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Article – Theme section

Ageing with apps

A Foucauldian study exploring older people's use of apps in managing their physical health

Martin Vinther Bavngaard[1]

1. PhD fellow, Department of Rehabilitation Science and Health Technology, Faculty of Health Sciences, Oslo Metropolitan University, Norway, martinvi@oslomet.no

Abstract

This article explores the incorporation of mobile applications in older people's physical health management through the lens of Foucault's concepts on self-governance. Based on ten interviews with older Danes, the article posits that physical health management practices constitute practices of self-governance, involving participants' attunement to both physical activity and bodily phenomena, which are both facilitated and optimized through app-based self-tracking. The findings align the rationales driving participants' efforts with the trajectory of the governmental concept of active ageing. Using apps thus becomes intertwined with participants' efforts towards ageing successfully, consequently taking on a dual function: Apps strengthen the adherence to norms of conduct for achieving an optimal ageing process by allowing for ubiquitous self-monitoring and self-assessment. Simultaneously, I argue that apps may also act as a gatekeeper, as lacking the technical competencies to efficiently use apps hinders effective health management and thus clashes with efforts conforming to active ageing.

Keywords

Foucault, self-tracking, apps, physical health, older people, ageing

Introduction

Population ageing constitutes a global demographic trend and is held as one of the biggest welfare challenges for developed countries (Cozza et al., 2019), as older population segments are at increased risk of chronic diseases and thus threaten to overwhelm healthcare services. Mirroring this trend, the percentage of adults aged 65+ in the Danish population is projected to grow from 5 pct. in the year 2021 to 10 pct. by 2050 (Statistics Denmark, 2021). Health economist Jes Søgaard projects a 32-pct. increase in Denmark's health and care spending towards 2030 and stresses the financial significance of ensuring a healthier ageing process with fewer complications (Baes-Jørgensen, 2021). Correspondingly, the physical health of older people constitutes a distinct area of intervention for the Danish Health Authority (2015), as good physical health lowers the risk of noncommunicable lifestyle diseases as well as dementia and depression (Ohrnberger et al., 2017). This push to govern physical health through lifestyle interventions is symptomatic of the current line of thinking within the Danish healthcare system: Citizens are increasingly regarded as responsible for ensuring good health in their everyday lives (Karlsen & Villadsen, 2017). This notion runs parallel to the ongoing implementation of digital technologies within the healthcare system for treating patients in non-clinical contexts (Sundhedsministeriet, 2022). Exemplifying this, the Danish Health Data Authorities move to digitalize health services to increase citizens' self-governance by enabling them to "take responsibility for the management of their own health" (2019, p. 25). Such services include the online public health journal sundhed.dk, as well as a national guide for consumer health applications (apps) (Implement Consulting Group, 2019; E-sundhedsobservatoriet, 2022).

Though the utilization of health apps for health management echoes the notion of the autonomous and responsible citizen, the relevance of consumer apps for ageing bodies has been largely neglected (Katz & Marshall, 2018): In general, the use of smartphones, and, by extension, health applications, is not yet widespread amongst older people (Onyeaka et al., 2021). For older Danes, managing health is one of the least common practices performed using their smartphone. However, 91 pct. of adults aged 55–59 and 76 pct. of adults aged 75–80 own a smartphone and score high on digital competency (Ældresagen, 2019). Coupling older Danes' smartphone ownership and digital competency with the governmental aim to digitalize health services outside the clinic thus reveals a potential for empowering a healthy lifestyle in later life. Simultaneously, questions arise regarding how older Danes currently use apps in managing their physical health. Informed by both the digital and governmental developments in Denmark, this article raises the research question: *How and why do older Danes (65+) use smartphone applications as self-governing technologies in managing their physical health*?

Existing research on older people's app use

Though it exists in a multidisciplinary field, older people's app usage has mostly been investigated by studies rooted in medical informatics or human–computer interaction. As noted by Paiva et al. (2020) and Arnhold, Quade, and Kirch (2014), studies conducted within these fields primarily focus on technical usability and measurable effects of use when investigating how apps are involved in older people's health-monitoring. As a significant portion of consumer apps neglects to integrate older user segments, much research has investigated functions and design choices to uncover the needs of older users and ensure positive user experiences (e.g., Castro et al., 2020; Aslam et al., 2020). In this research, older people's experiences primarily fuel the assessment of an app's feasibility and effectiveness when implemented. Like Stampe (2020), Urban champions research on older people's use of apps contrasting this prevailing focus on usability and effect in which "the potential of these digital practices to motivate older persons is […] approached as a purely technical challenge" (2017, p. 12). To avoid a deterministic position which marginalizes the meaning-making inherent to the dynamics between user and app (Lister et al., 2009), it seems pertinent to bring older people's experiences and practices to the fore. This is to learn how apps are incorporated into older people's everyday health practices, including on which conditions this happens and with what experiential consequences. However, the ambition to explore these qualitative dimensions reveals an apparent paucity in the research literature.

Exploring older people's rationales for using smartphones to track aspects of their physical health, Seifert et al. (2017) highlight the wish to motivate oneself and become more knowledgeable regarding one's daily exercise and sleep patterns. Some strive to ensure a status quo regarding their health, using apps to expose anomalies (Caldeira et al., 2016), while others wish to exercise a higher degree of self-control regarding lifestyle choices (Schlomann et al., 2016). Moreover, apps may take on emotional significance when incorporated into the day-to-day practices of older people. Both Ehn (2018) and Lin, Bautista, and Core (2020) report that several interview participants found tracking their physical activities joyous. Conversely, others felt controlled or kept under surveillance by the apps when tracking (Schlomann, 2017). Underlining the emotional significance of app usage, Urban (2017) finds that some tracking apps use standardized benchmarks when assessing the physical activities of older people. This, in turn, left them frustrated for not achieving the numbers projected by the app. As illustrated by these findings, and parallel to the epistemological position of the present study, Urban (2017) holds that technology does not play a neutral role when incorporated into human practices. Rather, it acts as a nexus for preexisting expectations and practices and the formal characteristics of the technology itself – a dyadic relationship reflected in the term *sociotechnical interaction*. Thus, older people's rationales for, practices with, and experiential significances derived from using apps are all undeterminable a priori, as the use of apps is not restricted to only one manner of application.

As illustrated in the following section, studies within critical-sociological research (e.g., Lupton, 2013; Kristensen et al., 2014) have noticed the parallel emergence of health apps and governmental pushes for self-responsibilization of health management – both exemplified in the beginning of this article. While much has been written regarding self-tracking practices as inherent to the governing of conduct, older people's app usage for physical health remains an area largely untouched. During my exploration of this subject matter, I develop a theoretical framework situated within critical-sociological research, taking as a point of departure the theoretical concepts of Foucault on self-governance.

Foucault and self-governance

The work of Foucault largely centers around the operational mechanics of power by illustrating how contemporary governance of individuals are interwoven with certain methods, techniques, and practices. Rather than centralizing the nexus of power within specific institutional apparatuses, the concept of *governmentality* denotes an indirect structurization of individuals' freedom by a multiplicity of actors, and thus concerns the "conduct of conduct" (Dean, 2010, p. 17). This mode of regulation hinges on individuals who are free: reflexive subjects with innate capacities to act and think. Despite this presupposition, freedom is not to be viewed as absolute. Rather, it is enacted within a structure framing it – often in alignment with hegemonic discourses in society regarding conduct. Thus, individuals are "not free to do nothing or everything but free to do *something*" (Knudsen, 2019, p. 78, emphasis added). Structuring individuals' perceived freedom in normative ways entails shaping the moral principles which directs their self-perception, identity, and as a result, their behavior. Neoliberal discourses embedded in institutions, policies, reforms, and society occupies a normative view on the identity of the individual, and thus acts, as a moral compass used to regulate conduct (Dean, 2010). By designating values, norms, and ideas to one pole of this metaphorical compass, neoliberal discourses portray conduct consistent with this pole as morally superior to its contrast, perceived as amoral and irrational. Importantly, rather than explicitly prescribing concrete actions, these values, norms, and ideas propose ways of conducting one's life (Foucault & Rabinow, 1997). However, as governmentality hinges on this question of how moralities of conduct are shaped, it cannot be limited to specifying the regulation of the conduct of others. For Foucault (1988), the concept came to encompass the ways in which an individual exercises self-governance.

Technologies of the self

Foucault's focal shift from macro-level analyses of governmental strategies towards self-governance extends the thought of moralities as guiding conduct while emphasizing how individuals internalize morals *in* and *through* practice (Villadsen & Mik-Meyer, 2007). To this end, Foucault employs the concept of *technologies of the self*, denoting practices

through which individuals perform "a certain number of operations on their own bodies and souls, thoughts, conduct, and way of being, so as to transform themselves in order to attain a certain state of happiness, purity, wisdom, perfection, or immortality" (1988, p. 18). Technologies of the self, then, involve the practices through which individuals target parts of themselves with the intent of transforming these into objects of knowledge and control, producing the individual as "an object for himself or herself" (Steward & Roy, 2014, p. 1877). Embedded in the intention of achieving self-knowledge, there exists a power dynamic: The individual's self-work adheres to a certain direction guided by a moral commitment to one set of values over another. Consequently, this intention becomes a process in which the individual conforms to the types of values innate to the techniques employed to achieve self-knowledge (Ramirez, 2017). In this way, technologies of the self constitute the micro-level pendant to governmentality.

Extending Foucault: Tracking and self-optimization

Although Foucault (1988) overtly refers to technologies of the self as denoting techniques rather than physical instruments, in present times, the two terms converge. In line with Bakardjieva and Gaden (2012), I argue that digital technologies have expanded the repertoire of technologies of the self. By merging digital media practices with Foucault's (1988) concepts, I position technology as significant in shaping individuals' practices. Attesting to this merging of techniques and technologies, the Foucauldian concepts presented above have provided fertile soil for a range of studies examining individuals' digital health practices (e.g., Lifková, 2019; Petrakaki et al., 2018). Lupton (2013) expounds on the practice of self-tracking wherein digital technologies are used to produce, organize, analyze, and visually present data. These processes enable external and detailed insights to be made by targeting parts of individuals' bodies and activities – often physical (Sanders, 2017). Data pertaining to the individuals' doings are either collected through registrations by sensors or inputs by users (Lupton, 2016). Mirroring Foucault (1988), both Lupton (2016) and Kristensen et al. (2014) emphasize the invitation given to us by these technologies to engage with data as part of our efforts in optimizing our lives. As part of our identity as free and responsible individuals, this invitation even constitutes an expectation (Kristensen et al., 2014). Self-tracking practices thus become a site for the intertwinement of work on the self and the subjection to a moral obligation to optimize oneself in line with a normative trajectory – for instance, in managing physical health. This, in turn, carries with it the potential for self-governance.

Though inextricably linked, this study is guided by the concept of technologies of the self more than that of governmentality. Exploring the research question warrants an analysis rooted in individuals' discursive construction of their practices. Thus, I approach participants' opinions both *as is* and as expressing latent values and ideas (Braun & Clarke, 2012). The concepts of Foucault were included as part of the framework developed

during the reflexive thematic analysis and were thus selected based on their productivity in answering the research question rather than put up as a priori analytical categories.

Methods

The study's data set is comprised of in-depth qualitative interviews conducted between May and June 2021 with ten Danish participants (five females and five males) between the age of 65 and 79 and with heterogenous backgrounds. Line of work varied, as did educational level: from no formal education past secondary school to higher education. Most participants were middle-class, and all were retired at the time of recruitment. Recruitment primarily took place at a local seniors' activity center located in a major Danish city and involved physical visits during opening hours and dissemination via bulletin boards and through the center's digital newsletter. Two interviews were attained by employing snowball sampling to utilize already secured participants' networks (Bryman, 2016). In total, twelve people responded to the recruitment call, ten of whom met the criteria for participation.

Apart from age (65+), the inclusion criteria stated in the call dictated regular use of at least one mobile app related to physical health management. Recognizing that users may incorporate apps in divergent ways by isolating specific functions or use-contexts, I avoided basing inclusion criteria on app genres. Participants were also encouraged to relate their app usage to the management of their physical health themselves. Similar considerations arose regarding the notion of physical health. In keeping with the holistic definition of health by the World Health Organization (2006), I do not consider physical health as isolated from mental health. However, including mental health could potentially widen the field of possible apps and use-contexts to a point where the notion of "health" no longer constituted a coherent category of inquiry. Moreover, the semantic content of the notion of physical health was considered more readily comprehensible for participants vis-à-vis the broader and potentially diffuse notion of health.

Interested participants were contacted by telephone prior to the interview. This allowed for a preliminary screening based on abovementioned criteria, as well as a chance to discuss app usage and answer any questions regarding the study. In preparation for the interview, participants were asked to reflect on their motives for using the apps. Following a pilot interview, guidelines for the final interviews were refined. These involved encouraging participants to have their mobile phone at hand during the interviews to better articulate their use-patterns or showcase app-specific characteristics (Galletta, 2013). On this account, face-to-face interviews were prioritized. The interviews were conducted in Danish. Seven took place in private locales at the activity center, two in the participants' homes, and one in the author's campus office. The interviews lasted between 24 and 50 minutes and followed a semi-structured interview guide to establish an overall structure for inquiring into the participants' perspectives while still allowing app-specific digres-

sions. Questions pertained to physical health, concrete app usage, and reasons for use. Examples include: "How would you describe your physical health?": "Why do you use this particular application?": and "Do you feel that the application(s) influence the way in which you relate to your physical health?" Based on sound recordings, the interviews were transcribed verbatim and in Danish using the CAQDAS-program NVivo 12 following Gregersen's *Danish Standard 1-minimal conventions* (1992).

Participants were informed of the research aims ahead of each interview. To remain sensitive to the heterogeneity amongst older people (Bayer, 2017), i.e., in reading comprehension, extra time was allotted for reading the consent form at the start of each interview. All participants provided written consent: Some signed the form without looking, others perused it thoroughly. As the interview questions pertained to potentially sensitive health information, participants were encouraged not to answer in cases where they were not comfortable sharing this information with the researcher. All participants were made aware of their rights (e.g., to review data or withdraw at any time) prior to signing the form. The study did not seek formal ethical approval.

Analytical procedure

The data analysis was guided by the analytic approach *reflexive thematic analysis*, as described by Braun and Clarke (2006, 2021). By shedding any inherent allegiances towards theoretical underpinnings, this approach affords systematic identification of themes grounded in a qualitative data corpus – themes defined as "some level of patterned response or meaning within the data set" (Braun & Clarke, 2006, p. 82). The analytical process moved along a continuum from inductive to deductive interpretations. During the first phase, familiarization with the data was achieved by transcription and subsequent readings while writing down initial thoughts. Next, an open coding of the data was carried out, incorporating both latent and semantic interpretations. During this process, an interpretative framework incorporating Foucault's (1988) concepts of self-governance was developed, from which the deductive coding and initial thematization was initiated. Following two successive rounds of thematization, both iteratively oscillating between existing codes and the data set, the second phase led to the development of three main themes encompassing six total subthemes: 1) optimizing everyday life – intertwining apps and physical health management, 2) truth in tracking – apps as facilitating self-assessment, and 3) rationales for use – apps as both managing and creating health risks.

Results

Optimizing everyday life: Intertwining apps and physical health management

Pertaining to the "how" of using apps, this theme encircles concrete health management practices in which apps are deeply embedded. Physical activity constitutes the most vital practice for participants' governance of their physical health. Apps allow participants to

target different aspects of their *bounded sessions of physical activity* for optimization, but also extends the thought of optimization to other, *less formal aspects* of their everyday lives.

When performing bounded sessions of physical activity, participants incorporate apps in a variety of ways. Common to all were the expressed wish for optimizing their practices. This wish manifested through three distinct objectives of app usage, the first of which entailed controlling one's physical activity based on a set goal.

Among the eight participants engaged in controlling is Asta (age 69), who had decided to cycle between 3,000–3,500 kilometers each year. The app CycleMetre provides her with her daily mileage, which helps her uphold her bike-riding goals. When asked about the significance of the app, she explains: "If I look at it and see that I've biked maybe 12 kilometers, I'll think: 'well, back on the bike we go' and then go for at least eight more". By converting her bike rides to data through GPS measurements, the app enables Asta to use datapoints to assess and control her physical activity referring to her established daily target. Likewise, Bente's (age 66) primary form of exercise is walking and interval walking. She tracks both practices through multiple apps in order to obtain the most precise gauging of her exercise: "It gives me a better overview, as not all [apps] have the same qualities… Uhm, and the apps are working together". She is aware that pedometer apps may inaccurately measure her steps. To counter this inaccuracy, she triangulates the numbers in her pedometer apps and enters the mean number in the app HealthMate, which acts as a data hub for most of Bente's tracking apps. Through HealthMate's data visualizations, Bente can monitor and control her progression towards her daily exercise goals.

For Bente and six other participants, apps are involved in initiating physical activity by acting as a reminder. Thus, the optimization does not occur during the physical activity, but, prior to it, by ensuring that the activity is initiated rather than neglected. For 71-year-old Inger, the loss of her husband has impacted her daily physical activity, and she finds herself more inactive than she would like: "all this with: 'we should go for a walk', right? That's harder to do if you're alone too, right?" In this context, the app's automatic pop-up notifications not only help Inger initiate her daily walks, they also re-create the commitment to physical activity which she shared with her husband: "I don't think I would've bought this watch if I was… If I weren't alone. I don't think so". However, even though apps are used to initiate a change of behavior from inactive to active, app-to-user communication is not simply perceived as imperative. Both Jørgen (age 71) and Bente recount instances in which they have resisted the reminders, even in cases when they themselves have programmed them. Their statements illustrate the human agency embedded in the process of self-optimization: It is not to be viewed as a unidirectional, linear process of betterment, but rather as a dynamic and complex constellation of (sociotechnical) actions, which sometimes come into conflict (Vaaben, 2014).

Four participants use apps as a means to increase their efforts when exercising. Asta describes herself as competitive and uses the apps' measurements to push herself: "I

mean, if I walked five-and-a-half kilometers yesterday, then I feel like walking just a bit further today". For Asta, satisfaction is not derived solely from her bodily experience of physical exertion (i.e., sweat, increased pulse and breath), but also from witnessing this exertion through the numbers in the app. Another participant, 79-year-old Otto, suffers from arteriosclerosis in his legs, and frames physical activity as an important activity for restoring his arteries. He experiences physical activity as painful, but recruits the Google Fit app to help him push himself when the pain sets in. By combining measurements of spatial movement and pulse levels, the app visually represents Otto's activity as "heart points". These encourage him to walk both further and faster: "It hurts. But it has to. And when I up my pace, I get heart points. I can get up to forty heart points on such a walk". For Otto, the heart points act as documentation of his efforts as productive in governing his physical health, despite being painful. Both Asta and Otto implement physical activity as a type of self-governing work, framed towards self-optimization. For Otto, this work necessarily involves sacrifices in the form of pain, which the app helps procure. This type of self-initiated pushing is unique to Otto, and in this regard, he poses a diametrical opposite of Søren (age 77). When asked whether he intends to improve his walks, Søren responds with a resounding "not at *all*". He used his pedometer app solely as a method of controlling his walking distance.

Beyond showcasing concrete acts of app-usage, the scenarios described above bring to the fore the interplay between physical activity as a means of self-governing and apps as a means of optimization. Participants designate value to the role of physical activity in governing the self through physical health management, thus highlighting physical activity as a technology of the self in its own right. In using apps to control, initiate, and increase efforts, participants target physical activity as a practice to be optimized. As such, technologies for self-governance (engaging in physical activity) merge with technologies for optimizing self-governance (self-tracking apps). Consequently, the value of physical activity extends to other aspects of participants' everyday lives.

Participants describe efforts to maintain routines and structures to ensure physical activity on a day-to-day basis. Exemplifying this, Bente recounts how her smartphone "calls on me" at eleven o'clock every morning due to reminders she created. Additionally, she is reminded to perform her workout routine every other day. By dedicating fixed timeslots for physical activities, Bente and other participants engage with apps in an effort to "negotiate their everyday life" (Lomborg & Frandsen, 2016). For several participants, these efforts are grounded in experiences of freedom post-retirement. In seeking to embed physical activity into their everyday lives, participants intentionally structure this freedom to ensure productive conduct, hereby accentuating the value of physical activity as a technology of the self. In this context, apps play a crucial part. For instance, Asta's line of work as a physical education and swimming teacher naturally entailed daily physical activity. Now retired, she utilizes apps to remind herself to extend this structure into retirement by actively designating daily time slots for her physical activity. Similarly,

Jonna (age 67) found that she tended to "crumple up" after she retired from her job as a pedagogue, as physical activity was no longer a part of her everyday routine. Instead, she needed to actively plan it. Thus, the transition to retirement attuned her to the fact that she "needed to move and be active and… In that case, such a thing [the app] is very helpful". Jonna uses her pedometer app to break down her day into three segments. Before taking a nap at lunchtime, she commits to walking half of her daily goal of 10,000 steps. The remaining steps are left for the afternoon. For Jonna, then, tracking herself via her pedometer app does not just inform her of her physical activity levels, but contributes to the scheduling of physical activity in her everyday life – and as a result, her day-to-day conduct.

For some participants, the general optimization of everyday life also extends to specific practices. Continuing her deliberation, Jonna describes how a TV-broadcasted morning gymnastics class becomes a landmark for her physical activity: "Before morning gymnastics I'll think: 'don't just sit there and drink all that coffee, get up and walk a thousand steps before the morning gymnastics [laughs]". Similarly, the thought of optimization enters her casual TV viewing habits. When ad breaks interrupt the programming, she thinks: "*Fine*, let's go for seven or eight hundred steps or how many I can reach". In this case, the app contributes to Jonna's construction of a part of TV viewing deemed unproductive – ad breaks – as an opportunity to engage in productive conduct by working towards her goal of 10,000 steps a day. Likewise, Bente plans her commutes with the goal of maximizing her daily steps as counted by her pedometer app. On the way to the interview for the present study, she deliberately took a bus stopping far from the address, as it meant walking more steps. Both Jonna's and Bente's statements illustrate how the apps' data output creates the means with which participants regulate their day-to-day conduct with regards to physical activity. Apps assist the optimization of the self via physical activity, but also extend such self-governing efforts to permeate other scenes of everyday life. By incorporating apps, optimization becomes ubiquitous: even practices with other primary goals (e.g., TV-viewing or transportation) are rendered as sites for optimizing work on the self.

Truth in tracking: Apps as facilitating self-assessment

The preceding theme encompassed the varying ways in which apps enter the participants' everyday lives. Building upon those insights, this theme emphasizes the ways in which participants make sense of the data produced by their apps.

Participants use apps which produce and present data regarding different aspects of their bodies, either by manual data entries, as in Bente's use of MyFitnessPal to track her caloric intake, or by automatically tracking the body, as in Otto's use of Google Fit to measure pulse level and spatial movements. For participants, self-tracking constitutes a window through which insights into their own bodies can be made. 74-year-old Doris has long had a goal of walking 10,000 steps every day. Only after acquiring her pedometer app

was she able to ascertain that she consistently keeps to her goal. Through data collection performed by the app, her bodily activity becomes an object for questioning regarding whether she complies with her goal. Thus, Doris's app usage does not only help her optimize her physical activity by quantification, but simultaneously makes visible aspects of her bodily performance which were formerly invisible to her and therefore difficult to address. However, data produced by the apps regarding the participants' bodies are not assessed in isolation. Rather, they are compared with the participants' own bodily experiences. In addition to tracking her steps, Doris uses a smartwatch linked to her FitBit app to monitor her sleep pattern. She articulates the synergy between her own knowledge and the app's data:

> And when I'm looking at it [the data visualizations], it fits pretty well with my own experiences, you know. I mean, when you reach my age, you sometimes think to yourself: "ugh, I've barely slept tonight", even though you actually have. Because it's… It's just because you've occasionally been lying awake for a moment […] and its actually pretty interesting to see whether you're really sleeping well, and apparently, I am.

Here, Doris doubts her ability to interpret her own bodily experiences – a problem which she associates with her age. Her own experiences may trick her, for which reason she somewhat writes off her own ability to form valid opinions of her sleep patterns. In a similar fashion, Asta mentions using her app to contextualize her own bodily experiences regarding the extent of her physical activity, as her own experiences may "persuade" her of an incorrect and unjustified feeling of satisfaction. Apps become tools for establishing an external, data-driven perspective through which participants make sense of their bodies. In the words of Petersen, Mahnke, and Nielsen (2022), the self-tracking apps constitute "frames" through which bodily experiences are rendered real by virtue of quantification. Inherent to this process is also the delegitimization of bodily experiences made by the participants themselves when exposed to data-driven insights. This delegitimization is akin to the one described by Foucault when an individual faces expert knowledge, perhaps most prominent during the examination of a patient by a doctor (2009). In this case, however, the apps conduct the examination of participants by tracking steps, pulse, or sleep patterns, hereby producing knowledge on their bodies – knowledge which would have been inaccessible for the participants without the apps. In this process, a normative component is introduced: Data generated by the apps frame participants' view on what constitutes valid knowledge, which in turn is used for the regulation of conduct.

Exemplifying this, Doris describes how she inferred a causal connection between her experienced knee pain and the registration of asymmetrical gait in one of her apps. Only after her knee pain was explicitly registered by the app did she contact her general practitioner. Similarly, Inger used the app Garmin Connect to monitor her sleeping habits based on feelings of sleep deprivation. Her feelings were validated by the app's data, which she then brought to her general practitioner as documentation, stating that "you can always

show up and assert it. But is what you're asserting actually true, right?" In merging participants' accounts of concrete self-tracking practices with their perception of data as objective and valid, apps become the literal "techné" (Foucault, 1988, p. 24) embedded in technologies of the self: apps allow participants to engage in granular self-monitoring practices by way of quantification, hereby rendering certain aspects of their bodies as objects for themselves, from which they can optimize their self-governance by physical health management.

However, participants' engagement with self-tracking practices does not solely allow for insights to be made regarding their efforts. Participants are also provided the opportunity to assess their efforts – a practice which implies a normative frame of reference. Jonna articulates her feeling when she sees on the FitBit app that she has met her physical activity goals: "like, you think to yourself: 'well, this is good, this isn't that bad at all'". Likewise, Otto mentions "the satisfaction […] seeing that I've achieved something today". As illustrated by these statements, participants' feeling of satisfaction rests on their actualization of specific forms of conduct deemed beneficial to the management of their physical health. Thus, a moral component is included in the management practice: Efforts taking the form of physical activity are rendered productive and give cause for feelings of satisfaction. Conversely, feelings of dissatisfaction accompanied participants who failed to attain physical activity goals or other health management practices deemed productive. Elaborating on the assessments of her activity, Jonna explains: "If I don't meet my goal, that's not good. No, meeting my goal means a lot to me". Interestingly, Jonna is able to project this feeling of disappointment despite never actually failing to meet her goal during the time she has had the app installed. Similarly, if Otto forgets to bring his smartphone when exercising, he "would get a guilty conscience".

These accounts attest to the convergence between technologies of the self (the practice of self-tracking) and technologies of optimization (self-tracking apps) in performing operations on both body and thought (Foucault, 1988): feelings of satisfaction or dissatisfaction are not brought about solely by engaging in health practices deemed productive, but stem from having said practices witnessed in the apps. As such, self-tracking through apps is intimately connected with the way in which participants perceive their own morally driven efforts towards governing their physical health. Apps not only establish the premise for participants' self-assessment through their production and presentation of data targeting aspects of their bodies – they are also perceived as the most objective way through which to assess oneself.

Rationales for use: Apps as both managing and creating health risks

Despite a contrasting discursive construction of their role, apps are implemented by participants in earnest efforts to manage physical health based on participants' individual conditions. Both app selection and self-tracking practices are performed to manage

health risks perceived by participants as most salient. However, apps are not always incorporated smoothly into these practices, thus presenting risks themselves.

Seven participants explicitly verbalize self-tracking as a pleasurable practice. However, when asked to elaborate, five of these participants extend this adjective to signify that self-tracking is done *for pleasure* or *fun*. When asked how she conceives of apps in relation to managing her physical health, Asta responds: "Pleasure. Fun. Entertainment". Though this quotation indicates a view of self-tracking as holding little gravity in Asta's self-governing efforts, it coexists with contrasting accounts of more earnest app uses. Asta mentions using apps to control whether she has walked far enough on any given day, or if she should engage in additional physical activity to make up for falling short of her goal. Like Asta, 73-year-old Erik responds in short when asked why he uses his pedometer app: "For fun". Erik's statement implies a distancing from self-tracking as a serious endeavor. However, less than a minute after this initial response, Erik mentions his "competitive gene" in ensuring that he performs a certain amount of physical exercise every day, based on his wish to be "diligent […] yes, something about wanting to do things thoroughly". For all five participants, there exists a somewhat contradictory relationship regarding their use of apps: Despite discursively constructing their use as just for fun, apps are incorporated with clear intent in their self-tracking practices explicitly aimed at optimizing the management of their physical health.

Bearing witness to this earnest utilization of apps, all participants implement specific self-tracking practices in light of their unique physical health conditions, aiming to manage the immediate health risks perceived to be most prominent. This extends to their selection of apps for self-tracking. Bente, for instance, recounts several potential risks: Beyond blood clots and type 2 diabetes, she worries about the consequences of her inactivity on the autoimmune Hashimoto's disease from which she suffers, as it may accelerate the onset of osteoporosis. In combatting these risks by self-tracking using seven different health apps, she explains: "It's simply to […] try to be as well off as possible health-wise. Try to prevent as much as possible", continuing "before it gets so bad that I'll need formal treatment". Not suffering from any chronic diseases, Inger directs her physical health efforts towards postponing an age-induced state of dependency for as long as possible. Using her apps, she can monitor and react on developments pertaining to her physical activity and sleep pattern. Similarly, Jonna's commitment to a daily goal of 10,000 steps serves to maintain her mobility in an effort to combat one risk in particular: "I've got some older siblings, both of whom walk with one of these [mimes walking with a walker]. That… That's my one true fear in life. I'd like to postpone that as long as humanly possible". Thus, the risks associated with ageing are prominent amongst talk of health risks in need of handling.

As illustrated by the preceding themes, physical health management is a form of self-government entailing participants' attunement to both physical activity and bodily phenomena, which can be optimized through app-based self-tracking. Congruent with

this larger framework of self-governing initiatives, apps are specifically selected by participants and embedded into preconceived physical health-management practices. As such, participants display agency in assigning roles to their apps as tools for monitoring and assessing health-related conduct of the self. However, as made evident by the statements above, engagement in optimizing self-governance via apps does not constitute one linear progression towards achieving "a certain state of happiness, purity, wisdom, perfection or immortality" (Foucault, 1988, p. 18). Rather, participants' efforts in managing their physical health have different starting points and objectives, although all framed towards perceived health risks in need of handling. Further underlining this "messier reality" (Kristensen, 2022, p. 599) of self-tracking, I posit that the apps themselves may pose a risk to the idea of governing of the self when incorporated in physical health-management practices. Specifically, possessing the technical competencies to engage in self-tracking practices with apps becomes a prerequisite for supporting the enactment of this commitment to self-governance. To illustrate this, the remainder of this theme will focus on the participant Inger, who acquired her Garmin Connect smartwatch to measure sleep and initiate physical activity – the latter as a substitute for her husband's motivating company after his death. However, when she failed in getting the watch to function properly, the distress affected her physical health:

> If you can't see your way out of the… the way to get those apps to work and stuff like that, then that's […] contributing to destroying your sleep, you know! Then you're lying there tinkering at night, thinking: "what can you do tomorrow to make it all stick together", right?
> Researcher: Yes. It takes up that much thought?
> It really does! […] Because it's taking part in destroying your health 'till the day when you're so experienced that you can do everything yourself.

Inger's frustration does not stem directly from missing physical activity goals, but from lacking the skills to get her app to work on her own. After her husband's passing, Inger feels alone in handling the challenges of new technology. Despite her intention to incorporate the app into the management of her perceived physical health risks, it became an impediment for successfully managing her health altogether. Continuing the line of interpretation presented in the second theme, in which apps become crucial for gaining insight into physical health matters, I interpret Inger's frustration as caused by being denied insight, thus feeling unable to act productively according to her goals. This experience is unique to Inger, although five other participants also experienced challenges during use. These were framed as only minor hurdles, specifically inaccurate app measurements (Bente, Doris), non-functioning cross-app synchronization (Bente), in-app bugs (Erik, Jens), and difficulties understanding interface languages (Jonna). Thus, only Inger perceived inadequate technical skills as a source of frustration and exclusion. Despite getting the app to work with the help of her son, Inger still felt ambivalent towards using apps because of her self-perceived poor technical competencies. Nonetheless, she views

apps as the most effective way of managing her physical health, which for her – like Bente and Jonna – means maintaining "a coherent day-to-day life" without dependency.

Discussion

The purpose of this article was to explore the incorporation of apps in the uses and practices of older people with the intention of managing their physical health. Operationalizing Foucault's (1988) concept of technologies of the self enabled a view of these practices' manifestations of self-government efforts driven by discursively constructed values and ideas related to future health goals. I have suggested that the thoughts and practices described by the participants take on a certain normative trajectory: Engaging in practices such as physical activity is highly valued, while the failure to do so is considered unfavorable. In reflecting upon this trajectory through a Foucauldian lens, it does not exist in isolation but rather in the context of the governmental concept of active ageing.

The concept of active ageing supersedes the discourse on ageing as associated with decline, disability, and dependency, prominent in mid-20th century government health policies (Evans & Nistrup, 2020). In the contemporary governmental context, the discourse surrounding active ageing (and its antecessor "successful ageing") emphasizes combatting the biological ageing process by productive lifestyle interventions (Rowe & Kahn, 1997). In applying the concept of active ageing politically, public health policies follow a neoliberal mentality, shifting responsibilities of lifestyle choices to older people themselves. Thus, ageing becomes something one can *do* (Schwennesen, 2019), whilst active ageing constitutes the optimal way of *doing* ageing. Active ageing prioritizes countering physical risks by "taking responsibility for one's own fitness and discipline in order to maintain the body's ability to function for as long as possible" (Sobiech & Leipert, 2021, p. 457). In articulating the rationales for their physical health management, participants align themselves with this discursive construct: Physical activity, in particular, is perceived as the key to fighting the descending spiral of their health, while inactivity is perceived as an act of resisting, giving rise to feelings of guilt. In perceiving physical activity as an investment made in the present for future reaping, participants echo the distinct nature of self-optimization as described by Rose (2007): Practices are framed towards swaying one's life trajectory towards a particular future scenario. In assimilating the values of active ageing, participants oppose contending discourses on post-retirement lives as periods of merited rest and leisure-driven, low-intensity activities (Dyk et al., 2013), and of strenuous exercise as for the young (Pike, 2015). Instead, participants actively structure their newfound freedom around physical activity, thus installing – quite literally – an apparatus of discipline to ensure an optimal conduct (Foucault, 1995). Though not all participants overtly associated their health management efforts with resisting old age, all engaged in practices aimed at limiting future noncommunicable health risks and extending independence and agency.

The role of apps in ageing actively

In construing ageing as performative, the participants' incorporation of apps reveals new ways of *doing* ageing. As illustrated by the results, apps afford new ways of experiencing and making sense of bodily phenomena. Thus, these technologies embed themselves into the enactment of self-care by expanding the capacity for self-knowledge (Sanders, 2017). Indeed, as noted by Katz and Marshall, successfully ageing bodies employing apps are no longer just "busy", but also "smarter" (2018, p. 67). Quantifying the body (Lupton, 2016) via self-tracking apps renders it an object of biomedical intervention in the form of granular monitoring: Hours slept, heart rate, symmetry of gait, and steps and distance walked all make up parameters of optimization suddenly visible to the participants. By micromanaging these parameters, participants can constantly document and assess their journey towards a successful ageing trajectory, thus helping them "keep track of their own life" (Lomborg & Frandsen, 2016, p. 1022).

Marhánkova (2010) offers a productive interpretation of the concept of active ageing as inherently occupied with older people's effectiveness in managing their health. Within this context, the way apps facilitate insight can be held to increase efficiency in achieving said effectiveness by inviting older people to engage in micromanagement of their quantified selves. As held by Sanders (2017) and Urban (2017), this heightened efficiency, in turn, contributes to reinforcing the norms with which older people seek to align their conduct. However, as illustrated by the results and consistent with the findings of Katz and Marshall (2018), apps can also expand the domain of biomedical intervention to include inactivity. Setting up digital reminders or relying on built-in timers to "get moving" contrasts measurements of steps and heart rate by targeting periods of inactivity rather than activity. As such, inactivity becomes definable as a site of risk to be governed. This is especially the case for Inger, who – after the loss of her husband – utilized apps to actively target her prolonged sedentary behavior. This observation proves consistent with Tulle's (2015) findings of an emerging paradigm in Western sports science and medicine policies wherein the sedentary behavior of older people is targeted as a problem in its own right.

As found by this study, apps may take on a role of gatekeeping when interweaved in the health practices of older people. Corresponding with the findings of Oxlund and Whyte (2014), some participants in this study discursively constructed apps as the prerequisite to intervention and management of their physical health. Returning to the case of Inger, her experienced frustration over the inability to install and use her app illustrates how the act of self-tracking not only increases the efficiency of self-optimization but enables it altogether. This function of enablement stands in accordance with Katz and Marshall (2018), who points out that incorporating even consumer-grade self-tracking devices for health management demands a certain level of technological competencies. While many older Danes possess high levels of technological competency (Ældresagen, 2019), the plethora of usability studies on health apps for older people bears witness to the fact that these competencies cannot be assumed (e.g., Cao et al., 2020; Helbostad et

al., 2017). Moreover, the findings of Naaldenberg et al. (2012) offer a further interpretation of Inger's frustrations, posing that older people's ability to mobilize resources (both social and technical) towards achieving health-related ambitions hinges on feelings of being in control. Situating this perspective within the interpretative framework of active ageing, Inger's frustrations may stem from not feeling in control of the technology, and, as a result, of her efforts towards ageing successfully. In offering these interpretations of Inger's frustration, I propose that future studies consider the embedment of technological competencies in ageing successfully when investigating the meaning of digital technology in ageing.

Limitations and future directions

Only few studies have qualitatively investigated older people's use of apps in a physical health context. Though contributing with rich descriptions exploring both the *how* and *why* of using apps, this study holds several limitations. Results are based on ten participants aged 65–79, all fitting the label of the resourceful "young old" (Dyk et al., 2013), i.e., being in good self-rated health, without care duties for family members, and having work-related technological proficiency. Continuing the contestation of Naaldenberg et al. (2012), the participants recruited in this study possessed resources enabling them to utilize apps for physical health management. However, as Nilsson et al. (2021) remind us, "older people" is a heterogeneous group. Nuanced understandings could be made from sampling, for example, those older than 80, in an ethnic minority group, or simply struggling with smartphones. Shifting attention to the opposite end of the age spectrum, more research is needed on young people's use of health applications as well (Goodyear et al., 2019).

This study fragments the holistic view of health by the World Health Organization (2006) by isolating physical health as a category for app use. Future studies may investigate the use of mental health apps or focus more holistically on users' app-ecologies for health purposes. Such purposes may include aspects of health not covered in this study, e.g., diet, stress management, socializing, or self-acceptance. In such research endeavors, future studies may benefit from employing qualitative methods to investigate uses, meanings, and contexts inherent to the sociotechnical dynamics of older people's app usage.

Conclusion

As the world's population ages, digital technologies may prove valuable in inspiring a healthy lifestyle in later life, but in-depth knowledge on current use is lacking. This study contributes to bridging the gap between effects-based research on older people's app use and critical-sociological studies on self-tracking practices. Self-tracking was found to permeate physical health management practices such as physical activity and sleep tracking, embedding the logic of quantification in self-governing efforts. Thus, apps may both

facilitate and optimize the regulation of conduct by older people seeking to govern their physical health. Applying the governmental concept of active ageing, the discussion contextualized the latent rationales framing the participants' self-tracking practices. Situating my findings within existing research literature, I highlight how participants' utilization of apps becomes intertwined with their efforts towards ageing actively. Conversely, lacking the ability to use apps is perceived by some participants as hindering effective health management, thus clashing with efforts conforming to active ageing. Awareness of these potentials and pitfalls of self-tracking in later life may help nuance public health policies' push for older people to influence their ageing trajectory in highly digitalized societies such as Denmark.

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