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Performance Monitoring? Results from a Factorial  
Survey Experiment**

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# When are Employers interested in Electronic Performance Monitoring? Results from a Factorial Survey Experiment

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**Abstract:** This paper examines supervisors' considerations about (not) using monitoring technologies to keep track of subordinates and their work performance. We conduct a factorial survey experiment. The hypothetical descriptions of workplace situations – so-called vignettes – create a situation where the surveyed supervisor is faced with a new team of subordinates and a given technology that can be used to track employees at work. Several components of the situation are randomly varied across vignettes and respondents. We find that supervisors are less interested in using monitoring technologies if the monitoring technology targets people rather than tasks and if the time effort for the supervisor is high. Supervisors' monitoring interest increases if their subordinates interact with sensitive firm data and the data evaluation is AI supported. Thus, our results confirm that supervisors take the costs and benefits of electronic performance monitoring into consideration regarding their attitude towards monitoring technologies at work.

**Zusammenfassung:** Dieser Beitrag analysiert die Überlegungen von Vorgesetzten, ob sie Überwachungstechnologien einsetzen sollen, um ihre Untergebenen und deren Arbeitsleistung zu beobachten. Wir führen einen faktoriellen Survey (Vignettenstudie) durch. Hypothetische Beschreibungen von Arbeitsplatzsituationen erzeugen eine Situation, wo der/die befragte Vorgesetzte einer neuen Gruppe von Mitarbeitenden und einer einsetzbaren Überwachungstechnologie gegenübersteht. Mehrere Merkmale der Arbeitsplatzsituation werden über die Vignetten und Befragten hinweg zufällig variiert. Es zeigt sich, dass Vorgesetzte weniger Interesse am Einsatz von Überwachungstechnologien haben, wenn letztere v.a. Beschäftigte und weniger Tätigkeiten überwachen und wenn der Zeitaufwand für sie hoch ist. Das Überwachungsinteresse der Vorgesetzten nimmt zu, wenn ihre Untergebenen mit sensiblen Firmendaten umgehen und die Datenauswertung KI-gestützt erfolgt. Insgesamt bestätigen unsere Ergebnisse, dass Vorgesetzte bei ihren Überlegungen und Entscheidungen die Kosten und Nutzen einer elektronischen Überwachung einbeziehen.

**Key words:** employee performance monitoring, workplace technology, factorial survey experiment, Germany

**JEL codes:** M50, D22, J01

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## 1 Introduction

Against the backdrop of the increasing availability and accessibility of data in firms and organizations (Christl 2021; Eurofound 2020), we investigate supervisors' interest in using electronic performance monitoring (EPM) systems to control their employees at work. While previous research has predominately focused on employees' reactions to EPM (e.g., Allen et al. 2007; Chen and Ross 2005; Gangwar et al. 2014; Mitrou and Karyda 2006; Ravid et al. 2020; Stanton 2000a, 2000b), this study focuses at the employer's calculations of costs and benefits before implementing surveillance technologies. Emanating from principal-agent theory, employers (principals) seek information about employees' work efforts (Eisenhardt 1989; Mitrou and Karyda 2006; McNally and Jeffrey J. 2008; Mahaney and Lederer 2011). However, observing employee work performance reliably and effectively comprises a recurring challenge for managers (Bhave 2014). Thus, EPM systems provide the opportunity to reduce this information asymmetry (Allen et al. 2007; Bernstein 2017) by capturing employee performance electronically. So far, supervisors' interest in using such monitoring systems has been taken for granted although disadvantages and financial costs for the management arise, such as trust issues, implementation costs, or costs for IT personnel (Christl 2021). Hence, employers are likely to weigh the costs and benefits of EPM before deciding about implementing and/or using surveillance technologies. Thus, we examine supervisors' actual interest to use EPM on their employees and ask when and which new EPM technologies they would consider.

We start by summarizing current research findings relevant to our research question (section 2). Relying on agency theory, we derive our hypotheses (section 3). Further, we present our methodological approach (section 4) using a factorial survey experiment to examine employees with personal responsibilities (supervisors) in terms of their interest in different EPM systems. Following, we analyze the results from our empirical analysis (section 5) and conclude by discussing our findings and further implications (section 6).

## 2 Literature Review

So far, research on EPM has mainly focused on the employees' reactions to EPM, e.g. privacy concerns, fairness strain, or performance (Allen et al., 2007; Chen and Ross, 2005; Gangwar et al., 2014; Mitrou and Karyda, 2006; Ravid et al., 2020). However,

little research has explored employers' attitudes towards EPM. To understand employers' intentions to monitor employees, it is crucial to identify the benefits and costs of monitoring practices. While most studies on this issue have been theoretical (e.g., Hodson et al. 1999; Dorval 2004; Ball 2010; Hugl 2013; Mitrou and Karyda 2006), some empirical studies have investigated employers' perspectives on EPM. For example, Mahaney and Lederer (2011) surveyed project managers that forwarded the survey to their employees. They found that monitoring practices reduced withholding information and increased project success. Stanton and Stam (2003) expanded the dual monitoring relationship between managers and employees by taking into account IT professionals who coordinate monitoring systems. They showed that managers support the use of electronic monitoring technologies to execute the firm's interests, but were also aware of the attached intrusiveness of employee data collection. Interviewing 89 managers and 58 non-managers regarding perceptions of employee monitoring, Allen et al. (2007) reported that socialization processes help employers to manage tensions between their intention to monitor and employees' concerns about privacy. Kaupins and Coco (2017) found that HR managers distinguished four types of monitoring related to the "Internet of Things" (IoT) - computer-related monitoring, location tracking, physical aspects of employees, and time spent on non-work activities. Further, familiarity with the technology increased ethics ratings (Kaupins and Coco 2017). Using a cross-national multi-level analysis of 20,000 firms in the EU (ECS data), Bechter et al. (2022) found that that "the use of HR analytics to monitor employee performance can be explained by firms' structural and managerial capability, as well as by their motivation and by the opportunity to be able to make use of it" (Bechter et al. 2022, p. 19). Finally, we find inconsistent results for the effect of monitoring performance, with more evidence for zero effects (e.g., Ravid et al. 2020) than positive correlations (e.g., Bhave 2014). These studies suggest that employers can benefit from monitoring practices, but also highlight the complexity of balancing the benefits of monitoring with employees' privacy concerns.

### 3 An Agency Perspective on Employer's Interest in EPM

We draw on agency theory (e.g., Eisenhardt 1989; Shapiro 2005) to answer our research question on when and how employers monitor their employees. Monitoring employees can help to reduce employers' information deficit about their work performance (Eisenhardt 1989; Jensen and Meckling 1976). The employer-employee

relationship can be defined as “a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf” (Jensen and Meckling 1976, p. 5). It entails the inherent agency problem of the employer's uncertainty about the employee's task performance (Eisenhardt 1989; Jensen and Meckling 1976). To address this problem, employers can establish outcome-based incentives or monitor employees (Eisenhardt 1989). Thus, the cost of monitoring behaviour is weighed against the cost of monitoring outcomes (Eisenhardt 1989).

Consequently, we investigate the cost-benefit calculation of employers to answer our research question. First, we argue that the benefits of monitoring employees will be greater if their work can be evaluated more easily (Jensen and Meckling 1976). Thus, especially prescribed tasks should allow reliable (digital) monitoring. Highly autonomously working employees should be less likely to work prescribed tasks and draw performance incentives from work autonomy rather than control (Eisenhardt 1989; Khoshnaw and Alavi 2020). Consequently, we hypothesize that *employers are less likely to be interested in using digital monitoring systems if their employees work autonomously* (H1). Additionally, we argue that monitoring data on work behaviour is more valuable to the employer if it captures task-related data rather than person-related data. Thus, we argue that *employers are less likely to be interested in using digital monitoring systems if the monitoring technology captures person-related data rather than task performance-related data* (H2).

Following the utility maximation argument employers will weigh costs against the benefits of monitoring, such as information gains (Eisenhardt 1989; Jensen and Meckling 1976; Shapiro 2005). Therefore, monitoring efforts – such as conducting and evaluating surveillance data – should influence supervisors' interest in digital monitoring systems. We state that the time effort of monitoring represents a strong concern of supervisors regarding monitoring technologies. Thus, we hypothesize that *employers are less likely to be interested in using digital monitoring systems with an increasing time effort associated with the monitoring system* (H3a). Contrary, we assume that AI (Artificial Intelligence) supported monitoring systems indicate a reduction of effort regarding the evaluation and interpretation of surveillance data. Thus, *employers are more likely to be interested in using digital monitoring systems if the monitoring technology provides an AI supported data analyses* (H3b).

Referring to the benefit aspect we argue that employers aim to protect the firm's assets and avoid a waste of resources (Shapiro 2005; Mahaney and Lederer 2011). Thus, shirking by employees who work more frequently with sensitive (firm) data should increase the risk for the company. Consequently, monitoring employees would not only reduce the risk of misuse of sensitive data due to employees' anticipation of detection but also increase employers' benefits of monitoring. Therefore, we argue that *employers are more likely to be interested in using digital monitoring systems if employees are working with sensitive data* (H4).

## 4 Method and Data

### 4.1 Factorial Survey Design

To examine supervisors' attitudes about using a specific monitoring technology on their subordinates we employ a factorial survey experiment that comprises descriptions of job situations with randomly varying dimensions (independent variables). Subsequently, we present a 7-point Likert rating scale to measure supervisors' interest to use a given digital monitoring technology (dependent variable). Specifically, we asked respondents – who all hold personnel responsibilities in their current employment relation – to rate their monitoring interest in the given situation (see Figure 1).

Factorial survey experiments aim to capture respondents' reactions to hypothetical situations, so-called vignettes. By randomly varying the dimensions of the vignettes, we can estimate the causal effect of each variable on the respondent's evaluation (for an overview, see Auspurg and Hinz 2015). Thus, this design enables isolated estimations of individual factors that are often confounded in reality. Further, randomly assigning each respondent to several hypothetical situations – the vignettes – allows us to use interpersonal as well as intrapersonal variation to investigate the effect of each independent variable and its relative importance.

In the following, we will describe several workplace situations. Please imagine for the evaluation of each situation the following circumstances:

Assume, that you just changed your employer where you now are responsible for a team of employees. The team's work tasks are mainly consistent with the working field of your former team. Assume that your new employer is comparable to your current employer in terms of industry and firm size. Your new employer provides each supervisor with the possibility to track their subordinates' work performance using an existing monitoring technology.

**Situation 1/6**

Your new employer assigns you to a team of four employees. Your subordinates work highly autonomously on their tasks. They rarely have access to highly sensitive firm data/ customer data. Your employer provides an employee monitoring system that enables you to control your subordinates' by using a software program to track central computer activities. The interpretation of the conducted data is executed by a system of artificial intelligence (AI). The evaluation or analysis of employees' work performance comes with a low (time) effort for you as their supervisor. Assume that your new employer has no works council.

**Please rate how interested you would be in the given situation to use the described technology to track your subordinates' work performance.**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<i>not interested at all</i>						<i>very interested</i>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*Figure 1: Exemplary vignette from the survey experiment*

Our vignette setting was framed as a situation of new employment with an employer that offers the respondent to decide about using a monitoring technology to keep track of their new team's work performance. To rule out possible confounding factors and increase the empirical realism we noted that the new employment would resemble their current employer in terms of firm size, industry, and field of responsibility. In sum, seven dimensions (independent variables, see Table 1) with either two or three different specifications (vignette levels, underlined phrases in Figure 1) varied systematically and created 432 possible situations ( $2 \times 2 \times 3 \times 3 \times 2 \times 2 \times 3 = 432$ ). Each respondent was assigned to rate six situations in terms of a) their personal interest to use the monitoring system in this situation (first dependent variable) and b) how they would rate the monitoring interest of a 'typical leader' within their industry (second dependent variable). For each of the dependent variables, they were given a 7-point rating scale (1, "not interested at all" to 7, "very interested"). However, in this paper, we exclusively focus on the first dependent variable of respondents' evaluation of their personal monitoring interest. We used the full universe (72 decks) by randomly assigning six vignettes to each respondent. Hence, each deck and vignette were rated

by approximately seven participants. Our online survey also included several questions about the respondent's job situation (e.g., experience with digital monitoring systems, questions about their role as a supervisor, questions about their current employer and subordinates, and sociodemographic characteristics).

*Table 1: Experimentally varied dimensions in the vignette study*

<b>Dimension</b>	<b>Level</b>	<b>#</b>
Team size	4	2
	25	
Subordinates' autonomy	High	2
	Low	
Working with sensitive data	Never	3
	Sometimes	
	Frequently	
Monitoring system	Screen tracking (computer activities)	3
	(Tele-)communication tracking (calls, e-mails, zoom etc.)	
	Video tracking (webcams, video cameras)	
Source of data interpretation	Artificial intelligence (AI)	2
	Supervisor	
Time effort	Low	2
	High	
Works council	No work council	3
	Works council with usage agreement	
	Works council without usage agreement	

## 4.2 Measures

As described, we asked respondents to rate each vignette situation by asking to which extent they were interested in using the described technology to track their subordinates in the given situation. Each situation had to be rated along a scale ranging from 1 "not interested at all" to 7 "very interested". Moreover, we employed the following independent variables:

*Team Size.* Following the argumentation of agency theory, the probability and costs of opportunistic behaviour of employees should increase if the number of their employees



increases. This stems from the presumption that more employees are more difficult to monitor at the same time – which is, in turn, known by employees as well. Thus, the probability of disclosing opportunistic behaviour decreases for bigger teams. Further, a higher count of employees statistically increases the probability of counterproductive employee behaviour. At the same time monitoring technologies provide an easy way to track even numerous employees at once (Monokha 2020). Therefore, team size was manipulated in our vignettes to indicate if more subordinates (25 subordinates) will increase the supervisors' wish to use monitoring technologies compared to a small team of 4 subordinates. We argue that small teams can be monitored easily without technology and are usually characterized by more familiarity where control mechanisms like social control (e.g., exchange relationship) apply instead.

*Autonomy.* As already mentioned previously, reliable performance measures increase the attractiveness for employers to monitor employees (Jensen and Meckling 1976). Since highly autonomous tasks are less prescribed, programming digital monitoring systems to capture them accurately is more difficult. Thus, autonomously working employees can be evaluated less reliably by monitoring technologies. Consequently, employees' task performance in our vignettes was executed either highly or hardly autonomously.

*Sensitive Data.* A major reason to monitor employees in the literature refers to firms' desire to protect their resources – especially, regarding legal matters (e.g., Hodson et al. 1999; Dorval 2004; Ball 2010; Hugl 2013; Mitrou and Karyda 2006). Thus, we manipulated in our vignette situations how often subordinates interact with sensitive firm data (“never” vs. “hardly” vs. “frequently”).

*Monitoring System.* Central to our research question is the way employee monitoring is executed. Thus, we introduced three different digital monitoring options to determine which technology is perceived to be more or less appropriate to track employees. As a reference, we use communication tracking including recordings of phone calls, E-Mails, and interactions on communication software programs like Zoom or MS Teams. The second option was a screen tracking software that retraces all computer activities, such as clicks and interactions on the internet. The third option – and most intrusive monitoring – was video surveillance via webcam or surveillance cameras. We hypothesize that video surveillance targets people whereas communication tracking and screen tracking are task-oriented monitoring systems. Thus, video surveillance

should a) provide less informative data on the performance but more informative data on the employee and b) be perceived as less acceptable on the part of employees (Grant and Higgins 1991).

*Source of Data Interpretation.* In terms of trust in technology and technology affinity, we varied in our vignette situations how the data has to be interpreted. Thus, the data on employee performance provided by the monitoring technology was either processed and interpreted by a system of artificial intelligence (AI) or had to be interpreted by the supervisors themselves.

*Time Effort.* We further incorporated a measure for the respondent's direct disadvantage regarding the monitoring system. Thus, the analysis of the monitoring data was accompanied by either low or high (time) effort for the supervisor.

*Works Council.* For German managers, an important part of the decision framework is the works council – a participative committee that may be elected by the workforce. In Germany, works councils have wide-reaching legal rights of information and co-determination. Hence, a works council's decision about the use of a monitoring technology should indicate the anticipated likelihood of adaption or resistance of employees regarding the monitoring system. Therefore, we create either a positive employee position ("works council with a usage agreement") or an uncertain/negative employee position ("works council with no usage agreement") towards the monitoring system. Further, we include a setting without any works council that leaves the respondents with their own (unbiased) anticipations regarding employee reactance.

To account for further factors, we included additional variables from our survey that were not part of the vignette experiment. Thus, we controlled for respondents' age ("younger than 35 years", "35-45 years", "46-55 years", "older than 55 years"), gender ("male" vs. "female"), management level (higher management: "yes" vs. "no"), experience with employee monitoring ("yes" vs. "no"), current number of subordinates (metric), gender composition of the current team ("more men", "equal", "more women"), and the sector of their current employer ("public sector", "private sector, manufacturing", "private sector, services").

## 4.3 Sample and Data Analysis

### 4.3.1 Sample and Data Collection

*Participants and Procedure.* Participants were recruited in cooperation with the convenience panel provider TalkOnline (www.talk-group.com). TalkOnline holds about 100 000 panellists in Germany. Individuals are actively recruited by the panel provider, including regularly updated information regarding more than 400 attributes. Therefore, the convenience panel provides the opportunity to preselect respondents to match the corresponding target group. TalkOnline uses an incentive scheme for their panellists that assigns bonus points after the conscientious completion of a survey which can be exchanged for money or vouchers afterwards.

We make use of the preselection by restricting our sample to currently employed people between 18-64 years with personnel responsibility for at least three subordinates. Note that in the following, we will avoid a concise distinction between employers and employees with personnel responsibilities and use the term 'supervisors' instead. Further, to increase empirical realism our sample was selected to respondents with subordinates working typically at least 30% of their working time on a computer. For the same reason, we also excluded some sectors with little plausibility of typical computer jobs (construction, agriculture/forestry, and logistics). Our survey was conducted in October and November 2021.

*Sample.* Our final sample resulted in 494 completed surveys. On average, our respondents were 45 years old (SD = 10.21, median = 44 years) with 37.73% female supervisors (n = 186) and 30.35% being top managers (highest management level). About half of our respondents (48.45%) were responsible for 10 employees at most while 11.80% reported being responsible for at least 50 employees. On average, respondents' subordinates spend about 75% (SD = 17.73, median = 80%) of their working time on a computer. About 80% (79.15%) of our respondents already used some sort of monitoring but only 47.06% have experienced workplace monitoring themselves. Further, 72.62% of our respondents reported having a works council at their firm (Table 2).

Table 2: Sample description

	<b>N</b>	<b>Mean/ Proportion</b>	<b>Var</b>	<b>Min</b>	<b>Max</b>
<i>Variables on respondent level</i>					
<b>age</b>	<b>493</b>	44.84	104.32	22	65
<b>age (categorical)</b>	<b>493</b>				
<35 years	80	16.23			
35-45 years	183	37.12			
46-55 years	139	28.19			
>55 years	91	18.46			
<b>sex (1 = male)</b>	<b>493</b>	0.62	0.24	0	1
<b>management level (1 = top management)</b>	<b>491</b>	0.30	0.21	0	1
<b>subordinated employees</b>	<b>488</b>	29.13	3505.69	3	500
<b>team size</b>	<b>483</b>				
<10	234	47.37			
10-20	122	24.70			
21-50	70	14.17			
51-100	37	7.49			
101-300	20	4.05			
<b>team's gender composition</b>	<b>494</b>				
more men	166	33.60			
equal share of men and women	229	46.36			
more women	99	20.04			
<b>computer-based working time (in %)</b>	<b>494</b>	75.35	314.41	33	100
<b>experience with employee monitoring (1 = yes)</b>	<b>494</b>	0.79	0.17	0	1
<b>experience with being monitored (1 = yes)</b>	<b>429</b>	0.54	0.25	0	1
<b>firm size (current employer)</b>	<b>461</b>	1547.20	0.00	4	70000
<b>firm size (categorical)</b>	<b>461</b>				
<50	75	15.18			
50-100	54	10.93			
101-500	185	37.45			
501-1000	63	12.75			
>1000	84	17.00			
<b>firm with a works council (1 = yes)</b>	<b>493</b>	0.73	0.20	0	1
<b>sector (of current employer)</b>	<b>494</b>				
public sector	130	26.32			
private sector, manufacturing	141	28.54			
private sector, service	223	45.14			
<i>Variables on the vignette level</i>					
<b>DV: monitoring interest</b>	<b>2964</b>	3.54	4.46	1	7

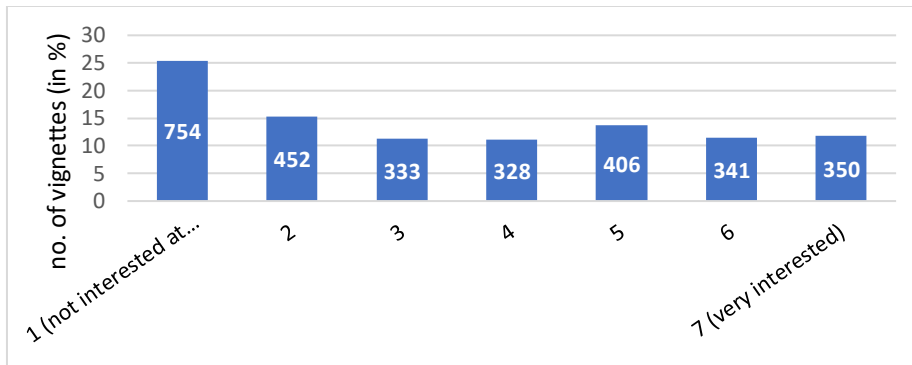
### 4.3.2 Data Analysis

Since our vignette data is hierarchically nested (six vignettes for each respondent), we estimate a linear regression model with cluster-robust standard errors as well as a multilevel regression (Auspurg and Hinz 2015). Since the dependent variable was assessed along a 7-point Likert scale we assume linearity and estimate an OLS (ordinary least squares) model and a multilevel model. Comparing the results, both models (with and without control variables) yield comparable estimates regarding effect sizes and significance. Relying on Auspurg and Hinz' (2015) methodological assessment that multilevel estimations allow for more flexibility and “explicitly focus on the multilevel structure of error terms” (p. 90) within vignette data we proceed with the multilevel estimation. Additionally, measures of model fit (AIC and BIC) suggest favouring the multilevel model as well.

## 5 Results

Interest ratings for our vignette situations (Figure 2) show that the total range of the scale from 1 (“not interested at all”) to 7 (“very interested”) is covered for our dependent variable. Even though there is an accumulation of vignette ratings on the first interest scale point – 24.44% of all vignettes were rated to initiate no interest in monitoring at all (scale point 1) – there is also some indication for situational monitoring interest. Approximately, all the other scale points were used equally often. A cross-table analysis shows that 43.50% (equaling 328 vignettes) of all “not interested at all” ratings were allotted to the ‘video monitoring’ technology, therefore, this peak might be driven by an aversion against video surveillance.

In sum, our data contains 2964 vignette ratings – equaling our observations on the vignette level. The mean rating of the respondent’s interest in (digital) monitoring bears 3.54 scale points (SD = 2.11).



*Figure 2: Distribution of respondents' interest in digital monitoring, vignette level*

To test our hypotheses regarding supervisors' interest in digitally monitoring their subordinates, we conducted multilevel regression models.

Regarding our first hypothesis stating that employers are less likely to be interested in digital monitoring systems if their employees work autonomously (H1) we find no support in our data. Situations with highly autonomously working employees were not evaluated significantly differently in terms of respondents' monitoring interest and also show only a very small effect size of 0.05 (Table 3). Thus, we reject the hypothesis that autonomy influences monitoring interest in our experiment.

Our next hypothesis states that employers are less likely to be interested in digital monitoring systems if the monitoring technology captures person-related data rather than task performance-related data (H2). Our vignette dimension regarding the monitoring technology consists of three systems – communication tracking, screen tracking, and video tracking. Hence, video tracking serves as person-focused monitoring whereas communication tracking and screen tracking represent task-focused monitoring. Consequently, the first two monitoring systems are suited to monitor tasks that require digital correspondence (e.g. E-Mails) and computer activities that are common for computer-based office jobs. However, video surveillance is suited to capture behaviour and people – regardless of the job tasks. To test further distinctions for task-related monitoring, we hypothesize that screen tracking represents even more information in terms of task performance while communication tracking includes partially a social or personal component. Thus, we use communication tracking as a reference and find a highly significant negative effect on monitoring interest. Hence, compared to communication tracking supervisors' interest in monitoring their subordinates decreases significantly by 0.55 points on the interest scale.

However, we do not see significant differences between communication tracking and screen tracking. Thus, there might be no differentiation between task-related monitoring systems and both types of monitoring are perceived as equally appropriate to capture employee performance. To further test this relation, we estimated an additional model that only differs from the previous model by setting the person-related monitoring system (video tracking) as a reference (instead of 'communication tracking'). By doing so, we aim to test for the hypothesized discrimination between task-focused and person-focused technologies. Consistent with our previous explanation, we find that both task-related monitoring systems are perceived as significantly more interesting for employee monitoring – communication tracking by 0.53 scale points and screen tracking by 0.56 scale points. Consequently, our data support the hypothesis that task-related monitoring is preferred over person-related monitoring (H2).

*Table 3: Multilevel Regression (including control variables, not shown in table)*

<b>leader's interest in employee monitoring</b>	<b>Coefficient</b>	<b>Std. err.</b>	<b>z</b>	<b>P&gt;z</b>	<b>[95% conf. Interval]</b>	
employee autonomy (ref: low)						
high	<b>0.051</b>	0.055	0.93	0.355	-0.057	0.159
control system (ref: communication tracking)						
screen tracking	<b>0.035</b>	0.070	0.50	0.617	-0.102	0.172
video tracking	<b>-0.553</b>	0.069	-8.00	0.000	-0.689	-0.418
time effort for leader (ref: low)						
high	<b>-0.195</b>	0.057	-3.41	0.001	-0.307	-0.083
working with sensitive data (ref: no)						
rarely	<b>0.128</b>	0.069	1.87	0.062	-0.006	0.263
often	<b>0.554</b>	0.072	7.70	0.000	0.413	0.695
works council (ref: yes, no usage contract)						
no works council	<b>-0.345</b>	0.072	-4.82	0.000	-0.485	-0.205
works council & usage contract	<b>-0.318</b>	0.070	-4.56	0.000	-0.455	-0.181
data interpretation (ref: by the leader)						
by software (AI)	<b>0.126</b>	0.057	2.20	0.028	0.014	0.237
team size (ref: 4 employees)						
25 employees	<b>-0.023</b>	0.056	-0.40	0.687	-0.133	0.088
age (groups)						
35-45 years	<b>0.425</b>	0.223	-1.910	0.056	-0.861	0.011
46-55 years	<b>-0.884</b>	0.249	-3.550	0.000	-1.373	-0.395
>55 years	<b>-1.012</b>	0.266	-3.810	0.000	-1.532	-0.491
leader's gender (ref: female)						
male	<b>-0.065</b>	0.174	-0.370	0.709	-0.406	0.276

leader: higher management position yes	<b>0.769</b>	0.710	0.191	0.000	0.336	1.085
leader: experience with monitoring yes	<b>1.620</b>	1.578	0.183	0.000	1.219	1.937
number of currently subordinated employees	<b>0.001</b>	0.001	0.400	0.687	-0.002	0.003
team composition (ref: equally men&women) more men	<b>-0.318</b>	0.191	-1.660	0.096	-0.693	0.057
more women	<b>-0.811</b>	0.227	-3.580	0.000	-1.255	-0.367
sector (ref: public sector) private sector, man.	<b>-0.493</b>	0.234	-2.110	0.035	-0.952	-0.034
private sector, service	<b>-0.577</b>	0.208	-2.770	0.006	-0.984	-0.169
<b>_cons</b>	<b>4.077</b>	0.314	12.97	0.000	3.461	4.693
<b>Random-effects parameters</b>	<b>Estimate</b>		<b>Std. Err.</b>		<b>[95% conf. interval]</b>	
ID: Identity						
var(_cons)	<b>1.637</b>		<b>0.152</b>		<b>1.365</b>	<b>1.964</b>
var(Residual)	<b>1.210</b>		<b>0.045</b>		<b>1.126</b>	<b>1.301</b>
LR test vs. linear model:	chibar2(01) = <b>856.91</b>		Prob >= chibar2 = <b>0.0000</b>			

Following an intuitive cost-benefit rationale, our third hypothesis states that employers are less likely to be interested in digital monitoring systems with increasing effort associated with the monitoring system. We examine this in terms of time effort (H3a) and interpretation effort (H3b). Accordingly, our results show a highly significant decrease of 0.20 points in employee monitoring if it is linked to a higher time effort for the supervisor (Table 3). Further, monitoring technologies that provide an AI supported data interpretation feature increased respondents' monitoring interest by 0.13 points (Table 3). Hence, supervisors seem to appreciate support when interpreting monitoring data. To further examine this aspect, we ran an additional regression model including an interaction effect between the time effort and interpretation effort variables. However, the interaction effect showed no significant effect on respondents' monitoring interest (not shown in Table 3). Therefore, our results suggest that supervisors distinguish between costs regarding time effort and the cognitive component of interpreting the conducted surveillance data. Concluding, we can support the proposition that higher monitoring effort decreases employers' interest in digital employee monitoring.

Our last hypothesis (H4) refers to the employer's perceived risk of misconduct – e.g., regarding lawsuits, data security, or confidentiality reputation. Thus, we aim to



investigate whether employers are more likely to be interested in digital monitoring systems if employees are working with sensitive data (H4). To test this, we compare a situation where employees do not have to work with sensitive data (reference) to situations where they either rarely or frequently work with sensitive data. By distinguishing the frequency of accessing sensitive data we aim to display supervisors' security sensitivity and risk calculation behaviour. Results from our regression analysis show that – compared to no involvement with sensitive data – respondents were significantly more interested in monitoring if employees had to work with sensitive data regularly. Thus, the monitoring interest of supervisors increased by 0.55 scale points (Table 3). However, the 'rare data interaction' category did not yield significant effects and, further, generated only a small effect of 0.13 points. Thus, supervisors seem to factor in the risk of misuse of (firm) data to a certain degree. Concluding, we partially support our hypothesis (H4) that employers' interest in digital monitoring systems increases with employees' access to sensitive data. Although employee interaction with sensitive data does not per se elevate supervisors' monitoring interest, our results show that frequent interaction with sensitive data does.

## 5.1 The Relationship of Works Councils and Employers' Monitoring Interest

Our data was conducted in Germany and, therefore, provides a special condition in terms of employee participation. Thus, in this section, we discuss additional findings relating to this end. In Germany, workers in every firm that employs at least five people can (voluntarily) set up a works council as a worker representation body and participate in firms' decisions – such as introducing digital monitoring technologies to track employee performance (Abraham et al. 2019; Addison et al. 2001). Consequently, in firms that have a works council, decisions about employee monitoring technologies have to be run and approved by the elected employee representatives of the works council. Therefore, we integrated works councils as a vignette dimension signaling different degrees of certainty regarding the employee sentiments of the intended monitoring. Note that a final dismissal by the works council would make an implementation of the monitoring system not legally possible. Thus, we did not include the controversial situation of a works council that rejects the monitoring in question. Hence, we determine three occurrences regarding the works council in the described vignettes. First, a firm without a works council implies that the respondent can freely

decide about the appropriateness and benefits of the monitoring technology. However, it also provides no reference to employees' attitudes concerning the monitoring system. Second, we introduced a firm with a works council and a usage agreement regarding the monitoring system that was negotiated by management and the works council. Hence, the respondent can be assured that the monitoring system in question was approved by the employee representation. Third, we looked at a firm with a works council without any usage agreement regarding the monitoring system. Thus, the respondent knows that employee monitoring has not been dismissed but has to be negotiated with and approved by the worker representatives first. We set this last situation of restricted decision freedom with some uncertainty regarding employee reactions as our reference. Results from our regression model show significant negative effects for the first and the second works council situation (compared to the third). Thus, compared to having a works council without a usage contract supervisors' interest in digital monitoring systems – surprisingly – decreases by 0.32 scale points if a usage contract was signed by the works council (Table 3). Although this is an unexpected result, we speculate that it might stem from the impression that an agreement to use specific monitoring comes with more restrictions in terms of reporting back to the works council and making use of the conducted employee data. Further, it might indicate that the agreement was signed by the works council because it restricts the employer's intended sanctions (e.g., disciplinary arrangements in case of misconduct). However, these speculations have to be treated very carefully. Rather, they should be considered as a motivation for further investigations about how works councils and monitoring agreements affect monitoring attractiveness and practices. Correspondingly, our analysis showed an even stronger negative – and highly significant – effect for the situation without a works council compared to a firm with a works council but no usage contract. Consequently, supervisors' interest in monitoring technologies decreases by 0.35 scale points if they are completely free to decide on monitoring their subordinates digitally but also have no impression of employees' attitudes concerning the matter (Table 3). Thus, we hypothesize that even though supervisors like some freedom regarding their monitoring decision they also appreciate the existence of a worker representation body to validate their decision in terms of acceptability. Nevertheless, this issue – especially the dynamics of employee representation as an additional party regarding the monitoring decision process – yields potential for further research.

## 5.2 Findings on Individual Characteristics

As mentioned previously, we included individual characteristics to control for effects on the individual level (respondents' age, gender, management level, experience with employee monitoring, current number of subordinates, gender composition of the current team, and the sector of their current employer). We do not investigate those individual effects more closely during our analysis on the vignette level for reasons of methodological explanatory power. However, to avoid neglecting individual aspects of supervisors that may drive monitoring interest we want to take a look at some of the significant effects stemming from our control variables separately (Table 3).

Summing up our findings for individual factors that influence supervisors' evaluation of monitoring interest, our results indicate that monitoring interest decreases significantly with supervisors' age – especially for 46 years of age and older. Interestingly, respondents' gender did not yield a significant effect. However, the gender composition of the respondent's current team indicated a significantly lower monitoring interest for predominantly female teams compared to gender-equally teams by 0.81 scale points. Thus, we do not find any significant indication that male or female supervisors have more interest in monitoring. Yet, our data suggest that female teams might project more trust in consciously working employees and, thus, decrease their supervisors' monitoring interest. Further, we found that top managers are significantly more interested in digital monitoring by 0.71 scale points. This effect is specifically interesting since we control for age and the number of subordinates. Thus, it indicates a less trusting attitude along higher hierarchy levels. We propose that this might stem from either a somewhat greater (social) distance between top managers and their subordinates or greater responsibilities to the firm. Hence, more responsibility implies greater damage or loss potential in case of employee misconduct. Concluding, we can find some interesting influential factors on the individual level that further enrich our insights from our vignette analysis. Consequently, supervisors' characteristics should not be neglected when discussing supervisors' opinions regarding the implementation and use of employee monitoring technologies.

## 6 Conclusion and Discussion

In this paper, we investigate the – thus far often neglected – question of if and under which circumstances employers or supervisors want to monitor their employees

digitally. We conducted a factorial survey experiment to confront supervisors with hypothetical situations where job characteristics were manipulated – such as attributes of their subordinated employees and their tasks, features of the monitoring in question, and third-party involvement. Respondents were recruited via an access panel provider and pre-selected regarding employment characteristics (employees with personnel responsibilities, overseeing at least 3 subordinated employees working frequently on computers) to increase the empirical realism of our vignettes. We asked respondents to evaluate their monitoring interest after each situation. Each respondent was confronted with six situations (vignettes) and answered additional survey questions (e.g., sociodemographic questions, experience and attitudes regarding monitoring, and questions about their work situation). Using 494 completed surveys, we conduct multilevel regression models to answer our research question. We find that employees' task autonomy did not influence respondents' evaluation of using digital monitoring systems (H1). However, following our hypothesis (H2) we find a preference for monitoring systems that capture tasks (communication tracking and screen tracking software) rather than people's behaviour (video surveillance). Further, our data support the proposed assumption of employers' cost-benefit calculations as respondents' interest in monitoring systems declines along with higher time effort for monitoring (H3a) and increases for monitoring technology with AI supported data evaluation (H3b). Moreover, our results suggest that supervisors calculate the risks of employee misconduct in terms of data security. Although less interaction of one's subordinates with sensitive data was not influential, increasing interaction with sensitive data of their subordinates elevated respondents' interest in digitally monitoring them significantly (H4). Thus, we conclude that supervisors' sensitivity about anticipated (severe) consequences of employee misconduct is strongly associated with data protection policies.

Our analysis further revealed that some individual factors contribute to supervisors' sentiments regarding employee monitoring. We found that older supervisors and supervisors that currently lead predominantly female teams are less interested in digital employee monitoring. Contrary, top managers and supervisors with prior experience in monitoring their subordinates are more likely to consider digital employee monitoring. Regarding these findings, future research should investigate more closely which individual characteristics affect supervisors' interest to track employee performance digitally.

## 7 Limitations and Contribution

Our results show that supervisors' interest in digital employee monitoring should not be taken as a given. Findings from our vignette experiment show that supervisors adapt their monitoring intentions accordingly to situational factors, such as monitoring features and employees' (task) characteristics. However, since we used an online convenience panel our sample is pre-selected and not representative of all supervisors in Germany. Thus, we cannot generalize our results to the German workforce (for a discussion, see Kohler et al. 2019). Nevertheless, to test theoretical mechanisms, results on correlations from non-probability samples – such as our convenience panel sample – are usually comparable with probability samples (Mullinix et al. 2015). Notably, by employing an access panel we were able to recruit respondents with a relevant background to increase the empirical realism of our hypothetical vignette situations and, thereby, enhance external validity.

We also want to note that our respondents were all employees with personnel responsibility. Thus, referring to agency theory, our respondents may not only be principals to their subordinates but also act as agents to their employers. However, we focused on questioning supervisors for two reasons. First, we argue that it is difficult to ask employers about their monitoring interests since they are often corporate entities and, additionally, do not necessarily consist of an accurately definable plant or business. Thus we can avoid issues of international corporations and culture-related differences in terms of individualism and control (Panina and Aiello 2005). Second, we posit that employees with personnel responsibilities are confronted with supervisory tasks due to their position. Thus, decisions about digital employee monitoring should be present in their day-to-day work life and further enhance the empirical realism of our vignettes. Additionally, we assume that supervisors will adapt their supervisory responsibilities (with/without monitoring) accordingly to their preferences. Hence, we consider our approach suitable to answer our research question appropriately.

Our findings contribute to the current state of research by highlighting that supervisors' interest in employee monitoring depends on contextual – and individual – aspects of the work situation and the supervisor in question. Thus, negotiations about disclosing employee data at work are not necessarily a confrontation between 'controlling supervisors' and 'private employees'. We show that supervisors consider several aspects and weigh the costs and benefits of monitoring practices. These findings might be some indication of why digital control is not more widespread in Germany. Further,

our data suggest that managers appreciate employee feedback in terms of monitoring appropriateness and supposedly seek dialogue with employee representations like works councils. Hence, a transparent discussion of supervisors' need for control and employees' boundaries in terms of privacy may yield the potential to mitigate the 'big brother' discussion in a work context.

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