used the genetics to make the best humans*". Rose also positions tracking in the wider narrative she discusses based on the popular TV game-show *Hunted* (2015), with the premise that a group of participants must avoid surveillance and capture to win. She concluded that: "it is all to do with being hunted and tracked, [it is] the way we surveilled in modern society, I suppose". Dawn, in wrapping up her comments regarding a TV series she has been watching, stated: "there is a whole episode where there is two characters competing and somebody runs up and down the stairs, and that made me think 'aha!' *it is permeating into the public and popular consciousness*". Out of the multiple topics discussed by the participants, perhaps the most mentioned in relation to those artefacts was that of surveillance, with at least one-fifth of all participants spontaneously bringing up the dystopian worlds of George Orwell or Aldous Huxley (this theme is further explored in Chapter 7, on privacy). Those narratives not only indicate the sizable symbolic penetration of self-tracking representation into the current media (i.e. many media artefacts were mentioned as relevant and simply described by the participants), but also point to the critical debates already existing in the public imagination. It is worth noting that almost none of the media artefacts that

were mentioned were celebratory – rather, they were subjected to critical analysis. For the purposes of illustration, two examples are especially telling.

First, Nathaniel, who was travelling at the time of the study, attached a picture of a media artefact that he snapped at a UK airport (Figure 1, below) to his diary and reflected upon it during his interview. The picture presents an ad for one of the mainstream wearable trackers that markets itself, in Nathaniel’s words, on the “hollow” promises that made him “chuckle” – more exercise, better sleep, more activity, management of weight, and celebration of life.

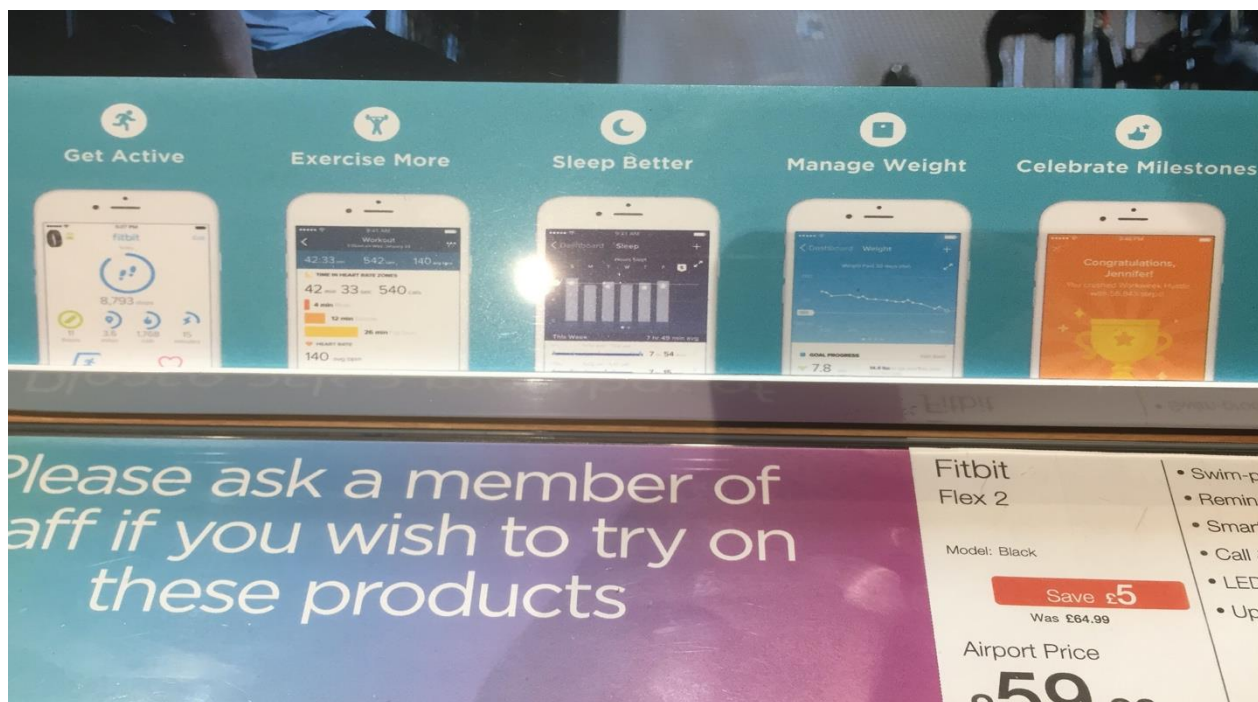


Figure 7: An image of a commercial for a popular consumer device captured by a participant during the time of the study

Nathaniel reflects that he took the picture with the study in mind in order to show “commercial marketing, *just trying to sell it*”, while pointing out that wearing any kind of device would not automatically make you anything, including more active or a better sleeper, but that it would merely record what you are doing or not doing. In a similar vein, multiple participants pointed out that while self-tracking adverts make promises that lack empirical evidence, they also

questioned the potential of long-term engagement with the trackers and challenged the ability of wearables to change behaviour; some were sceptical of “fluff[y]” empirical groundings on which tracking goals are based. For example, even the quality of academic studies on which tracking devices reportedly rely for determining health goals were questioned by the participants – “it was the standard 10,000, but I know there *is no actual science behind the 10,000 steps, it is like one study in Japan*”; and “they have a random 10,000 and it is like don't accept it from one study in Japan from like 50 years ago”.

Second, in her diary, Katie reflected on her experiences with an article she found online:

I found an interesting article online that states "It's best to identify the two stats that are most important, like heart rate or weight, and focus on those. Tracking a more manageable number of factors might help you avoid burnout and stick with the health tracking regimen for longer" and *it made me wonder how the heck the person came up with that theory*. If you have this amazing new tracking watch, why not take full advantage of it? *It also discourages drawing "your own conclusions" which I think is completely wrong. Why can't you explore your health?* It's almost like *the article encourages us to just depend on doctors*. I think it's important for your health to be a combination of your own research and conclusions *\*along\** with your doctors

This quotation focuses on the way some media artefacts suggest specific ways in which data should be used and interpreted. The assumptions made in the article and Katie's reaction to them – “what the heck?”, “completely wrong” – makes the participant's critical reflection visible via questioning and then dismissing the problematic premises of relying on external expertise for interpretation of her data. Similarly, Emma concluded that: “I definitely think that things like for *moods and anxiety should not be a number*”, calling into question quantification's universality and ability to capture the state of how an individual feels.

Overall, commenting on the media artefacts, the participants expressed critical views about the practice and its representation. The respondents were sceptical not only of the obvious

commercial interest of device and platform providers, but expanded their critique to question the scientific backing of self-quantification's promises, and even further into its normative claims.

### Self-tracking as a Social Signifier

The participants' interpretation of media discourses reveals only a part of the overall story about symbolic meaning and self-tracking's cultural values. Further insights come from direct probing of what the practice means for the participants personally. When asked what the devices symbolize and what a participant thinks when she sees somebody wearing a tracker or looking at their tracking app on the street, the symbolic interpretation of self-tracking was again not focused on health and self-betterment. The devices were discussed as being signifiers of wealth – both positive (e.g. luxury) and negative (e.g. waste of money) – and “coolness”, again both positive (e.g. “he [participant's father] definitely wears it to look cool or like young”, status symbol, innovative, up-to-date with gizmos, a fashion statement) and negative (e.g. being too common, vain). Furthermore, the participants' interpretations were frequently conflicting, and tracking's Western-centred and gendered nature was recognized.

For example, one of the participants explained that in the high-pressure environments of his industry, as well as in his country of origin, making time for sports – and indeed, being able to exercise at all – as well as activities one can afford (e.g. gardening or walking) due to limitations of time, space, and infrastructure are linked directly to and are indicative of socio-economic status. Thus, a quantification of activities becomes a proxy for having space for a garden or living in a safe neighbourhood that is suitable for running. At the same time, a participant from a lower socioeconomic group reported that he would not want to be seen wearing a device because he felt it would single him out of his social group and symbolize vanity. Similarly, some of the younger participants reported not getting tracking devices because

they felt they would be perceived as being too mainstream by their social circle, where a fringe self-representation is desirable. Another insightful story about social signification of tracking devices comes from a participant who forgot to take her tracker off for a job interview she was attending. She described feeling: “a little less bad about forgetting to take mine [tracker] off for the interview” when she found out that the leader of her interview was also wearing a tracking device; when asked why would she feel bad about the device, she explains that she did not feel that it looked smart enough for the social situation she was in.

When it comes to signification at the individual level, Aaron provided an especially clear explanation of the meaning of the device for personal branding and conflicting symbolisms that he could not resolve until he changed his health behaviour. Aaron describes tracking devices as: “*sort of compliment to that ideal lifestyle* to sort of looks amazing, lots of money, works out a lot, that which is become sort of *ideal in society*”; he then explained that he used to own an Apple watch “to give up an impression ‘Oh, this is my life and I love tracking health’”, which clashed with his reality of being sedentary and overweight. This conflict in self-perception made him give up tracking for a period of time, because he felt that he should not “be using [an Apple watch] because this *isn't representative of my life*”. Aaron explains that after losing weight and getting into new health routines, he re-acquired an Apple watch that now matched his reality, his vision of himself, and his mission to stay fit.

Moving away from more individualistic understandings, some participants made a broader cross-cultural comparison as they feel that tracking is perceived differently in various settings and cultures, both locally and internationally. For example, Joan explained that devices would be interpreted differently depending on where she is within the UK. In her hometown of Newcastle, trackers are a part of the fitness hype – as she puts it: “no, I want to look hot, I don't

care what it does to me inside my body” – while in London, where she works and resides, such devices are more of an understated self-care symbol. Interestingly, the symbolic meaning of tracking (i.e. purely instrumental device for enhancing physical appearance) that Joan describes stands in direct contradiction with the ideas of better life, self-improvement, or an individual-centred wellness journey with which celebratory discourses about tracking come to be associated. Paralleling Joan’s insight, Aurora, in her commentary on the nature of self-quantification and its role for her cycling community, concluded: “I think it is *quite narcissistic* and err, *culturally yeah, I think very much Western-based*”. Similarly, George, who travels globally, pointed out that a standard ten thousand steps goal that might be meaningful in Southampton, where he is based, but is senseless in states with poor access to water, where an extensive amount of walking is a requirement for survival. To his diary, he attached pictures of a Mayan woman from a village in Mexico who has to walk excessively in order to be able to access water and another picture, taken in the UK, of two individuals visibly enjoying their treats at one of the coffee chains (Figure 2, below) querying if we actually know what is good for us and wondering if data might become a source of empathy for people. George reflects: “truly



Figure 8: Images included as a part of reflexive diary by one of the participants.

understanding the people of the region depends on a sense of empathy. Empathy depends *on shared experience*. *We can't all actually walk a mile in the shoes of an Amerindian* in the rainforest, or the Mayan woman in the photograph in a village in Quintana Roo, Mexico in 2014. *With the data from her wristband though – heart rate, calorie burn, distance walked, could we get any closer to empathising?*” By juxtaposing the two pictures, George raises the question about how data might appear and appeal not only to ourselves, but to others. He wonders whether in a society where “we don't really know what is good for us” (presented as a commentary to the second picture), can data become a source for a shared understanding? This example opens an unexpected interpretation of self-tracking and its potential for a participant.

Overall, the presented analysis shows that tracking apps and devices are understood by the participants to signify – sometimes conflicting – social aspects such as socio-economic status, the extent of edginess and seriousness, and one's desired lifestyle, and are used for symbolic representation of a personal brand. It is notable that in the examples discussed above, cultural signifiers of health, wellness, and values underlying healthism and self-improvement ethos are largely absent, giving way to more analytical interpretation of the practice. Indeed, the participants are both critical and creative in their meaning-making about the practice. Thus far the analysis has also uncovered that the self-trackers' interpretation of the practice is homogenous and does not fit neatly with the dominant frames.

### Social Imagination of Tracking

In his work *The Invention of Culture*, Roy Wagner (1981), a cultural anthropologist, draws attention to the importance of creativity and invention “inside” cultures, such as using symbols in a non-conventional way. Human creativity, for Wagner, is a propeller for cultural development and transformation. To understand how self-quantification fitted into a broader



interpretation of culture, the participants were asked where they see the tracking trend going in the future (e.g. what would you like to measure that trackers of today cannot capture), and a note was made of all creative adaptations of tracking devices in their everyday lives.

The creative element in using self-tracking devices was especially visible from the way in which they have been occasionally repurposed by the participants. For example, one of the participants used her device to be able to recall what happened and how she found her way home a previous night after a few drinks; she explains: “tracking enabled me to figure out what had happened and how long the walk had taken, if I'd made any stops, etc. It was a really good job I have this app. *I never thought of it as a safety app, but in this instance it was.* I found it interesting”. A few participants, including Roman – who was dissatisfied with the pricing of specialized technology – suggested that tracking devices might be used by family members to check if elderly relatives had woken up in the morning. Other participants used their devices to check up on travelling friends (Mary, Nancy). One of the animal lovers suggested using the devices for monitoring whether the pets in the care of others have been walked enough, rather than being stuffed in a car. Multiple participants (Emmanuel, Vanessa, Evelyne, George) used their trackers’ silent alarm to remind them about things to do during the day, with some reporting that this has become the primary function of their wearable.

When asked about future imagination for trackers, the responses varied. The participants were creative in envisioning what self-tracking might look like in culture. Some of the participant (Aaron, Mary) placed self-tracking squarely as a continuation of the digital age, and how the practice feeds into others, both commercial and public (Evelyne, Joan, Dawn), such as interests in fitness, self-discipline, data-generation, and shifts in medicine. Some expressed hope that self-tracking would be taken more seriously in the culture. Only one participant (Vanessa)

pointed out that self-tracking feels like a fad, as it picks up during certain times of the year, such as holidays, when people make commitments to healthy lifestyles, which are then given up; at the same time, other participants showed awareness that tracking was given up by the users (Lisa, Maureen), as well.

When it comes to more pragmatic changes in the devices, most participants stressed that tracking is likely to be more accurate, cheaper, more ubiquitous, and more capable of measuring elements such as iron, glucose, and cholesterol, which now require laboratory analysis.

Similarly, to findings of earlier studies,<sup>12</sup> the participants also suggested material improvements, such as sun batteries, improved manual input and automatic detection, longer battery life, water resistance, and comfort. The participants flagged measuring galvanic responses of the skin, analytics of sweat, muscle fatigue, and brain activity as an upcoming capability in tracking.

Another common thread across the participants was that they expected trackers to change form, into implants, tattoos, and other devices. In addition, the participants expressed a desire for measuring less corporeal experiences, such as emotions, mental health, pain, happiness, moods, thoughts, health and activity of their brains, and even body entropy. In other instances, the participants hoped that new technologies would result in improvement of unpleasant medical procedures, such as colonoscopies, or medical regime management (Hillary, Alistair, John).

Some participants (Nancy, Paul, Emma) expressed hopes that the future would bring more intelligent analysis, such as photo analysis for food consumed, better scanning possibilities, and a use of artificial intelligence, as well as a desire for more intelligent feedback from their devices (Alistair, Will, Katie, Evelyne), such as effects of correlations of different factors, knowing when

---

<sup>12</sup> Ancker, Wittman, Hafeez, Provercher, van de Graff & Wei, 2017; Lazar, Koehler, Tanenbaum & Nguyen, 2015; Puri, Kim, Nguyen, Stolee, Tung & Lee., 2017; Shin & Biocca, 2016.

to stop an activity, more control for the types of variables they are tracking and correlating, when one activity affects another, or when the peak performance is reached.

Despite a generally positive imagination of the future of tracking, the sentiment some participants expressed strongly was that of caution. For example, Li, an athlete with a great deal of tracking experience, concludes his initial interview, where the future of tracking was discussed, by saying: “if you track too much you feel like you *are imposing, you impose something on yourself and becomes very restrictive*”. Alternatively, Hannah, who, while benefiting from trackers, has a critical take on tracking culture, concluded her thoughts about the future of the trend with the following statement: “*society wants to control quiet a lot of aspects and I feel like with fitness trackers we want to control even more in our life* that actually, you know shouldn't be [controlled]”.

The discussions of creative, not-as-directed uses of tracking technologies is useful for uncovering that tracking is not adopted in a linear way in everyday life. While participants’ imagination of the future of devices and practices signalled that quantification is perceived as having a historic trajectory that extends beyond contemporaneity, is optimistic, and makes promises of betterment in healthcare. At the same time, many points raised in the realm of imagination touched upon the basic functions of self-tracking apps and devices (i.e. poor analytics, difficulty of recording, issues with accuracy) that affect them at the moment.

In line with Sewell’s (2005) two-fold conceptualization of culture, this section examined the symbolic representations of tracking and devices, as well as ways that participants perceive self-quantification. The section highlighted examples of agentic use of devices, critical reflections on media artefacts regarding self-quantification, and their ideas about what self-tracking represents across different social and cultural contexts. The lack of focus on elements of

normalization or self-disciplining in participants' responses signals that mechanisms of governmentality, biopolitics, or neoliberal self-shaping might not be operating as straightforwardly as some more obvious strands of literature used for theorization of the phenomenon would suggest (Ajana, 2018; Elliott, 2013; Rose, 1999).

### *The Material and Reflexive Practices of Self-Trackers*

As established in the beginning of the chapter, a dual conceptualization of culture as symbols and as practices not only allows for constant comparison between two mutual structuring dimensions, but potentially opens up previously untheorized points of tension. To explore the practice dimension of self-tracking, the interview guides and diaries included questions about data routines, meaning-making from data, data analysis, and actions that participants take based on their data. The findings focused on material, reflexive, and habitual routine data practices of self-quantification are presented in subsections.

#### *Habitual Routine & Material Data Practices*

##### *Collecting and Engaging with Data*

To understand how self-tracking practices unfold in everyday life and how well currently proposed analytical frameworks fit (e.g. discipline, neoliberal self, healthism), the participants were asked about what they do with data – especially how they make sense of it and actions they take based on their data. When the participants spoke about what they do with their self-tracked data in everyday life, a shared sentiment appeared, variously expressed as: “*just look* at it [their data]”; “nothing, *I look* at it and *that is it*”; “*I don’t do anything*, it is just for interest really, ‘oh what is happening now?’”; “look at it [...] and this is that”; “I will say, right ‘ok, was this cricket and then I would record what it was on the app, but *I don’t do anything with it, so I don’t know why am I doing it*’”; and “*I don’t really do anything* with it, apart from going ‘oh, yeah ok’”.

Some participants reflected on their interactions, showing their awareness of inactive use of data: “I have *not looked at it since* and that was *Thursday last week*, so I have not look what I have done”; and “I don't think *I haven't done anything really*, [...] I have all the data in the places, but to be fair *I don't really look into details*, you have like tendencies, trends and it gives you when you sleeping pattern kind of on there”. Overall, most participants looked at their data throughout the day or whenever they had time during quiet periods, such as commutes or evening, but did not engage further with it (e.g. adjusting goals or exploring it in detail). Some users also noted that they did less with their data now than when they had just started tracking, as the excitement started to fade. The minority of trackers, such as Roy, reported doing a bit more. He explains his data routine:

So, what I do say, so *routinely everyday I just check how I am progressing, if I have checked how many steps I have done, ok I am off target I need to do some more steps, I would just go for a walk around the block* or something, so I do check it quiet often, sometimes, for example, if I know I am close to my target, if I have 500 steps to go and it is you know time for bed I would end up walking around *the living room just to you know for 500 I just have to hit my target, you know*. I kind of do that which is a bit *weird* but anyway

Roy's case of habitual engagement on daily basis mirrors a small number of other participants' accounts (Evelyne, Margaret, Aurora, Roman). Reported data-based activities occasionally included in-the-moment action, planning a corrective action in the future, looking for a boost of motivation to sustain the desired level of activities, or comparing daily statistics. In addition, Roy's self-correction story was told in variations by other participants, including going up and down a set of stairs, cycling around the block, and doing jumping-jacks to perk up their statistics of the day. The sentiment of it being, feeling, and acting “weird” in relation to the tracked data will be further explored in Chapter 8, on meta-ethics and morality; what is important for the purposes of the current analysis is that the engagement with the self-tracked data mostly ends at the in-the-moment stage of interaction.

At a level of introspection, Zoe reflects and aptly summarizes the dilemma of everyday tracking in her diary: “I started collecting my data, I was like ‘oh, *I got all this data*’ but what do I do with all this data?” For most participants the answer was – very little. This finding is an early indication that both the practice’s promised usefulness as well as its disciplining effects are limited, since the use data breaks so early in the engagement cycle. Furthermore, the participants reported a limited number of corrective actions they took based on their data. Despite this, numerous participants reported that they felt compelled to meet their fitness goals. This contradiction calls for further scrutiny of why, with its recognized limited utility, the practice was still perceived as appealing.

### Self-tracked Data Analysis

To better understand what the participants found useful in self-tracking, it is important to explore the types of analysis they perform on their data and whether they would want to engage in any more detailed tracking from their devices under analysis-for-a-fee schemes, quantification of their microbiome, or a DNA analysis. Most participants reported not doing much analysis themselves, with some noting that they probably could do more if they wanted to. For example, Maureen and Eloise created a special folder where they stored their weekly snapshot reports generated by their devices, but when asked what they did with graphs and findings, one of them explained: “I *don't really do anything* with it I suppose, *I just look at it*”. Similarly, other participants commenting on their automatically generated reports “I just *delete them, I don't even look at them*” (Hannah, Joan). Some of the participants reported having looked through standardized analytics (e.g. heart zones, daily stats) (Gabriel, George, Mary) or automatically generated weekly or daily reports sent to them by their applications (Martina, Eloise, Tilly, Melissa, Lisa, Florence, Maureen), or looking at short-term trends during their workouts (Bert,

Gabriel, Li, Will). Long-term analytical strategies were rarely reported, and when it came to using data over a period of time, the participants mostly discussed looking at their “*greatest hits*”, as Roy puts it, such as record numbers of steps per day or other grand millstones, or again just looking at data out of interest “probably *once every few month just to sort of see what the flow is like but not because... I am, it is just out of interest really, just yeah, just like, oh you know*”. Regarding certain data points collected over the long term (e.g. total number of steps taken since the activation of device), one of the participants pointed out that: “you could see that sort of stuff, but it doesn’t really mean anything”. Some participants (Evelyne, Carla, Paul, Emma, Aaron) pointed out that understanding data is difficult and that background or training is required for users to be able to make sense of their numbers; as one of the participants puts it, “*I’m not scientific enough to be able to manipulate data to say, ‘well this is what happened’*”. Stunningly, even a participant with numerical expertise (i.e. mathematical physics) did not feel comfortable conducting analysis of her data; she explained: “*I am not really used to working with data so I don’t even know what to do with it, I just really enjoy looking at the data I collected*”.

An important finding is that a sub-set of participants engaged in additional forms of analysis (Margaret, Zoe, Evelynne, Paul), but these were mostly done and interpreted with the help of professionals, such as personal trainers, more informed friends, and sports laboratories. Evelynne and Margaret, for whom spread-sheeting and gathering data is a hobby, explain that: “the data analysis was a big part of the fun of it all” and elaborate on how they use their data to make sense of their athletics standing in relation to their competitors, as well as their own past performance. Both Margaret and Zoe consult their friends and a personal trainer while seeking additional insights into their data. In addition, Zoe, in order to make data actionable and to

validate her own self-tracking findings, sought out professional help in the form of laboratory testing and found out that the recommendations she had previously received were inaccurate.

To complicate matters further, most participants were aware that more advanced data analysis is possible, but almost half of the participants reported that they do not pay for any extra services, such as more in-depth tracking or data analysis, and would be unlikely to be interested in any additional analysis of their data. The respondents explained their choice with five different rationales. First, some pointed out that there was no utility in such analysis for them, suggesting that perhaps others, such as professional athletes, might benefit more than regular people such as themselves. To illustrate this, Roy explains that he would know that he had worked hard enough on a particular set of exercises because he is in tune with his own body, and states that to benefit from more intensive tracking, you have to be: “either *a proper athlete and then actually has a genuine benefit* or if you are *not really listening to your body*”. Similarly, Mary explains: “I don’t think so, it is not thing that sort of appeals to me, *I mean if I had a medical condition* if I haven’t got and that was something specific it could track to help me, I might be interested”. Second, the participants did not know what kind of information they could get or what they could do with it. Although they expressed that describing their health information in generic terms would possibly be interesting, they provided no specific explanation for what they might be seeking to understand. Third, the participants did not trust any analysis because the quality of data they were collecting on themselves was already suspect due to accuracy and consistency concerns. For example, Hannah, who was concerned about the veracity of her measurements, explains that extra analysis would be vulnerable to the same problem; she states: “no, I think it [...] I already *think it is not that trustworthy, I don't think that extra analysis* would be more trustworthy”. Fourth, a few participants were concerned about the price tag attached to more advanced analysis



or testing. For example, Will, who in theory would be interested in additional analysis, explains that the pricing is not consumer-friendly: “I am curious to find out, if they really wanted to build the huge database and study then fine like you can have my DNA to compare against other peoples, *but I don't want to pay for the privilege* even though I suppose on the grand scheme of things, [...] I could justify it at some point or at a certain price point, yeah ok, if it pops up on Groupon or something”. Similarly, other participants stated that the costs of additional analysis and subscriptions were too steep. The costs were not only explained in terms of monetary investment, but also in terms of time and effort, as Dawn illustrates: “that would be nice to have a little bit more information but not if it *takes loads of time to collect, monitor, upload it has to be something that fits into my schedule*”. Finally, some participants did not want to engage in more intense analysis because they did not trust private companies with their data, indicating potential misunderstanding of who presently has access to their data (see Chapter 7, on privacy for analysis).

Overall, while it is reasonable to expect that when it comes to quantification, data analytics would serve as a core pillar and a source of recommendations for action, data makes the practice functional. Yet the analysis indicates that the participants rarely engaged with the analytics and visualizations provided by their devices and did not seek additional analysis themselves. The respondents viewed data analysis as a specialist interest rather than something they need or want to do themselves in order to gain benefits from the practice. In addition, more advanced analyses of tracked data were both sources of critical reflection and skepticism. As such, a point of divergence between symbols and everyday action develops, as based on the postulates of frameworks of governmentality or technologies of the self, we would expect to see

a consistent engagement with the data and analysis over time, rather than a passive acknowledgment of the data's existence.

### Reflexive Practices of Self-Trackers

When it came to actions based on data, the conclusions are similar to that of on data analysis. In cases where a corrective action was taken by the participants based on their data, it was a minor, short-term adjustment, rather than a long-term change. Some participants (Roy, Margaret, Nancy, Li, Roman, Emmanuel, Will, Zoe, Zara, Paul), especially those interested in sports or those who have a specific goal or a medical condition, took corrective action after looking at their data, such as trying to go to bed earlier, take a nap, go for an extra walk, not drink before bed, close the curtains, do less or more activity depending on the previous day, try to be more active on weekends, and adjust food group or calorie intake. Some will adjust work routines to incorporate low-level activity at work (Lisa, Gabriel) or incorporate a bit more activity in their shopping or after work leisure activities (Willow, Nancy). However, mostly, meaningful action and reflexive engagement with data was not a reality of everyday life. At the same time, the participants (Rose, Sean, Peter) stated that they felt that they “should” look at their data more, but “don't”. Yet, it is important to consider exceptions.

In case of Sean, tracking changed his behaviour dramatically. Sean lives with HIV and is dependent on a heavy regimen of medications; when talking about tracking his medication, he mentioned both the benefits and the resentment that tracking has caused (other studies report similar conflicts for people living with chronic health conditions; see Ancker et al., 2017). Sean starts by pointing out that the effects of some medication or of missing medications might not be obvious in the short-term and explains how he found a correlation between the days he went out and missing medications, as well as action he took to change his behaviour:

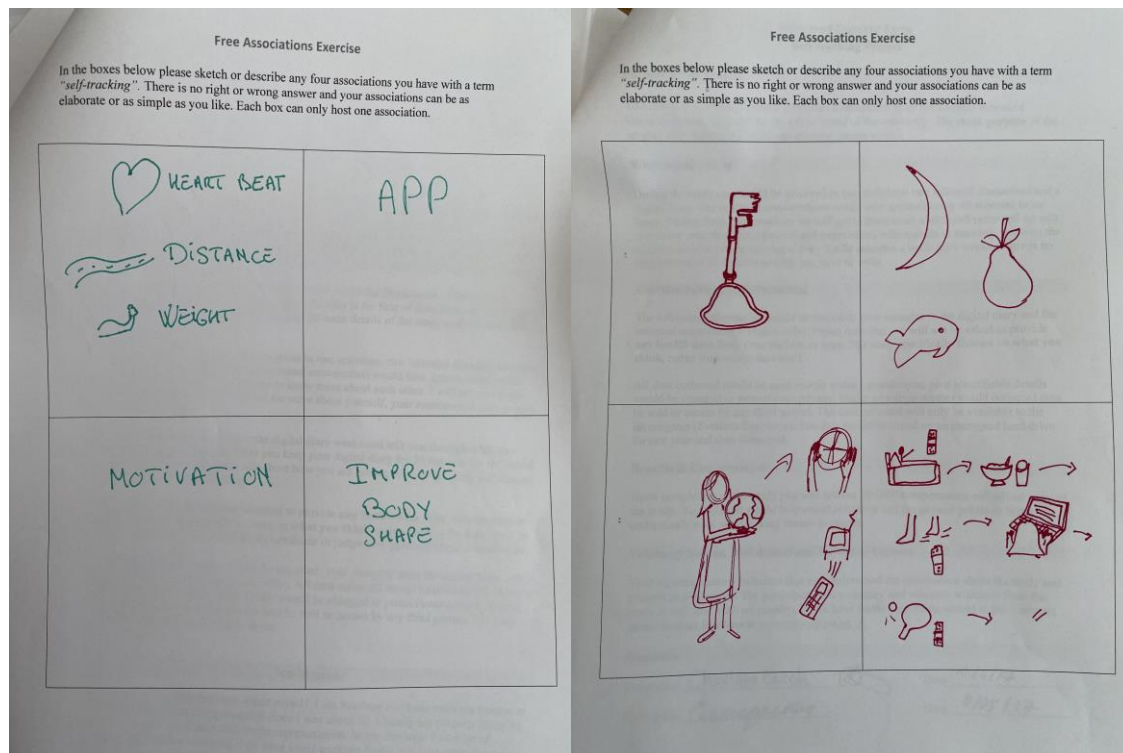
but yeah, and at the end *you realize they [medications] are working a month in rather than a week later*, so you can get and try to change things when you have to keep on going and *with self-tracking it helps by making you realize that for example, one of the reasons ,that I really needed to stopped drinking is that I don't drink in the house ever*, so I always have to go to the pub or something and I don't drink in the week, so then I'll go on a Friday and maybe on the Saturday, but *then over time I realized that these were also the days when I missed out on my meds*, so you know, *it wasn't a coincidence, there was something causing it*, and it is easy, looking back at my tracking it was easy to realize it was, *it was a cause – so I cut that out!*

Alternatively, Lisa and Evelyne used their data from a marathon/cycling route on which they competed a year earlier to remind themselves of the layout of the terrain. Lisa explains that it is a “really good way of using your data to know where you need to slow down, not to over exert yourself, when you can speed up” and that it helped her to reduce her time by 40 minutes. Margaret similarly uses data to decide how to best approach and evaluate the performance – both her own and that of others – in the qualifying rounds of competitions in which she takes part. What unites all of those cases is that the actions based on data are instrumental, rather than conditioning, and the participants talk about them in relation to achieving their personal goals.

Yet not all the behaviour changes based on engagement with data were agentic. For example, Aaron, a tracking enthusiast, was prompted by his device to go for a walk while being significantly under the weather; he explained: “I was really ill, that is why I didn't move that much because I was still in bed trying to revise so I got my trainers on and I *went for a walk and I didn't come back until I met the goal*”. In further chapters, other examples of Aaron's actions similarly motivated by his device would be discussed, but this example perhaps comes closest to representing how technologies of the self might operate in everyday life and at the same time how rare such scenarios are.

## Wider Consequences of Self-Tracking: Practices and Symbols

As explained in the introduction to this chapter, during their initial interviews, the participants were asked to think of four things – whether it be terms, images, or ideas – that they associated with the term self-tracking (see Figure 3, below, for examples).



**Figure 9: Examples of associations given by participants.**

The exercise enabled further contextualization of self-tracking as culture by highlighting the conceptual ideas users perceived as relevant to their practice. In total, 168 associations, both practices and symbols, were collected (see Appendices 13 for a full table). Unsurprisingly, quantitatively larger categories revolved around actual activities that are tracked (i.e. 29 different associations were verbs – running, walking, swimming); self-tracking measurements (i.e. 26 associations were related to what is being measured – pulse, calories, weight); general references to health (i.e. 14 references to being healthy, staying healthy, healthy mind and body); data (i.e. 12 associations were of graphs, data, analysis); and gadgets (i.e. 9 references to devices such as

Fitbit, Apple watch, more generic wearable). While popular, those associations tell us little about the practice and its meaning beyond its material dimensions. Less frequently mentioned and more abstract associations, however, were telling of existing framings of the practice. The simplest way of making sense of such data is to divide it into broad themes and explore contrasts between practices and semiotic meaning.

First, when the discussion touched on cultural dimensions of self-tracking, many of the participants spoke about tracking in terms of commercialization, consumerism, immediacy, competition, narcissism, and social comparison – what these concepts have in common is the focus on the individual and meeting personal needs, both material needs and the need for validation from others. For example, tracking was associated with ideas of “a slippery slope”, being “a bit scary”, or “making me sad about the society”. Probing into such phrasing, along with examining associations such as “commercialization” (x1), “consumerism” (x1), “technology and millennium” (x3), “tyranny” (x2), “competition” (x2), and “nerdy people” (x1), was especially helpful for revealing contradictions with practice and conflicting cultural values. During one of the interviews, Rose expounds a similar narrative, stating that for her, self-tracking falls in line with the culture of constant comparison propagated by social media. She explains:

I think it is stupid really that we live in the world where we are constantly are *led by comparisons*, say even on Facebook you are looking to see what other people are doing in their lives is like we are let by what's this person doing, and how much of a great life they are having and you know they are on holiday here, and I am miserable here or there is constant comparisons, [...], but then *that is the same with things like S Health, it make you feel bad, if you don't compare to the average*, do you see what I mean? There is sometimes, I think, you know what I know how much *I have done, I know what I should be doing why do I have to compare myself to other people or why do I have to have that comparison there*, I know what is good for my average, I know what I should be doing, because I know what daily, I know what targets I should be getting exercise wise.

For Rose, tracking feeds into the culture of constant comparison and competition, and, as further discussion reveals, it affects not only her, but also her young children, as they are being compared based on these parameters. In addition, she points out that she feels like the practice is gendered, with pressure especially felt by women who are encouraged to maintain prescribed standards of beauty. Concerns about the gendered nature of self-tracking were expressed by other women in the study (Margaret, Emma, Hannah). For example, Emma, who needs to track her calories to maintain a competitive weight, summarizes her thoughts about the gendered nature of her experience: “I think it is quite strange because *for women* most of the messages are *like measure calories, keep measuring calories, don't ever forget to measure your calories*”. Similarly, Hannah, who acknowledged gaining some benefits from her own tracking experience, echoing Rose’s sentiments, explains that tracking is not a “real” need and does not bring about any substantive improvement to society, but rather, it creates artificial desires. Finally, Emma discusses tracking in terms of consumerism, concluding that “nobody needs an apple watch, I am sorry if you have one [addressed to the researcher], but *NOBODY NEEDS an Apple watch*”. What all those quotations share is the recognition of conflicting values that underline self-tracking as a practice, where the personal benefit is gained, but the critical reflection is sharp and insightful.

Second, fifteen associations from the exercise (third-biggest group with 15 associations) can be labelled as the “self-responsibility and control” group and include such ideas as “self-control”, “self-monitoring”, “being in control”, and “being responsible”, which dovetail with the associations about “empowerment” (X2). In addition, during the interview, when asked what kind of people track, about a quarter of the participants responded with discussion of health mind-sets, self-discipline, and personal responsibility for health. Some participants construed the

material dimension of devices or practice (e.g. aesthetics, required constancy of use) as something that is overcome by motivated and responsible users. Cultural values underlying both of these association groups can be easily linked to the theoretical frames found in the frames of neoliberal responsibility, including healthcare and technologies of the self. However, when it comes to practices, the values related to self-empowerment fade. For example, participants, especially these with medical backgrounds, pointed out that in practice, self-reliance does not work. For example, Eloise and Nancy, speaking from the perspective of medical professionals, explained that for any behavioural change effort to be effective, it should come as a part of a wider programme to give the effort meaning. Similarly, Alistair, who is enthusiastic about the future of the data in healthcare, is acutely aware of the limitations, such as the meaninglessness of datasets on their own or devices' limited capabilities to motivate users to change. When I asked my participants if they share their data with their doctors, sixteen participants said they would not do so for reasons ranging from doctors not having time to look at data, not trusting that they have expertise to look at it, not wanting to be treated as a number, and data as not being helpful to doctors. However, a few participants did discuss their data with doctors. In sum, data does not easily fit into people's formal medical health routines.

Indeed, the recognition of the values that self-tracking promotes does not easily result in changes in behaviour, even when participants reaped substantial benefits from personal self-tracking. For example, Roman used his habit of consistently measuring his blood pressure, athletic performance, and weight to convince his doctor to prescribe him a "relatively untested" medication that otherwise would be perceived as a risk for him. Alternatively, using her data, Katie was able to renegotiate her medication regimen with her doctor. However, they and other participants pointed out that the idea of "empowerment" that they might have experienced does

not necessarily translate to the experiences of others, citing generational, affluence, literacy, and digital divide issues. In sum, the values of self-control, awareness, and personal accountability that are valorized in theory were balanced against socio-economic and structural realities, as well as deeply critical reflections of the participants.

Finally, deeply personal association of self-tracking were also confronted by both positive and negative frames. On the one hand, there were ten associations, such as “getting to know myself better”, “personal journey”, “personal path”, or “checking up upon myself” aligned with another seven positive associations of “achieving goals”, “results”, “performance”, and “improvement”, and five concerning motivation. For example, a participant explains how she would feel if she could no longer track, stating: “that *would devastate me*, that really would I would have to go out and buy a pedometer there is just no way around it, that *would feel like a part of me was missing*, because I have been doing it for so long now and it is a part of my daily routines, you have a shower, you brush your teeth it is you know if you suddenly stopped doing something you for me, I would feel *totally out of sync and not comfortable at all*”. Similarly, the idea of inseparability comes out in another participant’s account. After the initial interview, George followed up with an association he had not thought of during the interview. He wrote: “I thought of a fourth association – ‘*part of me*’. I associate self-tracking with a sense of continuity and I never take my UP3 off, so it can genuinely be said”. To the email, he attached a picture of his arm with intertwined bracelets and his tracking device.





Part of me

Sean

**Figure 10: Association "Part of Me" as presented by a participant**

On the other hand, there were negative values underlining the practices of “self-centredness”, “navel- gazing”, and “narcissisms”, where self-tracking is presented as taking over one’s life and reducing the enjoyment of activities such as walking or sleeping. For example, a participant living with HIV who acknowledged that he benefited from tracking for monitoring his medical regime also explained the contradictory nature of his experience. In his discussion of associations, he explains how “continuous improvement” comes into direct contradiction with the idea of “navel- gazing”, where although improvement is required to feel better, it is associated with “self-indulgence and *looking too far inwards that sometimes it’s not healthy*”. When the conflict became unbearable for Sean, it resulted in the abandonment of his tracking

routines, recurring hospitalizations, and real effects on his life that then motivated him to return to tracking. Alternatively, some of the participants discussed the idea of data obsession and a fear of data taking over their lives, yet explained how it helps them in instrumental ways to lose or gain weight and to monitor themselves (these ideas will be further explored in the Chapters 6 and 8, on Reflexivity and meta-ethics & Morality). In sum, what this discussion brings to the surface is that tracking is perceived and even experienced in contradictory ways. While it might be individually helpful, most of the participants are sceptical about claims made within commercial discourses, and do not make much use of their data or do very little advanced analysis. The data-based action in which they engage is limited.

#### Perceived Value of Self-quantification as Practice

Another way to understand why self-tracking as a practice is valuable to individuals is to inquire about what would be lost if it were to be discontinued. A few empirical studies provided interesting insights about discontinuation (for fascinating insights, see Clawson et al., 2015; Epstein et al., 2016; Lazar et al., 2015; Rapp & Cena, 2016). A question with a hypothetical scenario in which the participants can no longer use tracking devices proved to be insightful. A question of what, if anything, would be missed were the tracker to be abandoned turns the discontinuation debate on its head – it is no longer about what does not work or is not valued, but about what *is*. The reasons given by the participants can be broadly divided into two groups: instrumental and reflexive. Instrumental reasons ranged from disturbed routines (Zara, Will), data loss-aversion, and having already invested time and effort (Paul, Vijay, Mark, Grace), as well as the usefulness of silent alarms and reminders (Peter, Joan, Vanessa, Nancy, Katie) and the ability to self-challenge and motivate that the apps and devices provide (Helen, Alistair, George, Martina).

The set of reasons relevant to reflexivity and self-assessment includes the ability to reflect on good and “low” days (Nathaniel, Camilla), not receiving the “comfort” or validation of knowing personal statistics (Victoria, Dawn, Eloise, Melissa), knowing and awareness (Carla), and seeing progress (Emma). Some participants were unable to provide an answer to what they would miss, explaining that this is a complex question (Florence), while other participants are clear on what would be missing for them. For example, Aaron explains that he would “miss something in my life” and that “it slowly turned into a *quite a big part of my life so I enjoyed looking at it, talking about it, thinking about it and interacting with it on the daily basis*”. In response to the question, some participants (Zoe, Tilly, Mary) stated that they would have gotten a new device right away or resorted to other types of tracking if that was not possible. This is best explained by Margaret, who explains that she would have gone out to get a new device because “the data is really crucial” to her personal mission of returning to sport.

To return to the main argument made in the chapter, considering cultural aspects of self-tracking simultaneously as practices and as symbols uncovers the points of contestation along two dimensions. First, despite gaining some personal benefits, the participants reflect critically on the practice of self-tracking, highlighting its limitations for the self and others. This is especially evident in the lack of action they undertake based on data, especially against the background that they feel they should do more, but do not. Second, valorized values from commercial discourses – while present in the meaning-making processes of the participants – are by no means dominant or not contested. Indeed, many participants provide critical reactions to commercial discourse promoted by the symbol generating media discourse.

## Discussion and Conclusion

The main aims of this chapter were first to paint a broad picture of what self-tracking represents to the participants in preparation for a deeper, more focused analysis in the chapters that follow. Second, the chapter aimed to analyse in parallel what the participants do in their everyday lives with ways they perceive the practice based on their reflections, thoughts, and circulating media discourses. To that end, Sewell's (2005) conceptualization of culture as two-fold mutually constituting dimensions – as practices and as symbols – was employed.

The analysis shows that self-tracking does not fit easily into theoretical frames of the technologies of the self and neoliberal self-betterment, which are currently dominating academic discourses. At the symbolic level, self-tracking is subject to critical reflections and sceptical conclusions, with one in five participants referring to some kind of dystopic frame to talk about the phenomenon; the participants raised issues of surveillance, ethics of data use, and the extent of scientific veracity in relation to the claims that tracking devices make. The participants also draw out the frequently mutually exclusive values that they perceive as underlying the practice. For example, tracking, especially in its wearables' variant, was perceived by the participants as at once mainstream and innovative, valorized and stigmatized, Western-centred and gendered, and empowering and oppressive. In addition, the findings from the free association exercise demonstrated the diversity of frames used by the participants to think about their practice, including that of commercialization, commodification, navel-gazing, and tyranny. In sum, while the frameworks of neoliberal self-responsibility, discipline, and the health "mindset" are circulating as a part of self-tracking discourses (see Chapter 2, the review of literature), they are subjected to critical reflection and have competing alternatives. Yet, despite the abundance of critical reflections, the practices prevail in the everyday life.

When it comes to material and reflexive data practices, the misalignment of the existing analytical frames is further evident. For example, if the practices were convincingly underlain with ideals of healthism or governmentality, we would expect participants to actively utilize and analyse their data and use it to improve their health behaviours in line with the life betterment ideal of these frameworks. However, the analysis shows that this is not the case. The participants collected the data on themselves, but looked at it only occasionally, if at all; they did not engage in much analysis, preferring to look at the short-term trends (the long-term perspective was rarely mentioned); and most did not make their findings actionable. Interestingly, many of the participants were aware that they were not doing much with their data and indicated that they “should” do more. While some participants – especially those with access to experts who can enable them to take meaningful action based on data – personally benefited from the practice, they were aware that socio-economic and structural barriers might prevent others from getting similar outcomes, concluding that the practice might not be as beneficial to society overall.

Overall, the analysis shows that, on the material level, the participants engaged with their data in limited ways, rarely conducting data manipulations, additional analysis, or data-prompted actions. However, the analysis also surfaces a set of reflexive practices that constitute a different type of “doing” with data. Chapter 6, on reflexivity, and Chapter 8, on morality and emotion, interrogate multiple subtle ways through which data is put to work and comes to matter to individuals. Chapter 9, the discussion, then theorizes what self-trackers do with data and what data does to self-trackers.

As shown by the analysis in this chapter, self-tracking is bounded enough to be considered a cultural current with 1) its own internal tensions and contradictions, 2) with symbolic meanings produced by commercial and media entities being a subject of contestation and critical reflections

by the users, 3) a dynamic current opened to change and perceived optimistically in the future, and 4) self-quantification practices as having a space for creative adaptation of technology and change. Thus, the bounds of healthism, governmentality, and discipline that dominate theorization are clearly illuminating only a part of the picture. To advance our understanding of self-tracking as culture further, a wider theoretical net should be cast. For example, efforts are already being made in the direction of body, education, and data cultures. Other frameworks might include analysing the contribution of self-tracking to the culture of sport and fitness. Alternatively, studying practices and discourses around data donations for medical and research purposes might also be insightful. Another possible lens is the sociology of sleep (that deals with various dimensions and cultures of sleep) and its relationships with tracking. In short, by bounding cultures to existing frameworks, we risk losing insights that “unbounding” and links to novel theoretical frameworks can bring. The following chapters will unpack and analyse some of the observations made in this chapter. The next chapter, on reflexivity, provides an in-depth treatment of how self-tracking is understood by the participants, what motivates them to engage in the practice, and what kinds of reflective thoughts and questions arise in their minds in relation to it.

## Chapter 6 – Reflexivity

### Reflecting of Self-tracking: What It Is and Why It Matters

The focus of this chapter is on self-quantifiers' introspections about personal data and tracking practices against the backdrop of selfhood. Key scholars that worked on conceptualizing the idea of reflexivity – Taylor, Giddens, Elliot, and Margaret Archer – held diverse views on the specificities of the practice of reflexivity (see Chapter 3, on the conceptual framework, and Chapter 9, for a discussion), but agreed on its three core characteristics: reflexivity is vital for a person's agentic capabilities; introspection helps us navigate everyday life; and the practice is, at least partially, manifested as self-talk or internal dialogue. This chapter picks up some of the core points made in the previous chapter – that set out the grounds for exploring complexities of self-quantification – deepening the analysis and examining the practice from a different theoretical angle. The goal of this chapter is to explore a repertoire of participants' introspections on the practice and to study how such reflections feed into selfhood and everyday life. This chapter answers the questions of how self-tracking is accommodated in relation to individual projects, and how it is evaluated by the participants. As such, this chapter moves away from a general discourse and group meaning-making about tracking to exploring personal reflections in depth.

In order to help illuminate the core question of the dissertation about self-quantification's contribution to the sense of the self, this chapter focuses on developing a line of argument about mechanisms (e.g. self-talk, self-analysis, reflection) through which the practice comes to shape selfhood. The chapter's objective is achieved by analysing how the participants define "self-tracking", why the practice is valued by them, and what there is to be gleaned from the reflexive and summarizing thoughts/questions that self-quantifiers raised in diaries and interviews. The participants' reflections are then situated in wider personal contexts, such as professional and

personal aspirations, beliefs, and life-course transformations. Methodologically, most of the presented analysis is thematic. In addition, since reflexivity is conceptualized as an internal dialogue, additional attention is paid to scrutinizing the language of closing paragraphs in diaries, summative statements in interviews, and reflexive questions, where the reflexive and summative self-talk is most likely to appear.

The core argument of the chapter is that self-tracking as practice, while undertaken and valued differently by self-quantifiers, is situated within and acts in support of individual “projects”, to use Archer’s term (2007). Thus, the practice is a subject of reflection for the participants. The analysis shows that the use of tracking devices and apps is sometimes ontological, supporting a specific dimension of personal identity (e.g. athletic, health-conscious individual), typically in the long run; and it is sometimes instrumental in preparing for a specific stage of the life-course (e.g. aging, continuation of independent living in aging, parenthood, recovery from injury or disease, or recovery from or preparation for surgery), or in support of specific personal projects (e.g. competing with others, weight loss, or dietary changes). The analysis feeds into the broader argument of the thesis, as it further illustrates the limitations of conceptualizing the practice singularly within neoliberal theorization (via N. Rose or Foucault), such as technologies of the self and self-optimization. While the strands of theorization via governmentality, power, and technologies of the self are both rich and critical, these lenses are limiting in highlighting the role individual agency plays in how the practice is adopted in everyday life, precluding the examination of critical interpretations, adaptation, and use. This chapter presents and discusses numerous examples of critical moments of reflections and the arising tensions that self-quantifiers face in their everyday lives.



The chapter unfolds as follow: the first section explores what the participants understand by “self-quantification” and why, if at all, the practice matters to them. The subsequent sections contextualize those findings by placing them in the contexts of life-course transformations and evaluation of the practice. The chapter subsequently ties together the findings across sections by examining reflexive questions and thoughts of the participants, including what they learned about themselves by engaging in tracking and what kind of questions they are still struggling to answer.

### What is self-tracking?

Exploring what is understood under “self-quantification” reveals lenses through which the participants interpreted the practice and reasons for which they engage in it. Thus, the participants were asked how they would explain the concept “self-tracking” to those unfamiliar with the idea. The analysis revealed three main avenues along which the definitions unfolded. The first set of responses (about 25% of answers) focused on the technological lens – the participants described the practice primarily as use of technologies and devices. For example, self-tracking has been described as “use of some sort of *equipment*”, “forms of *tech applications*”, “*a device* that helps you”, “wearing a *device*”, and “it’s a watch that counts your steps, counts your calories, and it is an *apparatus that counts your pulse*”. As per the last definition, the participants who grounded their definitions of self-quantification in the technological dimension frequently expanded them with details about what kind of data one can collect on oneself – steps, calories, sleep – and also issued a set of disclaimers about who may (or may not) be interested in the practice. For example, Lydia and Camilla specified that “it is not just for sports people, it is also a good thing to do for health reasons”, and Melissa pointed out that tracking might not be for everybody. Across the sample, the participants specified that some users might draw more benefits from the practice than others: people wanting to lose weight (9 mentions), people recovering or managing health

conditions (7 mentions), and elderly and aging (9 mentions) individuals were most frequently mentioned as beneficiaries. Children and teenagers were a contested group, as some participants, especially those with medical backgrounds, saw health education opportunities in tracking, while others believed that given the young age, children and adolescents should not be concerned with the minutia of bodily numbers. People living with body dysmorphia were classified as being a risk group that might not benefit from the practice. In summary, the focus of the first group of definitions was on technology and its utility, but such definitions did not cover higher-level functions of quantification.

The second and most encompassing set of definitions revolved around quantification's core mission, such as monitoring of oneself, learning about oneself and one's own body, and goals that tracking helps to achieve. The participants eschewed the technological angle of tracking in favour of explaining it as "a little *report card*", "a *log* of your progress", "a *way to monitor* yourself", "*documenting* some aspects of your life", "*keeping* a more precise *track*", and "it is not really different from *writing it down on a piece of paper*". The definitions of participants in this cluster capture the core nature of self-quantification – recording in different forms, markedly capturing continuations rather than the novel nature of the practice. After establishing the general shape of what self-quantification means, the participants added a rationale for why self-tracking can be used, such as monitoring progress toward personal goals or "how you might improve that", continuous self-motivation, bringing more consistency to exercising, "not being able to lie to yourself", improving athletic performance, becoming healthier, and "add[ing] value to your life, to make [it] more productive and healthier". Those rationales are illustrative of participants' deeper reflections on the practice and its purpose – a subject further discussed in later sections.

The final group of definitions is the smallest (about 10% of all responses), but the broadest conceptually. The definitions of tracking in this group did not focus on technology or its functions, but on what the practice stands to represent – a “mindset”. The participants described the practice as sensitization to one’s own exercising or eating as being “mindful and aware” or “thinking more deliberately”. The definitions also focused on “getting to know yourself on another level”, especially with regard to one’s own body and how it changes and reacts to different activities or situations, and thinking about what one’s body is “trying to tell you” in a move away from focusing exclusively on how it looks, but not how it feels. Some of the participants emphasized that technology, while helpful, is not a necessity for self-tracking, as it was perceived as only “*a mechanical part of your thought process*”. In addition, some participants linked their definitions to a broader context of healthcare provisions (via preventative care and self-reliance). Self-tracking as contributing to lessening the burden on the British healthcare system was extensively talked about by 4 participants in this specific context and many more in other discussions. Finally, two participants described tracking as a “way of keeping tabs on us” by others rather than oneself, pointing to the tension surrounding potential third-party access to personal data (see Chapter 7, on privacy). Indeed, one of the participants explained that she has a problem with the term “tracking” because of its negative connotation of being stalked or spied on by others.

Three sub-sets of definitions varied in their approaches and rationales, but as the classification makes clear, the practice is not perceived by the participants as necessarily novel, but it is understood as useful beyond self-optimization or achieving a “hot bod”. The definitions indicate connectedness to personal corporal existence, continuation of the practice, its fit with broader personal projects, and even a link to social responsibility.

Accompanying the definitions of self-tracking was a discussion of why the practice mattered to the participants personally. Some of the responses in this category paralleled previously mentioned answers, such as being a source of motivation, seeing levels of fitness or effort in training, meeting calorie goals for athletic and bodybuilding purposes, and self-motivation. More importantly, those responses brought into the spotlight the influence of the life-course dimension on self-quantification. The discussion in this chapter is not bound by any specific definition of the concept of life-course, but instead treats it as a general label for the intersection of individual “projects” (Archer, 2007) with the set of broader socio-economic circumstances of participants’ everyday lives, including coming into adulthood, becoming a parent, changing jobs, being diagnosed with an illness, or undergoing a life-shaping experience that alters the perception of oneself. For the purposes of analysis, life-course changes were broadly divided into hermeneutic categories; owing to the longitudinal nature of the study, the participants reported a variety of motivations to engage in tracking (sometimes changing or contradicting their earlier responses) at different points in the study. Some of the ideas discussed in relation to those changes were unpacked by the participants in reflective conclusions and questions explored in the final section of this chapter.

### Life-course Transformations as Motivation to Self-track

Initially, the idea of the life-course in relation to tracking was made germane by an older participant who explained that quantification “give[s] you *a fighting chance* at least” against “*old age [that] will catch up* in the end”. Nathaniel (63), Hillary (63), Roman (67), Lydia (55), Victoria (63), Roy (40), Camilla (62), and Nancy (43) explained their motivation to track at least in part as preparation for healthy aging. In terms of negative outcomes, the participants hoped to avoid age-related illnesses, such as mental decline, diabetes, loss of mobility, dependence on others, and

dementia, or to lessen the burden of the transition during menopause. In terms of positive outcomes, the participants reported wanting to become better at physical activities (i.e. walking, exercising) and to be more motivated to engage in such activities in the latter stages of their lives. It is important to note that self-tracking here was seen as part of a fitness and health regime rather than a self-standing practice; as one of the participants summarizes: “FitBit is *not a fitness miracle*”. In addition, a number of participants had bought, or were planning to buy, tracking devices for their aging parents to motivate them to walk more and to check up on them remotely. Similarly, younger participants Katie (19) and Zara (18) pointed out that they tracked as part of their growing-up process: Zara, who was diagnosed with diabetes as a teenager, explains that the responsibility for managing her health conditions slowly shifted from her parents to herself. In this transition, tracking, both medical (i.e. blood sugar) and fitness, gave her a better sense of control that came with new responsibilities.

Another permanent life transformation in which self-tracking played a part was parenthood. A number of participants referred to tracking as part of preparation for childbearing or as a part of a health regimen in parenthood. For example, Martina explains that: “in the future I would like to have a child and I don't want to be like [...] I want to be able to be fit now, so that *when I am pregnant, I would be able to keep working out and not stop and you know*, so I want to *prepare myself for that*”. Alternatively, Rose tracks because she wanted to set a good example and show the importance of exercise to her children. Similarly, Jerome, who at the time of the study had just had a second child, explains his motivation: “my son is 8, nearly 9, he is at that stage where he wants to do things; she is four months old and *I can't be that fat slob who sits on the sofa with pizza*; if I do, *I will not see her for her 8th birthday*, so that's another driver behind it. *I don't*

*think I took it seriously enough with my son*”. These quotations are illustrative of how self-quantification supports and becomes embedded in broader personal projects of the participants.

Furthermore, participants made observations related to the general temporalities of life, reflecting how tracking plays into experiences of their bodies and activities. Nathaniel, who witnessed his granddaughter taking her first steps, reflected on the significance of quantification in this context:

While we were there [granddaughter] decided to walk about 10 steps. This was the first time I had really seen her walk *as she has only started walking this week. I thought that 10 of her very first steps in what will be a lifetime of walking.* It will be interesting to see as she grows and develops if she takes her health and wellbeing seriously. *I hope so, and I look forward to many days and years of being there for her*

His sentiment echoes that of Jerome in relation to his children. However, in the comment, he goes further by grounding quantification within both lifespan – human physical capabilities during early years of development and aging – and healthy living contexts. The participant also links the practice with hopes for his own longevity – one of the reasons he took up tracking. His comments signal that quantification, at least for him, is deeply embedded in the flow of life rather than being superficial or insignificant.

One of the older participants, Camilla, reported having her self-tracking as foundational to improving her physical health in preparation for her husband’s retirement, as he is a “good walker”, and having a walking partner would push her to do more exercise. While Lisa noted that since she started tracking, she became more aware that she feels well waking up in the morning, as well as being more appreciative of her body. Compared to her similarly-aged former partner, she believes she is in less pain and has more stamina for training and activities, and she also pointed out that self-quantification made her more aware of how her body feels. She explains: “[the partner] is 5 years older than me which isn’t significant at all but he doesn’t really exercise and *he will get up in the morning sort of moaning about the fact that his back aches his knees, and I will get out of*

*that like [...] not having any of these problems* hmm, I don't really have to think you, know *he always had to think about even about his lying position* so it is sort of sort of things like that, *I just roll into bed and roll out of it this morning*". The aforementioned narratives focused on the practice's ability to support various dimensions of personal changes through one's lifetime.

Recovering from or being diagnosed with a life-altering health condition was another life-course transformation that stood out. As explained in the methodology chapter, a sub-set of participants who were facing long-term, chronic, or serious illness were recruited for the study. The rationale for such inclusion was that people with special health needs might perceive self-tracking differently from other users. In addition, the literature indicated possible differences between self-initiated and pushed types of quantification (Lupton, 2014). This division was only partially reflected in the data; some participants took up self-tracking as part of their recovery or health management journey, while others did not perceive self-tracking as monolithic and distinguished between tracking out of medical necessity and tracking for fun – and they themselves engaged in both. For example, Zara, who lives with diabetes, distinguished between two types of tracking in which she engages: that which is mandatory for medical reasons, and fitness that she performs for herself. She gave different accounts of those two types of tracking, where the former was characterized as overbearing and dreaded, and the latter as empowering and joyful. Camilla, who was asked to write a food diary by a medical professional, reported "feeling abandoned" after the request, but did not perceive her personal tracking as daunting.

Some of the participants living with chronic health conditions reported using quantification to ascertain links between their lifestyles and conditions. John, an avid athlete who has been living with Crohn's disease, and Alistair, who suffers from chronic fatigue syndrome (CFS) – neither of which are predictable in terms of causes, trajectories, or management – use their quantification to

obtain a better picture of how their symptoms and flare-ups might correspond with their food consumption, activity, and workloads. Indeed, prior to self-quantification becoming convenient and commonplace, John had been tracking his symptoms for a decade using spreadsheets. Reflecting on the capabilities of new technologies, he and other participants noted the limitations of tracking data, exposing gaps in proxies, analysis, and linkages between measurements, subjective feelings of wellbeing, and health itself. Melissa, a cancer survivor, explains that in her case, tracking was integrated into her life as part of recovery and was a “*turning point*” in attitude toward her life, health, and body: “[Tracking] made me *more aware of how I was actually* living my life, you know, and it [...] played a part in my recovery”. Just as with aging, growing up, and becoming a parent, self-quantification supported a set of lifestyle changes by providing information or motivation.

Identity-transforming points were highlighted by the participants as conducive to the adoption of self-tracking. These were especially evident when athletes were preparing for competitions, recovering from an injury, or returning from taking time off from competing. For example, Margaret, a life-long professional athlete who distinguished between personal and professional self-quantification, took up the former while recovering from a major injury that prevented her from competing. Moving away from a 12-hour weekly training schedule was difficult for her and was accompanied by sadness and a partial loss of self-confidence, she explains that tracking her recreational activities motivated her and put her recovery into a long-term perspective. She explains that: “looking at the data, it shows me that unless I make a concerted effort to move my lifestyle is actually very sedentary. On the one hand, this is somewhat *disheartening for a life-long athlete*; on the other hand, it is massively motivational to make sure that I make a huge effort to move away from this *sedentary life that I do not like and*



*get back into training on a regular basis*". Similarly, Li, a professional fencer who represented China at top-level international competitions but opted out of professional sport to pursue a high-profile career in the UK, explains that tracking helps him to be consistent in his return to physical fitness by means of forcing him to see inconsistencies in his training and to maintain motivation and focus. Gabriel explained how, in preparation for competition, tracking is not exactly "very easy or nice". Li summarizes a conclusion shared among the respondents: "You win an award – that only happens in one day, but before that you spent a hundred days just doing normal work", where tracking is a part of such work. In those accounts, self-tracking again services meaningful personal projects.

In addition to life-stage transitions, social environments were also reported as being a source of a turn towards tracking. For example, a number of participants explained how by using tracking, they outgrew and challenged their or their families' unhealthy habits. To illustrate, a younger participant who still lives with their family reported that it is difficult for him to make better nutritional choices owing to cultural restraints imposed on him by the feminized nature of food preparation. He explained that with the help of self-tracking and NHS programmes, he was able to lose a significant amount of weight (10 stone and three clothing sizes). He was able to make more informed choices when he shopped for his lunch, as well as educate his siblings about nutritional issues. Other participants reported that their lifestyle choices, including that of engaging in self-tracking, were impacted by negative health events witnessed within their families. For younger participants, tracking accompanied the acquisition of new cooking skills, health knowledge, as well as shifting dietary preferences. As participants' reflections demonstrate, self-tracking provided reassurance of being on track, strengthened the sense of achievement, and contributed to selfhood-building.

In summary, in the cases mentioned above, self-quantification was grounded in life-course development, such as aging, growing up, or becoming a parent. The practice itself rarely took centre stage and was frequently treated as supplementary to broader, meaningful lifestyle changes, such as new diet or exercise regimes. The participants reported using their devices to boost confidence (e.g. by reviewing past achievements) or to drive their motivation to keep up their routines, get over humps, and to push through “boring” aspects of their health and athletic regimens. In sum, none of the life-course transformations featured self-quantification as its core practice, nor – as we might expect from a conceptualization of technologies of the self – did they support a specific, non-diverse type of lifestyle change based on externally determined norms and goals. The next section develops further discussion about participant values and their relation to self-tracking.

### Reflecting on Tracking in Relation to the Idea of “Healthy Body”

Previous sections contextualized how self-quantification is understood by the participants and how the practice plays into personal life-course transformations. This section explores how participants understood what constitutes a healthy body and contextualizes the responses in relation to self-quantification. Such analysis was conducted because the practice brings the health of the body – or rather, proxies that stand in for a healthy body, such as resting heart rate, calories burned, or quality of sleep – and occasionally the health of the mind, into focus, making it a productive line of inquiry for examining how corporal experience are reflected upon by the trackers.

When asked what “healthy body” means for participants personally, the most frequently mentioned definitions (14 times) did not relate to any specific characteristic, such as heart rate or performance, but rather, to feeling energized (e.g. “having a *lot of energy*”, “not being tired, feeling

a *lot of energy*”, “having a *lot of energy* being able to do so much and having a spring in my step”, “if you got a healthy body you *got the energy*”, and “not healthy, you are *kind of lethargic*”). Those were closely followed by definitions focusing on feelings associated with the idea of a healthy body: “feeling optimistic”, “it is a joy to have a healthy body”, “feels amazing”, “positive confidence”, feeling good, having confidence, the body as giving pleasure from exercising, “enjoying doing some physical activity”, and feeling well emotionally about oneself. Other participants, especially those reporting chronic health conditions, interpreted not feeling pain, strain, or “mental fog” (i.e. as opposed to being able to focus or having a clear mind), or knowing about the existence of internal organs. To illustrate, Alistair, who lives with CFS, explains: “*I have different types of healthy days [as opposed to having a constant state of healthy body], I had a healthy day when my brain works so I don't have brain fog or I have a healthy day where I can physically move without being in too much pain*”. Athletes in the sample, on the other hand, reported positive feelings from exercising and pushing one’s body, such as body aches, soreness, and tiredness, as part of the healthy body. As athletic participants reflect: “*I was going to say, no pain, but I’m constantly in pain from the cycling, it is self-induced [...] and so... I wouldn't say pain-free*” or “*I am pushing myself and doing good when I am aching, does that make sense, so I get muscle fatigue, so in a way that kind of pain is I see it as a good thing*”. Finally, some participants made reference to the weight or the shape of their bodies – not in specific numbers, but rather as a general idea – with some making a connection to being able to perform daily functions, such as taking stairs. Willow explains that a: “*healthy body to me is when I feel fit, when I am not like when I don't get out of breath going up the stairs, I can play a full match of netball without feeling like I am going to die, [...], it is more about how I feel when I am doing exercise, that is how I judge it, that, and if I can fit in my jeans*”. In short, a healthy body in the

participants' accounts was related to feelings and experiences, rather than metrics. Indeed, references to self-quantification, data, and health goals are absent in the responses.

These are striking findings for three reasons. First, none of the participants referred to normative ideals of sleep, weight, calorie consumption, or thousands of steps made, as might be expected from self-trackers; instead, they focused on embodied experiences of joy, having energy, and being able to perform activities. Second, many participants brought in the concept of mental health in the discussion of a healthy body, stating that one is not possible without the other, either for them personally or as a general ideal. For example, Vijay explained: “balance both; you need to be mentally stable and also physically as well so you feel very confident and you feel like you have the ability to carry on and pursue challenges in life and physically you feel more up to things”. Furthermore, Vanessa reflected: “I think healthy body for me is like a healthy mind it is the big like [...] such a big contribution to your body health you know, your heart, and your lungs and stuff like that [...] but I *mean if your mental health isn't there or you know ticking away properly it will have a big effect all over*”. Third, the participants recognized that a healthy body is not a permanent state: it has ebbs and flows, and requires attention and work – as one of the participants puts it, “a healthy body is something *that is worked for, is born out of effort*” – but even when such effort was mentioned, self-quantification was not discussed as a part of achieving it. With more Foucauldian-oriented ideas, such as technologies of the self or medicalization, we are able to capture self-trackers' ways of thinking about healthy bodies in relation to quantification, and we would expect more normative standardized concepts – ideal BMI, calorific intake, body measurements – to appear in the discussions, as within those frames power operates through internalized obligation to meet standards and prescriptive measurements. As evidenced by the analysis above, this is not the case for the participants, as reference to predefined healthy metrics

were not reflected in their responses. In contrast, health is discussed in terms of unmeasurable experiences of “feeling” energetic and being in balance. While in everyday life, health metrics contribute to the maintenance of a healthy body, they were not flagged by self-quantifiers as valuable in and of themselves.

In the absence of specific tracking references, it is reasonable to conclude that competing conceptualizations of the practice are illuminating. Perhaps potent lines of further inquiry would include a question of how self-quantification is mediated by other personal values, such as the balance of mental and physical health, energy, and strain. Close examination is likely to uncover the significance of the practice to its users not as presented by commercial discourses, but as relevant to and experienced by them personally. Examining mediating values, for example, can uncover a contribution of self-tracking that is not focused on a specific metric/goal/positive numerical value, but on the negative outcome, such as conquering the mental fog or strain in daily life. The prevalence of references to mental health or the balance between mental and physical health call for an examination of how those are (not) presented together by the quantification devices and applications. Finally, the focus on energy, lethargy, pain, and joy might be indicative of what is not covered by simplistic metrics used in tracking to date.

### Dimensions of Reflexivity: Learning about Oneself

After theorizing definitions and examining the role of self-quantification in life-course transitions, this chapter turns to examining deeper reflections of the participants on their practices. The findings presented in this section were drawn based on thematic analysis and explored the benefits and frustrations of self-tracking (vis-a-vis devices, data, and analytics) in everyday life, future imagination of the practice, and the role of quantification for self-understanding.

## Tracking Motivation & Understanding of the Self

One-third of participants mentioned motivation as the biggest benefit they receive from the practice. The responses ranged from the enjoyment of seeing their goals met and the ability to look back with pride on personal accomplishments, to daily boosts of inspiration and quantification's ability to present goals as concrete and achievable. Even some of those who were originally sceptical reported changing their minds about the motivational dimensions of tracking – Lydia explains that: “Today I have changed my mind about a fitness tracker. This small wrist band *actually supports and encourages you when you feel tired, down or have a lack of self-confidence*. How pleasing it is to check the tracker and find out that the dashboard is green. And a message: ‘You are in to win it.’ *It makes you happy.... Ok, a little bit happier*”. Benefits of having data analysis were mentioned by at least one-quarter of the participants, but were of special interest to those who needed “precision” to meet their lifestyle goals or to maximize “marginal gains” in athletic performance. This discussion was mostly informed by the experience of athletes and medical professionals. Paul, Evelyne, Margaret, Aurora, Roy, and other athletes described in detail how data enhances their practices, including exporting their data into a spreadsheet, conducting additional analysis, and sharing with others who command data expertise, such as personal trainers. Margaret explains: “*without having all that data to hand you can't train effectively, you can do a run you can do bike and stuff but if you are not doing it with any purpose you are not actually going to improve you are not going to get faster, you are not going to be efficient so the data is really crucial to do whatever you have to do*”. Similarly, Aurora pointed out that as she grew to understand her own statistics better, she became able to work more intelligently with numbers; for example, she reported being able to predict physical tiredness based on data before bodily fatigue settled in. Those participants mentioned the importance of both negative and

positive feedback for their performance, as well as the significance of having heart rate and long-term performance data, without which intelligent training would not be possible. Medical professionals and chronically ill participants also pointed out the importance such data holds for monitoring health conditions that require long-term maintenance. For example, even before the process of tracking was eased and popularized by technology, John – who suffers from Crohn’s disease – tried to identify correlations between different types of foods and flare-ups of his disease. Similarly, Alistair tried to better understand his CFS and also believes that tracking might help him understand his patients’ adherence to prescribed medical regimens. It is interesting to note that information gathering and analysis benefits were not mentioned more frequently or by a broader set of users, who described the benefits in more generic terms such as “being in good health”, socializing via devices, and using silent alarms.

When the participants were asked to recall anything new they had learned about themselves based on their data, the responses varied. Some (Nathaniel, Mark, Katie, Vanessa) explained that while they might enjoy tracking, “it is *not very enlightening*” and that with time, it becomes increasingly difficult to gain new insights from tracking. Some participants reported practical benefits related to learning about their own patterns, such as when they take the most steps, that they exercise in seasonal waves, or when sleep best; they were also able to establish personal benchmarks against which personal progress could be measured. For some, the recognition of personal trends led to changes in the ways they act; for example, some participants reported realizing how consumed calories unexpectedly added up, or how the food they ate affected their athletic performance or mood. The participants reported realizations about data inconsistencies, as well as the unexpected effects of food and alcohol on their sleep and athletic performance, although such responses were few. Others (Mary, Evelyne, Eloise) pointed out that instead of learning

something new, the main benefit of tracking for them was that of confirmation, which made them feel “more in tune with” themselves, increased their awareness of good and bad days, and enhanced bodily awareness. To illustrate, Helen reported that since she started self-quantification, she has felt more respect for her body and has had fewer self-image issues, while Vijay pointed out that his confidence has improved. Other personal discoveries were related to stress and productivity, as participants examined heart rates during exams and job interviews, journeys on the London Underground, fighting with partners, or taking breaks at work. The idea of enhanced self-awareness in relation to snacking, sleeping, feelings anxious, and exercising was brought up by various participants, but it mostly remained unelaborated on. Some participants also discovered how prevalent tracking was and how many of their conversations now centre around the practice.

The analysis shows that reflexive insights about the practice focused almost exclusively on its motivational ability and the capacity to enhance training, but predominantly by those who cannot be classified as typical users (i.e. athletes, people living with chronic health issues). The participants pointed out that the practice bore few novel discoveries, serving frequently as a confirmatory tool for something they already knew, and performing instrumental support tasks that enabled training and health maintenance. The self-discovery element of the practice was rarely reported. Overall, the reflections were not very diverse or unexpected, and the limitation of the practice in its existing form was aptly pointed out by the participants.

### Quantifying Frustrations & Benefits of Self-tracking

The discussion of the frustrations and benefits of self-quantification ran through every interview and thus constitutes a fruitful ground for analysis. Such reflections represent a more complex form – or second layer – of reflexivity, as they target not only material devices, but metrics, quality of data, and other complex dimensions of the practice. The participants noted three



broad types of limitations (for a detailed analysis, see summary table in Appendix 14): material, technical, and action-enabling. Material and technical limitations discussed by the participants speak mostly to the hardware and software capacity of devices and are therefore mostly mechanical. The participants reported issues ranging from poor communication among tracking devices or between the device and its respective mobile application; limited and country-centric databases on which food tracking applications rely; issues with non-transparent data flows; poor communication and abundance of advertising; unattractive or uncomfortable physical attributes; and a lack of desirable functions. To give a few examples, a number of participants expressed their frustration at devices failing to capture how intensely they were exercising. Roy explains: “one of the most annoying things ever is [...], *when you have a workout you work really really hard and your tracker actually says that you haven’t gone out of zone 2* in terms of your heartrate and you know full well, *that you are dying*. Do you know what I mean? Really really annoying, really annoying”. Similarly, Evelyne reported “I mean I have done 5-hour cycle ride and it register no intensity minutes and I am like are you joking?” Alternatively, the participants reported being woken up by the devices when they moved or when they placed their hands closer to their faces. Mary explains: “Also if you knock it in the night, it lights up so if you try and measure your sleep and you are *trying to relax and your light lights up it is annoying*”. When discussing other material issues that limited the usability of devices and apps, participants frequently mentioned a need for an Internet connection, phone storage space, a degree of tech literacy, phone battery life, the need for mobile data, ownership of a smartphone, issues for people who might have difficulty using their phones due to illnesses, and, for women, the absence of pockets into which the device can be placed for a more accurate capture of steps.

## (In)Accuracies in Self-quantification

On the more abstract side of the scale, poor accuracy of the devices was particularly frequently mentioned. Such issues constitute a deeper level of reflexivity because participants not only reflected on their practice, but provided additional evaluation of this specific dimension of self-quantification. Some reported inaccuracies as humorous occasions (e.g. a “vigorous hair wash can get you 200 steps”), others reported more mundane inaccuracies (e.g. “an hour’s piano practice could give 7800 free steps”, sitting still on the sofa registered as sleep), and yet others’ reports of inaccuracies were imbued with frustration. Physical impossibility was frequently mentioned as alerting the users to accuracy issues: for example, a swimmer found out she had swum an odd number of lanes while starting and ending at the same end of the pool, and another participant reported seeing records for activities that never happened – “sometimes it would tell me how far I have run, and I never run anywhere so I don’t know how it gets that I was running”. Similarly, a participant reported being tipped off about the accuracy issue via an exceedingly high heart rate registered by his device: “...well, [...] I think I would have been dead if it was accurate”, he explains. Finally, a number of participants suggested that the true nature of their athletic efforts was not captured by the tracker, which caused irritation – to illustrate: “*I’m about to die here* [exerting physical effort] and *you are telling me I’m taking it easy or work harder!* It’s like no way no way, I can’t work any harder”.

The issue of accuracy was pertinent, moving the participants to validate their devices. Aurora and Mary double-checked their trackers against professional devices – medical-grade heart-rate monitors at the specially equipped gym and respective GP practices. Nathaniel, who lamented in relation to his sleep data that “*some days I just don’t recognize the results!*” along with Hillary, Zoe, Victoria, Florence, and Aurora, validated devices by comparing them to their friends’

applications or other personal devices. In doing so, Nathaniel noted that his step count discrepancy was not negligible (around 3,000 steps), and Lydia found a 15% discrepancy in heartrate between her tracker and the record in the app. Hannah wore the same device in different positions – as a bracelet on her wrist and as a pendant – and the discrepancy in measurement for similar activities made her question the utility of tracking altogether. Many participants suggested that calorie expenditure and intake are most likely to be inaccurate if inputted via databases and due to the fact that individual bodily differences are rarely considered in calculations.

The reflections on accuracy are telling, because participants commented on the validity,



Figure 11: George's Reflection of the Meaning of Self-tracking

reliability, and overall quality of tracking rather than simple statistics. Such observations are important because they provide deeper insight into how introspection in the context of self-tracking operates, including a meta-reflection on the practice. For example, some participants commented that while they acknowledge tracking failures, absolute accuracy is not required for their practice; systematic error should not undermine their overall results; and inaccuracy does not

undermine their overall desire to track. Alternatively, some of the more active participants reported that they were aware that they can easily meet their health targets – owing to having animals that need walking, living out of town, needing to walk to work, having well established exercises routines, living in a multi-story building, and not having issues with sleep – without having to

measure their steps precisely, but they still enjoyed self-quantification. For others, it was not the numbers themselves, but the tracker as a reminder that kept them mindful of having to act in a particular way. For example, George, who attached the image above to his diary, explained that due to his work, he is required to remain sedentary for long periods of time, and thus for him, “avoiding making a dent in the seat is just the start” (the sentiment captured by him in Figure 1, above). In sum, the participants are aware of the issue and reflected on it; however, it had little bearing on their engagement in tracking.

### The Matter of Metrics

Tracking metrics and measurements were a subject of critical reflections, although the conclusions on this topic were fewer and less complex. For example, when asked how a particular measurement is produced, the participants responded with a variation of it is “just magic” – as one participant puts it – while other participants reported reading manuals, or asked the researcher for clarification on how different activities were measured. The participants were most familiar with measurements of steps, citing pedometers and pointing out issues of stride length and individual heights, as well as occasionally explaining that sleep was measured by the amount of movement they make during the night (i.e. medical sleep tracking relied on the same idea, making movement as a metric a sound proxy at least for people who do not suffer any sleep disturbances; see Bhat et al., 2015; Bianchi, 2017). On occasion, the participants referred to different sleep stages, an analysis of which has been introduced to some devices at the time of study. Stress levels and VO2Max were often mentioned as metrics that should require special equipment, such as face masks, in order to be measured accurately. The athletes were better informed about the metrics of their performances; for example, Aurora mentioned: “I have like power meter on my bike and it send the data to my Garmin [...] and also, there is another things that I track is my cadence [aka

pedalling rate]”. She went on to explain how power measurements can be taken and compared as output among different cyclists. However, such comments focused more on specialized equipment than on trackers in general. The overall sense of the responses here is that the participants were interested in how some measurements were taken, but when directly asked about how something is quantified, they came short of the answer; otherwise, the ways specific proxies are taken did not appear to be of pivotal importance to their practice.

### Meta-reflections and Critique of Self-quantification

The frustrations that moved past the material dimension were equally telling. Frustrations related to the non-material dimension of tracking gave an indication of what can limit or enhance personal introspections based on the practice. The responses are of significance because they exemplify second-level reflexivity, as the participants provided meta-reflections on both technology and the practice. Such reflections frequently contained normative critiques of self-quantification. The limiting factors, poor quality of feedback (i.e. not personalized, focused on short-term goals, no clear reasoning behind instructions provided), and the questionable utility of recommendations (i.e. unrealistic, repetitive) were frequently reported as sources of frustration. To illustrate, participants pointed out that devices were not sophisticated enough to register important training needs, such as rest days, weightlifting, or hurdle running needs, and focused on short-term goals at the expense of long-term progress, thus encouraging over-exercising. As such, self-tracking failed to consider the cumulative nature of training. Evelyne explains how that creates issues with her exercise regime:

*One of the problems of a self-tracker is it does override your better judgement about when you should or should not exercise. Still fairly knackered from yesterday's cycle I spent all day at work thinking I wouldn't go for my planned run when I got home – but once I got home my tracking device made me feel guilty enough to force me to go out the door. Then I had a horrible run as I really was too tired and now the stats from my tracker look rubbish as I was way slower than normal!*

In the quotation, her statement about quantification overriding a subjective judgment is an example of a normative critique of the practice. The quotation also contains an evaluation of the outcomes – “horrible run”, “rubbish” statistics – of such engagement. Similarly, the feedback that devices and applications presented was described as unintelligent, as it provided an inappropriate judgment along with information. To illustrate, Edward clarifies his experience in an example of food tracking:

*A lot of apps would tell you if you have eaten a thing that contain a lot of sugar or rewards you if you eat a thing that contains a lot of protein and I think that is incredibly frustrating because it is not for the app to tell you whether you are wrong or right to eat a thing. It is just there to record what you do, and I really like the way the app I am using it is not trying to do anything like that it just says this is what you did and then it up to you to say is it wrong or right?*

The judgment resulted in a sense of personal disappointment, guilt, frustration, and elation (this thread is developed in the Chapter 8, on ethics), raising a question about the desirability of such an outcome. In addition, feedback was reported as one-sided. For example, Katie pointed out that even top-of-the-line applications aimed at women’s health were not smart enough to account for how different contraceptive methods might impact menstrual, mental, and general health of its female users.

The aforementioned quotations point to a broader conclusion about self-quantification: the participants do reflect deeply, not only on their numbers, but on the practice of tracking and its consequences. Yet, despite acknowledging the limitations, participants recognized the appeal of the practice, stating that on the days when they failed to record their activities (e.g. drained battery, forgetting to put a device on, leaving their phone at home), despite having had their walk, healthy lunch, or being active, the participants often regarded their own efforts as “wasted” in view of the absence of the record. Roman explains that he has no rational justification (“don’t ask me to explain”), but he feels that: “The fact that an *anonymous object is no longer recording something*

*I am doing would be a loss for me*”. Such strongly-worded and abundant commentary indicates that the practice is deeply meaningful to the participants regardless of its well-acknowledged limitations. Furthermore, while the participants expressed a level of dissatisfaction with the process, some adjusted their practices to account for this reflection. Evelyne, for example, reported engaging differently with the data, focusing on the general long-term trends rather than the daily numbers. Victoria humorously reported that the accuracy of feedback does not matter: “as long as I am winning, I am fine”.

In other critiques, the participants described the feedback as repetitive, impersonal, generic, not of practical use – even if the sources of the advice were highly regarded and backed by science – or hard to enact in practice, especially in relation to sleep or clearing out cupboards and cooking, particularly for those living on a low income. The participants reflected deeply on the nature of tracking, by questioning the usefulness of metrics used to compare people in quantification competitions and inquiring if the number steps taken are a telling proxy for athletic performance, stating that relationships between health and exercise are more complex. Another point of concern was poor personalization, as the participants reported themselves and others receiving the same athletic goals despite clear differences in heights and weight. The participants also reported that the feedback was not very usable, but enough to make some kinds of inferences; as one participant puts it, it “*not very sophisticated, but enough to just try and sort of go why*” something happens. Finally, the time-consuming nature of tracking was reported as the biggest limitation to the consistency of the practice, especially in relation to data that required manual input, such as food consumed or hours slept. The participants reported that such issues limited their willingness and ability to track specific aspects of their lives.

## Making Quantification Practice Better

Interestingly, the participants did not simply raise the issues they had with devices, but offered creative solutions, demonstrating yet another level of thinking and introspection about the practices and what they would want to see changed. For example, the need to charge devices (which leads to inconveniences and data loss) could be ameliorated by the use of solar batteries; intensity of exercise was proposed as a novel comparative metric for calories burned; and interconnectivity and inter-device communication were flagged as one of the most pressing needs. Data presentation and feedback were also reported as requiring improvement in the future. For example, Evelynne suggested that instead of the binary division of achieving/not achieving goals for a specific day, visualization and analysis could include additional information about goal achievement in the long run, as this is more likely to impact health. She also suggested a use of more nuanced colour scheme, over the binary scheme currently in use, so as to facilitate a more nuanced distinction of how closely an individual came to meeting each of the goals.

Multiple participants reported a desire for more comprehensive tracking options within a single application or an easier way of connecting different data streams, so that metrics for periods, moods, contraceptive types, and pain can be tracked in a single space, rather than being scattered across applications that cannot interact with one another. One of the participants explains that given his health condition, he spent half an hour per day inputting “more or less the same information” into numerous different applications, expressing his desire for a “mega-app” that can accommodate all of his needs. Similarly, others reported using a combination of up to five different apps and devices to track desired aspects of their health and training. Some participants reported supplementing their digital tracking with pen-and-paper diaries for tracking their weight-lifting routines, which were mentioned as among the least convenient to track digitally. Another



feedback-related point had to do with the focus on numbers only. Emma explains that mental-health tracking “should not be reduced to numbers” and suggested that open text might be a better fit (e.g. “I just feel a bit neutral today, I am feeling a bit happy, maybe agitated, over excited”), resulting in a less reductionist analysis via word clouds and frequency counts. All of the aforementioned reflections signal that the practice merited deeper levels of thinking about the practices and how those could be improved to be made meaningful to the participants.

The participants also reflected on imaginary tracking practices that might enhance their experiences in the future. On a more pragmatic side, the responses were limited to technologies that already existed and proposed medical-grade devices for blood-pressure and blood-sugar monitoring, cholesterol, white and red blood cells, body-fat percentages, smart posture correctors, prescription compliance, and air quality, or additional coaching that comes with new devices. On multiple occasions, the participants pointed out that the devices are not “intelligent” enough to recognize such elementary characteristics of the environment as elevation angles, wind and other weather conditions, or different road surfaces – all leading to inaccurate records – and suggested that these should be addressed in future. On the more imaginative side, participants wanted to measure galvanic responses of the skin, estimate levels of pain and dehydration, quantify how much they talked, calculate the entropy of their bodies, and register thoughts and moods. To illustrate, older participants were interested in knowing about effects of aging on their cognitive abilities.

However, deeper reflections were not always positive. One of the professional athletes was sceptical about tracking too much – he concluded: “I think *this kind of life would be too boring*, I think sometimes you just need to be casual a bit dumb and stupid”. Another participant was worried about the future implications of self-quantification; to make her point, she told a story in which

her doctor used a mobile app to measure her anxiety and expressed concerns about it, saying: “I *also wonder if it’s an actual NHS data app or who invented it* or if he’s allowed to do it? I understand as a *doctor he cannot actively hurt me but issues such as consent, do I want to do this little app don’t really come up*”. These instances are indicative that while tracking has made its way into our everyday lives, the practice raises concerns even for the active self-quantifiers who describe the practice as beneficial. The reported issues included worries about non-transparency of data flows, unauthorized second-hand use of data, reduction of lived experiences to metrics, unintelligent analytics that could be a source of stress, as well as health harms, and the more benign failure of technologies to capture elements of the environmental impact of activities. Such concerns are indicative of the fact that the practice is subject to deep reflections by the participants as well as the recognition that it can result in substantive harm.

### Meaning and Significance of the Practice

The final section of this chapter probes into what kind of reflexive questions the participants raised in relation to their quantification practices. Such reflections were commonly found in the concluding entries of the diaries and exit interviews (at least 31 instances). Reflective questions touched on issues of introspection on both individual and societal levels, and the analysis examines them in turn.

Since the practice of self-tracking is grounded in personalization, it is not surprising that many introspective questions were directed at the self. The questions focused on three issues: its contribution to self-discovery, its role in everyday life, and the value of the practice.

The self-discovery lens touched upon personal relationships with the practice of quantification, and the participants’ conclusions show how deeply the practice is ingrained in their lives. To illustrate, Zoe asked: “as for myself, what have I learned?”; Dawn wondered: “what it

would be like to take a break for a few days?” and “if I was to stop wearing it, how long before I missed use of it?” Summarizing overarching sentiments, Melissa explained: “To conclude my diary on self-tracking, I have learnt that I measure myself to some degree through it, *how well I'm doing at life. I didn't realize it meant that much to me until I started thinking about it*”. On multiple occasions, the participants concluded that tracking affected their mood and outlook; anecdotally, looking at the tracker and seeing a poor pattern of sleep made them feel more tired (similarly, it made their day “good” or “bad”). As Vanessa explains: “I wake up tired, sync my tracker to see that I only slept 3 hours – ‘oh, that’s why I’m tired’. *It feels justified*. If I wake up tired but I’ve slept 7-8 hours, *I could almost trick myself into not feeling tired, as this technology says I slept fine*”. Professional athletes (Margaret, Li, Paul) reported that a session without any data might be “liberating” to “be free”, but concluded that the data is needed in order to achieve the best performance results, as “every session counts”. On the darker side, the participants wondered if their devices came to control them – “*where does all the tracking stop?*”, “Maybe it *takes the joy out of eating for me?*”, “if I can look back on the week of data I think ‘Right, so I didn't do all the steps so I need to be doing this’, you can tie yourself in knots like that; I think that [...] *letting the tracker take control and I don't think that is such a good idea, isn't it?*”; and “perhaps *this wrist thing is controlling ME now?*” – as well as what the outcomes of stopping would be. Some reported having to remind themselves that they are in charge of the device and not the other way around. Hannah summarizes that sentiment poignantly: “While I feel that *it keeps me motivated, it also makes me feel guilty* and much more aware of when I don't move as much. *Is that a good thing?*” This sentiment was echoed by another participant as: “self-tracking is an interesting thing, it is useful in some instances [...] *but is it really necessary? Is it positive?*” and “*just another*

*distraction* in life isn't it so?" These quotations illustrate that the practice of quantification is connected to complex self-evaluations, including achievement and quality of life.

The second set of reflective questions at the individual level focused on the role of tracking in everyday life. Nathaniel states that an "interesting thought came to [him]": he explains that people in their daily lives tend to look for shortcuts, but that because of the tracker, he finds routes that maximize his number of steps. Similar sentiments were expressed by other participants who changed their travel routines to get more steps in (Nancy, Roman) or to minimize exposure to fumes in London (Jerome). Equally, multiple participants concluded that they realized how much they value the opportunity to exercise. Contrary to this belief, three participants (Camilla, Mark, Katie) reflected that their beloved activities – walking and eating – were made less pleasurable when they had to think about the goals they had to accomplish or benchmarks they had to hit. Some participants realized that they did little with their data (see Chapter 5, on culture) and wondered in their reflections: "*why [they] bother tracking some of these things*"; "how much tracking is too much tracking? *Is there a point where it becomes counter-productive?*"; "I am sitting on all this data about myself like from like months and months of data *and like what DO I DO with it?*"; and even "*why am I using this?*" For example, Alistair was convinced that he was using his device in a proactive way, only to realize that he ignores alarms set for meditation and breathing exercises, and that despite having medical expertise, he does not do much with the data he gathers.

The participants also ruminated about the value and future of their tracking – whether they were getting enough information from their trackers, whether they became over-reliant on their devices, and whether would lose interest or motivation to use their devices in the future (e.g. "a question for me is, do I have the will to use an activity tracker in the future?"). One of the

participants wondered: “*should I have seen this* [health episode] coming and taken corrective action to prevent it from happening?” Another participant explained: “at the moment the data that we get from our trackers is nice to have but *it does not actually mean much* – would this *more detailed and personal data change that?*”, wondering if that would change in the future. At least two participants concluded that they were too preoccupied in their lives to continue tracking for the long run – “*if my Fitbit broke, would I replace it?*”, one individual ruminated. The issues of over-reliance and attachment received some reflection. To illustrate, one of the participants, whose favourite tracker broke, described the situation as the “drama” of losing her “beloved” device. In a few instances, participants realized that they “punish” themselves based on the data they collect. In a similar vein, some reported that they rely on data to the extent that they would eat more than they wanted because the app would suggest that there is still a calorie allowance remaining. Finally, some expressed experiencing a sense of relief when they did not meet their goals, as having to meet multiple goals in a row leads them to an “overly obsessive path” or to develop a “dependency” on the device.

The first two sets of reflexive questions the participants asked themselves in relation to the practice are concerned with the practice’s personal and broader meanings and impact, its limits, the hold it has over participants’ lives, and its normative “goodness”, as well as what value, if any, the practice adds to people lives, and whether their investment in self-tracking and the response to it is justified. All these questions go far beyond the instrumental nature of the endeavours, signalling that the participants perceive the practice as deeply meaningful and that they seek to make some sort of judgment about their activities.

The other set of reflexive questions was directed at the wider societal forces. Some participants wondered how many tracking devices end up in drawers after a week of being worn,

how can they decide which app or device is the “right one” for them, how reliable the devices are and whether they are personally “bothered” if they are not, and even ask “is the Big Brother watching me?”. Others were concerned about self-tracking contributions to personal religious practices – for example, where tracking had the potential to help with overindulgences, especially in regards to food. As Nathaniel summarized, “how can we ensure that our *health and wellness choices glorify God*?” In a similar vein, but from a more agnostic standpoint, another participant wondered how the tools would be used in the future to support different lifestyles. Finally, Jerome explained that reflecting on self-quantification matters to him as he came to link it to broader issues in his life, such as parenting, surveillance, and living off the grid; in his reflections, he expressed worries about his children being tracked without their permission or awareness. Other participants wondered where the data goes and how data about those who cannot consent, such as children, is collected and used. As Rose summarized: “in the endgame, *who has the real [...] information at the end of it*?” Emma responds with a similar sentiment, questioning which institutions would be able to make use of data and what their biases might be.

After being exposed to media discourse about the weaponization of all kinds of “machines”, some participants queried who has access to data, what it is being used for, and whether the information could be used against them. Interestingly, such opposition was the strongest in the context of location services, perhaps because it is easier to foresee harms done as a result of location disclosure (it is common for wearables to have a GPS function assisting fitness tracking). For example, a participant wondered “why do I need to tell you every step of my journey?”, and Roman gave up tracking his personal contribution to global emissions and how much money he saves travelling, passionately concluding “*no, I must draw the line!*” By asking such questions, the participants signalled that they made connections between the practice and

wider societal developments, such as surveillance, data use, and even religious practices, and reflected on the limitations and boundaries of this. Such connection is important because it acknowledges the weight the practice carries.

The analysis outlined in this section illustrates reflective and meta-reflexive introspections of participants on their practices of quantification. The participants expressed their views on the contribution tracking makes to their sense of self-discovery, everyday life, and value of practice. The analysis shows that the participants reflected thoughtfully not on the metrics they collected, but on the wider contribution tracking makes to their and others' lives. The appearance of normative judgments first became apparent in this analysis; the issue will be further discussed in Chapter 8, on meta-ethics and morality.

### Summarizing Thoughts, Links, and Conclusions

The analysis presented in this chapter explored complex first- and second-order reflections of the participants on their tracking practices. Specifically, the findings of the chapter first demonstrate how an ostensibly insular and routine activity becomes woven into dimensions of individuals' lives by, for example, informing life-course stages, and second, how it is subjected to deep reflections filled with contradictions and tensions. These wide-reaching connections and deep reflections are important because they call for theorization which is likely to move beyond stringent frames of governmentality or neoliberal selfhood and which accounts for inherent internal tensions, takes into account the various temporal planes on which tracking unfolds, and grounds the practice in relation to self-quantifiers' long-term goals and the objectives they try to achieve in their lives.

The former set of findings has implications as to how we understand the role of self-quantification in everyday life. The majority of participants did not perceive self-quantification as

a novel practice enabled squarely by technologies, but instead, as a part of a thought process or an innovative type of record-keeping for purposes of self-discovery, motivation, or validation. Furthermore, the findings make clear that the practice came to play into specific personal projects and different life stages, especially during periods of major life adaptation or adjustment. The role of self-quantification in support of healthier lifestyles later in life, in preparation for parenthood, in support of living with specialized health regimens, or in returning to exercising after trauma was discussed in depth by the participants. The participants linked their practice to dimensions of their lives. A quotation from one of the participants summarizes the argument neatly:

*I was tracking myself and I didn't realize that it will get me thinking about pretty much everything that happens on a day to day basis [...] you know, just from tracking steps to really sit down and to be perfectly honest, I don't think I have set down before that, if you hadn't put in there I don't remember about, but you said how it made you feel and it just made me start thinking more and more about other things*

The latter set of findings explore dimensions of reflexivity in relation to self-quantification. The participants show critical insight in their evaluation of the practice, including accuracy, barriers to use, and motivation, but more importantly, they reflect and make normative judgements about the practice, adding another layer of reflexivity. For example, the participants reported their trackers as not being accurate, but that did not diminish their interest in self-tracking. Thus, self-tracking as a practice – sold on the premise of a healthier and better life – is not taken lightly by people who recognize that this might not be the case. This analysis is valuable because it demonstrates that the participants reflect deeply not only on their personal statistics, but also on the nature of the practice of tracking itself, identifying tensions and proposing potential work-arounds. In particular, the participants reflected on the limitations of the practice; the nature of feedback and its usefulness, normativity, and presentation; and the allure of the practice despite its restraints. For example, one of the participants draws attention to the idea of improvement,



explaining that: “in mindfulness, we are reminded to be aware and not judge ourselves, yet self-tracking provides you with an *unshakeable sense that you must always ‘improve’*” (the argument further explored in Chapter 8, on ethics).

The final section of this chapter illustrated the types of self-talk in which the participants engage in relation to the practice. The findings touch upon inward and outward reflections and their links to bigger issues such as surveillance, religion, and personal transformations, as well as social issues to which tracking can contribute. The findings feed into the argument that self-tracking is not perceived as an insular practice, but is reflected upon and situated as a practice within everyday life.

Overall, the chapter also points to two larger issues of concerns – privacy and ethics of quantification – that will be taken up and theorized in the analysis that follows. As some of the quotations in this chapter made clear, self-quantification made the participants feel a specific way (e.g. a bit rubbish, obsessed, proud, good) or induced them to take a corrective action irrelevant to the physical dimension of their lives (e.g. punishing themselves for not exercising or overeating). The next two chapters, on privacy (Chapters 7) and meta-ethics and morality (Chapter 8), will explore in more detail some of the themes raised in the analysis. The former chapter will look at the issues of surveillance, data flows, and privacy, and the latter will explore emotions, metaphors, and moral reflections involved in the practice.

## Chapter 7 – Privacy & Self-tracking: Unease as an Alternative Conceptualization of Informational Privacy

### Introduction: Setting the Scene

The main research objective of the dissertation is to examine how self-tracking contributes to our sense of the self. Self-construction is enabled by a set of conditions – not intervention from third parties, autonomy, space for consideration and creativity – at its core. This chapter focuses on the issue that circumscribes these preconditions – informational privacy. Informational privacy, some challenges related to which have been discussed in the previous chapters, is a tension-filled issue for those practising self-quantification. As argued in the Literature Review, privacy protection mechanisms operating at various levels are largely ineffective and prioritize individual action over structural solutions. At the design level, informational privacy is both not valorized as an issue and is undermined by practicalities of production (e.g. relying on third-party identification, not treating privacy as strategically important). At the device level, privacy protective mechanisms, such as data encryption or clear storage and sharing protocols, are not enforced. At the legislative level, existing national frameworks (US, Australia, European Union, Canada) do not provide adequate safeguards to quantified data as it is classified as consumer, rather than medical data, and is thus excluded from the special protective umbrella. At the global level, a comprehensive governing regime regulating cross-border data streams is absent.

As such, the burden of informational privacy protection is shouldered by individuals via the notice and consent regime. The regime has been extensively studied – from non-transparent and difficult to comprehend terms and conditions and privacy policy statements, to behavioural manipulations that operate via defaults, transactional barriers, and decision-making biases and favour companies over individuals. The shortcomings of this regime are widely recognized (see

Literature Review for details). Earlier studies found that self-quantifiers are aware of their data being collected and used by companies, and while some are impartial to its use, others are concerned (Motti & Caine, 2015; Lupton and Michael, 2017; Vitak et al., 2018; Zimmer et al., 2018). Additionally, the users were not always aware of conditions of data collection, storage, sharing, and retention, or what they can do to minimize unwanted privacy invasions, but were not uncritically accepting of the free-for-all premise operating in other data-rich environments. One of the earliest contextual studies aptly summarized privacy's state of affairs in the self-tracking context: users responded to the issues related to privacy with a "combination of resignation, cynicism, and fear" (Patterson, 2013, p.48). Finally, a limited number of studies touched upon the emotive dimension of privacy via concepts such as dis/trust, anxiety, worry, and hope. This chapter advances this line of argumentation.

The chapter derives a new conceptualization of privacy in the context of self-quantification by addressing the following questions: to what extent, if any, are individuals self-quantifying for health and wellness concerned about informational privacy of their data? What kind of concerns do they have? How do their privacy attitudes change overtime and how do they alter depending on a role the participants play in everyday life? And what kind of action do they take to protect the privacy of their data? For the purposes of this chapter, the discussion is confined to a specific type of privacy – informational privacy – as this was most commonly discussed by the participants in relation to their self-tracked data.<sup>13</sup> The departure point of the argument is that informational privacy is vital for the formation of our agentic selves, as it underlies our autonomy, selfhood, and

---

<sup>13</sup> Informational privacy is broadly defined as being able to determine what happens to and limit access to one's own personal information (i.e. that is "relatively enduring features of an individual" Archard, 2006, p.16). This includes collecting, analysing, storing, processing, and making data-based predictions.

identity (Cohen, 2012; Lanzing, 2016; Rössler, 2015), as well as our ability to make decisions, including those about health, without the interference of third parties.

The chapter presents an argument that self-quantifiers, while not fully informed about issues related to the privacy of their data and potentially unable to easily verbalize their apprehensions, are concerned about privacy of their data; this observation results in a gap in conceptualization and calls for a new conceptualization of privacy. A shared sentiment among self-quantifiers related to informational privacy is a sense of anxiety, as users are unsure as to what to worry about specifically, what actions to take in relation to protecting their data, and what their data will be used for. Thus, a conceptualization of informational privacy as “unease” is outlined in the discussion section. Conceptualizing privacy as unease has three main benefits: 1) it keeps analytical attention on privacy decision-making as an affective and fluid process; while at the same time 2) re-focusing attention on the external stimuli rather than internal states of individual users (as opposed to the concepts of anxiety, worry, fear, or trust); and 3) captures the socially shared and structural nature of privacy concerns.

The argument developed in this chapter is significant because it offers a precise, non-prescriptive way to describe privacy attitudes in the context of self-quantification. The proposed conceptualization captures the dynamic and agentic nature of privacy attitudes, focuses on structural factors and the shared nature of informational privacy concerns, and advances the line of argument on the emotive nature of privacy. The argument developed in this chapter further buttresses the overarching argument of the dissertation as a whole, about self-quantification as a meaningful and reflexive practice, in the flow of which concerns about data privacy result in additional tensions. The argument developed in this chapter contributes to the scholarship on self-

tracking and the emotional dimension of informational privacy (Stark, 2016; Wolf, Polonetsky & Finch, 2015).

This chapter unfolds as follows: first, a three-pronged typology of privacy attitudes based on the thematic analysis of responses is presented. The findings concerning privacy knowledge, privacy attitudes' transformation over time, perceived harms, willingness to share, and factors that shape privacy decision-making in everyday life are presented in subsequent sub-sections. The analysis shows how pragmatics of everyday living, such as the absence of time or expertise, competing personal priorities, and lack of power over data-related decision-making, amplify the sense of unease over informational privacy. The discussion section focuses on developing the conceptualization of privacy as unease and surveying the benefits of such a conceptualization.

### Thinking Differently, but Feeling Uneasy: Taxonomy of Privacy Attitudes

The analysis in the chapter on cultural signifiers of quantification found that one-fifth of the participants referenced the literary works of George Orwell or Aldous Huxley in describing the practice. For example, the participants express concern over data flows, suggesting: “it is just *very very Orwellian*” and “*just feeling a bit paranoid about tracking. Is the Big Brother watching me? [...] I am starting to think it is like 1984 and all where this is how it starts*”. The dystopian narrative became a frequent reference point in relation to privacy, as most participants recognized the commercial value of their personal data but had a limited understanding of data flows and privacy regimes. As explored in the following section, the privacy attitudes fell into three distinct groups: those perceiving privacy trade-offs as necessary, those who were only slightly concerned as they perceived themselves as unimportant to specific institutions, and those resistant to use of their data – with the active resistance group being the smallest and the middle group encompassing the most diverse views. All but one of the participants had an opinion about

informational privacy, and the concerns expressed often took an outward-looking rather than an inward-looking view, with participants reporting privacy infractions as important to others, especially vulnerable social groups, and society in general. While privacy action, belief, and knowledge diverged, they were united by a shared sense of an unresolved tension that permeates through most responses, typically through individuals' recognition of their powerlessness against institutional powers and hard-to-verbalize concerns. The overarching sentiment expressed across the taxonomy is best captured by the term "unease", as the discussions of privacy precipitated a sense of unspecified worry in the face of unspecified menace.

### Lacking Open Discontent

The first hermeneutic category contains the responses of thirteen participants who showed limited deference for information privacy. The participants in this category held no illusions – they recognized that their data is constantly exploited by third parties and come to expect that. Couching their responses in neoliberal terms, the participants rationalized their position in one of two ways. Some considered privacy to be a fair exchange for services rendered, while others did not embrace the free market ideology, but saw the lack of privacy as something that: a) they cannot challenge; and b) is not worrisome on the basis of low data sensitivity or the lack of embarrassment that access to such data can cause.

The free market rationale is summarized by the following response: "Nobody does *anything for free [...] if you don't understand who is making money of it – they are making money out of you. [...] but it didn't really worry me, because I got something good in return*". The participants who defended this position on privacy pointed out that in exchange they received "good service" and felt that "life is enriched" by self-quantification. One of the participants also explained that data is a revenue-generating part of business and it can be expected that it would be

used. Few participants expressed this view, often with cynicism, but without much reservation for data privacy. Respondents holding this view frequently stressed that this privacy position applies to them only, redrawing privacy boundaries for others who might want more protection – “*personally, I have no problem, but as a blanket I would say it would be a good idea to just say it needs to be [protected]*”. This preference indicates a recognition that others might have privacy concerns due to their status, life-stage, or signal externalization of the privacy attitudes they personally hold. The lack of discontent can be partially explained by the framing of the practice in comparative terms to other domains of life. Financial, medical, academic, and geo-location data were perceived in comparison as more important than self-quantified data, as those were more likely or, perhaps more visibly, to impact life chances or result in harm to an individual.

A more nuanced set of responses in this group stressed one’s inability to challenge the status quo with regards to data privacy and, therefore, the resulting personal willingness to overlook the issue. To illustrate, Lisa summarizes this position: “[companies] are going to retain our data *unfortunately, it is a part of life, it is not one I am not particularly happy with*, but if you want to use the apps or the technology that’s you *have to accept that*”. Echoing Lisa’s sentiments, Rose explains “I quiet like it [tracking] when I am exercising [...] but I just kind of *forget that, I ignore that side [privacy] of it*”. In both of those quotations, the participants normalized their attitudes by presenting the current state of privacy affairs as a fact of life, yet as a part of critical reflection they also expressed some disquiet: the loss of privacy was the part of the practice they willingly overlooked or were “not particularly happy” about. The informants here also drew parallels to other informational contexts (e.g. tracking cookies, social media platforms, loyalty cards, CCTV, Oyster cards) under which data commodification has been normalized for at least the last two decades. For example, participants ruminated: “I mean Facebook has got loads of stuff

on us, Google too, *what difference does it make if Google knows something?*” and “I mean, so *many things* happen with Facebook and all these. *Where is it going? Who knows*, it has to be stored somewhere, probably vaults in the bank, but you couldn’t really could you millions of people”. The participants thus concluded that the self-tracking context is no different: there is little they can do to safeguard their privacy if they want to use the service, and it falls in line with what happens in other domains of life.

Finally, the lack of concern for personal data in this category of responses stems from conflating privacy principles with privacy outcomes, as well as patent ignorance. With the former, the participants linked privacy to secrecy or/and sensitivity and that, in turn, to the feeling of embarrassment. A heuristic shortcut thus emerged: if self-tracked data cannot embarrass/reveal a vulnerability, it does not result in an active concern for personal informational privacy. With the latter, the participants rarely foresaw potential privacy issues resulting from the accumulation and amalgamation of data. The participants rarely recognized the power of prediction associated with incremental increases in data points or data linkability, which enables the drawing of a comprehensive picture of individual health states and behaviours. Both of these points are illustrated below.

The idea of embarrassment was central in the discussions. Embarrassment stemmed from making the undesirable data – such as failures to meet goals – known to others, thus revealing some kind of personal failure (see chapter on meta-Ethics). For example, participants lamented: “I have even *given up on recording* sleep, I’m *too embarrassed* by how many nights I only got 5 hours” and “*normally, I’d be embarrassed with the above data*, but I have to remember that coming back from injury”. This idea crystalized in the comparative accounts of privacy. To illustrate, Florence, who used to attend *Weight Watchers*, a dieting community famous for their public



weigh-ins, explains that she did not mind her tracking company monitoring her, but abhorred the same practice when it was made visible by the co-presence of others. The sentiment was echoed by another participant in relation to the same community. However, with self-tracking, the lack of immediate observer masks, but not disarms, the observation practice. Rose, Nancy, and Nathaniel make similar points about their sudden sense of “uh?” – as one of the participants puts it – when unexpectedly the presence of observers is revealed via an unsolicited Google review request or an unexpected phone call. Finally, Melissa’s account of embarrassment in a medical interview context comparative to self-quantification reveals the perceived innocuousness of the latter:

self-tracking – you are *in control of it*, [...], you are not answering horrible, *embarrassing questions in public or on Facebook or something*, but yeah *I think it is a bit like that actually* because, [...], say if you are going to sexual health check – that is the worst because even if you are fine, and you have not like you know things, whatever, you still feel really horrible when you are there and *you get asked all these questions* and you *don't want to be there* and you *don't want anybody to see you there* [...]

In her quotation, Melissa starts by differentiating self-quantification as a less embarrassing and more controlled practice, but her narrative wavers to indicate that self-quantification is “a bit like that”, “you don't want anybody to see you there” to other potentially embarrassment-inducing activities, such as medical interviews. In combination, those accounts show that the potential to be subject to a privacy violation becomes more visible when the observer lets herself be known. The mediated nature of data collection does not necessitate “face-saving” measures, thus diminishing observation-induced privacy concerns.

Turning to the idea of data sensitivity, some participants suggested that they are not concerned about privacy because data was lacking sensitivity: “there is nothing on it which is *particularly private* – so there is *this is how I walked, how far I run*, so there is nothing in particular I would mind *anyone knowing* like I have never, *I probably should* [laughs]” and “Because *there is no personal data involved*, I would checked the privacy a bit more, if I felt there was a *true personal data rather than my name and my age*, I think that is the only thing

they capture so”. Indeed, some participants did not perceive self-tracked data as “true personal data”. Developing this argument, Gabriel reports:

*is not too personal in a sense [...]. This is so, if I had like some genetic diseases or something I would definitely not want to have this data stored by the companies to do what they want, but because [it is] just heartbeat, the weight, the run, etc there is not much data –so i don't think any, if there is more [devices] that I tried – data from the skin – that tracks much more information I would definitely rather have something that is kept a bit more secret than the rest.*

In those responses, the participants accepted data collection “at the moment” and framed such collection as being “just” about a specific dimension of their activities or “not too personal”. Yet, the responses conclude with normative statements or externalizations – “maybe it should bother me”, “they should” and “would be more concerned if...” – or pointed out that “others” might want to draw borders of what would/should be acceptable. Those normative conclusions indicate a level of unease with existing privacy arrangements. In the quotation, the sense of unease becomes visible: users are not actively concerned about privacy, but they acknowledge that there is a potential for concern, if not for them at the moment, then for others. The lack of active concern here can be partially attributed to patent ignorance, in that users do not recognize data linkability: their sleep or steps might not be significant on their own, but taken together, they paint a detailed picture of injury, illness, or pregnancy, for example, if combined with location, shopping, income, and productivity data.

In this taxonomic category, some participants accepted data use as a part of fair market exchange, while others did not see ways to resist it, and for others, the mediated nature of data collection dampened the concerns about informational privacy. While the participants reported that they should or might be more concerned about privacy if their personal circumstances were different, the lack of a visible observer and the low potential for embarrassment made the impacts of possible privacy violations less specific in the participants’ minds. The perception of tracked data as not sensitive illustrates the working of bias of incremental information increases – it is hard

for individuals to patch together the impact of the combination of all the small data traces (Acquisti, Brandimarte & Loewenstein, 2015; Kang, 1998; Solove, 2007; Wieneke, Lehrer, Zeder, & Jung, 2016) that they leave, especially when the effect is not immediate, mediated, and less threatening in comparison to other domains of life.

### Not of Importance to Institutions

The unifying argument of the second category of taxonomy was the perceived lack of importance to the institutions that use personal data. The participants described themselves in one of three ways: 1) not being a person of importance/being average; 2) belonging to a generation/social group that does not have to be concerned about privacy; or 3) not foreseeing how the loss of privacy can harm them. In providing justifications for their positions, the participants frequently used negatively imbued descriptors to characterize themselves, such as: an “open book”; “[not] privacy super privacy guy”; “paranoid”; “secretive”; “[not having] a criminal mind”; “[not being] freaks, who thinks that the Big Brother is watching”; “haven’t got any secrets”; “not as secret”; “quite trivial”; and “big brother-ish”. These positions and discourses reverberate Solove’s (2007) nothing-to-hide fallacy in which criminality – or in the self-quantification realm, perceived institutional interest – guided a person’s perception of entitlement to privacy.

The privacy attitudes of this category of participants are best illustrated as follows: “presumably someone can check on that, but if I was, you know, *someone who is a bit more important, like a CEO of a major corporation, maybe that would have been a bit different*” or

There is *definitely an issue around and I might be worried about* it more if [I] was younger, [...] I don't need to be worrying about health insurance [(the participant's age prevents her from purchasing life insurance)], but certainly if you were younger and you felt that you activity on an app or your smoking cessation status or your weight or *anything like that was being fed insurance companies might than affect your ability to get life insurance then it is definitely is going to be a big factor.*

In those quotations, the participants invoke a rationalization for their lack of concern as they perceived themselves as not being of interest to surveilling parties and as not having the data to affect their life chances. However, they acknowledge that others in society might have a reason to worry – such as people of different generations, individuals living in different states, or people suffering from various health conditions – whom the respondents concluded would be less lenient when it comes to data protection.

Furthering this line of argumentation, a participant explores why she thinks she is of no importance to institutions by comparing her experiences to instances where a person suffered harm as a result of drastic privacy violations. Grace recounts stories of real-life harms that came to others when their informational privacy was violated, such as a child finding her biological father by de-identifying the sperm donors, individuals being refused marriage based on the history of genetic cancer, a vegetarian teenager who contracted Mad Cow disease and has been taunted by the media who identified her, and battered women. In relation to these cases, she sees herself in bring in a position as of no importance to institutions that use data: “*obviously, it [data collection] has no implications for me. There is no problem, they can check all they want if it helps them advance their business or whatever, I couldn't care less, but that was sort of...* then I understood that my data are owned by a variety of institutions”. In this comparison, it appears reasonable for the self-quantifiers to assume that they are unlikely to be harmed by privacy violations and thus discount privacy as an issue. The participants’ perception of the self as not being of specific interest to institutions is understood as a protective mechanism. Yet, the participants externalize their concerns by pointing out that people in other socio-demographic groups have a valid reason to worry about the privacy of their data.

The knowledge related to informational privacy in this group was mixed, with some self-trackers having more awareness than others. For example, a few participants stated that they knew that their data “is up there *somewhere in the Cloud*, it is the Cloud” or “[the data] *floats around on the Internet*”, or “*they* are also able to access and use *it in ways that I am not entirely sure about*”. Both the unspecific statements and the vague language signal limited understanding of who data processors are, where the data is stored, and how it can be used by third parties. Some participants thought that Terms of Service agreements protect the privacy of the user, rather than that of the company. To illustrate, George explained that the Terms & Conditions of his devices state that the company will not sell data to others parties, stressing that while he would not mind if the company itself used his data to deliver better services, “*if I knew it was being used [by other parties] then I would stop wearing it* because I think that would be to me that *would be breach of privacy*”. Similarly, Nathaniel reported that he would be disappointed if he found out that his brand of tracker was selling his data. Those hopes go against the reality of data flows, but fall in line with findings from earlier studies have shown that users expected their data would not be sold (Cheung et al., 2016; Leibenger, Mollers, Petrlc, Petrilic & Sorge, 2016; Patterson, 2013; Prasad et al., 2014; Wieneke et al., 2016).

At least nine participants did not know whether their application or tracker had privacy settings all together. Some respondents (Camilla, Nathaniel, Martina) posed the question about privacy of their data back to me. Nathaniel queried: “*but you tell me, because you are doing your PhD. Do they read these stuff on here off the health app?*” and Camilla asked: “*oh, you are making me worried now, is the data something that can be used?*” – indicating yet again the limited understanding of data flows. Camilla explains that she was not “*heavily into it [privacy]*”, but “*if I had gone out to buy an activity tracker then I might have look more carefully at any*

notices that says your data maybe collected, *I don't know if they do that*, but that would have made me more aware, but I just didn't think about it when I was using the app on the phone”.

This quotation further indicates that the participants might differentiate between data collected by mobile applications versus devices. The vagueness of the terms “they” and “stuff” signals a lack in awareness not only about data flows, but also about who might be interested and in what. For at least five participants, the issues of privacy did not come to the foreground of the decision-making, as they reported “*have never actually thought about it [privacy] really so till now*”.

Overall, the power imbalance in data accumulation, storage, and processing, the lack of transparency about data flows, and the absence of clarity of how data can be used all play a role in informing this cluster of attitudes. Instead of considering data processing as an issue, the participants focused on themselves, and after evaluating their perceived importance, especially in comparison to others, and labelling themselves as being of no interest to institutions that use data, the participants in this category considered their privacy as unaffected. The sense of unease here permeated from the lack of clarity about data flows and a false perception of one's own unimportance to institutions accumulating the data.

### Active Concern and Resistance

The two following quotations aptly summarize the responses of in the final category: “*you don't own a FitBit, the FitBit owns you*” and “it worries me. On some days I think that *big enterprises have a profile of me and know much more* than I'm okay with them storing. On other days, *I'm happy that a shoe sale was advertised to me*. There is no in-between”. The participants in this group shared an active concern about informational privacy, demonstrated a nuanced understanding of related issues, and were cognizant of the conflict between their personal attitudes and actions. Some even took action to protect their data. For example, participants critiqued

nominal data ownership, lack of transparency in data use by third parties, and the excessive amount of detailed data that devices were collecting. To illustrate, seven participants discussed difficulties associated with the international nature of legal contexts (e.g. living in Britain and having their data stored in the US) and data regulations. One participant concluded: “*there is no one international treaty to say information should be shared this way*, but then you know the point is should there be *restrictions*”. In line with findings from privacy policy studies (Aimeur, Lawani & Dalkir, 2016; Patterson, 2013), even the participants with a background in law were not always able to decipher what the company is actually going to do with the data and expressed scepticism that others would be able to understand privacy policies. A participant explains: “I did a degree in Law which taught me to always read the Terms and Conditions – that’s one of the thing”, and she then proceeds to outline how the company that produces her tracking app is a subsidiary of another company that in turn owns the data, and yet she still qualified her response with “I didn’t understand it”. Some called for Terms of Service that are easier to understand, such as bringing in an interactive video format and laymen’s language.

The sense of unease stemmed from the disagreement with the current data regime combined with the acknowledgement that even with this knowledge, self-quantifiers cannot afford to act differently. The participants reported that despite this awareness, the convenience of bigger databases, social pulls of brands, faster loading times, and more user-friendly interfaces make it hard to switch to potentially more privacy-friendly alternatives. To illustrate, Rose, a new mother at the time of the study, explained how she was waiting to use a tracking app until she had the time to read the Terms of Service agreement, but, giving into pragmatic needs, she eventually started using the app without doing so: “one day I was *like-screw that and I just ticked, ticked the box*”. Similarly, Dawn concluded: “you can’t really use it unless you agree to it

[terms of service], then you just agree to it, so I haven't consciously spent time figuring out what they are taking [about]". Mary chose to stick with a specific manufacturer because "you can see people you know, and *two friends that got me onto FitBit* in the first place, *that's why I am with that maker* I suppose because they had *FitBits*, so they were on it". Alternatively, Joan, who describes herself as cautious and even paranoid, was one of the participants with the most profound recognition that her own attitudes about privacy clashed with what she did in practice. She explained that she should probably throw out her tracking device because of how worried she is about third-party data collection and then concluded that "for *somebody so paranoid I'm fairly laissez-faire about the whole thing* {laughs}". Those responses illustrate a detailed level of awareness of what happens to self-tracked data and a discontent with the current data regime, but also highlight real pressures of everyday life that cause clashes with personal privacy beliefs.

A few participants engaged in acts of active privacy protection. For example, Emmanuel expressed his frustration at tracking applications for "want[ing] to have *permission to access your contacts* and once *consolidated what you generated on their Cloud*, and *I don't really like that*, not for something that personal like calorie counting". Emmanuel found a technical solution by using an application that allowed him to sift through hundreds of tracking apps to identify those that do not request permission to access his contacts and other information irrelevant to the function of the app. On further reflection in the diary, he reported that he would prefer to have his data stored locally on his device, because it allows for more control, and pointed out that while he did find a technical solution, it "[was] a lot of work". Other participants engage in information privacy protection by obfuscation (Brunton & Nissenbaum, 2012; Marx, 2003, 2006, 2009). For example, Roy and Helen signed up with different variations of their names and email addresses to identify which companies are selling their data or to prevent their data from being linked. Finally, even



those individuals who, like Nancy, took a proactive stance, “always tick the box to always *say no*” to sharing of personal details with frustration that “it still doesn't work. People *obviously somehow are sending, sharing your data and they do just crafty things*”. Some participants considered threatening legal action or contacting the *Information Commissioners Office*<sup>14</sup> for the purposes of privacy protection. For example, Zoe explains:

I will read the Terms and Conditions and say “*no, firm big no*”, and if *anything comes out of that I* am a kind of person that would probably pick up the *phone and say “look I fill this out and I clear remember saying I don't want my details passed on to anybody else, so stop passing my details on and I will take it to the Information Commissioner if you do it cause I said not to do it”, I will make a formal complaint* about it

In line with Zoe's actions, Roy reported that when his data is used by a vendor without his permission, he can request that it be legally deleted. Frequently, participants referred to other data contexts to explain protective actions they took, such as: limited number of posts, pictures, and comments they post online; changed privacy settings on their social media sites; not clicking on extraneous links; not using GPS locators or check-in apps; anonymizing themselves; using minimum necessary disclosure; refusing to fill out forms not directly relevant to their dealings with a specific agency; not picking up phishing phone calls; and asking to be removed from various public registries. In this category, self-quantifiers felt uneasy about the privacy issues because they were informed about informational privacy and because they recognized that resisting data-use pulls was hardly possible, as well as time-consuming and largely ineffective.

### Conceptualizing Privacy as Unease

Sentiment-focused concepts (e.g. trust, anxiety) have opened up a new analytical path for the conceptualization of privacy. However, the currently used concepts share a number of

---

<sup>14</sup> ICO is an independent body that deals with information rights of individuals in the UK.

unfortunate traits for these who understand privacy as a structural rather than personal issue. First, feelings such as worry, trust, and anxiety focus on an internal state of one's being in response to actual or perceived events rather than focusing on the stimuli that had triggered them – thus elevating the locus of scrutiny to internal personal states, rather than the impetuses that caused them, such as poor data protection regimes or asymmetry of power. Second, all of the aforementioned emotive concepts are individualistic and frame privacy concerns as a personal, rather than socially-shared, structural issue. As the analysis shows, the participants are often concerned for others rather than themselves. Third, terms such as “anxiety” and “trust” carry conceptual and pragmatic loads from other academic fields. For example, “anxiety” has an association with mental health issues and has recently been claimed by legal privacy scholars for an instrumental use in court cases (Bartow, 2006; Crawford & Schultz, 2014; Solove, 2007; Zarsky, 2003). To illustrate, Solove and Citron (2019) made a convincing case for how anxiety stemming from potential privacy violations can translate into – in legal terms – real injury or harms and outline ways in which legal frameworks should treat it. Based on the outlined analysis, a term that: 1) recognizes the emotional dimension of privacy; 2) views privacy concerns as social rather than individual in nature; 3) focuses on external stimuli as antagonistic to privacy, is needed for a fruitful examination of privacy in context of self-quantification. For the purposes of clarity, such a term should also have little conceptual claim from other fields. “Privacy unease” is a suitable contender.

The concept of unease can be defined as a sense of worry or slight fear of something unspecified. The state of unease is constantly present, without giving a release or rest; it frequently describes a shared sense of concern over broader issues that affect society, especially in contexts of groups of people – unease of citizens, parents, or employees – but does not result

in specific action. The concept has not been popular within scholarship in general, and privacy<sup>15</sup> scholars in particular. Privacy unease can be defined *as a sense of unspecified worry shared amongst self-quantifiers with the diverse privacy attitudes and behaviours, stemming from asymmetry of knowledge and decision-making power in relations to personal data flows.*

The analysis highlighted that the sense of unease can be seen as the background layer onto which other attitudes and behaviours are mapped. It manifested both in the general discourse – such as “algorithms know”, “somewhere in the cloud”, “they are making money” – lacking details about potential harms, and recognition that “others” might desire privacy protection, as well as a limited understanding of one’s own importance to the institutions collecting data. The analysis illustrates that unease stemmed from issues like a lack of negotiating power, limited control over personal flows of data, complex Terms of Service, and limited understandings of how data can be used by companies – all resulting in a sense of unspecified concern. For some, the unease is strong enough to motivate protective action, and for others, on a personal level this concern has not caused an issue at the moment of the study, yet the participants acknowledged that others in society might need or want better data protective mechanisms. Yet this sense of discomfort with the state of informational privacy did not persuade self-trackers to abandon the practice.

### Privacy in Everyday Life: It’s Complicated

The following section builds on the earlier findings and explores how the practicalities of everyday life – demands of competing roles, the passage of time, the emergence of new privacy-

---

<sup>15</sup> I was able to locate only two studies in which academics attempted to define and describe what constitutes unease based on the available literature and their data. For example, Fruhen, Flin, and McLeod (2014) studies psychometric qualities associated with “chronic unease” of safety managers and, by inductive analysts of existing descriptors, arrived at a five-attribute conceptualization of the term. Similarly, Steenvoorden (2014), a scholar of political sociology, conceptualized negative views on social states of Western societies as generalized societal unease. She discussed unease in terms of deterioration of fundamental aspects of society (e.g. loss of ideology, decline of community). Both of these efforts define the attributes of unease in their respective contexts and determine how the concept can enhance theory-building. There is no overlap between the two studies at either level of analysis (individual versus society) or contexts, however, the authors show that the term can be a fruitful avenue for analysis.

related harms, and the dynamic nature of the self-tracking industry – perpetually re-shape privacy decision-making, furthering the sense of unease.

### Conflicting with Other Values & Roles

Individuals' desires for informational privacy came into conflict with competing personal and professional roles. The theoretical underpinning for the analysis that follows is Lahire's (2011) argument about the multiplicity of embodied dispositions and contextual constraints actors face in everyday life. This multiplicity of roles, and thus privacy attitudes, was especially evident with five participants from medical and athletic sub-samples. To illustrate, Nancy, a public health professional and a specialist nurse, believes as an individual that informational privacy should be protected and takes action to guard hers by opting out of public registries. Yet, she states that in her work context: "there is a part of me" (she uses a narrative turn) to explain that she faces situations in which she cannot treat patients safely because their data has not been shared with the emergency room:

*I know people get really strong up about it, but part of me is thinking well actually [...] it is a big issue – it [data] is not automatically available, I mean there is something that is called Summary Care Record that comes in, but it is only a snapshot of certain things [...]. And a part of me feels very uncomfortable about it, I mean if you want me to treat you safely you should allow me to see what that data is*

In Nancy's account, there was no normative resolution as she described data privacy landscapes as a "nightmare". Similarly, Alistair, a pharmacist, explained that he would like to use personalized data to help his patients to manage their health conditions; however, he himself is "a very private person" and would only share his personal data anonymously. Some participants pointed out that shared social responsibility for maintaining the NHS might have to take priority over the informational privacy of others. To illustrate, three participants believed that obese people should show their data as proof of attempted weight loss before being able to undergo a gastric bypass surgery. But such views were far from universal, with participants questioning the ethics of using

personal data to coerce others to behave in specific ways regardless of the positive motivation behind such disciplining actions. Others gave personal examples: Emma points out that as a patient with a history of depression – a condition which she would prefer to share only with health professionals with whom she has developed trusting relationships – unrestricted sharing of data resulted in a general practitioner treating all her ills, including a dislocated arm, with antidepressants. She elaborates: “One the GPs I see had like a little app to see how depressed you were, and they pulled up a number – *I was like I am not quantified by a number* – I am feeling bad and I can tell you this because and I know there are significant times when I am quiet ill, depressed and I don't realize it but when I do, I do see the doctor and I am quiet conscious of the fact that I am working towards getting better *that is the time when I feel that you cannot you should use an app to ask how someone is depressed*”. Another participant pointed out that she would not be sharing her data with the GP because he would prescribe her sleeping pills. In those responses, personal informational privacy beliefs did not easily align with requirements of a multiplicity personal roles, such as medical professional, patient, or citizen, adding to the sense of unease.

Athletes also held a different view of informational privacy in the context of sports, because those parts of their identities were “about the data really”. Margaret, who shares her data with her trainer and partner, explained how informational privacy is vital for her athletic identity. She provided an account of a British elite cyclist – Chris Froom – whose detailed self-tracked data was made public, giving his competitors a leg up, as they were able to figure out the margin of effort that it would takes to overtake the competitor. Margaret herself has been keeping what she calls “stalking spreadsheets” – a record of performance of her rivals – in order to be able to strategically beat them in qualifying rounds. At the same time, Margaret – who is protective of her data, including her athletic performance and her digital footprint – suggested that

informational privacy might not be of importance to everybody: “depends on who you really are, *what your data is related to*; if you are a lady who just want to do 10,000 steps a day to just tick the box on the wellness programme at work *she probably does care*”. Li, a professional fencer, presents a similar argument differentiating between his tracked data and that collected from athletes during training. He states that he “ha[s] no problem if anyone can own my data that is fine, *it is nothing secret*”, but clarifies that when preparing for major competitions, athletes who eat, sleep, and train together are closely monitored by a group of doctors who contently take measurements, and “they record it every day so *you are like a machine*”. Medical professionals and athletes took different views on informational privacy depending on their contextual positions and differentiated between scenarios in which data is used. This argument echoes the line of thinking about not being of importance to institutions. The participants did not foresee the potential impactions of piecemeal chunks of data being used in scenarios beyond specific types of identities, in cases of insurance, forced tracking, or job discrimination. For example, in Margaret’s scenario, a lady might not be able to opt out of a wellness programme.

A mismatch between individual beliefs in the value of privacy and actual privacy behaviours did not go unnoticed by the participants themselves. Those moments of reflection highlight the participants’ abilities to think deeply the implication of the practice. To illustrate, Melissa, a student nurse and a former cancer patient, writes in her diary that she enjoys her tracking devices because they help her to validate her tiredness or they make her feel good about herself, yet she questions if tracking is a positive thing. She writes:

But it's a lot of information about me, *where does it go?* Is the *information used?* My phone records, where I go, and how long I stay there for, how long I sleep for. It's an interesting concept. We live in a day and age where everything we do is recorded on camera and saved as data, then used to *manipulate us into spending money*. Is the tracking device on my phone a *part of that?*

Furthermore, Rose, Jerome, and Eloise saw personal benefits in tracking themselves, but their parental identities made them worried about their children being tracked to a granular extent. Eloise explained: “I don’t like putting her [daughter’s] name in anything and teaching kids especially teenagers who think they are internet savvy about protection and security, is quiet challenging [...] especially with teenagers when they are offered free things I think they then perhaps they should just give out some kind of *fake name for a particular promotion*”. Jerome and Rose express concern about their child being tracked at a very early age without having any say about who she wants her data to be shared with. Finally, some participants (Mary, Florence, Nancy, Will, Eloise, Gabriel, Roman) who expressed various informational privacy concerns concluded that despite those concerns, they might enjoy trading their data for monetary or material rewards or “reduced [...] health insurance premiums”.

The privacy discourse discussed above illustrates the reflexive complexity of the participants as well as the conflicting requirements of the multiplicity of roles in relation to informational privacy in everyday life. The pulls of multiple personal positions further the sense of unease in relation to data privacy.

### **Privacy Throughout Time**

Existing literature indicates that time plays a role in shaping individual privacy views. For example, of a study of Facebook over an eight-year period showed how privacy attitudes and actions strategically changed over time, owing to the maturation of both the platforms and the users (Kelly, Kerr & Drennan, 2017). In the context of self-tracking, longitudinal research is sparse. Available at the time of this study, researcher – such as Prasad and colleagues (2014) – conducted an experiment in which individuals were asked to share self-tracked data with different parties based on randomized requests (e.g. research, commerce, government) through a five-day

period. They demonstrated that privacy behaviours changed throughout time based on feedback participants received. Since the privacy literature is dominated by cross-sectional studies, the view of privacy as a process changing over time is obfuscated. The analysis below shows that for some participants, attitudes and privacy-related actions change dramatically as time passes.

Jerome's account of privacy attitude transformation is demonstrative. Initially, Jerome, a politically aware professional in the City (i.e. UK's main financial district), had just become a father for the second time. Owing to this event, he changed his habits (e.g. quitting smoking, changing his diet) to improve his health in order to be able to take care of his young children. Self-quantification became a part of his health routine. During the initial interview, in response to a contentious question about whether everyone in society should be tracked to decrease the cost of healthcare, Jerome expressed a concern about privacy: "everything is tracked, everything is tracked. *It does not sit easy with me [...]* but tracking everyone – no – because then you are *not in a democracy when you are tracking every single person*". In this quotation, for Jerome, privacy outweighs other socially desirable outcomes. He links the value of privacy to that of broader democratic processes. In his diary, Jerome reflects further on the issue of privacy, concluding with the following excerpt:

Is this how we subtly submit to *draconian tracking by the state*? Does tracking start of as a *subtle fun task*? Does this then expand to track other things? Does it *expand further to incorporate surveillance*? Before we know it, we living in a *Police state* where our every move is monitored or does it become like the *Panopticon* and we believe *we are being tracked and willingly comply with good behaviour*. Sorry I think I may have gone off on a tangent there. I *like tracking my steps and I have fun making it a competition with* [partner's name] but I also *worry that these subtle things that become every day events* can be used to restrict us rather than benefit us. Slightly paranoid I know but I have read lots of Orwell so that's bound to happen.

The questions Jerome raises to himself are a part of his reflection about the future of tracking. He frames the issues of privacy in terms of surveillance, a police state, restrictions, compliance, Panopticon, paranoia, and the Orwellian world – indeed, the quotation is packed with negative



references, ranging from the direct control to ruling by biopolitical instruments. He is concerned with how tracking might affect individual autonomy. He developed his thoughts further: “it got me thinking more about what is *actually going on and had me thinking more about surveillance* and things like that particularly with Trump becoming president in America. It kind of made me think you know all like – *where does tracking stop?*” The election of Donald Trump and a rise in Brexit rhetoric fed into Jerome’s understating of privacy in the context of self-tracking. On the micro level, his personal experience of targeted marketing (regardless of safeguards he implemented), being tracked via supermarkets’ loyalty programmes, phone companies, and social media platforms, as well as conversations with family, compounded by hyperawareness about how much his children are being tracked – he explains “{with horror} and this is the thing that [daughter name] *is being tracked already and I didn't even think about it!*” – resulted in Jerome reflecting that he found himself “*coming out as anti-tracking*”. He justified his new position by saying that there is not enough information about what happens with his or his children’s data, how it is used, and where the tracking stops. He contemplates what a life off the grid would look like for him in modern London.

However, this narrative developed through time and is disturbed by an epiphany that contradicts its initial inclination. The realization comes from an unexpected place. When asked if he would accept a free tracking device as a part of his work or gym, Jerome responds:

If there is one thing that would *stop me being paranoid is a cheap deal*. Yeah, yeah, I am always looking for a bargain, so will my paranoia and my morals go out of the window for a cheap deal? I would say – *my morals would go out of the window for a cheap deal*, so yeah I would most likely sing up. [...] But-would-I do-it-for-a-cheaper-deal {elongated with a sense of thought and pleasure}? YEAH, I- think-I-would... *I think my paranoia is just cracked, isn't it?* [...] *My morals go out of the window when it comes to money!*

Allowing some space for self-irony, in the quotation above, the conflict between personal attitudes and behaviours result in a tension, when Jerome concludes, ruminating on his earlier

statements, that “I have no morals and *I am a hypocrite*”. The case study illustrates how privacy attitudes evolve over time and how informational privacy conflicts with competing pulls of convenience, comfort, rewards, and material benefits. To complement Jerome’s account, some participants pointed out that they started using their devices up to five years ago and have not checked if Terms of Service have since changed. At the same time, as illustrated in the Literature Review, tracking companies do not notify users about issues such as transferring, selling, sharing, or de-identification, using data as bankruptcy protection information and, most relevantly, changing of any of their privacy policies. This is especially relevant for the practice of self-quantification because of how dynamically technologies are developing.

### **Privacy Harms: Reflections and Experiences**

A key feature of unease is that the potential threat is ever-present, but never fully known or anticipated. In the case of the quantified self, the participants had difficulty anticipating potential issues, as well as struggling to draw on lived experiences of privacy violations to which they have been subjected in other parts of their lives. In this section, those two themes are considered in turn.

When asked about what kinds of harm the use of self-tracked data might result in, the participants’ concerns grouped around three domains— corporate, interpersonal, and state – with the former being referenced most commonly. The participants frequently expressed risks in abstract terms, such as the potential of the data to be “used against me” or “against people” without being able to specify potential dangers. Some also concluded that humanity is likely to be facing risks “we [aren’t] as a society really aware of yet”.

Risks associated with commercial entities’ use of personal data ranged among marketing, manipulation, brainwashing, conspicuous consumption, black market data trade, and artificial

creation of needs. One of the participants states: “mind games *they are going to play with knowing too much*, with the *algorithms know too much, about people*”. The lack of specificity in language – “they” and “algorithms know” – signals a limited understanding of how data can be used. A quarter of the participants were concerned with insurance companies accessing individual self-tracking data and potential health inequalities resulting from this action. The participants presented a scenario in which an individual has been refused care in later life or faced discrimination in the context of health premiums. This point was especially poignant for individuals coming from countries without well-established public healthcare systems, where health insurance is mandatory (e.g. the Netherlands, the US, Hong Kong). In reported hypothetical scenarios, the participants explained that people might be refused care if their own accounts of physical activity are lower than what they have self-reported. However, a data-scientist participant pointed out that in their research, overly-active people are more prone to accidents and are therefore more expensive to insure. Thus, potential avenues for discrimination can cut both ways. Another corporate risk encompassed concerns of discriminatory practices in hiring (e.g. being a part of a specific demographic category, having chronic health issues) and employment. The examples here mostly had to do with employers inappropriately accessing the data to check if an employee was ‘actually’ sick, engaging in risky activities or behaviours in their personal time, or if late night dancing is perhaps the true reason for Monday tiredness.

The most vivid example of how such risks are amplified in work environments comes from Carla, a computer scientist and a meticulous self-tracker. She explains:

I used to have a health insurance policy with one of my ex-employers, and one of the perks was getting a free cinema ticket every week. After a few months they changed how those free tickets were awarded: *now you were forced to make a min amount of steps a week to be able to enjoy the free cinema tickets*. Many people *never complained*, got a personal tracker and continued enjoying the free tickets (as the number of steps required wasn’t high at all) but I thought...wtf!! *First, they are forcing you to buy a tracker from one of their recommended ones (otherwise the system wouldn’t recognize the data) and, second, they were granted access to all the health*

*info you need to input to make those tracker work plus the tracking data. I thought it was outrageous, but no massive complaints were raised.*

There are two particularly important points in this quotation. First, when participants talk about their self-tracked data, they frequently mentioned only a specific type of data – steps, sleep, or heart rate. This indicates that self-quantifiers frequently fail to recognize the linkability of data points with other personal data streams and that they forget about a chunk of personal information (gender, year of birth, height, weight, level of activity) they have already provided in order to be able to use their tracking device. Second, Carla, who is surrounded by tech-savvy and well-informed colleagues operating in the data realm, and therefore best placed to perceive the “full” picture of how data is used, expressed disappointment at the fact that her colleagues did not challenge the company’s decision. This example also echoes the argument explored in Chapter 5, on reflexivity: the participants not only reflect on their practice, but on their reflection about the practice.

In the interpersonal realm, the participants reported the potential danger from others (friends and strangers) accessing GPS locations registered by their trackers or phones, knowing where they are at all times, data misuse, and data re-identification, as well as issues related to identity theft and impersonation. The most vivid lived experience comes from a participant whose controlling partner followed her runs, and when he “felt that *I spent longer than he thought [I should]* and he *insisted that he wanted to see my route*” and discovered that she stopped at a particular spot for a telephone conversation that he did “not approve of”. Similarly, Dawn pointed out that her tracking brand used to display running routes for people, making it easy to identify where they lived and worked. In another example, a medical professional concluded that quantified data might become a source of “background” checks for potential partners.

The final category of risks reported by the participants were from state actors' data use. Strikingly, state-related concerns were spared. For example, the participants reported potential data and technology hacking by such groups as Islamic State, as well as unwanted surveillance by the state and persecution for uncommitted crimes or political affiliation, but those accounts were of regimes perceived as hostile to Western democracies (e.g. ISIS, Turkey). On occasion, a participant's account would suggest a threat from her own state, but it would usually go unexplored. For example, Jerome explained: "I am really starting to sound like somebody who is *massively paranoid about state tracking me, companies tracking me, I wouldn't put my location services ON, unless I need to go where I have never been before*". In her ruminations, Melissa conflating her thoughts about "corporations and government agencies and stuff":

I kind of think quite into *like conspiracy theories* and stuff and [...] you know the people *there is a compilation of data about every human and everything they do – it is scary isn't it*. It is a bit like, and even stuff like that *I mean nobody really cares how far you walk everyday*, but it is used to sell products and stuff so it is quite *a bit strange you know, to know that someone else has got the data*.

Continuing this line of argumentation, Joan, of the few participants to consider cumulative effects of data accumulation, concludes: "it's way too easy to think of you know just your own individual pieces of information that might not mean much, but if everybody is wearing some kind of tracking data, like, you know, *the amount of marketable info that can be extracted from that is to vast* and I think that is something that frightens me". Both of the examples are illustrative of the second level reflexive thinking about the practice.

Past experiences of privacy violations further complicate self-trackers' outlooks on informational privacy. It can be expected that a case of data misuse or a privacy violations would make privacy hams more visible (Crawford & Schultz, 2014; Solove, 2007). In the case of self-quantification and in line with Nissenbaum's (2010) argument, however, privacy violations from other domains of life – however egregious – did not easily map onto the domain of self-

quantification.<sup>16</sup>To illustrate, we analyse accounts from Zoe, Grace, and Eloise, two of whom became victims of identity fraud – one of the crimes involving a radical form of informational privacy violation (Golladay & Holtfreter, 2017; Prosch, 2009). Eloise explained that her banking account was jeopardized by someone who collected detailed data on her: “they had my name, phone number, bank account details but all that apparently was available through the internet”. Despite this experience, she concluded “*I’m not sure there are many risks*” associated with self-tracking data. In a different domain, a participant (Grace), who has a genetic predisposition to rare brain cancer and voluntarily donates her data to researchers, stated that she has a clear understanding of – and no issues with – her data being used by doctors, dentists, online and offline businesses, and the police. Yet, was “very shocked” when one of the retailers contacted her to recall protein powder she had previously purchased:

*I was shocked because they tracked my home address and... it is very easy to do because I have Boots discount card that I used obviously, but it was very shocking that somebody is keeping track of what you buy or for example the Nectar card has; is in Sainsbury’s is the same shit, but like, I just like, I am not one of these freaks like Bob, who thinks that the Big Brother is watching, so I never think about that until I was hit on the head with these things.*

Unlike Eloise, Grace concluded that the privacy of self-tracked data appeared to have little implications for her, until she faced a situation in which she felt her own vulnerability to unexpected data use by third parties.

On the other hand, Zoe, who has a minimal-disclosure tactic to personal data, describes herself as “very wary” with data and has been known to “decline to fill out a form because their because [they] are going to use [her] information”. At the time of the study, Zoe was receiving phishing calls and voicemails that were illegitimately requesting her to pay for one of her credit cards. Upon further investigation, she discovered that following an acquisition by another

---

<sup>16</sup> The study took place before the infamous Cambridge Analytica scandal that might have altered data privacy attitudes of the participants.

financial institution, a data leak had occurred “somewhere along the line, whatever they did, maybe they didn't destroy the information properly, or somebody hacked into their database, and they just got the whole pile of peoples details”, leading to her current situation. Reflecting on the incident, Zoe concluded that companies should not assume that if “people *willingly gave this particular company* the information”, the buyer automatically gets the right to access personal information because they bought the company out (take-over of data is a common procedure for companies in cases of bankruptcy). Discussing self-quantification, she drew a parallel with medical data flows, concluding that fitness tracker data should not be used without the individual's permission: “you *need to come back and say to me*, we are conducting this survey on whatever *can we also use this data of yours – don't just take it!*”

Overall, the analysis of perceived risks indicates that the participants are not certain of what or whom to fear in the data paradigm. Some issues, such as possible discrimination in the healthcare context and stalking, were more obvious to the participants, while wider structural issues associated with data linkability, data accumulation, the predictive power of combined datasets, asymmetric access, and the processing power of data remain mostly obfuscated. Yet, it is important to note that some of the participants recognized that as a society, we have not reflected enough on the sources of potential harms. Experiences with privacy violations in other domains might have heightened the awareness about informational privacy, but did not necessarily make participants more aware of potential harms in the tracking realm. However, such experiences stimulated additional reflections on informational privacy as an issue. As such, it is not surprising that the sense of unease would be a fitting conceptual label for the shared sentiment based on the lack of clarity, personal experiences, and dynamic changes of quantification as practice.

## Data Sharing & Protection

Participants (Paul, Rose, Katie, Grace, Tilly, Roy) across the study reported that they would not mind sharing their data with health services, especially the NHS and research institutions, in order to “contribute to the society”. In addition, some participants (Grace, Florence, Li, Will, Peter) indicated that they do not mind companies that produce their tracking devices using their data to improve the products they are selling, couching their reasoning in similar terms of “helping the general public” – and resulting in better goods. Many of those who reported that they are happy to share data with specific brands added that their data should not be sold to third parties. Reflecting on the practice further, the participants who work with quantitative data pointed out that self-tracked data is not sophisticated or accurate enough to be valuable without sophisticated processing and analysis and, in itself, it holds little value.

Finally, when asked who should be in charge of protecting the data, the responses were not uniform, with some participants pointing towards regulations and others suggesting a multi-layered approach. For example, Emmanuel called for “digital sanitary practices” for individuals and drew a parallel to car theft, where it might be illegal to steal others’ vehicles, but it still happens, which is why we lock our cars (i.e. in this case, encrypt data). George, who works for an environmental charity, furthered this line of argument, pointing out that fines for a cut tree are made irrelevant when the tree is gone (i.e. an irreversible action of data being made public). Other participants called for more granular control of privacy settings and more user-friendly privacy policies. Even sceptical participants pointed out that privacy outlooks of other users are likely to be different from their own and expressed a nuanced view of shared responsibility among governments, companies, and individuals; specifically, they advocated for multi-faceted protection mechanisms that include technical solutions, digital literacy, transparency regarding



data collection and use, and encryption, as well as legislation and enforcement of regulations. As some participants stated, “I do think it should be regulated and I think it should be encrypted” and “I think it should be regulated within the data privacy law yeah cause that is yours, it is up to whether you want to give that data or not”.

The findings of the section indicate sources of a potential sense of unease – from the requirements of the roles that individuals play in everyday life to transformation through time, to the inability to fully grasp or predict what will happen with personal data flows. The findings of the both empirical sections highlight that self-trackers who took part in the study are uniformly privacy happy, complacent, or unaware of informational privacy and the issues associated with it. While some participants are resigned to the cynicism of neoliberal trade-offs and privacy setting defaults, or did not see a reason to worry about data privacy, others actively reflected upon the issue, took action to protect their data, and recognized the internal conflicts they were facing.

## Discussion and Conclusion

This section summarizes the main findings of the chapter before making the case for why the term “unease” is a fitting concept for the conceptualization of informational privacy in the context of tracking. The main findings of the chapter can be summarized as follows. First, while self-quantifiers’ attitudes to privacy and their protective knowledge and actions differ, as illustrated by the three-pronged taxonomy, the sense of unease permeates across the taxonomy. The sense of unease stemmed from unclear data use and protection policies, social and commercial pulls, the impossibility of opting out, and a lack of effective ways to protect personal data. Even when the participants were not concerned their individual informational privacy, believing that they are not of importance to specific institutions, they stated that others belonging

to different generational or social positions might want more protection. The majority of users were also unaware of how data linkability, the multiplicity of aggregated commercial flows, and flaws in consent and notice regimes – which they falsely believed should protect them – might affect them, while also recognizing that their data is valuable to others. Thus, the participants express a sense of latent worry about information privacy without knowing whom or what to fear, what might happen to their data, or what kind of protective action they might take.

Second, informational privacy in the context of self-tracking was not experienced as a cross-sectional, one-off decision, but changed over time and was dependent on personal and professional roles and experiences in everyday life. Conflicting demands from personal and professional roles, or from the multiplicity of personal roles in daily life, resulted in dissonance for some participants. The irreconcilability of multiple positions was recognized and reflected upon by the participants, especially those from medical and athletic backgrounds. The same can be said about the conflicts between privacy attitudes and privacy actions. Past privacy violations, including the most drastic forms of identity theft, experienced in other domains of life did not neatly align to inform privacy action in the context of self-tracking. The participants were aware of those conflicts and reflected on them during the study.

Third, the participants were able to anticipate three types of risks associated with the use of their data – interpersonal, commercial, and state. Risks from commercial data use were the most concrete in the participants' minds. However, many participants had difficulty articulating what specific things might happen, and they framed their responses in vague terms of data being used against them in some way. The participants recognized the current informational privacy regime as problematic. They offered some solutions to improve the protection of informational privacy, including regulation, encryption and other technical solutions, and education. Overall, strenuous

concerns, deep reflections, and experiences of serious data breaches (i.e. identity thefts, surveillance by others) did not deter the participants from engaging in the practice.

This analysis leads to an alternative conceptualization of informational privacy. The concept of unease is a precise, non-normative, and conceptually powerful term that opens up a new analytical avenue for examining privacy attitudes. Constructing privacy as unease serves three purposes: 1) it keeps analytical attention on privacy decision-making as an affective and fluid process; while at the same time 2) re-focusing the attention on the external stimuli rather than internal states of individual users (as opposed to the concepts of anxiety, worry, fear, or trust); and 3) captures the socially shared and structural nature of privacy concerns. In other words, the term elevates privacy concerns from the realm of individualistic, emotive reactions to an actual or perceived stimulus, to that of collective concern. In addition, being stimuli-focused, rather than inwardly-focused, the term precludes the possibility of framing privacy concerns as a matter of perception. These constraints result in re-orientation of the search for privacy solutions at the structural, not individual, level. The concept of unease is indicative of a constant state, rather than a fleeting emotion, and is thus able to capture the longitudinal nature of privacy attitudes. Unease also presupposes a certain level of dissatisfaction under which an individual might be moved to take some kind of reparative action. For example, the concept of trust conceptually locks individuals into acting in ways that presuppose trust, and thus highlights as contradictory behaviours that do not fall in line with the idea of trusting action.

This argument is significant because such a conceptualization offers a novel analytical trajectory that recognizes users' concerns as valid without them having to be overly specific and makes structuring actors a visible part of the equation, instead of treating privacy attitudes as a personal matter. Under the conceptual umbrella of unease, an individual's actions and feelings

can be separated: you can feel uneasy about the general state of privacy in self-tracking, but act in pragmatic ways which – although they might be contradictory to your concern – are practical for your situation. The term is also of value because it makes visible the co-presence of others, interpersonal influences, and interactions with activities of others in the shaping of the self, unlike Foucault-inspired framings of technologies of the self, which were fruitfully criticised on shared sociality grounds (e.g. McNay, 1992). In sum, the concept of unease presents a viable lens through which to explore privacy in the context of self-tracking and beyond. The next chapter explores self-quantification from an angle of meta-ethics and morality, furthering the findings of the preceding chapters.

## Chapter 8 – Meta-Ethics and Morality of Self-tracking: Emotions and Metaphors of Self-quantification

“Dear *fitness tracker* please forgive me. *I will be good tomorrow*”, wrote one of the participants in her diary. This quotation is striking because it contains an element of self-evaluation, an apology, and a promise to act differently in the future – all features of ethical self-evaluation. This quotation was one of many to include an evaluation of the self and of others. The presence of such self-appraisals begs the question: does self-tracking have an ethical dimension, and if so, why is that important? And thus, through which specific mechanisms does the practice contribute to selfhood? Answering these questions may help to advance the conceptualization of selfhood in the data age.

The previous chapters explored self-quantification from reflexive, cultural, and privacy perspectives, uncovering the tensions of the practice and the participants’ reflections about it. The findings illustrated that self-tracking is a deeply meaningful practice; it is a source of reflexive thought; it contains contradicting values; and it is a basis of latent concern for the participants. The analysis presented in earlier chapters also brought to the surface frequent references to how trackers feel about their practice and react in response to their, and highlighted the normative pressures to do, to take action, or to behave differently. Building on those threads, the main aim of this chapter is to advance the conceptualization of selfhood in relation to data with a particular focus on the ethical dimension of the practice. Emotional and metaphoric dimensions of the practice are treated together in this chapter because of their convergent focus on moral and ethical standards in relation to tracking.

The core argument of the chapter is that self-tracked data (and data in general) is in the process of becoming a new source that informs our selfhood and, as such, it is hardly possible to understand the developments of the age of data without examining data in relation to selfhood.

As such, self-tracked data becomes a new ethical framework, akin to religion, reason, or Romanticism, based upon which self-evaluations have been drawn by individuals. The argument of this chapter rounds up the overall argument of the dissertation – that self-tracked data cannot be understood as simply additive to our sense of the self, but rather, that it has a complex relation to selfhood serving as its resource – by showing how data is becoming a new resource for self-construction, the source for self-evaluation, and an ethical framework.

A discussion of the ethical and normative dimensions of tracking was initiated by two empirical studies. Grom and Shklovski (2016) focused on a corporate wellness programme, and Lupton and Smith (2017) engaged with the general audience. The studies focused on empirical analysis, in the case of Grom and Shklovski, included an indicative link with literature concerning “moral accounting”. The authors did not develop a conceptual framework for the ethical dimension of tracking, but their work presents an excellent starting point for developing a conceptual tool that illuminates self-tracking as an ethical endeavour. Existing conceptualizations of the self in relation to tracking technology, such as “the digital cyborg assemblage” (Lupton, 2015a) and Clarke and colleagues’ conceptualization of “techno-scientific identities” via Rabinow (2003) – while fruitful – treat technology as still simply additive to selfhood or are used for creating new typologies, but not identities, of the self. However, conceptualizing data as an add-on to selfhood fails to capture the complexity of self-construction. Therefore, a different way of conceptualizing selfhood in relation to data is needed. The overarching point of agreement in the literature used to conceptualize selfhood in this is that selfhood is relational, draws on shared and social resources, is at least partially outward-oriented, and is constantly unfolding in reflexive ways. To understand how tracking can be conceptualized differently, an exploration of how it plays into the lives of the participants is needed.

The analysis presented in this chapter supports the argument about data becoming a new source for self-evaluation and self-construction at two levels. First, data is a new, unique, and indivisible part of frameworks that inform our selfhood at the conceptual level, in line with Charles Taylor's conceptualization of moral horizons and selfhood in *The Sources of the Self* (1989). Second, at the micro- and meso-sociological levels, including those of institutions and everyday life, data is a resource for self-understanding and self-construction akin to the natural language via Ricoeur (1992), Butler (2005), and Lakoff and Johnson (1980).

The main underlying assumptions on which the argument buttresses are: first, the self is a moral subject, as "our morality is an essential feature of our circumstances as human beings" (Nussbaum, 1988, p.50); and second, language is essential for the construction of selfhood (Ricoeur, 1992; Butler, 2005) (see Chapter 3, on conceptual framework). The argument is advanced by pulling out three interrelated themes from the corpus of the data. First, by means of sentiment and metaphor analysis of the corpus of interviews and diaries, the participants' talk about self-tracking is explored, and the analysis studies ethics-focused and moral emotions (Lakoff & Johnson, 1980; Turner, 2009). Understanding comparative domains in metaphors is important because as a language structure, they are relatively free from the effects of self-representation and uncover individual and collective patterns of thought (Schmitt, 2005). Furthermore, "the self" is an abstract concept that is difficult to describe and verbalize (Moser; 2000), making the use of metaphors in relation to it more likely. Understanding emotions in relation to tracking and exploring the predominance of so-called "moral emotions" reported by the participants "tells [...] self and others much about what the self honors and values" (Turner & Stets, 2006, p.564), and contributes to understanding the link that connects moral standards and behaviours (Tangney, Stuewig, and Mashek, 2011). Analysis at this level will reveal that moral emotions (e.g. guilt, shame, pride), those associated with ethical self-evaluation, and morally-imbued metaphors (e.g.

self-tracking as obsession and addiction, self-tracking as moral accounting, self-tracking as religion) dominate the way in which the participants talk about their quantification practices.

Second, an exploration of how self-tracking is positioned in relation to the multiplicity of individuals' ethically relevant roles (i.e. being a "good" parent, athlete, citizen, patient, Christian, pet owner, gardener), how the practice is used to make judgements about the self and others, and how ethical values underlying tracking compete with other values. The indicative conclusion is that self-tracking is far from being solely an inward-looking, narcissistic activity that self-referentially results in empty self-fulfilment, but instead, the practice informs other dimensions of selfhood. Furthermore, the values that underlie the activity compete with these other societal values.

Third, by using the works of Ricoeur (1992) and Butler (2005) to theorize the empirical findings. As such, the data acts as a resource for self-construction. It has unique (e.g. automation, constant feedback) characteristics, and this in turn raises a question about the power that institutional players obtain in this new field through having the power to shape individuals' practices of self-tracking. Using philosophical works on selfhood and exploring data from the perspective of a recourse for self-construction and self-evaluation allowed us to open new avenues for inquiry, which were previously unexplored in the current literature on self-tracking, thus raising novel questions for the future research.

This chapter consists of three sections dealing with metaphors, moral emotions, and various dimensions of identity, respectively. The final section weaves together findings from linguistic, emotional, narrative, and power dimensions of self-tracking to illustrate that self-tracking and data are becoming a structuring source of the self, as well as a pragmatic recourse for building one's selfhood. The chapter concludes with a call (that is developed further in Chapters 9 and 10, which offers a discussion and conclusions) for scrutiny of data practices on



an institutional level (e.g. tech companies, data brokers, application and algorithm writers, media discourses, and others players on the output of which individual reflections and judgements about self are drawn), as it links practices of everyday life with a wider ethical framework.

## Data as a Source of Moral Self-evaluation

### Metaphors of Self-quantification

Metaphors are sense-making devices that help people to orient themselves in new or complex situations. As language structures, metaphors might be used to draw parallels, contrasts, or explain various dimensions of a new phenomenon in terms of a familiar domain. In terms of moral actions, metaphors also delimit understanding of our obligations, rights, and duties in relation to the self and others (Johnson, 1988).

Overall, a total of 1,877 linguistic forms<sup>17</sup> were analysed. Those linguistic forms were naturally occurring in both diaries and interviews. The metaphors used by the participants were coded into 18 main thematic categories. Those can be further grouped as follows: related to embodied life (body, mind, part of life, attachment to others); related to science (control and investigation, science and experiment); related to dimensions of existence (space, time, waste); related to activities (journey, food, sports, machines); and, finally, related to organizing frameworks (religion, addiction and obsession, accounting). The remainder of the metaphors were coded under “other”. Some of those categories contained are morally coloured, while others are not. The discussion in this section moves from generic to moral metaphors.

The metaphors concerning embodied dimensions of life (comparative domains of body, mind, part of life, attachment to others) were popular, with references to “body” as a comparative

---

<sup>17</sup> From existing methodological and empirical literature, it can be inferred that metaphors do not always exist in full or pure form (Schmitt, 2005), and other linguistic forms such as comparisons, similes, and clichés might be equally as revealing (for example, Hampson et al., 2017). Given the limits of the corpus of the data, metaphors and other linguistic forms under each theme were coded together.

domain ranking as the 5<sup>th</sup>-most mentioned category. Examples in the body group included: “*listening/respecting to your body*” in relation to tracking; “*to go hand in hand/to feel like a limb is missing* [in relation to a forgotten device]”; the “*body is a gift/being comfortable in your own skin/body-clock*”; data as being “*a pain/ pain in the ass/neck*” to analyse, upload, or use; numbers as being “*disheartening/trust it [data] with my heart*”; and “*to keep an eye on/to turn a blind eye to/caught an eye/close look/ as oppose to just nothingness or blindness*” on own numbers. In the mind category, examples included: “*blood sugar being a bit crazy*”; data as a part of “*midgame/mindset/make up mind to run/clearing mind*”; and data as making one “*feel better about oneself/feel down/gain a peace of mind/ being at peace with oneself/keeps me in the zone*”. The “part of life” or routines category was the least frequently populated with references, and examples included: to check data “*the first thing/regularly/part of my everyday*”; and “*a part of my everyday life*”. In the attachment group, examples included: “*brotherhood of fitness devices/kindle spirit/ partner in walking/ conversation starter/ a little bit of a friend of mine/ a little companion/good silent partner/ a pet*” in reference a device; and noting that the device “*got to know me/it brings up competitiveness*”.

Overall, the metaphors and other linguistic forms in this category exemplify that the users have a deeply meaningful connection to their tracking devices, as they compare it to friendship, companionship, brotherhood with others, and other meaningful social relations, as well as a sense of peace, or even body parts. The data also offers senses of comfort and of trust. Not all of the comparisons are positive, given the links to negative mental states, pain, or disappointment, but those highlight the significance of the practice given the vocabulary used to describe it. In addition, there are two sub-themes of special interest in this group of metaphors: insanity and death.

For example, recording data on their daily practices was described as “*feels a bit psycho to me to record water*”. Alternatively, others referred to their tracking practices of recording as “*being bonkers*” or “my family and friends think *I'm a bit crazy*”, “some people might think I *am a bit mad*” manipulate our brain”, “a *bit paranoid* about tracking” or “*drive me insane/without going crazy*”. Those mentions are the first indication that tracking might symbolize a potentially unhealthy, even disturbing practice – something sinister, pathological. Those sentiments would be later echoed by metaphors and references concerned with obsession and addiction.

The other interesting theme is that of death in relation to self-quantification: “*kill yourself as you training/Oh-God-I'm-Going-To-Die pace*”; “to come *apart at seams*”; “*nearly expiring at the top of a big hill*”; “*kills the joy in eating*”; “dead units/dead watch/battery dies”; “*without passing out*”; or “*born out of effort*”. Such comparisons were often made in relation to devices and apps failing to record the level of effort a participant has put into his or her training. This signals the vitality of self-quantification to the participants as well as practice’s ability to destroy joy.

The next group of metaphors was concerned with the metaphysical dimensions of existence – time, space, and waste. For example, in the time domain and in relation to the importance of the data, individuals mentioned: “to keep fit and *keep the years back*/to look back/trying to *keep myself ticking over*”; as descriptive of the practice, they used terms like: “time consuming/ *black holes* for time/ I was just *burning time*/ I have lost half a day or a day of tracking”; as demanding of time: “to *lose time/find time/take time* (out)”; or as description of how the practice fits into the modern world “just a continuation of a digital age/expectations of wanting everything yesterday”. In the realm of space, data was perceived as helping to understand the self: “in broader perspective/ to *find a middle ground/on the grand scheme of things*”; in relation to data being inaccurate: “sleep patterns are *all over the place*/ [data] was all

over the place”; to explain connectivity of the practice as: “keep buying into *their ecosystem*”; and to describe self-quantification practice as: “just an extension of world/ [to] have the whole of the world on board”. When it came to the domain of waste, description of tracking benchmarks and goals as “*just rubbish*” were frequent and their scientific grounds were questioned or “*waste time/how much you waste in every sense/waste of money/I wasted a workout/lost sleep/ so that activity is not ‘lost’*” as a popular descriptors related to the practice itself, in light of the things the participants did not want to record “*junk food/eaten rubbish/empty calories/ bingy weekend/crap day*”; data was also described as making one “feel rubbish”. Alternatively, on discontinuation of the practice, individuals used phrases such as: “chuck it in the bin/useless data”.

In those domains, the negative connotation of the practice for the participants became more obvious: self-quantification was described as draining their time, finances, and resources. The tracking benchmarks and data was described as being “rubbish” – not on par with scientific evidence. Time was being wasted needlessly on recording of activities. On the other hand, the prevention of data loss in unrecorded sleep, steps, and workouts was also highlighted by the participants as undesirable. On the positive side, healthy aging was seen as made possible by the practice.

The group of metaphors related to human activities (journey, food, sports, machines) is unsurprisingly large and diverse given the focus of the study. In this category, linguistic forms related to sports were the 4<sup>th</sup>-most numerous across all categories, with 208 different mentions by the participants. The realm of sports and athletic achievement was a predictably popular comparative domain. For example, in relation to tracking goals, individuals mentioned: “*to hit the target/hit my mark/to stay under target/to meet the goal/to be rewarded/to cheat/to beat the system/trying to clock it to the next milestone/ been in a good groove over the past few weeks*”.

In light of the social dimension of tracking, people used terms like: “to *beat the competition/how I am performing against/push myself/ahead of the curve/personal record/* anything to try and bump up my score/blasted my 10 k/having a good streak/ to win a challenge/*want to be on top of the tree*”. In relation of the practice’s utility for life, participants noted: “to *stack the odds in one’s favour/to give yourself a fighting change [against old age]/ to gain bragging rights/smash the record*”; and as to how activates are performed, they mentioned: “to *push hard/to struggles with weight/ might not be world beating pace/ fascinated with what the optimum level of thing*”. Overall, many of these references are positive, described the practice of self-tracking as rewarding and in terms of active verbs such as to smash, to beat, to blast, to hit, and to win, and being in a favourable position such as a winner, topping the chart of competitors, or beating others. One of the participants comments on his meeting of daily targets as “win[ing] everyday as a result”. The dimension of sports focuses on winning, competing, striving, working hard, and on rewards and achievements – highlighting the competitive nature of the practice, as well as the importance of personal victories in relation to tracking.

A less anticipated comparative domain for self-tracking as a practice was that of voyages and trips, with both positive and negative mentions. For example, on the positive side, individuals mentioned: “*keeping oneself on track/moving in the right direction self-tracking or fitness journey/ whilst in the air*”. George, in his free associations exercise, gave the following association with self-tracking: “creating a *pathway through life*”. He explained that data he collects on himself feels like the “*footsteps that you leave behind and that might be able to help you see what you are doing*”. However, frequently, the references to travelling in light of self-tracking were negative: “to *carry baggage/to get carried away/letting myself go/heart rate skyrocketing/going out of the window/coming out from a bad patch/to go downhill/to be on autopilot/to have fallen of the waggon/turning point/missed the boat/help from tipping over/*

weight creep up/*lose your way*”. In framing self-tracking as a journey, the participants capture the temporal nature of the practice, as well as signalling that self-tracking has a final destination, as a journey would. The negative linguistic turns highlight that the journey is not always straightforward or easy (e.g. carrying baggage, to go downhill, falling off the wagon) and involves failures (to lose one’s way) that require corrective action.

The comparative realm of machines was used by the participants to describe their own bodies in relation to the statistics they were collecting on themselves: “to have a *big engine*/to *run out of steam*/to be full of or *to conserve energy*/to *have optimum power*/crashing and rebuilding myself/to *lose momentum*/to hibernate/to *run on a full tank*/to *fuel yourself correctly*”. Alternatively, in relation to how they were feeling while recording specific numbers, individuals mentioned: “to *feel drained*/to *have a spring in my step*/wanting to *disconnect*/to *plug in*/to *feel hollow*”. The most prominent theme in this category was that of energy and energy use. This comparison highlights parallels between personal bodies and machines. In relation to tracking, this category vividly captures personal states of being connected and disconnected and the desire to do so.

The final category in this group of metaphors and linguistic structures was that of food, where mentions were either characterizing diets (e.g. vice, guilty pleasure, comfort food, others as feeders) or explaining that participants were sceptical of tracking (e.g. take it with a grain of salt, to be fed up). The eating habits were frequently described in normative terms, such as “good”, “bad”, “sensible”, or “terrible”. The most interesting metaphor in this category was given by a participant in relation to privacy of data: he explains that a single “*slice of data/information/raw form*” might not be very useful or telling about a specific person (see Chapters 6 and 7, on reflexivity and privacy, for further exploration of this theme). Overall, in the group of metaphors related to food, machines, voyages, and sports, a clear division of

positively and negatively coloured linguistics structures comes through. However, in those groups of metaphors, there are few references to the ethical frameworks, but the reference to normative states indicates that potential. Before tackling those complex metaphors, two other groups of linguistic assemblage deserve a brief discussion: the science and experiments/control and investigation category; and the category of “others”, with metaphors that were not accommodated by the discussed reference domains.

The category of “others” covered metaphors that did not easily fit into existing coding categories, but did not appear frequently enough and did not have enough shared characteristic to merit their own groupings. These included, for example: “to be on the same page” or “to sit on the fence” regarding the role of data and tracking for society; or noting that one “must draw the line” – that is, where one stops tracking. Furthermore, terms like “To cover my own back”, “to dig deep,” “the flow of data”, “my numbers are all screwed up”, “loads of data”, “hard and fast rule”, “a slippery slope”, “a secret weapon,” and “a knock off effect” were all used in some way to describe personal data practices. There is no straightforward way to unite those references with a single narrative, but as a group, they indicate a type of relationship the participants have with their data in which they are using it as a weapon, are concerned about its quality, or reflect normatively on when the tracking “should” stop.

The final group that signals the potential rise of formal frameworks contains references to science and experiments, and investigation and control. The category dealing with control has about 2.5 times more mentions in comparison to the science group (135 vs 57). In terms of science and experiments, reference fields such references in relation to the practice itself were used – for example: “very much *trial and error*/becoming too scientific/doing *self-experiments*/to run a *controlled experiment*/to be experimenting/ a reasonable *sample size*”; in relation to data: “*data can’t be manipulated/ noise in data/ apple watch acts almost as a placebo/*

*a light bulb effect*"; and in relation to building theories about outcomes: "need more data before theorizing a missing link/a correlation/ positive bias/to document/ using myself as a guinea pig/ not entirely sure about the *ethics about all of that* [controlling unhealthy behaviours]". Those metaphors and other linguistic forms are mostly descriptive, with some presupposing a certain level of scientific knowledge and conventions about data analysis, experiments, and biases. Those terms also serve as a reminder of the self-quantification movement's claim of having a scientific background.

When it comes to control, the references are plentiful. For example, in the context of giving a sense of control, participants used terms such as: "tracking gives you a sense of control/ it just keeps me a bit more *in check*/ I am *taking ownership* of my health/ it is an *element of control*/ you are in a *driving seat*/ I keep a *check on it*/ a way to monitor what you have been up", in which most references are positive. On the other hand, there are references to giving the control away or it being taken away from an individual: "someone going *around crunching the data*/ it just became a little *bit intrusive*/ to control areas of people's lives/ 'they' were being *watched all the time*/ there are *keeping their tabs on us*". Finally, some references are more evaluative, such as: "just give myself some slack/ technology *shouldn't be in charge*/empower people to take control of what they are doing/ [tracking] becomes very restrictive/ getting on the scales every day isn't usually all that *constructive*", which include a judgment of how self-quantification might be experienced. The category of the idea of surveillance and control by others demonstrates a reminiscing of the findings on privacy discussed in the previous chapter.

The diversity of the discourse analysed in this section is reflective of the multiplicity of domains in terms of which self-tracking is talked about by the participants in everyday life. Each domain speaks to different characteristics of the practice, such as its claims to a scientific base, movement towards a goal throughout time, the sociality of the practice, its links to mental and



physical states, and its relation to the body. Some of the domains use predominantly positive terminology (e.g. sports), while others use predominantly negative (e.g. waste) terms. Finally, some of the statements the participants used were made in normative terms, such as good/bad, or having to draw a line with how far the practice should go.

### Comparative Domains with Moral Connotations

The final set of metaphors – with comparative domains of religion, addiction/ obsession, and accounting – is of a special interest, because those areas operate with a set of ethical standards and evaluative components. The popularity of such domains in comparison to those previously discussed – addiction and obsession was the most populous category with 222 mentions, accounting took second place with 220 mentions, and religion had 142 mentions – is indicative of how pertinent these evaluative frameworks were for the participants. While religion was the least-populated category out of the three, the breadth and variety of religious references make it a domain of special interest. The following paragraphs explore those metaphors in detail.

The group of linguistic forms with direct references to religious practices and vocabulary that emerged from the corpus of data can be exemplified by the following statements: “*to (not) track something religiously* [usually in reference to self-weight ins, food measurement, and food recording]/*to not have much faith* or have an *absolute faith* in tracker/ the *daemon* you don’t know/*admitting what you have done*/ people are very sort of *religiously devoted* to theirs [devices]/*I have to confess*/ some people take it *as the Bible/cult/ proof of that that you are telling the truth*/ tracking devices are so much *about confession/ a good revelation/ just a part of the ritual*”. These examples capture various dimensions of religious practice, from the claims to truth-telling and confession, to sacred books and rituals, to symbolism. This diversity signals the large extent of conjunction points between two practices. Those linguistic forms were used by participants to describe their practices or to provide evaluation of quantification practices of

others, as well as to pass some sort of judgments about the practice. Another set of religiously coloured linguistic structures tackled feelings and actions, such as: “not recording feels *shady/to guilt me/* what is out *moral duty to food,* looking after ourselves/ to feel *virtuous/* to be *tempted/* to feel *guilty/ a little bit liberating/ feel guilty* for not doing more or for eating the *wrong things/the temptation is too big/* I was able to resist the *temptation/* feeling of *overindulgence/* to be *tempted* to take off the tracker”. In this set, the ethical dimension is especially vivid, as it is framed in terms of guilt, temptation, moral duty, and liberation. Those comparative bottom lines helped the participants to describe their practices and personal attitudes towards tracking, indicating a powerful ethical reaction in relation to the practice. Finally, a theme of judgment and moral goodness has emerged strongly: “to be on the *right side of things/to be more honest/* all the *wrong people would be doing it/feels very judgmental,* or *app is judging /to beat myself up/* connotation of *self-indulgence and looking too far inwards/* allowed to have that *cheat day/* to dictate *what they should and shouldn't be doing*”. The phrases indicate that the participant experiences tracking as a judgment-giving authority, but that they also reflect normatively on the fact that they do not feel that it should be done by the applications and devices. Some participants reported not recording food that they perceived as indulgent or lowering their actual activity goals on the day to avoid feeling a sense of guilt and judgment.

In sum, the quantification practice draw parallels to religious practices (confessions, truth telling), to sacred sources and symbolisms (daemons, rituals), to action (over-indulgence, feeling guilty), and, most importantly, to moral judgment. The practice was spoken of in terms of virtues and indulgences, reflecting positive and negative ethical evaluation.

In the realm of accounting as a comparative domain, the diversity and multiplicity of references persist. For example, consider the references to how tracking is done: “to (throw off) *balance/to guesstimate/it all adds up/seeing in black and white/to benchmark/mental arithmetic*

/to pour over results/to save up [calories]/ to go over [calories]/to pay more attention to/ to be allowed more calories/ to keep fit/to maintain weight/adding to my tally/adding pressure/ getting step credit/to view something [steps] as a bonus/to bank the minute”, in which self-quantification was perceived in terms of getting bounces and credits, or simply keeping balance in life, weight, or activities. Alternatively, some linguistic forms characterized action that tracking allowed them to engage in: “being held and holding others to account with data/to make allowances/to add value to your life/to accept the fact/providing no obvious gain”. These were usually used in the context of making judgments about the self and others’ actions. Finally, some phrases were used to provide a description about the volume and value of data and activities – “astronomical amount of/an amazing investment/over-reward myself/data is currency/information is worthless” – as we all to evaluate their quality or usefulness. The most pertinent finding here is that of “account”, against which self-trackers could hold themselves – indicating the presence of some kind of benchmark in tracking.

The final group of the moral metaphors is the nexus between addiction and obsession. The two were frequently discussed together, like in this comment from Evelyne: “being bothered about trying to not break a goal streak is really *a bit of an addiction*, and actually could *create an anxiety problem* if you get so *obsessed* with hitting the goals”. References to obsessive recording and relationships with tracking devices were especially common, for example: “to be *obsessed* by [records, steps, data, power output, watching numbers, exercise]/to be an *obsessive person*/ tracking device as it probably *dictates* what I do/ lead me down an overly obsessive path/*doing it obsessively*/to be *true fitness obsessive*/ to get completely *bloody obsessed* with this”. Building on this theme, some other linguistic forms presented more extreme scenarios, such as the following self-descriptions: “*crazy fitness addict freak*/ I am not a *complete health nut*/I am not like *tracking maniac*/ never a *sports freak*”, many of which were used with negation to separate

the self from the path of over-attachment. Even more drastic scenarios included references to a complete loss of freedom in relation to data: “I am probably a bit *more crazy* about it than *I should be*/ they are not *becoming a slave to it/ be a slave to the data*/ being chained to this device/becoming very like paranoid/ I don't want for *it to take over my life/ I'd feel lost without one*/ very easy to get carried away/ self-tracker is it does *override your better judgement/ a bit of overreliance* on a new gadget/ it *shouldn't take over my life*/ it is a *total addiction*/ it is scary how *addictive* all this tracking is/ I got *quite addicted quiet quickly*”. In this group of statements, the sentiment of complete dependency was developed by the participants, including states when one is not in control of what he or she is doing, such as paranoia, loss of judgment, and slavery. Some participants used the vocabulary of detox as a cure to attachment to their devices – “having self-tracking *detox/take detox every 2-3 months/ to be on a self-tracking mini-detox*” – suggesting that taking breaks helped them to mitigate the potential harms of tracking. Another participant stated that she felt “relief” at missing a goal, because it would have otherwise taken her down an overly obsessive path.

The final theme in this group is related to illness or pathology, rather than addiction – for example: “to be *OCD* /genuinely kind of the *OCD* kind of things / even more *obsessive chasing the data/quite OCD about record keeping/we get a little bit OCD/ overanalysing everything/ it could make you a bit neurotic* actually/ becomes *hypochondriacs*/ I have become so ‘*attached*’ to my device / I am being a *little bit extreme*/ make you feel *quite anxious*”. Unlike the other statements in this category, references to obsessive-compulsive behaviours, worry, and overanalysing have roots in illnesses rather than being a developed behaviour in light of specific substances – in this case, tracking or data. Most of those expressions have negative connotations and point to the negative comparative domain. The final expression worth noting is “to get sort of *emotional high*”, which the participant reportedly experienced from meeting their goals. The

comparative domain here is that of addiction to the altered state of mind – as in using substances to feel good – but the “high” is here described in reference to emotions. Numerous sentiments and emotions reported by the participants in relation to the practice will be explored in detail in the next section.

To date, the analysis in this chapter showed that comparative source domains were diverse, ranging from more expected ones, such as sports or machines, to frames with strong, ingrained moral and ethical codes, such as religion, obsession, or accounting. The latter set is more telling about expectation for behaviours, potential moral rules, transgressions in regards to self-tracking, and the rules for what is considered “correct” behaviour. Within the domains with stronger moral frameworks, a division can also be observed, with actuarial references being slanted positively. Religious references were a mixed basket – oscillating between virtuosity and cultish-ness – and the obsession-addiction nexus is clearly negatively coloured.

In the religious domain, following the rules – in the form of meeting goals, not questioning the veracity of numerical dogma – as well as having faith in numbers, frequent reaffirmation of relations with the data, and checking up on oneself religiously were praised. In the domain of accounting, maintaining a balance, earning credit, adding value to life and not losing (domain of waste) steps, data, or recordings was praised as correct behaviour. Finally, addiction and obsession were perceived as transgressive, unhealthy behaviour. Both of these phenomena are perceived as negative, implying a loss of control, a lack of will-power, over-concentration on an issue, dependence, and un-freedom. These potentially indicate the kind of ethical violations that should not be made by self-trackers: for example, over-attachment to data, which was called traumatic by participants, or excessive obedience and action that goes into meeting external goals (e.g. running up and down the stairs to meet a goal, waking up at night to stand up). Multiple participants described their own experiences of attachment to devices as sad,

while others questioned if tracking made them happy. The line of analysis of sentiments reported by the participants in relation to their tracking is developed in the next section.

### Guilt, Shame, and Pride: Moral Emotions of Self-trackers

The historical and current debates in the sociology of emotions are discussed in Chapter 3, on conceptual framework. The argument presented below rests on assumptions that some emotions are universal (i.e. fear, sadness, anger, and happiness); there are biological mechanisms that underlie emotional expressions; and at the same time, the way people express emotions is culturally dependent and constrained. Most emotions reported by the participants were related to oneself and one's own actions, and therefore, a theoretical lens of individual appraisals was chosen, rather than theories that look at sanctions and assessments from the outside (i.e. emotions as power, social recourse, currency of exchange). Guilt, shame, and pride (along with feelings of anxiety and annoyance) unexpectedly prevailed in the corpus of the data, while references to being chuffed, interested, bored, shocked, cheered up, or worried occurred less frequently. Those emotions are qualitatively different.

Collectively, guilt, shame, embarrassment, pride, empathy, and sympathy are referred to as “moral emotions”. The notion of moral emotions frames the analysis in the rest of the chapter. Moral emotions constitute a special group of emotions, as they typically arise from self-evaluation in relation to an existing moral and ethical standard – one does not need a benchmark to feel sad, while it is impossible to experience shame without looking inward and evaluating oneself (i.e. to be ashamed of something).

The table and the word cloud below provide a birds-eye overview of all the references to emotions mentioned by the participants in interviews and diaries.

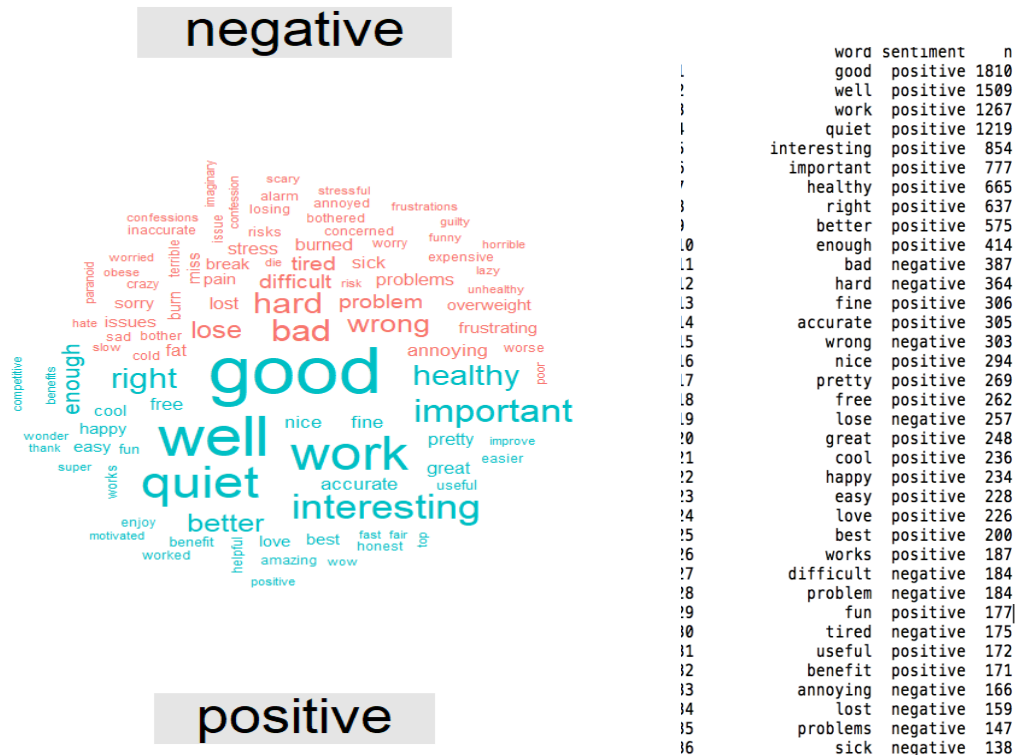


Figure 12: The word cloud represents positive and negative emotions (size proportionate to number frequency of use) reported by the participants

Figure 13: A section of sentiment analysis (simple frequency count) conducted using R

Overall, the positive and the negative side of the emotional spectrum is well represented, with the intensity of reported emotions varying on both ends. For example, on the positive side of the spectrum, some emotions characterized the practice of self-tracking more intensely than others (e.g. pleased, chuffed, happy, proud), as were they on the negative side of it (a bit/very upset, sad, disappointed, distressed). Being an automated process, sentiment analysis, using a packaged software for R, is a blunt instrument and is limited, because automated analysis does not discern attributions (between the interviewer and interviewee) without a manual review; cannot interpret the contextual factors (i.e. whether reference made in relation to the topic of interest); and treats all statement of sentiment in the same way (e.g. there is a difference in statements such as “I am not feeling good” and “self-tracking is good for society”). In addition, automated sentiment analysis distinguishes positive and negative emotions rather crudely – for example, “hard” is considered an exclusively negative emotion, while “easy” is labelled as positive – however, in

the way those terms are used, this distinction is not always accurate, as a “hard challenge” might describe something rewarding, and “an easy goal” may refer to something that is not.

Consequently, the automated sentiment analysis was only used to illustrate the feasibility of analysing emotions in the dataset, as different sentiments appear frequently and in diversity. The rest of the analysis was conducted via manual searches within the body of data. The main finding is the frequency and variety of moral emotions that were reported in relation to self-tracking.

This is especially relevant considering that sentiments of “guilt” and “shame” were frequently mentioned in the accounts of the participants. Those two emotions are not only important in themselves, as they shape our self-evaluation and selfhood, but they also are a source of both adaptive and maladaptive actions we take, and thus influence further moral choices and behaviours. The variation of “guilt/guilty” was mentioned by 20 distinct participants at least 40 times, mostly in relation to eating or not meeting their goals – for example: “I felt slightly guilty *for all the food I ate*”; “well I do feel *quite guilty* if I don't reach my 10000 steps”; and “feeling *guilty about not working harder*”. It is worth noting that some mentions of guilt were a part of reflection on how participants should *not* feel – for example, a participants explained that she felt guilty when she was not sleeping or exercising enough, but pointed out that: “*it makes me feel guilty in a moment where actually I shouldn't feel guilty* because I am sick and I have been dumped and I need some time for myself”. A statement like this shows that she acknowledges both guilt as an emotional experience in relation to the practice, but also a meta reflection and a normative evaluation of how it should (not) be. On a couple of occasions, the participants pointed out that they do not feel guilty about not meeting their goals or spending time on activities. However, regardless of the context, the emotion of guilt includes a self-evaluation against a kind of standard. Guilt is a moral emotion that is oriented towards evaluation in cases of specific behaviours and does not directly affect general self-evaluation (Turner &



Stets, 2007). Guilt as an emotion is not damaging to overall selfhood, as it is likely to involve a reparative action such as confession, apology – as illustrated in the opening quotation of this chapter – a changed behaviour, or undoing an action (Tangney, Stuewig, and Mashek, 2011). As an emotion, guilt also motivates people to act without violating what is perceived to be an ethical standard. In short, in the context of self-tracking, guilt can motivate the participants to stay with arbitrary prescribed benchmarks.

The emotion of anger, for example – “I get *very angry/depressed* when there is no opportunity to stride out and *just get that all important number of steps*”, “I am going to be very *angry with myself*. I am *scared* to track them [calories]” – was mentioned 7 times (4 different participants) in relation to tracking or data itself and was often accompanied by other negative emotions such as disappointment or frustration (those two are not classified as moral emotions). A sense of being frustrated at the device or at one’s inability to meet a goal on a specific day was also prevalent and mentioned by one-fifth of all participants on 15 different occasions. Certain vivid examples illustrate the reported sentiment: “I’m angry and *frustrated that my beloved Garmin is no longer doing its bit* [due to being broken] and sad that it has to be replaced”; “feeling annoyed and frustrated at myself for being ill, for a number of reasons (not being on top form for my exams), but *one of these reasons is that I am constantly thinking about my goals and how I’m going to meet them*”; and “I get frustrated because I think what have I done today? Sometimes there is a good reason, but it is frustrating”. The emotion of disappointment, which is not classified as a moral emotion, but is also telling in this context (e.g. “I was *disappointed I couldn’t improve* on the previous time for 5k”, “well, *obviously I feel disappointed when I don’t meet the goals*”) was mentioned by 9 participants on 9 different occasions – each of which had to do with not meeting their goals. Finally, another moral emotion, “embarrassment”, in relation to data was mentioned by 5 participants as part of the discussions, with two examples being

outward-oriented, as others might be embarrassed by their data – for example: “normally I’d be *embarrassed with the above data*” or “they would be *embarrassed about* their weight and *what the data is on there*”. Embarrassment are emotions that – similarly to guilt – serve as a “moral barometer” call for conforming to some kind of social standard and zoom in on personal behaviours that should be monitored and adjusted (Tangney, Stuewig & Mash, 2007).

Both guilt and shame originate in self-reflection and self-evaluation in relation to some kind of shared social standard that in turn motivates moral behaviours. Unlike guilt, which is theorized to be focused on specific behaviours, the emotion of shame is directed at the self-evaluation of the whole self and focuses on the “integrity and worth of self” (Turner, 2009, p.345). Shame is typically experienced when a person feels inadequate or incompetent, and it makes “the individual feel small, worthless, powerless, and otherwise in disfavor with others” (Turner & Stets, 2006, p.551). This is the case because shame attacks a personality as a whole, rather than a specific behaviour; it often causes maladaptive responses, such as repressions, avoidance, or attribution (Tangney, Stuewig, & Mashek, 2007). Feeling shame or ashamed was mentioned 4 times by 3 participants in relation to data or tracking (excluding the expression “it is a shame”, which was frequently used in diaries, but cannot be fully attributed to expressing a personal feeling of shame due to its idiomatic nature). Let’s take a closer look at the following quotation by a participant who explains the sense of shame he experienced in relation to not sleeping enough: “I kind of like became *quite ashamed of how little I was sleeping* and I was like right ok, we are going to like start tracking this again once the Masters is handed in. So I guess that's *the high end of cheating* but it is sort of saying ‘I know this *is going wrong*, I don't need the data to tell me’ it just doesn’t work”. This statement reveals a self-evaluation, a recognition that he engages in some kind of morally dubious behaviour, which he calls “cheating”, and points out that this behaviour is “wrong” instead of using a term like “unhealthy” or “insufficient”, for

example. All of those statements characterize a deep self-evaluation in terms of a moral standard. For other participants, shame similarly arose from not meeting a specific goal in their tracked activities – for example: “I sometimes *feel a little ashamed* about the fact that I *haven’t moved the recommended 250 steps*”; or “think I *would actually end up creating sort of* maybe not *resentment*, but just some sort of *anxiety and shame*”. Shame is a problematic emotion in the context of self-tracking because it is designed at the self-evaluation of the whole self, rather than specific behaviours, and is experienced deeply by the participants even though the goals against which self-evaluation takes place are arbitrary, not validated by scientific evidence, and imposed from the exterior.

On the positive side of the emotion spectrum is the moral emotion of pride and a sense of being proud of oneself and personal achievement deriving from self-evaluation. The sense of pride was mentioned by 10 participants on 10 separate occasions in relation to their data – for example: “my running app told me that I burnt 248 calories, having this recorded made me *feel really proud* and using this information I will compare it to how many calories I can burn next”; “*feel really proud of myself and want to talk non-stop about my training*”; “it is almost like I *feel proud, like if it had been a bad day at work, look at home many steps you did- it is great!*”; and “I have *felt proud of myself* as I have been able to *get my resting heart rate lower* than it has been in the past 2 weeks”. In some cases, the sense of pride is a bit easier to explain than in others – for instance, having a bad day but achieving a goal or sense of pride accompanying the effort of exercising, rather than being related to tracking specifically. However, the other two quotations indicate that data such as numbers of calories burned, steps, and heart rate are in themselves a source of pride. The sense of happiness – “I was quite *happy to see that record*”, “I *feel happy when I’ve done lots [steps]*”, “I *always go to bed happy when I have exceeded the targets*”, “was really tired in the eve but meeting my *daily goal makes me happy and content*”, “it makes me

*happy to see entries for all day*” – was frequently reported by 36 distinct participants (80% of the sample) on multiple occasions in diaries and interviews. Less intensely coloured but positive emotions included the sense of contentment in achievement or a feeling of being chuffed. While happiness and contentment might not be classified as moral emotions, their prevalence and the intensity with which they are reported goes to show the deep connection the participants have to their practice.

Shame, guilt, and pride are important emotions because they provide feedback about our standing against ethical standards, as well as underlying serious psychological issues such as anxiety – which by 13 distinct participants in relation to data or tracking goals. Furthermore, a sense of being depressed was mentioned by 11 people specifically in relation to self-tracking. The participants expressed a sense of anxiety and depression in relation to achieving or not achieving their goals; as Aaron puts it, “I’ve found myself *quite anxious* about how I’m going to reach my goals”. Mark writes in his diary: “too distracted to do any proper tracking. *Too depressed about it as food intake* also gone up and hope to get back into some routine exercise from Monday”. The participants who suffer from medically diagnosed mental health issues pointed out that as depressive episodes happen in their life, they find it more difficult – but also more important – to keep an eye on their tracking statistics, as sometimes it helps them gauge what and how much they have eaten, how much pain they are in in comparison to their perception of it on the day, or to estimate the level of physical activity they did without having to use their strained cognition.

Overall, the section illustrated that the practice resonates with participants on an emotive level. In relation to other axes of the framework, it is clear that accounts of emotional states and reactions have been threaded through the participants’ responses as well as the unfolding analysis. For example, the proposed conceptualization of informational privacy in Chapter 7, on

privacy, has at its core a sentiment, i.e. unease, and participants across the sample worry about flows and uses of their data. The analysis in Chapter 5, on culture, highlights that engagement with data and the “doing” of data happens beyond the material dimensions and highlights the normative pressure of feeling that they “should” be doing more; the practice itself was also characterised as making participants feel tyrannized, sad, and even scared of the personal and societal impact of tracking. Chapter 6, on reflexivity, surfaced how data supports meaningful personal projects, transition through life-stages, and self-perception; seeing their data in these contexts made the participants feel motivated, elated, or even disheartened. The analysis presented in this section crystalizes and adds precision to the emotion-related findings of other chapters by framing self-trackers’ sentiments via the filter of moral emotions. While acknowledging that emotions inform many dimensions of self-quantification, it is theoretically productive to single out and separate moral emotions, which are qualitatively different from other emotions, for analysis.

To specify, the moral emotions that were discussed are associated with personal reflexivity and self-evaluation against some kind of standard. Therefore, it is plausible to conclude that the practice of self-quantification incorporates a set of rules or ethical standards that dictate what is acceptable in the realm of quantification. The presence of those rules raises the question of what kind of forces and actors are empowered to create them, as it appears that arbitrary, not scientifically validated benchmarks derived from black-box algorithms make claims to veracity and shape those rules. These findings are especially informative when considered alongside the metaphor analysis which revealed comparative domains with strong moral valences, which give indications of the kinds of rules, standards, and benchmarks operating in the context of tracking. The combined findings also raise questions around sanction and enforcement, as well as how this account of the practice can further the analysis of broader

trends in the quantification of everyday life (e.g. do people experience moral emotions in relation to quantification of their education, productivity, finances?).

Furthermore, negative moral emotions related to feelings of inadequacy, transgressions, and breaking rules – guilt, shame, embarrassment – as well as associated mental states, such as anxiety and depression, dominate over the positive moral emotion of pride, raising questions about the impact of the practice on the participants. Like with metaphors, moral emotions indicate that understanding data practices cannot be done in an additive fashion, but instead require an alternative theorization that recognizes that self-quantification is not a mundane practice of everyday life, but is deeply linked to the sense of the self. The next section explores types of moral self-evaluation in everyday life and illustrates how the practice fits into various personal dimensions of identity.

### Ethics and Identity

This section explores ethical dimensions of identity in attempting to paint a bigger picture of how ethics underlies the practices of self-quantification. The analysis in Chapter 6, on reflexivity uncovered that the participants engaged in tracking in turning points in their life-course and in support of a particular goal or a dimension of identity, rather than using tracking as a self-standing activity. Younger and middle-aged participants explained that their data was used in preparation or maintenance of their family, friendships, and social roles (frequently other-oriented roles). For example, Jerome, along with other participants, reported that tracking originally became a need because he wanted to maintain his health: “making sure that I *am around for them* [kids]”. Lisa, who is a primary carer for a disabled child and who herself suffers from depression, used self-tracking to develop a new healthcare regimen for herself in order to make sure that does not have to live in the “fog” of anti-depressant medication. She explains: “*I didn't want to live the rest of my life like that* [she has “been medicated by the doctor”] *I needed*

*to sort myself out*” in order to ensure her own longevity and to be able to take care of her child. For older participants, more pragmatic goals, such as keeping at bay dementia, diabetes, and aging, were mentioned – frequently in relation to not being a burden to their family and society. Overall, such findings demonstrated how self-tracking fits within personal narratives. The findings that moral emotions and metaphors dominate the discourse about the practice call into question how the participants evaluate their practice in relation to specific ethical standards, as well as how they reflect on such standards. The following section uses three case studies to add nuance to those points.

The first case is that of Aaron, who had a tension-filled relationship with tracking, and had given up the practice before returning to it as a part of reshaping his body as well as his identity. Aaron’s health narrative developed around his weight and physical activity. He explained that he transitioned from being overweight and inactive, something he passionately described at the time of the study, to being fit and extremely health conscious. During an interview, Aaron explains how when he tried self-quantification for the first time, the practice did not “stick”, thereby causing internal conflict:

I think when I had it [refers to a tracking device he used] then it felt to me *very tokenistic* and very not *representative of what my life* was and then. [...] wearing a *watch is a perception of you* and, perhaps, that when I have it and I was *giving up a false perception*, because I wasn't particularly healthy and it might have been *some sort of unconscious – not shame*, but things that are unconscious that I was *thinking “It isn’t me, this isn’t for me”*, this is not a product that should be using because this isn’t representative of my life [...] because it just *didn't fit my lifestyle* and *wasn't prepared to change* I that as I am not. [...] *I was trying to give up an impression* “oh this is my life and I love tracking health,” but *I didn't really*, as I just wasn't doing much as I was still going home and sitting and sitting down all night and not doing very much.

The statement binds together multiple themes: self-representation, self-perception, self-evaluation, and an implicit understanding of who the practice is and is not for. The quotation also highlights how deeply reflexive the participants are in their analysis of quantification. Aaron, seeing himself as a particular kind of subject – not active, but not ready to change – caused the conflicting reaction within himself, and in turn put him off tracking as a practice until he was

ready to introduce changes in his life that aligned better with the perception that tracking is meant to give. In making those reflections, Aaron refers to the sense of shame and evaluates himself not only against a health standard, but against that which he understands as a true self. The use of words such as “tokenistic” and “false perception” is also notable, as they potentially point to a performative element of self-quantification. Aaron’s comments highlight the presence of some kind of ethical rules – who the practice is for, what it helps to achieve, and how it differentiates between the true self and impression-giving.

Similarly, other participants – Mark, Peter, and Rose – having reflected on the practice in detail, concluded that the practice’s premise to optimize the self did not quite fit with their perception of the self or its promised benefit for society. They reported that tracking did not fit easily with their understanding of the self, as the practice conflicted with at least some of their beliefs. For example, Rose explained that while she feels that tracking brings her personal benefits – reassurance, satisfaction when meeting goals – she feels that the practice is not as harmless for society. She explained that tracking feeds into the culture of constant comparison and competition fuelled by social media, explaining that this is not a healthy dimension of the practice in her perception. Similarly, Hannah – an avid tracker who enjoys both wearing her device and benefiting from the data she collects – pointed out embracing quantification on a grander scheme of things with her identity as a critical social science scholar. She noted how tracking promotes further commercializing of life, while being “*an addition to the society that brings us nowhere*”.

Finally, Vanessa and Mark, during exit interviews and after reflecting about why they are engaged in tracking, concluded that the practice was no longer meaningful to them and indicated they were likely to give it up, because tracking did not contribute to their lives or self-understanding. Vanessa, who in the initial weeks of diary writing suggests that tracking became



as habitual for her as “brushing my teeth”, explains: “I’ve got to the point in my ‘fitbit life’ that I assumed I would get to sooner – *I have grown bored of my Fitbit*. I feel that if it didn’t have the silent alarms, there would be no point in me owning it. *I’m bored of wearing it* - I never wear jewellery or anything on my wrist and it’s becoming irritating to have it constantly in the way”. Expanding on this thought, she asks herself: “if my Fitbit broke, would I replace it? I think I would have to, *just for the silent alarms!*” The utility of the silent reminders rather than a reference to self-reflection or evaluation are indicative of the value that quantification brings to Vanessa. Mark, in his exit interview, reflects on the process of reflecting about his own quantification practice, stating that: “yeah, it [dairy writing] *forced me to think about things* having to do you know, having to do with tracking forced me to think more closely and yeah, *yeah I probably would wouldn’t want to continue with for long term, I prefer just to walk somewhere when it is not counting steps or anything*”. On other occasions, Mark pointed out that counting calories and steps removes the joy from his activities, and thus giving up the practice appears to be the choice that most aligns with his sense of self.

In all of those cases, the participants reflected deeply on the practices and concluded that such a contribution was not necessarily positive – feeding meaningless competition, sapping joy from activities such as eating and working out, performing a perfunctory role, not adding to societal discourse, and causing internal tensions. At the same time, the participants also recognized the tension arising from the fact that the practice might have benefited them personally, but did damage at the societal level.

A more radical case of self-tracking coming into conflict with a wider perception of selfhood and not being able to settle into a new identity was described by Sean, who has been diagnosed with HIV and offered self-tracking applications for levels of pain and medication as a part of the management of his condition. He explains:

In the last 18 months or couple of years that I started doing it as properly as it should be done was because on so many different medications, and *tracking and writing it all down felt like I have nothing else in my life than just to focus on what medication I have taken today, how to I feel like today, what was my weight this week comparing to the end of the week, so I kind of went the other way and just refused to track anything at all – just refused to do it*, so I would take my meds when I remember but if I don't remember that's it, *because it felt like I was focused too much and that obviously didn't work out very well.*

Sean is an example of how an acute focus on tracking did not leave space for other dimensions of the self and felt suffocating to him. In his case, quantification took over his daily life, rather than enabling him to cope better with his condition. He acknowledges that he had to get back to tracking because not paying attention to his medication did not go well and, later in the interview, explains how he came to use the practice in support of his lifestyle for monitoring pain and making sure he is keeping an eye on himself during depressive episodes. His account mirrors experiences of the participants living with eating disorders and athletes who reported that their personal awareness was so heightened by tracking that while they were accurate in counting how many calories they have eaten that day, some of those participants found their tracking traumatic and presented it in terms of destruction. For example:

I think I am very accurate within a margin of 300 calories [...] *You don't want to get there, you should never get there!* [laughs] That what they say, you *should NEVER get to that level of awareness because it doesn't make you happy*, because *I was dying and it was suicide and there is no joke about it and I was going to die*, and nothing would have stopped me I think [...] So it is not then, it is no fun I speak about it and I laugh, but it is just I mean, it doesn't mean it was easy, it was a horrible period and of course and it is also, I mean, the point, the reason why *I keep tracking things* because I keep tracking things is because I have *a huge trauma obviously, which I just process in this way*. But never, I would never, I sort of, *I really think that people should be happier gaining a couple of kilograms but just being happy* and yeah *nobody should track things to that extent*

In the quotation above, the experience of tracking is clearly presented as dialectically both traumatic and health-preserving. Similarly, another participant tracked herself in a destructive way by deliberately causing malnourishment, but then also tracked to cope with the potentiality of death after realizing that not eating will result in damages to their personal self. Tracking here plays into both the destruction and the creation of personal identity. There is also an evaluation in her normative warning to others, as the speaker of the quotation also points out that she

reveals that others “should NEVER [her emphasis]” get to the level of awareness that she reached – a sentiment echoed by another participant, who stated that she “remember[s] everything [she] never ate!” Taken together these accounts show that the participants question that more data necessarily leads to better or even positive outcomes. Indeed Sean explained his relations with the practice by stating that “*it’s not healthy*, like focusing on yourself [...] And it does sometimes *feel self-indulgent* because I am saying, thinking me, me, me, me, me it’s that and that is why I tried [self-tracking] *it many times before I just couldn’t* [stick with it]”.

The main point of agreement of these diverse accounts is that exploring self-tracking as a self-standing phenomenon fails to account for its interactions with other parts of our ethical reflective selves, our normative beliefs, and our multiplicity of personal positions. These case studies illustrate the deeply reflexive nature of the practice and its profound impact on the identities of the participants. The types of reflection are also of note, with the participants commenting on the normative goodness of the practice, its fit with their personal identity, societal implications, and its role in self-presentation. Based on these points, additive conceptualizations end up missing the nuance of how tracking comes to support, contradict, feed into, or interact with the wider process of self-construction and evaluation, as well as how the practice can enable the dialectic of creation and destruction. A different conceptual lens is therefore needed to better capture the phenomenon.

### Perceptions of Self-tracking Practice

The works of Taylor and Giddens discuss the issue of the plurality of competing moral goods. To understand how the participants perceived what kind of values underlie self-tracking and how these rank against other values, the interview schedule included a set of questions about seeing others tracking on the street and making self-tracking mandatory for all members of society. Evaluations of other self-trackers were usually couched in terms of respect to and moral

duty for one's own body, as well as in the language of sociality. Most of these evaluations were positive – such as, for example, a sense of camaraderie (e.g. “*brotherhood* of fitness devices”, “he or she is *also a sports person* you know cares about his or her health”, “I *would feel some connection* with them”, “you know you see somebody driving the same car and you *get that like “hi”*”, “a bit of *brotherhood*”); curiosity (e.g. “curious *what sort of person* they are, what sort of goals they would have”); a shared mind-set (e.g. “oh *you are just like me*”, “*kinder spirit*”); friendliness (e.g. “*conversation starter*”, “generated a conversation”, “*an ice breaker*”); as well as other positive attributions (e.g. “*obviously an active person*”, “a bit *more fitness conscious than an average person*”, “*people trying to be better*. Some kind of work on the self”, “I would like to *give them a high five*”). All of the aforementioned themes revolved around a positive social element of being a part of a group and sharing something in common. One of the participants summarized her feelings of curiosity, excitement, and approval of seeing others using tracking:

*I am having a little smile yeah, in the pool if somebody is about to press their GO button for a lap you think they are quiet serious and then you think what are they doing it for, are they tracking or what are they doing, so you look and you sort of think hmm ok*

Despite mostly positive perceptions of tracking when conducted by others, a few (4) participants mentioned that they perceive the activity and people engaging in it as narcissistic, inward-focused, vain, and/or mainstream. However, even the negative characterizations of the practice were presented side-by-side with the personal benefits: “I just feel like I can do anything, I suppose that is quiet narcissistic really, but yeah, I just feel, when I set a goal and I reach it just makes me feel empowered”. The participants also mentioned technophobia, not wanting to take responsibility for one's own health, unwillingness to be consistent with the practice, not having sufficient education, and not wanting to face the truth about their activities as reasons why people might not want to engage in the practice.

Interestingly, when asked about people who would usually receive negative social evaluations (i.e. people with BMI deviations in both directions), most of the participants described them in positive terms. While some of the participants recognized that having a device should not automatically be equated to taking health action, overweight trackers were overwhelmingly described as trying to address health issues, making an effort, attempting to be healthier, and showing that they are trying to improve their health.

Notwithstanding mostly positive evaluations of self-tracking when practised by others, when asked if self-tracking should be made mandatory for the whole population in the UK, an overwhelming number of participants (31) said “No”, and only three agreed with the idea. A few participants thought that tracking should be made mandatory for some socio-demographic groups (e.g. diabetics, overweight individuals) or in certain conditions (e.g. pre-operation preparation for obesity) or that it might benefit the healthcare system. It is important to note that while some mentions of impracticality or difficulty of giving everybody a tracking device – lack of funding, importance of health support programmes, and health awareness were mentioned – most responses were in terms of competing values, such as self-responsibility, non-intervention of the state, democracy, anti-surveillance, self-efficacy, and voluntary choice. This entanglement of ethical and social values, some of which come into contradiction, signal the practice’s underlying ethical complexity as well as its dependency on and shaping of other social practices.

To illustrate, Jerome explains: “we live *in a democracy* where *we chose what we do* and some people *chose to do nothing and that's fine*, because if you chose to do nothing then more power to you –*that is your choice!*” Nancy offers another take on the issue, focusing on the idea of state intervention: “that is a difficult one because I would like to think that people would think well this is free, yes I am going to use it but I think there will be a large section of society that would say *I don't agree with this nanny state, I m not want them to collect my data, I don't know*

*why are you doing this*". Camilla had a similar conclusion, but placed the emphasis on the NHS rather than the state: "I think if it was mandatory to have tracking, *you are trying to control areas of people's lives that I don't think the NHS has a place to do that*". Finally, Zoe pointed out: "I don't want the aggravation of someone that texting me saying 'oh' or emailing me saying 'you are not doing enough' or *whatever because I chose to do what I chose to do*".

While being perceived as a positive and socially desirable practice – others wearing tracking devices as being kindred spirits, working diligently towards their goals, and taking care of themselves – self-quantification was not perceived as demanding or mandating, as that would conflict with other values such as the freedom to choose, democracy, and non-intervention by the state. A minority of the participants concluded that the practice is narcissistic and vain.

### Deceptive Bodies, Truthful Devices

"My *tracker is not happy with me at all!*" reflected one of the participants in his diary. Another wrote: "I don't want *my wearable to be like chatting to me*, I just want it to tell me *what I need to do* so [laughs] so yeah, sort of forced hmm like fake friendliness". Another participant suggested that tracking technologies should have a "*no judgment' mode*", explaining that he felt frustrated with the apps that indicated what was the "right" or "wrong" food to eat. Those comments draw our attention to a power dynamic that is important to explore, as self-tracking devices potentially provide benchmarks for ethical self-evaluation. Ricoeur, Butler, and Taylor explore in different ways the impossibility of escaping "the other" being present in the self. Butler (2005) argues that the account of the self is given in a response to the inquiring other and is constructed depending on the inquiring partner. Ricoeur (1992) uses the Aristotelian thesis on friendship to illustrate a situation where the balance of power between the self and the other is ideal and thus productive for selfhood. The inquiring other is not only equally powerful and benevolent, but for both Butler and Ricoeur, obviously human. In the case of self-tracking, the

other that calls the self to account is at best quasi-human and, in most cases, fully automated. This poses questions about the kind of relationship we have with the trackers and how we react when we are called to “give an account” by them, as well as what kind of power imbalances are embedded in this questioning. Two empirical observations are illuminating here.

First, multiple individuals reported taking breaks from their trackers. Participants were especially likely not to use their trackers when they intended to relax – for example, when going on vacation, during holiday season, when they were sick, or when they chose to take a day off. In other words, tracking is often described in terms that oppose relaxation (e.g. “kills” joy of eating, “fed up” with being told what to do). For example, “on holiday you *can do what you want, you need a break from it*, if I know it is going to *be a bad* month than I tend to allow myself”, explained Willow, while other participants justified their preferences in terms of taking a break from everything, including technology, as they did not want to be stressed out by their devices. Similarly, Dawn, Zara, and Bert described removing technology as “liberating”, describing “*a break from everything from the technology [...] in a sense that it is really it is really want disconnected [...] during my breaks I don't collect my data anymore, [...] when I m starting my normal lifestyle then I put my watch back*”. The separation of a “normal lifestyle” from relaxation is especially clear in this quotation, which indicates that “giving an account of oneself” is not a relaxing or even pleasant activity, since it is being cut out for holiday periods.

In a similar vein, some of the participants chose not to track particular aspects of their lives because they found that they tended to punish or over-reward themselves for (not) meeting imposed standards. Katie, who tried out calorie tracking, explains: “I feel like I would punish myself for not doing them. I feel like *I am going to be very angry with myself. I am scared to track them*”. The discourse of punishment brings the argument back to moral self-evaluation in relation to the practice. On a more dramatic side of the scale, Aaron tells a story of how –

regardless of his illness and exam stress – he forced himself to go for walks to meet his tracking goals. He recounts: “I remember one day I went for a walk and *I was so ill, I was like I shouldn't be doing that, but I need to reach these goals*”. Upon further questioning, he explains that meeting his fitness goals regarding his actual physical conditions or benefits for overall health allows him to have an “assurance” of being a fit person – an assurance that he loses otherwise. Similar stories were told by professional athletes who would force themselves to work out despite knowing that they needed a rest day.

On rare occasions when participants could not have their tracking devices on them, they resorted to special actions to avoid not meeting their goal. Aaron and Dawn both had to attend events where tracking of food they ate would not be possible. To meet his standing goal (i.e. to be standing for 1 minute of a designated inactive period of time), Aaron explains in his diary:

as I'll be taking the watch off around 5/6pm *and I need to make sure I have completed my stand goal before then. To do this I'm going to stay up a little later tonight until about 1am so I have already banked some hours, and I've set an alarm for 7am to get up and walk around for a bit to get another hour. Even if I go back to bed I'm not worried but I just want to bank the one minute stand goal for that hour. It's really not good that I'm anxious about meeting this goal before I go out with friends, but I've worked so hard to have a perfect strike so far and I don't want to ruin it now as I know that it would annoy me. It's so extreme that I feel like it would ruin my night and make me feel guilty, which is really not good.*

In the quotation, Aaron shows how he went to extraordinary lengths to make sure that his fitness goal would be met – from going to bed later, to waking up to stand for one minute – just to avoid the disappointment of ruining an arbitrary baseline. What is especially interesting in his statement is that Aaron acknowledges that it is “really not good”, that his feelings are extreme, and that a cost of not doing his tracking is personal guilt and a ruined night out. It is one of multiple occasions where actual health benefits were potentially undermined, rather than supported, by the tracking.

Dawn, who also felt that her watch did not go well with her outfit, developed a different data loss strategy – she took the tracker off as soon as she met her goal by dancing at a night club



and continued her entertainment without it. Furthermore, many participants mentioned that not wearing their tracking device (i.e. because they forgot their device, the device was charging or lost charge, or they did not take their phone) made them feel as if they did not do the activity or as if their steps did not benefit their health. To illustrate, Roman explains: “I will tell you *I feel really upset* when that [he doesn’t track] happens even though nobody is ever going to know about it [...] *it is bizarre, it is bizarre*”. He circles back to this comment during the second interview and states “don't ask me to explain because *I can't and so the fact that an anonymous object is no longer recording something I am doing would be a loss for me*”. Alternatively, Willow, in her diary and in a subsequent interview, explains: “I left my phone at home when I went on a walk at the weekend and *was very upset that it wouldn't then have my steps on!*” Other participants recount similar experiences, reflecting on “lost” data that could have been counted towards their goals. The meta-reflexivity crystalized in those cases, as the participants themselves concluded that the sense of being upset or felt accountability was “bizarre”, as they acknowledged that the benefits of the activities were preserved.

Similar feelings were expressed by many participants in relation to both data loss and breaking a streak of their goals, despite the obvious preservation of any health benefits associated with their activities. This point brings back the idea of moral accounting, where only the activity that was counted counts. When the data was not lost, but did not add up to a desired goal, participants engaged in additional walking or cycling around the block, continuously taking sets of stairs, doing jumping jacks, or going on an extra walk to bulk up the numbers (e.g. Nancy, Margaret, Evelyne, Vanessa) to meet such a mark. Overall, those accounts demonstrate a deep attachment – constituted in the mix of emotions and everyday behaviours – or even entrapment that mobile apps and devices promote in everyday life. In sum, pre-given and most often generic tracking goals were clearly used for self-assessment with a stake high enough to force knowingly

unhealthy actions upon oneself. To unfold the argument further, additional case studies are helpful; stories told with regards to anticipated loss of data are a good fit.

The second empirical observation surfaced from the debate about the “trustworthiness” of bodies comparing to that of tracking devices. When asking the interviewees what they are likely to trust more – their bodies or their devices – in the case of receiving conflicting information, 18 participants reported that their bodies were more reliable sources of information, with another 7 explaining situations in which they would be more likely to rely on their tracker (e.g. number of steps they took, when they cannot objectively evaluate how they are feeling due to sickness), while three people in the sample reported relying more on trackers. The participants reliant on their bodies in cases of conflicting information elaborated that living in one’s own body has taught them to “know your body more”, “you got to go with your gut instinct,” and “listening to your body”. Those who had mixed feeling about choosing between one or the other explained that facing conflicting information, they are likely to investigate further – as Eloise puts it “to dig into the data better” – and that they are inclined to trust some types of data from the tracker over others (e.g. “it is hard because in some cases *the sleep I trust myself, the steps FitBit seems to be pretty accurate*”). The smallest of the three groups of the participants believed that the body can be deceptive – it can demand more than it needs, for example, or be more tired than it is “supposed” to be. One of the respondents described this as “misinformation”, elaborating that it is easy for the body “to ask for another doughnut or another cup of ice cream or/and the next day it will ask for two doughnuts, two more cups of ice cream”. Thus, some of the participants perceived their data as more objective and as recording preventing the user from being able to “to lie to yourself”, from being able to change the numbers retroactively, or to create “an image of yourself”, unlike that on social media. This finding links back to the chapters on culture and reflexivity, in which it was found that the participants questioned the usefulness of advanced

analysis, the claims of pseudo-scientific discourse surrounding their devices, and the accuracy of data after taking steps to validate their data and criticizing the devices for poor validity. Taken together, the observations about taking a break from tracking, going to extreme lengths to meet arbitrary goals, and trusting or not trusting their personal devices show that the desire to meet some kind of benchmark based on self-evaluation is truly strong for the participants, indicating yet again that self-tracked data is becoming a meaningful source for construction of self-identity.

### Data as Resource of Self: New Horizon

The aim of this chapter was to show that self-tracking is experienced by the participants as an ethical pursuit and to understand how the practice is nested in the wider project of the self. There have been a number of main findings in this chapter. First, the chapter noted the high frequency with which moral emotions and metaphors in which other ethical frameworks are used as comparative domains that are used to describe the practice – especially prevalent are religious (e.g. treat the tracker like a Bible, tracking religiously) and illness metaphors (OCD, the practice being obsessive and addictive), as well as the appearance of negatively coloured moral emotions, such as guilt and shame, which indicate that data is used as a source of ethical self-evaluation against some kind of commonly agreed standard. The frequency of these emotions reported in relation to self-tracking is worrying because of the arbitrary nature of the benchmarks against which achievement is measured and the relative powerlessness of individuals to determine or affect them. This raises further questions about competing moral benchmarks and about the position of heart rate, the number of calories consumed, or the number of steps taken in relation to other morally evaluative behaviours.

Second, tensions with regards to practice evaluation that are embedded in self-quantification in the everyday life – for example, a desire for “no judgment mode”, taking a “liberating” break or detox from tracking during holiday, or going to extraordinary lengths to

meet an assigned goal – indicate a desire to avoid being judged by the device or avoid being given grounds for moral self-evaluation. Third, when framed as a practice engaged in by others, self-tracking was described in predominantly positive terms, except for when mandated tracking appeared to conflict with moral values of democracy, free choice, and non-intervention from the state. As such, tracking is used to make judgements about the self and the other. This is important because generated evidence links data to other dimensions of our selfhood, as it was used in service to bigger self-identities.

In relation to the wider literature on quantification, these findings, combined with the key points raised in the other empirical chapters, illustrate how the “doing” with and of data on the self goes far beyond material engagement with devices and data traces. At the same time, by tackling the questions of what we do with data and how we make meaning of it, from an empirical rather than theoretical perspective (Cheney-Lippold, 2011; Kitchin, 2014; Lyon, 2015; Ruppert, Isin & Bigo, 2017), the analysis showed that notions of modulation, filtering, benchmarking, categorization, data sorting, and aggregation might not be commonplace in everyday life, yet their shaping of the data flows is hard to negate. As such, by drawing attention to the role of reflexivity in the practice, this thesis offers a novel avenue for examination of the meaning-making and doings of the data, as well as the ethical and emotional undercurrents that underlie such “data work”.

These findings lead us to rethink the ways self-tracking (and data) are currently treated as separate, add-on dimensions of selfhood and call for a more comprehensive framework that can illuminate the links that connect data to other dimensions of selfhood. Based on the literature and empirical findings, a productive avenue might be to treat self-tracked data as a resource and a source of the self. Such a conceptualization would allow us to study the underlying power structure of the shared resources, as Foucault and Butler did with natural languages, and compare

and contrast it with other resources we use for the construction of the self. Such features as automatization, constant feedback, misbalance of power, and lack of transparency in resource production are thus considered in detail. Finally, in the tradition of Charles Taylor, data can be productively explored as a part of the structuring framework that effects how other moral goods are organized and valued.

The next chapter – Chapter 9 – will review and explore the significance of the findings from the empirical chapters, before examining the significance of the overall argument of the dissertation, which proposes a new theoretical and conceptual perspective on the self in relation to data.

## Chapter 9 – Discussion: What do the findings add up to?

### Summary and Significance of Core Argument

This chapter examines and contextualizes the core findings of the study. First, the chapter weaves major conclusions into a single arc and reflects on their combined contribution from the perspectives of theoretical and conceptual agendas for studying self-tracking. Second, the chapter highlights core thematic findings and discusses their significance in a focused way. Schematically, each of the four heuristic axes – with a respective emphasis on cultural, reflexive, ethical, and privacy dimensions – helped to advance the core argument of the dissertation, which contends that data is becoming a new source of the self.

Throughout the dissertation the analysis evidenced that self-tracking is a deeply meaningful practice that creates complex interrelations among the self, identity, agency, and personal projects. Therefore, self-quantification practice and the data it generates cannot be understood as a purely additive resource for construction of the self. This overall finding calls for new conceptualizations of the practice and alternative theoretical entry points.

In particular, the dissertation concluded that the practice is employed by self-quantifiers to engage in meaningful introspection, higher-order reflection, and judgment about the self. The practice is used to enable life-course transformations and to assist in completing personally significant projects (Chapters 5 and 6). Moreover, the practice is a source of profound visceral reactions, emotional investment, and sustained connection (Chapter 8). Indeed, the practice stimulated para-social relationships with personal data and devices, stimulating data aversion loss even in the face of expected reasonable adjustments (e.g. striving to meet goals while being ill). At the same time, the practice, its premises and functions are the subject of sharp reflections and far-reaching criticism from those who engage in it (Chapters 5 and 7). Many limitations of the practice, including those that inhibit its primary functions – unusable feedback, judgmental

communication, reductionist nature of quantification, privacy issues – are acknowledged by the self-quantifiers who took part in the study (Chapter 6 and 7). Also notably, the participants did little with their data, but even individuals' recognition of this issue did not dampen the appeal of the practice for them. This conclusion highlights a paradox in use, as the practice – even when not fit for its core mission and with the problematic dimensions being understood by the participants – remains firmly planted in everyday life and personal projects.

The findings are significant because they highlight the limits of current theoretical frameworks and call for new approaches to studying and conceptualizing self-tracking practice. First, on the theoretical front, the findings highlighted the limits of the explanatory power of discipline-focused frames, such as governmentality, technology of the self, healthism, and biopower. This is the case because self-quantifiers did little with the data they collected and did almost nothing based on their data in the long run (Chapter 6). This finding challenges the logic of frames that rely on long-term constant engagement, self-correction, and strive for optimization as a power-exerting mechanism. Alternative approaches are also merited given how critical participants were of the practice – they highlighted problematic dimensions in terms of socio-economic, gendered, and Western-centered aspects of the practice, poked holes in the promises of commercial discourses, and used their technologies in creative ways rather than for the purposes of their direct functioning (Chapter 5). Those conclusions suggest that agency-centred theoretical approaches are well suited for further research in this area.

On the conceptualization front, a new way of understanding self-quantification in relation to selfhood is warranted, as findings indicate a strong integration of the practice in support of personal projects as well as a significant emotional response to it (Chapters 6 and 8). These findings make the case for a non-additive conceptualization of quantified data in relation to the self. For example, the prevalence of moral emptions in relation to the practice signals the

presence of ethical standards or rules against which personal behaviours are measured. This finding is significant because recognition of strong emotive responses in relation to the practice raises important questions about who is empowered to shape shared resources that are used for self-construction: for example, who has the power to devise standards and benchmarks for measurements; what these benchmarks are; and the utility of such standards for self-construction. At present, such standards are likely to be drawn by commercial entities via non-transparent processes, non-scientifically validated information, and obscured algorithmic suggestions. Furthermore, the predominance of negative moral emotions as well as the negative mental states associated with those raises questions about the influences of such evaluations on selfhood (Chapter 8). As such, self-tracked data can be more accurately conceptualized as a resource on which the self draws with its own norms and values ingrained in it, rather than a simple additive to the self.

The findings of the dissertation also addressed a gap in longitudinal research efforts to examine self-quantification by capturing participants' reflections on a continuous basis over a period of time, thus allowing us to derive original insights which cross-sectional designs are unable to capture (Chapter 4). For example, the longitudinal nature of the study allowed a novel conceptualization of privacy as unease by capturing how privacy attitudes evolve and change over time, as well as come into conflict with each other given the demands of various personal roles in everyday life. The longitudinal nature of the study also helped to uncover the "sticky" nature of self-quantification, as the analysis showed – in contrast to the findings of wider literature – that participants returned to their practice after giving it up and went to great lengths to make sure that their data was recorded, even while acknowledging that they make little use of it (Chapter 7).



These conclusions call for more longitudinally-oriented studies to examine how self-trackers engage in the practice over time in order to scrutinize current arguments about practice being given up easily, and the potential cyclical nature of use. The proposed conceptualization of privacy as unease is significant because it refocuses the locus of privacy issues from the individual to the collective level; it avoids the issue that the privacy paradox suffers from (by arguing that you can feel worried about something, but have a limited ability to act – thus making it less of a paradox and more of a structuring issue); and it draws attention to privacy violators rather than those affected by it (Chapter 7). From these standpoints, new avenues for analysis open. The next section highlights core topical findings and elaborates on their individual significance.

### **Axes of Culture and Privacy**

The main argument of the dissertation – that self-tracked data is becoming a new source for self-construction and self-evaluation - is buttressed by a series of findings and sub-arguments (synthesized below) which highlight the importance of the practice to various groups of self-quantifiers. The four-dimensional heuristic tool (i.e. culture, reflexivity, privacy, ethics) and the longitudinal research design (i.e. combination of interviews and diaries) promoted deep reflection on the practice of self-tracking, thus allowing the findings to fill a number of gaps in existing literature. The culture axis focused on symbols, practices, and values – the building bricks of self-construction; the privacy axis focused on the conditions required for self-construction; the reflexivity axis focused on the mechanisms involved in the process; and the ethics axis focused on the normative and ethical standards the self employs for judgment of one's own position. The findings and significance of these for each axis is taken in turn.

The double-layered conceptualization of culture (as symbols and as practices, via Sewell, 2005) was employed in Chapter 5, on culture, to ground the practice in everyday life and promote a comparative analysis between meaning-making and practices – shielding the analysis from developing only in the theoretical realm (Sharon, 2016). The analysis resulted in five core findings. First, the participants were critical of circulating mainstream discourses that fed into a celebratory public imagination of the practice. For example, they questioned the direct links that advertisers make between purchasing wearables and improving one's health and raised alarms around the quality of the scientific evidence on which quantified targets are based. Second, the contested nature of meaning was made evident by participants comments on gendered and Westren-centered nature of the practice as well as on opposing meanings it represented for them (e.g. edgy and mainstream, luxury and a waste of money). Third, the use of tracking devices was agentic with the practitioners creatively adopting their devices to serve purposes beyond their directed use (e.g. to find their way home after a night out, to check up upon elderly family members).

Fourth, most participants did very little with data, data analysis, or data-based action, usually limiting their actions to interreacting with their numbers in-the-moment. Very few, almost exclusively serious athletes, used professional services to assist in the analysis and to make data actionable and many were sceptical that everybody could receive similar benefits from the practice, pointing to the role of economic and structural inequalities shaping the quantification. Fifth, the free association exercises uncovered a negate connotation of tracking for participants who used repertoires of tyranny, consumerism, commercialization and “slippery slopes” to describe how they felt about the practice, indicating that tracking is not a necessity and is a continuation of the pressurized culture of constant comparison and immediacy. The ideas of self-centredness, obsessive-compulsive disorder, navel-gazing, and narcissism in relation to the

self were also reported as associated with the practice, as one of the participants explains “it got connotation of *self-indulgence and looking too far inwards*”. Those points foreshadowed some of the findings from latter chapters.

Together these findings amount to two vital considerations: the values that circulate in discourses around self-tracking are clearly contested and do not align with the values promoted in the commercial discourses; and most participants took little meaningful action based on their self-quantification practices. In relation to existing work, these points are important because they highlight the limits of Foucauldian-inspired frameworks, specifically those focusing on the material dimensions of work and bodily discipline, as well as those of healthization, medicalization, and biomedical governmentality popular in current literature. This is the case because a deep, long-term engagement would have been expected to respond to the forces of the technology-enabled powers to shape the self in everyday life. While not engaging in material data manipulations, the participants in the study did meaningful things, in the context of their subjectivity, with their data (e.g. supported personal projects, transitioned through life-stages, reflected) and, in turn as shown in the findings of chapter 8 on meta-ethics, their data did something to them as subjects (e.g. eliciting moral emotions). Such findings align with more agency-friendly interpretation of the theory of governmentality, though without fitting neatly within the framework. In addition, the findings clearly show critical reflexive evaluation and creative action in the adoption of self-quantification. Taken together these findings call for a different way of approaching what constitutes “doing” with data. A line of argument on how data comes to matter and have meaning is currently being developed by Lupton (2018) from a sociometrical and more-than-human lens, as well as Pink and colleagues (Pink et al., 2018; Pink & Fors, 2017a,b) and Gorm and Shklovski (2019). These works focus on how self-trackers articulate their practices, especially when “breakages” within the data happen and alternative

values are surfaced. However, in the light of the argument about limited “doing” with data on the material level presented in chapter 5, on culture, and in line with McNay’s (1992; also Haraway, 1991) critique of the Foucauldian notion of subjectivity as focusing too excessively on the body, an alternative productive avenue for inquiry examining the “doings” of and with data is needed. Perhaps considering what happens to the corporeal data in intersection with individuals reflection on identity, through life stages (especially given that data traces on the self can now start at conception) and across different data streams, might provide a different perspective. On the side of, the “doing” of the data, examining data emotions, valences, reflections on analytics, as well as political economy and data infrastructures, all remain productive avenues.

The findings in the Chapter 7, on privacy excavated another layer of meta-reflections on quantification. To start with, the analysis highlighted that privacy harms are not well-understood and predominantly focus on adverse effects related to commercial organizations, over that of nation states and other individuals. This is illustrated by the limited range of potential harms reported as well as vagueness of the language in which threats were discussed (i.e. the “algorithms knows” or “they”). This signals that the participants might not understand data environments enough to perceive the effects of data accumulation, linkability, patent ignorance and a failure to perceive dangers in the incremental increase of personal data points, and value to external actors. Moreover, the analysis showed that both passage of time and multiplicity of roles individuals play in everyday caused internal rifts due to the impossibility to reconcile contradicting positions on privacy owing to competing demands of their personal roles. For example, medical professionals who believed that informational privacy should not be prioritized in professional settings frequently took a protective stance in relation to their own privacy. Such conflicting views (i.e. especially clear in cases of medical professionals and professional athletes) did not go unnoticed by the participants themselves, indicating yet again the meta-

reflexive nature of their thoughts. These real-life constraints contributed to the new conceptualization of privacy that the chapter labels as “privacy unease” that was supported by a taxonomy briefly presented below.

Attitudes, knowledge, and privacy actions differed across the sample, forming a three-category taxonomy: users who are not or are only mildly concerned about privacy; people who perceive themselves as not being of importance to institutions that might be accessing their data; and individuals actively engaging in privacy protection. Despite diverging privacy attitudes and actions, a shared sense of unease emanated throughout the taxonomy becoming a pivot point for new conceptualization – about their informational privacy. Conceptualizing informational privacy as unease is beneficial because it captures the emotional dimension of privacy, but does not have conceptual baggage or claims from other fields as do similar terms (i.e. anxiety, worry). The term also has a number of advantages. First, it focuses critical attention on the stimuli that caused the reaction rather than treating the emotion as a personal attitude to real or imaginary impetuses that might have caused it. Second, on its own, the term usually stands to signify a collective rather than an individualistic response to an issue. Third, the term captures worry about something unspecific without being dogmatic, and as such, it allows us to capture the conflict between personal views and actions, without making the participants appear inconsistent in their actions and decisions.

The findings of this chapter go against the grain of literature that reported only modest privacy concerns from self-quantifiers (Motti & Caine, 2015; Zimmer et al., 2018) showing that while the degree of concern might vary, the overarching sense of concern is evident. The findings are significant because conceptualizing informational privacy in a novel way as unease, taking into consideration the emotive, dynamic, and contradictory nature of privacy actions and attitudes. The proposed conceptualization of privacy as unease is also significant because it

refocuses the locus of the privacy issues from the individual to the collective levels; it avoids the issue that the privacy paradox suffers from (by arguing that you can feel worried about something, but have a limited ability to act – thus making it less of a paradox and more of a structuring issue); and it draws attention to privacy violators rather than those affected by it. From those standpoints, new avenues for analysis open.

### **Axes of Reflexivity and Meta-Ethics**

Building on the findings about self-tracking as culture, the Chapter 6, on reflexivity – conceptualized as internal dialogue via works of Charles Taylor and Margaret Archer and notion of individual “projects” (i.e. “any course of action intentionally engaged upon by a human being” Archer, 2007, p.7) – furthered the line of argument concerned with the way the practice is employed and evaluated by the participants. The analysis found that self-tracking was adopted by quantifiers as a way of supporting their personal project (e.g. becoming a parent, returning to sport, healthy retirement) and vital life-course transitions (e.g. ageing, recovering from an illness). To illustrate, a professional athlete who was recovering from a major injury explained how quantification helped not only her recovery, but also helped her to hold on to her athletic identity. Another core finding indicated that while self-quantification was useful for participants, their experiences of a healthy body did not merit any alignment with numeric ideals, as purported by quantification. The surprising finding here is that there were no references made to specific “healthy” body statistics or numbers (which was expected given the element of quantification). In discussing the importance of data, the overall conclusion was that when it came to learning new things about oneself, the participants reported that such experiences were limited, and as time passed, it became increasingly more difficult to gain new insights. Furthermore, self-

tracking did not appear to contribute to self-learning equally for all types of users, favouring those with more recourses and expertise available.

Finally, important findings were drawn from analysis of three types – material, technical, or action-enabling – of limitations of self-quantification as reported by the participants. Most participants reported some kind of issue with the material dimension of their practice, such as durability, data loss, comfort, with in-depth discussion focusing on the lack of accuracy in recording, unclear derivation of measurements and goals, and poor analytics. For example, the participants reported poor feedback, a lack of personalization, unhelpful comparative metrics, unintelligent advice, the devices' inability to recognize training as longitudinal (and thus the absence of consideration for progression over time), and the absence of rest days which are vital for training. The participants reported that their devices encouraged over-exercising and that feedback often came across as judgmental rather than informational. Given the limitation of inaccuracies and not knowing how or why specific metrics are derived, the participants still continued to engage in self-tracking and were not discouraged from the practice itself. This indicates a paradox in use of devices.

The findings on the material limitations of tracking devices align with similar conclusions reported in the literature by scholars from the field of HCI, digital sociology, and computer science, and support a call for more intelligent analytics and visualization of data. What is original in the conclusions drawn in this dissertation is that users are well aware that it is problematic along many dimensions – such as accuracy, usefulness, fit, and validity of measurements – but is still used by participants in support of their meaningful personal projects. Furthermore, the findings show that self-quantification is subjected to higher-orders of reflections and evaluations, in for example indicating that the practice does not fit with ideals of healthy body, is not overly informative, does not benefit them much. As such, despite its

contested nature and limited capabilities, self-tracking was reported to be a deeply meaningful practice ingrained in the participants' lives in support of their personal projects. This conclusion again calls for attention to the limits of theorizing self-quantification as self-disciplining in a Foucauldian tradition, by positioning it in both continuity and everyday life of individuals.

The final empirical chapter (Chapter 8, on meta-ethics and morality) rounded up the argument of the dissertation – that self-tracking is a deeply meaningful practice and therefore cannot be understood as purely additive to selfhood, and that it instead creates complex interrelations to the self. The chapter explored the ethical dimension of self-quantification and answered questions about ethical values and the mechanisms through which they are embedded in the practice via works of Charles Taylor, Paul Ricoeur, and Judith Butler, as well as the sociology of emotions and metaphor analysis.

The core findings of the chapter include 18 comparative domains for metaphors in relation to self-tracking, including three that have a special quality of embedding distinct ethical frameworks. Indeed, morally-imbued spheres (i.e. obsession-addiction and accounting) were the most populous domains to which references were made. Examination of comparative domains (i.e. what self-tracking is compared to) is important signal what kind of ethical rules the practice might be guided by, including in relation to the self and others. The original contribution of the analysis is the unmasking of strongly ethically inflected comparative domains. These signal that self-tracked data is becoming a source of ethical self-evaluation, speaking to prohibitions, permissions, and rules in relation to data. For example, obsession and addiction are clearly negatively toned, featuring transgressive behaviours such as overdependence on data, while in domains such as accounting, the references are predominantly positive, where the practice was seen as adding to one's life. The participants described their practice in pathological terms: obsession, obsessive-compulsive disorder (OCD), neuroticism, and anxiety. The obsession is



pushed to the point of complete dependence, with dependence on the data being compared to slavery, freakishness, “taking over life”, and overriding better judgment. Self-quantification was described in terms of belief: to have complete or not much faith; to be religiously devoted to the practice; to confess; and to reveal the truth. Tracking was described with references to religious rituals, practices, and holy texts. Religious terms were also used to indicate parallels between ethical rules of the practices, with references to temptations, liberation, indulgence, and guilt.

The second set of core findings are around the presence of moral emotions reported in relation to tracking. For example, guilt was reported by 40% of participants along with frustration, anger, disappointment, and embarrassment. Guilt is a key emotion to consider in the context of selfhood because it is an emotion that arises from self-evaluation in response to specific personal behaviour. Of similar interests are reports of shame, an emotion that signals an evaluation that “attacks” the self at the core and is addressed to the entire selfhood over a specific behaviour, potentially causing maladaptive responses such as avoidance. The feeling of shame in relation to the practice (e.g. feeling ashamed for not having moved enough, slept enough, or done enough of an activity) was accompanied by the normative statement of being “wrong”, rather than a more fitting word, such as, for example, “unhealthy”. On the positive side of the moral emotion spectrum is the sense of pride that was reported by roughly every fifth participant.

Finally, the chapter nuanced out some of the points stated in chapter on reflexivity. Despite largely positive perceptions of others partaking in the practice, the majority of the participants (31) believed that the practice should not be mandated, because it encroaches into other personal values, such as democracy and freedom of choice – not areas of life over which governments or the “nanny state” should have control. Some participants ultimately concluded that their devices made judgments that they were not entitled to make and stated that it was not

up to the applications to decide what was “right” or “wrong” for them to do. Yet, the participants went to extreme lengths to meet arbitrary goals to avoid being judged by their devices, indicating that self-tracking is a practice with ingrained ethical frameworks. For example, a participant would stay awake and go to bed late at night in order to bank his “standing minutes” for the next day, because otherwise he felt that his planned night out would be ruined if he did not meet his standing goal.

The findings on moral emotions and metaphors add novel insights to the field. To the best of the author’s knowledge, this is the first such analysis. These findings, along with conclusions drawn by other scholars from different angles, especially in relation to the labour of tracking of people living with chronic health conditions, are of significance for two reasons. First, by showing the importance of the practice to the participants and the ethical frameworks embedded in it, the findings corroborate the main argument of the dissertation: that the self-tracked data is in a process of becoming a new source for self-construction and self-evaluation. This calls for scrutiny of the processes and actors involved in enabling the practice. Second, the arguments made in the chapter present a springboard that can be used to fill the gaps concerned with the ethical dimension of tracking in existing literature. The next section discusses methodological contribution of the study.

### **Methodological Contribution: Future of Solicited Diaries**

The robustness and suitability of the methodological design were illustrated by the following successes: 1) a rich, unique, and expansive dataset was collected that captured data continuously over a period of a month; 2) novel findings were identified throughout the study that were not accounted for by the conceptual framework, causing adjustments and thus enriching the findings; 3) behaviours and opinion changes that would not be registered by cross-

sectional designs were captured; and 4) the participants reported a high level of satisfaction from taking part in the study.

The dissertation also puts forward an original methodological argument calling for a wider adoption of solicited diaries as a research methodology for studying data practices. This extension in academic use should be accompanied by a series of rigour-enhancing measures, as even current cutting-edge studies leave space for improvement in implementation and analysis. To that end, the dissertation identified two interventions that might lead to improvements in implementation and enhance the rigour of diary designs. The proposed interventions are further detailed in the following paragraphs.

First, as illustrated in Chapter 4, on methodology, while diverse, rich, and voluminous non-textual data was collected via solicited diaries, existing methodological literature does not address the analytical and interpretive challenges such data poses. As a result, no procedures to elicit a systematic commentary on non-textual materials was outlined at the beginning of the study. The artefacts were discussed mostly when a participant made a reference to an item they included in their diary. This potentially hampered reflexivity and led to a loss of relevant insights. To improve on the comment elicitation, an early consideration of what types of materials might be collected with the diary is necessary, as it would dictate what kind of analytical strategies should be incorporated in the overall data analysis strategy (e.g. narrative visual, semiotic analysis, discourse analysis for visual materials, video and audio analysis). Existing data analysis expertise can be used to strengthen the analysis of non-textual materials collected with the diary methodology. For example, the literature on visual analysis offers excellent guidance on the systematic and conceptually driven integration of art, images, audio, and photos into the research process and analysis (see Bauer & Gaskell, 2000; G. Rose, 2007; Prosser & Loxley, 2008; for a good example, see Bartlett, 2012).

Second, explicit consideration should be given to the role and conceptualization of time in the study at its conception. For the current study, the qualitative analytical procedures were designed *post hoc*, as a position of non-intervention during the data collection was purposefully elected. However, on reflection, this strategy did result in missed opportunities during the data collection. Giving consideration to the role of time prior to undertaking a diary study is important for the purposes of data collection and analysis. On the data collection front, defining the role of time beforehand helps to identify potential intervention points during the process (i.e. times when probing further will result in more detailed accounts), and such interventions can help to enhance the quality of data. Deciding on how time might be of interest prior to data collection could help to enhance the rigour during fieldwork by sensitizing researchers to the transformation during the process of data collection, indicating fruitful points of intervention.

On the data analysis front, explicit conceptualization of time promotes the use of longitudinal data analysis techniques, thus enabling researchers to create a more compelling picture of participants' accounts. At present, with rare exceptions (for excellent examples that conceptualized the temporal development from the start, see Broom & Tovey, 2008; Bernays, Rhodes & Terzic, 2014; Furness & Garrud, 2010; Jones & Candlin, 2003), the researchers use cross-sectional data analytical techniques on qualitative longitudinal data generated by diaries. As such, the longitudinal data is "flattened" by a cross-sectional analytical strategy, and valuable insights, especially about the dynamics of the processes under study, might be lost if treated as snapshots in time. Saldana (2003) provides a typology one can use as a guide: change in the participant's narrative; reinterpretation by the participant; reinterpretation by the researcher; and absence of change. To enhance data analysis in practice, researchers have developed matrices for longitudinal data reduction and analysis (see especially Saldana, 2016; also Grosseohme & Lipstein, 2016, Lewis, 2007; for an example, see Travers, 2011) and offered a data interrogation

strategy consisting of three sets of questions – framing, descriptive, and analytical – that help researchers to think about their data from a longitudinal perspective (Saldana, 2003, Chapters 4–6). Further guidance might be gleaned from a wide variety of qualitative longitudinal studies.

This methodological contribution is especially of interest to scholars in the fields where diary studies are frequently used (e.g. health studies, nursing, education, human geography, psychology, sociology, and media) and, in particular, to researchers interested in using solicited diaries, as well as researchers focusing on studying data practices. The next section briefly examines why the study was important to conduct.

### **Why was the Study Necessary?**

This study is timely and necessary for four reasons. First, the study grounds diverse and disjointed findings from various sub-fields of knowledge in a single concept: selfhood. The study then addresses the practice of self-quantification from two fronts: it paints a picture of how the practice is experienced, judged, and understood by individuals, while at the same time examining how the practice is being shaped by powerful actors, commercial interests, inaccurate measurements, the rising value of data, and non-validated health information – with a view to who benefits from it.

Second, the study conceptualizes and investigates the practice from the angle of continuous engagement and perpetual reflection. This not only contributed to addressing the dire lack of longitudinal studies in the field dominated by cross-sectional research (i.e. studies which capture participants' reflections only at a moment in time), but it also allowed for examination of the continuities and discontinuities in the ways individuals employ this practice of self-discovery, self-construction, self-understanding, and self-presentation. This contribution is further boosted by the novel design employed in the study.

Third, given that the study focuses on reflexive thoughts of the participants on their practices, this study allows for examination of how the dominant discourses are understood and challenged by self-quantifiers. The study thus examines the extent of critical engagement and meaning-making of the practice. Lastly, given the unique sample of four different types of users, the study provides comparative insights into the practice. This aspect in particular helps the research to stand out, as empirical research to date predominantly focused on a single group of life-loggers at one time. The final chapter briefly presents the core features of the study, discusses its limitations, and indicates directions for future research.

## Chapter 10 – Conclusion : Final Reflections

The dissertation endeavoured to answer the question: how the practice of self-tracking for health and wellness – using applications and wearable devices – contributes to our sense of the self. Inspired by the theoretical works of Charles Taylor, Margaret Archer, William Sewell, Julie Cohen, Danie Solove, and George Lakoff, amongst others, and in dialogue with the contemporary critical research on self-quantification spearheaded by Deborah Lupton, Tamar Sharon, Mina Ruckenstein, and Gina Neff, the research positioned itself in the field of critical studies, to which the dissertation made an original contribution.

To examine the research question a four-axis heuristic tool was designed, respectively focusing on cultural, reflexive, privacy, and ethics dimension of the self. The cultural axis was conceptualized employing Sewell's double-layered interpretation of culture as practices and as symbols. This axis provided a birds-eye overview of the phenomenon and indicated points of tension that were further explored using theories of reflexivity, privacy, and ethics. The reflexivity axis was designed based on works examining selfhood by Archer and Taylor – both of which tackled self-construction via introspection and in parallel with the Foucauldian idea of subjectification. The concepts of the self-as-a-project (Archer) and second-order reflexivity (Taylor) were especially pertinent for the conceptualization of reflexivity in this chapter. The privacy axis employed the concept of informational privacy – a type of privacy that creates a protective space for unrestrained self-construction – to examine attitudes, knowledge, and beliefs towards the flows of the data streams generated by the practice; the chapter eventually arrived at a novel way of thinking about privacy. Finally, the ethics axis relied on the works of Butler, Taylor, and Ricoeur, centered on the self and ethical frameworks involved in self construction, as well as the works of linguists and sociologists considering emotions, so as to examine the ethical

norms coded into the practice and their influence on the self-quantifiers' understanding of the self.

The conceptual tool shaped the methodological approach of the study: the methodological design combined a set of two qualitative interviews and open-ended, four-week solicited diaries. The schedules and variants for each of the two methods were informed by the conceptual needs of the dissertation as well as existing literature. The study engaged with 50 individuals who fell into one of four types of self-quantifiers: casual users; semi-professional and professional athletes; individuals living with chronic health conditions; and medical professionals.

The dissertation argued that self-tracking is a deeply meaningful personal practice that has complex interrelations with selfhood, and thus cannot be understood as simply additive to it. Most notably, self-tracked data was employed by participants as a source of self-reflection, ethical self-evaluations, and self-judgment, becoming a new source of the self. The practice is employed to enable meaningful personal projects and transitions through life stages, in support of health and athletic achievement as well as to signal personal values and identity. The practice was also a subject of critical reflection, serious criticism, and scepticism. The limitations of self-quantification – including those that went to the core of the practice, such as unactionable insight, inaccurate data, limited engagement with the data, a failure to help individuals learn anything about the self, and to a lack of contribution to health regimes – were all recognized by the participants. Yet the practice remains firmly planted in personal pursuits and everyday life, is a source of intense emotional reaction, and a measure against which the self is judged. The discovery of the prevalence of moral emotions in relation to data (e.g. shame, guilt, happiness, anger, embarrassment, anxiety) and moral comparative metaphorical (e.g. religion, obsession, addiction) domains is especially telling. As such, self-tracked data also presents a new ethical



framework or a moral horizon. These findings have implications for how data in relation to selfhood is conceptualized and theorized. The findings also call for further scrutiny of those actors who have the power to shape collective resources of self-construction.

The analysis presented in this thesis builds both methodological and conceptual bridging to the interdisciplinary field concerned with self-tracking and quantification of everyday life more generally. In methodological terms, some of the most interesting and original findings presented in this thesis were made possible by the longitudinal nature of the study. For example, the analysis of informational privacy and moral emotions, both of which develop through time, would have been curtailed by any cross-sectional design, which is unable to capture progressions, turns, and tensions that develop through time. In view of this, the dissertation argues for wider adoption of solicited diaries – implemented over a period of time and analysed with the conceptualization of time in mind – for studying how quantification is experienced across various domains of everyday life. The dissertation makes its case by showcasing that such designs can produce rich, expansive, and original datasets. As part of its original contribution the dissertation offers two novel rigour-enhancing mechanisms, related to conceptualizing time and change and to systemic examination of non-textual materials, which scholars interested in diary methodology can implement to strengthen their designs.

Conceptually, in relation to the works of other scholars, the findings hint at the limits of theories that do not afford sufficient agency to self-trackers, as the participants reflected critically on the technologies and creatively adopted them. The findings also cast doubt on the explanatory power of frameworks such as healthism, governmentality, or technologies of the self, as their core disciplining mechanisms rely on continuous engagement with the practice. Yet, the findings indicate that while at the material level engaging in direct manipulation of data, data analysis and visualization by the participants is limited, the “doing” *of* the data cannot be easily dismissed.

The analysis offered an everyday-life-grounded way to examine how this data practice shapes our sense of the self by means of moral emotion, self-talk, and second-level reflexivity. These findings enrich empirical debates by suggesting a novel way of conceptualizing informational privacy in the context of tracking, uncovering a unique set of emotions related to the practice, and responding and adding to the debate about the socio-cultural nature of the practice currently offered by interdisciplinary scholarship (Ajana, 2017; boyd & Crawford, 2011; Costa Figueiredo et al., 2017; Dow Shull, 2016; Lanzing, 2016, 2019; Ruckenstein & Pantzar, 2017). The dissertation also offers a dovetailing account from the perspective of the individual to complement the theoretical literature on the datafication of everyday life (Cheney-Lippold, 2011; Gitelman, 2013; Mayer-Schonberger & Cukier, 2013; Ruppert, Isin & Bigo, 2017) by showing how people make meaning of their datafication practices. Overall, the findings are significant because they call for a new way of conceptualizing self-quantification in relation to selfhood. Self-tracked data can be more accurately conceptualized as a resource on which the self draws in ways that have the self's own norms and values ingrained in them, rather than as a simple additive to the self.

The sections below discuss the limitations of the study and recommendations for policy, design, and further research before concluding with a brief recap of topical findings and examining why they matter today.

### Limitations of the Study

The methodological limitations of the study fall along two main dimensions: technical and conceptual. The technical limitations were discussed in-depth in the evaluation section of the methodology chapter. Briefly, technical issues can be attributed to the digital tool used for implementation of the digital diary (e.g. malfunctioning of the “back” button, diaries not functioning without an Internet connection). Technical hindrances potentially led to the loss of

some reflexive insights. Conceptual limitations are more significant. The two core issues were a lack of systematic procedures for examining non-textual artefacts and an under-conceptualization of what constitutes “change” (i.e. changing practices, shifts in opinions) in the study. Both of those issues stemmed from the originally defined position of non-intervention in the process of data collection; however, the data analysis made it clear that having a pre-designed procedure for identifying changes in the flow of the participants’ narratives would have enhanced the quality of the longitudinal insights. Similarly, a set procedure for a systematic examination of non-textual materials would have resulted in a more detailed understanding of the participants’ priorities and meaning-making processes. Based on those limitations, the dissertation proposed two methodological innovations – analytical and conceptual – for enhancing the rigour of diary studies. Conceptually, an explicit consideration of the role of time in studies is advocated; analytically, rigour-establishing procedures should be outlined prior to the start of diary studies (e.g. systematic analysis of non-visual materials or systematic comment elicitation).

In the realm of the literature review, the biggest limitation surrounded deriving representative key words. This is the case because in this dynamic, fast-moving, and unestablished domain, scholars across different disciplines do not use the same vocabulary, thus creating bubbles of knowledge that tackle the same issues, but do not connect with each other. Having used the key terms from the domain of Media and Communication/Sociology (e.g. self-tracking, self-quantification) meant that the literature from engineering and computer science, medical and nursing studies, works on adoption of technologies, and implications for medical interventions (that adopted terms such as “life-logging”, “[fitness] wearables”, and “wearable technologies” more frequently) were missed in the initial searches. The arguments from those works were included later on, but that scholarship played a lesser role in shaping the conceptualization of the study. Second, as is typical for academic studies, the work of a few

well-established scholars received the lion's share of attention, while high-quality work from less powerful actors or from less prestigious publishing outlets (e.g. early career researchers, conference papers) might have remained overlooked. I did my best to address this by recording and documenting my search of the literature, but there are no guarantees that some fruitful pieces of work were not missed in the process. It is my hope that those exclusions do not undermine the overall findings of the dissertation. It is also worth noting that the literature available in English, on which this work is based, is Western-centred (mostly coming out of the UK, US, Denmark, Finland, Australia, and other countries in continental Europe).

In the realm of research dynamics, the literature on self-quantification is burgeoning and moving rapidly – thus, some of the findings that appeared novel a few months ago might have been presented in published literature by the time of the examination. This will especially be the case in terms of the dimensions, such as that of privacy, where technical and legislative changes have taken place at a rapid pace.

The study design also favoured articulate and literate participants who had the time and resources to engage in research. This limitation was partially mitigated by the multimedia nature of the diary. Finally, given the small size of the sample, the findings of the study have limited generalizability. Taking into consideration the limitations of the study, the next section presents suggestions for future research and design.

## Future Research Recommendations

The literature review revealed an imbalance between qualitative and quantitative research efforts in the domain of self-quantification. Given the new nature of the phenomenon, to date, the research understandably favoured qualitative, cross-sectional, and exploratory work. As the field matures, it would be interesting to see studies that draw on larger samples and those that allow for more generalization. For example, a potential study could derive a typology of self-trackers

based on a factor analysis and compare that with available qualitative taxonomies. Alternatively, nationwide surveys and comparative studies from across different cultural contexts, on issues such as self-quantification adoption and use, might be insightful. A recent study of Western-centred frames in self-quantification practices for mental health in India – where historic, political, and socio-economic factors go against the main assumptions on which the practice rests (Mills & Hilberg, 2018) – is a telling example of how fruitful such research might be.

Furthermore, participants in the study reported that tracking devices have arrived at their places of work, and medical professionals who participated in the study pointed out that they see self-quantification's potential for improving patient care and monitoring, as well as health education. Despite the new nature of the technological integration, political-economists, medical researchers, and sociologists (see multiple works of Phoebe Moor, Christopher Till, and Nanna Gorm and Irina Shklovski) have already contributed to this area. Based on the findings of the dissertation and on existing literature, it would be insightful to examine – for example – how, if at all, quantification can be embedded in community care or medication monitoring; what data flows of wellness programmes look like; and how this new junction reshapes the landscape of the self at work or in medical settings. Critical research in this area is especially urgently needed to outweigh the uncritical, celebratory discourses on which Silicon Valley couches the practices, and because the tracking devices are being actively imbedded into corporate welfare packages across the world and even across in various nations, such as Singapore.

Finally, there is a sizable research gap in the area of health outcomes. One of the findings of the dissertation is that while all participants amassed large quantities of personal data on themselves and desired to act upon it, only those with access to expertise (e.g. medical doctors, personal trainers, data specialists) have received positive health outcomes. For example, wealthier and more highly educated participants were able to negotiate more targeted drug

prescriptions or achieve better athletic results. Meanwhile, the most socio-economically disadvantaged participants reported no benefits from this intense practice. This raises new questions: does self-quantification propel inequalities in health outcomes? And who benefits from this practice? A few studies have directed their attention to self-quantification among people living with disabilities and chronic health conditions (for example, Ancker et al., 2017; Passanante Elman, 2018), and experiences of structural disadvantages, despite evidence that self-tracking has penetrated all socio-demographic groups. Thus, it is crucial to examine how self-tracking contributes to, or can potentially address, health inequalities.

Lastly, in terms of thematic research, there is a rise in new tracking consumer devices, such as sports wear, personalized vitamins, and even intimate toys. These represent promising areas for further research. The subsequent section turns to practical recommendations for policy and design.

## Policy and Design Recommendations

The findings of the dissertation show that self-quantification is a deeply meaningful, personal practice that shapes how we perceive and evaluate the self and others, and that it is a source of concerns and higher-order reflections by people who engage in tracking. The practice has gained cultural currency and is unlikely to disappear. Policy and design interventions are therefore needed to enhance the quality of the practice and minimize potential harms.

To start with, British self-quantifiers who took part in the study were concerned to varying degrees about the privacy of their data. This has implications for policy and design. As the chapter on privacy explained, the problems of protecting informational privacy in self-quantification are multi-layered, given the number of actors, processes, and directionalities involved in the movement of such data. Those problems are rendered further complex by multi-state and multi-actor (e.g. corporations and insurance companies give tracking devices to

employees) issues, powerful actors and lobbyists, as well as mergers and acquisitions of smaller companies by big data holding bodies (e.g. Google's acquisition of FitBit). Indeed, UK- and US-based researchers (e.g. Huckvale et al., 2015; Katuska, 2018; Prasad et al., 2012) have been proposing a breadth of technical and legislative solutions, ranging from more granular control over data to accreditation of applications based on their privacy-friendliness, to expanding legislative protections. At present, the regulatory and legislative regime in the UK – and globally – is incoherent and favours the interests of companies over individuals. However challenging, this has to change. Given the existence of publicly funded health services (with a digital arm) that maintain a library of the approved health tracking application – many of which are run by private companies – a case can be made to the regulators that self-tracked data deserves the same level of protection as medical data does, as it is used to perform similar functions. While some of the participants in the study suggested the idea of privacy hygiene, given the disparity of powers and technical capabilities between commercial actors and individuals, stronger instruments that are not reliant on the self-compliance of companies are needed to protect user privacy. Regulation interventions are needed not only in terms of data trade and data streams, but also in the shaping of how tracking technologies might be adopted by the companies (e.g. are employees forced to wear their devices, what are limitations on data collection and sharing). Whatever shape the regulations may take, they should account for the transformation of attitudes and the actions of quantifiers over time. While this argument is hardly new, I add my voice to those advocating on the side of the users on this challenging issue.

Next, the dissertation argued that problematic assumptions – non-validated medical claims, arbitrary benchmarks, and inaccurate measurements – underlie a deeply meaningful personal practice that guides self-evaluation, self-construction, and health behaviours. The metaphor and sentiment analysis showed how data is becoming a source of moral self-

evaluation. Therefore, the scrutiny of data practices at an institutional level is needed. The regulation around standards of scientific evidence for making health claims might be a good starting point.

Third, the findings of the dissertation also revealed that people do little with the data they collect, unless they have access to expertise (e.g. medical, coaching) that enables them to take steps in their desired direction. As such, making data actionable at present falls on the shoulders of the users. This calls for design and analytics solutions. For example, the issue of the non-actionability of self-tracking data – one of the main commercial premises of the paradigm – is that the issue has been problematized by researchers in behavioural sciences, HCI, and visualization (e.g. Alqhatani & Lipford, 2019; Hepworth, 2019; Fawcett, 2015; Rapp & Cena, 2016). To address those issues, a new set of expertise from health professionals, behavioural scientists, psychologists, and ethicists should be incorporated in the design of applications and devices to enable lasting change. This can include scientifically grounded advice for health behaviour changes, inclusive designs that go beyond assumptions about ablebodiedness, economic recourses, and health literacy, and recognition of unevenness and lapses in human behaviour.

Finally, as the practice of self-tracking is presented as a panacea for future medicine and healthcare structures – the conception that already guides policy efforts and organizational and personal behaviours – the practice requires critical attention as to how it is being adopted in medical, insurance, and state contests, from all affected stakeholders. This is especially the case because quantification's promises are rarely matched by the realities of everyday use. Should this be left unchallenged, commercial interests might further add to the undermining of the resilience and communal nature of healthcare, in favour of self-responsibility and personalized “solutions”



that frequently fail to benefit individuals, while making them more transparent and analyzable for companies.

The dissertation argues that the practice of self-quantification is deeply meaningful, complexly integrated, and ingrained in participants' lives: it serves meaningful personal projects, causes strong emotional reactions, is a source of self-evaluation, and is subject to second-order reflections. In the context of current debate, the dissertation's findings about the nature of engagement with the practice rule out the polarized arguments of no significance and excessive usefulness of self-quantification circulating in the literature. Further, the dissertation also contributes innovative insight into the nature of the practice by demonstrating the prevalence of moral emotions experienced by the self-quantifiers. Finally, the analysis brought to light the ethical dimension of quantification by analysing comparative domains that surfaced ethical frameworks embedded in the practice. The work concluded that self-tracking is becoming a new source of self-construction and evaluation, thus calling for a more complex conceptualization of the practice, as well as new theoretical entry points for analysing it.

# Appendices

## Appendix 1 – Participants Details

Name	Age	Marital Status	Type of Tracker	Place of residence	Occupation	Duration of Tracking	Diary Experience	Sex
Aaron	22	Single	Apple Watch	Liverpool	Student, NHS employee	5 months	No	Male
Allstair	54	Married	FitBit watch; mood tracker app	Manchester	Pharmacist	12 months	No	Male
Aurora	50	Cohabiting	Heart monitor, Strava; Garmin 500	Essex	Assistant company secretary	2-3 years	Yes	Female
Bert	35	divorced	FitBit watch; Apple watch	London	Lead data scientist	2 years 6 months	Yes	Male
Camilla	62	Married	Fit app	West Yorkshire	Painter	1 year 6 months	Yes	Female
Carla	35	Single	FitBit Charge 2, my fitness pal	London	Web developer	4 years	Yes	Female
Dawn	33	Single	Garmin connect, Strava	London	Policy researcher	1 year 6 months	Yes	Female
Eloise	45	Divorced	FitBit charge 2 hr	Oxford	Programme manager	5 months	Yes	Female
Emma	25	Single	My Fitness Pail, 5X5	Nottingham	UG studnet	6 years 6 months	Yes	Female
Emmanuel	23	Single	Nutrition apps	Edinburgh	Student	1 year	Yes	Male
Evelyne	44	Married	Garmin Vivofit 3; Garmin 910XT	Basingstoke, UK	Civil servant	10 years	No	Female
Hannah	28	Single	Bellabeat Leaf Tracker	London	University lecturer	1 year 3 months	Yes	Female
Florence	24	Single	FitBit, Map My Run, diary	London	Copywriter	2 years	Yes	Female
Gabriel	32	Single	FitBit watch, sleep cycle app, weight app	Cambridge	Sales rep	6 months	Yes	Male
George	51	Divorced	Jawbone up 3, app	Southampton	Fundraiser conversationist	1 year	No	Male
Grace	30	Single	Polar Watch, heart monitor	Cambridge	Academic	Unassigned	Yes	Female
Helen	22	Single	Mobile phone apps, FitBit, XiaoMi MiBand	Edinburgh	Student	4 years 6 months	Yes	Female
Hillary	63	Divorced	SHealth; sphigmometer	Hackney	Retired	blood pressure 30 years; 5 years	Yes	Female
Jerome	41	Cohabiting	Shealth	Hackney	Team Manager	2 years	Yes	Male
Joan	27	Single	FitBit watch	Camberwell	Project manager	2 months	No	Female
John	48	Single	Sunto armfit 3, heart rate monitor	Bristol	Business architect	8 years	No	Male
Katie	19	Single	Clue, tablets, charts	Bristol	Engineering apprentice	1 year 6 months	Yes	Female
Li	35	Single	Polar watch	Cambridge	University reseacher	5 months	Yes	Male
Lisa	43	Cohabiting	iPhone, MapMyRun, Strava	Sawtry	Estate Agent	4 years	Yes	Female
Lydia	55	Married	FitBit watch	Harrogate	Housewife	Unassigned	Yes	Female
Margaret	48	Married	Garmin, iWatch	St.neots	Manager	10+ years	Yes	Female
Mark	48	Single	Tictrac app	Tooting	Campaign officer, Charity	5 months	No	Male
Martina	21	Single	SHealth; Fitbit watch	London	Mental Health Care Assistant	1 year 4 months	Yes	Female
Mary	55	Married	FitBit watch	West Chiltonton	Managing director/consultant	2 years	No	Female
Maureen	25	Single	Pedometer, app on phone	Cambridge	Research assistant	2 year 5 months	Yes	Female
Melissa	32	Single	Shealth	Manchester	Student nurse	1 year 6 months	Yes	Female
Nancy	43	Married	FitBit watch	Kent	Nurse	12 months	Yes	Female
Nathaniel	63	Married	Apps, fitbit watch (trial)	Chelmsford	Retired	5 years	No	Male
Paul	20	Single	Calorie counter app	West Yorkshire	Bar & Hotel Manager	1 year 6 months	No	Male
Peter	26	Single	FitBit HR	Newcastle Upon Tyne	Stretegist	8 months	Yes	Male
Roman	67	Married	Jawbone UP3, A&D sphigmomanometer, Scales,Fora thermometer, Contec pulse oximeter,					
Rose	33	Married	Polar HR strap & app, Concept2 ergometer	London	Health & care IT, retired	5 years	Yes	Male
Roy	40	Cohabiting	Shealth	Hackney	Police Officer	7 months	Yes	Female
Sean	38	Married	Unassigned	Northumberland	Director of marketing	12 months	No	Male
Tilly	23	Single	FitBit watch, apps, online diaires	Sheffield	Unemployed	10 years	Yes	Male
Vanessa	24	Single	FitBit app	London	Student, dentistry	6 months	Yes	Female
Victoria	63	Married	FitBit watch	London	Executive and office assistant	9 months	Yes	Female
			Garmin Vivofit, Viviofit HR with GPS	London	Retired	2 years	Yes	Female
			FitBit app; headspace; my fitness pal;					
Vijay	27	Single	be food smart app	Birmingham	Financial assistant	2 years	Yes	Male
Will	33	Single	FitBit watch, RunKeeper, myFitnessPal	Newcastle Upon Tyne	Strategy & Planning Associate	4-5 years	Yes	Male
Willow	25	Single	Lifecycle, myFitness pal	Wokingham	Nurse	2-3 years	No	Female
Zara	18	Single	MyFitness pal, Nike app, glucose meter	North West London	Student	6 years (BS); 3 years (MFPI)	Yes	Female
Zoe	51	Single	FitBit Flex	SE London	Business Support	6 months	Yes	Female

## Appendix 2 – Example of Record Keeping, Key Words, Databases, and Search Strategy

Number	Date	Search Term	Place of Search	Number of results	Selected results	Search Filters
1	11 May, 2020	self-tracking	LSE catalogue	424		books book chapters conference proceedings government documents articles English
2	11 May, 2020	self-quantification	LSE catalogue	50		books book chapters conference proceedings government documents articles English
3	11 May, 2020	self-tracking AND cultur*	LSE catalogue	620		books book chapters conference proceedings government documents articles English
4	11 May, 2020	self-quantification AND cultur*	LSE catalogue	99		books book chapters conference proceedings government documents articles English
5	11 May, 2020	self-tracking AND privacy	LSE catalogue	620		books book chapters conference proceedings government documents articles English
6	11 May, 2020	self-quantification AND privacy	LSE catalogue	58	10 relevant to chapters; 9 relevant to core	books book chapters conference proceedings government documents

38	6 July, 2020	life-logging and reflexivity	LSE catalogue	0	0	
39	6 July, 2020	self-tracking and reflexivity	web of science	2	0	
100	6 July, 2020	self-quantification and reflexivity	web of science	0	0	
101	6 July, 2020	life-logging and reflexivity	web of science	0	0	
102	6 July, 2020	self-tracking and reflexivity	sage	54	0	
103	6 July, 2020	self-quantification and reflexivity	sage	24	1	
104	6 July, 2020	life-logging and reflexivity	sage	11	0	

## Appendix 3 – Recruitment Poster

The recruitment poster for the study was designed by the LSE's Design Unit according to the researcher's specifications. It contained information about the study, including aims, procedures, incentives, and participation requirements, the researcher's contact information and ways to learn more about the study.

**LSE** Media and Communications

# DO YOU QUANTIFY YOURSELF?

**DO YOU COUNT STEPS, CALORIES, HEART RATE, SLEEP OR ANYTHING IN BETWEEN?**

**IF YOUR ANSWER IS YES, YOU ARE INVITED TO PARTICIPATE IN A STUDY OF SELF-TRACKING IN EVERYDAY LIFE.**

**The main purpose of the study is to understand what self-tracking means to YOU!**

**About the study**

- Two informal discussions (60 minutes each)
- Keeping a diary (20 minutes a week x 4 weeks)

**About you**

- You are engaged in health and fitness self-tracking with personal devices and/or health apps

**About Us**

- Based at the London School of Economics and Political Science
- Completely confidential
- No health data sharing required
- 50 GBP to all selected participants

**Learn more and Contact**  
Contact Svetlana at [s.smirnova@lse.ac.uk](mailto:s.smirnova@lse.ac.uk)  
For more details: see the study brochure

### Introduction & Briefing

Thank you for choosing to join the project. The main objective of the study is to understand what self-tracking means to you. By conducting this project we want to learn what you think about self-tracking, how you interact with your health trackers and/or apps, what does data you collect means to you and how does it fit into your everyday life. This research is conducted by a researcher from the London School of Economics and Political Science (LSE). It received an approved from the ethics board of the university.

My name is Svetlana and I am a PhD candidate with the Department of Media and Communication at the LSE. Our discussion today is the first of three parts of the project. Before we begin let me talk you through the main details of the study and tell you more about today's conversation.

During the study you would be involved in two activities: two informal discussions and a digital diary keeping. Our initial informal conversation would take approximately **one hour**. During this time we will get to know more about each other. I will tell you more about the project and you will tell me more about yourself, your routines and experiences with self tracking.

After that I will show you how the digital diary works and talk you through what and how you can be recording. After you keep your digital diary for 20 minutes for the next 4 weeks we will meet again to talk about how you are getting on with the diary and discuss your thoughts on self-tracking.

Please note that you **will not** be asked to provide **any health data** from your trackers or apps. The study specifically focuses on **what you think**, rather than on the data itself. In addition, the study is not intended to evaluate or judge your personal choices or abilities.

The following information would be recorded: your thoughts from the digital diary and our informal conversations (audio only). All data collected would be used strictly under a **pseudonym**; your identifiable details would be changed to protect your privacy. Under no circumstances would collected data be sold or access by any third parties. The data collected will only be available to me.

### Ice-breaker

Let me tell you a little bit more about myself. I am Svetlana and I am graduate student at the LSE. I have been doing research since I was about 20. Usually my projects focus on issues of health, inequality and media representation. In my free time I do a lot of cooking and Netflix-watching. I do have a self-tracking device but I am yet to form an opinion about it. What about you?

## Block 1: Socio-demographic

Thank you for joining the study! This brief questionnaire asks a series of simple questions about you.

Q1 What is your name?

Q2 How old are you?

Q3 Where do you currently reside?

Q4 What is your marital status?

Q5 How many children do you have? If none, please write 0

Q6 What is your occupation?

Q7 Approximately for how long have you been tracking yourself?

Q8 What kind of self-tracking devices do you use?

Q9 Have you written a diary before? Please elaborate

Q10 What is your preferred email address?

## Block 2: Core Topic

Core Topic:

**Can you please tell me a story about the role of HEALTH in your life? You can start with your memories of your childhood and talk me through your growing up process. You can conclude with stories about your body and your health today**

My interests here (not voiced):

What are some main health activities undertaken in childhood/adulthood? How is body perceived and valued? How is health prioritized in comparison to other values? What is the meaning of health? What are some health-related activities the person is engaging in? What are sources of information consulted when it comes to health? How does tracking come into the participant's life? How is social setting and connection are affecting health behaviours?

## Block 3: Questions

1. The core of this section revolves around participants' personal narrative and follow up questions are to be developed in relations to mentioned topics or events. (Including questions about what happened before or after XX event)

### 2. You as a person

- If you were to describe yourself in the third person to somebody else, what are three most important things you would say?
- Can you tell me a little bit more about what kind of person you are?
- Can you tell me a little bit more about how and where did you grow up?

### 3. You & your Routines

- Tell me a little bit more about your work routines? What do you like to eat? Do you have a preferred physical activity?
- How would you describe the environment at your work place?
- What do you usually do when you get sick; headaches? Flu?
- Do you have a personal doctor/GP?

### 3. You and others

- What kind of things do you like to do in your free time?
- Can you tell me more about the last time you met with your friends or family what did you do?
- What kind of news do you find interesting?
- Can you think of any story or anecdote about yourself or your friends in regards to self-tracking?

### 4. You and tracking

- What devices do you use at the moment to track yourself?
- Is there a self-tracking device you would really want to have?
- Where do you usually get your information about self-tracking technologies?

Thank you for telling me so much about yourself. This material will help me to understand you better. Now we will turn to the diary tool.

## Block 3: Free Association Exercise

In the boxes below please sketch or describe any four associations you have with a term “*self-tracking*”. There is no right or wrong answer and your associations can be as elaborate or as simple as you like. Each box can only host one association.

For each quadrant, can you tell me about this? Can you tell me more about X? You mentioned X can you tell me more about that?

\*Any questions that have arisen from the diaries to date are also probed at this stage

## **Block 4: Diary Training**

I would like to introduce you to the diary tool. It works on both laptop and phones/tablets. The diary set up was specifically design for the study. You will receive an individual link that only you will be able to activate and use. Like any diary, this diary has 7 separate days with empty text boxes where you can write as much or as little as you want. You can also attach any kind of files, including pictures, audio and text. Let me show you how it works.

Thinking about the past week...

- what sources of information did you consult to find out more about self-tracking devices, digital technologies or health application have you read
- what kind of conversations about tracking, health or digital technology you had with friends or colleagues
- did you participated in the self-tracking completion and/or interacted with members of the self-tracking communities
- what did you do with the self-tracked data you collected
- why is self-tracking important to you
- does your tracker or app meet your needs
- do you have any concerns regarding your tracker
- have you seen any of new episodes or commercials about tracking devices? What was your impression of it

The last box is left without instruction, here you can describe your data or write any thoughts or reflections you find relevant, including these about diary keeping itself.

There is no right or wrong answer, and everything you record is equally important.

## **Conclusion**

Thank you for the engaging discussion today and for joining the project. I hope the diary exercise would be enjoyable and interesting. You will be receiving email reminders from me, but it does not mean you need to write in the diary on the day you receive it. You can write in your diary as many times a day as you decide and minimum once a week. If at any point you have question, concerns or decide you no longer want to participate in the study please contact Svetlana at the email provided on your copy of the consent form. I look forward to seeing you in a month!



## Appendix 5 – Informed Consent Form

### Self-tracking Project

#### Purpose of the Project

This study is a research project conducted by a researcher from the London School of Economics and approved by the ethics board of the university. The **main purpose** of the project is to understand what self-tracking means to you.

#### What would you do?

During the study you would be involved in two activities: two informal discussions and a digital diary. Our informal conversations would take approximately **45 minutes to an hour**. During these conversations we will get to learn more about each other and we will talk about your thoughts, opinions and experiences with regards to tracking. Between the discussions you will be keeping a diary for **20 minutes** a week for 4 weeks. There is no requirement of how much or little you have to write.

#### Confidentiality & Data Protection

The following information would be recorded: your thoughts in the digital diary and the informal conversations (audio only). Please note that you **will not** be asked to provide **any health data** from your trackers or apps. The study specifically focuses on **what you think**, rather than on the data itself.

All data collected would be used strictly under a pseudonym; your identifiable details would be changed to protect your privacy. Under no circumstances would collected data be sold or access by any third parties. The data collected will only be available to the investigator (Svetlana Smirnova). The data would be stored on an encrypted hard drive for one year and then destroyed.

#### Benefits & Compensation

Upon completion of the study you will receive 50 GBP compensation and a final copy of the study. Your insight would help social scientists and the general public to better understand what self-tracking means to people.

#### Voluntary Nature, Withdrawal and Record of Consent

Your signature below indicates that you understood the information about the study and consent to participate. The participation is voluntary and you may withdraw from the study at any time with no penalty. If you have further questions related to this research, please contact Svetlana at [s.smirnova@lse.ac.uk](mailto:s.smirnova@lse.ac.uk)

#### Signature

Participant\_\_\_\_\_

Date\_\_\_\_\_

Researcher\_\_\_\_\_

Date\_\_\_\_\_

## Appendix 6 – Socio-demographic Survey

### Basic Introduction

Thank you for joining the study! This brief questionnaire contains a few general questions about you.

Q1 What is your name?

---

Q2 How old are you?

---

Q3 Where do you currently reside?

---

Q4 What is your marital status?

---

Q5 How many children do you have? If none, please write 0

---

Q6 What is your occupation?

---

Q7 Approximately, for how long have you been tracking yourself?

---

Q8 What kind of self-tracking devices do you use?

---

Q9 Have you written a diary before?

---

Q10 What is your preferred email address?

---

## Appendix 7 – Free Association Exercise

In the boxes below please sketch or describe any four associations you have with a term “*self-tracking*”. There is no right or wrong answer and your associations can be as elaborate or as simple as you like. Each box can only host one association.


## Appendix 8 – Diary Instructions and Layout

Welcome to your **personal diary!**

This diary is about **you** and **your everyday self-tracking practices**. By keeping a diary you will help us to better understand what people do with their data and how we interact with our tracking devices.

Your diary entries are a part of a study conducted by the researchers at the London School of Economics and Political Science.

Everything you write in this diary will remain **strictly confidential**. Nobody, but Svetlana, will be able to access and read your contributions. You will never be personally identifiable in any analysis or published work.

Should you have any questions about the study do not hesitate to contact Svetlana at s.smirnova@lse.ac.uk

**Thank you for making this study possible!** Your contributions are vital to us.

>> Save & Next

Survey Powered By Qualtrics

Welcome to your **personal diary!**

This diary is about **you** and **your everyday self-tracking practices**. By keeping a diary you will help us to better understand what people do with their data and how we interact with our tracking devices.

Your diary entries are a part of a study conducted by the researchers at the London School of Economics and Political Science.

Everything you write in this diary will remain **strictly confidential**. Nobody, but Svetlana, will be able to access and read your contributions. You will never be personally identifiable in any

Day 1

Enter a date:

May 2020						
Su	Mo	Tu	We	Th	Fr	Sa
26	27	28	29	30	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	1	2	3	4	5	6

<< Back >> Save & Next

Survey Powered By Qualtrics

Day 1

Enter a date:

← May 2020 →

Su	Mo	Tu	We	Th	Fr	Sa
26	27	28	29	30	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	1	2	3	4	5	6

<< Back >> Save & Next

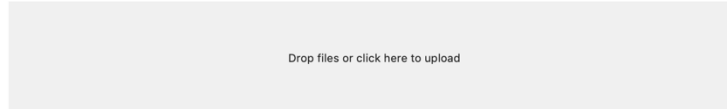
In the space below please write **anything you find relevant, important, or interesting** about your **experiences with self-tracking**. There are no right or wrong answers. If you would like to make multiple entries about the same day please use **the same box**.

It can be anything: an account of your interaction with your own tracker, your thoughts on the matter, an account of a conversation you had with friends or colleagues, a description of something you saw or read, or absolutely anything else you find relevant.

You can include **any text, images, videos, articles, or voice files** to your account by pressing "Choose File" button on the next page.

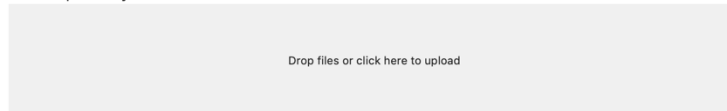


Please upload **any relevant files** in the boxes below



Drop files or click here to upload

Please upload **any relevant files** in the boxes below



Drop files or click here to upload

## Appendix 9 – Diary Email

Dear

Thank you for your enthusiasm and insightful answers today. This study would not be possible without you! It was very nice to meet you

This is the diary tool that I introduced you to during the last part of our discussion. As I mentioned, it is a very open-ended exercise. You can write **as much or as little as you want**. There are **no right or wrong answers**, so you can record anything you find interesting, important or relevant. You can **attach any files you think relevant**, including audio recordings, pictures, or snippets of your data...

Each week you will get a fresh link that contains seven identical boxes. When you are done with your record, please press **Save & Next** button. When you finish your final entry for the week just press **Save & Next** until you reach the **Thank you message** (this action will submit your diary to the project's database). You can use the same link to access your diary as many times as you want every week.

Examples of things you might want to write about in your diary...

- what sources of information did you consult to find out more about self-tracking devices, digital technologies
- what kind of conversations about tracking, health or digital technology you had with friends or colleagues
- did you participate in self-tracking competition and/or interacted with members of the self-tracking communities
- what did you do with the self-tracked data you collected
- why is self-tracking important to you
- does your tracker or app meet your needs
- do you have any concerns regarding your tracker

If you have any questions or concerns, please contact Svetlana at [s.smirnova@lse.ac.uk](mailto:s.smirnova@lse.ac.uk) at any time during the study.

Best wishes,  
Svetlana

## Appendix 10 – Email Reminder Examples

Dear,

The link below will take you to the Week 2 Notebook of your digital diary. The procedure is exactly the same as last week. You can record any thoughts, news, frustrations, successes, reflections, ideas about self-tracking you might have, or anything else you find relevant. Feel free to attach any files ranging from picture and voice to videos and web links. There is no right or wrong answer and everything you share with me contributes greatly to the study!

Thank you for your continues participation!

Best,  
Svetlana

Dear,

Did you have a “oh, I should write that in the diary” moment today? If you seen, read, heard, thought anything you deemed relevant to the self-tracking project, don't forget to share! To write something in your digital diary press [follow this link to the survey](#) at the end of this email or copy the link below directly into your browser.

Your highly informative entries make this study possible! Everything you say would remain confidential and it will help us a great deal in understanding self-tracking practices.

Svetlana is always here for you to answer any questions and address concerns you might have. Please feel free to contact Svetlana at 07437883235 or at [s.smirnova@lse.ac.uk](mailto:s.smirnova@lse.ac.uk)

Thank you for your contributions!  
Svetlana

Dear,

I hope this email finds you well! This is a reminder for the Digital Diary part of the project. If you have anything that you want to share with me about self-tracking, the study, or your diary experience, please click on the link below and type your response in any of the boxes. The link will remain active for another couple of days. After that all of your responses would be submitted to the study's database.

Thank you for being so kind with your time and for sharing your experiences and thoughts with me!

Regards,  
Svetlana

## Appendix 11 – Exit Interview Guide

### Introduction

Thank you for your continues participation in the project and welcome to the final interview! Today we are going to talk about your diary and self-tracking in general. Today's conversation is a little bit more structured than usual, but if there is something I have not asked about feel free to share at any point.

### Personal Diary

How are you getting on with the diary? Was it a fun experience? What was your favorite and least favorite part of diary keeping?

You mentioned, X, Y, Z and I was wondering if we can talk more about that....

### Material

Can you please tell me when do you wear your tracker? What kinds of activities are of interest to you to measure? When do you take it off?

Can you please tell me about the time when you just got the device? How did you feel? What about now? Can you tell me something about your wearing routines?

How did you decide what kind of tracker did you wanted to get? Did you do research about it? If so, how?

What are some functionalities of your device? What is that is tracked best using it? What is something you cannot track?

How does your self-tracking device make you feel? Do you think it fits into your daily routines?

If there was something you can change in your self-tracking device what would that be? Why is that? What about an individual who falls outside socially acceptable standards for weight?

How much would you say you interact with your device? Would you be actively inputting data into it throughout the day?

What is something that you want to measure but your self-tracking device is unable to capture?

With your device do you have to pay extra to get more detailed analysis of your data? Do you do that?

Did you engage in any self-weighting? Or self-measurement? If so, how did you input your personal information into the tracker?

How do you think your tracker gives your daily goals?



Can you tell me about a rewarding/ frustrating experience with your tracking device?

Do you follow developments of technology? Can you think of something that you wanted to get?

## **Cultural**

How many of your close friends engage in self-tracking? What about your colleagues?

Are you a member of any online forums related to self-tracking? What kind of posts do you usually make? Have you ever attended any meet ups?

In your work environment have you been offered incentives for self-tracking? Are tracking competitions part of your work place culture?

Do you feel that you need a tracing device to fit in with your group of friends?

What do you do with your sleep data?

Have you considered getting a more detailed tracking test, such as DNA test?

For people like you, what do you think main barriers for getting self-tracking device are?

Do you talk about your findings to other people? Who are they? What kind of conversations do you usually have?

Do you share any of your data on social media? On online forums?

Are you a member of the online self-trackers community? What do you usually do on these forums? Are you actively engaged or do you go there for additional information?

If you want to seek out information about tracking devices where do you go? Why?

## **Normative**

Do you know how health goals are given to you by your tracker or do you input your own goals? Do you know how your device arrived at these?

Can you think of the time when you have adjusted your settings on your tracker?

Have you ever thought about privacy of your health data you are collecting using your device?

Have you ever deleted any of your data from the device?

Do you take any data-protection steps? What are they?

Do you think medical data that your doctor collect about you and your self-tracking data should be regulated differently? If so, how? Have you ever given your-self tracking data to your doctor?

Who do you think owns your data? Who do you think has access to your data? In the ideal world who do you think should access your data?

If a third party accesses your information, what kind of risks do you think you would be facing?

Have your medical professional or a personal trainer recommended a tracker to you?

What do you think our society values the most in human lives? What do you think should be valued the highest? What about your closest group of friends?

Who do you think can benefit from self-tracking devices?

Can you think of the time your data was really off? E.g. you have woken up and had 10000 steps on the tracker. If you collected some information about yourself and then realize it was not accurate what do you usually do?

### **Reflexive**

What do you do with your data? Have you ever downloaded it in full?

What do you think you gain by looking at your self-tracking data? What is your main interest in terms of tracking?

When did you get a tracker what kinds of questions/curiosity did you have about your self?

When you do not meet your step/calorie/water goal how do you feel?

What kinds of benefits do you gain from self-tracking? What about some costs?

What do you think you will lose if tomorrow you were to stop wearing your tracking device?

Can you tell me about the time you used your data to introduce changes in your life?

Can you tell me about something you discovered about yourself using your self-tracking practices?

Would you want your partner/children wearing a self-tracking device? Why?

Thinking about your body, how did your relationships with it changes since you started tracking yourself?

A lot of people are experimenting with their tracking devices. Can you think of a self-experiment you engaging in?

New stories are often reporting interesting findings of self-trackers, such as unexpected pregnancies, heartbreaks etc, that were captured by individual's data. Can you think of something curious you captured with your device?

When it comes to your body versus your device which do you think is provides you with more accurate information?

What are some of your tracking goals?

A lot of people mention discovery when discussing their self-tracking. Does that apply to you?

What is something you wish you could track, but you cannot at the moment?

Do you have special notifications set up on your phone or tracker, such as sleep-reminders? Walking motivation and other messaging?

Can you please run me through your data analysis process? Lets say you want to analyse what happened to you today... what are your steps?

You have been tracking for XXX amount of time, can you think of how your attitude/relationships with data changed in that time period?

## **Historic**

Before getting your current device have you ever tracked anything in your life? For example, during your pregnancy or child rearing, productivity at work, nutritional diaries?

Do you take selfies? If so do you think they are different from of self-tracking or are they different? What about geographical pins on Facebook or geolocation taggers on phones?

In your opinion how do self-tracking and confession differ? What about medical interview you get done by your GP?

Do you do any other kind of tracking? Home? Garden? Children?

## **Motivational**

Why did you buy your first tracking device? Was it given to you or was it something you acquire? Why did you make this particular choice?

What kind of goals do you have in regards to your health? How does self-tracking device helps you to achieve these goals?

If you have to describe a self-tracking device to somebody who does not know what it is what would you say?

## **Society & Technology**

If you see an individual who is wearing self-tracking device on the street what kind of thoughts are visiting you?

What do you think self-tracking means to us as a society? What are some social/cultural implications?

Do you think self-tracking should be mandatory?

Some employers and gyms offer self-tracking devices in exchanges for lower health insurance rates. What do you think about that?

An argument has been made that if everybody wore a self-tracking device the costs of NHS would have gone down. What do you think?

### **Conclusion and Thank You**

Thank you for all the time and effort you put into the project! It was a great pleasure to get to know you! I will keep you posted about the development of the study. You will receive a final copy as soon as it is ready

## Appendix 12 – An Example of Coding Framework

Name	Description	Files	References
	personal tracking goal		
Goal-setting where is it from	discussion of goal setting or where goals are coming from, including personal modification of goals.	67	118
Not achieved goal feeling	description of how do you feel when you haven't achieved your goal	44	57
Health literacy	node to include references to any kind of health related knowledge or undertaking including extra knowledge etc	59	118
Historic	anything related to the history of tracking and old-new habits	89	212
Health History	anything to do with childhood, adulthood health habits changing or important shifts in health behaviour, such as stopped smoking. Not include present health influences	57	138
History of tracking	any comments related to the history of tracking be it with diaries, calendars etc	21	36
New Habits	node containing information on people picking up new self-tracking habits	31	38
Images	overall code for assembly of pictures	160	160
In Media	node contains references to old and new media, to sharing data, to public health	63	82
Old & New Media references	Including any information about the new and old media like, TV or Facebook	56	69
Public Health Sound Bits	anything to do with public health campaigns such as 5-a-day	10	13
Interesting Stories	anything that might be cited and look good as an intent quote; not a primary coding category, but an additional one	33	49
Methodological	any feedback on the diary or the interview procedures or instruments evidence that method works	13	24
Diary-related	top node included information about diary habits and feelings	58	124
Advice	any advice information that was provided during the diary or interview process by the participant	5	7
Apologetic for diary	record of any apologies for not filling out diary - for personal use and reflection on the effect of the study on the participants	10	12
How i wrote a diary	any reflections on how the diary was completed	39	47
Technical comments	include antigen to do with Qualtrics set up of the diary	30	52

Oct 18, 2020

3

Name	Description	Files	References
Interview	my comments and reflections on how i could have done better of improved the interviews	16	23
Morality	node contains anything to do with morality of food or tracking	42	63
Moral tracking	discussion by a participant of any element of tracking that has moral dimension, or feeling such as feeling "like a good person"	35	46
Morality of food	feeling that are guilt, happiness and others associated with food that wouldn't typically be associated with food	13	17
Motivation	anything relevant to motivation	106	210
Motivation for Healthy lifestyle	anything to do with why one engaged in preferred health behaviours	24	31
Motivation for Tracking	main reason to start tracing including the original and how it has changed	71	110
Why tracking important to me	any description of why self-tracking is important for an individual personally	47	69
Observational	Includes any information from my observation during or after the actual interview	3	3
Privacy & Power	node contains any discussion about privacy, regulation and power with regards to data	70	278
Changed-privacy setting	information pertinent to privacy setting of the devices	38	51
Power	anything related to different forms of power in the context of data	20	40
Privacy-actual, normative, practice	the node contains any privacy related comments made by the participants. This include what participants think it is, how they think it should be and factual information about them changing privacy settings	51	129
Protection mechanisms	anything related to people protecting their data	19	29
Regulation differ	the node contains responses to the question if regulation for self-tracking and health care data should in their opinions differ	23	28
Reflexivity	reference to any self-talk	131	253
Routines	anything relevant to once routines	111	321
Gym, MDs & Insurance Tracking	including answers about gym and insurance tracking as well as medical tracking	23	36
Information seeking behaviour incl	information I purposefully found or was given to me about health including information	48	74

Oct 18, 2020

4

## Appendix 13 – Free Associations Exercise Analysis

168 (total collected association)/45 participants = on average 3.7 per person

### **Thematic clusters by frequency of mention with examples:**

(29) Actual measurements (e.g. sleep, steps, food diaries, calorie counting, weight measurement, pulse)

(26) Activities (e.g. exercise, running, walking, sleeping, fitness, healthy eating, diabetes)

(15) Responsibility & control (e.g. being in control, more responsible, self- monitoring, self-control, self-confidence)

(14) Health (e.g. healthy body and mind, being healthy, keeping health, healthy body, looking and feeling good)

(12) Numbers/data/data collection graphs (e.g. data, graphs, analysis)

(10) Personal (e.g. part of me, challenge myself, getting to know my body, self-centered, me time, personal journey, personal path, checking up on yourself)

(9) Gadgets & objects (Apple Watch, FitBit, app, device, wristband, healthy food, dumbbell, lose and gain weight)

(7) Performance & improvement (e.g. achieving goals, setting goals, results, performance improvement)

(5) Motivation & being motivated

(5) Lifestyle & Perception (e.g. balanced life style, lifestyle, perception of others, style)

(4) Time (e.g. progression, time, continuous improvement)

(3) Technology & millennium

(3) Emotions (e.g. pride, mindfulness, knowledge , key to unlocking knowledge)

(2) Ease of use

(2) Film & Instagram

(2) Friends and family

(2) Surrounding (e.g. hills, fresh air)

(2) Empowerment

- (2) Completion
- (2) Tyranny & navel- gazing
- (2) Commercialization & consumerism
- (2) Habits
- (1) Nerdy people
- (1) Doing whatever you want
- (1) Fun
- (1) OCD
- (1) Routine
- (1) Useful, but slippery slope
- (1) A bit scary
- (1) Makes me sad about society

## Appendix 14 – Limitations of Devices Summary

Type of Limitation	Specific	Number of Mentions	Examples
<b>Material</b>			
	<b>Charging</b>	13	Losing data collection time while charging; running out of battery at an inconvenient time, requiring frequent charging, inconvenient if travelling
	<b>Unappealing physical attributes</b>	16	Uncomfortable to wear/sleep in, not durable for multiple sports activities, such as kettleble, emitting too much light at night, unappealing looks, not being waterproof, breakable clasps
	<b>High price point</b>	4	Expensive to buy, expensive subscription services
<b>Technical</b>			
	<b>Failures to record data</b>	11	Not being able to identify exercise activity, losing data if intern connection is dropped, having to manually initiate exercise period, hardware updates that lead to lose of data, lost access to accounts that is impossible to retrieve, not recording activities such as Pilates
	<b>No data editing function</b>	3	Editing only of some data possible, no abilities to add extra activities, no ability to fix incorrect data points
	<b>Issues with data transmission and synchronization with other devices</b>	11	Poor integration within and between apps and devices, slow loading times, technical failures at different points, issues with data transfer for additional analysis
	<b>Insecure data storing/too much advertisement</b>	4	Asking for too much access, little known about data flows, too much advertisement and communication from the devices
	<b>Poor accuracy</b>	12	Confusing different types of activities such as cycling for walking, not recognizing some activities such as gardening as physical, registering hand gestures as steps taken
<b>Action-enabling</b>			
	<b>Reminders and feedback are limited in utility</b>	6	Feedback and reminders that are not personalized, no help for data interpretation
	<b>Calorie tracking systems are not functional</b>	12	Hard to input food consistently, food databases are limited/country-specific, hard to input home cooked meals and food without barcodes, American metric system and brands
	<b>Time-consuming</b>	3	Takes a lot of time to do manually, hard to be consistent, software is slow
	<b>Poor feedback</b>	4	Encourages to over exercise, poor measurement proxies and comparative metrics, provides judgment beyond information
	<b>Health hazard</b>	5	Causing rash and allergic reactions



## References

- Acquisti, A., Adjerid, I., Balebako, R., Brandimarte, L., Cranor, L., Komanduri, S., . . . Wilson, S. (2017). Nudges for Privacy and Security: Understanding and Assisting Users' Choices Online. *ACM Computing Surveys (CSUR)*, 50(3), 1-41. doi: 10.1145/3054926
- Acquisti, A., Brandimarte, L., & Loewenstein, G. (2015). Privacy and Human Behavior in the Age of Information. *Science*, 347(6221), 509-514. doi: 10.1126/science.aaa1465
- Adams, M. (2003). The Reflexive Self and Culture: a Critique. *British Journal of Sociology*, 54(2), 221-238. doi: 10.1080/0007131032000080212
- Adhikari, R., Richards, D., & Scott, K. (2014). *Security and privacy issues related to the use of mobile health apps*. Paper presented at the Proceedings of the 25th Australasian Conference on Information Systems, Auckland, New Zealand : Auckland University of Technology.
- Ahmed, S. (2014). *The cultural politics of emotion*, Second edition. Edinburgh University Press
- Agamben, G. (2009). *What is Apparatus? and other essays*. Stanford, CA: Stanford University Press.
- Agamben, G. (2016). *The Use of bodies*. Stanford, CA: Stanford University Press.
- Ajana, B. (2017). Digital Health and the Biopolitics of the Quantified Self. *Digital Health*, 3, 1-18. doi: 10.1177/2055207616689509
- Akram, S., & Hogan, A. (2015). On Reflexivity and the Conduct of the Self in Everyday Life: Reflections on Bourdieu and Archer. *British Journal of Sociology*, 66(4), 606-625. doi: 10.1111/1468-4446.12150
- Alam, M., Saxena , M., & Jain, R. (2017). A Comparative Security Analysis of Fitness Wearables. *International Journal of Engineering Research*, 6(4), 209-210.
- Alaszewski, A. (2006). *Using diaries for social research*. London, UK: SAGE Publications.
- Alexander, H. (2017, April 25). Man charged with wife's murder after her FitBit contradicts his timeline of events, *The Telegraph*. Retrieved from <https://www.telegraph.co.uk/news/2017/04/25/man-charged-wifes-murder-fitbit-contradicts-timeline-events/>
- Alexander, J. C., & Seidman, S. (1990). *Culture and Society: Contemporary debates*. Cambridge, UK: Cambridge University Press.
- Alqhatani, A., & Lipford , H. (2019). “There is nothing that I need to keep secret”: Sharing Practices and Concerns of Wearable Fitness Data. Paper presented at the USENIX Association, Santa Clara, CA.

- Altman, I. (1975). *The Environment and social behavior: Privacy, personal space, territory, and crowding*. Monterey, CA: Brooks/Cole Publishing Company.
- Altman, L. K. (1986). *Who goes first?* Berkeley, CA: University of California Press.
- Ancker, J. S., Witteman, H. O., Hafeez, B., Provencher, T., Van de Graaf, M., & Wei, E. (2015). “You Get Reminded You’re a Sick Person”: Personal Data Tracking and Patients with Multiple Chronic Conditions. *Journal of Medical Internet Research*, 17(8), e202. doi: 10.2196/jmir.4209
- Archard, D. (2006). The Value of privacy. In E. G. Claes, S Duff, A (Ed.), *Privacy and the Criminal law* (pp. 13-31). Antwerpen, Oxford: Intersentia.
- Archer, M. S. (2003). *Structure, agency, and the internal conversation*. Cambridge, UK: Cambridge University Press.
- Archer, M. S., & Archer, M. S. (2007). *Making our way through the world: Human reflexivity and social mobility*. Cambridge, UK: Cambridge University Press.
- Arksey, H., & Knight, P. (2009). *Interviewing for social scientists*. London, UK: SAGE Publications.
- Asimakopoulos, S., Asimakopoulos, G., & Spillers, F. (2017). Motivation and User Engagement in Fitness Tracking: Heuristics for Mobile Healthcare Wearables. *Informatics*, 4(5).
- Athey, S., Catalini, C., & Tucker, C. (2017). *The digital privacy paradox: Small money, small costs, small talk*. National Bureau of Economic Research: Working Paper Series. National Bureau of Economic Research. Cambridge, MA
- Attig, C., & Franke, T. (2020). Abandonment of Personal Quantification: A Review and Empirical Study Investigating Reasons for Wearable Activity Tracking attrition. *Computers in Human Behavior*, 102, 223-237. doi: 10.1016/j.chb.2019.08.025
- Austen, K. (2015). The Trouble with Wearables. *Nature*, 525, 22-24.
- Ayobi, A., Marshall, P., Cox, A., & Chen, Y. (2017). *Quantifying the Body and Caring for the Mind: Self-Tracking in Multiple Sclerosis*. Paper presented at the 2017 CHI Conference on Human Factors in Computing Systems ( CHI '17 ), Denver, CO.
- Aïmeur, E., Lawani, O., & Dalkir, K. (2016). When Changing the Look of Privacy Policies Affects User Trust: An Experimental Study. *Computers in Human Behavior*, 58, 368-379. doi: 10.1016/j.chb.2015.11.014
- Baker, D. A. (2020). Four Ironies of Self-quantification: Wearable Technologies and the Quantified Self. *Science and Engineering Ethics*, 26, 1477-1498.

- Balebako, R., Marsh, A., Lin, J., Hong, J. I., & Cranor, C. F. (2014). *The Privacy and security behaviors of smartphone app developers*. Paper presented at the USEC '14, San Diego, CA. <http://repository.cmu.edu/hcii/265/>
- Bamberg, M., & Georgakopoulou, A. (2008). Small Stories as a New Perspective in Narrative and Identity Analysis. *Text & Talk*, 28(3), 377-396. doi: 10.1515/TEXT.2008.018
- Barassi, V. (2017). BabyVeillance? Expecting Parents, Online Surveillance and the Cultural Specificity of Pregnancy Apps. *Social Media + Society*, 3(2), 1-10. doi: 10.1177/2056305117707188
- Barta, K., & Neff, G. (2016). Technologies for Sharing: Lessons from Quantified Self about the Political Economy of Platforms. *Information, Communication & Society*, 19(4), 518-531. doi: 10.1080/1369118X.2015.1118520
- Barth, S., & de Jong, M. D. T. (2017). The Privacy Paradox – Investigating Discrepancies Between Expressed Privacy Concerns and Actual Online Behavior – A Systematic Literature Review. *Telematics and Informatics*, 34(7), 1038-1058. doi: 10.1016/j.tele.2017.04.013
- Bartlett, R. (2012). Modifying the Diary Interview Method to Research the Lives of People With Dementia. *Qualitative Health Research*, 22(12), 1717-1726. doi: 10.1177/1049732312462240
- Bartlett, R., & Milligan, C. (2015). *What is diary method?* London, UK: Bloomsbury Academic.
- Bartow, A. (2006). A Feeling of Unease About Privacy Law. *University of Pennsylvania Law Review*, 154(477), 52-62.
- Bauer, M. W., & Gaskell, G. (Eds.). (2000). *Qualitative researching with text, image and sound: A Practical handbook*. London, UK: SAGE Publications.
- Behar, J., Roebuck, A. S., Domingo, J. S., Geder, E., & Clifford, G. (2013). A Review of Current Sleep Screening Applications for Smart-phones. *Physiological Measurement*, 34, R29–R46.
- Belli, J. (2016). Unhappy? There's an App for That. Tracking Well-Being through the Quantified Self. *Digital Culture & Society*, 2(1), 89–103. .
- Berg, M. (2017). Making Sense with Sensors: Self-tracking and the Temporalities of Wellbeing. *Digital Health*, 3. doi: 10.1177/2055207617699767
- Bernays, S., Rhodes, T., & Jankovic Terzic, K. (2014). Embodied Accounts of HIV and Hope. *Qualitative Health Research*, 24(5), 629-640. doi: 10.1177/1049732314528812
- Bert, F., Passi, S., Scaioli, G., Gualano, M. R., & Siliquini, R. (2016). There Comes a Baby! What Should I Do? Smartphones' Pregnancy-related Applications: A Web-based

- Overview. *Health Informatics Journal*, 22(3), 608-617. doi: 10.1177/1460458215574120
- Bhat, S., Ferraris, A., Gupta, D., Mozafarian, M., Debari, V. A., Gushway-Henry, N., & Chokroverty, S. (2015). Is There a Clinical Role For Smartphone Sleep Apps? Comparison of Sleep Cycle Detection by a Smartphone Application to Polysomnography. *Journal of Clinical Sleep Medicine*, 11(7), 709–715. doi: 10.5664/jcsm.4840
- Bianchi, M. T. (2018). Sleep Devices: Wearables and Nearables, Informational and Interventional, Consumer and Clinical. *Metabolism*, 84, 99-108. doi: 10.1016/j.metabol.2017.10.008
- Bietz, M. J., Bloss, C. S., Calvert, S., Godino, J. G., Gregory, J., Claffey, M. P., Sheehan, J. & Patrick, K. (2016). Opportunities and Challenges in the Use of Personal Health Data for Health Research. *Journal of the American Medical Informatics Association*, 23(e1), e42-e48. doi: 10.1093/jamia/ocv118
- Bigo, D., Isin, E. F., & Ruppert, E. (2019). *Data Politics: Worlds, Subjects, Rights* (1 ed.). Milton: Milton: Routledge.
- Blayden-Ryall, M., Crampton, H., Eastall, S., Kiedrowski, G., Lawton, T. & Mowbray, A. (Writers) & Curtis, L. (Producer) (2015). *Hunted* [Television Series]. UK: Endemol Shine UK.
- Bode, M., & Kristensen, D. B. (2016). The Digital doppelgänger within: A Study on self-tracking and the Quantified Self movement. In R. Canniford & D. Bajde (Eds.), *Assembling Consumption: Researching actors, networks and markets* (pp. 119-135). Oxon, UK: Routledge.
- Bolger, N., Davis, A., & Rafaeli, E. (2003). Diary Methods: Capturing Life as it is Lived. *Annu. Rev Psychology*, 54, 579-616.
- Bornat, J., & Bytheway, B. (2012). Working with Different Temporalities: Archived Life History Interviews and Diaries. *International Journal of Social Research Methodology*, 15(4), 291-299. doi: 10.1080/13645579.2012.688312
- Bowker, G. C., & Star, S. L. (1999). *Sorting things out: Classification and its consequences*. Cambridge, MA: The MIT Press.
- Boyd, D., & Crawford, K. (2012). Critical Questions for Big Data: Provocations For A Cultural, Technological, and Scholarly Phenomenon. *Information, Communication & Society*, 15(5), 662-679. doi: 10.1080/1369118X.2012.678878
- Brockling, U. (2016). *The Entrepreneurial Self: Fabricating a new Type of subject*. London, UK: SAGE Publications.

- Brooker, C. (Writer). (2016). *Black Mirror*. UK: Endemol Shine.
- Broom, A., & Tovey, P. (2008). Exploring the Temporal Dimension in Cancer Patients' Experiences of Nonbiomedical Therapeutics. *Qualitative Health Research*, 18(12), 1650-1661. doi: 10.1177/1049732308326511
- Brunton, F., & Nissenbaum, H. (2013). Political and ethical perspectives on data obfuscation. In M. Hildebrandt & K. de Vries (Eds.) *Privacy due process and the computational turn: the Philosophy of law meets the philosophy of technology* (pp. 171-195): Routledge.
- Buchwald, A., Letner, A., Urbach, N., & von Entreß-Fürsteneck, M. (2017, June 5-10, 2017). *Towards explaining the willingness to disclose personal self-tracking data to service providers*. Paper presented at the Proceedings of the 25th European Conference on Information Systems (ECIS), Guimarães, Portugal.
- Burrows, R., Nettleton, S., & Bunton, R. (Eds.). (1995). *The Sociology of health promotion: Critical analyses of consumption, lifestyle and risk*. New York, NY, US: Routledge.
- Butler, J. (2005). *Giving an account of oneself* (1st ed. ed.). New York, NY: Fordham University Press.
- Calhoun, C. (1991). Morality, Identity, and Historical Explanation: Charles Taylor on the Sources of the Self. *Sociological Theory*, 9(2), 232-263. doi: 10.2307/202087
- Calo, R. (2011). The Boundaries of Privacy Harm. *Indiana Law Journal*, 86(3), 1-31.
- Catlaw, T. J., & Sandberg, B. (2018). The Quantified Self and the Evolution of Neoliberal Self-Government: An Exploratory Qualitative Study. *Administrative Theory & Praxis*, 40(1), 3-22. doi: 10.1080/10841806.2017.1420743
- Cederström, C., & Spicer, A. (2015). *The Wellness syndrome*. Cambridge, UK: Polity.
- Charitsis, V. (2016). Prosuming (the) Self. *Ephemera*, 16(3), 37-59.
- Charitsis, V. (2019). Survival of the (Data) Fit: Self-Surveillance, Corporate Wellness, and the Platformization of Healthcare. *Surveillance & Society*, 17(1/2), 139-144. doi: 10.24908/ss.v17i1/2.12942
- Charitsis, V., Yngfalk, A. F., & Skålén, P. (2019). 'Made to Run': Biopolitical Marketing and the Making of the Self-quantified Runner. *Marketing Theory*, 19(3), 347-366. doi: 10.1177/1470593118799794
- Chen, J., Cade, J. E., & Allman-Farinelli, M. (2015). The Most Popular Smartphone Apps for Weight Loss: A Quality Assessment. *JMIR mHealth and uHealth*, 3(4), e104. doi: 10.2196/mhealth.4334

- Cheney-Lippold, J. (2011). A New Algorithmic IdentitySoft Biopolitics and the Modulation of Control. *Theory, Culture & Society*, 28(6), 164-181.
- Cheung, C., Bietz, M. J., Patrick, K., & Bloss, C. S. (2016). Privacy Attitudes among Early Adopters of Emerging Health Technologies. *PloS One*, 11(11), e0166389.
- Ching, K., & Singh, M. (2016). Wearable Technology Devices Security and Privacy Vulnerability Analysis. *International Journal of Network Security and Its Applications*, 8(3), 19-30.
- Choe, E. C., Lee, N., Lee, B., Pratt, W., & Kientz, J. (2014). *Understanding quantified-selfers' practices in collecting and exploring personal data*. Paper presented at the CHI'14: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, Toronto, ON, Canada.
- Chung, C.-F., Gorm, N., Shklovski, I., & Munson, S. (2017). *Finding the right fit: Understanding health tracking in workplace wellness programs*. Paper presented at the *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI '17)*. New York, NY.
- Clarke, A. E., Mamo, L., Fosket, J. R., Fishman, J. R., & Shim, J. K. (2010). *Biomedicalization: Technoscience, health, and illness in the U.S.* Durham, NC: Duke University Press.
- Clarke, A. E., Shim, J. K., Mamo, L., Fosket, J. R., & Fishman, J. R. (2003). Biomedicalization: Technoscientific Transformations of Health, Illness, and U.S. Biomedicine. *American Sociological Review*, 68(2), 161-194. doi: 10.2307/1519765
- Clarke, R. (1997). Introduction to dataveillance and information privacy, and definitions of term. Retrieved July, 12, 2020 from <http://www.rogerclarke.com/DV/PTyp-1701.html>
- Clarke, V., & Braun, V. (2013). Teaching Thematic Analysis: Over-coming Challenges and Developing Strategies for Effective Learning. *The Psychologist*, 26(2), 120-123.
- Classen, J., Wegemer, D., Patras, P., Spink, T., & Hollick, M. (2018). Anatomy of a vulnerable fitness tracking system: Dissecting the Fitbit Cloud, app, and firmware. *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies*, 4(2), 1-24. doi: 10.1145/3191737
- Clawson, J., Pater, J., Miller, A., Mynatt, E., & Mamykina, L. (2015). *No longer wearing: investigating the abandonment of personal health-tracking technologies on craigslist*. Paper presented at the UbiComp '15: *Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing*, Osaka, Japan.
- Clayton, A.-M., & Thorne, T. (2000). Diary Data Enhancing Rigour: Analysis Framework and Verification Tool. *J. Journal of Advanced Nursing*, 32, 1514-1521.

- Cohen, J.E. (2019). Turning Privacy Inside Out. *Theoretical Inquiries in Law*, 20(1), 1-31. doi: 10.1515/til-2019-0002
- Cohen, J. E. (2012). *Configuring the networked self: Law, code, and the play of everyday practice*. New Haven, CT: Yale University Press.
- Cohen, J. E. (2013). What Privacy Is For. *Harvard Law Review*, 126(7), 1904-1933.
- Colonna, L. (2019). Legal and Regulatory Challenges to Utilizing Lifelogging Technologies for the Frail and Sick. *International Journal of Law and Information Technology*, 27(1), 50-74. doi: 10.1093/ijlit/eay018
- Conrad, P. (1992). Medicalization and Social Control. *Annual Review of Sociology*, 18, 209-232.
- Coorevits, L., & Coenen, T. (2016). *The rise and fall of wearable fitness trackers*. Paper presented at the Academy of Management Proceedings, Anaheim, CA.
- Corti, L. (1993). Using Diaries in Social Research. *Social Research Update*(2), 1-7.
- Costa Figueiredo, M., Caldeira, C., Reynolds, T., Victory, S., Zheng, K., & Chen, Y. (2017). Self-tracking for fertility care: Collaborative support for a highly personalized problem. *Proceedings of the ACM on Human-Computer Interaction*, 1(CSCW), 1-21. doi: 10.1145/3134671
- Couldry, N. (2003). *Media rituals: a Critical approach*. London, UK: Routledge.
- Couldry, N. (2012). *Media, society, world. Social Theory and digital media practice*. Cambridge, UK: Polity Press.
- Couldry, N. (2014). Inaugural: A Necessary Disenchantment: Myth, Agency and Injustice in a Digital World. *The Sociological Review*, 62(4), 880-897. doi: 10.1111/1467-954X.12158
- Couldry, N., Livingstone, S., Markham, T. (2010). *Media Consumption and Public Engagement Beyond the Presumption of Attention*. London, UK: Palgrave Macmillan.
- Crawford, K., Lingel, J., & Karppi, T. (2015). Our Metrics, Ourselves: A Hundred years of Self-tracking from the Weight Scale to the Wrist Wearable Device. *European Journal of Cultural Studies*, 18(4-5), 479-496.
- Crawford, K., & Schultz, J. (2014). Big Data and Due Process: Toward a Framework to Redress Predictive Privacy Harms. *Boston College Law Review*, 55(1), 93-128.
- Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed method approaches* (3rd ed. ed.). London, UK: SAGE Publications.
- Creswell, J. W., & Miller, D. L. (2000). Determining Validity in Qualitative Inquiry. *Theory Into Practice*, 39(3), 124-130. doi: 10.1207/s15430421tip3903\_2

- Criado, N., & Such, J. M. (2015). Implicit Contextual Integrity in Online Social Networks. *Information Sciences*, 325(C), 48-69. doi: 10.1016/j.ins.2015.07.013
- Crosby, A. W. (1997). *The Measure of reality: Quantification and Western society, 1250-1600*. Cambridge, UK: Cambridge University Press.
- Cusack, B., Antony, B., Ward, G., & Mody, S. (2017). *Assessment of security vulnerabilities in wearable devices*. Paper presented at the 15th Australian Information Security Management Conference, Edith Cowan University, Perth, Western Australia.
- Cyr, B., Horn, W., Miao, D., & Specter, M. (2014). *Security analysis of Wearable fitness devices (Fitbit)*. MIT. <https://pdfs.semanticscholar.org/f4ab/ebef4e39791f358618294cd8d040d7024399.pdf>.
- Daly, A. (2015). The Law and Ethics of 'Self-quantified' Health Information: an Australian Perspective. *International Data Privacy Law*, 5(2), 144-155.
- de Arriba-Pérez, F., Caeiro-Rodríguez, M., & Santos-Gago, J. (2016). Collection and Processing of Data from Wrist Wearable Devices in Heterogeneous and Multiple-User Scenarios. *Sensors*, 16(9), 1538. doi: 10.3390/s16091538
- De Mooy, M., & Yuen, S. (2017). *Towards privacy-aware research and development in Wearables health*. Paper presented at the HICSS: the 50th Hawaii international Conference on System Science, Hawaii, HI.
- de Zambotti, M., Rosas, L., Colrain, I. M., & Baker, F. C. (2019). The Sleep of the Ring: Comparison of the ŌURA Sleep Tracker Against Polysomnography. *Behavioral Sleep Medicine*, 17(2), 124-136. doi: 10.1080/15402002.2017.1300587
- Deacon, D., Pickering, M., Golding, P., & Murdock, G. (2007). *Researching communications: a Practical guide to methods in media and cultural analysis* (2nd ed.). London, UK: Bloomsbury Academic.
- Deleuze, G. (1992). Postscript on the Societies of Control. *October*, 1(59), 3-7.
- Damasio, A. (2000). *The feeling of what happens : Body and emotion in the making of consciousness*. London: Vintage.
- den Bulck, J. V. (2015). Sleep Apps and the Quantified Self: Blessing or Curse? *Journal of Sleep Research*, 24(2), 121-123.
- Depper, A., & Howe, P. D. (2017). Are We Fit Yet? English Adolescent Girls' Experiences of Health and Fitness Apps. *Health Sociology Review*, 26(1), 98-112. doi: 10.1080/14461242.2016.1196599
- Didžiokaitė, G., Saukko, P., & Greiffenhagen, C. (2018). The Mundane Experience of Everyday Calorie Trackers: Beyond the Metaphor of Quantified Self. *New Media & Society*, 20(4), 1470-1487. doi: 10.1177/1461444817698478



- Dow Schull, N. (2018). Self in the loop: bits, patterns, and pathways in the Quantified Self. In Z. Papacharisi (Ed.), *The Networked Self, Vol 5: Human Augmentics, Artificial Intelligence, Sentience* (pp. 25-38). Abingdon, UK: Routledge.
- Draper, N. A., & Turow, J. (2019). The Corporate Cultivation of Digital Resignation. *New Media & Society*, 21(8), 1824-1839. doi: 10.1177/1461444819833331
- Elias, A. S., & Gill, R. (2018). Beauty Surveillance: The Digital Self-monitoring Cultures of Neoliberalism. *European Journal of Cultural Studies*, 21(1), 59-77. doi: 10.1177/1367549417705604
- Elias, N., (1994). *The civilizing process* (New ed.). Oxford: Blackwell.
- Elliott, A. (2013). *Reinventions*. London, UK: Rutledge.
- Elliott, A. (2014). *Concepts of the Self*. Cambridge, UK: Polity Press.
- Elliott, H. (1997). The Use of Diaries in Sociological Research on Health Experience. *Sociological Research Online*, 2(2), 1-16.
- En, B., & Poll, M. (2016). Are You (self-)tracking? Risks, Norms and Optimization in Self-quantifying Practices. *Graduate Journal of Social Science*, 12(2), 37-57.
- Entreß-Fürsteneck, M. V., Buchwald, A., & Urbach, N. (2019). "Will I or Will I Not?" Explaining the Willingness to Disclose Personal Self-Tracking Data to a Health Insurance Company. *HICSS Computer Science*.
- Epstein, D., Lee, N., Kang, J., Agapie, E., Schroeder, J., Pina, L., . . . Munson, S. (2017). *Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools*. Paper presented at the CHI '17: Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems, Denver, CO.
- Esmonde, K. (2020). '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. *Qualitative Research in Sport, Exercise and Health*, 12(1), 76-90. doi: 10.1080/2159676X.2019.1617188
- Esmonde, K., & Jette, S. (2020). Assembling the 'Fitbit Subject': A Foucauldian-sociomaterialist Examination of Social Class, Gender and Self-surveillance on Fitbit Community Message Boards. *Health*, 24(3), 299-314. doi: 10.1177/1363459318800166
- Esposti, S. D. (2014). When Big Data Meets Dataveillance: The Hidden Side of Analytics. *Surveillance & Society*, 12(2), 209-225.
- Eveleth, R. (2014). How self-tracking apps exclude women. *The Atlantic*, N/A.

- Fairclough, N. (2011). Critical Discourse Analysis as a method in social scientific research. In R. Womack & M. Meyer (Eds.), *Methods of Critical Discourse Analysis* (pp. 121-138). London, UK: SAGE Publications.
- Farrugia, D., & Woodman, D. (2015). Ultimate Concerns in Late Modernity: Archer, Bourdieu and Reflexivity. *The British Journal of Sociology*, 66(4), 626. doi: 10.1111/1468-4446.12147
- Fawcett, T. (2015). Mining the Quantified Self: Personal Knowledge Discovery as a Challenge for Data Science. *Big Data*, 3(4).
- Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating Rigor Using Thematic Analysis: A Hybrid Approach of Inductive and Deductive Coding and Theme Development. *International Journal of Qualitative Methods*, 5(1), 2-11.
- Fereidooni, H., Frassetto, T., Miettinen, M., Sadeghi, A.-R., & Conti, M. (2017). *Fitness Trackers: Fit for Health but Unfit for Security and Privacy*. Paper presented at the 2017 IEEE/ACM International Conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE), Philadelphia, PA.
- Fietkiewicz, K. J., & Ilhan, A. (2020). *How do users of activity tracking technologies perceive the data privacy environment in the EU?* Paper presented at the iConference 2020. <https://www.ideals.illinois.edu/handle/2142/106603>
- Filep, C. V., Turner, S., Eidse, N., Thompson-Fawcett, M., & Fitzsimons, S. (2017). Advancing Rigour in Solicited Diary Research *Qualitative Research*, 18(4), 451-470.
- Filkins, B. L., Kim, J. Y., Roberts, B., Armstrong, W., Miller, M. A., Hultner, M. L., & Steinhubl, S. R. (2016). Privacy and Security in the Era of Digital Health: What Should Translational Researchers Know and Do About It? *American Journal of Translational Research*, 8(3), 1560–1580.
- Finn R.L., Wright D., & M., F. (2013). Seven types of privacy. In Gutwirth S., Leenes R., de Hert P. & Poullet Y. (Eds.), *European Data Protection: Coming of Age*. Dordrecht, Netherlands: Springer.
- Fiore-Gartland, B., & Neff, G. (2015). Communication, Mediation, and the Expectations of Data: Data Valences Across health and Wellness Communities. *International Journal of Communication*, 9(2015), 1466-1484.
- Flick, U. (2007). *Designing qualitative research*. London, UK: SAGE Publications.
- Fontana, A., & Frey, J. H. (2005). The Interview: from neutral stance to political involvement *The Sage handbook of qualitative research* (3rd ed., pp. 695-727). London, UK: SAGE Publications.
- Food and Drug Administration (2019). *Changes to existing medical software policies resulting from section 3060 of the 21st Century Cures Act*. U.S. Department of Health and

- Human Services Retrieved from <https://www.fda.gov/regulatory-information/search-fda-guidance-documents/general-wellness-policy-low-risk-devices>.
- Fotopoulou, A., & O'Riordan, K. (2017). Training to Self-care: Fitness Tracking, Biopedagogy and the Healthy Consumer. *Health Sociology Review*, 26(1), 54-68. doi: 10.1080/14461242.2016.1184582
- Foucault, M. (1987). The Ethics of Care for the Self as a Practice of Freedom. *Philosophy and Social Criticism*(<https://journals.sagepub.com/doi/10.1177/019145378701200202>).
- Foucault, M. (1973). *The Birth of the Clinic: An Archaeology of Medical Perception*. London, UK: Routledge.
- Foucault, M. (1980). *Power/Knowledge: Selected interviews and other writings, 1972-1977*. New York, N.Y.: Panteon Books.
- Foucault, M. (1982). The Subject and Power. *Critical Inquiry*, 8(4), 777-795. doi: 10.1086/448181
- Foucault, M. (1984). *The Care of the Self*. London, England: Penguin Books.
- Foucault, M. (1987). The Ethics of Care for the Self as a Practice of Freedom. *Philosophy & Social Criticism*, 12(2-3), 112-131.
- Foucault, M. (1988a). Self Writing. In P. Rabinow (Ed.), *Ethics: subjectivity and truth (Essential works of Michel Foucault, 1954-1984)* (pp. 207-222). New York, NY: New Press.
- Foucault, M. (1988b). Technologies of Self. In L. H. Martin (Ed.), *Technologies the Self: A Seminar with Michel Foucault*. Amherst, MA: University of Massachusetts Press.
- Foucault, M. (1993). About the Beginning of the Hermeneutics of the Self. Two Lectures at Dartmouth. *Political Theory*, 21(2), 198-227.
- Fox, N. J. (2017). Personal health technologies, micropolitics and resistance: A new materialist analysis. *Health*, 21(2), 136-153. doi: 10.1177/1363459315590248
- Frankfurt, H. (1971). Freedom of the Will and the Concept of a Person. *The Journal of Philosophy*, 68(1), 5-20.
- Friedland, S. (2014). The Difference between Invisible and Visible Surveillance in a Mass Surveillance World. *Elon University Law Legal Studies*, Research Paper No. 2014-2002.
- Fritz, T., Huang, E., Murphy, G., & Zimmermann, T. (2014). *Persuasive technology in the real world: a Study of long-term use of activity sensing devices for fitness*. Paper presented at the CHI '14: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, Toronto, ON, Canada.

- Fruhen, L. S., Flin, R. H., & McLeod, R. (2014). Chronic Unease for Safety in Managers: a Conceptualisation. *Journal of Risk Research*, 17(8), 969-979. doi: 10.1080/13669877.2013.822924
- Furness, P. J., & Garrud, P. (2010). Adaptation After Facial Surgery: Using the Diary as a Research Tool. *Qualitative Health Research*, 20(2), 262-272. doi: 10.1177/1049732309357571
- Gabriele, S., & Chiasson, S. (2020). *Understanding fitness tracker users' security and privacy knowledge, attitudes and behaviours*. Paper presented at the CHI '20: CHI Conference on Human Factors in Computing Systems, Honolulu, HI. <https://dl.acm.org/doi/proceedings/10.1145/3313831>
- Gambier-Ross, K., McLernon, D. J., & Morgan, H. M. (2018). A Mixed Methods Exploratory Study of Women's Relationships With and Uses Of Fertility Tracking Apps. *Digital Health*, 4, 2055207618785077. doi: 10.1177/2055207618785077
- Gandy, O. (1989). The Surveillance Society: Information Technology and Bureaucratic Social Control. *Journal of Communication*, 39(3), 61-76.
- Gandy, O. (1993). *The Panoptic Sort: A Political economy of personal information*. San Francisco, CA: Westview Press.
- Gandy, O. (2012). Statistical sensing: Remote sensing in the Digital Age. In K. Ball , K. D. Haggerty & D. Lyon (Eds.), *Routledge handbook of surveillance studies*. Oxon, UK: Routledge.
- Gatti, L., & Catalano, T. (2015). The Business of Learning to Teach: A Critical Metaphor Analysis of one Teacher's journey. *Teaching and Teacher Education*, 45, 149-160. doi: 10.1016/j.tate.2014.10.003
- Gerber, N., Gerber, P., & Volkamer, M. (2018). Explaining the Privacy Paradox: A Systematic Review of Literature Investigating Privacy Attitude and Behavior. *Computers & Security*, 77, 226-261. doi: 10.1016/j.cose.2018.04.002
- Gidaris, C. (2019). Surveillance Capitalism, Datafication, and Unwaged Labour: The Rise of Wearable Fitness Devices and Interactive Life Insurance. *Surveillance & Society*, 17(1/2), 132-138. doi: 10.24908/ss.v17i1/2.12913
- Giddens, A. (1991). *Modernity and self identity: Self and society in the late modern age*. Cambridge, UK: Polity Press in association with Basil Blackwell.
- Gill, R. (1996). Discourse analysis: Practical implementation. In J. T. E. Richardson (Ed.), *Handbook of qualitative research methods for Psychology and the Social Sciences*. London, UK: British Psychological Society
- Gilmore, J. N. (2016). Everywear: The Quantified Self and Wearable Fitness Technologies. *New Media & Society*, 18(11), 2524-2539. doi: 10.1177/1461444815588768

- Gitelman, L. (2013). *"Raw Data" is an oxymoron*. Cambridge, MA: The MIT Press.
- Glaser, B. G., & Strauss, A. L. (1967). *The Discovery of grounded theory: Strategies for qualitative research*. Hawthorne, N.Y: Aldine de Gruyter.
- Goffman, E. (1990). *The presentation of self in everyday life*. London, UK: Penguin.
- Gonzalez, L. O., & Lengacher, C. A. (2007). Coping with Breast Cancer: A Qualitative Analysis of Reflective Journals. *Issues in Mental Health Nursing*, 28, 489-510.
- Goodyear, V. A., Kerner, C., & Quennerstedt, M. (2019). Young People's Uses of Wearable Healthy Lifestyle Technologies: Surveillance, Self-surveillance and Resistance. *Sport, Education and Society*, 24(3), 212-225. doi: 10.1080/13573322.2017.1375907
- Gorm, N., & Shklovski, I. (2016). *Steps, Choices and Moral Accounting: Observations from a Step-Counting Campaign in the Workplace*. Paper presented at the Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing, San Francisco, CA.
- Gorm, N., & Shklovski, I. (2019). Episodic Use: Practices of Care in Self-tracking. *New Media & Society*, 21(11-12), 2505-2521. doi: 10.1177/1461444819851239
- Goyal, R., Dragoni, N., & Spognardi, A. (2016). *Mind the tracker you wear: a security analysis of wearable health trackers*. Paper presented at the SAC '16: the 31st Annual ACM Symposium, Pisa, Italy.
- Grodzinsky, F., & Tavani, H. (2011). Privacy in "the Cloud": Applying Nissenbaum's Theory of Contextual Integrity. *ACM SIGCAS Computers and Society*, 41(1), 38-47. doi: 10.1145/2095266.2095270
- Grodzinsky, F., & Tavani, H. T. (2010). Applying the "Contextual Integrity" Model of Privacy to Personal Blogs in the Blogosphere" *School of Computer Science & Engineering Faculty Publications*, Paper 2.
- Gross, S., Bardzell, J., Bardzell, S., & Stallings, M. (2017). Persuasive Anxiety: Designing and Deploying Material and Formal Explorations of Personal Tracking Devices. *Human-Computer Interaction*, 32(5-6), 297-334. doi: 10.1080/07370024.2017.1287570
- Grundy, Q., Chiu, K., Held, F., Continella, A., Bero, L., & Holz, R. (2019). Data Sharing Practices of Medicines Related Apps and the Mobile Ecosystem: Traffic, Content, and Network Analysis. *BMJ*, 364, 1920. doi: 10.1136/bmj.1920
- Gubrium, J. F., Holstein, J. A., Marvasti, A. B., & McKinney, K. D. (2012). *The SAGE handbook of interview research: the Complexity of the craft* (2nd ed. ed.). Thousand Oaks, CA: SAGE Publications.

- Hacking, I. (1985). Making up people. In T. L. M. Heller, M. Sosna & D. E. Wellbery (Eds.), *Reconstructing Individualism* (pp. 161-171). Stanford, CA: Stanford University Press.
- Haggerty, K. D., & Ericson, R. V. (2000). The Surveillant Assemblage. *British Journal of Sociology*, 51(4), 605-622.
- Hammond, C. (2005). The Wider Benefit of Adult Learning: An Illustration of the Advantages of Multi-method Research. *Int.J. Social Research Methodology*, 8(3), 239-255.
- Hampson, M. E., Hicks, R. E., & Watt, B. D. (2017). A Metaphorical Analysis of Employment Barriers and Support Needs in Psychosis. *The Qualitative Report* 22(10), 2638-2651.
- Harvey, L. (2011). Intimate Reflections: Private Diaries in Qualitative Research. *Qualitative Research*, 11(6), 664-682. doi: 10.1177/1468794111415959
- He, D., Naveed, M., Gunter, C. A., & Nahrstedt, K. (2014). *Security concerns in Android mHealth apps*. Paper presented at the MIA Annual Symposium proceedings. AMIA Symposium.
- Healey, K., & Woods, R. H. (2017). Processing Is Not Judgment, Storage Is Not Memory: A Critique of Silicon Valley's Moral Catechism. *Journal of Media Ethics*, 32(1), 2-15. doi: 10.1080/23736992.2016.1258990
- Health and Social Care Information Center (2015). Information and technology for better care: Health and Social Care information centre strategy 2015–2020. London, UK: Health and Social Care Information Center.
- Hepworth, K. (2017). Big Data Visualization: Promises & Pitfalls. *Communication Design Quarterly Review*, 4(4), 7-19. doi: 10.1145/3071088.3071090
- Hermesen, S., Moons, J., Kerkhof, P., Wiekens, C., & De Groot, M. (2017). Determinants for Sustained Use of an Activity Tracker: Observational Study. *JMIR mHealth and uHealth*, 5(10), e164. doi: 10.2196/mhealth.7311
- Hern, A. (2017). Vibrator maker ordered to pay out C\$4m for tracking users' sexual activity, *The Guardian*.
- Hildebrandt, M. (2013). Balance or Trade-off? Online Security Technologies and Fundamental Rights. *Philosophy & Technology*, 26(4), 357-379. doi: 10.1007/s13347-013-0104-0
- Hilts, H., Parsons, C., & Knockel, J. (2016). Every step you fake: A comparative analysis of fitness tracker and privacy *Open Effect Report*. [https://openeffect.ca/reports/Every\\_Step\\_You\\_Fake.pdf](https://openeffect.ca/reports/Every_Step_You_Fake.pdf).
- Hislop, J., Arber, S., Meadows, R., & Venn, S. (2005). Narratives of the Night: The Use of Audio Diaries in Researching Sleep. *Sociological Research Online*, 10(4), 13-25.

- Holloway, W., & Jefferson, T. (2009). Researching defended subjects with the free association narrative interviewing method. In H. J. Cook, S. Bhattacharya & A. Hardy (Eds.), *History of the social determinants of health: Global histories, contemporary debates*. (pp. 296-315). Hyderabad, India: Orient Black Swan.
- Holstein, J. A., & Gubrium, J. F. (2004). The active interview. In D. Silverman (Ed.), *Qualitative research: Theory, method and practice* (pp. 140-161). London, UK: SAGE Publications.
- Hochschild, A. (2003). *The managed heart : Commercialization of human feeling* (20th anniversary ed. , with a new afterword. ed.). Berkeley, Calif., London: University of California Press.
- Howard, R. (Writer). (1995). Apollo 13. In B. Grazer (Producer). US: Universal Pictures.
- Howell, N., Chuang, J., De Kosnik, A., Niemeyer, G., & Ryokai, K. (2018). Emotional Biosensing: Exploring Critical Alternatives. *Proceedings of the ACM on Human-Computer Interaction*, 2(CSCW), 1-25. doi: 10.1145/3274338
- Hoy, M. (2016). Personal Activity Trackers and the Quantified Self. *Medical Reference Services Quarterly*, 35(1), 94-100.
- Huckvale, K., Prieto, J. T., Tilney, M., Benghozi, P.-J., & Car, J. (2015). Unaddressed Privacy Risks in Accredited Health and Wellness Apps: a Cross-sectional Systematic Assessment. *BMC Medicine*, 13(1), 214. doi: 10.1186/s12916-015-0444-y
- Huisman, F., & Oosterhuis, H. (2014). *Health and citizenship: Political cultures of health in model Europe*. London, UK: Pickering & Chatto (Publishers) Limited.
- Hull, G., Lipford, H., & Latulipe, C. (2011). Contextual Gaps: Privacy Issues on Facebook. *Ethics and Information Technology*, 13(4), 289-302. doi: 10.1007/s10676-010-9224-8
- Hutton, L., Price, B. A., Kelly, R., McCormick, C., Bandara, A. K., Hatzakis, T., . . . Nuseibeh, B. (2018). Assessing the Privacy of mHealth Apps for Self-Tracking: Heuristic Evaluation Approach. *JMIR mHealth and uHealth*, 6(10), e185. doi: 10.2196/mhealth.9217
- Hyers, L. L. (2018). *Diary methods*. New York, NY: Oxford University Press.
- Ignatow, G., & Radev, D. (2017). *Text mining: a Guidebook for the social sciences*. SAGE Publications: Los Angeles, CA.
- Iida, M., Shrout, P., Laurenceau, J. P., & Bolger, N. (2012). Using diary methods in psychological research. In H. Cooper (Ed.), *APA Handbook of research methods in Psychology: Foundations, planning, measures and psychometrics* (pp. 277-305). Washington, D.C.: American Psychological Association.

- IQVIA Institute for Human Data Science (2017). *The growing value of digital health: Evidence and impact on human health and the healthcare system*. <https://www.iqvia.com/insights/the-iqvia-institute/reports/the-growing-value-of-digital-health>: The IQVIA Institute for Human Data Science.
- Jacelon, C. S., & Imperio, K. (2005). Participant Diaries as a Source of Data in Research With Older Adults. *Qualitative Health Research*, 15(7), 991-997. doi: 10.1177/1049732305278603
- Janesick, V. J. (1999). A Journal About Journal Writing as a Qualitative Research Technique: History, Issues, and Reflections. *Qualitative Inquiry*, 5(4), 505-524.
- Jawbone (Writer). (2015). <yt-formatted-string class="style-scope ytd-video-primary-info-renderer" force-default-style="" style="word-break: break-word;"> Jawbone - TV Commercial 2015</yt-formatted-string>. In U. T. M. Ltd (Producer), [https://www.youtube.com/watch?v=Xnc\\_p\\_wBKNk](https://www.youtube.com/watch?v=Xnc_p_wBKNk).
- Joffe, H., Washer, P., & Solberg, C. (2011). Public Engagement with Emerging Infectious Disease: The Case of MRSA in Britain. *Psychology & Health*, 26(6), 667-683. doi: 10.1080/08870441003763238
- Johnson, J., & Bytheway, B. (2001). An Evaluation of the Use of Diaries in a Study of Medication in Later Life. *International Journal of Social Research Methodology*, 4(3), 183-204. doi: 10.1080/13645570010029467
- Johnson, M. (Ed.). (1981). *Philosophical perspectives on metaphor*. Minneapolis, MN: University Of Minnesota Press.
- Jones, R., & Candlin, C. (2003). Constructing Risk Across Timescales and Trajectories: Gay Men's Stories of Sexual Encounters. *Health, Risk & Society*, 5(2), 199-213. doi: 10.1080/1369857031000123966
- Kang, J. (1998). Information Privacy in Cyberspace Transactions. *Stanford Law Review*, 50(4), 1193-1294.
- Kantar Media. (2014). Health and fitness wearable: Tech market set to double to 13.1m users in 2015 [Press release]
- Katuska, J. (2018). Wearing Down HIPAA: How Wearable Technologies Erode Privacy Protections. *Journal of Corporation Law*, 44(2), 385-401.
- Katz, S., & Marshall, B. L. (2018). Tracked and Fit: FitBits, Brain Games, and the Quantified Aging Body. *Journal of Aging Studies*, 45, 63-68. doi: 10.1016/j.jaging.2018.01.009
- Kelly, L., Kerr, G., & Drennan, J. (2017). Privacy Concerns on Social Networking Sites: a Longitudinal Study. *Journal of Marketing Management*, 33(17-18), 1465-1489. doi: 10.1080/0267257X.2017.1400994



- Kennedy, H. (2018). Living with Data: Aligning Data Studies and Data Activism Through a Focus on Everyday Experiences of Datafication. *Krisis: Journal for Contemporary Philosophy*(1), 18-30.
- Kent, G. (2000). Ethical principles. In D. Burton (Ed.), *Research training for social scientists*. London, UK: SAGE Publications.
- Kenten, C. (2010). Narrating Oneself: Reflections on the use of Solicited Diaries with Diary Interviews. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, 11(2), Art.16.
- Kienle, M. (2019). Dear Data: Feminist Information Design's Resistance to Self-Quantification. *Feminist Studies*, 45(1), 129-158. doi: 10.15767/feministstudies.45.1.0129
- Kim, Y., Lee, B., & Choe, E. K. (2019). Investigating Data Accessibility of Personal Health Apps. *Journal of the American Medical Informatics Association*, 26(5), 412-419. doi: 10.1093/jamia/ocz003
- Kitchin, R. (2014). Big Data, New Epistemologies and Paradigm Shifts. *Big Data & Society*(April/June), 1-12.
- Klugman, C. M., Dunn, L. B., Schwartz, J., & Cohen, I. G. (2018). The Ethics of Smart Pills and Self- Acting Devices: Autonomy, Truth-Telling, and Trust at the Dawn of Digital Medicine. *The American Journal of Bioethics*, 18(9), 38-47. doi: 10.1080/15265161.2018.1498933
- Kong, L. (2010). Data Protection and Transborder Data Flow in the European and Global Context. *European Journal of International Law*, 21(2), 441-456. doi: 10.1093/ejil/chq025
- Kononova, A., Li, L., Kamp, K., Bowen, M., Rikard, R., Cotten, S., & Peng, W. (2019). The Use of Wearable Activity Trackers Among Older Adults: Focus Group Study of Tracker Perceptions, Motivators, and Barriers in the Maintenance Stage of Behavior Change. *JMIR mHealth and uHealth*, 7(4), e9832. doi: 10.2196/mhealth.9832
- Krebs P, D. D. (2015). Health App Use Among US Mobile Phone Owners: A National Survey. *JMIR Mhealth Uhealth*, 3(4).
- Krieger, W. (2013). Medical Apps Public and Academic Perspectives. *Perspectives in Biology and Medicine*, 56(2), 259-273.
- Kristensen, D. B., & Ruckenstein, M. (2018). Co-evolving with Self-tracking Technologies. *New Media & Society*, 20(10), 3624-3640. doi: 10.1177/1461444818755650
- Kupfer, J. (1987). Privacy, Autonomy, and Self-Concept. *American Philosophical Quarterly*, 24(1), 81-89.

- Kvale, S. (1996). *Interviews: an Introduction to qualitative research interviewing*. London, UK: SAGE Publications.
- Kvale, S. (2007). *Doing interviews*. Thousand Oaks, CA: SAGE Publications.
- La Porta, L. (2019, July 22). iOS app permissions - are your apps asking too much? Retrieved July, 12, 2020
- Lahire, B. (2011). *The plural actor*. Cambridge, UK: Polity.
- Lakoff, G. (1981). *Metaphors we live by*. Chicago, IL: University of Chicago Press.
- Langley, H. (2020, June 16). European regulators just set a July 20 deadline to decide whether they will allow Google's Fitbit deal to pass. *Business Insider*.
- Langley, M. (2015). Hide Your Health: Addressing the New Privacy Problem of Consumer Wearables. *The Georgetown Law Journal*, 103(6), 1641- 1659.
- Lanzing, M. (2016). The Transparent Self. *Ethics and Information Technology*, 18(1), 9-16.
- Lanzing, M. (2019). “Strongly Recommended” Revisiting Decisional Privacy to Judge Hypernudging in Self-Tracking Technologies. *Philosophy & Technology*, 32(3), 549-568. doi: 10.1007/s13347-018-0316-4
- Lapadat, J. C. (2012). Thematic analysis. In A. J. Mills, G. Durepos & E. Wiehe (Eds.), *Encyclopedia of case study research*. Thousand Oaks, CA: SAGE Publications.
- Latham, A. (2003). Research, Performance, and Doing Human Geography: Some Reflections on the Diary-Photograph, Diary-Interview Method. *Environment and Planning A: Economy and Space*, 35(11), 1993-2017. doi: 10.1068/a3587
- Lazar, A., Koehler, C., Tanenbaum, J., & Nguyen, D. (2015). *Why we use and abandon smart devices*. Paper presented at the Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing.
- Lazzarato, M. (2006). From Biopower to Biopolitics. *Tailoring Biotechnologies*, 2(2), p.11-20
- Lee, J., & Finkelstein, J. (2014). Activity Trackers: a Critical Review. *Studies in Health Technology and Informatics*, 205, 558-562.
- Lee, V. R., & Dubovi, I. (2020). At Home with Data: Family Engagements With Data Involved in Type 1 Diabetes Management. *Journal of the Learning Sciences*, 29(1), 11-31. doi: 10.1080/10508406.2019.1666011
- Leibenger, D., Möllers, F., Petrlc, A., Petrlc, R., & Sorge, C. (2016). *Privacy challenges in the Quantified Self movement – An EU perspective*. Paper presented at the Proceedings on Privacy Enhancing Technologies.

- Lewis, J. (2007). Analysing Qualitative Longitudinal Research in Evaluations. *Social Policy & Society*, 6(4), 545-556. doi: 10.1017/S1474746407003880
- Li, H., Wu, J., Gao, Y., & Shi, Y. (2016). Examining Individuals' Adoption of Healthcare Wearable Devices: An Empirical Study From Privacy Calculus Perspective. *International Journal of Medical Informatics*, 88, 8-17.
- Li, I., Dey, A. K., & Forlizzi, J. (2011). *Understanding my data, myself: Supporting self-reflection with Ubicomp technologies*. Paper presented at the Proceedings of the 13th International Conference on Ubiquitous Computing, New York, NY.
- Liman, D. (Writer). (2002). The Bourne Identity. In D. Liman, P. Crowley & R. N. Gladstein (Producer). USA: Universal Pictures.
- Lin, F., & Windasari, N. A. (2019). Continued Use of Wearables for Wellbeing with a Cultural Probe. *The Service Industries Journal* 39(15-16).
- Lincoln, Y. S., & Guba, E. G. (1984). *Naturalistic inquiry*. Beverly Hills, CA: SAGE Publications.
- Lindner, P. (2020). Molecular Politics, Wearables, and the Aretaic Shift in Biopolitical Governance. *Theory, Culture & Society*, 37(3), 71-96. doi: 10.1177/0263276419894053
- Lomborg, S., & Frandsen, K. (2016). Self-tracking as Communication. *Information, Communication & Society*, 19(7), 1015-1027. doi: 10.1080/1369118X.2015.1067710
- Lomborg, S., Langstrup, H., & Andersen, T. (2020). Interpretation as Luxury: Heart Patients Living with Data Doubt. *Big Data & Society*, 7(1), 1-13.
- Lupton, D. (2013). Quantifying the Body: Monitoring and Measuring Health in the Age of mHealth Technologies. *Critical Public Health*, 23(4), 393-403.
- Lupton, D. (2014). *Self-tracking cultures: Towards a Sociology of personal informatics*. Paper presented at the Proceedings of the 26th Australian Computer-Human Interaction Conference on Designing Futures: the Future of Design, New York, NY, US.
- Lupton, D. (2015a). *Digital Sociology*. London, UK: Routledge.
- Lupton, D. (2015b). Quantified Sex: A Critical Analysis of Sexual and Reproductive Self-tracking Using Apps. *Culture, Health and Sexuality*, 17(4), 440-453.
- Lupton, D. (2016a). The Diverse Domains of Quantified Selves: Self-tracking Modes and Dataveillance. *Economy & Society*, 45(1), 101-122.
- Lupton, D. (2016b). *The Quantified Self: a Sociology of Self-tracking*. Malden, MA: Polity.
- Lupton, D. (2018). How do data come to matter? Living and becoming with personal data. *Big Data & Society*, 5 (2), p.1-11

- Lupton, D. (2019). 'It's Made Me a Lot More Aware': a New Materialist Analysis of Health Self-tracking. *Media International Australia*, 171(1), 66-79.
- Lupton, D., & Michael, M. (2017). 'Depends on Who's Got the Data': Public Understandings of Personal Digital Dataveillance. *Surveillance & Society*, 254-268.
- Lupton, D., & Smith, J. D. (2017). 'A much better person': The agential capacities of self-tracking practices. In B. Ajana (Ed.), *Metric Culture: Ontologies of self-Tracking practices* (pp. 57-75). London, UK: Emerald Publishing Limited.
- Lyall, B. (2019). Fitness for Sale: The Value of Self-tracking in Secondhand Exchange. *The Information Society*, 35(3), 109-121.
- Lyall, B., & Robards, B. (2018). Tool, Toy and Tutor: Subjective Experiences of Digital Self-tracking. *Journal of Sociology*, 54(1), 108-124. doi: 10.1177/1440783317722854
- Lyon, D. (2015). *Surveillance after Snowden*. Cambridge, UK: Polity Press.
- Mackrill, T. (2008). Solicited Diary Studies of Psychotherapy in Qualitative Research—Pros and Cons. *European Journal of Psychotherapy & Counselling*, 10(1), 5-18. doi: 10.1080/13642530701869243
- Magnet, S. A. (2011). *When biometrics fail: Gender, race, and the technology of identity*. Durham, NC: Duke University Press.
- Maltseva, K., & Lutz, C. (2018). A Quantum of Self: A Study of Self-quantification and Self-disclosure. *Computers in Human Behavior*, 81, 102-114. doi: 10.1016/j.chb.2017.12.006
- Margulis, S. T. (2003). Privacy as a Social Issue and Behavioral Concept. *Journal of Social Issues*, 59(2), 243-261. doi: 10.1111/1540-4560.00063
- Markham, A. (2013). Undermining 'Data': A Critical Examination of a Core Term in Scientific Inquiry. *First Monday*, 18(10).
- Marx, G. T. (2003). A Tack in the Shoe: Naturalizing and Resisting the New Surveillance. *Journal of Social Issues*, 59(2), 1-15.
- Marx, G. T. (2006). Soft Surveillance The Growth of Mandatory Volunteerism in Collecting personal Information- "Hey Buddy Can You Spare a DNA?". *Lex Electronica*, 10(3), 33-45.
- Marx, G. T. (2009). A Tack in the Shoe and Taking Off the Shoe: Neutralization and Counter-neutralization Dynamics. *Surveillance & Society*, 6(3), 294-306.
- Mason, J. (2002). *Qualitative researching* (2nd ed. ed.). Thousand Oaks, CA: SAGE Publications.

- Matthews, M., Murnane, E., & Snyder, J. (2017). Quantifying the Changeable Self: The Role of Self-Tracking in Coming to Terms With and Managing Bipolar Disorder. *Human-Computer Interaction: The Lived Experience of Personal Informatics*, 32(5-6), 413-446. doi: 10.1080/07370024.2017.1294983
- MaRS Market Insights (2014). Wearable Tech: Leveraging Canadian innovation to improve health. Toronto, Canada: <https://www.marsdd.com/wp-content/uploads/2015/02/MaRSReport-WearableTech.pdf>.
- Maxwell, J. A. (1992). Understanding and Validity in Qualitative Research. *Harvard Education Review*, 62(3), 279-300.
- Mayer- Schonberger, V., & Cukier, K. (2013). *Big Data: A Revolution that will transform how we live, work, and think*. London, UK: John Murray Publishers.
- McDermott, Y. (2017). Conceptualising the Right to Data Protection in an Era of Big Data. *Big Data & Society*, 4(1). doi: 10.1177/2053951716686994
- McDonald, A., & Carnor, L. (2008). The Cost of Reading Privacy Policies. *A Journal of Law and Policy for the Information Society*, 4(3), 543-568.
- McKillop M, Voigt, N., Schnall R, & Elhadad, N. (2016). Exploring Self-Tracking as a Participatory Research Activity Among Women with Endometriosis. *Journal of Participatory Medicine*, 8(e17).
- McNay, L. (1992). *Foucault and Feminism*. Cambridge, UK: Polity Press.
- Mercer, K., Li, M., Giangregorio, L., Burns, C., & Grindrod, K. (2016). Behavior Change Techniques Present in Wearable Activity Trackers: A Critical Analysis. *JMIR mHealth and uHealth*, 4(2), e40. doi: 10.2196/mhealth.4461
- Metcalfe, A. (1993). Living in a Clinic: The Power of Public Health Promotions. *The Australian Journal of Anthropology*, 4(1), 31-44.
- Meth, P. (2003). Entries and Omissions: Using Solicited Diaries in Geographical Research. *Area*, 35(2), 195-205. doi: 10.1111/1475-4762.00263
- Meth, P. (2004). Using Diaries to Understand Women's Responses to Crime and Violence. *Environment & Urbanization*, 16(2), 153-164. doi: 10.1177/095624780401600207
- Merleau-Ponty, M., & Smith, Colin. (2002). *Phenomenology of perception* (Routledge classics). London: Routledge.
- Miles, M. B. (1994). *Qualitative data analysis: an Expanded sourcebook* (2nd edition. ed.). Thousand Oaks, CA: SAGE Publications.

- Milligan, C., Bingley, A., & Gatrell, A. (2005). Digging Deep: Using Diary Technique to Explore the Place of Health and Well-being Amongst Older Adults. *Social Science & Medicine*, 61(9), 1882-1892.
- Millington, B. (2016). 'Quantify the Invisible': Notes toward a Future of Posture. *Critical Public Health*, 26(4), 405-417. doi: 10.1080/09581596.2015.1085960
- Mills, C., & Hilberg, E. (2020). The Construction of Mental Health as a Technological Problem in India. *Critical Public Health*, 30(1), 41-52. doi: 10.1080/09581596.2018.1508823
- Moore, P., & Robinson, A. (2015). The Quantified Self: What Counts in the Neoliberal Workplace. *New Media & Society*, 1-19.
- Mopas, M. S., & Huybregts, E. (2020). Training by Feel: Wearable Fitness-Trackers, Endurance Athletes, and the Sensing Of Data. *The Senses and Society: Sensuous Governance*, 15(1), 25-40. doi: 10.1080/17458927.2020.1722421
- Morse, J. M., Barrett, M., Mayan, M., Olson, K., & Spiers, J. (2002). Verification Strategies for Establishing Reliability and Validity in Qualitative Research. *International Journal of Qualitative Methods*, 1(2), 13-22. doi: 10.1177/160940690200100202
- Moser, K. (2000). Metaphor Analysis in Psychology—Method, Theory, and Fields of Application. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, 1(2), Art. 21.
- Motti, V. G., & Caine, K. (2015). Users' privacy concerns about Wearables - Impact of form factor, sensors and type of data collected. In Brenner M., Christin N., Johnson B. & R. K. (Eds.), *Financial Cryptography and Data Security. Lecture Notes in Computer Science* (Vol. 8976). Berlin, Germany: Springer.
- Myers West, S (2019). Data capitalism: Redefining the logics of surveillance and privacy. *Business & Society*, 58(1): 20–41.
- NA. Quantified Self: Self-knowledge through Numbers. Retrieved July 16, 2020, from <https://quantifiedself.com>
- Nafus, D. (Ed.). (2016). *Quantified: Biosensing technologies in everyday life*. Cambridge, MA: The MIT Press.
- Nafus, D., & Neff, G. (2016). *Self-tracking*. Cambridge, MA: The MIT Press.
- Nafus, D., & Sherman, J. (2014). Big Data, Big Questions| This One Does Not Go Up To 11: The Quantified Self Movement as an Alternative Big Data Practice. *International Journal of Communication*, 8(11), 1784 – 1794.
- National Academy of Science (2003). Dietary reference intake: Applications in dietary assessment. Washington, DC. National Academies Press, US

- National Health Services (2014). *Personalised health and care 2020: Using data and technology to transform outcomes for patients and citizens*. <https://www.gov.uk/government/publications/personalised-health-and-care-2020>.
- Neuman, W. L., & Robson, K. (2012). *Basics of social research: Qualitative and Quantitative approaches*. Toronto, Canada: Pearson Canada Inc.
- Newman, T., & Kreick, J. (2015). The Impact of HIPAA (and Other Federal Law) on Wearable Technology. *SMU Science & Technology Law Review* 18(4), 429.
- Nissenbaum, H. (2011). A Contextual Approach to Privacy Online. *Daedalus*, 140(4), 32-48. doi: 10.1162/DAED\_a\_00113
- Nissenbaum, H., & Patterson, H. (2016). Biosensing in context: Health privacy in a connected world. In D. Nafus (Ed.), *Quantified: Biosensing technologies in everyday life* (pp. 79-100). Cambridge, MA: The MIT Press.
- Nissenbaum, H. F. (2010). *Privacy in context: Technology, policy, and the integrity of social life*. Stanford, CA: Stanford Law Books.
- Norval, A., & Prasopoulou, E. (2017). Public Faces? A Critical Exploration of the Diffusion of Face Recognition Technologies in Online Social Networks. *New Media & Society*, 19(4), 637-654. doi: 10.1177/1461444816688896
- Nussbaum, M. C. (1988). Non-Relative Virtues: An Aristotelian Approach. *Midwest Studies in Philosophy*, 8(32).
- Obar, J., & Oeldorf-Hirsch, A. (2016). The biggest lie on the internet: Ignoring the privacy policies and terms of service policies of social networking services *Information, Communication & Society*, 1-20.
- Olson, P. (2014). Wearable tech is plugging into health insurance. , *Forbes*.
- Ortner, S. B. (1984). Theory in Anthropology since the Sixties. *Comparative Studies in Society and History*, 26(1), 126-126. doi: 10.1017/S0010417500010811
- Ostherr, K., Borodina, S., Bracken, R. C., Lotterman, C., Storer, E., & Williams, B. (2017). Trust and Privacy in the Context of User-generated Health Data. *Big Data & Society*, 4(1). doi: 10.1177/2053951717704673
- Owens, J., & Cribb, A. (2019). 'My Fitbit Thinks I Can Do Better!' Do Health Promoting Wearable Technologies Support Personal Autonomy? *Philosophy & Technology*, 32(1), 23-38. doi: 10.1007/s13347-017-0266-2
- Paluch, S., & Tuzovic, S. (2019). Persuaded Self-tracking with Wearable Technology: Carrot or Stick? *Journal of Services Marketing*, 33(4), 436-448. doi: 10.1108/JSM-03-2018-0091

- Pantzar, M., & Ruckenstein, M. (2015). The Heart of Everyday Analytics: Emotional, Material and Practical Extensions in Self-tracking Market. *Consumption Markets & Culture*, 18(1), 92-109.
- Paolisso, M., & Hames, R. (2010). Time Dairy versus Instantaneous Sampling: A Comparison of Two Behavioural Research Methods. *Field Methods*, 22(4), 357-377.
- Papageorgiou, A., Strigkos, M., Politou, E., Alepis, E., Solanas, A., & Patsakis, C. (2018). Security and Privacy Analysis of Mobile Health Applications: The Alarming State of Practice. *IEEE Access*, 6.
- Pasquale, F. (2014). Redescribing Health Privacy: the Importance of Information Policy. *Houston Journal of Health Law & Policy*, 95-128.
- Passanante Elman, J. (2018). "Find Your Fit": Wearable Technology and the Cultural Politics of Disability. *New Media & Society*, 1-18.
- Patterson, H. (2013). *Contextual expectations of privacy in self-generated health information flows*. Paper presented at the *TPRC 41: The 41st Research Conference on Communication, Information and Internet Policy* New York, NY. <https://ssrn.com/abstract=2242144>
- Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed. ed.). Thousand Oaks, CA: SAGE Publications.
- Perez, S. (2015). Apple Stops ignoring women's health with iOS 9 Healthkit update, now featuring period tracking. *TechCrunch*.
- Petersen, A., & Lupton, D. (1996). *The New public health: Health and self in the age of risk*. London, UK: SAGE Publications.
- Pettinico, G., & Milne, G. R. (2017). Living by the Numbers: Understanding the "Quantification Effect". *Journal of Consumer Marketing*, 34(4).
- Pingo, Z., & Narayan, B. (2019). "My Smartwatch Told Me to See a Sleep Doctor": a Study of Activity Tracker Use. *Online Information Review*, 44(2), 503-519. doi: 10.1108/OIR-04-2018-0115
- Pink, S., & Fors, V. (2017a). Being in a Mediated World: Self-tracking and the Mind-Body-Environment. *Cultural Geographies*, 24(3), 375-388. doi: 10.1177/1474474016684127
- Pink, S., & Fors, V. (2017b). Self-tracking and Mobile Media: New Digital Materialities. *Mobile Media & Communication*, 5(3), 219-238. doi: 10.1177/2050157917695578
- Pink, S., Ruckenstein, M., Willim, R., & Duque, M. (2018a). Broken Data: Conceptualising Data in an Emerging World. *Big Data & Society*, 5(1). doi: 10.1177/2053951717753228



- Pink, S., Ruckenstein, M. & Horst, H. (2018b). Data anxieties: Finding Trust in everyday digital mess. *Big Data & Society*, 5(1). doi: 10.1177/2053951717753228
- Pink, S., Sumartojo, S., Lupton, D., & Heyes La Bond, C. (2017). Mundane Data: The Routines, Contingencies and Accomplishments of Digital Living. *Big Data & Society*, 4(1). doi: 10.1177/2053951717700924
- Platt, J. (2012). The SAGE handbook of interview research: the Complexity of the craft. In J. F. Gubrium, J. A. Holstein, A. B. Marvasti & K. D. McKinney (Eds.), *The History of the interview* (Second edition. ed.). Thousand Oaks, CA: SAGE Publications.
- Porter, T. M. (1995). *Trust in numbers: The Pursuit of objectivity in science and public life*. Princeton, NJ: Princeton University Press.
- Prasad, A., Sorber, J., Stablein, T., Anthony, D. L., & D, K. (2017). Understanding user privacy preferences for mHealth data sharing. In S. Adibi (Ed.), *mHealth Multidisciplinary Verticals* (pp. 545-568). Boca Raton, FL: Taylor & Francis (CRC Press).
- PricewaterhouseCoopers. (2016). The Wearable Life 2.0: Connected living in a wearable world *Consumer Intelligence Series*. <https://www.pwc.com/ee/et/publications/pub/pwc-cis-wearables.pdf>: PwC.
- Privacy Rights Clearinghouse (2013). Mobile health and fitness Apps: What are the privacy risks? In L. Ackerman (Ed.), (pp. 1-26). <https://privacyrights.org/sites/default/files/pdfs/mobile-medical-apps-privacy-consumer-report.pdf> : Privacy Rights Clearinghouse
- Prosch, M. (2009). Preventing Identity Theft Throughout the Data Life Cycle. *Journal of Accountancy*, 297(58).
- Prosser, J., & Loxley, A. (2008). *ESRC national centre for research methods review paper: Introducing visual method*. ESRC National Centre for Research Methods. <http://eprints.ncrm.ac.uk/420/>. Retrieved from <http://eprints.ncrm.ac.uk/420/1/MethodsReviewPaperNCRM-010.pdf>
- Puri, A., Kim, B., Nguyen, O., Stolee, P., Tung, J., & Lee, J. (2017). User Acceptance of Wrist-Worn Activity Trackers Among Community-Dwelling Older Adults: Mixed Method Study. *JMIR Mhealth Uhealth*, 5(11), e173. doi: 10.2196/mhealth.8211
- Rahman, M., Carbunar, B., & Banik, M. (2013). *Fit and vulnerable: Attacks and defenses for a health monitoring device*. Cornell University. arXiv:1304.5672. Retrieved from <https://arxiv.org/abs/1304.5672>
- Rapp, A., & Cena, F. (2016). Personal Informatics for Everyday Life: How Users without Prior Self-tracking Experience Engage with Personal Data. *International Journal of Human - Computer Studies*, 94(C), 1-17. doi: 10.1016/j.ijhcs.2016.05.006

- Rapp, A., & Tirassa, M. (2017). Know Thyself: A Theory of the Self for Personal Informatics. *Human-Computer Interaction: The Lived Experience of Personal Informatics*, 32(5-6), 335-380. doi: 10.1080/07370024.2017.1285704
- Reijneveld, M. D. (2017). Quantified Self, Freedom, and the GDPR. *SCRIPTed*, 14(2), 285.
- Rich, E. a. M., A. (2014). Understanding Digital Health as Public Pedagogy: a Critical Framework. *Societies*, 4, 296 – 315.
- Ricœur, P. (1992). *Oneself as another*. Chicago, IL: University of Chicago Press.
- Riesmann, C. K. (1990). Strategic Uses of Narrative in the Presentation of Self and Illness: a Research Note. *Social Science & Medicine*, 30(11), 1195-1200.
- Riesmann, C. K. (2001). Analysis of personal narratives. In J. F. Gubrium & J. A. Holstein (Eds.), *Handbook of interview research*. Thousand Oaks, CA: SAGE Publications.
- Riffe, D., Lacy, S., & Fico, F. (1998). *Analyzing media messages: Using quantitative content analysis in research*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Riggare, S., Scott Duncan, T., Hvitfeldt, H., & Hägglund, M. (2019). "You Have to Know Why You're Doing This": a Mixed Methods Study of the Benefits and Burdens of Self-tracking in Parkinson's Disease. *BMC medical informatics and decision making*, 19(1).
- Rivers, D. J. (2020). Strava as a Discursive Field of Practice: Technological Affordances and Mediated Cycling Motivations. *Discourse, Context & Media*, 34. doi: 10.1016/j.dcm.2019.100345
- Robert, D., & Shenhav, S. (2014). Fundamental Assumptions in Narrative Analysis: Mapping the Field. *Qualitative Report*, 19(38).
- Roessler, B. (2017). X—Privacy as a Human Right. *Proceedings of the Aristotelian Society*, 117(2), 187-206. doi: 10.1093/arisoc/aox008
- Rooksby, J., Rost, M., Morrison, A., & Chalmers, M. (2014). *Personal tracking as lived informatics*. Paper presented at the SIGCHI Conference on Human Factors in Computing Systems ( CHI '14 ), New York, NY, US.
- Rose, G. (2007). *Visual methodologies : an Introduction to the interpretation of visual materials* (2nd ed. ed.). Thousand Oaks, CA: SAGE Publications.
- Rose, N. (1988). Calculable Minds and Manageable Individuals. *History of the Human Science*, 1(2), 179-200.
- Rose, N. (1999). *Governing the soul: The Shaping of the private self*. London, UK: Free Association Books.
- Rössler, B. (2005). *The Value of privacy* (English ed. ed.). Cambridge, UK: Polity.

- Rubin, H. J. (2012). *Qualitative interviewing: the Art of hearing data* (3rd ed. ed.). Thousand Oaks, CA: SAGE Publications.
- Rucka, G., & Lark, M. (Writers). (2013). Lazarus. US: Image Comics.
- Ruckenstein, M. (2014). Visualized and Interacted Life: Personal Analytics and Engagement with Data Doubles. *Societies*, 4, 68-84.
- Ruckenstein, M., & Granroth, J. (2020). Algorithms, advertising and the intimacy of surveillance. *Journal of Cultural Economy: Digitalizing Consumer Society*, 13(1), 12-24. doi: 10.1080/17530350.2019.1574866
- Ruckenstein, M., & Pantzar, M. (2017). Beyond the Quantified Self: Thematic exploration of a dataistic paradigm. *New Media & Society*, 19(3), 401-418. doi: 10.1177/1461444815609081
- Ruckenstein, M., & Schll, N. D. (2017). The Datafication of Health. *Annual Review of Anthropology*, 46(1), 261-278. doi: 10.1146/annurev-anthro-102116-041244
- Régnier, F., & Chauvel, L. (2018). Digital Inequalities in the Use of Self-Tracking Diet and Fitness Apps: Interview Study on the Influence of Social, Economic, and Cultural Factors. *JMIR mHealth and uHealth*, 6(4), e101. doi: 10.2196/mhealth.9189
- Saldaña, J. (2003). *Longitudinal qualitative research: Analyzing change through time*. Walnut Creek, CA: AltaMira Press.
- Saldaña, J. (2016). *The coding manual for qualitative researchers* (3E. ed.). London, UK: SAGE Publications.
- Salmela, T., Valtonen, A., & Lupton, D. (2019). The Affective Circle of Harassment and Enchantment: Reflections on the ŌURA Ring as an Intimate Research Device. *Qualitative Inquiry*, 25(3), 260-270. doi: 10.1177/1077800418801376
- Sanders, R. (2017). Self-tracking in the Digital Era: Biopower, Patriarchy, and the New Biometric Body Projects. *Body & Society*, 23(1), 36-63. doi: 10.1177/1357034X16660366
- Sar, R., & Al-Saggaf, Y. (2014). Contextual Integrity's Decision Heuristic and the Tracking by Social Network Sites. *Ethics and Information Technology*, 16(1), 15-26. doi: 10.1007/s10676-013-9329-y
- Sathyanarayana, A., Joty, S., Fernandez-Luque, L., Ofli, F., Srivastava, J., Elmagarmid, A., . . . Taheri, S. (2016). Sleep Quality Prediction From Wearable Data Using Deep Learning. *JMIR mHealth and uHealth*, 4(4), e125. doi: 10.2196/mhealth.6562
- Schmitt, R. (2005). Systematic Metaphors Analysis as a Method of Qualitative Research. *The Qualitative Report*, 10(2), 358-394.

- Schwebel, D. C., Binder, S. C., & Plumert, J. M. (2002). Using an Injury Diary to Describe the Ecology of Children's Daily Injuries. *Journal of Safety Research*, 33(3), 301-319. doi: 10.1016/S0022-4375(02)00028-2
- Schwennesen, N. (2017). When Self-Tracking Enters Physical Rehabilitation: From 'Pushed' Self-Tracking to Ongoing Affective Encounters In Arrangements of Care. *Digital Health*, 3. doi: 10.1177/2055207617725231
- Schüll, N. D. (2016). Data for Life: Wearable Technology and the Design of Self-care. *BioSocieties*, 11(3), 317-333. doi: 10.1057/biosoc.2015.47
- Schüll, N. D. (2019). The Data-Based Self: Self-Quantification and the Data-Driven (Good) Life. *Social Research*, 86(4), 909-930.
- Sedgewick, M. (2017). Transborder Data Privacy as Trade. *California Law Review*, 105(5), 1513. doi: 10.15779/Z382V2C94C
- Sewell, W. H. (1992). A Theory of Structure: Duality, Agency, and Transformation. *American Journal of Sociology*, 98(1), 1-29. doi: 10.1086/229967
- Sewell, W. H. (2005). *Logics of history: Social theory and social transformation*. Chicago, IL: The University of Chicago Press.
- Sharon, T. (2017). Self-Tracking for Health and the Quantified Self: Re-Articulating Autonomy, Solidarity, and Authenticity in an Age of Personalized Healthcare. *Philosophy & Technology*, 30(1), 93-121. doi: 10.1007/s13347-016-0215-5
- Sharon, T., & Zandbergen, D. (2016). From Data Fetishism to Quantifying Selves: Self-tracking Practices and the Other Values of Data. *New Media & Society*(March), 1-5.
- Sheble, L., & Wildemuth, B. (2009). Research Diaries. In B. Wildemuth (Ed.), *Applications of Social Research Methods to Questions in Information and Library Science* (pp. 211-221). Santa Barbara, CA: Libraries Unlimited.
- Shih, P. C., Han, K., Poole, E. S., Rosson, M. B., & Carroll, J. M. (2015). *Use and Adoption Challenges of Wearable Activity Trackers*. Paper presented at the iConference2015, Newport Beach, California, USA.
- Shin, D.-H., & Biocca, F. (2017). Health Experience Model of Personal Informatics: The Case of a Quantified Self. *Computers in Human Behavior*, 69, 62-74. doi: 10.1016/j.chb.2016.12.019
- Sjöklint, M., Constantiou, I., & Trier, M. (2015). *The Complexities of Self-Tracking - An inquiry into user reactions and goal attainment*. Paper presented at the The 23rd European Conference on Information Systems (ECIS) 2015, Westfälische Wilhelms-Universität Münster, Münster, Germany. [http://aisel.aisnet.org/ecis2015\\_cr/170/](http://aisel.aisnet.org/ecis2015_cr/170/)

- Smarr, L. (2012). Quantifying Your Body: A How-to Guide from a Systems Biology Perspective. *Biotechnology Journal*, 7, 980-991.
- Smith, G. J. D., & Vonthethoff, B. (2017). Health by numbers? Exploring the practice and experience of datafied health. *Health Sociology Review*, 26(1), 6-21. doi: 10.1080/14461242.2016.1196600
- Smith, H. J., Dinev, T., & Xu, H. (2011). Information Privacy Research: An Interdisciplinary Review. *MIS Quarterly*, 35(4), 989-1015. doi: 10.2307/41409970
- Smith, W. R., & Treem, J. (2017). Striving to Be King of Mobile Mountains: Communication and Organizing Through Digital Fitness Technology. *Communication Studies*, 68(2), 135-151. doi: 10.1080/10510974.2016.1269818
- Solove, D. (2013). Introduction: Privacy Self- Management and the Consent Dilemma. *Harvard Law Review*, 126(7), 1880.
- Solove, D., & Citron, D. (2018). Risk and Anxiety: A Theory of Data-Breach Harms. *Texas Law Review*, 96(4), 737-786.
- Solove, D. J. (2006). A Taxonomy of privacy. *University of Pennsylvania Law Review*, 154(3), 477-564. doi: 10.2307/40041279
- Solove, D. J. (2008). *Understanding privacy*: Cambridge, Mass. : Harvard University Press.
- Sorensen, E. S. (1991). Identification of Stress Buffers in School- Age Children. *Journal of Community Health Nursing*, 8(1), 15-24. doi: 10.1207/s15327655jchn0801\_2
- Spencer-Oatey, H. (2012). What is Culture? A Compilation of Quotations. <https://www.warwick.ac.uk/globalpadintercultural>: University of Warwick.
- Spiller, K., Ball, K., Bandara, A., Meadows, M., McCormick, C., Nuseibeh, B., & Price, B. A. (2018). Data privacy: users' thoughts on Quantified Self personal data. In B. Ajana (Ed.), *Self-Tracking: Empirical and philosophical investigations* (pp. 111–124). Cham: Palgrave Macmillan.
- Spotswood, F., Shankar, A., & Piwek, L. (2020). Changing Emotional Engagement with Running through Communal Self-tracking: the Implications of 'Teleoaffective Shaping' for Public Health. *Sociology of Health & Illness*, 42(4), 772-788. doi: 10.1111/1467-9566.13057
- Stark, L. (2016). The Emotional Context of Information Privacy. *The Information Society*, 32(1), 14-27. doi: 10.1080/01972243.2015.1107167
- Statista. (2020). Wearable technology - Statistics & Facts. Retrieved July, 13th, 2020 from <https://www.statista.com/topics/1556/wearable-technology/>

- Steenvoorden, E. (2015). A General Discontent Disentangled: A Conceptual and Empirical Framework for Societal Unease. *Social Indicators Research*, 124(1), 85-110. doi: 10.1007/s11205-014-0786-4
- Steinfeld, N. (2016). "I Agree to the Terms and Conditions":(How) Do Users Read Privacy Policies Online? An Eye-tracking Experiment. *Computers in Human Behavior*, 55, 992-1000. doi: 10.1016/j.chb.2015.09.038
- Stets, J. E., & Turner, J. H. (2007). Moral emotions. In J. E. Stets & J. H. Turner (Eds.), *Handbook of the sociology of emotions* (pp. 544-566). New York: Springer.
- Stone, A., & Shiffman, S. (2002). Capturing Momentary, Self-report Data: A Proposal for Reporting Guidelines. *Annals of Behavioral Medicine*, 24(3), 236-243. doi: 10.1207/S15324796ABM2403\_09
- Stone, A. A., Shiffman, S., Schwartz, J. E., Broderick, J. E., & Hufford, M. R. (2002). Patient Non-compliance with Paper Diaries. *British Medical Journal*, 324, 1193-1194.
- Stone, A. A., Shiffman, S., Schwartz, J. E., Broderick, J. E., & Hufford, M. R. (2003). Patient Compliance with Paper and Electronic Diaries. *Controlled Clinical Trials*, 24, 182-199.
- Stopka, T., Springer, K., Khoshnood, K., Shaw, S., & Singer, M. (2004). Writing About Risk: Use of Daily Diaries in Understanding Drug-User Risk Behaviors. *AIDS and Behavior*, 8(1), 73-85. doi: 10.1023/B:AIBE.0000017527.25533.f4
- Suchman, L. (1994). Do Categories Have Politics?The Language/Action Perspective Reconsidered. *Computer Supported Cooperative Work*, 2(177-190).
- Sunyaev, A., Dehling, T., Taylor, P. L., & Mandl, K. D. (2015). Availability and Quality of Mobile Health App Privacy Policies. *Journal of the American Medical Informatics Association*, 22(e1), e28-e33. doi: 10.1136/amiajnl-2013-002605
- Susser, D., Roessler, B., & Nissenbaum, H. F. (2019). Technology, Autonomy, and Manipulation. *Internet Policy Review* 8(2).
- Swan, M. (2012). Health 2050: The Realization of Personalized medicine through Crowdsourcing, the Quantified Self, and the Participatory Biocitizen. *Journal of Personalized Medicine*, 2, 93-118.
- Swan, M. (2013). The Quantified Self: Fundamental Disruption in Big Data Science and Biological Discovery. *Big Data*, 1(2), 85-99.
- Sysling, F. (2020). Measurement, Self-Tracking and the History Of Science: An Introduction. *History of Science*, 58(2), 103-116. doi: 10.1177/0073275319865830
- Talebi, N., Hallam, C., & Zanella, G. (2016). "The new wave of privacy concerns in the wearable devices era". Paper presented at the 2016 Portland International Conference on Management of Engineering and Technology (PICMET), Honolulu, HI.

- Tangney, J. P., Stuewig, J., & Mashek, D. J. (2007). Moral Emotions and Moral Behaviour. *Annual Review of Psychology*, 58(345–372).
- Taylor, C. (1984). On Freedom and Truth. *Political Theory*, 12 (2), p. 152- 183
- Taylor, C. (1985). *Philosophical Papers Volume 1 Human Agency and Language*: Cambridge: Cambridge University Press.
- Taylor, C. (1989). *Sources of the Self: Making of the modern identity*. Cambridge: Cambridge: Cambridge University Press.
- Technologies, B. (2016). LVL is the first ever wearable hydration monitor. <https://www.youtube.com/watch?v=o5-psMKP-kM>: BSX Technologies.
- Terris, M. (1999). The Neoliberal Triad of Anti-Health Reforms: Government Budget Cutting, Deregulation, and Privatization. *Journal of Public Health Policy*, 20(2), 149-167.
- Thomas, G., & Lupton, D. (2016). Threats and Thrills: Pregnancy Apps, Risk and Consumption. *Health, Risk & Society* 17(7-8), 495-509.
- Thomas, G. M., Lupton, D., & Pedersen, S. (2018). 'The Appy for a Happy Pappy': Expectant Fatherhood and Pregnancy Apps. *Journal of Gender Studies*, 27(7), 759-770. doi: 10.1080/09589236.2017.1301813
- Thornham, H. (2019). Algorithmic Vulnerabilities and the Datalogical: Early Motherhood and Tracking-As-Care Regimes. *Convergence: The International Journal of Research into New Media Technologies*, 25(2), 171-185. doi: 10.1177/1354856519835772
- Toms, E. G., & Duff, W. (2002). “ I Spent 1 ½ Hours Sifting Through One Large Box. ...”: Diaries as Information Behavior of the Archives User: Lessons Learned. *Journal of the American Society for Information Science and Technology*, 53(14), 1232-1238. doi: 10.1002/asi.10165
- Tower, S. (2020). Health & Fitness App Adoption Up Record 47% So Far in Q2 2020. *Sensor Tower Blog: Store Intelligence*.
- Travers, C. (2011). Unveiling a Reflective Diary Methodology for Exploring the Lived Experiences of Stress and Coping. *Journal of Vocational Behavior*, 79(1), 204-216. doi: 10.1016/j.jvb.2010.11.007
- Trosow, S., Taylor, L., & Hanam, A. (2017). *The Internet of Things: Implications for consumer privacy under Canadian law*. Law Publications. <https://ir.lib.uwo.ca/lawpub/91/>.
- Turner, J., & Jonathan, H. (2009). The Sociology of Emotions: Basic Theoretical Arguments. *Emotion Review*, 1(4), 340-354. doi: 10.1177/1754073909338305
- Turow, J., Hennessy, M., & Draper, N. (2015). The Tradeoff Fallacy: How marketers are misrepresenting American consumers and opening them up to exploitation (pp. 1-24).

- [https://www.asc.upenn.edu/sites/default/files/TradeoffFallacy\\_1.pdf](https://www.asc.upenn.edu/sites/default/files/TradeoffFallacy_1.pdf): Annenberg School for Communication, University of Pennsylvania.
- Turrini, M. (2015). A Genealogy of "Healthism": Healthy Subjectivities between Individual Autonomy and Disciplinary Control. *Journal of Medical Humanities & Social Studies of Science and Technology*, 7(1), 11-27.
- Urban, M. (2017). 'This Really Takes It Out of You!' The Senses and Emotions in Digital Health Practices of the Elderly. *Digital Health*, 3, 2055207617701778. doi: 10.1177/2055207617701778
- van Dijck, J. (2014). Datafication, Dataism and Dataveillance: Big Data between Scientific Paradigm and Ideology. *Surveillance & Society*, 12(2), 197-208.
- van Dijk, T.A. (1993). Principles of Critical Discourse Analysis. *Discourse & Society*, 4(2), 249-283.
- van Haasteren, A., Gille, F., Fadda, M., & Vayena, E. (2019). Development of the mHealth App Trustworthiness checklist. *Digital Health*, 5, p.205520761988646. doi: 10.1177/2055207619886463
- Venema, H. (2002). Oneself as Another or Another as Oneself? *Literature and Theology*, 16(4), 410-426. doi: 10.1093/litthe/16.4.410
- Verbrugge, L. M. (1980). Health Diaries. *Medical Care*, 18(1), 73-95. doi: 10.1097/00005650-198001000-00006
- Vitak, J., Liao, Y., Kumar, P., Zimmer, M., & Kritikos, K. (2018). *Privacy attitudes and data valuation among fitness tracker users*. Paper presented at the International Conference on Information. iConference 2018 : Transforming Digital Worlds.
- Waddington, K. (2005). Using Diaries To Explore The Characteristics Of Work-Related Gossip: Methodological Considerations From Exploratory Multimethod Research. *Journal of Occupational and Organizational Psychology*, 78, 221-236.
- Wade, M. (2018). Virtuous Play: The Ethics, Pleasures, and Burdens of Brain Training. *Science as Culture*, 27(3), 296-321. doi: 10.1080/09505431.2018.1458828
- Wagner, R. (1981). *The invention of culture* (Revised and expanded edition. ed.). Chicago: University of Chicago Press.
- Ward, C., Ellis, D., D'Ambrosio, L. A., & Coughlin, J. F. (2018). *Digital breadcrumbs: a Lack of data privacy and what people are doing about it*. Paper presented at the Human-Computer Interaction. Theories, Methods, and Human Issues - 20th International Conference, HCI International 2018, Las Vegas, Nevada.
- Warner, R. H., & Sloan, R. (2013). Beyond notice and choice: Privacy, norms, and consent. *Suffolk University Journal of High Technology Law*, 14(2), 370.



- Warren, C. A. B. (2002). Qualitative interviewing. In J. F. Gubrium & J. A. Holstein (Eds.), *Handbook of interviewing research: Context and method*. Thousands Oaks, CA: SAGE Publications.
- Warren, S. D., & Brandies, L. D. (1891). The Right to Privacy. *Harvard Law Review*, 5(3), 193-220. doi: 10.2307/1322232
- Wei, Z., & Piramuthu, S. (2014). *Security/privacy of wearable fitness tracking IoT devices*. Paper presented at the 9th Iberian Conference on Information Systems and Technologies (CISTI), Barcelona.
- Weisse, A. B. (2012). Self-experimentation and Its Role in Medical Research. *Texas Heart Institute Journal*, 39(1), 51-54.
- Westin, A. F. (1967). *Privacy and freedom*. New York: Atheneum.
- Wetherell, M. (2012). *Affect and emotion: A new social science understanding*. London: SAGE.
- Wheeler, L., & Reis, H. T. (1991). Self-reporting of Everyday Life Events: Origins, Types, and Uses. *Journal of Personality*, 59(3), 391-351.
- Whitson, J. (2013). Gaming the Quantified Self. *Surveillance & Society*, 11(1/2), 163-176.
- Wickham, R. E., & Knee, C. R. (2013). Examining Temporal Processes in Diary Studies. *Personality and Social Psychology Bulletin*, 39(9), 1184-1198. doi: 10.1177/0146167213490962
- Wieneke, A., Lehrer, C., Zeder, R., & Jung, R. (2016). *Privacy-related decision-making in the context of wearable use*. Paper presented at the 20th Pacific Asia Conference on Information Systems (PACIS) 2016, Chiayi, Taiwan.
- Wilkinson, S. (2004). Focus group research *Qualitative research: Theory, method and practice* (2nd ed., pp. 177-199). London: SAGE Publications.
- Williams, M., Nurse, J. R., & Creese, S. (2017). "Privacy is the boring bit": User perceptions and behaviour in the internet-of-things. Paper presented at the 15th Annual Conference on Privacy, Security and Trust (PST).
- Williams, S. J. (2005). *Sleep and society: Sociological ventures into the (un)known*. London: Routledge.
- Williams, S. J. (2007). Vulnerable/Dangerous Bodies? The Trials and Tribulations of Sleep. *Sociological Review*, 55, 142-155. doi: 10.1111/j.1467-954X.2007.00698.x
- Williams, S. J., Coveney, C., & Meadows, R. (2015). 'M - apping' Sleep? Trends and Transformations in The Digital Age. *Sociology of Health & Illness*, 37(7), 1039-1054. doi: 10.1111/1467-9566.12283

- Williams, S. J., Coveney, C. M., & Gabe, J. (2013). Medicalisation or Customisation? Sleep, Enterprise and Enhancement in the 24/7 Society. *Social Science & Medicine*, 79(1), 40-47. doi: 10.1016/j.socscimed.2012.07.017
- Williamson, I., Leeming, D., Lyttle, S., & Johnson, S. (2015). Evaluating the Audio- Diary Method In Qualitative Research. *Qualitative Research Journal*, 15(1), 20-34. doi: 10.1108/QRJ-04-2014-0014
- Wills, M. (2014). Decisions Through Data: Analytics in Healthcare. *Journal of Healthcare Management*, 59(4), 254-261.
- Wilson-Barnao, C., & Collie, N. (2018). The Droning of Intimacy: Bodies, Data, And Sensory Devices. *Continuum: Cultures of Capitalism*, 32(6), 733-744. doi: 10.1080/10304312.2018.1525922
- Wiseman, V., Content, L., & Matovu, F. (2005). Using Diaries to Collect Data in Resource-poor Settings: Questions on Design and Implementation. *Health Policy and Planning*, 20(6), 394-404.
- Wissinger, E. (2017). Wearable Tech, Bodies, and Gender. *Sociology Compass*, 11(11), E12514. doi: 10.1111/soc4.12514
- Wissinger, E. (2018). Blood, Sweat, and Tears: Navigating Creepy versus Cool in Wearable Biotech. *Information, Communication & Society: Communication, Information Technologies, and Media Sociology (CITAMS) Special Issue*, 21(5), 779-785. doi: 10.1080/1369118X.2018.1428657
- Wodak, R. (2011). What CDA is about – a Summary of its history, important concepts and its developments. In R. Wodak & M. Meyer (Eds.), *Methods of critical discourse analysis* (pp. 1-13). London: SAGE Publications.
- Wolf, C., Polonetsky, J., & Finch, K. (2016). A Practical privacy paradigm for wearables. <https://fpf.org/wp-content/uploads/FPF-principles-for-wearables-Jan-2015.pdf>: Washington : Future of Privacy Forum .
- Woll, H. (2013). Process Diary as Methodological Approach in Longitudinal Phenomenological Research. *Indo-Pacific Journal of Phenomenology*, 13(2), 2-11.
- Yakovleva, S., & Irion, K. (2020). Pitching Trade Against Privacy: Reconciling EU Governance Of Personal Data Flows With External Trade. . *International Data Privacy Law*, ipaa003.
- Zarsky, T. Z. (2003). "Mine Your Own Business!": Making the Case for the Implications of the Daat Mining of Personal Information in the Forum of Public Opinion. *Yale Journal of Law and Technology*, 5(1), <https://digitalcommons.law.yale.edu/yjolt/vol5/iss1/1>.
- Zhao, S. (2005). The Digital Self: Through the Looking Glass of Telecopresent Others. *Symbolic Interaction*, 28(3), 387-405.

- Zimmer, M. (2018). Addressing Conceptual Gaps in Big Data Research Ethics: An Application of Contextual Integrity. *Social Media + Society*, 4(2). doi: 10.1177/2056305118768300
- Zimmer, M., Kumar, P., Vitak, J., Liao, Y., & Chamberlain Kritikos, K. (2018). 'There's Nothing Really They Can Do with This Information': Unpacking How Users Manage Privacy Boundaries for Personal Fitness Information. *Information, Communication & Society*, 23(7), 1020-1037.
- Zuboff, S. (2019). *The age of surveillance capitalism : the fight for a human future at the new frontier of power* (First edition. ed.): New York: PublicAffairs.