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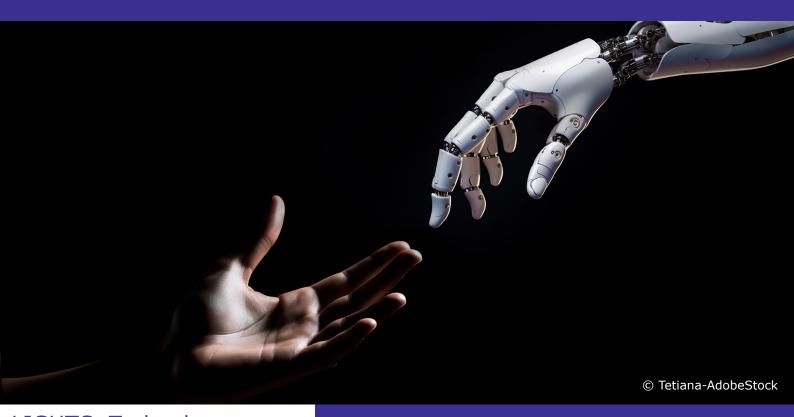**LIGHTS - Technology**

From self-empowerment to self-rejection: On the (un)intended consequences of AI-powered physiological self-tracking

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From self-empowerment to self-rejection: On the (un)intended consequences of AI-powered physiological self-tracking

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Abstract

AI-powered physiological self-tracking, involving technology to monitor biometric data, has primarily been studied within health contexts. However, research gaps persist regarding its broader, non-health-related impacts. With global acceptance of self-tracking as a social norm, understanding its psychological and social consequences beyond health is vital. This paper addresses both positive (e.g., self-empowerment) and negative (e.g., self-rejection) implications of physiological self-tracking as an emerging technological trend, emphasizing the need for comprehensive understanding and strategic management at individual and societal levels.

Keywords: Physiological self-tracking, artificial intelligence, social consequences, psychological consequences

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Introduction

Physiological self-tracking (hereafter self-tracking) refers to the practice of using technology to record, analyze, and reflect on one's biometric data such as one's steps, body temperature, blood pressure, heart rate, and even brain activity. Often, these practices are aided by artificial intelligence (AI) systems, which analyze data and provide recommendations on what, how, and when to do something to achieve a goal.

The widespread adoption of wearable devices such as Fitbit or Apple Watch, combined with the increased presence of the Internet of Things in healthcare has largely accounted for the rising popularity of self-tracking. As of 2023, over one-third of the world's population has reported using self-tracking apps and/or wearable devices to track their biometric data. The worldwide wearables market is valued at 116.2 billion U.S. dollars in 2021 and is expected to reach 265.4 billion U.S. dollars by 2026. Self-tracking is a form of disruptive technology that provides a new type of personal data that transforms how individuals manage their health. Importantly, self-tracking is on its way to becoming a new social norm and is integrated seamlessly into our daily lives. As such, an important question that arises is whether the practice of self-tracking has a broader psychological and social impact that requires our strategic management.

Building on self-tracking technologies' unique characteristics, this paper explores the potential positive (intended) and negative (unintended) consequences of self-tracking beyond its traditional health applications. Specifically, we discuss how self-tracking empowers users through the data that facilitate self-awareness but at the same time undermines the sense of self if such data are not interpreted or managed carefully. These discussions suggest implications regarding how we should manage self-tracking and the user data that such practice generates in the digital age (Paton et al. 2012).

Bright side: self–empowerment through awareness

An integral aspect of self-tracking involves utilizing mobile apps (e.g., Apple Health) and wearable digital devices (e.g., Apple Watch) to collect intimate biometric data that would otherwise go unnoticed by human senses. Several wearable devices (e.g., Oura Ring) can be worn on the body throughout the day and at night to provide 24/7 monitoring and generate vast amounts of data about the body. Such continually generated data of enormous amounts may provide individuals with a sense of self-knowledge, often referred to as "self-knowledge through numbers" (Lupton 2013). Possession of such exclusive knowledge about the body offers individuals a means by which illness and diseases may be prevented. Self-tracking, thus, renders individuals more control over a significant part of their self, enabling them to feel more *empowered*. This sense of empowerment tends to be not domain-specific and could subsequently influence a range of consumer behaviors, beyond the health domain:

Prosociality

Prosocial behaviors, consisting of "helping, sharing, donating, cooperating, and volunteering... are positive social acts carried out to produce and maintain the well-being and integrity of others" (Brief and Motowidlo 1986). Different types of prosocial behavior may

result from different antecedents or processes, but the feeling of empowerment tends to influence prosocial behavior universally. People who believe that they can make a positive impact by engaging in prosocial behavior (i.e., empowered individuals) tend to engage more in prosocial behavior. A feeling of empowerment may also increase individuals' future orientation, making them consider the consequences of their actions, thus more likely to engage in prosocial behavior that has a long-term impact.

As individuals utilizing self-tracking devices gain empowerment through heightened self-awareness, they may behave in a more prosocial manner. Prior research, for example, has shown that physiological self-tracking increases users' organ donation tendencies (Hoang & Ng 2023).

Nonconformity

Nonconformity is generally defined as a behavior or belief that is inconsistent with norms or standards (Nail, Macdonald, and Levy 2000). Nonconformity includes two types of behavior: (i) independence or resisting influence; and (ii) anti-conformity or rebelling against influence. Both types of nonconformity tend to be effective in differentiating people from others, which can satisfy a need for individuation or uniqueness or a desire to distance the self from dissimilar, disliked, or unattractive others or out-group members.

The feeling of power is antecedent to nonconforming behavior. Unlike powerless individuals, powerful individuals can afford to deviate from conventional behavior and common expectations without social disapproval. For example, powerful individuals can adopt nonconforming consumption habits, such as material frugality and simplicity. More powerful individuals can also better resist the influence of others when making health decisions. Similarly, self-tracking users, who become empowered by their enhanced self-awareness, may exhibit nonconforming behavior in their consumption decisions.

Risk-taking

Risk-taking refers to the tendency or willingness of individuals to engage in activities or behaviors that involve potential uncertainty, variability, or the possibility of adverse consequences. Risk-taking offers the opportunity for personal growth and development by challenging individuals to step outside their comfort zones and learn from both successes and failures.

People who feel empowered, for example, through self-tracking, are more willing to engage in risk-taking activities because they have a heightened sense of confidence in their abilities and decision-making capabilities. Moreover, empowered individuals often possess a strong internal locus of control (Rotter, 1966), believing that they have the power to influence their destiny, which further emboldens them to embrace calculated risks in pursuit of their goals.

Executive functions

Executive functions refer to a set of cognitive processes that are responsible for guiding and regulating higher-order mental activities, including planning, problem-solving, impulse control, and decision-making (Hoang & Ng 2023). Executive functions play a crucial role in facilitating adaptive and goal-oriented behavior across various domains of life, including academics, work, and relationships.

Prior research suggests that individuals who hold positions of power or feel empowered (e.g., due to self-tracking) often exhibit enhanced executive functioning abilities, including

better planning, decision-making, and goal management (Smith & Trope, 2006). Specifically, feelings of power or empowerment promote cognitive flexibility and self-regulation by reducing the cognitive load associated with stress and uncertainty, allowing individuals to allocate cognitive resources more effectively to executive functioning tasks.

The downside: unintended consequences of self-tracking

Like any other technology (Lima and Belk 2024), wearable devices are double-edged swords. Their use brings paradoxes that shape consumer experiences of self-tracking, such as food intake, exercise, and sleeping. These paradoxes may come in the form of ideas and feelings of freedom/enslavement, control/chaos, efficiency/inefficiency, and so on. The consequence is a series of psychological coping strategies that individual consumers experience in relation to the stresses, ambivalences, and conflicts that are shaped by contemporary neoliberal notions of productivity.

Moreover, with the integration of AI features, contemporary self-tracking devices have evolved, introducing a new layer of complexity to their usage and impact on users. This means that while enthusiasts argue that tracking personal data enhances awareness and motivates behavior change, critical examinations reveal a complex interplay between self-tracking practices, negative effects, and their relation to AI (Baron et al. 2017). The latter is responsible for the data displayed on the screens and related recommendations on what, when, and how to do something to be(come) better. Such a human-technology entanglement is critical. AI-powered algorithms within self-tracking devices introduce new complexities to the commodification of life, as these algorithms mediate consumers' interactions with their tracked data and shape their understanding of themselves (Lupton 2013). It becomes imperative to adopt a critical position towards self-tracking practices and their integration with AI. Rather than perpetuating normative categories and predefined notions of health and well-being, discussions about self-tracking practices and AI-powered wearable devices should strive to accommodate the complexities and nuances of individual experiences (Baron et al. 2017). Aiming to contribute to such debate, we explore three key challenges and related unintended, unpleasant, and eventually disempowering aspects of self-tracking.

Self-deprecation

Most consumers need to learn how to navigate and negotiate their interpretations of biomarkers data vis-à-vis AI-generated insights. Not all of us know beforehand the meanings behind what we see on screen, which suggests that a proper degree of digital and biological literacy may be required to fully experience the benefits of self-tracking devices. This is a key idea in Nagele and Hough's (2024) work. They show that the normative encoding of "how to be good or do well" categories in tracking devices clash with consumers' individual experiences of themselves. Eventually, self-trackers get confused and frustrated when the wearable device describes specific events using words with conflicting connotations or that contradict their actual experience. This lack of coherence makes it difficult for them to understand the information being presented. This means that the favoring of AI interpretations and suggestions over their own feelings and beliefs underscores their agency in resisting, coping with, or benefiting from the homogenizing effects of algorithmic categorizations. As a result of this mismatch, self-deprecation may arise and thoughts like "I don't understand this tech," "This may be my fault," "I did something wrong," "I can't do anything right," and so on, become an unhealthy part of the self-tracking experience.

Self-oriented perfectionism

One promise (and goal) of AI-powered systems is to make the decision-making process flawless, almost inhumanly perfect to an extent. Perfection, or at least the idea of it, is, therefore, a key component of tech discourses and related daily behaviors. But for humans, striving for flawlessness, setting exceedingly high standards of performance, and having the tendency to think in extremes, either complete success or total failure, is what Hewitt and Flett (1991) call perfectionism. This is a personality trait that can be directed towards the self and lead to the pursuit of unachievable ideals of self-perfection. The outcome, Hewitt and Flett (1991) explain, is anxiety and depression. One example of such a phenomenon is orthosomnia. This is a quest to achieve "perfect sleep" similar to the unhealthy fixation on healthy eating, known as orthorexia (Baron et al. 2017). Sleep-tracking devices, such as the Oura Ring, promise the optimization of the self by framing sleep as a measurable performance that can be improved upon through diligent tracking and analysis. However, the reduction of sleep to scores, to numbers, to objective data neglects subjective experiences and situational factors, overlooking the intricacies of sleep's entanglement with various internal and external influences. Consequently, self-trackers run the risk of experiencing anxieties surrounding sleep, which only perpetuates a cycle of sleep-related distress.

Self-commodification

We live in a data economy, where everything we do, from production to distribution to consumption, is data-driven. This means that every bit and byte is potentially a commodity, regardless of its origin. However, capturing and further monetizing personal data from self-tracking raises ethical concerns about data privacy, anonymity, and, ultimately, well-being. The tricky point here is that health-related data is more sensitive in terms of legal and ethical considerations than other types of data, such as grocery purchases. It becomes even more complicated when companies use this data to target their marketing campaigns and profit from their customers' vulnerabilities. For example, GoodRX, a US-based telehealth company, shared consumer health data with third-party companies such as Google and Facebook without the customer's consent, with the intention of optimizing their online advertising campaigns. As a result, the Federal Trade Commission (FTC) imposed a fine of 1.5 million USD on the telehealth company. This example highlights that self-trackers may be unknowingly contributing to the perpetuation of blurred boundaries between persuasion and manipulation, helping and harming. They may be victims of the commodification of their own personal data, which in turn may exacerbate psychological issues related to self-esteem and self-image, leading to high levels of stress.

Conclusion

While self-tracking holds promise for empowering individuals and promoting positive behavioral change, navigating its complexities and challenges requires careful consideration of its broader psychological and social impact. The inclusion of AI features makes the technology especially difficult to manage, adding layers of complexity to its impact. As self-tracking continues to become a widespread phenomenon in modern life, awareness of both the positive and negative broader consequences of these disruptive technologies is crucial. Through ongoing dialogue and research, we can strive to harness the potential of self-tracking technologies to promote well-being and enhance the human experience in the digital age while mitigating potential risks and safeguarding individual autonomy and privacy.

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