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Humans judge, algorithms nudge: The psychology of behavior tracking acceptance

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ABSTRACT

This article examines employees' acceptance of behavior tracking in the workplace. We theorize that people more willingly accept behavior tracking when it is conducted solely by technology (i.e., computer algorithms) rather than by humans. We posit that this is driven by the expectation that human-free tracking feels less judgmental and will, therefore, allow for a greater subjective sense of autonomy. The results of five experiments supported these predictions, revealing that participants were more likely to accept technology-operated than human-operated tracking (Experiments 1–5), an effect driven by reduced concerns about potential negative judgment, which, in turn, increased subjective sense of autonomy (Experiment 2). The stated purpose for tracking (Experiment 3), relation to the human tracker (Experiment 4), and type of behaviors tracked (Experiment 5) did not eliminate the effect. Technology-operated tracking also led to higher anticipation of intrinsic motivation (Experiments 3–4). Implications for research on the future of work are discussed.

> "On April 23, I started work at 8:49 a.m., reading and responding to emails, browsing the news and scrolling Twitter. At 9:14 a.m., I made changes to an upcoming story and read through interview notes. By 10:09 a.m., work momentum lost, I read about the Irish village where Matt Damon was living out the quarantine. All of these details — from the websites I visited to my GPS coordinates — were available for my boss to review" (Satariano, 2020).

The above quotation of a *New York Times* technology reporter captures the new reality of workplace tracking. Although employee surveillance efforts based on the classic time and motion studies pioneered by Frederick Taylor in the early 1900s (Taylor, 1912)—with the iconic clipboard- and stopwatch-carrying human observers—were ultimately rejected (Katzell & Thompson, 1990), it appears that Taylor's original aim of collecting data on all facets of work is alive and well. Indeed, we are witnessing a surge in the accepted use of behavior-tracking tools, a class of products and services that use computer-based algorithms to continuously track information about users and provide feedback based on that information. This acceptance is intriguing given that, traditionally, employees would never willingly agree to have others observe and record their every move, location, keystroke, and daily activity, as such forms of extensive tracking undermine feelings of freedom and self-determination (e.g., Gagné & Deci, 2005; Lepper & Greene, 1975; Niehoff & Moorman, 1993).

The rapid proliferation of behavior-tracking devices is undisputed, however, with sales expected to generate nearly $52 billion in revenue in 2020 (Gartner, 2019a). Examples include wearable products (e.g., smart watches, smart wristbands, smart badges) and digital applications that can be installed on computers and mobile devices. These products and services can track users' behaviors in real time, recording this information every few milliseconds. This trend is not limited to personal activities: organizations are increasingly using behavior-tracking technologies as well. Indeed, by 2021, organizations are expected to introduce over 83 million wearable behavior-tracking devices (ABI Research, 2016). A recent survey of 239 large corporations indicated that, in fact, over 50% were tracking non-traditional employee metrics like their emails, social media activity, biometric data, and with whom they met and how they used their workspaces (Gartner, 2019b). Moreover, the current work-from-home reality as a result of the COVID-19 pandemic has led organizations to explore new ways of tracking employees. For example, in November 2020, Microsoft rolled out a new 'productivity score' feature in its Office products allowing employers to track employee behaviors across 73 metrics including how often employees turned on their cameras during meetings, how often they contributed to

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shared documents/group chats, and their frequency of using Office tools (Sandler, 2020).

While organizations are expanding the scope of tracking through various tools, they are able to do so, in part, because employees have shown an increased acceptance of technological tracking. In fact, a majority of workers—three out of five—who responded to the State of Workplace Productivity Survey said that they would willingly try technological behavior-tracking tools if doing so would help them perform their job better (Corsello, 2013). Similarly, a recent survey revealed that while only 10% of employees surveyed in 2015 were willing to accept their employers tracking personal data, this number increased to 30% in 2018, and jumped to 50% if employers were transparent about the purpose of tracking (Gartner, 2019b). This newfound willingness to accept technological tracking points to the need for new theory and also introduces major implications for the future of work; thus, it warrants further attention.

One clue into workers' increased willingness to accept tracking may be found in the fact that people often desire feedback on their progress toward goals (Hackman & Oldham, 1976). This implies that employees may be more willing to accept tracking when it is experienced as *informational* (i.e., feedback), rather than *controlling* (i.e., surveillance). Building on this possibility, we posit that by changing people's perceptions about who, or what, is doing the tracking, one might transform the entire experience. Specifically, we explore people's acceptance of being tracked by an algorithm versus a person[1]. In particular, we examine the idea that people believe tracking will feel less aversive when they perceive (rightly or wrongly) that human observers have been removed from the equation (i.e., when they perceive being solely tracked by technology). If this is the case, the introduction of algorithms that eliminate the need for and/or perception of human involvement may be one explanation for people's increased willingness to accept tracking. In particular, we suggest that technology-operated tracking (relative to human-operated tracking) may reduce concerns about potential negative judgment, leading to a greater subjective sense of autonomy and, consequently, an increased willingness to accept tracking.

The present findings contribute to extant research by providing a psychological account for people's increased willingness to accept, rather than resist, technology-operated behavior tracking in the workplace. Second, we contribute to research on cognitive evaluation theory (Deci & Ryan, 1985; Deci, Olafsen, & Ryan, 2017; Ryan, 1982) by shedding light on the impact of advanced technologies on people's experiences of autonomy and their perceptions of a situation as autonomy-reducing. Third, we contribute to the growing body of scientific knowledge in the emerging area of the psychology of technology by exploring the psychological underpinnings of technology-operated tracking and its implications in the workplace.

1. Acceptance of tracking: psychological and organizational implications

Organizational scholars have closely examined the nature and consequences of employees' (un)willingness to accept tracking in the workplace (Aiello & Kolb, 1995; Chalykoff & Kochan, 1989; Ranganathan & Benson, 2020; Stanton & Barnes-Farrell, 1996). Being monitored generally hinders employees' sense of autonomy (Deci & Ryan, 1987) and leads to psychological reactance (Brehm, 1972). When employees refuse to accept tracking, they often do so directly, by actively avoiding monitored areas (e.g., Stanton, 2000). This could influence employees' choices to leave an organization or not to work with it in the first place. Unwillingness to accept tracking also shows up indirectly when employees become less intrinsically motivated (Alge, Ballinger, Tangirala, & Oakley, 2006; Niehoff & Moorman, 1993), engage in counterproductive work behaviors (e.g., Taylor & Bain, 2000), or provide false impressions of engaging in activities that are tracked (Bain & Taylor, 2000). Employees additionally resist tracking by reducing their organizational commitment (Chalykoff & Kochan, 1989; Wells, Moorman, & Werner, 2007) or hiding their most innovative techniques from management (Bernstein, 2012). Thus, employees' unwillingness to accept tracking takes various forms and can lead to negative consequences for their organizations.

While research has revealed behavioral consequences of the unwillingness to accept tracking, we know little about how employees' reactions to tracking might be determined by their perceptions of the tracking itself. Initial research in this area indicates that employees respond negatively to tracking when they perceive it to be coercive (Anteby & Chan, 2018; Sewell & Barker, 2006) or interpret it as a signal of managerial distrust (Bernstein, 2012). However, when employees experience some control over monitoring, they perceive it as more acceptable and fair, leading to positive organizational and employee outcomes (Alge et al., 2006; Alge, 2001; Douthitt & Aiello, 2001; Niehoff & Moorman, 1993). Organizational rationales for monitoring also influence employees' perceptions of and reactions to monitoring (Ravid, Tomczak, White, & Behrend, 2020). In sum, perceptions and interpretations of tracking are malleable and can influence employees' willingness to accept or resist tracking in organizations. In the following sections, we focus on how a new methodology—technology-operated behavior tracking—might affect employees' willingness to accept tracking.

2. Tracking and concerns about potential negative judgment

When people are subjected to traditional forms of tracking and are closely observed by others, they expose themselves to scrutiny and judgment. In such situations, people are aware of the possibility of being judged, potentially negatively (Leary, 1983; Schlenker & Leary, 1982; Van Boven, Lowenstein & Dunning, 2005). The experience of negative judgment leads to psychologically aversive feelings (Goffman, 1959; Leary & Baumeister, 2000; Leary & Kowalski, 1990), such as embarrassment (Brown & Garland, 1971; Garland & Brown, 1972; Miller, 1995; Modigliani, 1971), social anxiety (Jackson & Latane, 1981; Schlenker & Leary, 1982), and shame (Tangney, 1992; 1999). As a result of these aversive effects, people desire to avoid negative judgment from others (Aiello & Kolb, 1995; Bates & Holton, 1995; Karim, Kaminsky, & Behrend, 2014; Stanton, 2000; Watson et al., 2013; also see Cottrell, Wack, Sekerak, & Rittle, 1968; Hency & Glass, 1968).

The desire to avoid negative judgment constrains people by creating the need to behave in a socially desirable manner. Even when one can ultimately obtain a positive outcome, an awareness of the need to conform to social expectations in order to do so can be experienced as psychologically controlling. In sum, the experience of being closely tracked by others is psychologically aversive because of the potential for negative judgment. Consequently, human-based tracking may constrain the ability to feel intrinsically directed, thereby reducing one's sense of autonomy (Ryan, 1982) and diminishing intrinsic motivation (Harackiewicz, Manderlink, & Sansone, 1984; Shalley & Oldham, 1985). We explore these possibilities in the following sections.

3. The autonomy-infringing effects of human-based tracking

Autonomy is characterized as the perceived freedom to choose one's actions, or "an inner endorsement of one's actions, the sense that they emanate from oneself and are one's own" (Deci & Ryan, 1987, p. 1025). Feeling autonomous signifies that one experiences oneself as the initiator of one's own behaviors, free from being constrained by external

[1] We note that although many organizational monitoring systems may involve a human-technology combination that lies on a continuum from little to complete automation at various points in the tracking process, the question of who (or what) views the data is an overlooked issue that warrants further attention. Thus, we specifically explore this distinction between algorithm-based versus human-based tracking.

pressures. By contrast, a lack of perceived choice and the feeling that one *has to* do what one is doing produces a lack of autonomy (Deci & Ryan, 1987; Patall, Cooper, & Robinson, 2008; Rotter, 1954). Moreover, even when people are psychologically (rather than objectively) constrained in their actions, they experience a lower subjective sense of autonomy (DeCharms, 1968; Deci & Ryan, 1987).

According to Cognitive Evaluation Theory (Deci & Ryan, 1985; Ryan, 1982), the way in which people perceive their contexts is critical for determining their subjective sense of autonomy. When people perceive their context as creating pressure to attain particular behavioral outcomes, they experience it as controlling, which hinders their subjective sense of autonomy (Ryan, 1982). Alternatively, when people perceive their context as providing behaviorally relevant information, without pressure to attain particular outcomes, they experience it as informational and perceive a greater sense of autonomy. Although several contextual factors support or hinder autonomy (e.g., Blanck, Reis, & Jackson, 1984; Deci, 1971; Deci & Cascio, 1972; Ryan, Mims, & Koestner, 1983; Zuckerman, Porac, Lathin, Smith & Deci, 1978), we focus on a core factor that characterizes the tracking context: the possibility of negative judgment.

As noted above, when observed by others, people open themselves to the possibility of being judged, potentially negatively. Thus, they are psychologically constrained by the pressure to behave in ways that allow them to avoid negative judgment. Such a situation reduces one's ability to feel an internal locus of control and, in so doing, hinders one's subjective sense of autonomy (Deci & Ryan, 1987; Ryan & Connell, 1989). Indeed, studies show that the mere presence of an evaluator, even without rewards or aversive consequences, can undermine autonomy (e.g., Deci & Ryan, 1987; Ryan, 1982). Research on monitoring reiterates the autonomy-infringing effects of tracking (Bernstein, 2012; Ranganathan & Benson, 2020). Taken together, when subjected to human-based tracking, people experience pressure to avoid negative judgment (George & Zhou, 2001; Zhou, 2003); this makes them feel controlled and, ultimately, less autonomous (Kolb & Aiello, 1996).

4. Technology-based tracking and reduced concern about potential negative judgment

Importantly, by removing the humans who are capable of making negative judgments about those being tracked, technology-operated tracking enables people to obtain information about their behaviors without worrying about being judged. In this sense, people may come to perceive the tracking context as one that offers behaviorally relevant information without inducing external pressures to behave in certain ways—a context that is informational, rather than controlling. Thus, we posit that, in the context of tracking, technology removes an important barrier to one's subjective sense of autonomy: concerns about potential negative judgment.

Consistent with this idea, recent research suggests that people tend to perceive technology as less likely to form judgments. For example, in a clinical interview context, people were more willing to disclose sensitive information about themselves when they believed they were being interviewed by an automated virtual human (Lucas, Gratch, King, & Morency, 2014). Similarly, people preferred human interviewers for talking about less sensitive information and virtual humans for more sensitive information, a preference that was influenced by the interviewer's perceived ability to judge (Pickard, Roster, & Chen, 2016). This effect is consistent with findings from a meta-analysis indicating that computer administration of surveys increased self-disclosure, especially relative to face-to-face interviews and in contexts that elicited sensitive information (Weisband & Kiesler, 1996). Similarly, in the moral decision-making domain, recent research highlights that people perceive technology as lacking mind required to judge and make moral decisions relative to humans (Bigman & Gray, 2018; Gray & Wegner, 2012). Taken together, these findings offer support for the prediction that technology-operated tracking reduces concerns about potential negative judgment.

Lower concerns about potential negative judgment should, in turn, influence people's subjective sense of autonomy in that context. As noted earlier, the experience of being subjected to human-based tracking can impose *psychological* constraints produced by the desire to avoid negative judgment (Cottrell, 1972; Enzle & Anderson, 1993; Watson et al., 2013). In contrast, by reducing concerns about negative judgment, technology-operated tracking removes this psychological constraint. Therefore, technology-operated tracking (relative to human-operated tracking) should lead to increased subjective sense of autonomy. We posit that when their subjective sense of autonomy is not hindered in the tracking context due to concerns about potential negative judgment, people are more likely to accept (rather than resist) tracking. Building on these arguments, we hypothesize that:

Hypothesis 1: People are more willing to accept behavior tracking when it is technology-operated than when it is human-operated.

Hypothesis 2: Technology-operated tracking leads to lower concerns about potential negative judgment relative to human-operated tracking.

Hypothesis 3: Reduced concerns about potential negative judgment associated with technology-operated (relative to human-operated) tracking lead to increased anticipated autonomy, and these factors serially mediate acceptance of behavior tracking.

While we posit that reduced concerns about potential negative judgment and anticipated autonomy will drive people's willingness to accept technology-operated (relative to human-operated) tracking, it is worth considering alternative factors that might influence this acceptance. First, it is possible that technology-operated and human-operated tracking signal different organizational rationales for tracking. For example, human-operated tracking might be relatively more likely to signal that the organization will take actions based on what the tracking uncovers (relative to when employees are solely tracked by technology) and might lead employees to avoid human-operated tracking. Second, people may perceive potential differences in how tracking is executed when it is technology-operated versus human-operated. For example, people may expect tracking and feedback to be offered in-person when subjected to human-operated tracking (versus through automated platforms when subjected to technology-operated tracking) and might avoid human-operated tracking as a result. Third, perceived differences in the quality of feedback may be another alternative factor to consider. For example, people could perceive technology-operated tracking to be more effective in providing higher quality feedback than human-operated tracking, and may prefer technology-operated tracking for that reason. Finally, people may perceive differences in the extent to which feedback from technology-operated tracking and human-operated tracking is trustworthy and unbiased. For example, people might perceive feedback from technology-operated tracking to be more trustworthy and unbiased, and this perception might lead to a greater willingness to accept technology-operated tracking. In our experiments, we address each of these alternative explanations.

5. Technology-based tracking and intrinsic motivation

Our predictions also have implications for how people view their own behavior. Social psychological and organizational research has highlighted the importance of intrinsic motivation, the self-endorsed drive that stems from internal factors, such as one's own interests and values, rather than from factors external to the self (Deci & Ryan, 1985; Ryan & Deci, 2000). Theoretical and empirical studies grounded in Self Determination Theory (Deci & Ryan, 1985; Ryan & Deci, 2017) suggest that intrinsic motivation directly influences employees' performance and well-being at work (see Deci et al., 2017 for review). Specifically, when employees are intrinsically motivated they tend to perform better in their jobs (e.g., Grant, Nurmohamed, Ashford, & Dekas, 2011), show greater persistence (e.g., Grant, 2008), experience less stress and burnout (e.g., Fernat, Gagné & Austin, 2010), and report higher job satisfaction and commitment (e.g., Gagné & Deci, 2005; Meyer, Becker, & Vandenberghe, 2004). Importantly, contexts experienced as *controlling* (i.e., those that create pressure to attain particular behavioral outcomes) decrease intrinsic motivation, and contexts experienced as *informational* (i.e., those that provide behaviorally relevant information without pressure to attain particular behavioral outcomes) enhance intrinsic motivation (Ryan, 1982).

As noted earlier, when employees are subjected to tracking, they may perceive it as either informational or controlling. Therefore, their intrinsic motivation may depend on their perceptions of the tracking context. Consistent with this idea, research on monitoring suggests that when employees are tracked for informational, noncontrolling reasons, they have higher intrinsic motivation than when they are tracked for controlling purposes (Enzle & Anderson, 1993; Shalley & Perry-Smith, 2001). Similarly, recent work suggests that when employees are led to perceive monitoring as a game (rather than as serving a controlling function), their intrinsic motivation improves (Ranganathan & Benson, 2020). Building on these ideas, we suggest that technology-operated tracking is perceived as informational and, in turn, increases intrinsic motivation. On the contrary, human-operated tracking is perceived as controlling, thereby decreasing intrinsic motivation. Thus, we hypothesize that:

Hypothesis 4: Technology-operated tracking leads to increased anticipation of intrinsic motivation relative to human-operated tracking.

6. Overview of the present research

We conducted five experiments to test these hypotheses. For all five experiments, we collected data in single, complete batches and did not conduct any analyses until all data for a given experiment were collected. Following recommendations for increased power (Simmons, Nelson, & Simonsohn, 2013), we conducted a power analysis (G*Power software; Faul, Erdfelder, Buchner, & Lang, 2009). Based on a meta-analysis on acceptance of similar technological products (Khalil & Abdallah, 2013; Rauschnabel, Brem, & Ivens, 2015; Sumak, Hericko, & Pusnik, 2011; Zhang & Rau, 2015), we elected to use an anticipated effect size in the small-to-medium range (Cohen's $d = 0.4$) in order to conservatively estimate our sample sizes. The power analysis revealed that we needed at least 156 participants in between-subjects designs, and at least 82 participants in two-instance within-subjects designs, to have adequate power (0.80) to detect small-to-medium effects. Thus, we aimed to recruit at least 200 participants for studies with a between-subjects design and at least 100 participants for studies with a within-subjects design. Our total final sample size across five studies was 3,499 participants. We recruited a diverse set of participants including undergraduate students, MBA students, employed U.S. adults recruited via Prolific Academic, and U.S. adults via Amazon Mechanical Turk. All recent experiments (Experiments 3–5) were preregistered on AsPredicted.org (individual preregistration links are included in the study descriptions). All data and materials are posted and publicly available on OSF at https://osf.io/e7pgj/.

7. Experiment 1

7.1. Method

In Experiment 1, we examined our first hypothesis that people are more willing to accept behavior tracking when it is technology-operated rather than human-operated. We tested this idea through a behavioral study in a context where individual performance in a professional setting matters: university students preparing for jobs in business. We created a behavioral context that had real consequences for participants through a two-part study. In the first part (conducted online), participants indicated their willingness to accept technology-operated versus human-operated tracking by choosing one or the other. This was a choice that would ostensibly affect how their performance would be tracked in the laboratory during the second part of the study conducted in-person later that week. In the second part, they experienced tracking and received feedback via text messages, ostensibly given either by a person or by an algorithm.

7.1.1. Participants

We recruited 120 undergraduate students from a West Coast university to participate for course credit. We did not collect demographic information in the online portion of the study. We excluded three participants who participated multiple times, for a final sample size of 117.

7.1.2. Materials and procedure

The first part of the study was conducted online. Participants read about technology-based and human-based versions of an otherwise identical behavior-tracking product and indicated which product they would willingly accept to track their performance during the in-person portion (full manipulations in Appendix). This choice made in the first part of the study served as our main dependent variable.

The second part of the study was conducted in-person in the laboratory later that week. Participants completed a task during which they believed that their performance was being tracked in real-time either by an algorithm (i.e., technology-operated tracking condition) or by an algorithm with human oversight (i.e., human-operated tracking condition). To improve realism, we provided real-time performance feedback via text messages. Upon completing the task, participants provided open-ended responses about their experience of being tracked by the application (technology-operated or human-operated). The methods for this portion of the study are described in full in the supplemental materials.

Willingness to accept tracking. For our main dependent variable—participants' willingness to accept technology-operated versus human-operated tracking—we aimed to ensure that participants considered their choice to have real consequences. Therefore, in the first part of the study, we informed participants that a team of university alumni had created a start-up company called MasterTests and developed computer applications that would enable college students become better at taking standardized tests. Participants learned that the company had released its first application, Aptitude Tracker, which was a tool that offered specific feedback to test takers about their strengths and weaknesses by tracking their behaviors while taking tests. Following this, we informed participants that the company sought to pilot test their application before formally launching it, and they had been recruited for that pilot test.

Next, participants read that the company had created two versions of the new application – one operated by an algorithm (technology-operated) and the other operated by a person who was an analyst in the company (human-operated). For the technology version, participants read that the aptitude tracker was automated and fully operated by a computer algorithm designed to automatically perform data analytics. The tracker was said to track time spent on test questions, overall time left in the test, the number of times users switched screens or used online tools, and performance relative to other users. The human version was identical except that a human was involved in performing data analytics based on the data collected by the application. We informed participants that both versions of the application were designed to provide feedback to the user in real time during the test. In order to control for any possible differences in perceived effectiveness or quality of the product, both versions of the application were said to boost performance by 65%.

Following this, we measured participants' willingness to accept tracking. Participants were asked to rate their willingness to use the two versions of the application on a three-item scale ($\alpha = 0.91$): "The app controlled by the computer algorithm is highly desirable to me"; "I favor using the app controlled by the computer algorithm"; and "I definitely want to use the app controlled by the computer algorithm". Participants also rated their preference for the human version of the application on the same items adapted for the human-operated version ($\alpha = 0.91$). All ratings were made on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree).

We next informed participants that they would be completing a standardized test in the laboratory during the second part of the study. We informed them that their behaviors and performance during the test would be tracked by Aptitude Tracker. We asked them to select the version of the app—technology-operated or human-operated—that they would prefer to be tracked by during the second part of the study. Their choice was our primary dependent measure.

Finally, we informed participants that they would receive real-time feedback from the application via text messages. We chose to use text messages as the form of feedback in both versions in order to preemptively address a possible factor that might influence participants' willingness to accept the application: perceived differences in the way that the tracking-to-feedback process might be executed. For example, participants might imagine feedback being offered in-person or through a phone call when subjected to human-operated tracking versus through an automated platform when subjected to technology-operated tracking. We controlled for this by informing participants they would receive feedback through the exact same method (i.e., text messages) for both versions of the application.

7.2. Results and discussion

Consistent with our prediction, participants indicated a greater willingness to accept technology-operated tracking ($M_{Technology\ Version} = 5.10$; $SD = 1.06$) relative to human-operated tracking ($M_{Human\ Version} = 3.81$; $SD = 1.31$), $t(116) = 6.95$, $p < .001$, 95% CI of the difference = [0.92, 1.65], $d = 0.64$. This increased acceptance was also shown in participants' choice of which version of the application to use in the in-person portion of the study. Results from a one-sample chi-square test revealed that 79.4% of the participants selected the technology-operated version of the application (compared to a null of 50%), χ^2 (1, $N = 117$) = 40.69, $p < .001$. Thus, our findings supported Hypothesis 1 using a behavioral measure of acceptance of tracking.

We also tested whether differences in people's concerns about potential negative judgment emerged while ostensibly using the application. At the end of the in-person portion of the study, participants were asked to give open-ended responses, describing their reactions to being tracked by the application in the laboratory. Two research assistants who were blind to the type of tracking and predictions independently coded these responses "0" if they did not include statements about feeling judged, and "1" if they included expressions of concern about potential negative judgment. For example, statements about not wanting to be compared to others, or emotions due to being judged were coded as a "1."[2] Results of a binary logistic regression analysis revealed that participants in the technology condition (relative to those in the human condition) were less likely to report concerns about potential negative judgment: only 17% indicated concerns, compared to 36.4% in the human condition, $\beta = -1.03$, $SE = 0.50$, $p = .04$. We note that the sample size for this portion of the study is small, so we interpret these findings cautiously as initial evidence that people experience reduced concerns about potential negative judgment when ostensibly tracked by algorithms as opposed to by humans.

This study allowed us to test Hypothesis 1 during a performance-based task, indicating that willingness to accept tracking differs in situations where people have the option of choosing between technology-operated and human-operated tracking. One such choice occurs when deciding where to work, a context we explore in the following experiment.

8. Experiment 2

Although related to work, the previous study occurred outside of a traditional organizational context. We addressed this in Experiment 2 by examining whether people's acceptance of technology-operated tracking (relative to human-operated tracking) predicted their choice to enter organizations where behavior tracking is prevalent. In this experiment, we tested Hypotheses 1–3: that people are more willing to accept technology-operated tracking relative to human-operated tracking (Hypothesis 1), that technology-operated tracking will lead to reduced concerns about potential negative judgment relative to human-operated tracking (Hypothesis 2), and that people's increased willingness to accept technology-operated (versus human-operated) tracking is driven by lower concerns about negative judgment and increased anticipated autonomy (Hypothesis 3). We used a repeated-measures design to test the full model. We conducted the study with MBA students about to enter the job market as they represent a sample that is directly relevant to the context of considering job offers at different organizations.

8.1. Method

8.1.1. Participants

Two hundred and fifteen MBA students (31.6% female; $M_{age} = 28.23$) enrolled in a full-time program at a West Coast university participated in this study. To improve realism and simulate a situation similar to the common scenario where MBAs decide between multiple job offers, we used a within-subjects design in which participants viewed two job descriptions and indicated the extent to which they were willing to accept each job.

8.1.2. Materials and procedure

We asked participants to evaluate two job offers; the two jobs were in the same industry, city, and offered the same pay and benefits. We counterbalanced the order in which the two jobs were displayed to participants. We informed participants that the main difference between the jobs was how each company monitored their employees. Next, participants read about sociometric badges—behavior-tracking devices that tracked social interactions (full descriptions in the Appendix)—that both companies were using to monitor their employees.

Next, participants read how each company used the sociometric badges. Here, we manipulated whether the sociometric badge was controlled by an algorithm or by an analyst (akin to the manipulation in our previous experiment). Aside from this difference, the specifics of how the sociometric badges functioned were kept exactly the same (full manipulations in the Appendix). After reading these descriptions, participants were asked to rate both jobs on three scales: anticipated concerns about potential negative judgment, anticipated subjective sense of autonomy, and likelihood of accepting the job (all scales were counterbalanced).

Anticipated Concerns about Potential Negative Judgment. We used a 4-item scale adapted from the Brief Version of Fear of Negative Evaluation Scale (Leary, 1983). Sample items include: "When I wear the sociometric badge, I will worry about what other people will think of me even when I know it doesn't make a difference"; "When I wear the sociometric badge, I will be afraid that others will not approve of me", $\alpha_A = 0.96$, $\alpha_B = 0.94$ (full items included in the supplementals).

Anticipated Subjective Sense of Autonomy. We developed a 6-item scale relevant for this context and consistent with the definition of autonomy from self-determination theory (Deci & Ryan, 1987). Sample items include: "Wearing the sociometric badge will make me feel like my behaviors during social interactions are dictated by someone or

[2] To ensure accuracy, the two raters coded each response independently and resolved any discrepancies through discussion. The raters had initial discrepancies on 14 out of the 91 responses, but resolved all after discussing them.

something other than myself" (Reverse-coded); "Wearing the sociometric badge will make me feel like I have complete freedom in how I behave at work", $\alpha_A = 0.85$, $\alpha_B = 0.80$ (full items included in the supplementals).[3]

Likelihood of Accepting Job. We asked participants to rate their likelihood of accepting the job offers: "Please indicate how likely are you to accept the job offer from Company A [Company B]." Ratings were made on a scale from 1 (not at all) to 7 (very much).

8.2. Results and discussion

Consistent with our findings from Experiment 1, we found that participants were more likely to accept technology-operated tracking relative to human-operated tracking. Participants indicated a greater preference for Company A, where the sociometric badge was controlled by an algorithm ($M = 3.54$; $SD = 1.64$), than Company B, where the sociometric badge was controlled by a human ($M = 2.66$; $SD = 1.47$), $t(214) = 7.83$, $p < .001$, 95% CI of the difference = [0.66, 1.11], $d = 0.54$. Moreover, participants indicated that they would have lower concerns about potential negative judgment in Company A ($M = 3.95$; $SD = 1.67$) than in Company B ($M = 4.70$; $SD = 1.60$), $t(214) = -7.98$, $p < .001$, 95% CI of the difference = [−0.94, −0.57], $d = -0.54$. Participants also indicated that they anticipated having a higher subjective sense of autonomy in Company A ($M = 2.71$; $SD = 1.21$) than in Company B ($M = 2.29$; $SD = 1.10$), $t(214) = 6.77$, $p < .001$, 95% CI of the difference = [0.30, 0.55], $d = 0.45$.

We tested our full model by conducting bootstrapping mediation analyses using the MEMORE macro (serial mediation model) (Montoya & Hayes, 2017). The MEMORE macro estimates total, direct, and indirect effects in a path-analytic form using OLS regression where each path in the mediation model is estimated as the mean difference between the two measurements of the mediator(s) and the dependent measure(s) in a within-subjects design (Montoya & Hayes, 2017). In our model, MEMORE estimates each path in the serial mediation model by calculating the mean difference between participants' ratings of both the technology-operated and human-operated smart badge on our two mediators—concerns about potential negative judgment and anticipated subjective sense of autonomy—and our dependent measure, job preference. Specifically, we tested whether the (within-subjects) difference in concerns about potential negative judgment and the (within-subjects) difference in anticipated subjective sense of autonomy serially mediated the (within-subjects) difference in willingness to accept tracking (measured as job preference) between technology-operated and human-operated tracking.

Results based on a resampling size of 10,000 revealed that the 95% bias-corrected confidence interval for the indirect effect of job preference through anticipated concerns about potential negative judgment and anticipated subjective sense of autonomy excluded zero (0.07, 0.19), indicating these factors serially mediated the effect of technology on job preference (see Fig. 1 for the unstandardized regression coefficients of each pathway). Unstandardized regression coefficients and the 95% bias-corrected confidence intervals are presented in Table 1.

The findings from this experiment provide support for our hypotheses that technology-operated tracking leads to lower concerns about potential negative judgment, allows for a higher subjective sense of autonomy relative to human-operated tracking, and consequently increases people's acceptance for environments that employ technology-operated tracking relative to human-operated tracking. In order to replicate these findings in a different sample and with a control (i.e., no-monitoring) condition, we conducted a follow-up study, described below.

8.3. Replication of Experiment 2 with a 'no-monitoring' control

Experiment 2 did not include a "no-tracking" option that could serve as a baseline for comparing people's acceptance of technology-operated tracking relative to human-operated tracking. Perhaps the observed preference for technology-operated tracking would fail to emerge if people could just avoid both companies altogether. We sought to address this concern by including a "no-tracking" option in a preregistered, replication study using a diverse sample of community participants (the full study and results are included in the supplementals). Not surprisingly, participants were more willing to accept the job offer from the nonmonitoring company compared to the two monitoring companies. Consistent with our predictions, however, analysis of the two monitoring companies replicated all patterns of results from Experiment 2, including main effects and serial mediation – a preference for technology-based tracking emerged and was driven by lower anticipated concerns about negative judgment and a higher subjective sense of autonomy, replicating our prior findings.

9. Experiment 3

In Experiment 3 we sought to measure acceptance of tracking by examining people's responses to contexts that force either technology-operated or human-operated tracking, rather than providing the opportunity to choose between the two. We also sought to rule out a potential alternative explanation of our effect: the possibility that human-operated (as compared to technology-operated) tracking might signal to employees that the organization is more likely to take actions based on what is being tracked. That is, when there is a human involved in the tracking process (relative to technology-operated tracking), employees might have an increased perception that organizations will take actions based on what the tracking uncovers. As a result, they might seek to avoid human-operated tracking and prefer technology-operated tracking for that reason, rather than due to concerns about negative judgment per se. To address this concern, we created four conditions that varied in the type of tracking (technology-operated vs. human-operated) and in the purpose of tracking (whether used solely for informational purposes or for taking actions and making outcome decisions). Based on our theory, we predicted that people would be more likely to accept technology-operated (vs. human-operated) tracking. We also predicted that people would be most willing to accept tracking when it is purely informational (i.e., both technology-operated and used by the organization solely for informational purposes). We also sought to examine Hypothesis 4, the prediction that technology-operated (vs. human-operated) tracking would lead to increased anticipation of intrinsic motivation. We preregistered this experiment on AsPredicted.org (see: https://aspredicted.org/i95q7.pdf).

9.1. Method

9.1.1. Participants

We recruited 1,101 employed U.S. adults (45.5% female; $M_{age} = 34.94$) through Prolific Academic in exchange for payment. Of this sample, 55% reported having managerial experience. Participants were randomly assigned to one of four conditions in a 2 (type of tracking: technology-operated vs. human-operated) × 2 (tracking purpose: informational vs. decision-making), between-subjects design (ns = 272–277).

9.1.2. Materials and procedure

We instructed participants to picture themselves as the manager of the employee-training team at a large retail firm. Their main responsibilities in the role included meeting, training, and interacting with new employees during onboarding. We then informed participants that

[3] To address the concern of a reviewer, we also conducted analyses with three of the six items in the scale for greater conceptual clarity. All analyses are statistically significant at $p < .001$ both when subjective sense of autonomy is measured using the 6-item scale and the 3-item scale.

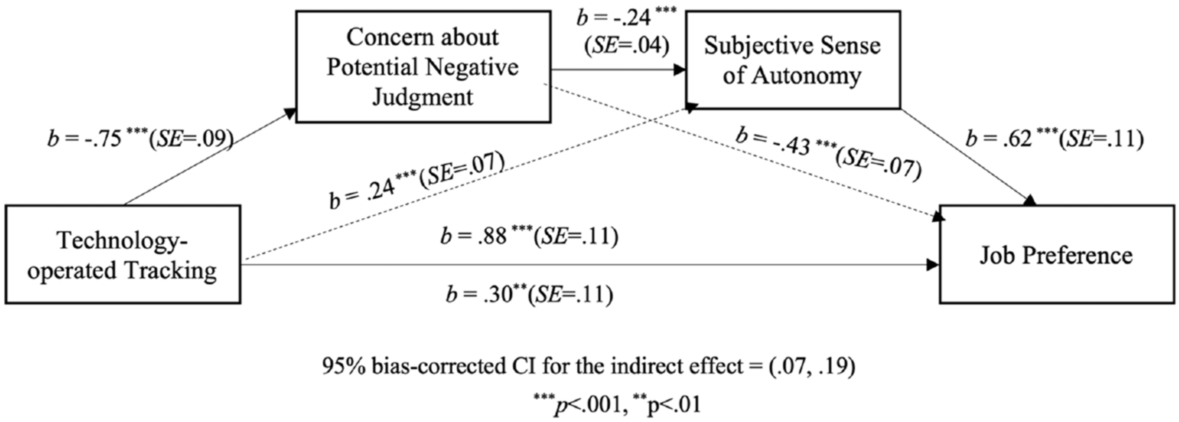

Fig. 1. Concern about potential negative judgment and subjective sense of autonomy serially mediate the effect of technology on job preference. Unstandardized regression coefficients and standard errors for all the paths are reported, $R^2 = 0.59$ (Experiment 2).

Table 1
Mediation results for the hypothesized Technology → Concern about Potential Negative Judgment → Subjective Sense of Autonomy → Job Preference path (Experiment 2).

Direct and indirect effects						
Direct Effect of Technology on Job Preference	*B*	*SE*	*t*	*p*	*95% LLCI*	*95% ULCI*
Technology → Job Preference	0.88	0.11	7.83	0.000	0.66	1.11
Direct Effect of Technology on Job Preference when Concern about Potential Negative Judgment and Subjective Sense of Autonomy are included as Mediators	*B*	*SE*	*t*	*p*	*95% LLCI*	*95% ULCI*
Technology → Job Preference	0.30	0.11	2.74	0.007	0.08	0.51
Indirect Effects of Technology on Job Preference	*B*	*SE*	*95% LLCI*	*95% ULCI*		
Total Indirect Effect	0.59	0.08	0.45	0.75		
Technology → Concern about Potential Negative Judgment → Job Preference	0.32	0.06	0.22	0.46		
Technology → Subjective Sense of Autonomy → Job Preference	0.15	0.05	0.07	0.26		
Technology → Concern about Potential Negative Judgment → Subjective Sense of Autonomy → Job Preference	0.11	0.03	0.07	0.19		

the retail firm tracked its employees using smart badges and provided feedback about their social interactions at work. Similar to prior experiments, we described the smart badge as having the exact same functionalities in both the technology and the human conditions. The type of tracking manipulation focused on whether the data tracked was analyzed by an algorithm in the technology-operated tracking condition or by a person working in the company's HR division in the human-operated tracking condition (full manipulations in the Appendix).

We manipulated our second independent variable—purpose of tracking (i.e., whether the tracking was solely for informational purposes or to allow the organization to take actions and make decisions based on the tracked information)—by explicitly specifying whether tracking data would be used to make outcome decisions. At the end of the smart badge description in both technology-operated and human-operated tracking conditions, we included a single sentence with this information. In the informational condition (i.e., tracking data *not* used by the organization to take actions), participants read:

> NOTE: All data collected by the smart badge and analyzed by the computer algorithm [*the person in the HR division*] will only be used to provide feedback for your own personal development. The data will NOT be used by your company to make business-related and personnel decisions.

In the decision-making condition (i.e., tracking information used by the organization to take actions), participants read:

> NOTE: All data collected by the smart badge and analyzed by the computer algorithm [*the person in the HR division*] will be used by your company to make business-related and personnel decisions.

Following these descriptions, we measured our key dependent variables: willingness to accept tracking and intrinsic motivation. We measured participants' willingness to accept tracking on a 3-item scale: "This smart badge is highly desirable to me"; "I favor using this smart badge"; "I accept my company's decision to use the smart badge", $\alpha = 0.95$. Ratings were made on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree). We measured intrinsic motivation using a measure adapted from DeVoe and Iyengar (2004): "In this job, how motivated do you think you will be for internal reasons (e.g., experiencing the activity of interacting with and training new employees as enjoyable and interesting)?". Ratings were made on a 7-point scale from 1 (not at all motivated) to 7 (extremely motivated).[4]

9.2. Results and discussion

9.2.1. Acceptance of tracking

Consistent with our preregistration plan, we conducted a 2 (technology vs. human) × 2 (informational vs. decision-making) between-subjects ANOVA on willingness to accept tracking to examine the main effects of our independent variables. Supporting our prediction, and consistent with findings from prior experiments, results revealed a significant main effect of technology on participants' willingness to accept tracking, $F(1,1097) = 12.97$, $p < .001$, $\eta_p^2 = 0.012$. Participants in the technology condition were more willing to accept tracking than were those in the human condition ($M_{technology} = 3.10$; $SD = 1.83$ vs. $M_{human} = 2.70$; $SD = 1.80$). There was also a significant main effect of tracking

[4] We also measured extrinsic motivation in this study and found no significant differences between conditions, $ps > 0.60$ (full results reported in the supplementals).

purpose, $F(1,1097) = 7.29$, $p = .007$, $\eta_p^2 = 0.007$. Participants were more likely to accept tracking when it was strictly for informational purposes than when it was for making decisions and taking actions ($M_{\text{informational}} = 3.05$, SD = 1.85; $M_{\text{decision-making}} = 2.75$, SD = 1.78). The interaction was not significant, $F(1,1097) = 0.50$, $p = .48$, $\eta_p^2 < 0.001$.

We followed these analyses with a one-way ANOVA and a series of planned contrasts to compare the technology-operated tracking and data-used-for-informational-purposes condition to the other three conditions. The one-way ANOVA revealed significant differences, $F(3,1097) = 6.94$, $p < .001$, $f = 0.14$. We expected the highest levels of tracking acceptance in the technology-operated tracking and data-used-for-informational-purposes condition (coded 3) relative to the other three tracking conditions (all coded − 1). Supporting our predictions, participants in the technology-operated tracking and data-used-for-informational-purposes condition were more willing to accept tracking ($M = 3.28$, $SD = 1.85$) than were those in the human-operated tracking and data-used-for-informational-purposes condition ($M = 2.81$, $SD = 1.82$), and those in the two conditions where data were used by the organization to make business and personnel decisions: ($M_{technology} = 2.91$, $SD = 1.78$), ($M_{human} = 2.59$, $SD = 1.77$), $t(1097) = 4.05$, $p < .001$.

9.2.2. Intrinsic motivation

Supporting Hypothesis 4, results of a 2 × 2 between-subjects ANOVA revealed a significant main effect of technology on participants' intrinsic motivation, $F(1,1097) = 3.86$, $p = .05$, $\eta_p^2 = 0.004$. Participants in the technology condition expected feeling more intrinsically motivated than those in the human condition ($M_{\text{technology}} = 4.34$; $SD = 1.72$ vs. $M_{\text{human}} = 4.13$; $SD = 1.77$). There was also a significant main effect of tracking purpose, $F(1,1097) = 9.66$, $p = .002$, $\eta_p^2 = 0.009$. Participants expected to be more intrinsically motivated when the tracking was strictly for informational purposes relative to when it was used by the organization for making decisions ($M_{\text{informational}} = 4.40$, SD = 1.70; $M_{\text{decision-making}} = 4.07$, SD = 1.79). The interaction was not significant, $F(1,1097) = 0.32$, $p = .57$, $\eta_p^2 < 0.001$.

Comparing the technology-operated tracking and data-used-for-informational-purposes condition with the other three conditions revealed significant differences, $F(3,1097) = 4.62$, $p = .003$, $f = 0.14$. We expected the highest levels of intrinsic motivation in the technology-operated tracking and data-used-for-informational-purposes condition (coded 3) relative to the other three conditions (all coded − 1). Supporting our predictions, planned contrasts revealed that participants in the technology-operated tracking and data-used-for-informational-purposes condition expected to be more intrinsically motivated ($M = 4.53$, $SD = 1.66$) than those in the human-operated tracking and data-used-for-informational-purposes condition ($M = 4.26$, $SD = 1.73$), or those in the two tracking conditions where data were used for decision-making: ($M_{technology} = 4.14$, $SD = 1.76$), ($M_{human} = 4.00$, $SD = 1.81$), $t(1097) = 3.26$, $p = .001$.

In sum, we ruled out a potential alternative explanation: the possibility that human-operated (relative to technology-operated) tracking signals that the data will be used by the organization to make task-contingent outcome decisions (e.g., rewards and punishments), thereby lowering employees' willingness to accept human-operated tracking. In addition to replicating our prior findings, we found that people are most willing to accept tracking when it is technology-operated and used strictly for informational purposes. Supporting Hypothesis 4, our findings also show that people were more intrinsically motivated when tracking was technology-operated (vs. human-operated). Moreover, people expected to have the highest levels of intrinsic motivation when tracked by technology and when the tracking was strictly informational.

10. Experiment 4

In the current experiment, we sought to provide additional support for Hypothesis 4 as well as to examine whether one's relationship to a human tracker (i.e., coworker vs. stranger) would influence intrinsic motivation. Based on our theoretical argument, we posit that being monitored by another human—regardless of whether the human is a coworker or stranger—should deter intrinsic motivation relative to technology-operated tracking. However, we expect this to be especially likely if the person is in a position to evaluate them, as in the case of a coworker rather than a stranger. We explored this factor in this experiment. Finally, we examined another form of unwillingness to accept tracking: intention to quit. We preregistered this experiment on AsPredicted.org (see: https://aspredicted.org/9xf72.pdf).

10.1. Method

10.1.1. Participants

We recruited 1,137 U.S. adults (55.8% female; $M_{\text{age}} = 33.19$) via Amazon Mechanical Turk in exchange for payment. Of the participants, 87.1% reported being employed and 61.6% reported having managerial experience. We excluded 74 participants (6.5%) who failed our attention check: "If you are reading this, please leave this question blank". Our final sample was 1,063 participants (56.8% female; $M_{\text{age}} = 33.34$). Participants were randomly assigned to one of four conditions in a between-subjects design: technology-operated tracking, human-operated tracking – stranger, human-operated tracking – coworker, and no monitoring ($ns = 261$–268).

10.1.2. Materials and procedure

We instructed participants to picture themselves as the head of the employee training team at a large consulting firm. Their main responsibilities in the role included meeting, training, and interacting with new employees during onboarding. We then informed participants that the consulting firm tracked its employees using smart badges and provided feedback about their social interactions at work (similar to Experiment 3). In this experiment, there were two notable changes: (a) we included a no-monitoring control condition, and (b) we described the human in the two human-operated tracking conditions as either a coworker (i.e., an analyst in the company's HR division) or a stranger (i.e., an analyst in the company that created smart badges and had no connections to the employee's company) (full manipulations in the Appendix). After reading one of four descriptions, participants responded to our key outcome measure, intrinsic motivation. We measured intrinsic motivation in the same way as in Experiment 3. Ratings were made on a 7-point scale from 1 (not at all motivated) to 7 (extremely motivated)[5].

Following this, we examined participants' intention to quit—another form of unwillingness to accept tracking—especially in contexts with unavoidable monitoring. We began by asking participants to select whether they liked or disliked the current situation at the company. We then asked participants in the three monitoring conditions who indicated that they did not like the current situation to indicate their intention to quit on the following item on a scale from 1 (strongly disagree) to 7 (strongly agree): "I'm going to quit the company".

10.2. Results and discussion

10.2.1. Intrinsic motivation

First, we examined intrinsic motivation across all four conditions. A one-way ANOVA revealed significant differences, $F(3,1059) = 8.25$, $p < .001$, $f = 0.19$. Consistent with our preregistration analysis plan, we conducted a series of planned contrasts. We first compared the no-monitoring condition with the three monitoring conditions. We expected the highest levels of intrinsic motivation in the no-monitoring condition (coded 3) relative to the three monitoring conditions (all

[5] We also included a measure of extrinsic motivation in this experiment (full results reported in the supplementals).

coded − 1). Supporting our predictions, participants in the no-monitoring condition indicated higher levels of intrinsic motivation (M = 5.24, SD = 1.11) than did those in the technology-operated tracking condition (M = 4.91, SD = 1.43) or the human-operated tracking conditions: ($M_{stranger}$ = 4.73, SD = 1.78), ($M_{coworker}$ = 4.64, SD = 1.64), $t(1059) = 4.49$, $p < .001$.

Next, we tested the prediction that, following the no-monitoring condition (coded 2), the technology-operated tracking condition would lead to higher levels of intrinsic motivation (coded 1), and that people would experience monitoring by a human stranger (vs. coworker) less intensely, leading to higher intrinsic motivation in the stranger condition (coded − 1) relative to the coworker condition (coded − 2). Results supported our predictions: participants indicated higher intrinsic motivation in the technology condition followed by the human stranger condition, then the human coworker condition, $t(1059) = 4.74$, $p < .001$. These findings offer further support for the idea that people perceive technology-operated tracking as informational rather than controlling. Interestingly, between the two human-operated tracking conditions, people anticipated higher intrinsic motivation when tracked by a stranger (vs. coworker), possibly because they perceived it as less evaluative.

10.2.2. Intention to quit

To examine intention to quit, another form of unwillingness to accept tracking, we first asked participants in all four conditions to choose whether they liked or disliked the current situation at the company. Results of a chi-square test revealed that 82.4% of the participants in the no-monitoring condition indicated that they liked the current situation, compared to 47.4% in the technology condition, 40.4% in the human-stranger condition, and 41.4% in the human-coworker condition, $\chi^2(3, N = 1063) = 127.04$, $p < .001$. Following our preregistered analysis plan, we then examined participants' intentions to quit if they were in one of the three monitoring conditions and had indicated that they did not like the current situation ($N = 453$). We found significant differences between conditions on participants' intention to quit, $F(2,452) = 5.70$, $p = .004$, $f = 0.21$. Next, we tested the idea that participants in the technology-operated tracking condition would show the lowest intentions to quit (coded −3) and people would experience monitoring by a human stranger less intensely than when monitored by a coworker, leading to lower intentions to quit in the stranger condition (coded 1) relative to the coworker condition (coded 2). These ideas were supported: participants indicated lowest intentions to quit in the technology condition ($M = 3.96$, $SD = 1.70$) followed by the human stranger condition ($M = 4.29$, $SD = 1.66$), and then the human coworker condition ($M = 4.63$, $SD = 1.75$), $t(450) = 3.17$, $p = .002$. Post hoc LSD tests revealed that participants in the technology condition had lower intentions to quit than did those in the human-coworker condition, $p = .001$, $d = -0.39$, and marginally lower than those in the human-stranger condition, $p = .09$, $d = -0.20$. Those in the stranger condition had marginally lower intentions to quit than the coworker condition, $p = .08$, $d = -0.20$. Taken together, these results suggest that people may be less likely to seek alternative employment in the face of technology-operated tracking relative to human-operated tracking.[6]

In sum, Experiment 4 extends our findings from previous experiments by showing how being subjected to technology-operated versus human-operated tracking (both by strangers and coworkers) influences intrinsic motivation and intention to quit, another form of unwillingness to accept tracking. Consistent with Experiment 3 and supporting Hypothesis 4, results revealed that technology-operated tracking leads to higher intrinsic motivation relative to human-operated tracking (both by stranger and coworker). Importantly, these results highlight that people experience negative consequences of human-operated tracking on intrinsic motivation, both when the human is a stranger or a coworker. However, we also found that participants experience human monitoring by strangers less intensely than by coworkers (i.e., humans who might be more likely to evaluate them), and anticipate having higher intrinsic motivation when monitored by a stranger (vs. coworker). Finally, consistent with prior findings, we found that participants were less likely to intend to quit the organization (another form of unwillingness to accept tracking) when subjected to technology-operated tracking relative to human-operated tracking.

11. Experiment 5

In Experiment 5, we examined a boundary condition that might weaken employees' willingness to accept technology-operated (vs. human-operated) tracking: whether the tracked behavior is relevant to one's work. People may be less opposed to human-operated tracking for behaviors that are related (vs. unrelated) to their job performance. Based on our theory, however, we expect that people's acceptance of tracking will be lower when humans are involved, regardless of the type of behaviors tracked due to concerns about potential negative judgment and lower subjective sense of autonomy. We also assessed whether perceptions about the quality and the trustworthiness of feedback from tracking might be additional potential mechanisms of our effect. Whereas feedback quality speaks to the effectiveness of the product (i.e., whether the product works well), trustworthiness of feedback speaks more to whether the feedback can be trusted and is unbiased. We preregistered this experiment on AsPredicted.org (see: https://aspredicted.org/gh97e.pdf).

11.1. Method

11.1.1. Participants

We recruited 1,003 U.S. adults (53.5% female; M_{age} = 35.58) via Prolific Academic in exchange for payment. Of the participants, 70.2% reported being employed and 46.9% reported having managerial experience. Participants were randomly assigned to one of four conditions in a 2 (type of tracking: technology vs. human) × 2 (type of behaviors tracked: job-related vs. job-unrelated behaviors) between-subjects design (ns = 249–252).

11.1.2. Materials and procedure

We instructed participants to picture themselves working in the call center of a large airline company and that their job was to handle as many calls as possible while maintaining customer satisfaction in each call. Their pay would include a base salary along with a daily bonus based on their performance. Next, we informed them that the airline company had introduced a fully optional program wherein it provided each participating employee with a smartwatch that tracked a number of behaviors.

In the two conditions in which job-related behaviors were tracked, participants read that the program was intended to help improve participating employees' performance and had been shown to increase their effectiveness, allowing them to earn an additional 40% performance-related bonus money, on average. In the two conditions where behaviors unrelated to the job were tracked, participants read that the program was intended to improve participating employees' health and well-being, and had been shown to improve their health, allowing them to improve healthy behaviors by 40%. Here, we emphasized that the behaviors tracked by the smartwatch were unrelated to employees' work tasks. The type of tracking—technology-operated or human-operated—was manipulated in a manner similar to prior experiments (full manipulations in the Appendix).

[6] In addition to intention to quit, we also examined whether participants were more likely to resign themselves to unavoidable monitoring or seek change. Results revealed no significant differences between the three monitoring conditions in the extent to which participants expected to feel resigned to unavoidable monitoring, $F(2,452) = 0.87$, $p = .42$, $f = 0.08$, or the extent to which participants wanted to seek change, $F(2,452) = 0.67$, $p = .51$, $f = 0.07$.

Following these descriptions, we measured our primary dependent variables: willingness to accept tracking and feelings of being judged. We counterbalanced the order in which these two measures were presented to participants. We measured participants' willingness to accept tracking on a 3-item scale: "This smartwatch is highly desirable to me"; "I favor using this smartwatch"; and "I would choose to accept my company's offer to use the smartwatch", $\alpha = 0.96$. We measured the extent to which participants felt judged on a 2-item scale: "In this situation, being tracked will make me feel evaluated"; "In this situation, being tracked will make me feel judged"; $r = 0.53$, $p < .01$. Next, we measured quality of feedback and trustworthiness of feedback (counterbalanced). We measured quality of feedback using a 2-item scale: "The feedback will provide helpful recommendations"; and "The feedback will be based on high-quality analysis"; $r = 0.83$, $p < .01$. Trustworthiness of feedback was also measured using a 2-item scale: "The feedback will be trustworthy"; and "The feedback will be objective (i.e., unbiased)"; $r = 0.77$, $p < .01$. Ratings were made on a 7-point scale, 1 (strongly disagree) to 7 (strongly agree).

11.2. Results and discussion

11.2.1. Acceptance of tracking

We examined our main prediction that people would be more likely to accept technology-operated (vs. human-operated) tracking, regardless of the type of behaviors being tracked. We conducted a 2 (technology vs. human) × 2 (job-related vs. job-unrelated behaviors) between-subjects ANOVA. Supporting our prediction, results revealed a main effect of technology on participants' willingness to accept tracking, F (1,999) = 17.87, $p < .001$, $\eta_p^2 = 0.018$. Participants in the technology condition were more willing to accept tracking than were those in the human condition ($M_{\text{technology}} = 3.81$; $SD = 1.95$ vs. $M_{\text{human}} = 3.30$; $SD = 1.88$). The type of behaviors being tracked did not affect participants' willingness to accept tracking, F (1,999) = 1.60, $p = .21$, $\eta_p^2 = 0.002$, ($M_{\text{job-related}} = 3.64$, SD = 1.88; $M_{\text{job-unrelated}} = 3.48$, SD = 1.98). The interaction was also not significant, F (1,999) = 0.07, $p = .80$, $\eta_p^2 < 0.001$. These results indicate that people's willingness to accept technology-operated (relative to human-operated) tracking persisted regardless of whether the behaviors being tracked were related or unrelated to one's job.

11.2.2. Concerns about potential judgment

Next, we examined the prediction that people would feel less judged when tracked by technology (vs. humans), and that this effect would persist regardless of the type of behaviors being tracked. Results of a 2 × 2 between-subjects ANOVA supported our prediction, revealing a significant main effect of technology on participants' ratings of feeling judged, F (1,999) = 34.59, $p < .001$, $\eta_p^2 = 0.033$. Participants in the technology condition reported feeling less judged ($M_{\text{technology}} = 5.27$; $SD = 1.62$) relative to those in the human condition ($M_{\text{human}} = 5.81$; $SD = 1.31$). Interestingly, the type of behaviors being tracked also had a significant main effect on participants' ratings of feeling judged, F (1,999) = 31.90, $p < .001$, $\eta_p^2 = 0.031$, ($M_{\text{job-related}} = 5.80$, SD = 1.26; $M_{\text{job-unrelated}} = 5.29$, SD = 1.66). The interaction did not reach significance, F (1,999) = 3.59, $p = .058$, $\eta_p^2 = 0.004$. Although the interaction did not reach significance, we tested the effect of technology-operated (vs. human-operated) tracking separately for job-related and job-unrelated behaviors to explore these results further. When job-related behaviors were tracked, participants reported feeling less judged in the technology condition ($M_{\text{technology}} = 5.62$; $SD = 1.33$) than in the human condition ($M_{\text{human}} = 5.98$; $SD = 1.16$), $t(500) = 3.27$, $p = .001$, 95% CI of the difference = [0.15, 0.58], $d = -0.29$. Similarly, when behaviors unrelated to the job were tracked, participants once again reported feeling less judged in the technology condition ($M_{\text{technology}} = 4.93$; $SD = 1.80$) than in the human condition ($M_{\text{human}} = 5.64$; $SD = 1.42$), $t(499) = 4.90$, $p < .001$, 95% CI of the difference = [0.43, 0.99], $d = -0.43$. These results indicate that people are less likely to feel judged when they are subjected to technology-operated (vs. human-operated) tracking, regardless of whether the tracked behaviors were related to their jobs.

11.2.3. Quality of feedback

Results of a 2 (technology vs. human) × 2 (job-related vs. job-unrelated behaviors) between-subjects ANOVA revealed that there was no significant main effect of technology on participants' ratings of quality, F (1,999) = 3.03, $p = .08$, $\eta_p^2 = 0.003$. Participants perceived the quality of feedback to be comparable in both technology-operated and human-operated tracking conditions ($M_{\text{technology}} = 4.53$; $SD = 1.54$ vs. $M_{\text{human}} = 4.36$; $SD = 1.52$). The type of behaviors being tracked also did not produce a significant main effect on participants' ratings of quality, F (1,999) = 0.052, $p = .82$, $\eta_p^2 < 0.001$, ($M_{\text{job-related}} = 4.46$, SD = 1.56; $M_{\text{job-unrelated}} = 4.43$, SD = 1.51). The interaction was also not significant, F (1,999) = 1.76, $p = .19$, $\eta_p^2 = 0.002$. These results indicate that participants perceived technology-operated and human-operated tracking as able to provide feedback of comparable quality, regardless of the type of behaviors being tracked.

11.2.4. Trustworthiness of feedback

Results of a 2 (technology vs. human) × 2 (job-related vs. job-unrelated behaviors) between-subjects ANOVA revealed a significant main effect of technology on trustworthiness of feedback, F (1,999) = 13.46, $p < .001$, $\eta_p^2 = 0.013$. Participants perceived the feedback from the technology-operated (vs. human-operated) smartwatch to be more trustworthy ($M_{\text{technology}} = 4.56$; $SD = 1.51$ vs. $M_{\text{human}} = 4.20$; $SD = 1.55$). The type of behaviors being tracked did not produce a significant main effect on trustworthiness of feedback, F (1,999) = 0.016, $p = .90$, $\eta_p^2 < 0.001$, ($M_{\text{job-related}} = 4.39$, SD = 1.56; $M_{\text{job-unrelated}} = 4.37$, SD = 1.52). The interaction was also not significant, F (1,999) = 2.83, $p = .09$, $\eta_p^2 = 0.003$. These results indicate that participants perceived technology-operated tracking to offer more unbiased, trustworthy feedback relative to human-operated tracking, regardless of the type of behaviors being tracked.

11.2.5. Mediation analyses

To be thorough, we examined whether participants' perceptions about quality of the feedback and trustworthiness of the feedback might account for their willingness to accept technology-operated tracking (relative to human-operated tracking). To explore them as simultaneous mediators, we conducted bootstrapping analyses using the PROCESS macro (model 4) (Hayes, 2013) and a parallel mediator model where they covary. Results from the bootstrapping analyses based on a resampling size of 10,000 revealed that the 95% bias-corrected confidence interval for the indirect effects through perceptions of feeling judged (0.10, 0.22) and trustworthiness of the feedback (0.04, 0.16) excluded zero, indicating that they both simultaneously mediated the relationship between technology and willingness to accept tracking. However, the 95% bias-corrected confidence interval for the indirect effect through quality of feedback (−0.02, 0.22) did not exclude zero, indicating that perceptions about the quality of feedback did not mediate the effect.

Next, we included perceived trustworthiness of feedback as a covariate in the mediation analyses and examined whether perceptions about feeling judged would mediate the relationship between technology and willingness to accept tracking, when controlling for this factor. Results from the bootstrapping analyses based on a resampling size of 10,000 revealed that the 95% bias-corrected confidence interval for the indirect effect of technology on willingness to accept tracking through perceptions of feeling judged excluded zero (0.09, 0.22), indicating that perceptions of feeling judged mediated the relationship between technology and willingness to accept tracking when controlling for differences in perceived trustworthiness of feedback.

These findings allow us to rule out potential differences in perceived quality of feedback as an additional mechanism of this effect. They do, however, suggest that perceived trustworthiness of feedback may partly account (in addition to perceptions of feeling judged) for people's willingness to accept technology-operated tracking (relative to human-operated tracking)—a point we discuss further in the General Discussion. Importantly, our hypothesized relationship between perceptions of feeling judged and willingness to accept technology-operated tracking persisted even when controlling for perceived trustworthiness of feedback.

12. General discussion

The results of five experiments provided support for our hypotheses that a) people are more willing to accept behavior tracking when it is technology-operated than when it is human-operated, b) technology-operated tracking leads to lower concerns about potential negative judgment, c) reduced concerns about potential negative judgment associated with technology-operated (as opposed to human-operated) tracking leads to increased subjective sense of autonomy, and these factors serially mediate acceptance of behavior tracking, and d) technology-operated tracking leads to increased anticipation of intrinsic motivation relative to human-operated tracking. In Experiment 1, participants showed a behavioral preference for a technology-operated tracking system over a human-operated tracking system when considering how their performance on a professionally relevant task should be tracked. In Experiment 2, participants were more willing to accept a job at an organization where tracking was technology-operated as opposed to human-operated. This effect was serially mediated by reduced concerns about potential negative judgment and higher subjective sense of autonomy. In Experiment 3, we accounted for an alternative explanation—that human-operated tracking might signal that the information would be used for making decisions and taking actions—and showed that participants were most willing to accept tracking when it was solely informational. Participants also anticipated higher intrinsic motivation when subjected to technology-operated relative to human-operated tracking, an effect that emerged even when tracking was unavoidable.

Having established support for our main predictions, in Experiment 4, we extended our findings by examining whether the identity of the human doing the tracking (stranger vs. coworker) influenced intention to quit, another form of (un)acceptance of tracking, and intrinsic motivation when tracking was unavoidable. We found that participants had lower intentions to quit and higher intrinsic motivation when subjected to technology-operated tracking (vs. human-operated tracking). Additionally, participants reported lower intrinsic motivation when tracked by a human who was in a position to evaluate them (i.e., coworker) versus a stranger. Finally, in Experiment 5, we examined whether the nature of behaviors being tracked might influence people's willingness to accept technology-operated (vs. human-operated) tracking in organizational contexts where the tracking was optional. Consistent with our predictions, results showed that changing the nature of behaviors did not eliminate people's greater willingness to accept technology-operated (vs. human-operated) tracking.

In these experiments, we also directly examined and/or controlled for various alternative mechanisms. In all our studies we specified that the tracking would be carried out in the exact same manner and varied technology and human involvement only when describing who/what analyzed the data and provided feedback. In addition, we addressed this issue directly in Experiment 1 by controlling how participants received tracking feedback during a performance-based task—through real-time text messages from both technology-operated and human-operated tracking. We directly tested for differences in perceived quality of feedback and found that participants perceived both technology-operated and human-operated tracking to be equally effective and capable of offering comparable quality feedback. Importantly, perceived quality did not mediate people's willingness to accept technology-operated (vs. human-operated) tracking (Experiment 5). Finally, we explored whether participants perceived differences in the extent to which feedback from technology-operated tracking and human-operated tracking would be trustworthy and unbiased. Interestingly, perceived trustworthiness of feedback mediated participants' willingness to accept technology-operated (vs. human-operated) tracking, but concerns about potential negative judgment remained a significant mediator.

Based on these findings from Experiment 5, we suggest trustworthiness of feedback from technology-operated versus human-operated tracking as a possible avenue for future research. Employees may be more willing accept technology-based tracking if they perceived it as fairer and bias-free. Indeed, research examining the effects of technology-based monitoring highlights how fairness-based motivation is one potential factor that might explain productivity gains in this context, given evidence that the implementation of technology-based monitoring improved honest employees' productivity by restoring perceptions of fairness (Pierce, Snow, & McAffee, 2015). However, future research should explore the conditions under which technology-based tracking is perceived as more or less fair. For example, while employees may be more willing to accept technology-operated tracking, and may even perceive such tracking as more trustworthy, they may be averse to technology autonomously making personnel decisions. In fact, recent research suggests that being evaluated by algorithms might make people experience the process as reductionistic and unfair (Newman, Fast, & Harmon, 2020). Thus, there are numerous opportunities for examining which factors affect employees' perceptions of trustworthiness in the context of monitoring and its implications for employee and organizational outcomes.

12.1. Contributions to theory and practice

The present research makes several novel theoretical contributions. First, our findings provide a psychological account for the rising proliferation of technological behavior tracking in organizations by showing that people are more willing to accept, rather than resist, technology-operated (relative to human-operated) behavior tracking, due to reduced concerns about potential negative judgment and an increased subjective sense of autonomy. Our findings suggest that, in the context of behavior tracking, an important barrier to subjective sense of autonomy is concern about potential negative judgment, which technology has the potential to remove. Thus, we elucidate the underlying psychological mechanism that drives one of the most widespread societal trends in recent times: the surge in the use of behavior tracking tools both in society at large and in organizations.

Second, we contribute to research on cognitive evaluation theory (Deci & Ryan, 1987; Ryan, 1982) by addressing the recent call for understanding the impact of advanced technologies on people's experiences of autonomy (Deci et al., 2017). In the present research, we clarify when and why people perceive differences in their sense of autonomy when subjected to technology-operated (vs. human-operated) tracking. We suggest that behavior-tracking technologies that closely and constantly track individuals' behaviors are perceived as less likely to deter their subjective sense of autonomy, as people have reduced concerns about potential negative judgment when subjected to tracking through these technologies. Through our findings, we highlight the role of technology as an important contextual factor that can influence the extent to which people perceive a situation as autonomy-reducing.

Third, we contribute to the growing body of scientific knowledge in the emerging area of the psychology of technology (e.g., Epley, Schroeder, & Waytz, 2013; Waytz & Norton, 2014). Prior research in this area suggests that when autonomous technologies have human-like features, people perceive such technologies more favorably (Waytz, Heafner, & Epley, 2014). We extend this emerging work by suggesting that although human-like features enhance people's perceptions of technology, those very features may cause people to be concerned about the potential for negative judgment, especially in the context of tracking. Anthropomorphizing nonhuman agents, for example, increases the social influence of those agents and constrains people to act in accordance with socially desirable norms (Waytz, Cacioppo, & Epley, 2010). Therefore, people may favorably experience technologies with human-like features, except in situations where their behaviors could be judged—in such situations, they may find them objectionable.

From a practical standpoint, our findings have important implications for employees and employers. As organizations increasingly use technology to monitor employees, our research suggests that it is critical to be mindful of how the tracking context will be perceived by employees. To effectively leverage technological tracking, organizations can consider fully automating technology-operated tracking so that it reduces employee concerns about potential negative judgment and is less likely to threaten autonomy. Moreover, while many organizations were already expanding their employee monitoring efforts before the COVID-19 pandemic, the current work-from-home reality has further accelerated the use of technological tools for employee monitoring. Indeed, many organizations are currently tracking employees' web activity, ranking them based on their 'productivity scores' tracked via several metrics, and mandating always-on webcam rules (Harwell, 2020). Our research highlights that some of these practices can deter employees' intrinsic motivation if perceived as evaluative. Instead, by adopting technological tracking for solely informational purposes, organizations may inspire employees to feel empowered to willingly track and change their own behaviors and be more intrinsically motivated at work.

Finally, and more broadly, our findings have implications for society as it faces the proliferation of devices in the Internet of Things. Many of these devices will introduce information-security challenges, and making thoughtful choices about them will be paramount to leading effective, healthy, and meaningful lives. Our research indicates that people may tend to express less psychological resistance to being tracked, and, ultimately, be more willing to accept technologies that can continuously subject them to intrusive tracking. In light of inevitable monitoring by large social media companies, their monopolistic control over data collected through these technologies, and the political concerns around increasing digital surveillance, our findings caution people to look beyond the immediate psychological impact of tracking and consider these deeply complicated, longer-term implications of tracking carefully before opening themselves to intensive surveillance, especially in the workplace.

12.2. Limitations and future directions

12.2.1. Salience of technology in long-term tracking

One limitation of our studies is that we focus on people's acceptance of tracking at a point in time where the perceived salience of who is doing the tracking is likely to be the highest. However, when people are continually subjected to tracking, they may be more accustomed to being tracked and less likely to pay attention to whether they are tracked by technology or humans. We suggest that understanding people's willingness to accept or reject tracking is likely the most important part of the process, perhaps especially if the salience of the tracking itself and who/what is behind it reduces over time. As people might adapt to any form of tracking over time (Fast & Jago, 2020), it becomes more critical for people to carefully consider the differences between technology-operated and human-operated tracking and their implications for their sense of autonomy at the decision point when accepting tracking, both in contexts where tracking is unavoidable and where it is optional. Nevertheless, our current findings do not inform us about implications of technology-operated (vs. human-operated) tracking for outcomes in the long term, a potential avenue for future research.

12.2.2. Human-technology combinations

Advances in artificial intelligence has enabled organizations to fully automate employee monitoring (e.g., De La Garza, 2019; Roose, 2019). In the context of tracking, our research compares tracking that is solely operated by technology to tracking that has human involvement. Future research could examine how various types of human-technology combinations compare to fully automated tracking. For example, people's attitudes toward tracking could vary based on the point in the tracking process at which humans become involved. Perhaps even when algorithms analyze data and provide feedback to employees, people may be more resistant to tracking if they know that their data will ultimately be shared with their team or supervisor at some point. Alternatively, people may continue to be less resistant to technology-operated tracking (relative to human-operated tracking) even when there is some distant possibility that their data would be shared with their teams or their supervisor as long as these parties are not proximally involved in the tracking process on a regular basis.

12.2.3. Threats due to acceptance of technological tracking

The rapid proliferation of behavior-tracking technologies has enabled extensive tracking in organizations and in our society at large (Warzel & Thompson, 2019). These digital records can increasingly provide accurate information to organizations about people's sensitive personal attributes such as sexual orientation, political views, personality traits, intelligence, and even use of addictive substances (e.g., Kosinski, Stillwell, & Graepel, 2013). In fact, studies show that algorithm-based judgments about people's personalities based on their digital records accumulated through tracking are more accurate than personality judgments by people (Youyou, Kosinski, & Stillwell, 2015). In light of these findings and given the increasing evidence for insufficient data protection by large, monopolistic social media companies (e.g., the Facebook data compromise during the 2016 election), it is critical to consider the political ramifications of people's acceptance of technology-operated tracking.

Future research could also explore implications for people's privacy-related attitudes and behaviors. By showing a greater acceptance of tracking through technologies that can closely and continuously track information about users' behaviors, people give up their ability to limit and control informational access to their behaviors. Perhaps the reduced salience of humans in technology-based tracking leads people to have higher perceptions of privacy because privacy perceptions are driven by people's assessment of possible risk (in the forms of negative judgment, deterioration of perceived self-image, and possibility of embarrassment) in a given context (Norberg, Horne, & Horne, 2007). This perception of privacy may also be exaggerated by an assumption that organizations with access to behavior-tracking data may use and analyze only aggregate data from groups of users, rather than identify and use individual-level data. However, it is not clear whether people make calculated assessments of privacy-related risks or have accurate privacy perceptions when they accept technology-operated tracking. Indeed, behavior-tracking technologies collect large volumes of sensitive personal data, and the manufacturers of these devices often store and transmit these data as well as share them with other third parties (Chester, 2017). This creates numerous risks related to information security and privacy (Kang, Dabbish, Fructer & Kiesler, 2015).

12.2.4. Additional moderators

It would be important to explore how employees' competence, skill level, or effort type influence their relative willingness to accept technology-operated versus human-operated tracking. For example, employees who are highly competent, have high levels of skill, or are high-effort types might show greater willingness to accept human-based tracking in order to be seen in a positive light. Indeed, research on star performers suggests that visibility—the extent to which one's job performance is visible to others—is critical for attaining and maintaining social capital and that high performers may be motivated to pursue visibility for self-enhancement and reputation-building motives (Call, Nyberg, & Thatcher, 2015).

It would also be interesting to explore how incentive structures may influence employees' acceptance of technology-operated versus human-operated tracking. For example, future research might explore whether employees will compromise economic gains (e.g., accept lower wages) in order to avoid human-based tracking and its psychological costs. Future research can also examine how economic incentives interact with other factors such as privacy concerns to predict employees' acceptance of technology-operated versus human-operated tracking. Extant research, for example, suggests that people are generally more likely to reject economic gains in exchange for reduced privacy but are reluctant to pay more money for higher privacy (Acquisti, John, & Loewenstein, 2013). This can have implications for people's willingness to accept one form of tracking over the other in situations where they would have to weigh both privacy and economic costs and benefits before choosing technology-operated versus human-operated tracking. In a similar vein, some employees may be more open to human-based tracking if it is less likely to detect behaviors that negatively affect performance (e.g., shirking, detecting mistakes, low effort) and resultant economic gains, relative to a more accurate technology-based tracking system. In this manner, employees may trade off psychological costs around concerns about potential negative judgment for potential economic benefits and vice-versa.

Finally, it is important to explore the effects of people's willingness to accept behavior tracking in the field. Field-based research on technology-operated tracking is burgeoning, as organizations continue to rapidly implement various forms of technological tracking to monitor employees' behaviors. Recent research has only just begun to explore the effects of various novel technological tracking systems, such as radio frequency identification (Staats, Dai, Hofmann & Milkman, 2017), point-of-service (POS) software services (Pierce, Snow, & McAfee, 2015), closed circuit cameras (Anteby & Chan, 2018), and body-worn cameras (e.g., Patil & Bernstein, 2020), to name a few. As organizations expand the scope of tracking through less intrusive, more novel technologies such as behavior-tracking wearables and computer-based algorithms, understanding the psychological and organizational implications of these technologies is of paramount importance.

13. Conclusion

In the face of rapid technological growth, it is imperative to understand the psychological factors that influence people's attitudes and behaviors toward novel technologies. The present research identifies key psychological factors that drive people to accept technologies that intensely track their behaviors: reduced concern about potential negative judgment and subjective sense of autonomy. It is our hope that the present work will help shed light on the rapid proliferation of behavior-tracking technologies in our organizations, as well as inspire further research related to the psychology of technology.

CRediT authorship contribution statement

Roshni Raveendhran: Conceptualization, Methodology, Formal analysis, Investigation, Resources, Visualization, Writing - original draft, Writing - review & editing. **Nathanael J. Fast:** Conceptualization, Methodology, Resources, Validation, Writing - review & editing, Supervision.

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Appendix A

A.1. Full descriptions of manipulations

A.1.1. Experiment 1

AptitudeTracker - Automated [*Human*] Version

This version of AptitudeTracker is fully controlled by a Computer Algorithm that is designed to automatically perform data analytics [*a person who is an analyst in the data analytics team at MasterTests*].

The computer algorithm [*This analyst*]:

1. Tracks the amount of time a participant spends on each question in the aptitude test.
2. Calculates the overall time left at any given point in the aptitude test.
3. Tracks the number of times a participant switches from the test screen to browse the internet.
4. Tracks the number of times a participant uses online tools like calculators and dictionaries.
5. Calculates the percentage of incorrect answers.
6. Calculates the overall percentile rank of the participant relative to other users.

All the information that is collected by the app is analyzed by the computer algorithm [*this person in the data analytics team*]. The algorithm [*The analyst*] will provide feedback to participants during the test.

In the beta tests of AptitudeTracker conducted by MasterTests, the algorithm version [*the human version*] is shown to boost performance by 65%.

A.1.2. Experiment 2

Company A

Company A asks that all its employees wear a sociometric badge while at work. This badge is controlled by a computer algorithm and is not monitored by any person.

The sociometric badge:

1. Measures how long the employee is at his/her desk.
2. Measures the amount of face-to-face interaction that the employee has with other people.
3. Measures the employee's conversational patterns in meetings (i.e., the amount of time the employee speaks in a meeting).
4. Provides feedback about the employee's social interactions at work.

All the information about the employees that is collected by the sociometric badge is analyzed by the computer and it provides automated reports to employees with feedback about their productivity and suggestions for how to improve their effectiveness.

Company B

Company B asks that all its employees wear a sociometric badge while at work. This badge is controlled by a person who works as an analyst in the company's human resources team.

The sociometric badge:

1. Measures how long the employee is at his/her desk.
2. Measures the amount of face-to-face interaction that the employee has with other people.
3. Measures the employee's conversational patterns in meetings (i.e., the amount of time the employee speaks in a meeting).
4. Provides feedback about the employee's social interactions at work.

All the information that is collected by the sociometric badge is analyzed by the analyst on the human resources team and he/she personally provides reports to employees with feedback about their productivity and suggestions for how to improve their effectiveness.

A.1.3. Experiment 3 – Full description of manipulations

Vintner tracks its employees using smart badges and provides feedback about their social interactions at work directly via a computer algorithm (no humans view the data) [*via analysts from your company's HR team*].

The smart badge is embedded with sensors, motion detectors, and microphones, and tracks the following:

- The amount of face-to-face interaction that you have with new employees.
- Your conversational patterns in training meetings (i.e., the amount of time you speak in training meetings).
- Your tone of voice during conversations with new employees (i.e., whether you are asking questions).

All data about your interactions collected by the smart badge is automatically analyzed by a computer algorithm [*observed and analyzed by a person who works in your company's HR division*].

The algorithm provides automated [*This person provides*] reports directly to you with feedback and suggestions for how to improve your interactions at work.

Informational

NOTE: All data collected by the smart badge and analyzed by the computer algorithm [*the person in the HR division*] will only be used to provide feedback for your own personal development. The data will NOT be used by your company to make business-related or personnel decisions.

Decision-making

NOTE: All data collected by the smart badge and analyzed by the computer algorithm [*the person in the HR division*] will be used by your company to make business-related and personnel decisions.

A.1.4. Experiment 4 – Full description of manipulations

Participants in the technology condition read:

Vintner tracks its employees using smart badges and provides feedback about their social interactions at work directly via a computer algorithm (no humans view the data).

The smart badge is embedded with sensors, motion detectors, and microphones, and tracks the following:

- The amount of face-to-face interaction that you have with new employees.
- Your conversational patterns in training meetings (i.e., the amount of time you speak in training meetings).
- Your tone of voice during conversations with new employees (i.e., whether you are asking questions).

All data about your interactions collected by the smart badge is automatically analyzed by a computer algorithm.

The algorithm provides automated reports directly to you with feedback and suggestions for how to improve your interactions at work.

Participants in the human stranger [*human coworker*] condition read:

Vintner tracks its employees using smart badges and provides feedback about their social interactions at work via analysts from the company that created these badges (no people from your workplace view the data) [*via analysts from your company's HR team*].

The smart badge is embedded with sensors, motion detectors, and microphones, and tracks the following:

- The amount of face-to-face interaction that you have with new employees.
- Your conversational patterns in training meetings (i.e., the amount of time you speak in training meetings).
- Your tone of voice during conversations with new employees (i.e., whether you are asking questions).

All data about your interactions collected by the smart badge is observed and analyzed by a person who works in the company that created these badges [*observed and analyzed by a person who works in your company's HR division*].

This person provides reports directly to you with feedback and suggestions for how to improve your interactions at work.

Participants in the no-monitoring condition read:

Vintner has a company-wide policy to not use monitoring tools or technologies to track its employees' interactions at work.

A.1.5. Experiment 5 – Full description of manipulations

Participants in the two conditions where job-related behaviors were tracked read:

The smart watch tracks your behaviors that are directly related to your effectiveness on the job and provides feedback relevant to improving your job performance.

Specifically, it does the following:

Tracks the number of calls you complete during your workday.
Measures the speed at which you complete calls.
Tracks your tone of voice during calls.
Tracks your calendar and assesses how you manage your time.

Within these conditions, participants in the technology [*human*] condition read:

The watch is connected to a remote computer [*and shared with a person who works as an analyst in the company*].

All data about you that is collected by the smart watch is analyzed by an automated computer algorithm (without involvement of any humans) [*observed by this person who then analyzes the data using a computer to generate insights*].

The computer algorithm sends automated reports [*This person sends reports*] to you twice a day with personalized feedback and suggestions for how to improve your effectiveness at work.

Participants in the two conditions where behaviors unrelated to the job (i.e., health behaviors) were tracked read:

The smart watch tracks your health-related behaviors and provides feedback relevant to improving your health and well-being. The smart watch does not track any behaviors related to your job performance.

Specifically, it does the following:

Tracks your physical movement and the amount of time you stand during your workday.
Measures your heart rate, blood pressure, and body temperature.
Tracks your mood and emotional states during the day.
Tracks your work schedule and when you take breaks from work.

Within these conditions, participants in the technology [*human*] condition read:

The watch is connected to a remote computer [*and shared with a person who works as an analyst in the company*].

All data about you that is collected by the smart watch is analyzed by an automated computer algorithm (without involvement of any humans) [*observed by this person who then analyzes the data using a computer to generate insights*].

The computer algorithm sends automated reports [*This person sends reports*] to you twice a day with personalized feedback and suggestions for how to improve your health.

Appendix B. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.obhdp.2021.01.001.

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