

# Better Living Through Creepy Technology? Exploring Tensions Between a Novel Class of Well-Being Apps and Affective Discomfort in App Culture

JOHN S. SEBERGER, Drexel University, USA

HYESUN CHOUNG, Michigan State University, USA

JAIME SNYDER, University of Washington, USA

PRABU DAVID, Rochester Institute of Technology, USA

Well-being apps promise to improve people's lives. Yet evidence shows that the data-hungry app culture that contextualizes well-being apps normalizes the user experience of affective discomfort. This apparent contradiction raises a difficult question: Is it *responsible* to ask people to improve their well-being by engaging further with an app culture that normalizes affective discomfort? We approached this question by deploying an online, scenario-based survey ( $n = 688$ ) about a fictional, but realistic well-being app called "Thalia." Thalia represents a novel class of well-being apps that are envisioned to: (i) utilize AI-driven facial recognition and analysis; and (ii) collect data for use in medical contexts. We found that people perceived Thalia to be affectively discomfiting even as they judged Thalia to be beneficial. Such findings imply a trade-off between 'better living through technology' and the negative affective implications of surveillance capitalistic app culture. Such a trade-off necessitates high-level analysis of just what "well-being" means in the context of contemporary app culture. Through analysis and discussion, we explore a troubling interplay between novel well-being apps and affective discomfort that requires careful attention from HCI researchers if human-centered well-being – flourishing – is truly what our products are intended to foster.

CCS Concepts: • **Human-centered computing** → **Empirical studies in HCI**.

Additional Key Words and Phrases: affective discomfort, creepiness, well-being, apps, app culture, facial analytics

## ACM Reference Format:

John S. Seberger, Hyesun Choung, Jaime Snyder, and Prabu David. 2024. Better Living Through Creepy Technology? Exploring Tensions Between a Novel Class of Well-Being Apps and Affective Discomfort in App Culture. In . ACM, New York, NY, USA, 38 pages. <https://doi.org/XXXXXXX.XXXXXXX>

## 1 INTRODUCTION

Apps are an integral part of daily life for hundreds of millions of people in the United States. They routinely shape relationships between individuals and their external worlds (e.g., city streets [95], sexual encounters [9, 129], food [13, 28], etc.). But, apps are increasingly deployed to mediate people's *inner worlds*, too. So-called "well-being apps" abound [67, 71], promising a wide range of behavioral benefits to augment the paint-by-algorithm schemes of people's quantified *selves* [63, 64]. Within the extant ecology of well-being apps, a new class of such apps is emerging: a class that deploys AI-driven facial recognition and analysis to track well-being. Notably, such novel well-being apps are envisioned directly in relation to their utility in medical contexts. Yet as we slip into AI-driven futures where anthropocentric ontologies no

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Manuscript submitted to ACM

longer seem to make much sense, the meaning of “well-being” is even less clear than the term *eudaimonia* to first-year philosophy students.

Despite the topically distinct functionality of well-being apps (i.e., to yield something called “well-being”), such apps do not exist in a vacuum. By virtue of *being apps*, they are part of a broader app culture [98, 99] grounded in techno-solutionism (see [72, 121]) and the exploitative data practices associated with the political economics of surveillance capitalism [128]. Such a surveillance-capitalistic app culture, in which end-users represent little more than sources of monetizable behavioral surplus, is characterized by digital resignation [30], deceptively conditional empowerment [98], and the normalization of *affective discomfort* [101, 107], including creepiness.

In acknowledging the affectively discomfiting sociotechnical context of app culture [98, 101], deep questions emerge about so-called well-being apps: Does reducing well-being to the collection and analysis of monetizable data challenge the longer history of humanistic well-being (i.e., ‘flourishing’ [121])? Or, more simply, does ‘better living through technology’ merely limit the scope of what ‘better living’ might entail in order to perpetuate the lucrative proliferation of apps into evermore areas of life?

To begin engaging in critical examination of the tensions represented in the questions above – tensions between *user* perceptions of data practices associated with surveillance capitalism and the possibility of *researchers* inadvertently reshaping the discourse of well-being to align with such practices –, evidence is required. As such, our work is motivated by two empirical research questions:

**RQ1:** If well-being apps are perceived to be beneficial, does that preclude them from being *creepy*?

**RQ2:** If not, then what factors associate with the perception of *affective discomfort* related to well-being apps?

Such empirically-oriented questions (RQs 1 and 2) build to a third, discursively-oriented question:

**RQ3:** What might the identification of such factors imply about the possible achievement of well-being through deeper enrollment in the data-hungry app culture driven by the economics of surveillance capitalism?

To answer RQs 1 and 2, we deployed an online, scenario-based survey to crowdworkers (mTurkers) on the Amazon Mechanical Turk (AMT) platform ( $N = 688$ ). Using IRB-approved protocols, we exposed participants to scenarios that described a fictional well-being app called “Thalia.” To reflect characteristics of novel well-being apps (see Section 2.2), Thalia was described as deploying self-report *or* AI to monitor well-being; Thalia was also described as doctor-recommended. To ensure external validity based on prior work that shows the normalization of affective discomfort in relation to contemporary app data practices [98, 101], Thalia was also depicted as engaging in three common types of privacy-invasive data practices associated with surveillance capitalism [101]. Such data practices implicitly situate Thalia within the contemporary economically-motivated app culture in which the value of data (and the brokering thereof) motivates data collection. Further, such invasive data practices were described as quickly resolvable to reflect recent, mass-market advances in usable privacy (e.g., privacy-focused updates to iOS). After reading their assigned scenario, participants completed three measures, including the Affective Perceptions Measure (APM) [101], the App Information Privacy Concern scale (AIPC) [14], and the Learned Helplessness Scale (LHS) [89]. Participants responded to questions about the perceived beneficiality of well-being apps, prior use of well-being apps, and prior use of facial recognition (e.g., for smartphone login). We used ANOVAs to answer RQ1; we used multiple linear regression (MLR) to answer RQ2 (i.e., to test hypotheses about factors associated with affective discomfort). We answer RQ3 through discussion of our findings grounded in literature from HCI, ethics, and humanistic/existential psychology.

Across all scenarios, participants judged Thalia to be realistic, beneficial, *and* creepy. Such judgment indicates that the perceived beneficiality of well-being apps that deploy the privacy-invasive data practices of surveillance capitalism does

not preclude such apps from eliciting affective discomfort in the form of creepiness. We then identified six factors drawn from the APM, AIPC, LHS and direct measures of prior technology use that predict affective discomfort about Thalia. We list such factors here in order of their importance in the MLR model: (i) privacy-related anxiety; (ii) perceived data literacy (i.e., the self-assessed extent to which people believe they understand an app’s data practices); (iii) ambivalence toward app data practices (i.e., not knowing how to feel about the way an app uses data); (iv) prior use of facial recognition for smartphone login; (v) prior use of well-being apps; and (vi) learned helplessness (i.e., the belief that one does not have control over the outcome of events). The perceived benefits of Thalia *did not* predict affective discomfort about Thalia either positively or negatively.

Through presentation and analysis of these findings, we make the following contributions:

- demonstrate that well-being apps can be perceived to be affectively discomfiting (i.e., in the form of being “creepy”) even when they are perceived to be beneficial;
- identify factors associated with the perception of affective discomfort about novel well-being apps in relation to the economically motivated data practices of surveillance capitalism;
- provide empirical evidence of the previously theorized relationship between creepiness (i.e., a member of the set “affective discomfort”) and learned helplessness;
- identify a troubling and implicit assumption that engagement with well-being apps may heighten metricated forms of comparative well-being, while perpetuating surveillance capitalistic data practices that degrade the conditions of daily life against which such ostensible well-being is compared.

In the sections that follow, we use literature from HCI to frame our RQs, ground our scenarios in real-world examples of new well-being apps, and formulate hypotheses. Following the presentation of our method and findings to answer RQs 1 and 2, we engage with RQ3 by discussing the need to account for latent evaluative assumptions about well-being and their implications for developing well-being research agendas in HCI grounded in humanistic psychology and existentialism. In this way, our empirical work performatively builds toward, and feeds into, a theory-oriented discussion of emergent well-being agendas within HCI research and practice. Finally, we provide a detailed discussion of our study’s limitations and a summary conclusion.

## 2 RELATED WORK

In this section, we provide an overview of literature about well-being from HCI, including a discussion of apps designed to enhance, track, and/or monitor well-being through an expanding set of functionalities including facial recognition and analytics. Second, we present an overview of work in HCI about well-being’s obvious foil: affective discomfort. We provide an expanded and exploratory definition of affective discomfort based on a synthesis of recent work in HCI. We use this literature review to frame our RQs, situate the construction of our scenarios, and justify the formulation of hypotheses.

### 2.1 Well-Being in HCI

The majority of HCI work on well-being stems from experimental psychology (i.e., scientific psychology [116]) and the relatively recent emergence of positive psychology.<sup>1</sup> Positive psychology generally relies on two assumptions. The first is critical: that empirical psychology (in which the field of HCI has deep roots [4, 12]) focuses too narrowly

<sup>1</sup>Experimental psychology has a history of at least some 130 years; positive psychology emerged in the late 1990s and early 2000s [24, 26, 103], although Csikszentmihalyi was active in research on creativity that would contribute to the development of positive psychology as early as the 1980s.

on abnormality, dysfunction, and the like, rather than humanistic strengths of character and such phenomena as creativity and happiness [24, 25]. The second is epistemological: that positive aspects of human behavior (e.g., creativity) can be understood through and by means of quantification – just the same as defects, discomforts, and pain. Such assumptions yield a pervasive evaluative mode of quantification: an assumption that, as with nearly everything in our computer-mediated realities, well-being can and should be quantified such that it might be improved. Such an evaluative mode is not necessarily problematic (*cf* [121, p.160-166]), *per se*, but becomes problematic in the context of surveillance capitalism [128], wherein processes of quantification (e.g., datafication) are entangled with exploitative and dehumanizing economic practices. In the context of surveillance capitalistic app culture, orienting the discourse of “well-being” in a data-driven way may fundamentally reshape the discourse in such a way as to foster a limited form of well-being possible through the dehumanizing practices of data-hungry apps.

Despite an abundance of literature describing relationships between well-being and such behaviors as social media use (e.g., [32, 87]), mental health technology use (e.g., [126]), chatbot interactions (e.g., [108]), and the use of paternalistic and reductive “self-care” apps [110], a surprisingly vague definition of well-being pervades. The concept often receives only implicit positive definitions, defined against mentions of “wellness” (e.g., [31]), “living well” (e.g., [22]), “life satisfaction” through the acquisition of social capital (e.g., [91]), “autonomy” or “independence” (e.g., [18, 126]), “balance” (i.e., between use/non-use [127] or use and compulsive use [29]), the experience of positive moods (e.g., [123]), “non-judgemental mindfulness” [60] and “reflectiveness” (e.g., [48, 52]). Rare, explicitly positive definitions of well-being relate it directly to mental health, where the treatment and management of mental health yields a state of well-being [96]. Such explicit framing in relation to mental health, however, challenges historical and humanistic notions of well-being. As Vallor points out [121, p.160], measurable psychological constructs that appear topically synonymous with “well-being” are emphatically not measurements of the “human flourishing [...] that is the motivating aim of ethical life.” The reduction of “flourishing” to metricated well-being *through* the deployment of apps entrenched in a wider culture of surveillance capitalism necessarily questions just what “well-being” means in HCI. Such a question resounds in the spaces between the limited definitions provided in the literature cited above.

Conversely, implicit negative definitions of well-being emerge through discussions of depressive affect (e.g., [106]), social isolation and stress (e.g., [10]), “deviant eating behavior” [73], and such medically detrimental behaviors as smoking (e.g., [94]). Well-being is also increasingly contextualized as a personal responsibility. Such contextualization, however, produces an oxymoron: the prospect of *being well* through neo-liberal processes of responsibilization (see [23, 85]; *Physician, heal thyself!*)

While each of the aforementioned works makes valuable, meaningful, and insightful contributions to a specific niche area of HCI, from a higher perspective, it is not clear that “well-being” demonstrates construct validity. Rather, it appears to represent a well-meaning orientation among researchers and practitioners to improve people’s experiences of themselves *through* technology with relatively little consideration of how technology filters concepts of “well-being.” We contend that one mode of filtering is found in the prevalence of surveillance capitalistic data practices – practices that always already construct end users as mere sources of behavioral surplus [128].

Conceptual boundaries between “well-being” and “health” remain persistently blurry – particularly when mediated by the construct of “the user” [19]. Such blurry differentiation leads to predictable and discipline-related controversies: is app-driven well-being a problem best addressed in the computing, psychological, or medical fields? Such controversies necessitate interdisciplinary investigation, particularly given that makers of novel apps – always already defined by the contemporary epistemic-economic culture of surveillance capitalism – are positioning their apps in relation to medical professionals, as we will describe in Section 2.2. Dubious differentiation between “digital well-being” [21, 29]

and “well-being” further complicates matters, uncritically reifying the *digital/real* divide that the tremendous successes of research in HCI and related fields has increasingly rendered moot by producing computer-mediated realities.

Still, recent work at CHI frames the problem of well-being so well that it merits direct quotation [29]:

“Well-being is a relative concept in two related ways. First, the ‘well’ in well-being mobilizes normative judgements about how humans should best live their lives. Second, the ‘being’ in well-being requires an ontological definition of what the human being is. Determining what is good for the human, as such, is always an evaluation of what the human individual is and ought to be.”

The ontological problem presented by Docherty and Biega [29] is obvious: in relation to metrication, the human is ontologically constructed as something that *can* be captured with excusable lossiness in and through the collection of data; the human about which monetized well-being apps are concerned is an objectival construction of *the laboratory*. Such an ontological construction of the human as an object – adequately representable through processes of datafication that are less and less separable from the financial *modus operandi* of surveillance capitalism – places exceptional emphasis on the grammatical function of “well” [29]. The comparative function of “well,” in the context of surveillance capitalistic app culture, wholly enfolds the human in the sociotechnical conditions of metrication as it edges out those aspects of being human that do not fit within the narrow conceptual walls of the monetized laboratory. The cumulative effect is potentially, but implicitly, to redefine “well-being” so narrowly as to be achievable through engagement with data-hungry apps. Such redefinition precludes engagement with the deeper question of whether the means by which well-being apps collect data is not already a degrading agent relative to “flourishing” [121].

Thus, we approach well-being as an aspirational and comparative state always already in flux. Such flux is, in the 2020s, dominated by the emergence of novel technologies, or the deployment of existing technologies in novel contexts which reifies the *a priori* (and economically motivated) assumption of ‘better living through technology.’ Given its roots in empirical psychology, we contend that well-being is paradoxical: abstractly referring to an holistic condition of *being well* that is blithely metricated through surveillance capitalistic modes of objectifying data collection and quantification – a pronouncement-by-action that the “human individual is and ought to be” [29] understood first as a permanent resident of the monetized laboratory, and second through the forms of quantitative reduction that support the monetized laboratory.<sup>2</sup> The rampant commodification of data under the regime of surveillance capitalism [128], however, implies that one must enroll in a dehumanizing [19, 97, 113] culture of objectifying datafication in order to achieve the forms of well-being such a culture of economically-motivated quantification allows. Enter: well-being apps.

## 2.2 Apps for Well-Being

Facilitated by smartphone saturation and readily accessible app distribution channels [104], many one-off apps and powerful platforms now purport to measure, track, and optimize user well-being [71]. McKay et al [67], for example, identified an initial set of roughly 200,000 apps oriented towards health and behavioral change available on the Australian iTunes and Google Play stores by using “health and well-being key search terms.” Some 5,000 of those apps specifically aligned with self-improvement behaviors, such as healthy eating, fitness, and mental health.<sup>3</sup> While such apps are not limited to a unified concept of “well-being,” the sheer number of them reflects the options available to everyday

<sup>2</sup>We explicitly do not contend that datafication cannot contribute to well-being; rather, we contend that when contextualized by the political economics of surveillance capitalism, datafication is always already dehumanizing and therefore does not apparently align with all but the most esoteric and *ad hoc* definitions of “well-being.”

<sup>3</sup>Notably, others actively encouraged medically negative behaviors like smoking. To highlight the normalized evaluations latent in this darkly humorous case, we call to mind a passage from the Thom Jones short story, “The Pugilist at Rest”: “[...] we shared the overmastering pleasure that tobacco can bring if you use it seldom and judiciously. These were always the best moments of the day” [51].

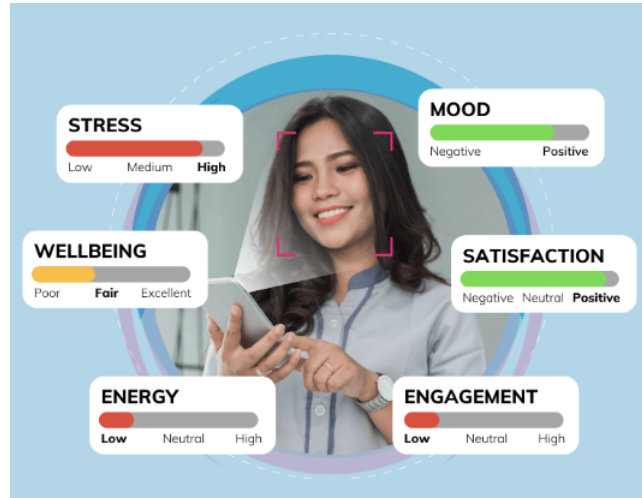


Fig. 1. Illustrative graphic of SOLO app depicting information outputs about affective states (including well-being) derived from computer vision (i.e., facial analysis). Screenshot from <https://www.imsolo.ai> on August 10, 2022.

people when and if they seek to enroll an app in the optimization of their behaviors. McKay et al [67] identified 27 apps specifically intended to improve people's "mental well-being." Related research [71] identified 42 apps that monitor "digital well-being" and encourage behavioral change among users through the presentation of standard forms of information (e.g., usage charts, etc.). Given the present availability of well-being apps, often backed by powerful institutions and infrastructures that confound data privacy [59, 93], it becomes necessary to effect a near-future gaze: to understand how expanded functionalities brought about by AI's golden decade may be received in the context of well-being.

Rapid developments in computer vision, including facial recognition and the use of facial analytics to recognize affect, yield a novel class of well-being apps that has not received direct, human-centered coverage in the literature.<sup>4</sup> Such apps purport to measure and track well-being through the use of smartphone cameras. Notably, theories underlying such a class of apps have been presented via the feminist concept of performativity [58], although it is unclear just how (or if) such theorization has been deployed in the wild to emphasize the co-construction of emotion, rather than merely the quantitative metrication and feedback thereof.

Contemporary examples of this novel class of "seeing" well-being apps include SOLO and TrueBlue. According to its developers, the SOLO app "detects, analyzes and monitors emotional well-being in real time using a device's built in camera in a non-invasive, easy to use, science-backed way."<sup>5</sup> (See Figure 1.) TrueBlue, developed by the company BlueSkeye, uses a combination of voice-analytic, facial analytic, and self-report data to allow users *and doctors* to assess mental health and well-being.<sup>6</sup> BlueSkeye describes the goal of TrueBlue as:

"long term self-monitoring that can help end users to gain a deeper insight into changes in their emotional states which can help them better understand themselves and identify negative mood changing trends at

<sup>4</sup>This is to say nothing of devices that merge haptic and visual display to present feedback about aspects of "well-being" (e.g., Happy Ring, FitBit Sense 2, and related jewelry [1]) or use in-home ambient monitoring systems [47], or in-car app-based interventions [56].

<sup>5</sup><https://www.imsolo.ai/about/>

<sup>6</sup><https://apps.apple.com/us/app/trueblue-data-volunteer/id1544794809>

early stages. Such long term monitoring data enables end users to perform frequent self assessments of their overall mental health as well as assist doctors in prompt and more precise mental health conditions diagnosis compared to conventional medical questionnaires to identify and monitor a variety of mental health conditions, such as depression.”

BlueSkeye’s choice to situate their well-being app, TrueBlue, within a vision of futures wherein medical doctors utilize data from such apps in mental health management is key to this study. While meaningful differences exist between the research domains of mobile health (mHealth) (e.g., [33, 54]), mHealth for mental health (e.g. [7, 8, 50]), and “well-being” (see Section 2.1), the apparent disciplinary differences that distinguish these domains in research and scholarship are not so clear in the wild. For example, prior work has demonstrated that a market for prescription apps exists alongside a burgeoning practice of prescribing applications [39, 81]. Such work identifies a set of possible futures characterized by a merger between healthcare and the data practices of surveillance-capitalistic app culture [99]. Further, recent work [100] has demonstrated that people in the US recognize the possibility of a practical merger between the data-hungry practices that characterize surveillance capitalism [128] and the provision of healthcare. The same work reveals people’s fears over such a merger [100].

Of similar importance is SOLO’s use of “science-backed” as a means of framing their app. In the context of a well-being app, “science-backed” has a few possible meanings. On the one hand, it may refer exclusively to the science deployed to yield algorithms capable of assessing one’s well-being, however “well-being” is operationalized. On the other hand, “science-backed” may also prime users to associate SOLO with the rigor of medical and psychological sciences. Such language may further prime a public vision of “science” in which it is reduced to mere data analysis through and by means of sensors and infrastructures inherently tied to the monetization of data (e.g., behavioral surplus) [128]. Each possible meaning smacks of *scientistic* authority – the adoption of objectivist rhetorics without the critical philosophical reflection that is core to the *scientific* method.<sup>7</sup> Perhaps most confoundingly, “science-backed” implies a nebulous merger of casually quantified “well-being” data with *the medical and psychological*, indicating a need for future-oriented work that explores the possible discursive mergers of an app culture grounded in surveillance capitalistic data practices [128] and medical and psychological sciences.

Promotional materials provided for both apps necessitate the adoption of a speculative future gaze in which apps have been more completely enrolled into the achievement and maintenance of “well-being,” where “well-being” is sociotechnically constructed through an emergent assemblage of apps, data practices, and economics that situates the discourse of “well-being” in a monetized quantitative evaluative mode [29]. Thus, while other examples of novel well-being apps exist, the SOLO and BlueSkeye apps ground the present research and serve as the primary inspiration for the scenarios we discuss in Section 3.

### 2.3 Affective Discomfort

Well-being implies the existence of ill-being, which can be characterized through the experience of persistent affective discomfort. Recent HCI research focusing on affective discomfort [101] posits that the experience or perception of creepiness is one phenomenon within a broader set of affectively discomfiting experiences that arise in relation to technology use. Such work has its roots in three domains: (i) affective aspects of privacy (e.g., [55, 76, 111]); (ii) an increasingly long lineage of research about creepiness and creepy user experiences (e.g., [86, 98, 107, 114, 117, 119, 120]);

<sup>7</sup>Herzfeld [45] provides an accessible definition of *scientistic*: “A *scientistic* scholar, one who adopts the rhetoric of exact science without subjecting it to critical analysis, claims that the only reality is one that can be measured, using the instruments – all of them, be it noted, human inventions – that are available to us; all else is froth, irrelevant detail that should not be allowed to interfere with the hard facts that make for scientific certainty.”

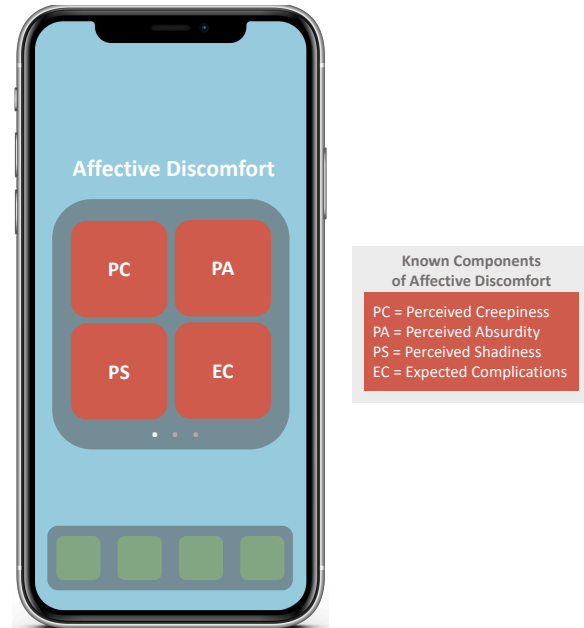


Fig. 2. A representation of the four known components of affective discomfort in surveillance capitalistic app culture.. Based on work presented by Seberger et al [101].

and (iii) existentialist-motivated work on the experience of absurdity in relation to the digitization of daily life [37, 53, 61, 97]. Research on affective discomfort is generally aligned with both third- and fourth-wave HCI, given their emphases on the importance of subjective experience in relation to computing and the scalar changes to subjective experience that computing begets [11, 12].

According to recent work by Seberger et al [101], and built upon work from the field of psychology [57], *affective discomfort* is a superset of phenomena that includes, but is not limited to: the perceived creepiness of data practices (e.g., [101, 107, 125]); existentially absurdist [17] realizations in relation to the use of technology [97]; the sense that there is something “shady” [57] about an app or its data practices; and the anticipatory frustration of complications arising from the use of new apps [101]. (See Figure 2.) Testing the limits of Seberger et al’s findings [101], we port their nascent theory of affective discomfort in app use to the realm of AI-enabled, app- and data-driven well-being. Given the prevalence of “creepiness” within the HCI literature, we tentatively identify “creepiness” as the flagship experience of the superset “affective discomfort.”

Generally, research about people’s experiences of affective discomfort in relation to app use seeks to account for several lingering problems in HCI work – particularly privacy-related work. Discourses about privacy calculus, for example, often (unintentionally) construct people who use apps as strictly or predominantly rational actors, despite ample evidence to the contrary. While people *are*, indeed, rational at times, they are also motivated by emotions – feelings, affective states [77]. Focus on affective discomfort seeks to foreground the role that feelings play in app-use decisions, thereby confronting the implicit, objectifying dehumanization of users (see [19, 82, 113]) that quantitative-reductionist evaluative assumptions perpetuate within the data-hungry app culture of surveillance capitalism. Based on the work



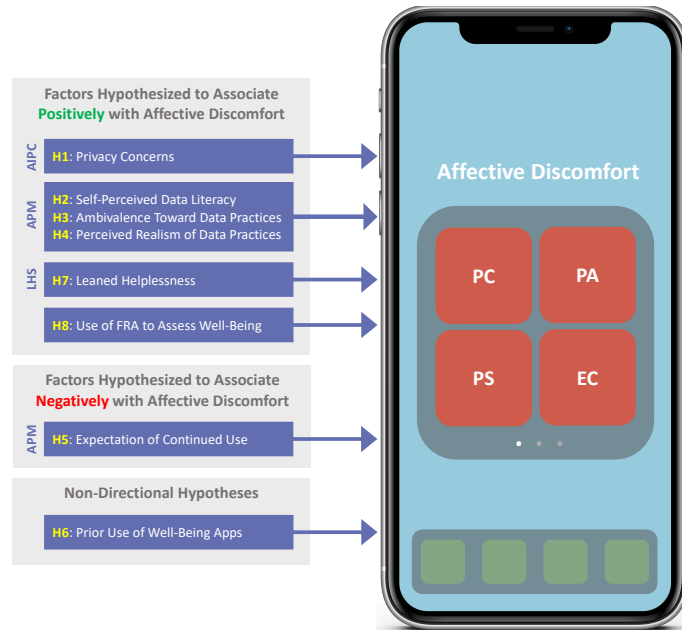


Fig. 3. Conceptual map of the eight hypotheses and their possible association with affective discomfort and its four principal components.

of Seberger et al [101], we present a series of hypotheses about possible factors that contribute to the perception of affective discomfort. (See Figure 3). We describe and justify such hypotheses in the text that follows.

In addition to limning the parent category of affective discomfort, Seberger et al [101] found that several factors negatively predicted the continued use of a fictional music-identification (i.e., audio fingerprinting) app that employed surveillance capitalistic data practices. These included: (i) four factors associated with perceived affective discomfort (see Figure 2); (ii) privacy concerns (measured by the AIPC [14]); (iii) perceived data literacy; (iv) ambivalence toward an app’s data practices; and (v) the perceived realism of an app’s data practices. Given the interrelationships of these factors, our hypotheses focus on the ways that these factors individually and collectively associate with perceived affective discomfort. (See Figure 3.) Thus, we formulate our first four hypotheses relative to RQ2:

- H1:** App information privacy concerns positively predict the perception of affective discomfort.
- H2:** Perceived data literacy positively predicts the perception of affective discomfort.
- H3:** Ambivalence toward an app’s data practices positively predicts the perception of affective discomfort.
- H4:** The perceived realism of an app’s data practices positively predicts the perception of affective discomfort.

Although we are not presently concerned with factors contributing to the expectation to *continue using* an app that employs creepy data practices, we *are* concerned with factors contributing to perceptions of affective discomfort about well-being apps and their data practices within the broader culture of surveillance capitalism. We justify the extrapolation of findings about a fictional music-identification app to the context of well-being apps based on work in which users were observed to engage in “hyperbolic scaling” (i.e., to assume that negative data practices of one app are to be expected in other, unrelated apps) [98].

Given that Seberger et al [101] found an inverse relationship between perceived affective discomfort and the expectation to continue using an app, we make a similar hypothesis:

**H5:** The intention to continue using an app negatively predicts the perception of affective discomfort.

Prior work shows that familiarity with a given technology is associated with adoption of, and trust in, that technology (e.g., [20, 83]). However, given differences between the sample and technology examined in the present study and those discussed in prior work, we do not make directional hypotheses about the impact that prior use of well-being apps and the perception of affective discomfort, but expect a relationship to exist:

**H6:** Prior use of well-being apps is associated with the perception of affective discomfort.

Core work in the area of creepy user experiences (i.e., a subset of affectively discomfiting user experiences) theorizes a relationship between the perception of creepiness and learned helplessness [107]. Based on this work, we expect that learned helplessness will positively predict the perception of affective discomfort:

**H7:** Learned helplessness positively predicts the perception of affective discomfort.

Given ongoing controversies about facial recognition technologies, as well as profound wariness about the societal benefits of such technologies [112], we expected that participants would perceive of higher levels of affective discomfort when a well-being app uses facial analytics rather than self-report to monitor user well-being:

**H8:** People will perceive of higher levels of affective discomfort when well-being apps use facial analytics rather than self-report as a means of data collection about well-being.

We make no hypotheses regarding the role that perceived benefit to oneself, to others, or to society may have on the perception of affective discomfort relative to well-being app data practices and functionalities. Similarly, we make no hypotheses as to the possible role that quickly resolved privacy-invasive data practices may have in affective discomfort about Thalia.

### 3 METHOD

Presently, we provide descriptions of scenario development and survey components. We then describe data collection, eligibility criteria, and sample characteristics. All procedures and materials received IRB approval.

#### 3.1 Scenarios

Based on the examples of the SOLO and TrueBlue apps described in Section 2.2, we developed a set of scenarios to assess the impact of various factors on people’s perception of affective discomfort about a fictional, but realistic and doctor-recommended well-being app. Our scenarios comprise a form of infrastructural speculation [99, 124], in which we meld the appearance of “creepy” (i.e., affectively discomfiting) data practices [101] such as are normalized in the context of surveillance capitalism [128] with concrete examples of novel well-being apps. Such novel well-being apps (see Section 2.2) push the envelope of common well-being apps by making use of facial recognition and analytics to observe and metricate user well-being. We deploy a speculative approach to facilitate understanding of how people may affectively interpret possible futures at the intersection of app culture and well-being. Presently, we describe the factors we considered when constructing our scenarios.

First, we considered the *functionality* of the app: whether people used the app to monitor well-being by engaging in (i) self-report (SR) of well-being or (ii) whether the app used automatic facial recognition and analytics (FRA) to collect well-being data automatically. Second, we considered the type of affectively discomfiting data practices employed by

Thalia. Based on work by Seberger et al [101], which was itself based upon engagement with the work of Langer and König [57] and Wozniak et al [125], such discomfiting data practices included violation of expectations (VE), breach of personal boundaries (PB), and ambiguity of threat (AT) [101].

Yet our approach differs from that taken by Seberger et al [101]. Their work focused on how creepy data practices influenced people's intentions to continue using an app. We focus on how the combination of context, functionality, and data practices that implicitly situated Thalia within the economics of surveillance capitalism relate to people's perception of affective discomfort regarding a well-being app that reflects recent advances in the design and functionality of well-being apps. Further, Seberger et al [101] emphasized differences in forms of privacy-invasive data practices and their resolution or non-resolution. Unlike that work, and given recent, market-facing strides in privacy-enhancing smartphone features, we presented each form of privacy-invasive data practice as quickly and apparently resolved. Such decisions were made in service to achieving external validity as described below in Section 3.1.3. Depictions of privacy-violating data practices associated with surveillance capitalism implicitly ground Thalia in the highly monetized market of app culture.

The decision to situate the core scenario, which serves as a control condition in our experimental setup, and all variations thereof in the context of a doctor's recommendation is doubly justified: first by the characteristics of, and promotional materials for, emergent well-being apps like SOLO and TrueBlue (see Section 2.2); second, by the increased responsibility that primary care physicians (PCPs) have for identifying and treating mental health (i.e., medicalized well-being) problems in the US [79].

According to the Centers for Disease Control (CDC), roughly 82% of adults in the US visited a doctor in 2021; in the same year, a further 91% of people under the age of 18 visited doctors in the US.<sup>8</sup> Roughly 50% of these 800 million visits took place with PCPs – physicians who, within the US medical system, are responsible for patients' general health. Such responsibilities increasingly include the identification and maintenance of mental health (i.e., a medicalized variation of "well-being") [78, 118]. Given the commonness of visits to PCPs in the US, the high prevalence of mental illness in the US,<sup>9</sup> PCPs' role in identifying and managing mental health among their patients, and the effects of neo-liberal responsibilization in PCP medical practices [69], we situate our scenarios in an emergent discursive assemblage of medicine and app-based technology that may seem stranger on the page than it is in actuality.

**3.1.1 Core Scenario.** The core scenario functions as a narrative baseline.<sup>10</sup> It describes a fictional, but realistic, well-being app called, "Thalia," and serves as the basis for textual additions that comprise each of the other six scenarios:

**Core Scenario:** *Last month, your doctor recommended that you start using a smartphone app called Thalia, which is designed to help people track and manage their well-being. Your doctor explained that well-being describes a balance between feelings like happiness, sadness, contentment, and fulfillment. "Using Thalia," your doctor said, "will help you and me monitor and understand your well-being and how to improve it." Your doctor also informed you that, "Thalia will regularly share data-driven insights with you and me, in addition to providing you with clinically proven behavioral suggestions on a daily and monthly basis."*

The core scenario sets the tone for each of the other scenarios and variations in the study. To achieve realism [70], the description of Thalia draws on information about the SOLO and TrueBlue apps, as well as language from various implicit definitions of well-being found in the HCI literature (see Section 2). Further, by framing Thalia as a doctor-recommended

<sup>8</sup>See: <https://www.cdc.gov/nchs/fastats/physician-visits.htm>.

<sup>9</sup><https://www.nimh.nih.gov/health/statistics/mental-illness>.

<sup>10</sup>Please note: scenario titles presented here, such as "Core Scenario," were not shown to participants.

well-being app alongside an explicit definition of “well-being,” we aimed to avoid potential confounds related to varied understandings of “well-being” among participants (i.e., construct validity).

**3.1.2 Self-Report and Facial Recognition Scenarios.** We amended the core scenario presented above with the addition of one of two paragraphs. The first constitutes the Self-Report (SR) scenario:

**Self-Report [SR]:** *Thalia works by sending you push notifications a few times throughout the day. Each push notification includes a short series of multiple-choice questions that ask you about different aspects of your well-being. Thalia uses state-of-the-art algorithms to assess your well-being and provide insights.*

The second scenario describes Thalia’s functionality as grounded in the use of facial recognition to analyze participant affect whenever they log into their phone:

**Facial Recognition [FRA]:** *Thalia works by temporarily accessing your phone’s camera when you log in using facial recognition. Each time you log into your phone using facial recognition, Thalia’s state-of-the-art, AI-based facial analysis algorithms assess your well-being.*

**3.1.3 Invasive Data Practice Variations.** To implicitly situate Thalia within the economics of surveillance capitalism (i.e., economics in which data are monetized), we further amended SR and FRA scenarios according to the three forms of creepy data practices described above: Violation of Expectations (VE), Breach of Personal Boundaries (PB), and Ambiguity of Threat (AT), based on the work of Langer and König [57]. The inclusion of such forms of privacy violations is justified by prior research that evidences people’s expectations that apps will violate privacy [98, 101]. As with prior work [101], in the VE variation, Thalia collects an unexpected form of data (i.e., location data). The PB variation describes Thalia as sharing and comparing data across platforms. Finally, the AT variation indicates that Thalia collects superfluous data in ambiguous ways and makes unexpected and implicit judgments about the user. The invasive data practices described in each variation are also described as easily and apparently resolved through manipulation of app settings, thus reflecting recent, mass-market advances in usable privacy. The decision to include invasive variations in our study is justified by the commonplace expectation of privacy violations among app users [98, 101]. It is impossible to unring a bell (i.e., the death of privacy) that has been ringing for at least the last seventy years [122]. John and Peters [49], for example, found at least 101 news articles decrying the death of privacy between 1990 and 2012. To include variations in which no privacy violations occur would be to reduce external validity, a core concern among recent privacy-critical research. We present VE, PB, and AT variations here:

**Violation of Expectations [VE]:** *Today, you received your first monthly well-being summary from Thalia. Thalia informed you that your well-being summary has been shared with your doctor, who will contact you to discuss the data. Additionally, Thalia showed you a map of locations where you’ve provided it with data, indicating where you are happiest. You were not aware that Thalia collected location data. By changing app settings, you are quickly able to stop location data collection by Thalia.*

**Breach of Personal Boundaries [PB]:** *Today, you received your first monthly summary from Thalia. Thalia informed you that your well-being summary has been shared with your doctor, who will contact you to discuss the data. Additionally, Thalia also automatically compared your well-being data with fitness data from your activity-tracking app to “give you a fuller picture of your health and well-being.” You did not know that Thalia linked data with your activity-tracking app. By changing app settings, you were quickly able to stop Thalia from linking data with your activity-tracking app.*

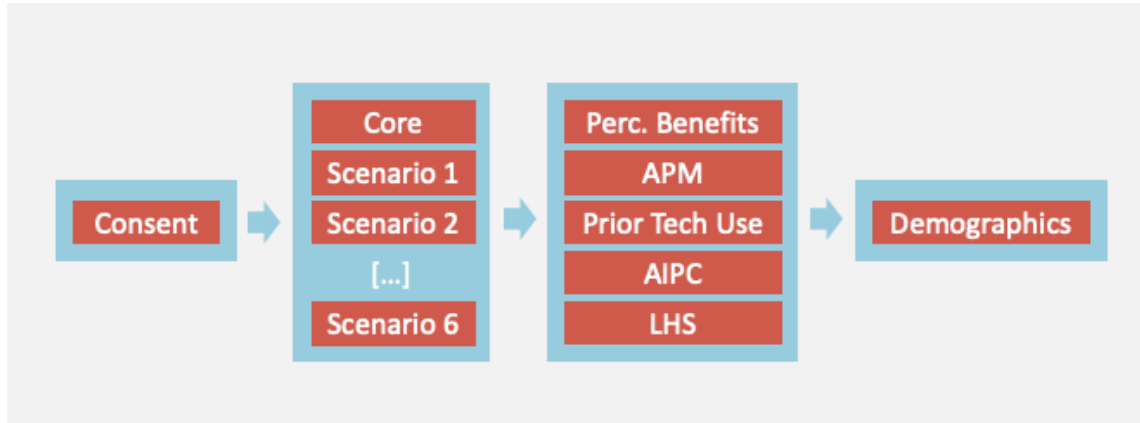


Fig. 4. Flow of online, scenario-based survey beginning with informed consent, then assignment to between subject conditions, then battery of measures and demographic items.

**Ambiguity of Threat [AT]:** Today, you received your first monthly summary from Thalia. Thalia informed you that your well-being summary has been shared with your doctor, who will contact you to discuss the data. Additionally, Thalia recommended other doctors in your area who accept your health insurance and have a history of treating “mood disorders.” You were not aware that Thalia would recommend new doctors or doctors who specialized in treating mood disorders. By changing app settings, you were quickly able to stop Thalia recommending new doctors, but you are unsure if you have a mood disorder.

In summary, we developed a suite of experimental scenarios that variously represent: (i) the emergence of a novel class of well-being apps that utilize facial recognition and analysis in a medicalized and surveillance capitalistic context; (ii) realistic, privacy-invasive data practices contextualized by the contemporary political economics of surveillance capitalism in which the collection of data is economically motivated; (iii) strides in usable privacy that mitigate the seriousness of privacy violations, but do not negate the expectation of such violations. Full examples of the Core Scenario, SR Scenario, FRA Scenario, and variations thereto are provided in the Appendix.

### 3.2 Survey Components

Three different measures were deployed in this study: the Affective Perception Measures [101]; the App Information Privacy Concerns scale [14]; and the Learned Helplessness Scale [89]. Following exposure to one of the scenarios described above (e.g., Core Scenario, SR+VE, FRA+VE, etc.), we presented these measures to participants in randomized order to control for ordering effects. We also included items about the perceived benefit of Thalia, prior technology use, and demographics. We present a graphical representation of the study flow in Figure 4.

**3.2.1 Affective Perception Measures (APM).** We used the APM [101] to collect participants’ self-reported, affect-driven perceptions of the Thalia app, its functionality, and data practices as described in scenarios and variations. Prior work [101] has shown that the APM collects data about five principal components: affective discomfort; perceived data literacy; expectation to continue using an app; ambivalence toward data practices; and the perceived realism of an app’s data practices.

Table 1. Distribution of participants assigned to the six scenario conditions (e.g., SR+VE, FRA+VE, SR+PB, FRA+PB, SR+AT, FRA+AT), excluding the Core Scenario. One hundred participants read the Core Scenario only.

	Violation of Expectations <b>VE</b>	Breach of Personal Boundaries <b>PB</b>	Ambiguity of Threat <b>AT</b>
<b>SR</b>	106	88	102
<b>FRA</b>	102	100	106

**3.2.2 App Information Privacy Concerns (AIPC).** The AIPC consists of 16 items and three sub-scales [14]. Such sub-scales include: (i) Anxiety, which measures people’s broad concerns about app data practices (i.e., how data will be used, processed, and shared); (ii) Personal Attitude, or the importance that people place on handling data carefully; and (iii) Requirements, which measures privacy concerns related to expectations of data practice transparency. Following the example of Seberger et al [101], we excluded one item from the Personal Attitudes sub-scale (“When mobile apps ask me for personal information, I sometimes think twice before providing it”) because we, too, found this item to be more related to behavior rather than perception. Thus the version of the AIPC we administered had 15 items, rather than 16.

**3.2.3 Learned Helplessness Scale (LHS).** We used the twenty-item LHS [89] to measure the prevalence of learned helplessness in our sample. Broadly, learned helplessness refers to participant perceptions of external loci of control, or that events and their outcomes are beyond participant control. Scores on the LHS can range from 20 to 80, where higher scores indicate higher levels of learned helplessness.

**3.2.4 Perceived Benefit, Prior Technology Use, and Demographics.** We asked participants to rate their agreement with three direct measures of perceived benefit: (i) “I think well-being apps like Thalia would be beneficial to me;” (ii) “I think well-being apps like Thalia would be beneficial to others;” and (iii) “I think well-being apps like Thalia would be beneficial to society.” We also asked questions about prior technology use. These included: “Do you regularly use facial recognition to login to your smartphone?”; and “Have you ever used an app to monitor or track your well-being?” The former question was deployed as a proxy for familiarity with facial recognition technologies. The latter was used as a proxy for familiarity with “well-being” apps. Finally, we collected data about standard demographic variables, including age, gender, education, etc.

### 3.3 Data Collection

We advertised our study as a human intelligence task (HIT) on AMT between 23 March and 3 April 2022. Samples from AMT have been shown to function as suitable means of understanding perceptions and attitudes among adults in the US possessing at least some level of college education [92]. The use of AMT for participant recruitment is also a common practice in research situated at the intersection of technology and healthcare, including participant perceptions of and attitudes toward medical care (e.g., [46, 68, 74, 88]). We present the number of participants assigned to each condition in Table 1.

Upon receiving the advertised HIT via AMT and clicking on the link, potential participants were presented with a detailed study information sheet in order to obtain informed consent from potential participants. If potential participants did not provide informed consent, they were asked to return the HIT via the AMT platform. mTurkers who provided

informed consent were randomly assigned to one of the seven scenarios (e.g., Core Scenario, SR+VE Scenario, FRA+VE Scenario, etc.). Participants were then asked to read their assigned scenario and respond to questionnaire items.

The median time to complete the survey was six minutes and twenty-three seconds. This aligns with the reported median time to complete the study presented by Seberger et al, which was “about six minutes and thirty seconds” [101]. When they had successfully completed the questionnaire, participants received a randomly-generated, seven-digit code. They were asked to enter this code via AMT. Based on the median time to complete the study, participants were compensated at a rate of roughly \$10.88 per hour for their time and effort.

### 3.4 Eligibility and Exclusion Criteria

Mirroring practices described in related work published at CHI [101], we limited eligibility to mTurkers who had completed at least 50 HITs with an approval rating of 95% or higher. We further limited eligibility to mTurkers 18 years of age or older and who reside in the United States. To account for known issues with faithless respondents and data quality in survey-based studies using crowd work platforms [2, 38, 80, 90, 105], we included a commitment to giving one’s best answers, one comprehension check, and three attention checks. Failure to provide correct responses to any of these items resulted in the immediate cessation of the survey in order to limit the amount of time AMT workers would spend providing unusable data.

### 3.5 Sample Characteristics

We presently describe participant gender, generational membership, rurality, education level, and prior technology use. We do so to improve the interpretability of our findings, despite the fact that our research questions are not demographically-oriented; nor was this study designed with an intersectional analysis in mind. We address the need for further, demographically-sensitive work in Section 7. Of the 688 participants, 292 (42.44%) identified as female, 393 (57.12%) identified as male, and 3 (0.44%) identified as non-binary. Ninety-five participants (14%) belong to Generation Z; 430 (62%) to the Millennial Generation; 131 (19%) to Generation X; and 32 (5%) to the Baby Boomer Generation. Ninety-seven participants (14%) reported living in rural areas. One-hundred and eighty-four (27%) reported living in suburban areas. Four-hundred and seven (59%) reported living in urban areas. Twenty-eight participants (4%) reported their highest education as a high school diploma; 1 (< 1%) as a high school equivalency; 3 (< 1%) as vocational training; 54 (8%) as some college courses; 408 (59%) as a college degree; 184 (27%) as a Masters degree; seven (1%) as a professional doctorate (e.g., JD, MD); and three (< 1%) as a PhD. Five-hundred and eighty-four participants (78% – an unexpectedly high percentage) reported regular use of facial recognition to log in to their phones, while 154 (22%) do not use facial recognition to log into their phones. Similarly, 501 participants (73%) reported using or having used well-being apps, while 187 (23%) reported no prior use of well-being apps.

## 4 FINDINGS

In this section, we provide validations of the APM [101] and AIPC [14]. We then describe ANOVAs to test for differences in (i) the perceived realism, (ii) the perceived benefit, and (iii) the perceived creepiness of Thalia across scenarios. We conducted the first ANOVA (i.e., perceived realism) to judge the external validity of the Thalia app scenarios – there would be little point in conducting further analyses on a fictional app if participants did not find it to be realistic. We conducted the second and third ANOVAs (i.e., perceived benefit and perceived creepiness, respectively) to answer RQ1. Following such analysis, we present the results of MLR to identify factors associated with the perception of affective discomfort about Thalia. Results from MLR modeling answer RQ2.

Table 2. Principal Component Analysis (Varimax) of the ten-item Affective Perceptions Measure yielded five components. These are labeled Affective Discomfort (Component 1), Intention to Continue Use (Component 2), Data Literacy (Component 3), Perceived Realism of Data Practices (Component 4), and Ambivalence Toward Data Practices (Component 5).

APM Item	Latent Components in APM					Communality
	1	2	3	4	5	
I have a feeling that there is something shady about Thalia.	<b>0.82</b>	0.18	0.15	0.05	0.06	1.2
I think the Thalia app is creepy.	<b>0.82</b>	−0.06	0.08	0.21	0.31	1.5
I expect complications when I start using Thalia.	<b>0.73</b>	0.34	0.20	0.12	−0.33	2.1
I think the way Thalia uses my data is absurd.	<b>0.65</b>	−0.01	0.33	0.45	−0.08	2.3
I would be comfortable with the way Thalia uses my data.	0.13	<b>0.86</b>	0.26	0.14	0.08	1.3
I would continue to use Thalia based on the information provided in the scenario.	0.07	<b>0.85</b>	0.30	0.12	0.07	1.3
I understand how Thalia uses the data it collects.	0.06	0.35	<b>0.80</b>	0.14	−0.03	1.7
I understand what kinds of data Thalia collects.	0.21	0.31	<b>0.84</b>	0.02	0.05	1.4
I think the manner in which Thalia uses my data is realistic.	0.16	0.57	0.39	<b>0.60</b>	0.04	2.9
I do not know how to feel about how Thalia uses my data.	0.25	0.21	0.00	0.03	<b>0.91</b>	1.3
<b>Percent Variance Explained</b>	0.31	0.27	0.22	0.14	0.07	—
<b>Cumulative Variance Explained</b>	0.31	0.57	0.79	0.93	1.00	—

#### 4.1 Principal Component Analysis of APM

We observed high internal consistency among the items used to measure affective perceptions (Cronbach’s  $\alpha = 0.87$ ). Such internal consistency is comparable to the Cronbach’s  $\alpha$  of 0.86 reported by Seberger et al. [101]. We then conducted principal component analysis (PCA) to determine how the items included in the APM [101] load onto latent variables. We present the results of PCA in Table 2.

PCA revealed the same cluster of latent variables within the APM as reported by the scale’s developers [101]. These include, Affective Discomfort, Perceived Data Literacy, Perceived Realism of Data Practices, Ambivalence to Data Practices, and Expectation to Continue Using an app – in this case, Thalia.<sup>11</sup>

#### 4.2 Confirmatory Factor Analysis of AIPC

We conducted Confirmatory Factor Analysis (CFA) on the AIPC [14]. CFA yielded an appropriate  $\chi^2$  (245.09,  $df = 87$ ), as well as the expected factors: Anxiety, Personal Attitudes, and Requirements [14]. As with prior work [101], the root mean square error of approximation (RMSEA) was rather low (0.05), but the comparative fit index (CFI) (0.97) appears to justify continued use of AIPC scores for analysis in this study. We observed appropriate internal consistency among

<sup>11</sup>It is worth noting that the single-item measure of Ambivalence Toward Data Practices loaded only slightly higher on Component 4 than on Component 2 (Intention to Continue Use).



items in the AIPC (Cronbach's  $\alpha = 0.82$ ). However, we also observed unusually high correlations between all three sub-scales of the AIPC: Personal Attitudes and Anxiety ( $r = 0.91$ ); Personal Attitudes and Requirements ( $r = 0.88$ ); and Anxiety and Requirements ( $r = 0.82$ ). Given that the highest correlations involved the Personal Attitudes sub-scale, we excluded it from subsequent analysis.

### 4.3 Perceived Realism Across Scenarios

Prior to answering RQ1 through examination of the perceived benefit and perceived creepiness of Thalia, we first conducted an ANOVA to compare mean responses to the item, “I think the manner in which Thalia uses my data is realistic” across all seven Scenarios presented in the study. We did so as a “reality check” – to assess the apparent external validity of Thalia given its fictional nature. We found no statistically significant differences ( $F(6, 681) = 1.16$ ,  $p = 0.33$ ), with means ranging from 4.99 to 5.43 (i.e., between “Somewhat Agree” and “Agree”). We interpret such findings as indication that the presence of privacy-invasive data practices is realistic, with no statistically significant differences among types of privacy-invasive data practices (i.e., VE, PB, and AT).

The lack of significant differences in the aforementioned ANOVA allowed us to collapse the seven scenarios into three: Core Scenario, SR Scenario, and FRA Scenario. Such collapsing allowed us to focus more specifically on possible differences between the mode by which Thalia collected data. As invasive data practices (e.g., VE, PB, and AT) were fully balanced across the SR and FRA scenarios, such collapsing is methodologically justifiable; it is also conceptually justifiable if one takes the position based on prior work [98, 101] that privacy-invasive data practices have been normalized and are therefore widely expected among users.

Using the collapsed categories, we again conducted an ANOVA to test for statistically significant differences in agreement with the APM [101] item, “I think the manner in which Thalia uses my data is realistic” ( $F(2, 685) = 1.59$ ,  $p = 0.20$ ). We observed no statistically significant differences, with mean responses being 5.38 in the Core Scenario, 5.15 in the Self-Report Scenarios, and 5.32 in the Facial Recognition Scenarios (i.e., between “Somewhat Agree” and “Agree”).

Based on these results, we judged the descriptions of Thalia (i.e., its data practices, functionalities, and the context in which it was recommended) to be sufficiently realistic to warrant continued analysis. That is, we find evidence that our scenarios have acceptable external validity because participants judged them to be generally realistic.

### 4.4 Perceived Benefit Across Scenarios

We compared means of three forms of perceived benefit across the Core, SR, and FRA scenarios: benefit to oneself; benefit to others; and benefit to society. We found no statistically significant differences between responses to the Core (mean = 5.24), SR (mean = 5.16), and FRA Scenarios (mean = 5.25) for perceived self-benefit ( $F(2, 685) = 0.29$ ,  $p = 0.75$ ).<sup>12</sup> Nor did we find statistically significant differences in Thalia's perceived benefit to others ( $F(2, 685) = 0.06$ ,  $p = 0.95$ ) or perceived benefit to society ( $F(2, 685) = 0.07$ ,  $p = 0.93$ ). Means of all three variables across each condition range from 5.16 to 5.38, indicating that participants “Somewhat Agree” with statements about the self-benefit, benefit to others, and benefit to society of the Thalia app regardless of its use of SR or FRA to collect data about well-being.

<sup>12</sup>As a safeguard, we also conducted an ANOVA based on the original set of seven scenarios, for which we found no significant differences in perceived benefit to oneself ( $F(6, 681) = 0.29$ ,  $p = 0.94$ ), to others ( $F(6, 681) = 0.41$ ,  $p = 0.51$ ), or to society ( $F(6, 681) = 0.45$ ,  $p = 0.85$ ). As with prior ANOVAs, these findings support the decision to collapse scenarios into Core, SR, and FRA.

Table 3. Table presents Standard  $\beta$  values and Standard Error values for factors modeled in Multiple Linear Regression to predict the perception of affective discomfort about the Thalia app.

Predictor Variable	Affective Discomfort	
	Std. $\beta$	Std. Err.
AIPC Anxiety Score	0.44	0.04***
Perceived Data Literacy	0.30	0.04***
Ambivalence Toward Data Practices	0.25	0.03***
Prior Use of FRA Login	0.23	0.08*
Prior Use of Well-Being Apps	0.17	0.07**
Learned Helplessness Score	0.13	0.03***
Perceived Benefit to Others	0.06	0.04
Expectation to Continue Use	-0.06	0.04
SR Functionality	-0.03	0.08
FRA Functionality	0.05	0.08
Perceived Realism of Data Practices	-0.02	0.04
AIPC Requirements Score	-0.04	0.04
Perceived Self-Benefit	-0.04	0.04
Perceived Benefit to Society	-0.08	0.04
Adjusted $R^2$		0.54

Sig.: \* :  $p < 0.05$  \*\* :  $p < 0.01$  \*\*\* :  $p < 0.001$

#### 4.5 Perceived Creepiness Across Scenarios

Using the collapsed Scenarios (i.e., Core, SR, FRA), we calculated mean values of participant levels of agreement with the statement, “I think the Thalia app is creepy,” which constitutes a direct measure of perceived creepiness in the APM [101]. We found no statistically significant differences in agreement with this statement across Core, SR, and FRA scenarios using an ANOVA ( $F(2, 685) = 0.60, p = 0.55$ ).<sup>13</sup> Participants exposed to the Core Scenario reported a mean score of 4.57 (i.e., between “Neither Agree nor Disagree” and “Somewhat Agree”). Participants exposed to the Self-Report Scenarios and the Facial Recognition Scenarios reported similar levels of agreement (4.67 and 4.76, respectively). Such responses reflect the generally creepy nature of each Scenario, which is likely mitigated by two aspects of the Scenarios: (1) the fact that Thalia is doctor-recommended; (2) the fact that all privacy violations (e.g., VE, PB, and AT) were resolved in the scenarios.

Participants found Thalia to be simultaneously *beneficial and creepy*. We thus provide an answer to **RQ1**: the perceived benefits of well-being apps, as represented by the fictional, but realistic Thalia scenarios, do not preclude such apps from being creepy, *per se*. This answer to RQ1 justifies further analysis of factors that associate with creepiness and its parent category, affective discomfort (i.e., perception of shadiness in data practices, absurdity in data practices, and the expectation of complications when using a new app).

#### 4.6 Perceptions of Affective Discomfort

Having observed that participants found Thalia to be realistic, beneficial, and creepy, we constructed a MLR model to identify factors contributing to the perception of affective discomfort about Thalia (Adjusted  $R^2 = 0.54, F(14, 673) =$

<sup>13</sup>We also checked for differences in mean responses across the original set of seven scenarios, for which we found no significant differences ( $F(6, 681) = 0.88, p = 0.51$ ). These results further support the decision to collapse scenarios into Core, SR, and FRA.

58.63,  $p < 0.0001$ ). We focus on affective discomfort because prior work posits that creepiness is a phenomenon belonging to the parent category of affective discomfort [101]. As depicted in Table 3, we found that six factors significantly predicted affective discomfort about Thalia. We describe such factors in descending order of their effect size (i.e., Standard  $\beta$ ) presently and accept or reject related hypotheses accordingly.

**Privacy-related anxiety**, as operationalized through the use of the AIPC [14], had the strongest effect on the perception of affective discomfort about Thalia (Standard  $\beta = 0.44$ ). People who scored highly on privacy-related anxiety were more likely to perceive of Thalia as affectively discomfiting. Scores on the AIPC Requirements sub-scale, however, had no significant effect on affective discomfort. Thus, we partially accept **H1**: “App information privacy concerns positively predict the perception of affective discomfort.” We are unable to accept this hypothesis fully because of the removal of one sub-scale from the AIPC because of unusually high intercorrelation. (See Section 3.)

**Perceived data literacy** (i.e., the extent to which people felt like they understand an app’s data practices) had the second strongest effect on affective discomfort over Thalia’s data practices (Standard  $\beta = 0.30$ ). When people felt that they understood how Thalia used the data it collected, people were more likely to be affectively discomfited by such practices. From this finding, we may infer that people’s understanding of app data practices accounts for the generalized affective discomfort of app culture itself: “understand” appears to equate with a normalized expectation of creepy data practices. We therefore accept **H2**: “Perceived data literacy positively predicts the perception of affective discomfort.”

**Ambivalence toward data practices** had the third highest effect on affective discomfort about Thalia’s data practices (Standard  $\beta = 0.25$ ). From this finding, we can infer that when people don’t know how to feel about an app’s data practices, they are more inclined to be affectively discomfited by such practices – *when in doubt, be creeped out*, as it were. We therefore accept **H3**: “Ambivalence toward an app’s data practices positively predicts the perception of affective discomfort.”

**Prior use of facial recognition** as a means of smartphone login had the fourth highest effect on affective discomfort about Thalia’s data practices (Standard  $\beta = 0.23$ ), followed by **prior use of well-being apps** (Standard  $\beta = 0.18$ ). These findings indicate that prior use of a specific functionality that can be used for different purposes (i.e., facial analytics) may prime affective discomfort when such functionalities are deployed in novel contexts (i.e., the deployment of facial analytics to monitor well-being rather than merely to authenticate access to one’s devices). We therefore accept the non-directional **H6**: “Prior use of well-being apps is associated with the perception of affective discomfort.”

**Learned helplessness** had the lowest significant effect on affective discomfort about Thalia’s data practices (Standard  $\beta = 0.13$ ). From this finding, we can infer that, depending on their data practices, well-being apps are likely to be perceived of as “creepy” or affectively-discomfiting by particular subgroups of the population for whom increased well-being (i.e., heightened agency, a perceived internal locus of control, etc.) would be especially beneficial. We therefore accept **H7**: “Learned helplessness positively predicts the perception of affective discomfort.”

Neither the **perceived realism** of Thalia nor participant **intention to continue using** Thalia had significant effects on affective discomfort about Thalia’s data practices either positive or negatively. Therefore, we reject **H4**: “The perceived realism of an app’s data practices positively predicts the perception of affective discomfort.” We similarly reject **H5**: “The intention to continue using an app negatively predicts the perception of affective discomfort.”

Similarly, we found that Thalia’s **functionality** (i.e., self-report or automatic facial analysis) did not have a significant association with affective discomfort. As such, we reject **H8**: “People will perceive of higher levels of affective discomfort when well-being apps use facial analytics rather than self-report as a means of data collection about well-being.”

Thus, in answer to **RQ2**, we found that six factors were significantly and positively associated with affective discomfort about Thalia, an app that participants judged to be simultaneously realistic, beneficial, *and* creepy. These

six factors include: privacy-related anxiety; self-assessed perceived data literacy; ambivalence toward data practices; prior use of facial recognition to log in to one's smartphone; prior use of well-being apps; and learned helplessness. We found no significant association between affective discomfort and (i) the perceived benefit of Thalia (i.e., to oneself, others, or society), (ii) the expectation to continue using Thalia, (iii) the perceived realism of Thalia, or (iv) the SR or FRA modes of data collection employed by Thalia.

## 5 DISCUSSION

In this section, we offer a broader contextualization of our findings in order to begin answering RQ3: “What might the identification of [factors contributing to the perception of affective discomfort] imply about the possible achievement of well-being through deeper enrollment in data-hungry app culture?”

We found that our US-specific sample perceived of Thalia to be simultaneously realistic, beneficial, and creepy. Such findings (in answer to RQ1) identify a core tension between the ostensible function of well-being apps like Thalia (i.e., to improve something called “well-being”) and the surveillance capitalistic culture of normalized data practices that contextualize well-being apps. If apps like Thalia are perceived to be realistic, beneficial, *and* creepy, then we can infer that creepiness – a subset of phenomena within the superset of affective discomfort – has become a normalized user experience. Such an inference necessitates the consideration of whether the emergence of a novel class of well-being apps, contextualized by the ubiquitous proliferation and dominance of surveillance capitalism as an economic *modus operandi* for app development, can logically contribute to an improvement in general well-being.

In the context of a novel category of well-being apps already available “in the wild” (e.g., SOLO, TrueBlue, etc.) the combination of these perceptions foreshadows a troubling merger between the data practices of surveillance capitalism and US healthcare [100] in the form of narrowly defined “well-being.” Our findings indicate that perception of affective discomfort about Thalia, which includes the perception of creepiness, derives from an assemblage of privacy-related anxieties, self-perceived data literacy, ambivalence toward data practices, familiarity with related technologies, and learned helplessness. That such factors are related to the perception of an app that is simultaneously perceived as realistic and beneficial deserves further attention. But, in and of itself, the identification of factors related to the perception of affective discomfort about Thalia highlights an obvious disjoint between the ostensible purpose of well-being apps and the downstream sociotechnical effects that such apps may have. Presently, our findings suggest that well-being apps like Thalia (e.g., TrueBlue, SOLO, etc.) may primarily serve to further normalize the experience of affective discomfort as a result of engagement with data-hungry app culture [101]. Such continued normalization is orthogonal to the well-meaning motivations that underlie the development and deployment of well-being apps: rather, such continued normalization of affective discomfort in app use may create a lowered bar against which the comparative state of *being well* [29] is judged.

By situating our findings about how our sample of US mTurkers perceive of a novel class of well-being apps in broader context, we argue that it is only reasonable to expect well-being through app use if one accepts the inevitability of a reductionist evaluative mode that supplants humanistic “flourishing” [121] with a quantitative-reductive evaluative mode motivated by the economics of surveillance capitalism. While it would be ridiculous to attack the well-meaning quantification of well-being – several hundred years of medical progress is predicated on quantification, after all –, it is necessary to contextualize such metrickation in the domineering economics of surveillance capitalism. When users expect privacy violations because of a tacit understanding of how data is used in surveillance capitalism, and such privacy violations and data practices contribute to the perception of affective discomfort, then the app-driven quantification of well-being necessarily perpetuates the normalization of the dehumanizing interpellation [27] of users as mere sources

of behavioral surplus (e.g., data about “well-being” that can be brokered by third parties for monetary gains). *Being* in a condition of standing reserve [44] such as that of behavioral surplus [128] is not obviously a form of *being well*. We explore this in the following subsection.

### 5.1 Surveillance Capitalistic Data Practices Poison the Well

Despite people’s perceptions that Thalia would be beneficial to themselves, others, and society writ large, the app also gave rise to the perception of affective discomfort. It did so most obviously in the form of perceived creepiness, which is a member of the set “affective discomfort” [101]. Factors associated with the perception of affective discomfort align with a stable set of variables that give rise to the perception of affective discomfort in other forms of app use [101]. Thus, in the context of surveillance capitalistic data practices that prime users to expect privacy violations (however quickly resolvable), well-being apps appear to beg the question of ‘better living through technology’: they take their beneficiality as foundation and outcome, even though such beneficiality is tempered by the normalization of affective discomfort – a normalization that cannot reasonably be considered to be a member of the set “well-being.” While it is true that people are capable of experiencing multiple affective states simultaneously, an ethical calculus is required to understand whether it is responsible for app designers and developers to deploy apps that induce affective discomfort in order to effect a state of “well-being.” As Judith Butler notes in conversation with Frédéric Worms [16, p.34], “Because a life can live contradictions, it can live in a contradictory way without solving the conceptual contradiction that structures that life. Usually when you live a contradiction, you live it as a tension, as an ambivalence, or perhaps through a certain kind of splitting.”

Earlier, we relied upon the work of Docherty and Biega [29] to frame our approach to well-being. As stated, well-being is always already a relative state. In the context of surveillance capitalistic app culture, the relativity of “well” comes into distinct focus: the extent of *being well* emerges in relation to the broader conditions that define the digitally-mediated daily life of users. When such daily life is contextualized by the normalized expectation of affective discomfort in app use [101], the bar against which *being well* is judged appears as lowered, if not negated.

The economic value of data and the surveillance-capitalistic app culture such value has fostered predicates questions not about “whether” or “at what scale,” but “how” well-being apps can contribute to people’s sense of well-being. Echoing debates about technological solutionism (e.g., [72]), Vallor alludes to this as, “a strong conviction among many that the social Internet is a powerful force for human well-being, a silicon-paved path to the good life” [121, p.160]. Such is the “blithe optimism” [35, p.24] of pushing our internal and external worlds ever further into the domain of computing (cf [5]).<sup>14</sup> Yet where we have deployed quantitative analysis to understand and, indeed, argue against metricated “well-being,” our approach is not as self-contradictory as it appears. In Section 2, we demonstrated that “well-being” possesses weak construct validity. Because of such weak validity, the apparently ad hoc metrication of well-being shapes what “well-being” might mean. Further, it does so in a way that is not obviously aligned with humanistic concern for “well-being” (i.e., a livable condition of *being well*). To the contrary, we deployed quantitative analysis in relation to a carefully operationalized condition: affective discomfort (see Section 2). The problem, as we see it, is not to be found in quantification, *per se*, but in the tangled web of interrelations among (i) data and datification, (ii) privacy violations that feed the monetization of data via surveillance capitalism, and (iii) the ongoing normalization of affective discomfort as a function of points (i) and (ii) above.

<sup>14</sup>Bardzell and Bardzell’s [5] language of “pushing the computer out,” itself an expansion of Grudin’s “reaching out” [40], does not capture the extent to which we, as users, insert ourselves *into* computational evaluative modes. In having pushed the computer out into the world, we, as researchers presently entangled with the economics of datafication, have created a corridor of sorts through which the user passes to receive knowledge about themselves.

We contend that the implicit assumption that a state of being well can be achieved through further enrollment in surveillance capitalistic app culture primes deeper resignation [98]: the tacit assumption that novel technologies (e.g., apps, machine learning, computer vision) are always already the answer to known problems (e.g., the problem of living well). It is as if we, as people, no longer believe in our ability to wield the responsibility of subjectivity – a true form of existential dread [37] – but rather seek our escape from such responsibility (see: [36]) through the quantitative evaluative gaze of computing. Yet we seem to have overlooked how the scientism of surveillance capitalistic app culture co-opts the construction of data-driven subjectivities that might “be well.” As we have noted above, there is nothing *wrong* with the adoption of quantitative evaluative gazes, *per se*. Complications arise, however, when such quantitative evaluation is nested within the monetization of data in the form of behavioral surplus [128].

Outsourcing the responsibility for subjective flourishing by way of metricated well-being comes with its own existential problems (e.g., the occurrence of absurdity [97]), as indicated by the observed relationship between participants’ self-perceived data literacy and their propensity to perceive of affective discomfort in relation to how an app uses its data. That self-perceived data literacy positively predicts the perception of affective discomfort may indicate latent processes responsible for normalization of affective discomfort – a normalization that, in the context of “well-being,” constitutes an oxymoron that only makes sense if we blame users for being people, too (i.e., embodied agents driven not only by rational thought, but affective states and emotions). It is possible that resignation toward the creepiness of contemporary app culture results from an emergent condition of “being a user” in which *use* is understood (i.e., implicitly expected) to be fundamentally tied to data-driven exploitation.

Logically, such resignation is, however, not solely located among people who use apps. Such resignation is implicitly located among the community of well-meaning researchers and practitioners who instrumentalize well-being, filtering a deeply and historically humanistic concept through the dominant and scientific [45] contemporary practices of interdisciplinary and socially-oriented computing. It is one thing to measure a clearly operationalized construct (e.g., affective discomfort); it is another thing entirely to bootstrap a construct (e.g., well-being) *through* measurement. The former process is derived from the scientific method; the latter is eschews the criticality of the scientific method and constitutes the underlying “scientism” of contemporary app culture.

Well-being is always already relative [29]. One demonstrates a mode of *being well* in relation to the complex sociotechnical conditions that characterize the historical era in which they live. The perceived realism of Thalia outlines such complex sociotechnical conditions; further analysis demonstrated that such perceived realism is characterized by the independence of perceived benefit and perceived creepiness. In the context of our study, it would appear that simultaneous perceptions of Thalia’s benefits and creepiness may characterize the app’s realism. That is, the apparently paradoxical perception of simultaneous beneficence and creepiness may drive the perceived realism of Thalia because of the ongoing normalization of affective discomfort in app use [101].

Narrow focus on specific forms of well-being potentiates the normalization of an app culture wherein “well-being” is achieved (i.e., bootstrapped through data-driven fishing expeditions conducted about weakly operationalized constructs) in relation to a ground truth of normalized affective discomfort – where one might *be well in spite of* heightened levels of affective discomfort that have been normalized by app culture. Despite optimistic and well-meaning intentions – generally represented by the quantitative paradigm of positive psychology, rather than the more apparently suitable paradigms of existential and humanistic psychology (e.g., [34, 65, 66, 116]) –, we cannot risk building sociotechnical futures wherein learned helplessness to data practices’ negative affective outcomes is normalized and the possibility of *being well* is always already contextualized by such resignation.

## 5.2 Zooming Out to the Bigger Picture in HCI

In this subsection, we consider our findings from a higher level of abstraction. Namely, their relevance to broader research agendas in HCI. First, we use our findings to argue that multiple definitions of creepiness exist in HCI, but that differences in such definitions need to be made explicit. Second, we highlight the need to give increased attention to the phenomenon of learned helplessness in HCI.

**5.2.1 Two Kinds of Creepiness in HCI.** What does it mean that participants judged Thalia to be creepy even though they also perceived of Thalia as beneficial? Any reasonable answer to this question is obligated to account for different meanings of “creepiness” in HCI. For example, locating creepiness at the intersection of data practices and social norms refutes prior, aesthetically-motivated work on creepiness [125] and justifies the continuation of work that situates creepiness as a phenomenon belonging to a superset of affectively discomfiting experiences related to the ongoing computerization of the world (in this case represented by the sprawl of app culture) [101, 107]. Our findings support such an existentialist approach to creepiness, rather than an aesthetically driven approach to creepiness. Participants were not exposed to graphical representations of Thalia – or any representation beyond the textual representations contained in the scenarios. It would therefore be inappropriate to attribute the perception of creepiness to Thalia’s aesthetic characteristics (cf [125]).

As such, our findings provide evidence that two separate constructs are represented by the word “creepiness,” in HCI: (i) an absurdist state of being in relation to apps and their data practices, which highlights the importance of developing a more nuanced and sturdy framework for existentialist HCI (see [53, 61, 97, 101]); and (ii) an aesthetic form of creepiness linked to repulsion as in the “uncanny valley” or unnerving intimacy (e.g., [84, 125]) that is more explicitly oriented toward implications for design. Simultaneous investigation of both forms of creepiness is necessary. The former allows for the situation of the creepiness of *being a user* in the existential conditions of surveillance capitalism (e.g., of existing, like so much human standing reserve [44], as a monetizable source of “behavioral surplus” [128]), therefore potentiating more deeply humanistic outcomes in HCI work that protect and even foster the dignity of the *sui generis* human. The latter allows for immediate solutions focused on *user experience* that may allow people here and now to live alongside technologies with less discomfort – or, more worryingly, to grow accustomed to the discomforts caused by app data practices. Yet, where the latter is treatment based on triage, the former is critical pathology.

While creepiness has been defined as a function of technological challenges to social norms [117], we contend that creepiness is the new norm. Its status as a “new norm” does not contradict Tene and Polonetsky [117], but rather recognizes challenges to social norms as ongoing given the break-neck pace at which computing colonizes evermore corners of subjective experience. Until such time as app data practices are not routinely expected to be creepy, it is not reasonable to expect the achievement of well-being through further enrollment into app culture – unless “digital well-being” explicitly refers to a wholesale reductive-quantitative evaluative mode that excludes without concern that for which it cannot account: the subjectivity central to third-wave HCI [12] at the scale of fourth-wave HCI [11]. By asking users, however naively, to further enroll in app culture in order to improve their own well-being, it is not only possible, but likely, that we are merely lowering the bar against which a state well-being is compared. It is no longer ethically acceptable to continue to hold the carrot of well-being before the user while whipping them with the stick of datafication and its ugly, discomfiting economics.

**5.2.2 Learned Helplessness is Understudied in HCI.** Our findings indicate that the heretofore theoretical relationship between learned helplessness and creepiness [107] bears out. Such relationship requires consideration of the possibility

that apps may exploit depressive pathologies even as they promise to improve well-being.<sup>15</sup> Such exploitation is obviously in opposition to the well-meaning intentions and rhetorical appeal of research about “well-being.” The groups of users who may use emergent classes of well-being apps – whether by individual choice or by doctor recommendation – are implicitly seeking a better mode of subjective experience. In the context of normalized affective discomfort brought about by pervasively expected invasive data practices in the US, such seeking may result in the functional disappearance of the paradox at the center of this paper: the possible achievement of well-being *through* creepiness. Such a disappearance would not constitute a resolution, but an obsolescence – a symptom of an evaluative mode that is incapable of, or blind to, accounting for computing’s existential impacts [53, 61, 97].

Further, our identification of learned helplessness as a factor associated with the perception of affective discomfort necessitates future research on the relationship between app use and the acquisition of learned helplessness. Prior work [98, 101] has shown that people continue to use apps that employ creepy data practices. Yet, the longitudinal effects of such continued use are unknown. Given that (i) learned helplessness is an acquired mode of thinking, and (ii) learned helplessness is not a reasonable member of the set “well-being,” it is essential that researchers and practitioners in HCI account for the role that their work might play in fostering learned helplessness among users, thereby (inadvertently) perpetuating the normalization of affective discomfort [101].

## 6 IMPLICATIONS

As a community of researchers and practitioners variously motivated by personal and professional demands, we are obligated to account for the affective discomfort that we have helped usher into the world by continuing our work without addressing the detrimental context of surveillance capitalism: an existential condition of *being users* in which increasingly any mode of being human is interpellated [27] by the evaluative mode of our computational god trick.<sup>16</sup> Failure to engage in such accounting constructs so-called “well-being apps” as Trojan Horses by which creepiness and affective discomfort gain access to, and domain over, the subjective, *sui generis* [5] experience of ourselves that third-wave HCI has long held as a central concern [12]. That apps such as Thalia are perceived to be simultaneously beneficial, realistic, and creepy identifies the existential absurdity [97] of being “users,” where the term “users” signifies the rapid colonization of ever-increasing aspects of daily life by app culture and its dubious blend of economic and epistemological motivations [98, 128]. Yet, this is where we are. Apps pervade; and with such apps pervade exploitative data practices that have become normalized. As a community fundamentally concerned with interactions between humans and computers, we are obligated to pay more than lip service to “well-being” by designing apps that are topically touted as beneficial to users without addressing large-scale problems of exploitation and dehumanization *through monetized datafication* – the existential conditions of *being users*, let alone *being well as users*. App culture appears as the merger of techno-theology and economics. And, as Haraway wrote, “From this point of view, science – the real game in town – is rhetoric, a series of efforts to persuade relevant social actors that one’s manufactured knowledge is a route to a desired form of very objective power” [41, p.577]. The enrollment of well-being into an uncritical, *scientistic* [45] system of rhetoric wherein monetized quantification functionally represents knowledge production risks the discursive

<sup>15</sup>For a discussion of the relationship between depression and learned helplessness, see Seligman prior to his turn toward positive psychology [102].

<sup>16</sup>See Haraway on “the god trick,” or the construction of an authoritative “view from above, from nowhere” [41, p.589]. Such a god trick demands contemporary epistemological critique. The historical unmooring of ethics from divinity [43, 62, 75] by way of The Enlightenment (i.e., a profound expansion of media and mediation [109]) ultimately necessitated the emergence of evermore nuanced frameworks for negotiating, understanding, and researching ethics and ethical action. In the absence of a divinity, we instrumentalized to objectify. It is presently necessary to systematically interrogate the limitations of such instrumentalization in relation to the experience of being a human interpellated [27] as a user.



replacement of humanistic flourishing with the reductive, if conveniently machine-processable notion of metricated well-being.

We said earlier that surveillance capitalistic data practices poison the well. Yet it is not merely that such practices foster the normalization of affective discomfort that concerns us here. It is, rather the bleed between (i) quantification as a mode of producing knowledge and (ii) quantification as an economic *modus operandi* that concerns us. App culture is about the monetization of data – that much is clear through the accessibility of app stores, the practice of advertising related to apps, and data practices that violate privacy.

Whether scientific or *scientistic* in nature, data objectify that which they represent. It remains unclear whether objectification is a one-way street in the emergent economic-epistemological culture of datafication (i.e., if people who have been objectified through the reductive measurement of their actions may again be granted the dignity of subjectivity). Because of such lack of clarity, we challenge the increasingly entrenched and implicit position that quantification is always valid *because* it is quantification. Our argument is not that quantification is “bad” – after all, we deployed a quantitative approach in the design of this study – but that the unquestioned adoption of quantified models of well-being can be detrimental. We contend that the blithe metrication of well-being presents an ontological path dependency: someone who is metricated as “well” through and by means of app culture is necessarily an object of that culture. Deeper problems of objectivity and subjectivity aside, the “well-being” of any object (i.e., user) constructed through engagement with app culture necessarily inherits the characteristics of such culture.

As such, we present a plea for deeper, more systematic, and more sensitive consideration of well-being, *per se*, among the researchers and practitioners of the HCI community. Foundations for such consideration already exist in work at the intersection of HCI and existentialism [53, 61, 97]. Foundations that fall well inside the scope of humanistic HCI [5] also exist in the work of humanistic psychologists (e.g., [34, 36, 65]). Although positive psychology represents some of the same intentions as humanistic psychology, it falls short because of its insistence on metrication, which renders it vulnerable to cooptation by surveillance capitalism [116]. As fourth-wave HCI [11] seeks to account for scalar issues of computing, and third-wave HCI [12] has established the importance of subjectivity in HCI, direct, simultaneous concern for scale and subjectivity is required. Such reconciliation is most apparently possible through engagement with philosophies of the *subject*, rather than epistemologies that filter subjectivity through the objectifying evaluative mode of datafication so foundational to app culture – epistemologies that, by their core functionalities, are ripe for colonization by the economics of surveillance capitalism.

Simply put, *it feels good to do research about helping others feel good*, which may desensitize well-meaning and optimistic HCI researchers and practitioners to the persistent need to defend the possibility of living well – *flourishing* [121] – by confronting those techno-epistemological pathologies that confound it. In a golden age of dread [37] it feels good to help, to attempt to solve grand problems by focusing on how technology might foster finer human qualities. But, we have an obligation to stay with the trouble [42]. In this case, staying with the trouble means confronting the onto-epistemological outcomes (e.g., the objectification and “dehumanization” [19] of people as *users*) that we smuggle into even the most well-meaning and helpful HCI research when we fail to account for macro-contexts (e.g., surveillance capitalism) in favor of focusing on micro-contexts (e.g., the laboratory-like construction of “well-being”). We are obligated to grapple with the dangerous liaisons emerging between scientific quantification and its doppelganger, that of monetized quantification in the form of surveillance capitalism. It may yet be the case that well-being is achievable through and by means of data-driven metrication. Yet it is highly dubious to assume that a “well-being” that bears any resemblance to humanistic flourishing will be attained through the assemblage of empiricism and capitalism: an assemblage that always already reduces people in the world to sources of monetizable data.

Without critical and humanistic foundations *for* the concept of well-being – foundations that necessarily interrogate the epistemic and economic assumptions of the data-hungry world we have been instrumental in achieving – it is not apparent that work about well-being in HCI and computing focuses on *people's* well-being at all. Rather, it may be interpreted to promote *user* well-being, ensuring the viability and concretization of our contemporary discomfiting and dehumanizing data practices – computing's own god trick [41] – at the expense of the *human* well-being it waves as a banner. As reflexive consideration of ethics becomes increasingly common in computing, we recommend that work pertaining to well-being in HCI explicitly engage with the longer history and gnarlier discourse of well-being as it exists independently of evaluative modes predicated on monetized quantification.

## 7 LIMITATIONS

The presence of doctor recommendations in the scenarios may have muted effects that the SR and FRA Scenarios might have had relative to the Core Scenario. Nonetheless, doctor-involved descriptions of real-world well-being apps (e.g., TrueBlue and SOLO) justify the presence of doctor recommendations in the present work, as does research calling for infrastructure allowing doctors to prescribe apps [39, 81]. Further work is required to analyze more closely the possible differences between well-being apps that use SR to collect data and well-being apps that use FRA to collect data.

While AMT has been shown to yield suitable samples for understanding perceptions and beliefs among younger (i.e., under 50 years of age) and well-educated Americans [92], findings from mTurk studies are not clearly generalizable to other populations. Differences between the prevalence of mental health issues in mTurk samples and the US population have been noted [3, 15]. It is for this reason, primarily, that we did not engage in an intersectional analysis of our data. We note, however, that pursuant to further work that identifies other facets of affective discomfort in app use (i.e., beyond the four factors described here and by Seberger et al [101]), such an intersectional approach would be highly useful. Interpretive caution should be used when attempting to generalize from our findings.

We conducted our work within the United States, which precludes cross-cultural generalization. Healthcare in the US differs substantively from healthcare in other regions. As such, participant perceptions of affective discomfort in the US may be differently motivated than concerns or perceptions demonstrated by other populations. Indeed, we make no claim as to cross-cultural or multi-region generalizability given the Western bias prominent in computing-related research [115]. Further work is required to understand how people perceive of quantitative well-being apps in under-served populations, where such apps play a vital role in the maintenance of mental health [6, 96].

We relied on the implicit relationship between privacy violations and surveillance capitalism to situate our scenarios within the monetized culture of surveillance capitalism: a culture in which the knowledge-productive epistemological practices (e.g., empirical data collection) are muddled by economically-motivated epistemological practices. Such reliance is justified by prior findings (e.g., hyperbolic scaling [98] and fears over a merger between surveillance capitalism and health [100]). Based on the findings presented in this paper, future work will systematically assess the role that perceived monetization plays in the experience of affective discomfort.

Finally, an unexpectedly large proportion (78%) of participants reported use of facial recognition as a means of smartphone login. This percentage is more than twice the expected level of FRA use for smartphone login.<sup>17</sup> Yet, it is possible that the high prevalence of FRA use among our participants reflects recent market-facing changes in the functionalities of smartphones (e.g., the removal of other forms of biometric authentication from recent iPhone models). It is possible that high use of FRA for smartphone login among participants skewed our results. If such an effect is

<sup>17</sup><https://www.paymentsjournal.com/by-2024-how-many-smartphone-owners-will-use-biometrics/>

genuine, our work highlights the need for future work to measure the prominence of FRA use in an app culture in which smart phones – the hubs of app culture – do not provide users with other means of biometric authentication. However, such a skew may also allow for speculation about people’s perceptions of well-being apps that use FRA once FRA has become more common among the general population.

## 8 CONCLUSION

Prior work has shown that app culture normalizes the experience of affective discomfort, including creepiness. The normalization of affective discomfort, however, stands in stark contrast to the intended purpose of well-being apps. Such contrast motivated the question, “Can we reasonably expect to achieve well-being through further enrollment in an app culture that normalizes affective discomfort?” We further specified this question in the form of RQs presented in Section 1 and hypotheses presented in Section 2. By analyzing responses to an online, scenario-based survey about a fictional, but realistic well-being app called “Thalia,” we found that apps intended to improve well-being can, indeed, be creepy, too. Apparently, this is the case in spite of the perceived benefits of such apps and despite doctor-recommended use and realistic privacy violations that are easily and successfully mitigated. Associated with privacy-related anxieties, self-assessed data literacy, ambivalence toward data practices, and learned helplessness, people’s affective discomfort about Thalia hints at a problem much deeper than usability and the quantified, metricated “improvement” of everyday life. Such affective discomfort requires the HCI community to more thoroughly engage with the philosophical ramifications of our successes, which have indelibly contributed to the present culture of data-for-profit and at all cost – despite the obviously well-meaning intentions of HCI research and practice. Given the fact that well-being is always already a comparative state, the HCI community is obligated to give due humanistic attention to the baselines our products create relative to the possibility of *being well*. Absent such consideration, the achievement of well-being through engagement with an app culture that is increasingly inseparable from the monetized quantification of surveillance capitalism may simply signify a lowered baseline against which *being well* is compared.

## ACKNOWLEDGMENTS

We would like to express our gratitude to the participants who made this study possible. We would also like to thank the individuals who reviewed this submission for their time and effort.

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## A APPENDIX A: SCENARIOS

This Appendix presents each of the seven full scenarios, which were presented in a between-subjects style. Each participant saw only one scenario; title information (e.g., Core Scenario, SR+AT, etc.) was not available to participants.

### A.1 Core Scenario

*Last month, your doctor recommended that you start using a smartphone app called Thalia, which is designed to help people track and manage their well-being. Your doctor explained that well-being describes a balance between feelings like happiness, sadness, contentment, and fulfillment. “Using Thalia,” your doctor said, “will help you and me monitor and understand your well-being and how to improve it.” Your doctor also informed you that, “Thalia will regularly share data-driven insights with you and me, in addition to providing you with clinically proven behavioral suggestions on a daily and monthly basis.”*



## A.2 Self-Report + Violation of Expectation (SR+VE)

*Last month, your doctor recommended that you start using a smartphone app called Thalia, which is designed to help people track and manage their well-being. Your doctor explained that well-being describes a balance between feelings like happiness, sadness, contentment, and fulfillment. “Using Thalia,” your doctor said, “will help you and me monitor and understand your well-being and how to improve it.” Your doctor also informed you that, “Thalia will regularly share data-driven insights with you and me, in addition to providing you with clinically proven behavioral suggestions on a daily and monthly basis.”*

*Thalia works by sending you push notifications a few times throughout the day. Each push notification includes a short series of multiple-choice questions that ask you about different aspects of your well-being. Thalia uses state-of-the-art algorithms to assess your well-being and provide insights.*

*Today, you received your first monthly well-being summary from Thalia. Thalia informed you that your well-being summary has been shared with your doctor, who will contact you to discuss the data. Additionally, Thalia showed you a map of locations where you’ve provided it with data, indicating where you are happiest. You were not aware that Thalia collected location data. By changing app settings, you are quickly able to stop location data collection by Thalia.*

## A.3 Self-Report + Breach of Personal Boundaries (SR+PB)

*Last month, your doctor recommended that you start using a smartphone app called Thalia, which is designed to help people track and manage their well-being. Your doctor explained that well-being describes a balance between feelings like happiness, sadness, contentment, and fulfillment. “Using Thalia,” your doctor said, “will help you and me monitor and understand your well-being and how to improve it.” Your doctor also informed you that, “Thalia will regularly share data-driven insights with you and me, in addition to providing you with clinically proven behavioral suggestions on a daily and monthly basis.”*

*Thalia works by sending you push notifications a few times throughout the day. Each push notification includes a short series of multiple-choice questions that ask you about different aspects of your well-being. Thalia uses state-of-the-art algorithms to assess your well-being and provide insights.*

*Today, you received your first monthly summary from Thalia. Thalia informed you that your well-being summary has been shared with your doctor, who will contact you to discuss the data. Additionally, Thalia also automatically compared your well-being data with fitness data from your activity-tracking app to “give you a fuller picture of your health and well-being.” You did not know that Thalia linked data with your activity-tracking app. By changing app settings, you were quickly able to stop Thalia from linking data with your activity-tracking app.*

#### A.4 Self-Report + Ambiguity of Threat (SR+AT)

*Last month, your doctor recommended that you start using a smartphone app called Thalia, which is designed to help people track and manage their well-being. Your doctor explained that well-being describes a balance between feelings like happiness, sadness, contentment, and fulfillment. “Using Thalia,” your doctor said, “will help you and me monitor and understand your well-being and how to improve it.” Your doctor also informed you that, “Thalia will regularly share data-driven insights with you and me, in addition to providing you with clinically proven behavioral suggestions on a daily and monthly basis.”*

*Thalia works by sending you push notifications a few times throughout the day. Each push notification includes a short series of multiple-choice questions that ask you about different aspects of your well-being. Thalia uses state-of-the-art algorithms to assess your well-being and provide insights.*

*Today, you received your first monthly summary from Thalia. Thalia informed you that your well-being summary has been shared with your doctor, who will contact you to discuss the data. Additionally, Thalia recommended other doctors in your area who accept your health insurance and have a history of treating “mood disorders.” You were not aware that Thalia would recommend new doctors or doctors who specialized in treating mood disorders. By changing app settings, you were quickly able to stop Thalia recommending new doctors, but you are unsure if you have a mood disorder.*

#### A.5 Facial Recognition/Analytics + Violation of Expectation (FRA+VE)

*Last month, your doctor recommended that you start using a smartphone app called Thalia, which is designed to help people track and manage their well-being. Your doctor explained that well-being describes a balance between feelings like happiness, sadness, contentment, and fulfillment. “Using Thalia,” your doctor said, “will help you and me monitor and understand your well-being and how to improve it.” Your doctor also informed you that, “Thalia will regularly share data-driven insights with you and me, in addition to providing you with clinically proven behavioral suggestions on a daily and monthly basis.”*

*Thalia works by temporarily accessing your phone’s camera when you log in using facial recognition. Each time you log into your phone using facial recognition, Thalia’s state-of-the-art, AI-based facial analysis algorithms assess your well-being.*

*Today, you received your first monthly well-being summary from Thalia. Thalia informed you that your well-being summary has been shared with your doctor, who will contact you to discuss the data. Additionally, Thalia showed you a map of locations where you’ve provided it with data, indicating where you are happiest. You were not aware that Thalia collected location data. By changing app settings, you are quickly able to stop location data collection by Thalia.*

#### A.6 Facial Recognition/Analytics + Breach of Personal Boundaries (FRA+PB)

*Last month, your doctor recommended that you start using a smartphone app called Thalia, which is designed to help people track and manage their well-being. Your doctor explained that well-being describes a balance*

*between feelings like happiness, sadness, contentment, and fulfillment. “Using Thalia,” your doctor said, “will help you and me monitor and understand your well-being and how to improve it.” Your doctor also informed you that, “Thalia will regularly share data-driven insights with you and me, in addition to providing you with clinically proven behavioral suggestions on a daily and monthly basis.”*

*Thalia works by temporarily accessing your phone’s camera when you log in using facial recognition. Each time you log into your phone using facial recognition, Thalia’s state-of-the-art, AI-based facial analysis algorithms assess your well-being.*

*Today, you received your first monthly summary from Thalia. Thalia informed you that your well-being summary has been shared with your doctor, who will contact you to discuss the data. Additionally, Thalia also automatically compared your well-being data with fitness data from your activity-tracking app to “give you a fuller picture of your health and well-being.” You did not know that Thalia linked data with your activity-tracking app. By changing app settings, you were quickly able to stop Thalia from linking data with your activity-tracking app.*

#### **A.7 Facial Recognition/Analytics + Ambiguity of Threat (FRA+AT)**

*Last month, your doctor recommended that you start using a smartphone app called Thalia, which is designed to help people track and manage their well-being. Your doctor explained that well-being describes a balance between feelings like happiness, sadness, contentment, and fulfillment. “Using Thalia,” your doctor said, “will help you and me monitor and understand your well-being and how to improve it.” Your doctor also informed you that, “Thalia will regularly share data-driven insights with you and me, in addition to providing you with clinically proven behavioral suggestions on a daily and monthly basis.”*

*Thalia works by temporarily accessing your phone’s camera when you log in using facial recognition. Each time you log into your phone using facial recognition, Thalia’s state-of-the-art, AI-based facial analysis algorithms assess your well-being.*

*Today, you received your first monthly summary from Thalia. Thalia informed you that your well-being summary has been shared with your doctor, who will contact you to discuss the data. Additionally, Thalia recommended other doctors in your area who accept your health insurance and have a history of treating “mood disorders.” You were not aware that Thalia would recommend new doctors or doctors who specialized in treating mood disorders. By changing app settings, you were quickly able to stop Thalia recommending new doctors, but you are unsure if you have a mood disorder.*

### **B APPENDIX B: MEASURES**

This Appendix presents the each of the surveys and items analyzed in the paper above.

#### **B.1 Perceived Benefits**

Based on the scenario you just read, please indicate your level of agreement with the following statements: (1 = Strongly Disagree, 7 = Strongly Agree)

- I think well-being apps like Thalia would be beneficial to me.
- I think well-being apps like Thalia would be beneficial to others.
- I think well-being apps like Thalia would be beneficial to society.

NOTE: Items above were presented in random order.

## B.2 Affective Perceptions Measures (APM)

Please indicate the extent to which you agree with the following statements (1 = Strongly disagree to 7 = Strongly agree):

- I have a feeling that there is something shady about Thalia.
- I think the Thalia app is creepy.
- I expect complications when I start using Thalia.
- I think the way Thalia uses my data is absurd.
- I understand what kinds of data Thalia collects.
- I would be comfortable with the way Thalia uses my data.
- I would continue to use Thalia based on the information provided in the scenario.
- I understand how Thalia uses the data it collects.
- I think the manner in which Thalia uses my data is realistic.
- I do not know how to feel about how Thalia uses my data.

NOTE: The APM items above were presented in random order.

## B.3 Prior Technology Use

Please answer the following questions: (Yes, No, I don't Know)

- Do you regularly use facial recognition to log in to your phone?
- Have you ever used an app or apps to monitor or track your well-being?

## B.4 App Information Privacy Concerns (AIPC)

Please indicate the extent to which you agree with the following statements (1 = Strongly disagree to 7 = Strongly agree):

[ANXIETY subscale:]

- I believe that as a result of my using mobile apps, information about me that I consider private is now more readily available to others than I would want.
- I am concerned that mobile apps may monitor my activities on my mobile device.
- I am concerned that mobile apps are collecting too much information about me.
- I am concerned that mobile apps may use my personal information for other purposes without notifying me or getting my authorization.
- When I give personal information to use mobile apps, I am concerned that apps may use my information for other purposes.
- I am concerned that mobile apps may share my personal information with other entities without getting my authorization.

- I feel that as a result of my using mobile apps, information about me is out there that, if used, will invade my privacy.
- I am concerned about threats to my personal privacy today.

[PERSONAL ATTITUDES subscale:]

- Compared to others, I am more sensitive about the way mobile app providers handle my personal information.
- To me, it is the most important thing to keep my privacy intact from app providers.
- It is very important to me that I am aware and knowledgeable about how my personal information will be used.

[REQUIREMENTS subscale:]

- Mobile app privacy is really a matter of consumers' right to exercise control and autonomy over decisions about how their information is collected, used, and shared.
- Control of personal information lies at the heart of mobile app users' privacy.
- Mobile app providers seeking information online should disclose the way the data are collected, processed, and used.
- A good privacy policy for mobile app users should have a clear and conspicuous disclosure.

NOTE: AIPC items above were presented in random order without separating them into subscales. The subscale headings were not shown to participants.

## B.5 Learned Helplessness Scale (LHS)

Please place a check in the box that most closely describes you or your feelings about yourself. (1 = Strongly Agree, 4 = Strongly Disagree.)

- No matter how much energy I put into a task, I feel I have no control over the outcome.
- I feel that my ability to solve problems is the cause of my success.
- I can find solutions to difficult problems.
- I don't place myself in situations in which I cannot predict the outcome.
- If I complete a task successfully, it is probably because of my ability.
- I have the ability to solve most of life's problems.
- When I do not succeed at a task, I do not attempt any similar tasks because I feel that I would fail them also.
- When something doesn't turn out the way I planned, I know it is because I didn't have the ability to start with.
- Other people have more control over their success and/or failure than I do.
- I try new tasks if I have failed similar ones in the past.
- When I perform poorly, it is because I don't have the ability to perform better.
- I accept tasks even if I am not sure that I will succeed at them.
- I feel that I have little control over the outcomes of my work.
- I am successful at most tasks I try.
- I feel that anyone else could be better at me at most tasks.
- I am able to reach my goals in life.
- When I don't succeed at a task, I find myself blaming my own stupidity for my failure.
- No matter how hard I try, things never seem to work out the way I want them to.
- I feel that my success reflects my ability, not chance.

- My behavior seems to influence the success of a work group.

NOTE: LHS items above were presented in random order. Reverse coding required for orthogonal items.