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Electronic Monitoring of Employees

Perceptions of Monitoring Procedures and the Organizational Context

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Zusammenfassung

Die Leistungs- und Verhaltenskontrolle von Arbeitnehmenden am Arbeitsplatz ist vermutlich so alt wie das Konzept der Arbeit selbst. Lange Zeit mussten Führungskräfte ihre Mitarbeitenden persönlich am Arbeitsplatz beobachten und bewerten. In den letzten Jahrzehnten verlagerte sich jedoch die Leistungs- und Verhaltenskontrolle von der direkten Beobachtung zur Überwachung mittels elektronischer Geräte wie Videokameras oder Computersoftware. Dieser Trend hat in den letzten Jahren aufgrund des technologischen Fortschritts und dem Wandel von Führungsstilen zugenommen. Psychologische Untersuchungen zur elektronischen Überwachung ergaben überwiegend negative Auswirkungen auf das Wohlbefinden und die Arbeitseinstellung der Arbeitnehmenden, aber positive Auswirkungen auf die Leistung. Die vorliegende Dissertation erweitert die bisherige Forschung, indem sie untersucht, unter welchen Umständen Arbeitnehmende elektronische Überwachung als weniger bedrohlich empfinden. Dementsprechend wird in den Studien 1 und 2 dieser Dissertation überprüft, wie der wahrgenommene Zweck eines Überwachungssystems den Zusammenhang zwischen Überwachung und Wohlbefinden verändert. In ähnlicher Weise werden der psychologische Vertrag, Partizipation am Arbeitsplatz und Kompetitivität beleuchtet. In Studie 3 wird untersucht, wie ein unterstützender und ein kontrollierender Überwachungszweck die Wahrnehmung von Bewerbenden beeinflusst und sich somit auf die wahrgenommene Attraktivität des Arbeitsplatzes und der Organisation auswirken. Studie 4 ist eine Metaanalyse, in der die Auswirkungen der elektronischen Überwachung auf Arbeitszufriedenheit, Stress und Leistung untersucht werden. Zusammenfassend kann festgehalten werden, dass der Zweck, warum Organisationen ihre Arbeitnehmenden überwachen, eine wichtige Rolle spielt. Darüber hinaus zeigen die vorliegenden Ergebnisse, dass elektronische Überwachung stark in den organisatorischen Kontext eingebettet ist und aus diesem Blickwinkel bewertet werden muss.

General Abstract

Monitoring employees to maintain their performance and control their behavior is probably as old as work itself. For a long time, supervisors had to observe their subordinates in person at the workplace. In the last decades, employee monitoring shifted from a supervisors' direct observation to monitoring by using electronic devices such as video cameras or computer software. Over the last years, this trend has increased due to technological advances and changes in management styles. Psychological research on electronic monitoring found predominantly negative effects on employees' well-being and work attitudes but positive effects on performance. This dissertation extends previous research by investigating under which circumstances employees perceive electronic monitoring as less threatening. Accordingly, Study 1 and 2 of this dissertation examine how the perceived purpose of a monitoring system alters the relationship between monitoring with work attitudes and stress. In a similar way, the psychological contract, participation, and trait competitiveness are examined. In Study 3, I present a study to investigate a developmental and a controlling monitoring setting and its impact on job applicants' organizational image. Study 4 is a meta-analysis in which the effect of electronic monitoring on work satisfaction, stress, and performance is examined. All things considered, this dissertation concludes that the purpose why organizations electronically monitor their employees plays an important role in the perception of electronic monitoring. Beyond that, the current findings show that electronic monitoring is strongly embedded in its organizational context and needs to be evaluated from this perspective.

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Part I.

General Background

1. Introduction

For more than a century, the organization of work has transformed substantially and continuously (Cascio & Montealegre, 2016; Hirsch-Kreinsen et al., 2015). These transformations have led to higher efficacy in manufacturing and more versatile products but also to constant changes in people's working life of all social classes (Piketty, 2014). Historically, changes at industrial workplaces introduced more repetitive and simple working steps allowing to employ less skilled workers and easier evaluation of workers' performance. Furthermore, automation using more versatile robots and machines took over the work of human employees making work processes more efficient (Cascio & Montealegre, 2016; Hirsch-Kreinsen et al., 2015; Lasi et al., 2014; Stearns, 2020; Xu et al., 2018). At the same time, machines helped to ease labor-intensive tasks and reduce employees' physical strain (Stearns, 2020). Current changes are aimed at integrating work processes more tightly into each other (König & Karn, 2016; Roblek et al., 2016; Xu et al., 2018). For example, algorithmic management is a new management style that is becoming more common (Duggan et al., 2020; Möhlmann & Zalmanson, 2017). Algorithmic management uses a software algorithm to distribute working tasks to a large number of human remote workers and control their fulfillment without any human intervention (Duggan et al., 2020; Möhlmann & Zalmanson, 2017). Uber, a mobility provider, uses algorithmic management to distribute passengers to drivers and to provide automated navigation advice to those drivers. This automated decision-making is achieved by collecting a large amount of data on passengers and drivers. However, the collection of data has more severe consequences for drivers than selecting the optimal route. If drivers fall under a certain level of rating they received by passengers, or if they repeatedly deny to drive to certain areas, they can be automatically

banned from the app – essentially "firing" the driver from their job (O'Donovan, 2017; see also Soper, 2021, for another case of algorithmic management). An algorithm as manager has often the opportunity for workers to have flexible working hours but results in constant pressure to fulfill the requirements of the algorithm. Without exactly knowing how the algorithm works, employees are in danger of being banned from the system without exactly knowing which behavior resulted in the ban (Duggan et al., 2020).

Data gathering of employees' performance and behavior is inherent in algorithmic management. However, even in more traditional management styles, organizations have a long history of monitoring their employees (Kluger & DeNisi, 1996; Yukl, 2012). For instance, organizations use monitoring to appraise their employees' performance, implement pay-for-performance, check the compliance to regulations, and counter theft by employees (Ball, 2010; Cascio & Montealegre, 2016). Whereas in the past, supervisors had to monitor their subordinates personally and individually, it is now possible to monitor an arbitrary number of employees electronically without being physically present at the workplace (Alge & Hansen, 2013; Ball, 2010; Ravid et al., 2019).

Psychological research on electronic monitoring started in the mid-'80s (Alge & Hansen, 2013; e.g., Irving et al., 1986) and discussed predominantly the negative effects of electronic monitoring on employee's well-being and work attitudes (Alge & Hansen, 2013; Ravid et al., 2019). Accordingly, many studies found a negative relationship of electronic monitoring with employees' well-being and work attitudes (Alge & Hansen, 2013; Backhaus, 2019; Stanton, 2000a). However, some studies found also positive aspects of electronic monitoring which might

foster employees' well-being (e.g., DelVecchio et al., 2013; Wells et al., 2007; and see Ravid et al., 2019, for a discussion).

The current dissertation tries to substantiate this line of research and investigates in three different scopes under which circumstances employees perceive electronic monitoring as less or more threatening. First, there are certain untested factors in organizations that might contribute to a positive perception of electronic monitoring by employees. The first study of this dissertation investigates the influence of electronic monitoring on employees' work satisfaction, motivation, and stress. Possible buffering (and strengthening) effects of monitoring purposes and two different forms of participation, namely participative leadership and works councils' assertiveness, on the relationship of monitoring with the dependent variables are examined. Study 2 extends this work and puts emphasis on the mutual psychological contract between employees and the organization. In addition, the influence of individual characteristics, namely trait competitiveness, is examined. Second, Stanton & Sarkar-Barney (2003) showed that organizations that use electronic monitoring at their workplace might be less attractive for job applicants. However, this finding has not yet been linked to proposed supportive aspects of electronic monitoring such as providing information to employees. Applicants who perceive certain monitoring measures as supportive might see monitoring as less threatening and the respective organization as more attractive. This is investigated in Study 3. Lastly, previous meta-analyses (Backhaus, 2019; Carroll, 2008) on the effects of electronic monitoring on employees' well-being, work attitudes, and performance have various drawbacks and do not investigate different moderators that might influence the perception of electronic monitoring. For example, different purposes of electronic monitoring and the existence of performance targets have

implications for employees' perception of monitoring (e.g., Gosnell et al., 2020; Nebeker & Tatum, 1993; Wells et al., 2007). Thus, Study 4 aims at improving this situation.

2. Theoretical Background

2.1. The Organization of Work and Technological Changes

The conditions in which people live and work have dramatically changed since the 18th century (Piketty, 2014). One major driving force for these changes was and is the industrial revolution (Cascio & Montealegre, 2016; Xu et al., 2018). The so-called first industrial revolution (see Hirsch-Kreinsen et al., 2015, for a critique on the term revolution) describes the transformation from manual manufacturing to mechanical manufacturing and faster transportation in the 18th century, both based on steam power. Whereas the second industrial revolution marks the begin of mass production utilizing electrical power in the late 19th century, the third industrial revolution introduces automation in production (starting in the latter half of the 20th century, Xu et al., 2018). The integration of a high number of computing devices and sensors in manufacturing systems and their interconnection marks the begin of the fourth industrial revolution. All these transformations led to higher efficacy and new ways of organizing work processes (Stearns, 2020). For example, before the industrial revolution, most of the available products were made locally in small workshops with the help of few employees. After the industrial revolution started, more and more products were produced in big companies using a large workforce and an increasing distance to the final consumer. This shift to assembly-line work resulted in smaller working steps and deskilled workers who were easily replaceable.

In the last decades, the computerization of working processes made it possible to interconnect different working steps and automatically adapt these processes to the current situation (Xu et al., 2018). An increasing number of sensors make it possible that human employees interact directly with robots, so-called "cobots" (Zaatari et al., 2019). These cobots adapt their behavior to the human being present in their proximity and collaboratively work together with human employees to fulfill a certain working task. This deeper integration of machines with their environment has many opportunities such as taking strenuous and dangerous tasks over from human employees, for instance lifting heavy weights.

However, this automatization of working tasks requires the collection of manifold data and includes data about employees. Nowadays, many software systems and industrial machines apply various logging procedures to ease maintenance, to be able to reproduce errors, and interconnect different systems (Hirsch-Kreinsen et al., 2015). These logging procedures are often enabled by default, can be stored centralized, and make it possible to derive different indicators on employees' performance and behavior. For example, assembling an engine block requires various parts to be bolted together. An automobile manufacturer in Saarland is able to record with how much force employees screw the different parts together. Based on this information, it is possible to track whether an employee used enough force or not. Even though the mentioned manufacturer is not using these information for human resource decisions, it would be possible depending on the legislative framework and the organizational context. Thus, electronic monitoring is an important issue in the management of organizations and accordingly for industrial and organizational psychology.

2.2. Research On Electronic Monitoring

The term electronic monitoring of employees describes the collection, storage, and analysis of data on employees' behavior using electronic devices (Nebeker & Tatum, 1993; Ravid et al., 2019). Psychological research on electronic monitoring started in mid-'80s and investigated the effects of electronic monitoring on employees' work attitudes, stress and performance (e.g., Chalykoff & Kochan, 1989; Irving et al., 1986). For example, Irving et al. (1986) reported higher levels of perceived stress, less work satisfaction, but higher performance in employees who were electronically monitored compared to employees who were not. However, Irving et al. (1986) reported also that electronic monitoring might have a positive impact on employees by providing a more accurate and complete assessment. Thus, researchers identified factors that might influence the perception and outcomes of electronic monitoring already in the beginning of research on electronic monitoring.

Early studies on the effect of electronic monitoring on employees concentrated often on simple, clerical, and repetitive tasks (e.g., Nebeker & Tatum, 1993; Kolb & Aiello, 1997; Schleifer et al., 1996). A typical study let participants input data in a computer terminal and measured performance by key rate and number of errors. Similar technologies were also present at actual workplaces. For example, Oz et al. (1999) conducted a survey with 823 participants who reported that their employer is monitoring their computer (19.7%) and intercepts their emails (13.5%). In addition, participants reported the use of video cameras (28.3%) and that the access to certain systems or locations was monitored (11.7%). However, many studies neglected already available performance measures in industrial settings (cf., Kluger & DeNisi, 1996). For example, it was already possible at this time to track the number of items produced per day without being

investigated in studies. Field studies at this time (e.g., Carayon, 1994; Chalykoff & Kochan, 1989; Irving et al., 1986), concentrated often on a specific job sample (often clerical workers or more specifically on employees working in call-centers) and asked accordingly for monitoring measures that were present at these specific workplaces.

In 2000, Stanton (2000a) wrote the first comprehensive review on electronic monitoring research. This way, the author systematized the results of existing research and identified several factors that influence the outcome and perception of electronic monitoring. Stanton (2000a) introduced a differentiation in short-term (e.g., perceived stress and performance gains) and long-term (e.g., effects on job satisfaction and intention to leave) monitoring outcomes. In addition, they found that a number of variables influenced (directly or indirectly) the effect of electronic monitoring on these outcomes. For example, individuals with higher levels of external locus of control reported higher anxiety about a monitoring system than individuals with higher levels of internal locus of control (Aiello & Svec, 1993). Employees' perception of a monitoring system also plays a role in evaluating its effects. For example, the reason why employees think they are monitored influences the perceived fairness of a monitoring system (Stanton, 2000b). Furthermore, Stanton (2000a) also puts emphasis on the organizational context in which monitoring occurs. For instance, Frey (1993) pointed out that with a mutual good relationship between employees and employer (an intact psychological contract), electronic monitoring might have a negative impact on employees' performance. Contrary, in a bureaucratic and impersonal relationship, monitoring has a disciplining effect and should foster performance. According to Frey (1993), this effect can be explained by different expectations of employees depending on organizational culture and the employer-employee relationship.

In the years from 2000 to about 2010, advances in computer technology made electronic surveillance more sophisticated, leading to its wider application. The American Management Association asked employers in 2001, 2005, and 2007 which monitoring technologies they are using to monitor employees (American Management Association, 2001, 2005, 2007). According to the surveys, employers tapped phone conversations and logged how much time employees spent on the phone. Regarding the use of computers, employers checked how much time employees spent on computers, their email communications, their web surfing, keystroke counts, and reviewed the files on their computer. Beyond that, some used video recordings to track employees' performance or to prevent theft and sabotage. A minority of organizations (less than 10%) also tracked the location of company vehicles and cell phones via the Global Positioning System (GPS). Employees' identification cards (smart cards) were used to control the access of persons to certain locations. This way, employers can also locate employees within organizations' buildings. So far, only one study focused on the effects of location tracking technologies (McNall & Stanton, 2011) and phone tapping is mainly examined in the setting of call-centers (e.g., McNall & Roch, 2009)

Over time, psychological research on electronic monitoring identified several variables which are important to understand the implications of monitoring for employees' well-being and work attitudes. One of these variables is the reason or the purpose why employees are monitored. Wells et al. (2007) separated two different purposes of monitoring: a developmental and a controlling purpose (see also DelVecchio et al., 2013). Whereas the developmental purpose supports employees at their working task and their rights, the controlling purpose follows an organization's goal to maintain performance and exert control (see also DelVecchio et al., 2013;

McNall & Roch, 2009). For example, controlling the working time of employees is a form of monitoring but might be perceived as beneficial if it helps to get extra hours rewarded. Wells et al. (2007) were able to link a perceived developmental purpose with more positive work attitudes, controlling purposes were related to more negative work attitudes. Even though there is already some evidence in this regard, there are remaining questions regarding monitoring purposes. For example, previous studies investigated how monitoring purposes influenced work attitudes and performance but did not examine how purposes alter the effect of a monitoring system on these variables.

Beyond that, the employer-employee relationship at the workplace shape how employees react to a monitoring system (Frey, 1993; Ravid et al., 2019). Already at the beginning of electronic monitoring research, studies discussed the ethical implications of electronic monitoring and whether it consolidates an organization's position of power over its employees and signals distrust to them (e.g., Ball, 2010; Ottensmeyer & Heroux, 1991; Tomczak et al., 2018). If employees perceive electronic monitoring indeed as a violation of their relationship with the respective organization, it may result in feelings of anger and frustration (Martinko et al., 2002; Yost et al., 2018). Arguing from an equity stance, these feelings might provoke deviant behavior and counterproductive work behavior such as loafing, harassment, and wasting resources to rebalance their relationship with the organization. However, research on this topic found contradicting results. Some studies suggest that electronic monitoring fosters deviant behavior (e.g., Yost et al., 2018), whereas other studies found a reduction of counterproductive work behavior (e.g., Hu et al., 2016). So far, there is no good explanation for these contradicting findings.

Finally, participation at the workplace can foster trust between employees and the respective organization and has been shown to influence the perception of electronic monitoring as well. For example, Douthitt & Aiello (2001) examined which effect employees' participation on the monitoring decision had on performance and work satisfaction. They found higher performance and work satisfaction in participants who were able to turn off the monitoring system (see also Alge, 2001). These two existing studies, Alge (2001) and Douthitt & Aiello (2001), were conducted in a laboratory setting. Due to short-lived manipulations and missing long-term outcomes on participants' working status, the results of these two studies might not be transferable to real-world working conditions. In addition, employees are most of the time not in the situation to shut down a monitoring system. Thus, a transfer of these studies on participation to a real-world working situation is necessary.

In the last years, the opportunities of the Internet of Things (IoT) and Big Data also extended the possibilities of employee monitoring (Ravid et al., 2019). The term IoT describes physical objects that are able to communicate with other devices and are able to collect data over their environment using sensors (Roblek et al., 2016). Examples are devices such as security cameras, thermostats, and industrial machines. The vast number of devices, their pervasiveness, and opportunities offer a broad range of employee monitoring. For instance, radio-frequency identification (RFID) uses tags attached to objects to store information on these objects and to locate them. This way, an organization is able to track the location of their employees (e.g., HexaHash, 2021). Contrary to GPS, RFID can track the location of employees within buildings and on short distances. Big Data describes the collection, storage, and analysis of vast amount of data. Employees interact with an increasing number of electronic devices (IoT

devices, smart phones, computers, etc.) offering the possibility to analyze the data collected and provided by these devices. Today, several companies offer technologies to provide deep insights into employees' communication and working behavior. For example, Microsoft (2021) offers a product to identify influential persons within an organization (according to their sent and received messages) and how much time employees spend on which tasks. These insights can be used to make human resource management decisions which directly affect employees.

To conclude, advances in monitoring technology made it possible to monitor a higher number of employees and more intensively (Cascio & Montealegre, 2016). Even though psychological research has identified important factors to explain the impact of electronic monitoring on employees, technological changes make it necessary to adapt research to the current possibilities of electronic monitoring. At this point, Ravid et al. (2019) argues that research needs to identify psychological characteristics of specific technologies like GPS and phone tapping to be able to transfer the results to other technologies with similar psychological characteristics. For example, if the location tracking device of a lorry driver shares a similar invasiveness and the same monitoring purpose with a video camera in a factory hall, the effect on employees' behavior and well-being are probably similar.

2.3. Open Research Questions and Dissertation Outline

The current dissertation aims to answer a few of the open questions around the impact of electronic monitoring on employees. Overall, there are four studies in this dissertation, each with its own focus. Whereas the first three studies are primary studies, the last one is a meta-analysis that summarizes existing studies. I will address four questions in this dissertation:

First, there are different monitoring purposes which warrant further research (Ravid et al., 2019). Whereas the influence of developmental and controlling purposes has been linked to employees' work attitudes and performance (DelVecchio et al., 2013; McNall & Roch, 2009; Wells et al., 2007), there is no investigation how these purposes alter the relationship between electronic monitoring with employees' well-being and work attitudes. Thus, Study 1 and Study 2 substantiate this line of research by examining this effect. Beyond that, Study 3 applies this research to a job application context. The implementation and use of electronic monitoring in an organization can discourage job applicants to apply for a vacant position at the respective organization (Stanton & Lin, 2003). However, the influence of monitoring purposes on this effect have not been investigated yet. It might be possible that job applicants show a greater acceptance of monitoring, if it is in their interest and helps them to fulfill their working task. Study 4 takes monitoring purposes as a moderator into account.

Second, Alge (2001) and Douthitt & Aiello (2001) found in a laboratory setting that employees who can participate in monitoring decisions report higher perceived fairness and work satisfaction. Contrary to a laboratory setting, employees in organizations are often not able to directly participate in the decision to monitor employees or not. Out of this reason, study 1 examines two different forms of participation that actually appear in a real-world setting: participative leadership and works councils. The effect of participative leadership on the relationship between monitoring with work satisfaction, motivation, and stress is examined. Beyond the collaboration with a direct supervisor, works councils are one way for employees to participate in decision-making processes on an organizational level. Thus, this variable is also investigated in Study 1.

Third, Yost et al. (2018) showed that electronic monitoring can increase deviant behavior in employees and lead to counterproductive work behavior. However, other studies found contradicting results (de Vries & van Gelder, 2015; Hu et al., 2016). Study 2 aims at explaining these contradicting results by hypothesizing that two different psychological processes mediate the effect of monitoring on counterproductive work behavior: Whereas employees perceive monitoring as a violation of trust and thus commit deviant behavior, monitoring is at the same time targeted at detecting deviant behavior and thus decreases it. Using these two contradicting processes, previously conflicting results might be explainable.

Finally, there is only limited evidence which influence personality traits have on the perception of electronic monitoring (Ravid et al., 2019). Whereas Aiello & Svec (1993) found an effect of locus of control on anxiety and Zweig & Webster (2003) reported that people with lower emotional stability and extraversion have lower acceptance of a monitoring system, it is still unclear how personality traits affect the effects of a monitoring system on employees' work attitudes and stress. Gläser et al. (2017) found that trait competitiveness is an important variable to explain variance in pay-for-performance incentives. Thus, Study 2 investigates whether competitiveness is also a relevant variable to explain different perceptions of electronic monitoring in employees. Beyond that, Study 3 evaluates whether job applicants with high trait competitiveness react differently to organizations with supportive and controlling monitoring purposes.

To summarize, the current dissertation takes various attempts to examine which factors do influence employees' perception of electronic monitoring. Both, Study 1 and 2, investigate the influence of monitoring purposes in the context of electronic monitoring. Whereas Study

1 focuses on participation as a second variable, Study 2 emphasis the employer-employee relationship in form of the psychological contract (Rousseau, 2004). Study 3 examines the reaction of job applicants to controlling and developmental monitoring purposes. Study 4 tries to subsume these different influences on the perception of electronic monitoring by conducting a meta-analysis and taking these various variables as moderators into account.

Part II.

Study 1: Expanding the view on electronic monitoring: Moderating effects of participation and perceived purposes of electronic monitoring

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3. Introduction

The last decades have seen rapid advances in new technologies and their adoption in organizations (Cascio & Montealegre, 2016; Schwarzmüller et al., 2018; Xu et al., 2018). Besides improvements in efficacy, customization, and maintenance, innovative technologies offer a greater possibility to interconnect employees, processes, and electronic systems, thus enabling increasing amounts of information to be collected. This allows not only for process optimization, but also for employee monitoring. As an example, pickers in warehouses have to stick to a route determined by an algorithm and are thus completely monitored in their performance and individual work steps (cf., Mirzaei et al., 2021).

Correspondingly, employee monitoring has evolved rapidly (cf., Kluger & DeNisi, 1996; Stanton, 2000a). Whereas in the past, employers primarily monitored their employees by observing them directly, recent technologies have led to many more direct and indirect opportunities to monitor employees electronically at work (Ravid et al., 2019). Although some studies have already demonstrated a negative effect of electronic monitoring on employee well-being (Alge & Hansen, 2013; Backhaus, 2019; Stanton, 2000a), the implications of electronic monitoring differ across situations and many questions remain open (Ravid et al., 2019). For instance, there is first evidence emphasizing the importance of the perceived purpose of the monitoring system and participation in the context of electronic monitoring (Alge, 2001; DelVecchio et al., 2013; Douthitt & Aiello, 2001; Wells et al., 2007). However, it is still unclear how these variables influence the perception of a monitoring system and especially in the case of participation evidence in an organizational setting is lacking. Therefore, the current study investigates the perceived purposes of a monitoring system, as well as participation, in an organizational setting. Drawing

from social information processing theory (SIP theory; Salancik & Pfeffer, 1978; Zalesny & Ford, 1990), we evaluate the perception of a monitoring system and its effects on employees' well-being and stress perception. Additionally, unique insights are gained by separating the effects of these characteristics on differences between employees and organizations.

4. Theoretical Background

4.1. Electronic Monitoring

Electronic monitoring refers to workplace practices in which data is electronically collected to observe, record, and analyze the performance and behavior of employees (cf., Bhave, 2014; Nebeker & Tatum, 1993). Over the years, it has become much easier and cheaper to gather, store, and analyze data. These advances have led to a higher prevalence of electronic monitoring (Alge & Hansen, 2013; Ravid et al., 2019) and to the possibility to reduce the issues of subjective and labor-intensive monitoring inherent in traditional methods (e.g., direct observation, managing by wandering around; Yukl, 2012). Electronic monitoring can take the form of keystroke logs, telephone call observations, video surveillance and the like (Alge & Hansen, 2013). Indeed, present-day electronic monitoring of employees might not even be a managerial decision but rather the default in machines or software products (cf., Johnson et al., 2014). Beyond this, in some areas, leadership has changed into "algorithmic management", in which algorithms distribute tasks, regulate work processes, and evaluate performance (Duggan et al., 2020; Möhlmann & Zalmanson, 2017). The collection of electronic data about employees is inherent in this kind of management style and is unavoidable in order to make decisions.

Electronic monitoring at work is often discussed in terms of its nature as a stressor and its negative effects on employees' work attitudes and physiological or psychological well-being (Alge & Hansen, 2013; Backhaus, 2019; Ball, 2010; Ravid et al., 2019). For instance, there are findings that electronic monitoring decreases job satisfaction, increases employee turnover, reduces organizational citizenship behavior, and increases stress (Chalykoff & Kochan, 1989; Holman et al., 2002; Irving et al., 1986; Nebeker & Tatum, 1993; Smith et al., 1992; Yost et al., 2018). On the other hand, electronic monitoring is often justified by arguments that it maintains organizational and individual performance and prevents theft or legal liabilities (Ball, 2010). To explain how electronic monitoring affects employees, SIP theory seems especially useful (cf., Larson & Callahan, 1990; Stanton & Julian, 2002; Stanton & Weiss, 2000).

4.2. Social Information Processing Theory

Fundamental to SIP theory (Salancik & Pfeffer, 1978; Zalesny & Ford, 1990) is the premise that individuals "adapt attitudes, behavior, and beliefs to their social context and to the reality of their own past and present behavior and situation" (Salancik & Pfeffer, 1978, p. 227). On a more specific level, this implies that one's attitudes are built on (social) information. The theory assumes that a broad range of information is social in nature (Salancik & Pfeffer, 1978): For example, it treats not only behavior and attitudes of coworkers or supervisors, but also past experience as a social information. In an organization, employees look for cues or signals to understand the environment and regulate their attitudes, behavior, and beliefs in order to fit into the environment (Zalesny & Ford, 1990). Central to the current study is the assumption, according to SIP theory, that job and task characteristics influence the formation of job attitudes

and needs. Salancik's (1978) original model proposed mainly salience and the strength of the relation between the social information and the respective attitude as processes that lead to the formation of attitudes from job characteristics. Social information may alter these two processes. For example, a statement like "Why do I need to clock in when I get to work?" from a coworker may direct an employee's attention to the monitoring system (see Zalesny & Ford, 1990, for an extension to cognitive processes). To conclude, electronic monitoring is a specific job characteristic whose salience may be changed due by social information.

Furthermore, Larson & Callahan (1990) demonstrated that traditional monitoring systems (human observers) send social cues to employees regarding which behavior is desirable. Accordingly, employees were found to perceive monitored tasks as more relevant and as more important to address compared to non-monitored tasks. Thus, these social cues may influence which aspects of job and task characteristics are focused upon. Stanton & Julian (2002) extended this research and transferred it to electronic monitoring. Furthermore, also from the perspective of SIP, Stanton & Weiss (2000) investigated how social cues of monitoring systems shape social norms among employees. However, none of the previous studies considered a broader organizational context. As such, the current study is the first to examine participation and monitoring characteristics in an organizational context under the scope of SIP theory. Moreover, it is the first study on electronic monitoring to examine the effect of participation on a team level (participative leadership) and on an organizational level (works councils) on the perception of electronic monitoring.

In addition to signaling the importance of tasks, electronic monitoring may give employees the impression that their organization distrusts them, and that maintaining performance or

theft prevention are necessary from the management's perspective (Holland et al., 2015). The greater the extent to which an employee is monitored (or the greater the number of monitoring techniques), the higher the salience of the monitoring system should be, and in turn also the employees' attention to it and the signaled distrust. This distrust should lead to a decline in work satisfaction and engagement and an increase in stress due to the extreme importance of performance measures (Holland et al., 2015). Indeed, intensity and invasiveness of electronic monitoring were shown to be related to work satisfaction, engagement, and stress perception (Holman et al., 2002; Yost et al., 2018). Therefore, in order to replicate previous findings, we propose the following hypothesis:

Hypothesis 1: The extent of electronic monitoring is negatively associated with work satisfaction and engagement, and positively associated with stress.

4.3. Purposes of Employee Monitoring

The salience of job characteristics and their influence on employee attitudes and behavior may be altered by other social information (Salancik & Pfeffer, 1978; Zalesny & Ford, 1990). Although the extent of monitoring probably impacts employees' attitudes and behavior, there are further variables that might shape the perception of electronic monitoring procedures. One such variable is the purposes of electronic monitoring, i.e., the reasons that are communicated to employees as to why they are being monitored. Ravid et al. (2019) identified four key purposes of electronic monitoring: performance appraisal, development, administrative, and no clear purpose. These purposes may provide employees with an indication of what an organization expects and values (Ravid et al., 2019), and according to SIP theory, they can shape the perception

of the monitoring system and of which behavior is expected. In the current study, we will focus on the purposes of performance appraisal and development, as they are the most relevant in the present context.

Performance appraisal, or controlling purposes, promote organizational interests and are aimed at maintaining performance and preventing loafing, theft, and other undesired behavior that may have a negative outcome for the organization (DelVecchio et al., 2013; McNall & Stanton, 2011; Ravid et al., 2019; Wells et al., 2007). If an organization communicates a controlling purpose (via representatives, official documents, etc.), employees will probably perceive monitoring procedures to be especially distrustful (McNall & Stanton, 2011; Siegel et al., 2021; Wells et al., 2007). For example, a time clock to monitor employees' working time might indicate to employees that the organization does not trust them to comply with the mandatory working hours. Thus, this attribution may strengthen the negative impression of the monitoring system. We therefore propose that the overall effect of electronic monitoring on employees' attitudes and stress perception is moderated by a perceived controlling purpose:

Hypothesis 2: A perceived controlling purpose of electronic monitoring moderates the relationship of the extent of electronic monitoring with work satisfaction, stress, and work engagement, insofar as the relationship is stronger for individuals who perceive a high controlling purpose of electronic monitoring.

By contrast, a developmental purpose (also known as informative or supportive purpose, DelVecchio et al., 2013; Wells et al., 2007) promotes employees' interests. This kind of electronic monitoring may provide employees with feedback about their performance and help to foster their individual development. Any additional information from an electronic monitoring system

that facilitates task-processing or is in the interest of the employee is also subsumed under the supportive purpose. In contrast to the example provided above, employees may see a time clock as beneficial if it makes it easier for extra work to be credited, even though this is still a kind of monitoring. From the perspective of SIP theory, developmental purposes portray a beneficial character of monitoring technology to employees. In the above example, credited extra work shows employees that their effort to go beyond the mandatory working hours is appreciated and may thus reduce the perception of a monitoring system as invasive and threatening. Therefore, we propose a buffering effect of a developmental purpose on the relationship between electronic monitoring and employees' attitudes and stress perception:

Hypothesis 3: A developmental purpose of electronic monitoring moderates the relationship of the extent of electronic monitoring with work satisfaction, stress, and work engagement, insofar as the relationship is weaker for individuals who perceive a high developmental purpose of electronic monitoring.

4.4. Participation

Previous research has investigated the role of participation in the framework of SIP theory (e.g., Lu et al., 2019; Shetzer, 1993) and in lab-based electronic monitoring studies (e.g., Alge, 2001; Douthitt & Aiello, 2001). According to SIP theory, participation is a characteristic of the work environment (comparable to monitoring). In this respect, participation signals to employees that they are trusted, that their input is valued and that they can shape decisions in their own way. In turn, this fosters a trustful environment in which employees do not expect threatening actions from their organization without prior notice and interaction. Beyond this,

Alge (2001) and Douthitt & Aiello (2001) demonstrated the relevance of participation in the implementation of (and the control over) electronic monitoring in terms of reducing negative impacts on employees. However, it is most likely that employees in an organization have only a minor influence on decisions, which may be made two or three levels above them (cf., Riordan et al., 2005). Moreover, new employees in an organization that already has monitoring procedures in place may be unable to change them. Thus, the two aforementioned laboratory studies are barely transferable to real-world situations. In the current study, we decided to focus on participation that is closer to real-world employment situations: participative leadership and works councils.

Participative decision making or participative leadership refers to leadership behavior that promotes the use of employees' knowledge and input in decision making (e.g., Arnold et al., 2000; Riordan et al., 2005) and fosters trust in one's supervisor (Dirks & Ferrin, 2002). Whereas decisions to implement electronic monitoring may occur at the level of top management, its actual use in everyday work contexts may be associated more with the behavior of employees' direct supervisors. Therefore, the direct supervisor might be particularly relevant for communicating and explaining the collection and use of data (cf., Stanton, 2000a). If participative leadership is high, the supervisor might be open to discussing the results of electronic monitoring and their implications with an employee instead of exerting control. From an SIP perspective, participative leadership signals to employees that they will be consulted before implications are enforced. Due to this process, which probably fosters trust in the direct supervisor, we assume a buffering effect of participative leadership on the relationship between electronic monitoring and employees' attitudes and stress:

Hypothesis 4: Participative leadership moderates the relationship of the extent of electronic monitoring with work satisfaction, stress, and work engagement, insofar as the relationship is weaker for individuals who experience high participative leadership.

As the decision to implement monitoring is likely made on a higher management level, participation on the organizational level is also crucial in the context of electronic monitoring. Works councils, which are prevalent in several countries within the European Union (Forth et al., 2017; Freeman & Lazear, 1994), represent one institution that is related to employee participation on the organizational level. Unlike trade unions, works councils do not initiate strikes or negotiate wages. Rather, they use their power to improve employees' situation within organizations. Specific rights of the works councils vary between countries, but works councils often need to be informed about specific management decisions in advance (Lecher et al., 2001). In Germany, works councils have to be involved in the implementation of new systems or work processes and are able to block certain changes within an organization (Hübler & Jirjahn, 2003). Moreover, organizations are legally bound to involve works councils in the implementation of monitoring systems. As such, works councils shape decisions in their own way and in the interests of employees. However, the assertiveness of a works council may depend on its members and their abilities. In other words, employees may perceive the endeavors of works councils differently depending on previous successes of their works council. Thus, we propose that an assertive works council is able to reduce the number of monitoring techniques within an organization:

Hypothesis 5: The more perceived influence the works council has, the lower the extent of electronic monitoring.

Furthermore, a works council may influence the perception of the monitoring system as well. If a works council is assertive and shows its employees that it can change decisions in line with employee interests, it also signals to employees that they are protected from detrimental monitoring procedures. In line with this argumentation and according to SIP theory (Salancik & Pfeffer, 1978; Zalesny & Ford, 1990), an assertive works council should lead to a reduced perception of monitoring as detrimental. Thus, similar to participative leadership, a works council should increase trust and reduce the negative impact of monitoring:

Hypothesis 6: The perceived influence of works councils moderates the relationship of the extent of electronic monitoring with work satisfaction, stress, and work engagement, insofar as the relationship is weaker for individuals who perceive a high influence of the works council.

Moreover, if the salience of the negative effects of monitoring is reduced, this should affect developmental and controlling purposes as well. Thus, the stronger a works council is perceived to be, the more supportive aspects and the fewer controlling aspects are perceived within an organization:

Hypothesis 7: The higher the perceived influence of the works council is, the more electronic monitoring is perceived as supportive and the less it is perceived as controlling.

5. Method

The hypotheses, variables, data collection information, and analysis procedure were registered prior to conducting this study, with the preregistration available at https://aspredicted.org/blind.php?x=5bk2ua. In addition, this paper was written as a reproducible manuscript using R

(see Aust & Barth, 2018). All files to reproduce statistical analysis and reports of statistics are available at the Open Science Framework (https://osf.io/gp6jq/).

5.1. Participants

In the current study, blue-collar workers from multiple corporations in the industrial sector in the South West of Germany were surveyed. Questionnaires were sent to different companies, which distributed them to the employees in their production or maintenance unit. In total, questionnaires of 391 employees from 29 organizations were collected. We excluded 19 participants who showed more than 20% missing values and seven participants due to more than two missing values in the monitoring measure. The final sample thus consisted of 365 participants. We recalculated all the analyses with all 391 employees, and the results did not substantially differ from those reported in the present paper. The average number of participants per organization was $M = 12.59$ ($SD = 6.46$). Table 1 presents sample and organization characteristics.

5.2. Measures

If not otherwise stated, all items were rated on a Likert scale from 1 to 5. For all scales, larger numbers correspond to higher agreement on the respective scale. If a participant had more than two missing values on a scale, we did not calculate the mean for this participant. A full list of items is available from the supplementary material on the Open Science Framework webpage. Due to a lack of standardized measures within the research on electronic monitoring and works councils, we had to develop new measures or adapt existing measures to fit to the current study (cf., Ravid et al., 2019). This was accomplished in collaboration with subject

Table 1
Sample (N = 361) and Organization (N = 29) Characteristics

			Count	%
Participants	Gender	male	300	82.2
		female	49	13.4
		no answer	16	4.4
	Age	< 24	29	7.9
		$25 - 34$	76	20.8
		$35 - 44$	78	21.4
		$45 - 54$	111	30.4
		> 55	54	14.8
		no answer	17	4.7
Organizations	Size (employees)	< 100	8	27.6
		$101 - 500$	11	37.9
		$501 - 1000$	1	3.4
		$1001 - 2500$	1	3.4
		$2501 - 5000$	1	3.4
		> 5000	7	24.1

matter experts (SMEs) to obtain valid and reliable measures. The SMEs worked in trade unions or were consultants of works councils and therefore have good background knowledge of works councils as well as monitoring techniques that occur on production and maintenance sites.

5.2.1. Electronic Monitoring Index

To obtain a measure of the extent of monitoring, an index of several monitoring techniques was developed together with the SMEs. The 15-item index assesses the prevalence of common monitoring procedures on production and maintenance sites. Example items are "In my organization my work output gets recorded" and "In my company, I am tracked when starting and ending my work. (e.g., via time tracking cards)." As response option, participants were able to state whether or not a certain procedure exists at their workplace or to state "I don't know."

The index was calculated by summing up all "yes" answers. Due to its nature as a formative construct, we refrain from reporting reliability indices for this measure (see Streiner, 2003).

5.2.2. Perceived Purpose of Electronic Monitoring

A scale to measure the perceived purposes of electronic monitoring was developed for this study together with the SMEs. This scale consisted of two dimensions: a controlling and a developmental dimension. Example items are: "The collection of my work-related data fosters my development" (developmental dimension) and "The collection of my work-related data leads to increased pressure regarding performance and time" (controlling dimension). To gather insights into the structure of our scale, we applied a principal component analysis (with oblimin rotation) which yielded a two-component structure using a parallel analysis (Horn, 1965). All four items developed to measure the developmental dimension of monitoring showed high loadings on the first component (range: 0.77 to 0.88) and low loadings on the second component (range: -0.14 to 0.13). The four items developed to measure the controlling dimension showed a reversed pattern with low loadings on the first component (range: -0.10 to 0.17) and high loadings on the second component (range: 0.80 to 0.86). Thus, the assumed two-component structure fitted our data.

5.2.3. Influence of the Works Council

As works councils are a rarely researched topic in psychology and computer science, there was no existing scale to measure their influence. Therefore, together with SMEs, we developed a scale reflecting the perceived influence of works councils focusing on employee privacy in order

to obtain information about a topic that is related to electronic monitoring. Example items are "The works council in my company stands up for the data security of the employees" and "The works council in my company can limit negative consequences of technological developments for the employees." Note that not every organization in our sample had a works council and this scale were omitted in such cases. A principal component analysis yielded a one component structure of our scale using a parallel analysis (Horn, 1965). All six items loaded highly on the single component (range: 0.80 to 0.89). Thus, we assumed a one-component structure of our scale.

5.2.4. Work Satisfaction

To assess work satisfaction, we applied the German-language Work Satisfaction Scale by Neuberger et al. (1978). We adapted the questions to start with "I am satisfied with ...". Example items are "I am satisfied with my working conditions" and "I am satisfied with my colleagues."

5.2.5. Stress

The *Personal Burnout* subscale of the Copenhagen Burnout Inventory (Kristensen et al., 2005) was used to measure stress. SMEs suggested to remove the item "How often are you emotionally exhausted?" due to probable misunderstandings. In addition, the questions were adapted to fit with our other questions (from "How often do you feel tired?" to "I often feel tired."). Example items are "I often feel exhausted" and "I often feel weak and susceptible to illness."

5.2.6. Work Engagement

Engagement was measured using the German version of the Utrecht Work Engagement Scale (Dedication subscale, Schaufeli et al., 2006). Example items are "My work is useful and meaningful" and "I am enthusiastic about my work."

5.2.7. Participative Leadership

Participative leadership was measured using the subscale *Participative Decision Making* of the Empowering Leadership Questionnaire (Arnold et al., 2000). Example items are "My supervisor encourages me and my colleagues to express ideas and suggestions" and "My supervisor offers me and my colleagues the opportunity to express our opinion."

5.3. Data Analysis

Due to the considerable number of companies and as well as multiple dependent variables, we opted for an analysis that best fits the structure of our data. Therefore, we used Bayesian mixed models to be able to nest individual employees in their respective organization and analyze multiple dependent variables at the same time. Accordingly, we estimated a mixed model with two levels. In addition, the analysis benefited from the opportunities of Bayesian statistics, which emphasize estimates and their distribution (or their uncertainty, Cumming, 2014) and avoid dichotomous decisions based on p-values (Dienes & McLatchie, 2018; van de Schoot et al., 2017). This shift in statistical reporting and interpretation has been endorsed for several years in psychological research (American Psychological Association, 2001; Vacha-Haase et al., 2000).

In Bayesian statistics, the uncertainty of estimates is expressed in Bayesian credible intervals (CI). Unlike a frequentist confidence interval, a Bayesian CI states the probability that a given parameter will fall into this interval depending on prior beliefs and the observed data (Dienes, 2014). A CI including zero does not indicate a non-significant result but suggests that an estimate of zero may occur within a certain probability. We report 95% CIs (based on quantiles) and means to describe coefficient estimates. Bayesian statistics require prior knowledge to be specified in so-called prior distributions which allow prior knowledge to be entered into the analysis. Dependent variables were not standardized before being entered into the analysis in order to enable the regression estimates to be interpreted on the outcome scale of the questionnaire (and achieve a better impression of the effect). Thus, we restricted intercepts to be in a range of $[1.04, 4.96]$ with a 95% probability (participants stated their answers in a range from 1 to 5). Predictor variables were grand-mean centered. Subsequently, we calculated cluster means for every organization and deviations from these cluster means for every employee. Cluster means (also called organizational level in the Results section below) and deviations from these cluster means (also called employee level in the Results section) were standardized before being entered into the analysis. In this way, cluster means can be interpreted as an estimation of the respective variable for an organization, and deviations from the cluster mean can be interpreted as differences in attitudes and workplaces between employees. We restricted the slopes of the predictor variables to be in a range of $[-1.00, 1.00]$ with a 95% probability. A regression parameter of $b = 1.00$ means that if the parameters increases by one standard deviation, the corresponding dependent variable increases by 1.00 on the outcome scale. We did not expect higher parameter estimates.

To test our hypotheses, we interpreted the width of the estimates' CIs (Cumming, 2014). For example, a 95% CI of [.12, .34] is reliable positive and suggests a stable positive relationship between the dependent and the independent variable. A 95% CI of [−.02, .15] is not reliable positive but suggests that the effect is most likely positive but could also be close to zero (and practically irrelevant). In contrast, a 95% CI of [−.14, .15] is inconclusive: The effect could be positive or negative or close to zero.

Bayesian mixed models were estimated using the *brms* package (Version 2.16.1; Bürkner, 2017) for R (R Core Team, 2015), which is based on the probabilistic programming language Stan (Gelman et al., 2015). Stan uses a Markov chain Monte Carlo sampling that derives parameter distributions from a multi-dimensional parameter space whose number of dimensions depends on the number of parameters. This estimation process runs iteratively and can be executed multiple times (thus by multiple *chains*). Parameter distributions should be similar between different chains and across iterations. An indicator of differences between chains is the $\hat{R}$ value, which should be lower than 1.01 (Vehtari et al., 2021) and can be inspected in chain plots. The latter can also be used to inspect the results of the iterative process (McElreath, 2016). In the current study, we used six chains (Vehtari et al., 2021, recommends at least four chains) and 4000 iterations (2000 of which were warm-up samples). These chains and iterations should result in an effective sample size (valid number of values to determine parameter estimates) of at least 1000 (Bürkner, 2017). We obtained a lowest $\hat{R}$ value of 1.003 and a minimum effective sample size of 2619. Chain plots looked well-mixed and stationary. Thus, we obtained a good model fit.

6. Results

Table 2 presents descriptive statistics of the measured scales. As a measure of reliability, we report Revelle's omega total (McNeish, 2018).

6.1. Hypothesis Testing

Hypothesis 1 stated that the extent of electronic monitoring is negatively associated with work satisfaction and engagement, but positively associated with stress. Using a Bayesian multivariate mixed model, work satisfaction, work engagement, and stress were predicted by an index of electronic monitoring procedures. The model included organization as group effect (in terms of frequentist statistics as a random effect). Organizations in which employees reported more monitoring were associated with more stress, $b = 0.13$, 95% CI $[0.03, 0.24]$. However, there were no clear links to work satisfaction, $b = 0.01$, 95% CI $[-0.14, 0.14]$, or engagement, $b = -0.04$, 95% CI $[-0.17, 0.08]$. Employees who reported more monitoring procedures than their coworkers also expressed higher levels of stress, $b = 0.14$, 95% CI $[0.04, 0.23]$. Regarding job satisfaction, the relationship was less reliable but probably negative, $b = -0.06$, 95% CI $[-0.13, 0.01]$. In the case of work engagement, there was no clear relationship with monitoring, $b = -0.04$, 95% CI $[-0.17, 0.08]$. Estimates of the fitted model are depicted in Figure 1. To summarize, electronic monitoring was linked to greater stress on both the organizational and the employee level. Employees who stated more monitoring techniques than their coworkers also reported lower job satisfaction. Thus, Hypothesis 1 was partly supported.

Hypotheses 2 and 3 proposed that perceptions of a developmental purpose of electronic monitoring would weaken the relationship of the extent of monitoring with work attitudes

Table 2

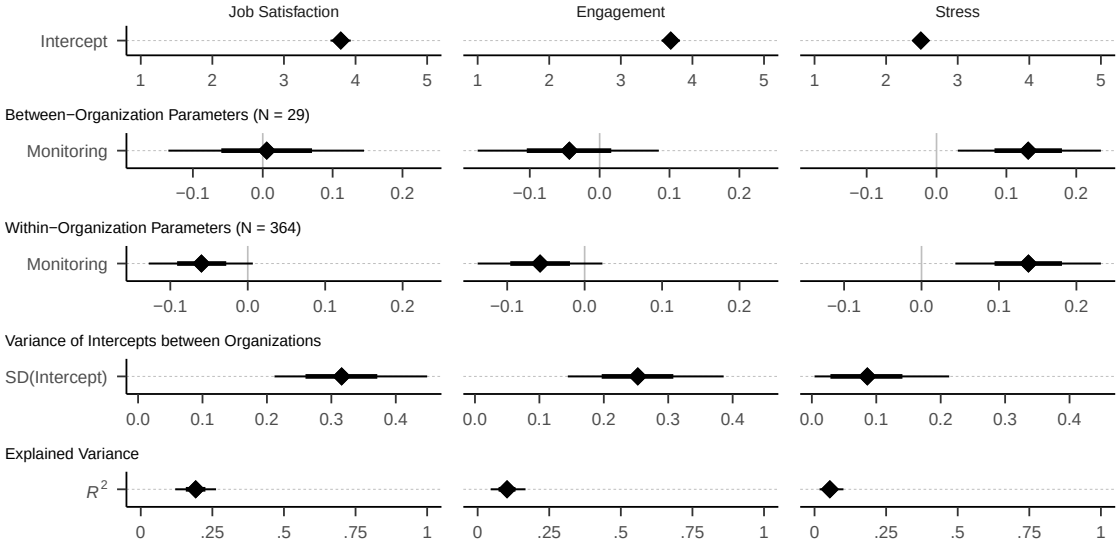
Means, Standard Deviations, Reliabilities, and Correlations Using a Frequentist Approach

Variable	*M*	*SD*	1.	2.	3.	4.	5.	6.	7.	8.
1. Monitoring	5.82	1.36		.11 [−.27, .46]	.42 [.06, .68]	.01 [−.48, .48]	−.03 [−.39, .34]	.54 [.21, .75]	−.19 [−.52, .19]	−.17 [−.51, .21]
2. Purpose develop.	2.56	0.57	.31 [.16, .44]	(.89)	−.18 [−.51, .20]	−.61 [−.84, −.18]	.49 [.16, .73]	−.01 [−.37, .36]	.40 [.03, .67]	.57 [.26, .78]
3. Purpose control	2.39	0.58	.40 [.26, .52]	.19 [.04, .33]	(.91)	.02 [−.46, .50]	−.37 [−.65, .00]	.27 [−.10, .58]	−.22 [−.54, .16]	−.30 [−.60, .07]
4. Works council inf.	3.19	0.66	−.02 [−.17, .13]	.14 [−.01, .29]	−.10 [−.25, .05]	(.95)	−.07 [−.53, .42]	.37 [−.14, .72]	−.23 [−.64, .29]	−.12 [−.57, .38]
5. Work satisfaction	3.79	0.37	−.15 [−.30, .00]	.18 [.03, .33]	−.36 [−.48, −.22]	.29 [.14, .42]	(.91)	−.24 [−.56, .14]	.69 [.43, .84]	.79 [.59, .90]
6. Stress	2.51	0.31	.12 [−.03, .27]	−.08 [−.22, .08]	.39 [.26, .52]	−.20 [−.34, −.05]	−.40 [−.52, −.26]	(.93)	−.29 [−.59, .09]	−.36 [−.64, .00]
7. Engagement	3.73	0.35	−.07 [−.21, .09]	.24 [.09, .38]	−.22 [−.36, −.07]	.25 [.11, .39]	.58 [.47, .67]	−.30 [−.43, −.16]	(.90)	.56 [.25, .77]
8. Part. leadership	3.28	0.54	−.13 [−.27, .03]	.26 [.12, .40]	−.21 [−.35, −.06]	.26 [.11, .39]	.56 [.44, .65]	−.20 [−.34, −.05]	.42 [.29, .54]	(.93)

Note. The upper triangle of the table shows correlation coefficients between organizations (ratings of employees were averaged, $n = 29$). The lower triangle of the table shows correlation coefficients within organizations ($n = 365$). Numbers in parentheses indicate McDonald's ω. For correlations, a 95% confidence interval is given in squared brackets. Purpose develop. = Purpose developmental; Works council inf. = Works council influence; Part. leadership = Participative leadership;

Figure 1

Results of the Bayesian Mixed Model, Fitted to Examine Hypothesis 1



Note. Diamonds indicate mean of estimate distributions. Thicker lines show 65% CI, whereas thinner lines show 95% CI.

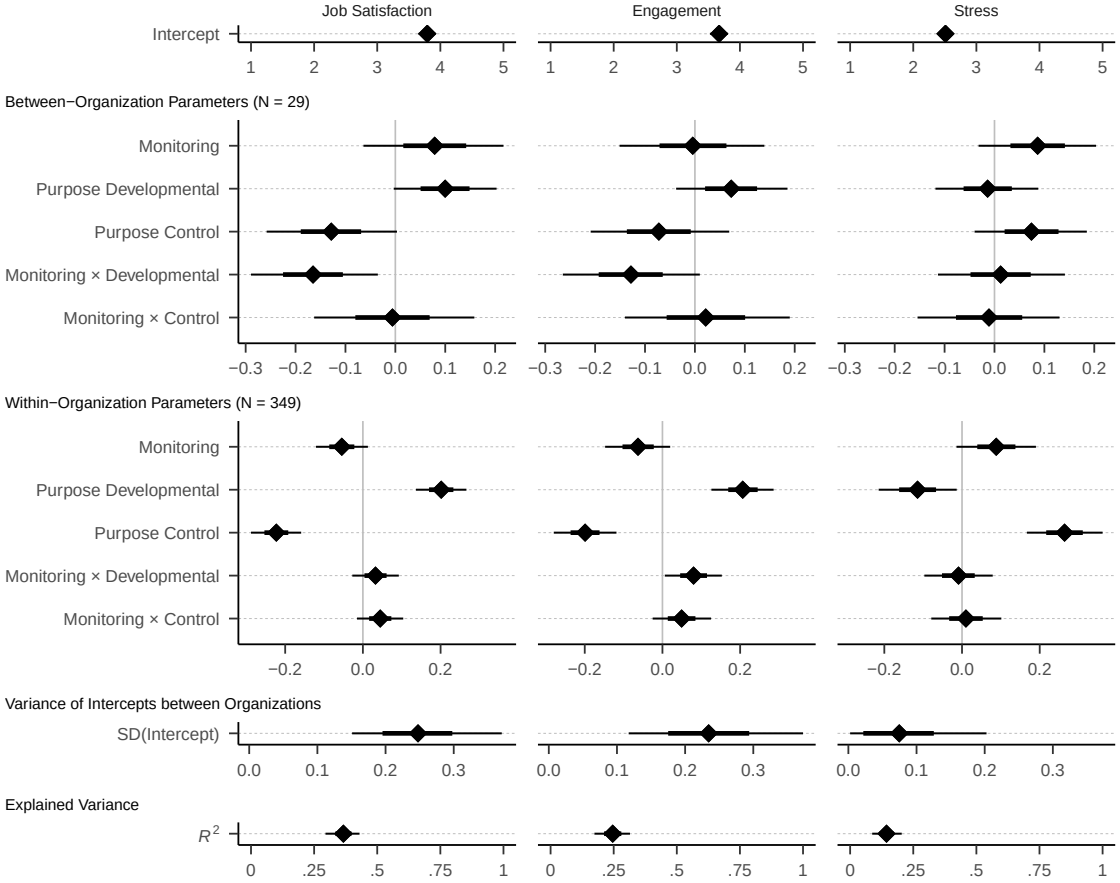
and stress, and that perceptions of a controlling purpose would strengthen this relationship. To examine these assumptions in a moderation analysis, developmental and controlling perceived purposes and their interactions with data collection were introduced into the model for Hypothesis 1. The interaction term of monitoring procedures and reported developmental purposes on the level of organizations was negative in the case of job satisfaction, $b = -0.16$, 95% CI $[-0.29, -0.04]$, and in the case of engagement (though less reliable), $b = -0.13$, 95% CI $[-0.26, 0.01]$. The results indicated that the higher the developmental purposes, the more negative was the relationship of monitoring with work satisfaction and engagement. With regard to stress, there was no clear direction of effect, $b = 0.01$, 95% CI $[-0.11, 0.14]$. Furthermore, the interaction term of monitoring and controlling purposes showed no influence on work satisfaction, $b = -0.01$, 95% CI $[-0.16, 0.16]$, engagement, $b = 0.02$, 95% CI $[-0.14, 0.19]$,

and stress, $b = -0.01$, 95% CI $[-0.15, 0.13]$, on the organizational level. The interaction between developmental purposes and monitoring on the employee level showed a positive relationship with engagement, $b = 0.08$, 95% CI $[0.01, 0.15]$, indicating that the higher the developmental purposes, the more positive the relationship between monitoring and engagement. There was no relationship of the interaction term with work satisfaction, $b = 0.03$, 95% CI $[-0.03, 0.09]$, and stress, $b = -0.01$, 95% CI $[-0.10, 0.08]$. The interaction term of controlling purposes and monitoring showed weak evidence for a positive relationship with work satisfaction, $b = 0.04$, 95% CI $[-0.02, 0.10]$, and engagement, $b = 0.05$, 95% CI $[-0.03, 0.13]$, but not with stress $b = 0.01$, 95% CI $[-0.08, 0.10]$. This means that low controlling purposes were associated with an increased negative relationship of monitoring with work satisfaction and engagement. See Figure 2 for a depiction of all regression parameters. To conclude, there is no compelling evidence in favor of Hypotheses 2 and 3 and there may even be some evidence against these two hypotheses.

Analogous to the previous moderation analysis, we tested the influence of the interaction between participative leadership and electronic monitoring on the dependent variables (Hypothesis 4). This hypothesis stated that participative leadership moderates the relationship between the extent of electronic monitoring and the dependent variables. Differences between organizations in the interaction between the number of monitoring procedures and participative leadership did not predict work satisfaction, $b = -0.01$, 95% CI $[-0.13, 0.11]$, engagement, $b = 0.05$, 95% CI $[-0.10, 0.20]$, and stress, $b = -0.03$, 95% CI $[-0.17, 0.10]$. Thus, no influence of this interaction on the dependent variables could be found on the organizational level. On the employee level, lower levels of participative leadership were associated with a more negative relationship between monitoring and work satisfaction, $b = 0.07$, 95% CI $[0.01, 0.13]$. A similar,

Figure 2

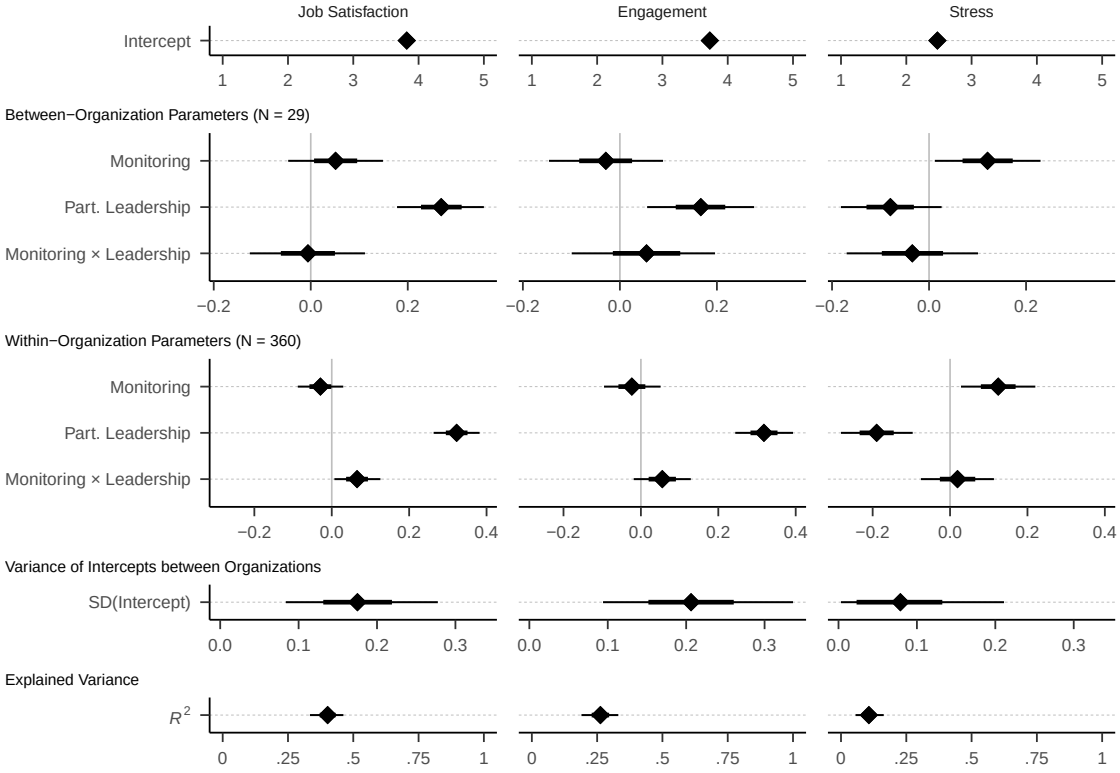
Results of the Bayesian Mixed Model, Fitted to Examine Hypotheses 2 and 3



Note. Diamonds indicate mean of estimate distributions. Thicker lines show 65% CI, whereas thinner lines show 95% CI.

Figure 3

Results of the Bayesian Mixed Model, Fitted to Examine Hypothesis 4



Note. Diamonds indicate mean of estimate distributions. Thicker lines show 65% CI, whereas thinner lines show 95% CI.

but less reliable finding emerged in the case of engagement, $b = 0.06$, 95% CI $[-0.02, 0.13]$. The interaction term of monitoring and participative leadership showed no clear relationship with stress, $b = 0.02$, 95% CI $[-0.08, 0.11]$. Thus, we found support for Hypothesis 4 regarding work satisfaction and engagement on the employee level but no evidence in favor of Hypothesis 4 regarding stress and for all dependent variables on the organizational level. See Figure 3 for a depiction of regression parameters.

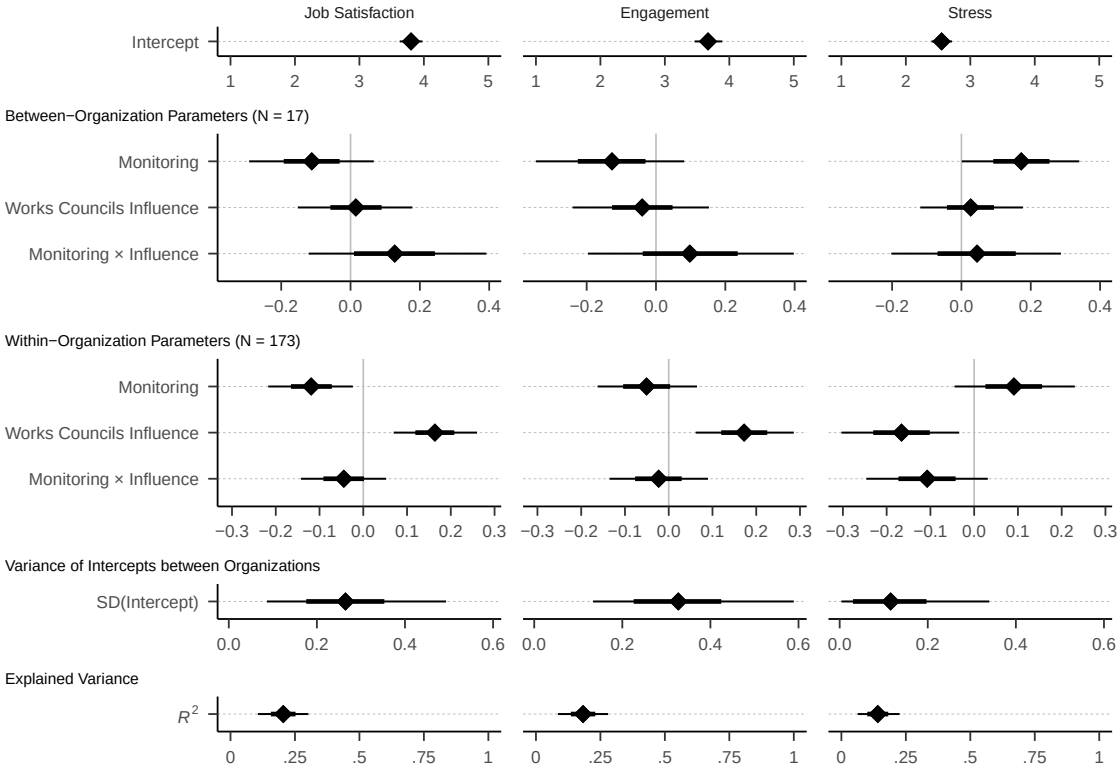
Hypothesis 5 stated that the more perceived influence the works council has, the lower the extent of electronic monitoring. To test this assumption, we fitted a Bayesian generalized

mixed model to predict data collection with the influence of works councils. The model included organization as group effect. As the monitoring index summed up "yes" answers, we used a Poisson distribution to reflect this in the analysis. We found no evidence that the perceived influence of works councils between organizations has an effect on the number of reported monitoring techniques, $b = -0.01$, 95% CI $[-0.14, 0.12]$. Beyond this, the number of monitoring techniques was similar in organizations with a works council, $b = 5.86$, 95% CI $[5.19, 6.61]$, and those without a works council, $b = 5.60$, 95% CI $[4.82, 6.53]$. Thus, we found no decisive evidence to support Hypothesis 5.

Hypothesis 6 was examined in a similar way to the previous moderation analysis. The hypothesis proposed that the influence of works councils has a buffering effect on the relationship of the extent of monitoring with work attitudes and stress. On the organizational level, the interaction term of works councils influence and monitoring showed no reliable relationship with job satisfaction, $b = 0.13$, 95% CI $[-0.12, 0.39]$, engagement, $b = 0.10$, 95% CI $[-0.20, 0.40]$, or stress, $b = 0.05$, 95% CI $[-0.20, 0.29]$. On the employee level, the interaction term also showed no reliable relationship with job satisfaction, $b = -0.04$, 95% CI $[-0.14, 0.05]$, and engagement, $b = -0.02$, 95% CI $[-0.14, 0.09]$, but did show a reliable relationship with stress, $b = -0.11$, 95% CI $[-0.25, 0.03]$. Thus, there was some weak evidence to suggest that employees who stated a higher influence of works councils perceived a reduced association between the number of monitoring techniques and stress (see Figure 4 for a depiction of regression parameters). To summarize, there was only in the case of stress and on the employee level some evidence in support of Hypothesis 6.

Figure 4

Results of the Bayesian Mixed Model, Fitted to Examine Hypothesis 6



Note. Diamonds indicate mean of estimate distributions. Thicker lines show 65% CI, whereas thinner lines show 95% CI.

Hypothesis 7 stated that the higher the perceived influence of the works council, the more electronic monitoring is perceived as supportive and the less it is perceived as controlling. To test this hypothesis, we used a Bayesian mixed model including organization as group effect. On the organizational level, the influence of the works council showed a stable negative relationship with a developmental purpose, $b = -0.29$, 95% CI $[-0.46, -0.12]$, but not with a controlling purpose, $b = 0.03$, 95% CI $[-0.26, 0.32]$. On an employee level, the influence of the works council showed a positive relationship with a developmental purpose, $b = 0.15$, 95% CI $[-0.01, 0.31]$, and a negative relationship with a controlling purpose, $b = -0.11$, 95% CI $[-0.27, 0.04]$. Hence, the influence of works councils was related to perceptions of supportive and controlling purposes but only on the employee level in the proposed direction. On the organizational level, the findings contradicted Hypothesis 7 or showed no evidence in a particular direction. Thus, there was partial evidence for Hypothesis 7. On an exploratory basis, we investigated whether developmental and controlling purposes differed between organizations with and without a works council. Employees in an organization with a works council did not state higher perceptions of developmental purposes, $M = 2.61$, 95% CI $[2.36, 2.86]$ (vs. $M = 2.50$, 95% CI $[2.19, 2.82]$), but stated a higher perception of controlling purposes, $M = 2.60$, 95% CI $[2.37, 2.83]$ (vs. $M = 2.10$, 95% CI $[1.83, 2.40]$).

7. Discussion

Based on social information processing theory (Salancik & Pfeffer, 1978; Zalesny & Ford, 1990), the current study explored the relationship of electronic monitoring with work satisfaction, engagement, and stress. By separating the effects on the level of organizations and employees,

we were able to disentangle these relationships in terms of differences between organizations and employees. In line with previous findings, a higher number of monitoring procedures was associated with increased stress and lower job satisfaction (Backhaus, 2019; Ravid et al., 2019; Stanton, 2000a). Contrary to the existing literature, we did not find a buffering effect of developmental purposes or a strengthening effect of controlling purposes on these relationships (DelVecchio et al., 2013; Wells et al., 2007). Rather, there was some evidence in the opposite direction. Furthermore, the distinction between, and differing main effects of, developmental and controlling purposes yields further evidence to suggest different purposes of electronic monitoring.

With regard to participation in the workplace, we were only able to establish the proposed buffering effect of participative leadership on the relationship of monitoring with work satisfaction and engagement on the employee level, but not on the organizational level and not in the case of stress. The findings therefore imply that in this case, the individual perception of leadership is more important than differences between organizations in terms of their leadership style. This may hint at an attraction-selection-attrition effect (DelVecchio et al., 2013; Schneider, 1987): Employees might either accept or welcome a certain monitoring and leadership behavior in an organization, or drop out. Beyond this, we found no indication that the influence of works councils buffers the effects of monitoring on employees' work attitudes and stress. Furthermore, we found no influence of the presence of a works council in an organization, and no influence of works councils on the number of reported monitoring techniques. Critics of works councils argue that they are often a hindrance to the introduction of new systems and procedures (cf., Hübler & Jirjahn, 2003). Our findings contradict this perception, as they do not reveal that

organizations with a works council have a lower number of monitoring techniques. Regarding the perception of developmental and controlling purposes, works councils showed different impacts on the organizational and the employee level: Between organizations, a higher influence of the works council reduced the perception of developmental purposes, and employees with a works council did not report higher levels of developmental purposes. This is contrary to our assumption, but might indicate that a works council communicates a more realistic image of the advantages of innovative technologies than does the management. Moreover, works councils are responsible for protecting employees from the undesired use of technologies, rather than themselves introducing technologies that promote employees' interests (Frege, 2002). However, our findings did support the proposed directions of works councils' influence and monitoring purposes on the employee level. Accordingly, employees who perceive the works council to be more assertive also perceive monitoring techniques as less threatening and as more likely to promote development. This suggests that works councils are an important institution within an organization to foster trust and development.

As one of the first studies to examine participation in the context of electronic employee monitoring in a field setting, the present findings demonstrate that the individual perception of leadership is more influential than differences between organizations in terms of their leadership style. As the study is also one of the first to integrate works councils into work and organizational psychology, the findings should be seen as tentative in nature. Nevertheless, our results may imply that works councils do not block the introduction of innovative technologies and it appears that works councils have an important function in communicating the advantages and disadvantages of technologies to employees. By separating the influence of different

organizations and employees, we were able to find support for the proposed information processing in SIP theory (Salancik & Pfeffer, 1978; Zalesny & Ford, 1990). The theory assumes that the salience of certain workplace characteristics influences the formation of job attitudes and needs. However, other social information can influence this process. Whereas differences between organizations manipulate the salience of monitoring procedures, differences between employees highlight the influence of other social information. The current study found evidence for the differentiation of these two levels.

7.1. Limitations

There is at least one limitation of the present study that needs to be considered: We based all measurements on one survey at one point in time. Thus, a common method bias might limit the implications and generalization of our study (Podsakoff et al., 2003). However, previous research has shown that the effect of common method bias is often overestimated and may reduce—and not inflate—relations (Conway & Lance, 2010; Siemsen et al., 2010). In particular, Siemsen et al. (2010) showed that interaction effects cannot be artifacts of common method bias, and our study is mainly based on moderation analysis. In addition, our multivariate approach does account for covariation between dependent variables. Nevertheless, further research could mitigate this issue by directly observation of monitoring techniques in a certain company or obtaining this information from the management of the corresponding companies. In addition, sampling at one time point implies that it is only possible to interpret relationships between variables, and no causal effects can be derived. Future research could circumvent this issue by

investigating how the implementation of new monitoring systems within organizations affects employee behavior and well-being.

7.2. Future Research

Our findings imply that the SIP theory is well suited to explain employees' attitudes and behaviors in the context of electronic monitoring within organizations. Beyond this, the study was one of the first to test the influence of participative decision making on the perception of electronic monitoring. The results suggest that an attraction-selection-attrition model can also be applied to electronic monitoring. While this finding is in line with research on the effect of organizational culture on the perception of electronic monitoring (e.g., Alder, 2001; DelVecchio et al., 2013), further research is warranted in this area. For example, it might be possible that especially people with higher performance or competitiveness might be attracted to or unconcerned about monitoring procedures (cf., Gläser et al., 2017). In addition, there are no long-term studies on electronic monitoring. It might be the case that intensive monitoring procedures (like at Amazon, Cattero & D'Onofrio, 2018) result in a high dropout of personnel even if they are well performing. Moreover, works councils are an under-researched area in psychology and computer science, and their impact on organizational decision-making and working procedures is unknown. Thus, the current study sheds first light on the impact of works councils on organizational decisions, but these findings need to be expanded and replicated. For example, knowledge on the interplay of employees, works councils, and organizations is insufficient.

7.3. Practical Implications

The current study shows that examining the effects of monitoring alone does not suffice. Rather, it is crucial to also pay attention to the organization in which monitoring is embedded, and to draw inferences for employees' well-being from the monitoring implementation and participative decision-making processes. Practitioners and HR managers should carefully investigate how monitoring procedures in their organizations are perceived and how this perception can be shaped by communicating their use and function. Works councils probably play an important role in this area and should be strongly involved in monitoring implementation decisions.

8. Conclusion

Our study demonstrated that electronic monitoring negatively affects employees' work attitudes and stress, but that these effects might depend on the participation within an organization. Stakeholders in organizations need to use electronic monitoring wisely and with the appropriate communication of which data is collected and how it is used.

Part III.

Study 2: Breaching the psychological contract:

Electronic monitoring as a violation of expectancies

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9. Introduction

The advances in technology led to substantial changes in organizations' structure and work processes (Cascio & Montealegre, 2016; Schwarzmüller et al., 2018). For example, some decades ago, organizations monitored employees in the workplace solely through direct observation. In the meantime, monitoring employees electronically has become increasingly widespread (Backhaus, 2019; Ravid et al., 2019) and in the future algorithmic management might play a greater role (Duggan et al., 2020; Möhlmann & Zalmanson, 2017). Algorithmic management organizes work processes automatically through algorithms and relies strongly upon monitoring of employees. Hence, there is an increasing trend in electronic monitoring of employees in organizations.

Research on electronic monitoring has grown in line with its use (Alge & Hansen, 2013), with studies establishing a predominantly adverse impact of electronic monitoring on employees' well-being (Cascio & Montealegre, 2016; Ravid et al., 2019; Stanton, 2000a). However, emerging evidence showed positive effects of electronic monitoring as well (e.g., Wells et al., 2007). For example, if the collected data is used for appropriate feedback and employee development, it can improve workers' satisfaction and performance (Ravid et al., 2019; Wells et al., 2007). However, in other issues, research has not come to a conclusion yet: There are contradictory findings regarding the effects of electronic monitoring on counterproductive work behavior (CWB, see de Vries & van Gelder, 2015; Martin et al., 2016) and the role of trait competitiveness in the effects of electronic monitoring has not been determined.

Following these research gaps, the aims of the current study are three-fold: First, we want to replicate previous findings on the effects of electronic monitoring on employees' well-being.

Second, the current study tries to shed some light on diverging effects of monitoring on CWB and finally, investigate the influence of trait competitiveness on the perception of electronic monitoring. We derived our research hypothesis from psychological contract theory (Frey, 1993; Rousseau, 1989).

10. Theoretical Background

10.1. The Psychological Contract

The employment contract between an organization and an employee regulates rights and obligations on an explicit level. Beyond this formalized exchange agreement, Rousseau (1989) proposed that employees additionally construct an implicit psychological contract that subsumes the employee's beliefs about an organization's obligations towards them and vice versa. Like any other contract, the psychological contract plays a crucial role in reducing uncertainty. By believing in their organization's obligations, employees build up expectations regarding future interactions and a feeling that there is agreement on the conditions under which the work is done (Shore & Tetrick, 1994). Due to the implicit and perceptual nature of the psychological contract, the corresponding organization does not have to agree to its content, and the content might also differ markedly between individual employees (Robinson, 1996; Rousseau, 2004).

According to the psychological contract perspective, employees observe and evaluate the behavior of organizational representatives and then form expectations about future actions of the organization (Robinson & Morrison, 2000). For example, in a recruitment situation, an interviewer might state that in the past, most employees received salary increases after a

certain amount of time. Accordingly, interviewees might form expectations regarding such increases, despite knowing that salary decisions are likely made by other representatives of the organization. As a consequence, an employee might believe that an employer is liable to fulfill certain promises although they were not formalized in a written contract or might not even have been communicated by the organization (Rousseau, 1998).

A breach of the psychological contract happens if the organization does not fulfill a perceived obligation towards the employee (e.g., not fulfilling the expected salary raise; Coyle-Shapiro & Conway, 2005). This typically results in a negative cognitive evaluation on the part of the employee (this cognitive response is termed contract *breach*), involving feelings of betrayal and anger (this emotional response is termed contract *violation*; Morrison & Robinson, 1997; Rousseau, 1989). This in turn may lead to increased CWB, reduced job satisfaction, and increased stress (see Bal et al., 2008; Cantisano et al., 2008; Zhao et al., 2007). Electronic monitoring might constitute a workplace characteristic that employees perceive as a psychological contract breach.

10.2. Electronic Monitoring

Nebeker & Tatum (1993) defined electronic monitoring as the recording, storing, and analyzing of employee behavior (mainly focused on performance, but behavior that is not related to work tasks might also be monitored, see Ball, 2010). Compared to traditional human observation, electronic monitoring can be used much more pervasively, unobtrusively, and thoroughly, and the results of electronic monitoring can be easily stored, aggregated, and used later. Due to these characteristics, electronic monitoring is described as potentially more influential on human well-being than traditional monitoring (Alge & Hansen, 2013; Ravid et al., 2019; Stanton, 2000a).

For example, blue-collar workers might work with machines that continuously monitor their work pace and steps; similarly, white-collar workers might be tracked by software on their computers.

So far, research on the relationship between electronic monitoring and employee well-being has mainly focused its reasoning on stress theories (see, for example, Davidson & Henderson, 2006; Jeske & Santuzzi, 2015; Nebeker & Tatum, 1993). We argue that psychological contract theory offers an interesting alternative theoretical approach to explain potential effects of electronic monitoring on employee well-being and CWB (Frey, 1993). For example, if an organization records the number of comfort breaks and an employee perceives that this is a privacy intrusion and that the organization has an obligation to protect employees' privacy, this might result in a contract breach. In this way, electronic monitoring has negative outcomes on employees' well-being, especially with regard to stress and work satisfaction (Bal et al., 2008; Cantisano et al., 2008; Zhao et al., 2007). Consistent with this argument, several studies found that electronic monitoring can decrease job satisfaction and increase stress (Backhaus, 2019; Chalykoff & Kochan, 1989; Holman et al., 2002; Jeske & Santuzzi, 2014; Yost et al., 2018). Thus, we aim to replicate these relationships and propose the following:

Hypothesis 1: The extent of electronic monitoring is (a) positively related to stress and (b) negatively related to work satisfaction.

10.3. Purposes of Employee Monitoring

McNall & Roch (2009) differentiated between two perceived purposes of electronic monitoring: developmental and controlling. The controlling (or bureaucratic, administrative) purpose of

electronic monitoring typically promotes organizational interests. This kind of electronic monitoring is justified to ensure performance maintenance or prevent loafing, stealing or other behaviors with negative outcomes for the organization (Ball, 2010; Eisenhardt, 1989). For example, management could monitor the time an employee spent on customer calls and mails to check whether the employee works as intended. In contrast, the developmental purpose of monitoring (also known as the informative or supportive purpose; DelVecchio et al., 2013; Wells et al., 2007) typically promotes employees' interests. This kind of electronic monitoring may provide feedback to employees and help them to foster their individual development. Any additional information from an electronic monitoring system that facilitates task-processing or is in the interest of the employee is also subsumed under the developmental purpose. For example, providing employees with information about the time they spent on meetings, calls, and emails might help them to regulate their time management. Note that as developmental purposes cannot work without data gathering either, a monitoring aspect is always present.

In terms of psychological contract theory, perceived purposes of electronic monitoring might alter the perception of an electronic monitoring system and the attributions regarding this system (see also Nishii et al., 2008). This in turn will change the probability that electronic monitoring is perceived as a contract breach. The controlling purpose might specifically be related to perceptions of interactional injustice which is characterized by disrespectful or inappropriate treatment and a lack of comprehensibility regarding how decisions are made (Colquitt, 2012). If electronic monitoring leads to control and punishment, employees are likely to perceive such a situation as unjust, especially if the situation and consequences do not reflect their own perception. These perceptions of interactional injustice are specifically related to

contract violation (Shore & Tetrick, 1994). Therefore, we assume that controlling purposes are related to perceptions of injustice, and in this way increase the negative outcomes of electronic monitoring. We propose the following moderation hypothesis:

Hypothesis 2: A perceived controlling purpose of electronic monitoring moderates the relationship between the extent of electronic monitoring and (a) work satisfaction as well as (b) stress, insofar as the relationship will be stronger for individuals who perceive a high controlling purpose of electronic monitoring.

By contrast, developmental purposes should be in line with employees' perceived obligations and might enhance perceptions of justice. For example, a time-tracking system might be supportive if it helps employees to keep track of extra hours and thus enables them to be rewarded for overtime work. Developmental purposes can therefore increase perceptions of justice and fairness (Ambrose & Alder, 2000; McNall & Roch, 2009; Wells et al., 2007) and therefore strengthen the employee's belief in the psychological contract (Shore & Tetrick, 1994). Consequently, we propose a buffering effect of developmental purposes on the relationship between electronic monitoring and work satisfaction as well as stress:

Hypothesis 3: A developmental purpose of electronic monitoring moderates the relationship between the extent of electronic monitoring and (a) work satisfaction as well as (b) stress, insofar as the relationship will be weaker for individuals who perceive a high developmental purpose of electronic monitoring.

10.4. Counterproductive Work Behavior

Findings from the literature on psychological contract theory suggest that contract breach and violation can lead to increased CWB (Chao et al., 2011; Griep & Vantilborgh, 2018; Jensen et al., 2010). A perceived contract breach can be accompanied by anger and frustration which in turn may result in deviant behavior (Martinko et al., 2002). This process can be explained based on an equity stance: Employees who feel mistreated want to rebuild equity in the relationship with their employer and mistreat them as well (Chao et al., 2011). Consequently, if electronic monitoring is indeed seen as a violation of perceived obligations, employees might react to it with deviance (cf. Yost et al., 2018). Therefore, psychological contract theory leads us to propose the following hypothesis:

Hypothesis 4: The extent of electronic monitoring is positively related to CWB.

However, research on electronic monitoring has so far produced mixed evidence regarding the relationship between electronic monitoring and CWB. Whereas Martin et al. (2016) found support for this relation in a field study and two experiments (see also Yost et al., 2018), de Vries & van Gelder (2015) found the opposite results (see also Hu et al., 2016). To explain these mixed findings, we suggest that there are two counteracting processes that act on CWB. First, psychological contract theory can explain increased CWB through perceived unmet obligations (see also Figure 6). Thus, the more electronic monitoring is seen as contract breach, the greater the extent of CWB should be:

Hypothesis 5: The relation between the extent of electronic monitoring and CWB is mediated by the perceived contract breach.

At the same time, the purpose of monitoring is often to detect deviant behavior of employees (Ball, 2010; Bhave, 2014; Ravid et al., 2019). Therefore, we assume that monitoring leads to an increased perceived detectability of deviant behavior. Perceived detectability can be defined as the subjective probability that employers will be able to detect one's behavioral actions that are not in line with organizational goals. If employees' perceived detectability is high, their perceived probability of being sanctioned for such behavior is also high, which should reduce counterproductive work behavior. Following this line of argument, electronic monitoring should reduce CWB, and perceived detectability may act as a second mediator – one that works in the opposite direction to the psychological contract breach (a kind of suppressor, MacKinnon et al., 2000), because electronic monitoring increases perceived detectability which consequently decreases CWB. We thus propose (see also Figure 6):

Hypothesis 6: The relation between the extent of electronic monitoring and CWB is mediated by perceived detectability.

10.5. Competitiveness as an Influencing Factor on an Individual Level

Psychological contract theorists have also argued that the interpretation of the psychological contract is highly subjective and that individual differences may alter the perception of the contract (De Vos & Meganck, 2009; Robinson & Morrison, 2000; Rousseau & Greller, 1994). Competitiveness has been suggested as a relevant trait in the case of pay for performance (Gläser et al., 2017). Pay for performance is closely related to electronic monitoring because performance levels have to be controlled using some form of employee monitoring. However, in the case of electronic monitoring, the importance of trait competitiveness has not been

shown yet. Trait competitiveness is a stable characteristic that differs between individuals and describes the enjoyment of interpersonal competition (Brown et al., 1998). People with high competitiveness enjoy competition and may thus perceive electronic monitoring more positively for competition purposes. For this reason, people with high competitiveness might perceive a contract violation through electronic monitoring only with higher invasiveness than people with lower competitiveness. Accordingly, competitiveness might reduce the relationship of electronic monitoring with work satisfaction and stress, and we therefore propose:

Hypothesis 7: Competitiveness moderates the relationship between the extent of electronic monitoring and (a) work satisfaction as well (b) as stress insofar as the association will be weaker for people with higher competitiveness.

11. Method

Hypotheses, variables, data collection information, and analyses were registered prior to conducting this study, with the preregistration available at https://aspredicted.org/blind.php?x=hb8n6e. In addition, this paper was written as a reproducible manuscript using R (see Aust & Barth, 2018). All files to reproduce statistical analysis and reports of statistics will be available at the Open Science Framework (https://osf.io/69qp3/).

11.1. Participants

Using an online questionnaire, we collected data from an ad-hoc sample of 343 participants.[1] Participants were recruited through personal contacts and posts on social media platforms. We excluded 72 participants who did not finish the questionnaire, 14 participants who worked less than 10 hours per week (according to their work contract), and three participants who completed the questionnaire in less than four minutes, which was determined to be the lowest time threshold to respond to all items while also reading the items attentively. Thus, we based our analysis on 250 participants. The respondents stated that they work $M = 32.00$ ($SD = 10.42$) hours per week according to their work contract and that they actually work $M = 36.48$ ($SD = 15.11$) hours per week. Additionally, 31.6% indicated that they were working on temporary contracts. Table 3 describes characteristics of the sample.

11.2. Measures

If not otherwise stated, all items were rated on a Likert scale from 1 to 5. For all scales, larger numbers correspond to more agreement on the respective scale. If a participant had more than two missing values on a scale, the scale mean for this participant was not calculated. See the supplementary material on the Open Science Framework (https://osf.io/69qp3/) for a full list of items.

[1] In the preregistration, we stated that we would collect pairs of data from participants and their corresponding coworkers. However, only a small number of people sent the questionnaire to their coworkers. Thus, we based our analysis on individual responses only.

Table 3
Characteristics of the Participants ($N = 250$)

		Count	%
Gender	male	93	37.2
	female	147	58.8
	3rd gender	4	1.6
	no answer	6	2.4
Age	< 24	66	26.4
	$25 - 34$	53	21.2
	$35 - 44$	48	19.2
	$45 - 54$	41	16.4
	> 55	38	15.2
	no answer	4	1.6
School-leaving qualifications	no qualifications	1	0.4
	lower-track secondary school [Haupt-/Volksschule]	8	3.2
	medium-track secondary school [Mittlere Reife]	35	14.0
	higher track secondary school [Abitur]	202	80.8
	no answer	4	1.6
Further education	no qualifications	45	18.0
	apprenticeship	45	18.0
	qualified technicians / master craftsmen	19	7.6
	university degree	138	55.2
	no answer	3	1.2

11.2.1. Electronic Monitoring Index

To obtain a measure of the extent of monitoring, we asked participants whether certain working behaviors are recorded electronically at their workplace, using items adapted from Siegel et al. (2019). Participants could answer "Yes," "No," and "I don't know" to 13 items reflecting different domains that might be subject to electronic monitoring. An example item is: "It is recorded electronically when I start and finish my work." The number of "Yes" answers formed the electronic monitoring index. Due to its nature as a formative construct, we refrain from reporting reliability indices for this measure (see Streiner, 2003).

11.2.2. Perceived Purpose of Electronic Monitoring

To assess the developmental and the controlling purpose of electronic monitoring, we used a scale that was developed by Siegel et al. (2019) together with subject matter experts. Sample items are: "The collection of my work-related data fosters my development" (developing purpose) and "The collection of my work-related data leads to increased pressure regarding performance and time" (controlling purpose). Each dimension consisted of four items. To test the existence of a two-dimensional structure, we conducted a confirmatory factor analysis comparing a model with one global factor and a model with two factors. For model comparison we used the Akaike information criterion (AIC), the Bayesian information criterion (BIC), and a χ^2-test yielding the following results: $\Delta AIC = 230.19$, $\Delta BIC = 227.09$, $\Delta\chi^2(1) = 232.19$, $p < .001$, which indicate a better model fit of the two-dimensional structure. The two-dimensional model yielded the following indices (CFI: comparative fit index; RMSEA: root mean square error of approximation; SRMR: standardized root mean square residual): $\chi^2(19) = 72.34$, $p < .001$,

$CFI = .91$, $RMSEA = .13$, 95% CI $[.10, .16]$, $SRMR = .09$. The CFI was above the recommended value (.9) and the SRMR was close to the recommended value ($< .08$), but the RMSEA was above .08 and χ^2-value was significant, although χ^2 is known to be sensitive to sample size (Marsh & Balla, 1994). Overall, the model fit was deemed acceptable.

11.2.3. Work Satisfaction

To measure work satisfaction, we used the seven-item German-language Work Satisfaction Scale by Neuberger et al. (1978). An example item is: "I am satisfied with my working conditions."

11.2.4. Stress

A German stress scale by Mohr et al. (2005) with eight items was used to measure stress at work. An example item is: "I find it hard to relax after work."

11.2.5. Psychological Contract Breach

We used the Psychological Contract Breach scale developed by Robinson & Morrison (2000). A sample item is: "I have not received everything promised to me in exchange for my contributions." We translated all five items into German and a back-translation was conducted to check for consistency.

11.2.6. CWB

We used the German version (Spector, 2018) of the 10-item scale by Bennett & Robinson (2000). An example item is: "I played a mean prank on someone at work."

11.2.7. Competitiveness

To assess competitiveness, we used the five-items German version (Gläser et al., 2017) of the competitiveness scale by Brown et al. (1998). A sample item is: "I enjoy working in situations involving competition with others."

11.2.8. Perceived Detectability

To measure the detectability of CWB, we created a new scale with five items such as "If I behave incorrectly at work, this will be noticed." We conducted a confirmatory factor analysis with one global factor that yielded the following fit indices: $\chi^2(5) = 30.89$, $p < .001$, $CFI = .91$, $RMSEA = .15$, 95% CI $[.10, .20]$, $SRMR = .08$. The CFI was above the recommended value (.9) and the SRMR was close to the recommended value (< .08), but RMSEA was above .08. The RMSEA and χ^2-value were significant. Overall, the model fit seemed acceptable.

11.3. Data Analysis

To test our hypothesis, we used a Bayesian multivariate regression analysis approach. Unlike frequentist statistics, which for some time now has been criticized for its focus on dichotomous decision based on *p*-values (Dienes & McLatchie, 2018; van de Schoot et al., 2017), Bayesian statistics proposes statistical decisions on estimates and their distribution (or their uncertainty; Cumming, 2014). This shift in statistical reporting and interpretation has been endorsed in psychological research for several years (American Psychological Association, 2001; Vacha-Haase et al., 2000). To interpret the results of our estimated regression models, we report means, 95% Bayesian credible intervals (based on quantiles), and Bayes factors (BF) for the respective

regression estimates. Bayesian credible intervals indicate the range in which an estimate will fall with a certain probability given the observed data (and prior beliefs). For example, a 95% CI of $[.12, .34]$ is reliable positive and suggests a stable positive relationship between the dependent and the independent variable. A 95% CI of $[-.02, .15]$ is not reliable positive but suggests that the effect is most likely positive but could also be close to zero (and practically irrelevant). In contrast, a 95% CI of $[-.14, .15]$ is indecisive: The effect could be positive or negative or close to zero (Cumming, 2014). In addition, we provide Bayes factors as an estimation of the probability of a hypothesis. Bayes factors represent the ratio of the probability of a hypothesis in contrast to the probability of its null hypothesis under the assumption of the provided data. This ratio is represented by the Bayes factor which indicates whether the data provide evidence for ($BF \gg 1$) or against ($0 < BF \ll 1$) a hypothesis. The higher the Bayes factor, the stronger the evidence for the investigated hypothesis. In contrast, the more the Bayes factor approaches zero, the stronger the evidence against the hypothesis. For example, a Bayes factor of 10 suggests that there is 10 times more evidence in favor of the hypothesis than in favor of the null hypothesis. Conversely, a Bayes factor of $1/10$ indicates that the null hypothesis is 10 times more likely than the examined hypothesis. Bayes factors are only possible to calculate in presence of a hypothesis. Thus, we provide Bayes factors for regression estimates for which we have a hypothesis only.

We estimated all models using the R package *brms* (Bürkner, 2017). In all models, variables were standardized before entering the analysis and we estimated a robust regression analysis using a t-distribution for dependent variables. Bayesian statistics requires the specification of prior knowledge in prior distributions. Priors for regression estimates (intercepts and slopes) were restricted to a reasonable range and set to a normal distribution with $M = 0.00$

and $SD = 0.40$. This means that we expected regression parameters to be in an interval of $[-0.78, 0.78]$ with a 95% probability. So-called uninformative priors ($M = 0.00, SD = 2.00$) did not change the interpretation of the hypotheses compared to the informed priors above. A relatively high number of participants reported no electronic monitoring at all ($n = 86$, 34.40%). For these participants we did not calculate scale means of developmental and controlling perceived purpose as they did not experience any monitoring at work. We ran all analyses with and without these participants but the interpretation of hypotheses did not differ.

12. Results

Table 4 presents means, standard deviations, reliabilities, and correlations of the measured variables. As a measure of reliability, we report Revelle's omega total (McNeish, 2018).

12.1. Relationships with Work Satisfaction and Stress

Hypothesis 1 stated that electronic monitoring is (a) positively related to stress and (b) negatively related to work satisfaction. Electronic monitoring was operationalized using an index of different domains in which electronic monitoring might occur. We used a Bayesian multivariate regression model to predict work satisfaction and stress with the extent of electronic monitoring. Electronic monitoring was negatively associated with work satisfaction, $\beta = -.07$, 95% CI $[-.19, .05]$, $BF = 6.66$, and the corresponding Bayes factor represents the ratio of the probability that the regression estimate is negative vs. the probability that the regression estimate is zero or positive. It is about seven times more likely that the regression estimate is negative than positive or zero. Furthermore, electronic monitoring was not associated with stress, $\beta = -.01$, 95% CI

Table 4

Means, Standard Deviations, and Correlations of Measured Variables (Based on Conventional Frequentist Analysis)

Variable	*M*	*SD*	2.	3.	4.	5.	6.	7.	8.	9.
1. Monitoring index	2.26	2.58	.26 [.11, .40]	.33 [.19, .46]	−.07 [−.19, .05]	−.01 [−.13, .12]	−.02 [−.14, .10]	.05 [−.07, .18]	.14 [.02, .26]	.09 [−.04, .21]
2. Developmental purpose	2.30	0.96	(.87)	.10 [−.05, .25]	.13 [−.02, .28]	−.10 [−.25, .05]	−.11 [−.26, .05]	−.11 [−.26, .05]	.07 [−.09, .22]	.24 [.09, .38]
3. Controlling purpose	2.22	1.03		(.87)	−.31 [−.45, −.17]	.34 [.19, .47]	.11 [−.04, .26]	.37 [.23, .50]	−.09 [−.24, .07]	.05 [−.11, .20]
4. Work satisfaction	3.89	0.77			(.91)	−.28 [−.39, −.16]	−.28 [−.39, −.16]	−.67 [−.73, −.60]	.12 [.00, .24]	.00 [−.13, .12]
5. Stress	2.33	0.81				(.93)	.21 [.09, .33]	.27 [.15, .38]	−.09 [−.21, .04]	.18 [.06, .30]
6. CWB	1.42	0.37					(.76)	.26 [.14, .38]	−.15 [−.27, −.03]	.19 [.07, .31]
7. Contract breach	2.19	0.89						(.91)	−.10 [−.22, .02]	−.07 [−.19, .05]
8. Detectability	3.57	0.70							(.78)	−.01 [−.14, .11]
9. Competitiveness	2.69	0.78								(.82)

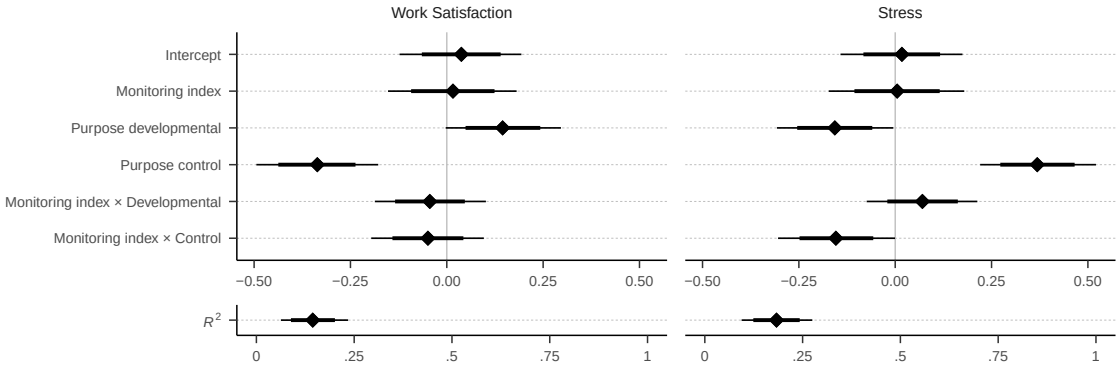
Note. $N = 247$, except for perceived purposes ($N = 161$). Numbers in parentheses indicate McDonald's ω. For correlations, a 95% frequentist confidence interval is given in squared brackets. CWB = counterproductive work behavior.

$[-.13, .12]$, $BF = 1/1.29$. In this case, it is about equally likely that the regression estimate is negative or zero than in the proposed positive direction. To conclude, our findings partially support Hypothesis 1.

Extending the previous model, Hypotheses 2 and 3 stated that the relationship of electronic monitoring with work satisfaction and stress is moderated by the perceived purpose of monitoring: A perceived developmental purpose should reduce the relationship, whereas a controlling purpose should strengthen the relationship. To test for these moderations, we extended the model of Hypothesis 1 and added both controlling and developmental purpose and their interactions with the monitoring index. Only participants who reported being targeted by electronic monitoring measures were included in this model (because people without monitoring cannot experience any purposes of monitoring). A developmental purpose showed a positive relationship with work satisfaction, $\beta = .14$, 95% CI $[.00, .30]$, and a negative relationship with stress, $\beta = -.16$, 95% CI $[-.31, .00]$. The relations of controlling purpose with work satisfaction, $\beta = -.34$, 95% CI $[-.49, -.18]$, and stress, $\beta = .37$, 95% CI $[.22, .52]$, were reversed. Note that negative interaction terms reduce a positive relationship between a dependent and an independent variable, whereas positive interaction terms strengthen such a relationship. The meaning of interaction terms is reversed for a negative relationship between dependent and independent variable. To test our hypotheses, we consequently examined whether the interaction terms were in the proposed direction. Overall, the interaction terms showed evidence against our hypotheses. Regarding work satisfaction, the interaction term of the monitoring index and developmental purpose, $\beta = -.04$, 95% CI $[-.19, .10]$, $BF = 1/2.69$, as well as the interaction term of monitoring and controlling purpose, $\beta = -.05$, 95% CI $[-.20, .10]$, $BF = 2.90$. showed

Figure 5

Means and Credible Intervals of Model Estimates Regarding Hypotheses 2 and 3



Note. Bold triangles correspond to means, thick lines to 79% credible intervals, and thin lines to 95% credible intervals. Only participants who reported electronic monitoring are included.

no decisive evidence for or against the proposed hypothesis. Regarding stress, both the interaction term of the monitoring index and developmental purpose, $\beta = .07$, 95% CI $[-.07, .21]$, $BF = 1/5.00$, and the interaction term of the monitoring index and controlling purpose were contrary to the proposed hypothesis, $\beta = -.15$, 95% CI $[-.30, .00]$, $BF = 1/39.82$. In sum, the regression estimates showed either no support in favor of our hypotheses or evidence against our hypotheses (see Figure 5 for a depiction of estimates and their distribution).

Based on our reasoning on psychological contract theory, it was additionally possible to expect that the relationship of the monitoring index with work satisfaction and stress is mediated by the psychological contract breach, although we did not formulate this as a hypothesis before the survey. Thus, on an exploratory basis, we tested whether the relationship of the monitoring index with work satisfaction and with stress is mediated by the psychological contract breach (see Table 5 for an overview of the results). With respect to work satisfaction, we would expect a negative indirect effect as monitoring is positively associated with contract breach which

in turn is negatively related to work satisfaction. Indeed, the indirect effect was negative, $\beta = -.03$, 95% CI $[-.11, .05]$, but not very stable. Regarding stress, we would expect a positive indirect effect because monitoring is positively associated with contract breach which in turn is positively associated with stress. This was again the case, $\beta = .01$, 95% CI $[-.02, .05]$, but again, the effect was not very stable. In sum, there was small evidence that psychological contract breach mediated the relationship between the extent of monitoring with work satisfaction and stress.

12.2. Relationship with CWB

Hypothesis 4 stated that electronic monitoring is positively related to CWB. To investigate this hypothesis, we predicted CWB by the monitoring index using a Bayesian regression model. We found no stable relationship of the monitoring index with CWB, $\beta = .02$, 95% CI $[-.05, .08]$, $BF = 2.48$, and the corresponding Bayes factor was not strong. Thus, there is no convincing evidence for or against Hypothesis 4.

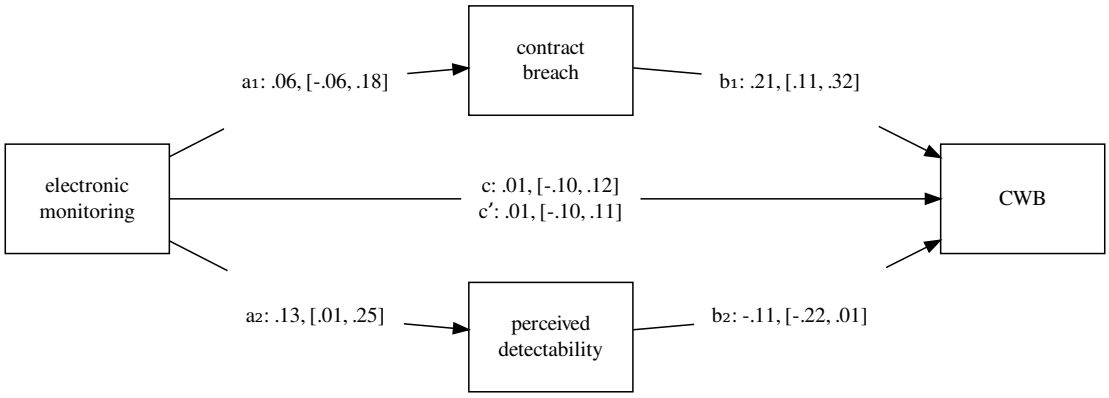
We extended the model of Hypothesis 4 to test our mediation Hypotheses 5 and 6. These hypotheses stated that the relationship between electronic monitoring and CWB is mediated by the psychological contract breach and the perceived detectability of CWB. See Table 6 and Figure 6 for an overview of path coefficients. To examine our hypotheses, we derived Bayes factors testing whether the indirect path from monitoring index via contract breach to CWB is larger than zero (Hypothesis 5) and whether the indirect path from the monitoring index via detectability to CWB is smaller than zero (Hypothesis 6). We found a mediation by contract breach, $\beta = .01$, 95% CI $[-.01, .04]$, $BF = 4.56$, and by perceived detectability, $\beta = -.01$, 95%

Table 5
Exploratory Mediation Model

Effect	Path	Estimate
Zero-order effects	Monitoring index → Work satisfaction	−.07, [−.19, .05]
	Monitoring index → Stress	−.01, [−.14, .11]
Direct effects	Monitoring index → Work satisfaction	−.04, [−.13, .05]
	Monitoring index → Stress	−.03, [−.15, .10]
	Monitoring index → Contract breach	.05, [−.07, .17]
	Contract breach → Work satisfaction	−.66, [−.75, −.56]
	Contract breach → Stress	.27, [.15, .39]
Indirect effects	Monitoring index → Contract breach → Work satisfaction	−.03, [−.11, .05]
	Monitoring index → Contract breach → Stress	.01, [−.02, .05]
Total effects	→ Work satisfaction	−.07, [−.19, .05]
	→ Stress	−.01, [−.14, .11]

Note. Examining psychological contract breach as a mediator in the relationship of electronic monitoring with work satisfaction and stress. Square brackets indicate 95% CI.

Figure 6
Mediation Model of Hypotheses 5 and 6



Note. Paths *a* and *b* denote the indirect path, *c* the direct path before entering the indirect path, and *c'* the direct path after entering the indirect path. Square brackets indicate the 95% credible interval. CWB = Counterproductive work behavior.

CI $[-.04, .00]$, $BF = 19.00$. In sum, we found support for our Hypotheses 5 and 6, although evidence was stronger with respect to the mediation by perceived detectability than by contract breach.

12.3. Moderation by Trait Competitiveness

To test Hypothesis 7, we used a Bayesian multivariate regression model predicting work satisfaction and stress by the monitoring index as well as trait competitiveness and their interaction. Hypothesis 7 stated that the relation of electronic monitoring with work satisfaction and stress is reduced by competitiveness. Competitiveness was not related to work satisfaction, $\beta = -.03$, 95% CI $[-.16, .09]$, but was positively related to stress, $\beta = .21$, 95% CI $[.08, .33]$. Like the moderation analysis for Hypotheses 2 and 3, we tested whether the interaction terms were in the proposed direction. In the case of work satisfaction, $\beta = .19$, 95% CI $[.05, .32]$, $BF = 351.94$, as well as in the case of stress, $\beta = -.12$, 95% CI $[-.25, .02]$, $BF = 21.90$, we found strong support

Table 6

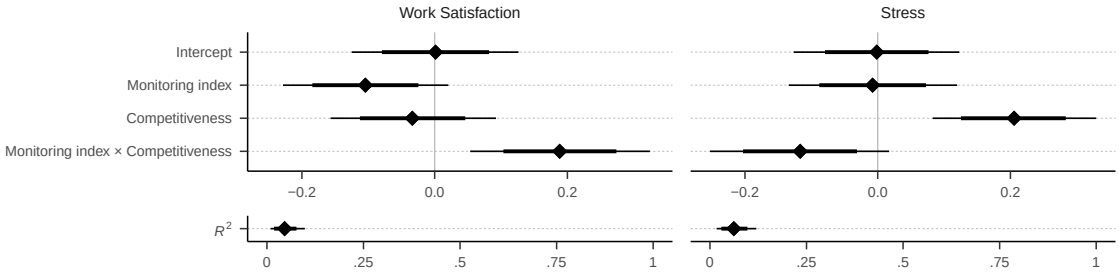
Bayesian Regression Model Examining Hypotheses 5 and 6.

Effect	Path	Estimate	Bayes factor
Zero-order effects	Monitoring index → CWB	.01, [−.10, .12]	
Direct effects	Monitoring index → CWB	.01, [−.10, .11]	
	Monitoring index → Contract breach	.06, [−.06, .18]	
	Monitoring index → Detectability	.13, [.01, .25]	
	Contract breach → CWB	.21, [.11, .32]	
	Detectability → CWB	−.11, [−.22, .01]	
Indirect effects	Monitoring index → Contract breach → CWB	.01, [−.01, .04]	4.56
	Monitoring index → Detectability → CWB	−.01, [−.04, .00]	19.00
Total effects	→ CWB	−.01, [−.11, .10]	

Note. Psychological contract breach and detectability of undesired behavior were introduced into the relationship between electronic monitoring and CWB. Square brackets indicate 95% CI. Note that we only report Bayes factors for parameters for which we have hypotheses.

Figure 7

Means and Credible Intervals of Model Estimates Regarding Hypothesis 7



Note. Bold triangles correspond to means, thick lines to 79% credible intervals, and thin lines to 95% credible intervals.

for the interaction effect in the proposed direction. In sum, our findings strongly support Hypothesis 7 (see Figure 7 for a depiction of regression estimates and their distribution).

13. Discussion

So far, research on electronic monitoring has produced diverging effects of monitoring on CWB (de Vries & van Gelder, 2015; Gläser et al., 2017). In the current study, we were unable to establish a direct association between electronic monitoring and CWB. However, we found two counteracting psychological processes that mediate the effect of electronic monitoring on CWB and can explain diverging effects of previous research: contract breach and perceived detectability. In line with psychological contract theory (Frey, 1993; Robinson & Morrison, 2000; Rousseau & Greller, 1994), electronic monitoring was associated with contract breach which in turn increased the likelihood of CWB. This behavior can be explained with an equity stance: Due to the perceived violated obligation, employees seek to rebalance the relationship with their employer and mistreat them as well. Thus, the current results affirm the relevance of

psychological contract theory in explaining behavior in the context of electronic monitoring. However, we also found support that psychological contract theory needs to be extended by perceived detectability, which is the perceived probability that one's deviant behavior is detected by electronic monitoring. Detectability counteracted the positive relationship between monitoring and CWB over contract breach and led to reduced CWB. These two counteracting processes might be responsible for diverging effects of monitoring on CWB. Thus, depending on a study's context and design, one of these paths might be stronger which leads to differing results between studies.

Beyond that and in accordance with the subjective nature of the psychological contract (De Vos & Meganck, 2009; Robinson & Morrison, 2000; Rousseau & Greller, 1994), we confirmed that a personality trait, namely competitiveness, moderates the influence of electronic monitoring on work satisfaction and stress. People with higher competitiveness might see monitoring as a possibility to compete with their coworkers and thus perceive monitoring as a contract breach only with higher invasiveness (if at all) compared to people with lower competitiveness. Thus, the current study is the first to demonstrate that competitiveness is an influential variable in the case of electronic monitoring.

Furthermore, we were partly unable to replicate previous direct effects of electronic monitoring on employees' well-being and buffering or strengthening effects of developmental and controlling purposes (DelVecchio et al., 2013; McNall & Roch, 2009; Wells et al., 2007). The current study found only a negative effect on work satisfaction but not on stress. Thus, we partly confirmed and replicated previous findings on the effects of electronic monitoring, but our inconclusive result regarding stress is not consistent with the literature (Alge & Hansen,

2013; Ravid et al., 2019; Stanton, 2000a). However, we found strong evidence for a buffering effect of competitiveness on the relationship between monitoring and stress. This implies that employees with low competitiveness show a positive relationship between monitoring and stress. This way, the proposed main effect might be overshadowed by the interaction effect of trait competitiveness. Furthermore, we found evidence against the proposed directions of perceived purposes. Whereas a developmental purpose of monitoring supports employees' development, a controlling purpose is in line with organizational interests and is targeted at maintaining performance and liability. The interaction effects between monitoring and the developmental and controlling purposes of employee monitoring were in the reversed direction than hypothesized. More research is required to interpret these findings. It might be the case that the perception of electronic monitoring depends on organizational culture (Alder, 2001). For instance, the effects of developmental and controlling purposes on organizational outcomes may be buffered by a bureaucratic and a supportive culture (DelVecchio et al., 2013). Thus, taking the number of different organizations in our sample into account, organizational culture might play a role in the interpretation of developmental and controlling purposes. Note that we also found small evidence that the psychological contract plays a role in the relationship between monitoring and employees well-being as well. Thus, it might be beneficial to investigate these findings further.

Beyond that, we found a rather small relationship between developmental purposes and controlling purposes, $r = .10$, 95% CI $[-.06, .25]$. This finding supports the notion that both purposes are distinct (DelVecchio et al., 2013; Wells et al., 2007). On the one hand, monitoring like automatic logging of employees' output can be controlling if an organization uses the

information to prevent loafing and sanctioning employees for errors. On the other hand, it can be supporting if an employee is able to access these data and look for problems or process optimization (in the sense of work crafting, Parker, 2014).

13.1. Limitations and Research Implications

The following two limitations of the present study should be kept in mind: First, as the study is cross-sectional in nature, it is not possible to draw any conclusions about causation from our results. Nevertheless, our findings fit with previous studies and we also reached similar conclusions to past research, which strengthen the trustworthiness of our results. Further research might circumvent this limitation either by surveying different employees in the same organization or by taking a longitudinal approach. Second, our study might be affected by a common method bias which is defined as variance that is attributable to a common method of different measures (Podsakoff et al., 2003). However, the implications of a common method bias are often overestimated and might reduce the magnitude of correlations rather than inflating them (Conway & Lance, 2010; Siemsen et al., 2010). In addition, a systematic common method bias is arguably not compatible with our model of two contradictory processes. For example, an acquiescence or a social desirability bias would result in higher correlations between electronic monitoring, contract breach, and CWB. This bias should result in a positive correlation between electronic monitoring, perceived detectability, and CWB as well. However, this was not the case. Nevertheless, this limitation might be circumvented in future research by collecting information about electronic monitoring from the organization and not from the employees themselves.

Beyond these limitations, future research might benefit from the present findings and the psychological contract perspective in the following ways. First, future studies should take into consideration whether their study design promotes contract breach or perceived detectability as aspects of electronic monitoring. Depending on this, results and implications might change. Note, that in the current study the evidence for the mediation path over contract breach was smaller than for the mediation path over detectability. Therefore, future research should further investigate the influence of contract breach. Second, the current study showed that electronic monitoring is associated with a violation of the psychological contract. However, it is not fully clear why employees experience a contract breach through electronic monitoring. Future research could explore how electronic monitoring influences perceptions of organizational justice, loyalty, privacy, and whether these are the reasons for perceived contract breaches. Third, psychological contract theory assumes that contract breaches result in anger and dissatisfaction (contract violation). Thus, employees who perceive that electronic monitoring breaches their psychological contract, should also experience frustration and anger. This way, one could explore how these emotions link contract breaches to negative outcomes of electronic monitoring. Fourth, perceived detectability deserves more research attention. For example, it is unknown how perceived detectability relates to actual sanctioning. One could argue that perceived detectability is only relevant in the context of electronic monitoring if employees feel threatened by actual sanctioning (see also Hu et al., 2016). Finally, there is a need to investigate monitoring purposes. It is surprising that the current study found evidence against the proposed directions in the literature. Organizational culture is a factor that may influence the effect of monitoring purposes on the perception of electronic monitoring. For example, it might be possible that in a

bureaucratic culture monitoring is more accepted because it is promoted as a necessary evil. This relationship might be present even though monitoring is not perceived as developmental.

13.2. Practical Implications

This study indicates that electronic monitoring can have a detrimental impact on employees' job satisfaction. Thus, managers and decision-makers should consider whether electronic monitoring is beneficial and how it should be implemented. Psychological contract theory demonstrates the importance of how electronic monitoring is communicated to employees and perceived by employees. As our results on CWB suggest, electronic monitoring may backfire on organizations even though if the purpose of monitoring is to prevent CWB. Furthermore, managers should pay attention to individual differences among employees. For example, trait competitiveness may be a relevant factor when considering potential effects of electronic monitoring on employees.

13.3. Conclusion

Previous research on electronic monitoring found mixed effects on CWB and employees' well-being. This study applied the psychological contract theory to gather further insights into these mixed results and was able to show that electronic monitoring is positively related to CWB if it is seen as contract breach. In addition, the current study suggests that monitoring reduces CWB by detectability of deviant behavior.

Part IV.

Study 3: Does electronic monitoring pay off? Influences of electronic monitoring purposes on organizational attractiveness

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14. Introduction

Today's workplaces are shaped by numerous new technologies that are changing how work is done (e.g., Ghislieri et al., 2018). These changes are highly relevant for employees and may also be noticed by people outside the organization, as they might be transported by the media or shared in talks with friends and relatives. Accordingly, such information may potentially affect the image and the attractiveness of the organization in the public realm (Gray & Balmer, 1998).

Several studies showed that the use of new technologies in the interview setting has an impact on applicant reaction and organization attractiveness (Blacksmith et al., 2016; Langer et al., 2017). What is more, how technology is used at the potential workplace seems to affect people who apply for a similar position as well. In the case of electronic monitoring, Stanton & Lin (2003) found that applicants evaluated an organization as less attractive if they feared privacy invasions through electronic monitoring at the future workplace. However, there are also arguments that despite the invasion of privacy, electronic monitoring can fulfill purposes that might be valued by potential new employees (e.g., Sewell & Barker, 2006). Thus, it may be possible that the findings of Stanton & Lin (2003) only apply to situations in which potential applicants anticipate that electronic monitoring will be used in a controlling way, thus focusing on the interests of supervisors or the organization rather than the employees.

Therefore, the aim of the current study is to gain further insights into applicants' reactions to electronic monitoring practices that would indicate a privacy invasion at the future workplace. Based on communication privacy management theory (CPM; Petronio, 1991, 2015) and considering individual differences in applicants' competitiveness, we investigated how

engineering students, who are about to apply for jobs react to different purposes of electronic employee monitoring.

15. Theory

15.1. Electronic Monitoring of Employees

Electronic monitoring is a widespread method which is used to obtain, store, and analyze data about employees' performance and behavior at the workplace (Ravid et al., 2019). Research on electronic monitoring has predominantly focused on its effects on employees' well-being mainly finding a negative link (Ravid et al., 2019; Stanton, 2000a). Nevertheless, organizations justify electronic monitoring with performance benefits and security considerations (Ball, 2010; note however, that there is also research questioning these benefits, Ravid et al., 2019).

Extending previous findings, several authors have highlighted that there is a supportive and a controlling aspect of electronic monitoring of employees (DelVecchio et al., 2013; Ravid et al., 2019). Controlling purposes of monitoring are in line with organizational interests such as performance monitoring and policy compliance. In contrast, supportive purposes are aligned with employees' interests such as feedback, rewards, and equal treatment of employees. Whereas the controlling aspect is particularly associated with negative effects on employees' well-being, the supportive aspect should promote employees' development (Ravid et al., 2019). Based on CPM theory, we argue that these two kinds of monitoring purposes elicit different responses not only from employees but also from applicants, and we thus introduce CPM theory in the next section.

15.2. Communication Privacy Management Theory

Petronio's (1991, 2015) communication privacy management (CPM) theory can be used to explain the privacy behavior of individuals and is thus useful in the context of the current study. CPM theory has its origins in describing how information are shared in families and couples (Petronio, 1991), but has successfully applied in research on electronic monitoring (Allen et al., 2007), social media (Frampton & Child, 2013), and information sharing at the workplace (Smith & Brunner, 2017). A strength of CPM theory is the possibility to explain decisions that may even harm one's own privacy (Kokolakis, 2017; Petronio, 2015). At its core is a decision-making process which takes benefits and downsides into account and if benefits outweigh the downsides, the outcome of the decision can even harm one's privacy. Compared to other privacy theories, CPM theory is thus particularly suitable to explain everyday decision outcomes (Kokolakis, 2017). Three key aspects of CPM theory are especially relevant for the current study.

First, CPM theory states that privacy behavior is aimed at fulfilling two conflicting objectives at the same time. On the one hand, people want to retain control of their sensitive information and keep it private. On the other hand, they want to be social and thus need to disclose sensitive information to connect interpersonally and to build a trusting relationship. However, this means that they will lose control over their sensitive information to a certain degree. This contradiction between being open to other individuals and keeping one's autonomy shapes how privacy decisions are made. In the context of the current study, applicants may base their decision on a comparison of benefits (e.g., getting a job) and disadvantages (e.g., revealing information at the later workplace which one does not want to share, see Smith & Brunner, 2017, as well). Second, CPM proposes that people act according to certain rules which describe how

and to whom information is shared. These rules may vary over time and situations. For example, Stanton & Lin (2003) examined whether Black applicants perceive a threat of discrimination in monitoring measures. The authors found that based on the participants' experiences of past situations at the workplace, the described monitoring procedure may elicit different sets of rules (and accordingly, reactions). Finally, different pieces of confidential information have different boundaries, which specify the value of the information; the higher the value, the less likely the information is to be shared. For example, applicants might be willing to share their name or country of origin with a hiring organization but may be less likely to disclose more sensitive information such as their political or sexual orientation.

Thus, CPM theory seem well suited to explain behavior in the context of the current study. In a situation where employees are in a need for a job, they need to balance advantages and disadvantages of a potential future workplace. One key aspect in the current study is the use of electronic monitoring at this future workplace. If participants evaluate a monitoring technique as too intrusive, they probably refrain from applying to an organization and evaluate the organization as less attractive. In terms of CPM theory, the intrusiveness of a monitoring procedure depends on the boundaries employees will assign to certain information and employees' individual privacy rules.

In line with CPM theory and with previous findings on electronic monitoring, we argue that monitoring procedures at a potential workplace have different influences on applicants' reactions depending on whether they are framed as supportive or controlling. Information about the monitoring procedures of a hiring organization might be available from media coverage, social media, and persons who already work at the respective organization. CPM theory suggests

that monitoring in a supportive manner might trigger another evaluation of advantages and disadvantages of a potential workplace than monitoring in a controlling manner: Specifically, monitoring in a supportive manner may be seen as more trustful and more in employees' own interest, thus triggering privacy rules that accept information disclosure, whereas applicants may perceive monitoring in a controlling manner to be in the interest of the organization and may believe that it is used for performance and policy observance. If, for example, an applicant fears that they may fail to reach performance targets, monitoring can even be detrimental to building a relationship with one's supervisor. Thus, controlling monitoring should provoke a stricter set of privacy rules, and if applicants believe that they cannot maintain their privacy rules, they will probably fear an invasion of their privacy:

Hypothesis 1: Applicants fear less invasion of their privacy when applying to a company with supportive monitoring procedures than in a company with a controlling monitoring procedure.

Organizational attractiveness is a common measure of applicant reactions (Highhouse et al., 2003), and privacy violations are negatively associated with a hiring organization's attractiveness (Ababneh & Al-Waqfi, 2016). For example, if applicants believe that they cannot maintain their privacy at the future workplace of the hiring organization, they will be less likely to apply for a vacant position or accept a job offer. Thus, we assume that supportive monitoring is associated with higher organizational attractiveness than controlling monitoring:

Hypothesis 2: Applicants evaluate a company with supportive monitoring procedures as more attractive than a company with controlling monitoring procedures.

In addition to supportive and controlling framed monitoring, we wish to examine reactions to a neutral description of the monitoring measures without any framing in either a supportive or controlling way (neutral frame). However, as it is unclear how people react to such a condition in comparison with the two aforementioned conditions, we refrain from proposing a hypothesis for this condition and formulate the following research questions:

Research Question 1: How does monitoring with a neutral framing influence privacy concerns compared to supportive and controlling monitoring procedures?

Research Question 2: How does monitoring with a neutral framing influence organizational attractiveness compared to supportive and controlling monitoring procedures?

15.3. Trait Competitiveness

CPM theory argues that individuals have certain rules by which information is shared, as well as certain boundaries that indicate the probability that particular information will be disclosed (Petronio, 1991, 2015). According to Petronio (2015), these rules and boundaries can be adapted to different situations and altered depending on previous experiences. Although CPM theory does not explicitly address personality traits, it nonetheless includes the argument that people can have differing privacy behavior due to differing privacy rules and thus implicitly incorporates the possibility of individual differences as moderators.

A personality trait that has been shown to play a significant role in the case of electronic monitoring is competitiveness (Gläser et al., 2017). Trait competitiveness is a stable individual characteristic that describes how much people enjoy competing with others (Brown et al., 1998). In addition, competitiveness is positively associated with risk taking (Buser et al., 2014).

Thus, in terms of CPM theory, individuals with high competitiveness might take more risk in sharing information to build relationships (e.g., with the supervisor) and may accept or promote the transfer of performance information to other people in the same organization. Thus, we assume overall a negative relationship between competitiveness and privacy invasion. However, different purposes of electronic monitoring might interact with trait competitiveness. Because of higher risk taking of highly competitive peoples, they may see controlling purposes as less intimidating and as a way to show their performance at work. This may lead individuals with high trait competitiveness to perceive control purposes as less threatening than individuals with low competitiveness. Due to the absence of risks, supportive purposes might be accepted independently of one's own competitiveness. Research on the relationship between electronic monitoring and competitiveness is scarce, in particular if monitoring is separated into a controlling and a supporting purpose. Thus, we do not formulate a hypothesis on the interaction of competitiveness with the three framing conditions and instead propose the following research question:

Research Question 3: How does trait competitiveness influence applicant reactions to different framings of electronic monitoring?

16. Method

Hypotheses, variables, data collection information, and analyses were registered prior to conducting this study, with the preregistration available at https://aspredicted.org/blind.php?x=jg6kj4. In addition, this paper was written as a reproducible manuscript using R (see Aust & Barth,

2018). All files to reproduce statistical analysis and reports of statistics are available at the Open Science Framework (https://osf.io/8vy74/).

16.1. Participants

In the current study, we surveyed 154 engineering undergraduates who were at the end of their Bachelor studies and would soon apply for jobs. There is a lack of engineers in the German labor market and many engineering students have multiple options to work for various organizations (Attström et al., 2014). As such, this sample allows us to examine the effects of monitoring on a sought-after population of undergraduates. Following Meade & Craig (2012), we excluded two participants who stated that they did not respond to the questionnaire seriously. Although we stated in our preregistration that we would exclude participants who failed to pass control questions, several participants stated that one of the two control questions was phrased ambiguously. Accordingly, and given that the results did not substantially differ when including or excluding those participants who failed the control question, we decided to include all remaining participants ($N = 152$). Participants (18.4% female) had a mean age of $M = 24.34$ ($SD = 3.41$) years. They were in their $M = 5.97$ ($SD = 2.44$) semester of a six-semester Bachelor's degree course.

16.2. Procedure

Participants were first informed about the procedure and purposes of the study, and then completed a paper-and-pencil questionnaire. After answering demographic questions, they completed the items regarding competitiveness. In the next step, the scenario was presented. A

description of an entry-level job-vacancy at a fictitious company called "MobilMaintenance" was given. MobilMaintenance was described as offering services in the aviation industry, namely maintaining private airplanes or as a contractor for firms that are unable to maintain their planes with their existing workforce (see Appendix A for the full scenario).

The description proposed that to become familiar with the maintenance work, job incumbents would wear data glasses that are able to display certain information and to record voice and video so that the maintenance work could be documented. The next part of the description differed depending on the experimental conditions. In the neutral framing condition, it was described that a connection to a supervisor and an experienced mentor is possible. In the controlling framing condition, participants additionally received the following description:

> "The exact recording of the maintenance work makes it possible to derive data on the work performance and quality of the individual employees. This allows the manager to get an idea of the level of performance of the employees. Through direct communication and the connection to the employee's field of vision, the manager or mentor can detect possible errors directly during maintenance."

Participants in the supportive framing condition instead received the following description:

> "The accurate recording of maintenance work makes it possible for employees to retrieve data on their work performance and quality. Based on this data, they can get a timely impression of their opportunities for improvement and development. Through the direct communication and the transfer of the field of vision to the

manager or the mentor, possible questions can be clarified directly during the maintenance and assistance can be given."

After reading the scenarios, participants were asked to complete the items on organizational attractiveness, privacy concerns, manipulation checks and faithful responding to the questions. Finally, participants were thanked for their participation. Participants did not receive any compensation for their participation.

16.3. Measures

All responses to the following measures were given on a scale ranging from 1 (*strongly agree*) to 5 (*strongly disagree*). For all scales, higher numbers correspond to more agreement on this scale. If a participant had more than two missing values on a scale, the scale mean for this participant was not calculated (a full list of items is available from the supplementary material on the OpenScienceFramework web page).

16.3.1. Competitiveness

Trait competitiveness was assessed using five items by Brown et al. (1998) in a German version (Gläser et al., 2017). An example item is: "I enjoy working in situations involving competition with others."

16.3.2. Organizational Attractiveness

We used a German version (Becker et al., 2008) of the Organizational Attractiveness Scale (Highhouse et al., 2003). An example items is: "For me, [MobilMaintenance] would be a good

place to work." We adapted the questions such that they contained the company name in our scenario instead of "this company." Scale means were calculated across all three subscales: general attractiveness, intentions to pursue, and prestige.

16.3.3. Privacy Concerns

Privacy concerns were assessed using the 13 items by Alge (2001). An example items is: "I feel personally invaded by the methods used by [MobilMaintenance] to collect personal information." We adapted the questions to contain the company named in our scenario instead of "my organization."

16.3.4. Manipulation Check

To check manipulation of the scenarios, we asked participants to what degree MobilMaintenance focuses on controlling their employees and on support of their employees. Items were "MobilMaintenance seems to be concerned with developing their employees." and "MobilMaintenance seems to be concerned with controlling their employees." Additionally, two distractor (or filler) items were presented to obscure the purpose of manipulation check items (Kestenbaum & Hammersla, 1976).

16.4. Data Analysis

Means of the three conditions were analyzed using univariate analysis of variance (ANOVA). Generalized omega squared (ω^2_{gen}) is reported as effect size. Differences between individual groups were examined using a Tukey range test.

Table 7
Means, Standard Deviations, Reliabilities, and Correlations

	M	*SD*	1.	2.	3.
1. Trait competitiveness	3.37	0.68	(.69)	.19 [.03, .34]	−.22 [−.37, −.07]
2. Organizational attractiveness	3.36	0.70		(.92)	−.61 [−.70, −.50]
3. Privacy concerns	3.19	0.72			(.89)

Note. $N = 152$. Squared brackets denote a 95% confidence interval. Numbers in parentheses indicate Cronbach's α.

All analyses were conducted using R (Version 3.6.3) and statistical estimates were reported using the *easystats* ecosystem (Lüdecke et al., 2019). For exploratory purposes, a mediation analysis was conducted using the *mediation* package (Version 4.5.0; Tingley et al., 2014).

17. Results

Table 7 presents descriptive statistics of the measured scales.

17.1. Manipulation Checks

Our scenario was presented to the participants in three different conditions: (a) a neutral framing, (b) a controlling framing, and (c) a supportive framing of the monitoring procedures. To check the manipulation of our scenario, we tested whether responses to the item "Mobil-Maintenance seems to be concerned with employee development" differed between the three conditions. We expected participants in the supportive framing condition to show higher values than participants in the controlling framing condition. We had no specific prior assumptions concerning the neutral framing condition. Using an ANOVA, we found a difference between the three groups, $F(2, 148) = 3.85$, $p = .024$, $\omega^2_{gen} = 0.04$, 95% CI $[0.00, 0.11]$. Post-hoc comparisons revealed a difference between the two experimental conditions, $\Delta M = -0.47$, 95% CI $[-0.89, -0.05]$, $p = .024$. The neutral framing did not differ from the supportive, $\Delta M = -0.36$, 95% CI $[-0.78, 0.06]$, $p = .109$, or from the controlling framing, $\Delta M = -0.11$, 95% CI $[-0.53, 0.31]$, $p = .811$. Thus, participants rated more employee development in the supportive condition than in the controlling condition, and the neutral condition lay between these conditions.

Table 8

Means (and Standard Deviations) of the Manipulation Check Items and Dependent Variables

	Supportive framing ($n = 50$)	Neutral framing ($n = 51$)	Controlling framing ($n = 50$)	ω^2_{gen} [95% CI]
Manipulation check: Development	3.92 (0.92)	3.56 (0.88)	3.44 (0.86)	.04* [.00, .11]
Manipulation check: Control	4.06 (0.82)	4.25 (0.72)	4.38 (0.75)	.02 [.00, .07]
Competitiveness	3.39 (0.81)	3.40 (0.61)	3.34 (0.63)	−.01 [.00, .00]
Organizational attractiveness	3.49 (0.64)	3.43 (0.62)	3.16 (0.79)	.03* [.00, .10]
Privacy concerns	2.98 (0.75)	3.17 (0.64)	3.42 (0.73)	.05* [.00, .12]

Note. * indicates a significant group difference ($p < .05$). Manipulation check: Control is significant if excluding one outlier.

Likewise, we examined differences in the responses to the item "MobilMaintenance seems to be concerned with employee monitoring." Again, we had no specific prior assumptions regarding the neutral framing but expected higher scores in the controlling framing condition than in the supportive framing condition on this item. There was no difference between the three experimental groups, $F(2, 149) = 2.42$, $p = .093$, $\omega^2_{gen} = 0.02$, 95% CI $[0.00, 0.07]$. By excluding one outlier, the three groups differed, $F(2, 148) = 3.31$, $p = .039$, $\omega^2_{gen} = 0.03$, 95% CI $[0.00, 0.09]$. This was driven by a difference between the supportive and controlling framing condition, $\Delta M = 0.38$, 95% CI $[0.03, 0.73]$, $p = .030$. as there was no difference of the neutral condition to the supportive condition, $\Delta M = 0.19$, 95% CI $[-0.15, 0.54]$, $p = .383$, nor to the controlling condition, $\Delta M = 0.19$, 95% CI $[-0.16, 0.53]$, $p = .421$. See Table 8 for scale means (and standard deviations) of the three conditions.

17.2. Hypothesis-Testing

Hypothesis 1 stated that participants in the controlling framing condition would express higher privacy concerns than participants in the supportive framing condition. In a first step, we used an omnibus test (ANOVA) to test for differences between the three experimental conditions. The three conditions differed, $F(2, 149) = 4.76$, $p = .010$, $\omega^2_{gen} = 0.05$, 95% CI $[0.00, 0.12]$, and post-hoc tests indicated a difference between the controlling framing condition and the supportive framing condition, $\Delta M = 0.43$, 95% CI $[0.10, 0.76]$, $p = .007$. Thus, we found support for Hypothesis 1. However, the controlling framing condition did not differ from the neutral framing condition, $\Delta M = 0.24$, 95% CI $[-0.09, 0.57]$, $p = .195$. Likewise, the supportive framing condition did not differ from the neutral framing condition, $\Delta M = 0.19$, 95% CI $[-0.14, 0.52]$,

$p = .371$. Regarding Research Question 1, the neutral framing condition did not influence privacy concerns in another way than the two experimental conditions. See Table 8 for scale means (and standard deviations) of the three conditions.

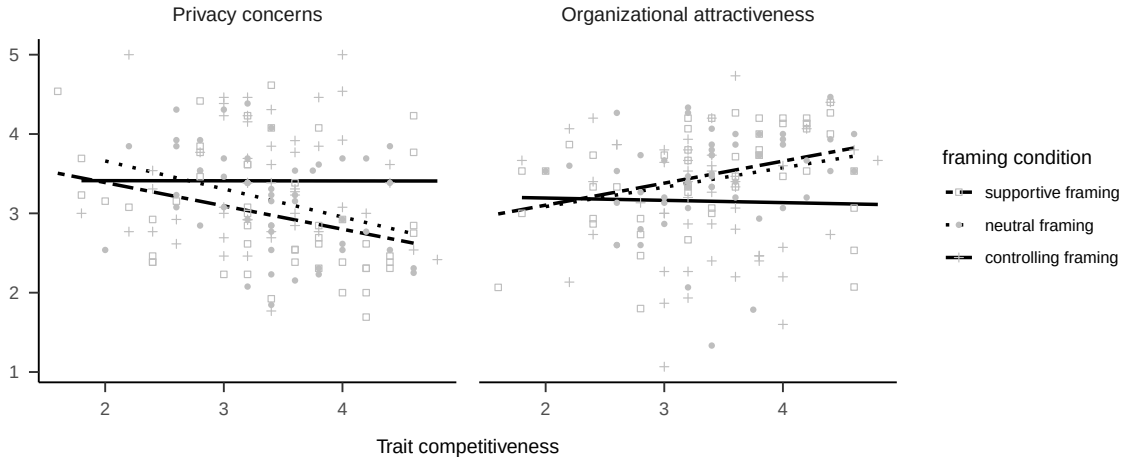
Hypothesis 2, which stated that organizational attractiveness would be higher in the supportive framing condition than in the controlling framing condition, was tested using a similar procedure. An ANOVA yielded differences in organizational attractiveness between the three experimental conditions, $F(2, 149) = 3.43$, $p = .035$, $\omega^2_{gen} = 0.03$, 95% CI $[0.00, 0.10]$. The controlling framing condition differed from the supportive framing condition, $\Delta M = -0.34$, 95% CI $[-0.66, -0.01]$, $p = .040$. Therefore, Hypothesis 2 was supported. Furthermore, we found no difference between the controlling framing condition and the neutral framing condition, $\Delta M = -0.27$, 95% CI $[-0.59, 0.05]$, $p = .114$. Likewise, the supportive framing condition did not differ from the neutral framing condition, $\Delta M = -0.06$, 95% CI $[-0.39, 0.26]$, $p = .889$. Thus, the neutral framing condition did not differ in organizational attractiveness from the two experimental conditions (Research Question 2).

17.3. Competitiveness

Figure 8 depicts the interactions with competitiveness. To test the interaction of our three conditions with trait competitiveness, we estimated a regression model predicting privacy concerns with condition and competitiveness and their interaction. To test the interaction effect, we extended the regression analysis by one simple slope analysis (Preacher et al., 2006). In the simple slope analysis, the strength of the relationship (slope) between the independent variable and the dependent variable was calculated for every condition in our study. These slopes can

Figure 8

Interaction of Privacy Concerns and Organizational Attractiveness with Trait Competitiveness



Note. Each regression lines depicts one framing condition.

be tested against zero and interpreted. This approach offers a far easier interpretation than a traditional interpretation of an interaction between a continuous variable and a variable with three levels (Preacher et al., 2006). The simple slope analysis yielded a significant relationship between privacy concerns and competitiveness in the neutral framing condition of $b = -0.33$, 95% CI $[-0.63, -0.04]$, $t(146) = -2.22$, $p = .028$, and in the supportive framing condition of $b = -0.28$, 95% CI $[-0.52, -0.03]$, $t(146) = -2.25$, $p = .026$. However, there was no significant relationship in the controlling framing condition, $b = 0.00$, 95% CI $[-0.35, 0.35]$, $t(146) = -0.01$, $p = .994$.

The same analysis was conducted using organizational attractiveness as dependent variable, revealing a negative relationship between privacy concerns and competitiveness in the neutral framing condition of $b = 0.24$, 95% CI $[0.01, 0.47]$, $t(146) = 2.05$, $p = .043$, and in the supportive framing condition of $b = 0.27$, 95% CI $[0.02, 0.53]$, $t(146) = 2.10$, $p = .037$.

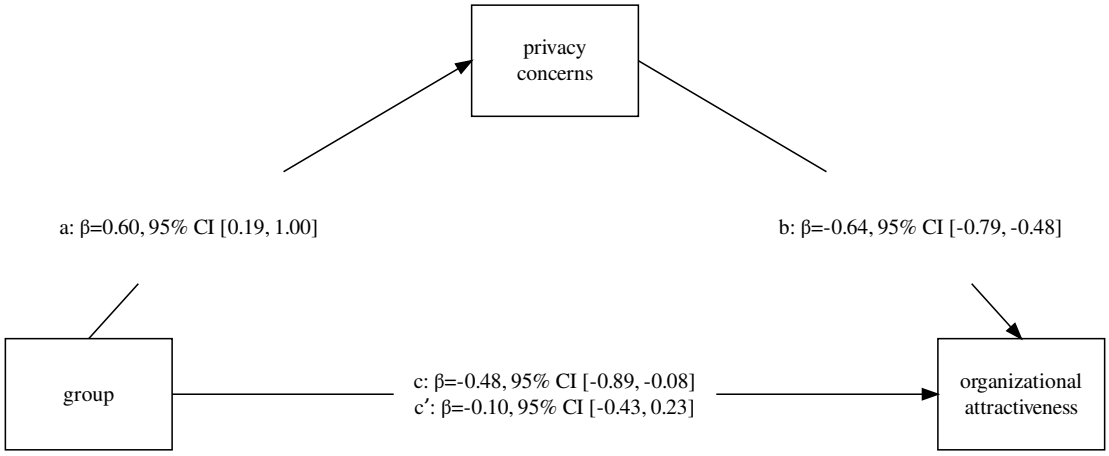
There was no relationship in the controlling framing condition, $b = -0.03$, 95% CI $[-0.40, 0.34]$, $t(146) = -0.15$, $p = .879$. To conclude, we found a positive relationship of competitiveness with organizational attractiveness and a negative relationship of competitiveness with privacy concerns in the neutral and supportive framing condition. These relationships did not emerge in the controlling framing condition (Research Question 3).

17.4. Exploratory Analyses

Although not hypothesized prior to the experiment, we conducted a mediation analysis to investigate whether the negative impact of the controlling framing condition on organizational attractiveness was likely mediated by privacy concerns. To ease the interpretation of results, we used only the supportive and controlling framing condition in this analysis. Before introducing the mediated path, the experimental condition was negatively associated with organizational attractiveness, $\beta = -0.48$, 95% CI $[-0.89, -0.08]$, $p = .020$, insofar as that participants in the controlling framing condition reported lower organizational attractiveness than those in the supportive framing condition.

After including the mediated path using privacy concerns as the mediator, the direct effect of the condition on organizational attractiveness was no longer significant, $\beta = -0.10$, 95% CI $[-0.43, 0.23]$, $p = .540$, indicating a full mediation. The mediation path showed that the controlling framing condition was positively associated with privacy concerns, $\beta = 0.60$, 95% CI $[0.19, 1.00]$, $p = .004$, and privacy concerns were negatively associated with organizational attractiveness, $\beta = -0.64$, 95% CI $[-0.79, -0.48]$, $p < .001$. A bootstrapped mediation analysis (number of bootstrap samples = 5000) indicated that the direct path was no longer significant,

Figure 9
Exploratory Mediation Model



Note. Paths *a* and *b* denote the indirect path, *c* the direct path before entering the indirect path, and *c'* the direct path after entering the indirect path.

-0.10, 95% CI $[-0.41, 0.21]$, $p = .514$, whereas there was a significant effect for the indirect path, 0.31, 95% CI $[0.06, 0.58]$, $p = .019$ (total effect: 0.21, 95% CI $[-0.22, 0.63]$, $p = .328$). See Figure 9 for a depiction of the mediation model.

18. Discussion

Based on communication privacy management theory (CPM; Petronio, 2015), this paper examined the effect of a supportive and a controlling purpose of electronic monitoring at a potential workplace on applicant reactions. We found that applicants evaluate an organization as less attractive if this organization monitors their employees in a controlling manner if the organization monitors their employees in a supporting manner. Similarly, privacy concerns were higher if monitoring is used in a controlling manner compared to a supportive manner. Thus, the current study extended previous findings (Stanton & Lin, 2003) by revealing that monitoring has

different implications for applicant reactions depending on its purpose. With respect to the CPM theory, these findings imply that this theory is not only capable of explaining privacy behavior in interpersonal relationships (Petronio, 2015) and in direct employee-employer relationships (Allen et al., 2007) but can be extended to decisions on a probable future workplace as well. In the current setting, CPM theory implies that different purposes of electronic monitoring change the outcome of comparing benefits and drawbacks of working under electronic control.

However, the findings of the current study go beyond this. In contrast to the neutral and supportive framing condition, we found no relationship of trait competitiveness with privacy concerns and organizational attractiveness in the controlling framing condition. Thus, highly competitive individuals evaluate monitoring procedures as less threatening, but only if they are non-controlling and in their interest. In addition, the negative effect of controlling monitoring purposes on organizational attractiveness was fully mediated by privacy concerns. Therefore, privacy concerns or violations that are known to applicants may have a severe impact on the decision to apply for a job and to accept a job offer.

18.1. Research and Practical Implications

Our study has several theoretical and practical implications. First, the current findings support the notion that CPM theory is relevant for recruitment procedures in order to explain the behavior of applicants in response to monitoring procedures at a potential future workplace. However, we argue that the implications of individual differences warrant further research which could provide the opportunity to clarify how people with certain characteristics shape their privacy rules as well as the permeability of boundaries that define the probability of

information sharing. Second, the underlying mechanisms of trait competitiveness and its impact on the reaction to monitoring procedures need to be addressed. In the case of the current study, multiple mechanisms appear to be possible. For example, highly competitive individuals might see monitoring procedures as an opportunity to demonstrate their performance, which would be in line with the definition of competitiveness. However, it is also possible that highly competitive individuals are less intimidated by the social (or remote) presence of their supervisor. Whereas the former explanation places an emphasis on competition per se, the latter focuses on social facilitation (Aiello & Kolb, 1995; Griffith, 1993).

In the context of electronic monitoring research, the current study has shown that the use and implementation of monitoring procedures does not only affect employees and the organization, but also potential candidates for vacant positions as well. Ravid et al. (2019) stressed the importance of monitoring purposes and stated that further research is needed in this area. Answering this call for research, the current study showed that not only monitoring procedures are matter for applicants but also their purposes. This emphasizes the relevance of communicating monitoring purposes to employees and ensuring that people understand which data are collected and how they are used.

In addition, the findings of the current study show that decision-makers in organizations should keep in mind how electronic monitoring of their employees is perceived in the public realm. If applicants feel that monitoring procedures at a particular organization would not be in their interest, they may refrain from applying to this organization. This is especially crucial for highly skilled workers (which was the case in our sample) and in times of a shortage of skilled workers (Attström et al., 2014; McDonnell, 2011). Moreover, supervisors should

change their leadership style (especially in regard to employee monitoring) in accordance with the competitiveness of their subordinates. Nonetheless, practitioners should keep in mind that electronic monitoring has not only an impact on potential applicants, but also on current employees as well (Ravid et al., 2019). Thus, the actual handling of monitoring and its data is a hint to the prevailing organizational culture and might influence the decision to stay in an organization.

18.2. Limitations

When interpreting the present findings, it should be kept in mind that the study was based on a scenario. Although scenarios are common in electronic monitoring research (e.g., McNall & Stanton, 2011) and allow experimental research (to test causality), the similarity between applicant behavior in scenarios and in real application situations remains to be tested. In addition, our data stem from a German sample, and applicant behavior may be different in other countries due to different privacy standards and legislation that allow for more (or even less) invasive monitoring procedures (Lasprogata et al., 2004). Thus, in terms of CPM theory, privacy rules and information boundaries may differ in other countries compared to Germany. Beyond that, our scenario was based in the context of a high-reliability organization (Sutcliffe, 2011) where the decision to implement electronic monitoring might be seen as more acceptable than in non-high-reliability-organizations. Nevertheless, it should be noted that our results regarding controlling monitoring are comparable to the findings reported by Stanton & Lin (2003) in the USA and a non-high-reliability-organizations context, suggesting that our findings should also hold for other countries and situations.

Finally, we would like to point at issues with our manipulation check based on the discussion in Hauser et al. (2018). Like other scales and items, manipulation checks have a certain measurement error (in terms of classical test theory; Novick, 1966). Our manipulation check consists of only two items; thus, it is probably quite strongly affected by measurement error. Another issue is the order of presentation of manipulation checks and dependent variables. Our manipulation checks were presented after measuring the dependent variables. This has the advantage that the dependent variables are unaffected by any reactions that our manipulation checks might provoke but is overly conservative because of the late presentation (Hauser et al., 2018).

Based on the limitations and findings of the current study, we argue that electronic monitoring at the workplace has implications on an organizations' attractiveness for applicants. Further research is warranted to get better insights into effects of the current findings on real world applicants. For example, subsequent studies could estimate how severe effects are for organizations that are well known to implement invasive monitoring techniques (like Amazon; Cattero & D'Onofrio, 2018). Different samples (like professions that are understaffed or not) and organization types could be considered. In addition, further research is needed to clarify the underlying mechanisms of competitiveness on applicant reactions.

Part V.

Study 4: Impact of Electronic Monitoring on Employees: A Meta-Analysis

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19. Introduction

Electronic monitoring of employees is a strongly debated topic since the 1980's (e.g., Irving et al., 1986; Tamuz, 1987). What is more, advances in technology led over the years to cheaper, more efficient, and easier to implement monitoring systems that resulted in higher numbers of electronically monitored employees (Alge & Hansen, 2013; Ravid et al., 2019). For example, in algorithmic management an algorithm distributes tasks, regulates work processes, and controls performance. This management style is more and more widespread in technology corporations and cannot work without collecting data on employees' behavior (Galière, 2020; Möhlmann & Zalmanson, 2017). This way, monitoring is present in a greater intensity and extent than previously seen.

Whereas proponents of electronic monitoring stress advantages like fair performance evaluation, improved security of employees, and higher accountability, opponents emphasize disadvantages like reduced employees' well-being (Ball, 2010; Ravid et al., 2019; Sewell & Barker, 2006; Yost et al., 2018). Research on electronic monitoring reflects these different stances: Some studies find detrimental effects not only on employees (Ball & Margulis, 2011; Cascio & Montealegre, 2016; Ravid et al., 2019; Stanton, 2000a; Yost et al., 2018), but also on supervisors and organizations (Reilly, 2010; Yost et al., 2018); according to other studies, electronic monitoring increases well-being, performance, and job satisfaction, especially if used in a developmental and supporting manner (Ravid et al., 2019; Wells et al., 2007). The increasing use and intensity as well as these different effects of electronic monitoring make a quantitative and systematic research synthesis desirable.

So far, there have been two systematic meta-analyses on electronic monitoring and its impact on employees (Backhaus, 2019; Carroll, 2008) and both have major limitations. The meta-analysis of Carroll (2008) was only concerned with feedback interventions and does not differentiate between studies with and without electronic monitoring. Although Backhaus (2019) focused specifically on electronic monitoring, he did not investigate moderators except of study design. In addition, many studies in this field report multiple effect sizes for the same outcome what makes it necessary to reflect this in the analysis. Thus, the current meta-analysis updates and extends the previous meta-analysis.

20. Background

20.1. Definition and Use of Electronic Monitoring

One of the first studies on electronic monitoring defined it "as the use of electronic instruments or devices such as audio, video, and computer systems to collect, store, analyze, and report individual or group actions or performance" (Nebeker & Tatum, 1993, p. 509). Though technical advances have tremendously changed the methods how employees can be monitored (Cascio & Montealegre, 2016; Khakurel et al., 2018) since Nebeker and Tatum's (1993) study, the purpose and target have not changed: employees' performance and behavior are monitored to maintain organizations' performance, prevent theft and legal liabilities, and foster security or development of employees (Ball, 2010; Ravid et al., 2019). In line with these reasons, previous research has often seen monitoring either as a stress inducing factor for employees or a possibility to ensure security and performance of employees by organizations (Sewell & Barker, 2006).

The latest representative survey on the use of electronic monitoring is from the American Management Association (2007) and estimates that about half of the surveyed companies in the USA are electronically monitoring their employees. Since then, the use of ubiquitous computing has proliferated. Ubiquitous computing describes the application of computing devices in any form and location. Examples are wearables and IoT (internet of things) devices. Wearables are small devices worn by individuals that are capable of collecting a large amount of data about their wearer (see also Khakurel et al., 2018). IoT describes a concept to connect a vast number of devices sharing the data of their sensors. Furthermore, advances in big data analysis, and reduced costs has further increased the use of monitoring systems (Cascio & Montealegre, 2016; Ghislieri et al., 2018; Schwarzmüller et al., 2018). Compared to traditional human monitoring, electronic monitoring offers the possibility to continuously and unobtrusively collect and store data on employees' behavior (Ravid et al., 2019). For example, modern workforce management systems can analyze vast amounts of data to identify how much time employees spent in meetings or on the phone and which employees are influential to others (e.g., Microsoft, 2019).

20.2. Effects of Electronic Monitoring on Employees

Previous studies addressed the impact of electronic monitoring on an array of dependent variables like work satisfaction, perceived stress, privacy violation, performance, perceived autonomy, trust, social support, and alike (Alge & Hansen, 2013; Backhaus, 2019; Ravid et al., 2019; Stanton, 2000a). Thus, it is possible to examine a huge number of effects which electronic monitoring may have on employees. At this point, we focus our efforts on job satisfaction, stress, and performance because there is a large number of studies that took these variables into

account, whereas other variables were less often addressed (Backhaus, 2019). In addition, these other possible dependent variables show a substantial correlation with our main outcomes. For example, a meta-analysis found high relationships between job satisfaction, justice / fairness perceptions, and citizenship behaviors (Fassina et al., 2008). In addition, the three chosen variables show distinct characteristics: job satisfaction can show the impact of electronic monitoring on employees' work attitudes, stress can show the impact on employees' well-being, and performance is a major justification for the implementation of electronic monitoring.

20.2.1. Job Satisfaction and Stress

There are different justifications to monitor employees electronically. Ball (2010) states three different reasons: maintaining productivity and resources of an organization, protection of corporate interests and secrets, and protection from legal liabilities. Some researchers extend this list of purposes by monitoring techniques that are targeted employees' security and development (Ravid et al., 2019; Sewell & Barker, 2006). For example, a location sensing device can be used to track employees during their work time, but can also solely be used to locate employees after an accident. Taking these different purposes and their frequency into account (see, American Management Association, 2007; Deutscher Gewerkschafts Bund, 2016; Holland et al., 2015, for older data on monitoring use), most monitoring implementations are targeted at employees' behavior to ensure productivity and corporate interests. These organizational interests might not be completely in line with employees' interests (Frey, 1993). This way, electronic monitoring might not only affect employees' performance but also the perception of job satisfaction and stress.

Job satisfaction describes the contentedness of an individual with their job or certain facets of their job (Neuberger et al., 1978). There are different theoretical justifications why electronic monitoring may affect employees' job satisfaction. For example, Holman et al. (2002) argues from a stress stance that the intensity of monitoring will reduce job satisfaction due to higher perceived work pressure. Others propose a relationship with work design (Parker, 2014): Working procedures that have less variety and complexity are more easily to observe and monitor but reduce employees' autonomy (Carayon, 1994; Gagné & Bhave, 2011; Martin et al., 2016). This in turn reduces job satisfaction. Empirically, several studies found a negative relationship of electronic monitoring with job satisfaction (cf., Alge & Hansen, 2013; Backhaus, 2019; Ravid et al., 2019). Based on these theoretical arguments and empirical findings, we propose the following hypotheses:

Hypothesis 1: There is a negative relationship between electronic monitoring and employees' job satisfaction

Compared to job satisfaction, similar conclusions can be drawn to perceived stress of employees. According to Karasek (1979), perceived stress is an energized state caused by work demands, conflicts, and stress resulting from other life domains. If this energy cannot be released due to low autonomy it manifests into strain and harms the individual in the long-term. Again, if monitoring reduces the autonomy of employees and emphasizes performance measures, it will probably increase stress. This relationship has been found empirically (cf., Alge & Hansen, 2013; Backhaus, 2019; Ravid et al., 2019). Thus, we propose the following hypothesis:

Hypothesis 2: There is a positive relationship between electronic monitoring and employees' perceived stress.

In addition to these main effects, there are plausible moderators that may alter the relationship of monitoring with job satisfaction and stress. As Ravid et al. (2019) pointed out, monitoring "is not a psychological construct but a method" (Ravid et al., 2019, p. 102) and its effects may thus differ according to its characteristics. One of these characteristics is the purpose that is communicated to employees why they are monitored. So far, the most attention in monitoring research gained performance maintenance and employee development (DelVecchio et al., 2013; Ravid et al., 2019; Wells et al., 2007). Whereas performance maintenance is in line with organizational interests, employee development is in line with employees' interests. For example, monitoring the number of pieces of blue-collar workers might have the reason to maintain employees' performance by the management, but could also solely provide feedback to employees. The influence of purpose on the relationship of monitoring with job satisfaction and stress can be explained using attributional theories (e.g., Nishii et al., 2008). If employees perceive electronic monitoring in their interests, the impact of monitoring on stress and job satisfaction should be less severe than they perceive monitoring only in organizational interests. Thus, we propose the following hypotheses:

Hypothesis 3: There is a stronger negative relationship of electronic monitoring with job satisfaction if monitoring is in organizational interests than in employees' interests.

Hypothesis 4: There is a stronger positive relationship of electronic monitoring with stress if monitoring is in organizational interests than in employees' interests.

Beyond the purpose of monitoring, Nebeker & Tatum (1993) and Gosnell et al. (2020) found evidence for the relevance of performance targets in monitoring research. Despite its impact on productivity, Nebeker & Tatum (1993) argue that performance targets put employee

in a threat that they may fail these targets. A failed performance target might be seen as a defeat by employees. Thus, we propose that performance targets increase the negative impacts of electronic monitoring:

Hypothesis 5: There is a stronger negative relationship of electronic monitoring with job satisfaction if monitoring is used together with performance targets than without performance targets.

Hypothesis 6: There is a stronger positive relationship of electronic monitoring with stress if monitoring is used together with performance targets than without performance targets.

20.2.2. Performance

A key justification for the use of electronic monitoring is the observation and maintenance of organizational performance and thus employees' performance. Regarding performance, different theories come to different conclusions about the effect of monitoring on employees' performance. Following a stress perspective, electronic monitoring reduces performance in the long term due to the strain an individual experiences (Karasek, 1979). In contrast, agency theory (Eisenhardt, 1989) predicts higher performance in monitored employees than in non-monitored employees (Mahaney & Lederer, 2011). According to agency theory, the agent (or the employee) has a knowledge advantage over the principal (or the supervisor), because the agent knows which performance they has achieved and is able to achieve. Monitoring balances this advantage by conveying these information to the principal as well. This way, the principal can act according to the agents' performance and maintain performance (see Frey, 1993, for a critique on this simplification). Indeed, research has found a positive impact of electronic

monitoring (e.g., Nebeker & Tatum, 1993; Huston et al., 1993) as well as a negative impact of monitoring on performance (e.g.; Aiello & Kolb, 1995; Becker & Marique, 2014). To summarize, there are different propositions regarding performance though the previous meta-analysis by Backhaus (2019) found a positive relationship between electronic monitoring and performance. We follow this finding and propose a positive relationship between these two variables:

Hypothesis 7: There is a positive relationship between electronic monitoring and employees' performance.

20.3. Study Setting as a Moderator

A long-debated topic in social sciences is the generalizability of results in laboratory studies to real world settings (e.g., Mitchell, 2012). This issue is prevalent in the field of electronic monitoring research as well (Ravid et al., 2019). For example, Becker & Marique (2014) asked undergraduates to put wooden pegs in a box for five minutes. Whether the findings of this study are transferable to a long-term employment relationship while being monitored is questionable. However, even field studies in monitoring research were most likely concentrated in call-centers where work is highly standardized and monitored (Ravid et al., 2019). To conclude, it is possible that laboratory studies report different effect sizes than field studies due to short-term effects and missing relevance for the future working conditions. At the contrary, several meta-analyses on this topic suggest that laboratory studies are comparable to studies in the field especially in work and organizational psychology and if workplace characteristics are examined (Mitchell, 2012; Vanhove & Harms, 2015). Thus, there is conflicting evidence regarding the generalizability

of laboratory studies to field settings. We propose the following research question without any assumption of the direction of an effect:

Research Question 1: Do laboratory studies and field studies differ in the magnitude of their effect size?

21. Method

Hypotheses, variables, data collection information, and analyses were registered prior to conducting this study. In addition, this paper was written as a reproducible manuscript using R (see Aust & Barth, 2018). All files to reproduce statistical analysis and reports of statistics will be publicly available. The preregistration and the analysis files are available at the Open Science Framework (https://osf.io/q57v8/?view_only=32b5a6d8e4db4d78a611849459bcf06c). The preregistration states more moderation hypotheses than reported in this study, but we could not investigate these hypotheses as too few studies differ in these moderators.

21.1. Literature Search

To identify published articles, we conducted an extensive literature search using several databases and sources. We gathered articles from the Web of Science database and the EBSCO Information Services. The following databases were included in the search on EBSCO Information Services: Academic Search Complete, APA PsycArticles, APA PsycInfo, and Psyndex. In contrast to our preregistration, we decided to widen our literature search. Thus, we also included results from ACM Digital Library, IEEExplore, and AISeLibrary. In addition, we added the following databases to the EBSCO Information Services: ERIC, EconLit, OpenDissertations,

Table 9
Used Search Terms to Gather Articles From Databases

work	electronic	monitoring
job	performance	surveillance
employ	computer	observation
occupation	smartphone	
	smartwatch	
	tablet	
	wearables	
	iot	

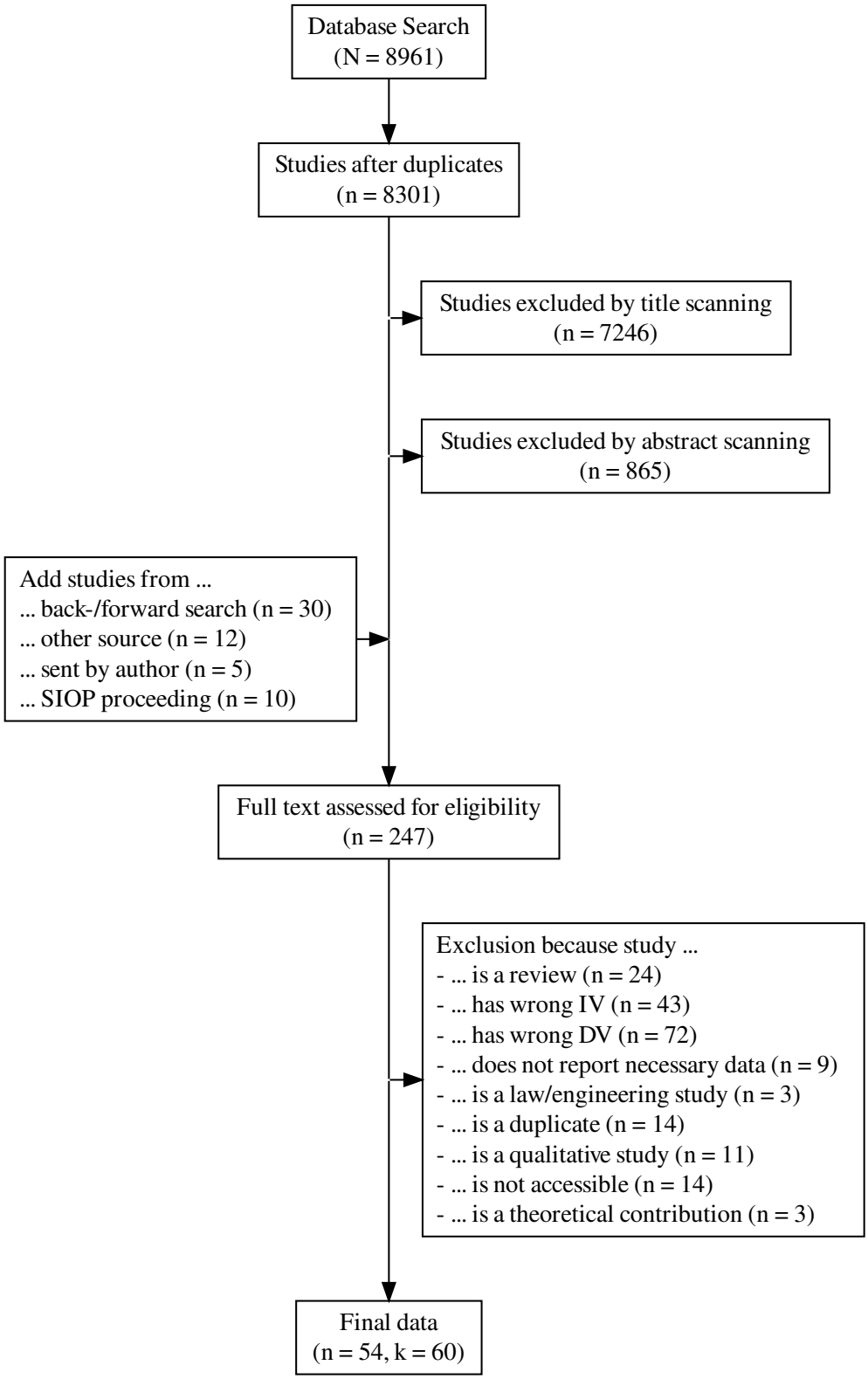
Note. Terms in columns were linked with "or" operators, terms between columns were linked with "and" operators. See supplemental material on the Open Science Framework for more information.

and Business Source Premier. In these databases, combinations and alterations of words related to work and electronic monitoring were used as search terms (see Table 9 for more details). However, search terms varied slightly between the databases due to different features (see the supplemental material on the Open Science Framework for the corresponding search terms to each database). We conducted the search on February, 3th and 4th, 2021.

Initially, we gathered 8961 studies. After removing duplicates (8301 studies remained), we applied our inclusion and exclusion criteria (see below) first to titles and then to abstracts (190 studies remained). After that, we conducted a backward and forward search on the remaining articles and checked SIOP proceedings. In addition, we reached out to researchers who published more than two articles in the field to ask for overlooked or unpublished studies. Overall, we asked 47 researchers and got replies from 16 researchers. Finally, 247 studies were eligible for full text assessment. Found, included, and excluded studies are depicted in Figure 10.

Figure 10

Flowchart Showing The Process of Identifying and Selecting Studies



21.2. Inclusion and Exclusion Criteria

To be included in our current meta-analysis, studies had to meet the following criteria: They (a) had to be an empirical study, (b) must be written in English or German language, (c) had to implement electronically or computer-based monitoring in a working context, and (d) had to contain at least one of the relevant dependent variables (job satisfaction, stress, and/or performance). In addition, studies had to be full-text accessible. Studies were excluded if they were a literature review, merely stated ethical or moral perspectives, monitoring was realized by direct/personal monitoring without electronic tools, or none of the relevant dependent variables were present (see also Figure 10). When preregistering the current study, we were not aware of the number of studies that are concerned with electronic monitoring of hand hygiene in a clinical context (e.g., Iversen et al., 2020). Although these studies fitted the inclusion criteria, we excluded them because hand hygiene is a single, well-defined behavior compared to performance that consists of multiple facets.

21.3. Final Data Set and Coding of Studies

All studies that were deemed eligible for full text assessment were assessed by two raters (inter-rater reliability = 94.4%). All coders used the same coding table, which ensured an identical coding procedure. Beforehand, coders were instructed to make sure that all coding variables were understood and all coders had a common ground of coding variables. All independent, dependent, and moderator variables were coded. If the studies did not report necessary details, we reached to the authors to obtain them. In five cases it was not possible to obtain standard deviations for reported means. We imputed these standard deviations using a similar approach

to Kwon & Reis (2015). We predicted the missing standard deviations by a Bayesian generalized linear model (assuming a Gamma-distribution of the standard deviations) from the corresponding means ($R^2 = 0.50$, 95% CI [0.35, 0.66]). Due to the low number of missing values and for the sake of easier reporting, we refrain from reporting results of a multiple imputation instead reporting results of a single imputation. However, results did not substantially change on subsequent runs of the imputation model or with multiple imputation.

To be included, studies had to manipulate the presence of electronic monitoring (experimental design), compare groups / organizations with and without monitoring (quasi-experimental design), or report a self-report of an electronic monitoring measure (correlative design). In the case of a correlative design, we excluded studies which only reported measures like perceived privacy invasion (e.g., Yost et al., 2018), satisfaction with performance monitoring (e.g., McNall & Stanton, 2009), or certain characteristics like monitoring purpose (e.g., DelVecchio et al., 2013). Beyond that, studies had to report one of our three dependent variables: job satisfaction, stress, and performance. Job satisfaction was always a self-reported measure and included similar constructs like task satisfaction (e.g., Nebeker & Tatum, 1993) or facets like intrinsic/extrinsic job satisfaction (e.g., Holman et al., 2002). Stress was most of the times a self-report measure and included constructs like burnout (e.g., Adams & Mastracci, 2019), work pressure (e.g., Carayon, 1994), exhaustion (e.g., Castanheira & Chambel, 2010), and cynicism (e.g., Castanheira & Chambel, 2010). We included also psycho-physiological measures like pulse rate if this was used as a measure of stress (e.g., Henderson et al., 1998). Performance was most of time experimentally measured (like speed or corrected entries; e.g., Bartels & Nordstrom, 2012) or provided by ratings of call-center agents (e.g., Story & Castanheira, 2020).

In addition to the independent and dependent variables, potential moderators were also coded. Monitoring purpose included a developmental purpose (monitoring was perceived as beneficial for the employee), a performance maintenance purpose (monitoring was perceived as beneficial for the organization), and no purpose (no purpose was given for the monitoring procedure). We also coded whether studies were conducted in a laboratory setting or a field setting. In almost all cases, laboratory studies had an experimental design and field studies had a quasi-experimental or correlative design. However, there were three exceptions: Galinsky et al. (1995), Gosnell et al. (2020), and Nebeker & Tatum (1993) conducted an experimental study in a field setting. These three studies were treated as field studies. The moderator goal setting reflected whether participants in a study had to reach a certain performance target.

At this stage, studies were again dropped if they did not meet the inclusion criteria or met exclusion criteria. The final data set consisted of 54 studies with 60 independent samples, and a total of 224 effect sizes. Overall, each independent sample reported 3.73 ($SD = 3.56$, Median = 3) effect sizes for 1.37 ($SD = 0.55$, Median = 1) dependent variables.

21.4. Data Analysis

All analyses were conducted in R (Version 3.6.3, R Core Team, 2015) using the *metafor* package (Version 3.0.2, Viechtbauer, 2010). To convert various effect sizes to the Pearson correlation coefficient, we used the *esc* package (Version 0.5.1, Lüdecke, 2019). Effect sizes were combined using the Fisher Z-transformation and transformed back to report them on the raw correlation scale.

Several coded studies in our meta-analysis did provide several estimates for the same dependent variable (job satisfaction, stress, and performance) or even for multiple dependent variables (see Huston et al., 1993, for example). To take these dependencies between effect sizes coming from the same study into account, we estimated a random-effects model with multiple dependent variables (Viechtbauer, 2010). This allowed us to analyze all studies and all dependent variables within a single analysis. More specific, we extended the regular random effects model (that has two levels) to a three-level model in which effect sizes were nested in dependent variables which in turn where nested in independent samples. Therefore, we estimated for each dependent variable in each independent sample a true effect. This way, we were able to estimate the variance of the effect sizes which originates from differences between studies (Viechtbauer, 2010). For this purpose, we report τ, an estimator for the standard deviation of the true effects between studies. τ does not differentiate between random or systematic sources of variance. Accordingly, moderators can be used to explain systematic differences between studies and reduce τ. To depict this influence, we report how much variance (in percent) a moderator can explain in between-study variance. For every moderator, a single meta-regression model was estimated.

However, dependencies between effect sizes make it necessary to know the covariance between dependent variables within studies (Kalaian & Raudenbush, 1996). Unfortunately, these covariances are often not available like in our case (Noortgate et al., 2012). To circumvent this issue, we applied two distinct approaches. First, we examined the correlations between job satisfaction, performance, and stress on *metaBUS* (date of query: March, 24th, 2021; Bosco et al., 2019). metaBus is a research synthesis platform to conduct rudimentary, instant meta-

analysis on a large set of collected research articles (see also https://metabus.org/). Job satisfaction (metaBUS ID: 20072) correlated with stress (metaBUS ID: 20432) to $r = -.29$ and with performance (metaBUS ID: 40055) to $r = .19$. Stress correlated with performance to $r = .01$. We used this information to impute the missing covariances between effect sizes within the same independent sample. For effect sizes of the same dependent variable, we assumed a correlation of $r = .50$ (cf., Scammacca et al., 2014). We assumed no correlation between effect sizes of different samples. To impute these information, the *clubSandwich* R package was used (Version 0.5.3, Pustejovsky, 2021). Finally, we used a cluster robust estimation of the variance-covariance matrix to report confidence intervals (Viechtbauer, 2010). This is an additional method to take dependency between effect sizes into account. Please note that the reported results did not differ substantially from results without an imputed covariance matrix and without a robust estimation. To show possible biases in the main meta-analytical results, we created a funnel plot (see Figure 12).

22. Results

22.1. Descriptive Statistics of Studies and Samples

All included studies and their description are shown in Appendix B. In average the samples had an age of $M = 27.27$ ($SD = 9.13$) and were to $M = 66.5$ ($SD = 22.1$) percent female. The studies were conducted in the United States ($n = 35$), the United Kingdom ($n = 4$), Australia ($n = 3$), Germany ($n = 3$), Canada ($n = 1$), Iceland ($n = 1$), Turkey ($n = 1$), South Africa ($n = 1$), Pakistan

($n = 1$), New Zealand ($n = 1$), and China ($n = 1$). Half of the studies were conducted in or before 2008. The oldest included study was from 1986, and the latest from 2020.

22.2. Main Results

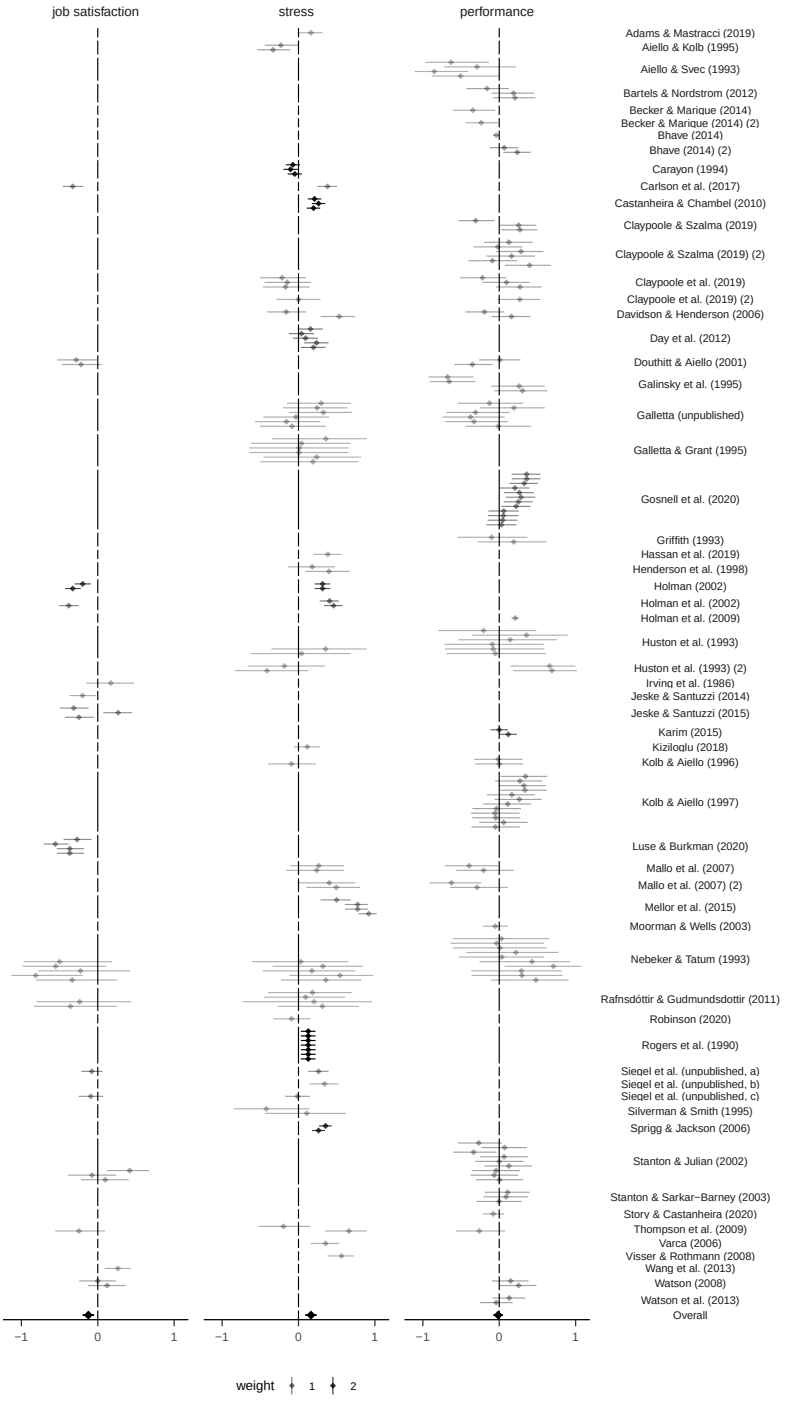
Hypothesis 1 stated a negative relationship between electronic monitoring and job satisfaction. Indeed, we found a reliable negative relationship between these two variables, $r = -.09$, 95% CI [−.15, −.03]. Hypothesis 2 proposed a positive relationship of electronic monitoring with stress which we found as well, $r = .12$, 95% CI [.07, .18]. However, we did not find the positive relationship of monitoring with performance as stated in Hypothesis 7, $r = -.01$, 95% CI [−.06, .04]. Thus, our hypotheses regarding main effects can be accepted in the case of job satisfaction (Hypothesis 1) and stress (Hypothesis 2) but not in the case of performance (Hypothesis 7). Main meta-analytical results are shown in Table 10 and Figure 11. A funnel plot is shown in Figure 12.

22.3. Effects of Moderators

Hypothesis 3 stated that monitoring has a stronger negative relationship with job satisfaction if monitoring emphasizes organizational interests than employees' interests, and Hypothesis 4 stated that monitoring has a stronger positive relationship with stress in the case of emphasizing organizational interests. There were too few studies to examine the impact of developmental purposes, but we were able to contrast organizational interests against no given purposes. No given purposes yielded a stronger negative relationship with job satisfaction, $r = -.14$, 95% CI [−.25, −.03], than with performance maintenance purposes, $r = -.07$, 95% CI [−.22, .07].

Figure 11

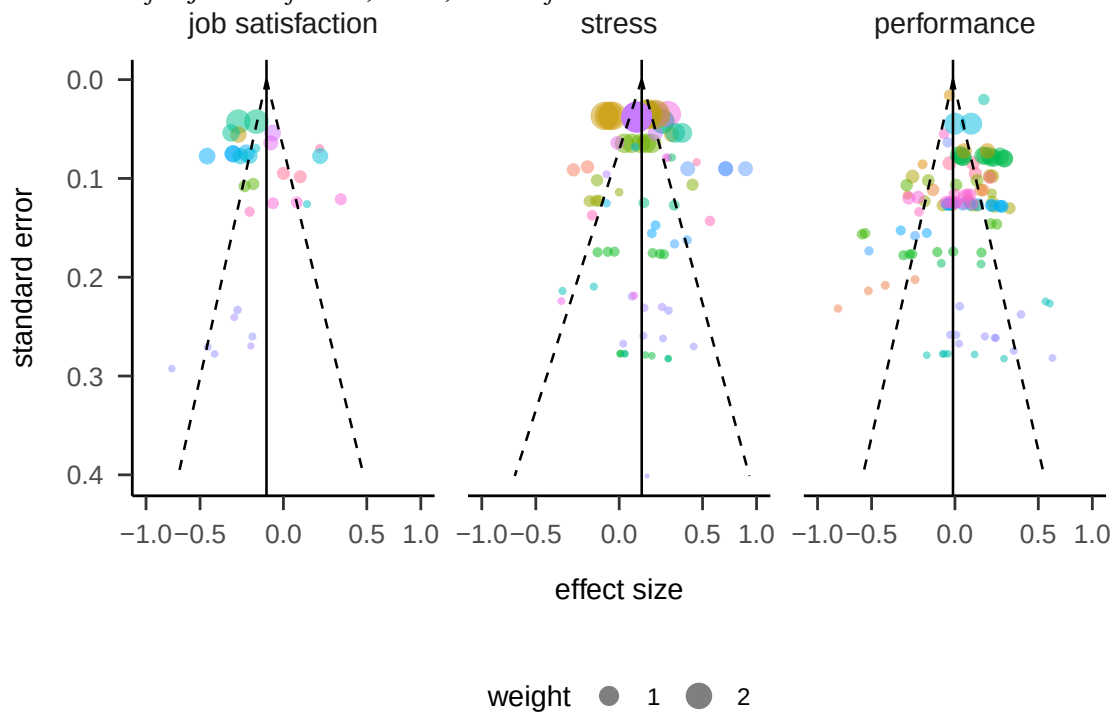
A Forest Plot Showing Included Studies



Note. Included studies, their effect sizes and the overall effect size for job satisfaction, stress, and performance (including the 95% CI) are shown. Opacity indicates the weight (in percent) of an effect size in the meta-analytical model.

Figure 12

Funnel Plots for Job Satisfaction, Stress, and Performance



Note. Dots indicate a single effect size with its corresponding standard error. Dot size represent the weight (in percent) in the meta-analytical model. Colors indicate independent samples.

Table 10
Main Meta-Analytical Results

				Reliability		Correlation	
Dependent variable	*k*	*e*	*N*	*DV*	*IV*	τ	*r*
Job satisfaction	16	31	3258	.84 (.08)	.93 (.11)	0.15	−.09, [−.15, −.03]
Stress	34	82	7550	.83 (.09)	.93 (.10)	0.17	.12, [.07, .18]
Performance	32	111	9421	.99 (.03)	.98 (.07)	0.11	−.01, [−.06, .04]

Note. Abbreviations: *k* = number of independent samples; *N* = mean sample size per study summed over studies; *DV* = dependent variable; *IV* = independent variable; τ = estimated standard deviation of true effects between studies; *r* = estimated mean true effect and surrounding 95% CI;

However, CIs overlapped strongly, so there is no strong support for a differentiation of these two attributions. This was similar in the case of stress. No given purpose, $r = .02$, 95% CI [−.11, .16], overlapped strongly with performance purposes, $r = .09$, 95% CI [−.02, .20]. On an exploratory basis, we also investigated this moderator for performance. Developmental purposes showed no relationship with performance, $r = .00$, 95% CI [−.17, .17], whereas no given purpose showed a slightly positive relationship, $r = .03$, 95% CI [−.05, .10], and performance purposes a slightly negative relationship, $r = -.04$, 95% CI [−.12, .05]. Also in this case were CIs too large and the differences too small to interpret differences between moderator levels (see Table 11).

Hypothesis 5 and 6 were concerned with the effect of performance targets on the relationship of monitoring with job satisfaction and stress. In both cases, the existence of performance targets should strengthen the relationship of monitoring with the dependent variable. Regarding job satisfaction, performance targets yielded a stable negative relationship, $r = -.20$, 95% CI [−.34, −.04], whereas this was not the case for the absence of performance targets, $r = .00$, 95% CI [−.16, .15]. Thus, there is evidence in favor of Hypothesis 5. The relationship with stress was with and without performance targets slightly positive but not differentiable between each other, $r = .08$, 95% CI [−.09, .26] and $r = .04$, 95% CI [−.06, .13] respectively. Thus, there was no conclusive evidence in favor of or against Hypothesis 6. On an exploratory basis, we tested this moderator for performance. There was no relationship with performance targets, $r = .03$, 95% CI [−.03, .09], and without performance targets, $r = -.01$, 95% CI [−.08, .05]. See Table 12 for more information.

Table 11
Meta-Analytical Results Regarding Monitoring Purpose

					Reliability		
Purpose	k	k_l	e	N	*DV*	*IV*	r
Job satisfaction (τ = .15, 3.07%)							
No purpose	4	3	7	368	.80 (.14)	> .99 (.00)	−.14, [−.25, −.03]
Performance	4	2	9	529	.88 (.02)	.94 (.13)	−.07, [−.22, .07]
Stress (τ = .16, 12.23%)							
No purpose	6	5	11	438	.76 (.19)	> .99 (.00)	.02, [−.11, .16]
Performance	10	8	25	635	.84 (.15)	.97 (.08)	.09, [−.02, .20]
Performance (τ = .11, 19.94%)							
Developmental	2	2	2	585	.99 (.01)	> .99 (.00)	.00, [−.17, .17]
No purpose	10	8	22	697	.99 (.02)	> .99 (.00)	.03, [−.05, .10]
Performance	17	16	57	1508	.99 (.02)	> .99 (.00)	−.04, [−.12, .05]

Note. Abbreviations: k = number of independent samples (k_l: conducted in a laboratory); e = number of effect sizes; N = mean sample size per study summed over studies; *DV* = dependent variable; *IV* = independent variable; τ = estimated standard deviation of true effects between studies and how much variance the moderator can explain in between-study variance (in percent); r = estimated mean true effect and surrounding 95% CI;

Table 12
Meta-Analytical Results Regarding Performance Targets

					Reliability		
Performance target	k	k_l	e	N	*DV*	*IV*	r
Job satisfaction (τ = .24, 0.00%)							
No target	5	4	11	412	.83 (.13)	> .99 (.00)	.00, [−.16, .15]
Target	2	1	6	120	.88 (.02)	> .99 (.00)	−.20, [−.34, −.04]
Stress (τ = .15, 0.00%)							
No target	13	12	28	649	.86 (.15)	> .99 (.00)	.04, [−.06, .13]
Target	2	1	6	77	.63 (*NA*)	> .99 (.00)	.08, [−.09, .26]
Performance (τ = .12, 6.19%)							
No target	24	21	79	2025	.99 (.02)	> .99 (.00)	−.01, [−.08, .05]
Target	4	2	20	248	.98 (.04)	> .99 (.00)	.03, [−.03, .09]

Note. Abbreviations: k = number of independent samples (k_l: conducted in a laboratory); e = number of effect sizes; N = mean sample size per study summed over studies; *DV* = dependent variable; *IV* = independent variable; τ = estimated standard deviation of true effects between studies and how much variance the moderator can explain in between-study variance (in percent); r = estimated mean true effect and surrounding 95% CI;

22.4. Moderator Study Setting

Study setting (laboratory vs. field) had a differential influence on the dependent variables. Regarding job satisfaction, a reliable negative relationship was found in field studies, $r = -.13$, 95% CI [−.21, −.06], but not in laboratory studies, $r = -.07$, 95% CI [−.19, .06]. However, confidence intervals did not indicate a strong difference between these to study settings. Laboratory settings found a correlation of $r = .04$, 95% CI [−.04, .13], between stress and monitoring, whereas field studies found a correlation of $r = .18$, 95% CI [.10, .25], between these two variables. Thus, Laboratory studies underestimate the relationship of monitoring and stress compared to field studies. In the case of performance, laboratory settings did not find a correlation between monitoring and performance, $r = -.02$, 95% CI [−.09, .04], but field studies found a small relationship, $r = .06$, 95% CI [−.02, .14]. Therefore, there is small evidence that field studies might find a small positive relationship with performance (see Table 13).

22.5. Exploratory Analysis

On an exploratory basis we were able to investigate two further moderators. In the case of performance, we could distinguish quantity and quality. However, there was no difference between these two kinds of performance (quality: $r = .00$, 95% CI [−.11, .11], quantity: $r = .00$, 95% CI [−.08, .08]; see Table 14). In addition, we examined whether feedback of the monitoring system has an impact on the dependent variables. The relationship between monitoring and job satisfaction was lower in the case of feedback, $r = -.29$, 95% CI [−.37, −.21], than without feedback, $r = -.07$, 95% CI [−.21, .07]. Also, the relationship with stress was stronger with feedback, $r = .28$, 95% CI [.23, .33], than without feedback, $r = .02$, 95% CI [−.08, .12]. In the

Table 13
Meta-Analytical Results Regarding Study Setting

				Reliability		
Study setting	*k*	*e*	*N*	*DV*	*IV*	*r*
Job satisfaction (τ = .15, 0.00%)						
Laboratory	5	12	501	.82 (.13)	> .99 (.00)	−.07, [−.19, .06]
Field	11	19	2757	.85 (.04)	.84 (.12)	−.13, [−.21, −.06]
Stress (τ = .16, 13.41%)						
Laboratory	14	35	727	.93 (.03)	> .99 (.00)	.04, [−.04, .13]
Field	20	47	6823	.81 (.08)	.82 (.08)	.18, [.10, .25]
Performance (τ = .11, 2.09%)						
Laboratory	24	81	2080	> .99 (.01)	> .99 (.00)	−.02, [−.09, .04]
Field	8	30	7341	.94 (.05)	.89 (.14)	.06, [−.02, .14]

Note. Abbreviations: *k* = number of independent samples; *e* = number of effect sizes; *N* = mean sample size per study summed over studies; *DV* = dependent variable; *IV* = independent variable; τ = estimated standard deviation of true effects between studies and how much variance the moderator can explain in between-study variance (in percent); *r* = estimated mean true effect and surrounding 95% CI;

case of performance, studies in which the monitoring system provided feedback reported a relationship of performance with monitoring, $r = .05$, 95% CI [.00, .10]. Without feedback there was no relationship, $r = -.01$, 95% CI [−.08, .05] (see Table 15).

23. Discussion

This meta-analysis investigated the relationship of electronic monitoring with job satisfaction, stress, and performance. In the current study, we found a reliable negative relationship of monitoring with job satisfaction and a reliable positive relationship with stress. The overall effect size for the influence of electronic monitoring on job satisfaction, $r = -.09$, 95% CI [−.15, −.03], and on stress, $r = .12$, 95% CI [.07, .18], are negligible to small according to Cohen (1988) and Funder & Ozer (2019). The current results (a) support previous findings on the relationship of electronic monitoring with job satisfaction and stress (Backhaus, 2019; Ravid et al., 2019), (b) is in line with stress theories and their predictions (Gagné & Bhave, 2011; Karasek, 1979; Martin et al., 2016), and (c) supports the notion that electronic monitoring has a negative impact on employees' well-being (Alge & Hansen, 2013; Ball, 2010; Ravid et al., 2019).

On a first glimpse, one might argue that these effect sizes are too small to be practically relevant. However, it should be kept in mind that a large number of employees may experience electronic monitoring over multiple hours per day for many years in their life. The long-term implications of these small effect sizes have probably severe and aversive consequences for employees' life and well-being (see Bosco et al., 2015; Funder & Ozer, 2019, for an in-depth discussion). The common language effect size is an indicator for the probability that a score from one group is greater than from another group. In our case, a correlation coefficient of 0.10

Table 14
Meta-Analytical Results Regarding Quality vs. Quantity

					Reliability		
Performance	k	k_l	e	N	*DV*	*IV*	r
Performance (τ = .10, 0.00%)							
Quantity	25	21	67	1844	.99 (.02)	.99 (.03)	.00, [−.08, .08]
Quality	15	11	41	1507	.98 (.03)	.99 (.03)	.00, [−.11, .11]

Note. Abbreviations: k = number of independent samples (k_l: conducted in a laboratory); e = number of effect sizes; N = mean sample size per study summed over studies; *DV* = dependent variable; *IV* = independent variable; τ = estimated standard deviation of true effects between studies and how much variance the moderator can explain in between-study variance (in percent); r = estimated mean true effect and surrounding 95% CI;

Table 15
Meta-Analytical Results Regarding Monitoring Feedback

					Reliability		
Feedback	k	k_l	e	N	*DV*	*IV*	r
Job satisfaction (τ = .15, 0.00%)							
No feedback	5	5	12	501	.82 (.13)	> .99 (.00)	−.07, [−.21, .07]
Feedback	2	0	6	361	.88 (.02)	.87 (.18)	−.29, [−.37, −.21]
Stress (τ = .13, 44.86%)							
No feedback	12	12	27	631	.93 (.03)	> .99 (.00)	.02, [−.08, .12]
Feedback	4	1	10	588	.73 (.14)	.91 (.15)	.28, [.23, .33]
Performance (τ = .11, 17.78%)							
No feedback	22	20	71	1536	> .99 (.01)	> .99 (.00)	−.01, [−.08, .05]
Feedback	6	3	30	916	.98 (.03)	.98 (.05)	.05, [.00, .10]

Note. Abbreviations: k = number of independent samples (k_l: conducted in a laboratory); e = number of effect sizes; N = mean sample size per study summed over studies; *DV* = dependent variable; *IV* = independent variable; τ = estimated standard deviation of true effects between studies and how much variance the moderator can explain in between-study variance (in percent); r = estimated mean true effect and surrounding 95% CI;

corresponds to a common language effect size of 55.65%. If there is no effect, both groups do overlap and the probability is 50%. Thus, if we take electronic monitoring as a binary decision, an employee which is under electronic observation reports more stress and less job satisfaction with a probability of 55.65%. Again, this 5.65% increase seems small but with the culmination of the number of employees and time, monitoring can have severe impacts. Thus, we would like to stress the importance of these "small" relationships.

If taking moderators into account, there was some evidence that a performance maintenance purpose and performance targets decrease reported job satisfaction of employees. These findings seem to be reasonable as performance maintenance purposes and performance targets increase work demands and do not foster employees' resources what should result in decreased job satisfaction (Demerouti et al., 2001; Karasek, 1979). If this explanation is correct, stress should show similar patterns across moderator levels. Even there were some small differences between moderator levels regarding stress, they were far too small to be robust. Feedback seems to be another moderator variable that affects the impact of electronic monitoring. In both cases, job satisfaction and stress, showed a stronger relationship with feedback than without feedback. In leadership research, appropriate feedback is a key variable to foster trust and development of subordinates (see Sexton et al., 2017, for example). However, in research on electronic monitoring, the opposite seems to be the case. A possible explanation is that feedback from monitoring systems is not helping in achieving a goal but to merely signal the amount of work that has to be done. This is a new insight in the area of electronic monitoring and needs further research. Beyond that, laboratory studies seem to slightly underestimate the

relationship of electronic monitoring with job satisfaction and stress what might be due to the relevance and long-term implications of a real employment situation.

However, we found no relationship of monitoring with performance and its confidence interval was narrow around zero. Thus, there is most probably no overall effect of electronic monitoring on performance in existing studies. This overall effect is in line with stress theories (Karasek, 1979) but in contradiction with agency theory (Eisenhardt, 1989; Mahaney & Lederer, 2011). We found no great differences when taking moderator levels into account, because differences were either too small or the uncertainty was too big. However, there seems to be some evidence that performance is higher when feedback is present and in field studies than in laboratory studies. On the one hand, one could argue from a developmental perspective that feedback is an opportunity for employees to improve their work processes (e.g., in the sense of job crafting, Parker, 2014). On the other hand and from a controlling perspective, feedback might simply indicate the remaining work that has to be done to employees and increase work pressure. Taking the results on job satisfaction and stress into account, the latter perspective might be more appropriate. Thus, the exact processes between electronic monitoring, feedback, and performance warrant further research. To conclude, performance maintenance as the most prominent justification for electronic monitoring seems not to be reflected in empirical studies – even if taking the small relationship of monitoring with performance in field studies into account. There might be several reasons for not finding this relationship. Electronic monitoring is most often not solely implemented (cf., Cascio & Montealegre, 2016; Reilly, 2010) but comes with a variety of HR measures like pay-for-performance and certain work design (Gerhart & Fang, 2015; Parker, 2014). Current research has most of the time not looked into work design decisions

that go in line with electronic monitoring and it is thus unknown how they influence each other. This way, it could be possible that there is only a performance benefit by electronic monitoring if it is accompanied by certain HR measures (cf., Posthuma et al., 2018; Stanton & Weiss, 2000). In contradiction with this argument is that we could not find a strong impact of moderators onto the relationship of monitoring with performance. What is more, there are several arguments in the literature why monitoring might have a negative impact on performance and overshadow positive effects on performance this way. For example, Stanton & Julian (2002) found that employees focus on monitored aspects of their work and disregard non-monitored aspects. This way, the overall performance might be negatively affected and positive effects canceled out. Reilly (2010) investigated how the management level is affected by electronic monitoring. In their study, supervisors and managers complained about reduced autonomy because they have to fulfill certain figures. This changed leadership to fulfilling numbers disregarding the negative side effects this may have. Again, this change in management may cancel positive effects of monitoring on employees' performance.

The current study is the latest and comprehensive meta-analysis in the area of electronic monitoring research. For example, Backhaus (2019) included only 9 independent samples regarding job satisfaction, 29 regarding stress and strain, and 18 regarding performance. In addition, the first time moderators beyond study design were examined and we applied a more sophisticated meta-analytical model that incorporated dependencies between single effect sizes. In addition, we applied a more rigid definition of electronic monitoring and did not include studies like Alder et al. (2008) which were concerned with privacy invasion and not monitoring per se.

23.1. Limitations and Research Implications

Readers of the current study should keep the following limitations in mind. First, we investigated only three dependent variables. However, job satisfaction can be seen as a proxy for other attitudinal variables like work motivation and commitment. Stress might be a proxy for other variables that reflect employees' well-being. Thus, the current study investigated three dependent variables that are crucial in understanding the effects of electronic monitoring. Beyond that, it is also possible to focus more strongly on verification of certain theories. Using meta-analytical structured equation modeling (Cheung, 2015), mediation models and more complicated models can be examined to verify the predictions of theories.

Second, most of the incorporated studies were either laboratory studies with undergraduates or conducted in call-centers or with clerical workers. Therefore, there is a lack of different professional backgrounds in primary studies. Future research should extend their samples to employees who have not been studied yet. This can be employees in fields like unskilled labor, healthcare, production, and maintenance. Related to this is the need to take different work designs and HR measures into account. It is largely unknown which HR measure do accompany monitoring implementations and how these are related to each other. There is no research how the decision to implement a monitoring system is met on an organizational level. Thus, it is still unclear under which conditions a monitoring system is implemented. For example, electronic monitoring is most easily implemented with simple, repetitive tasks (Carayon, 1993; Smith et al., 1992). Thus, a field study that is neglecting the influence of work design might be missing crucial aspects of monitored work.

Third, the lion's share of electronic monitoring research is concerned with effects of electronic monitoring on subordinates' job attitudes, well-being, and performance (Alge & Hansen, 2013). However, the effect of electronic monitoring on organizational management and supervisors' behavior and attitudes is largely unknown. Notable exceptions are Aiello & Svec (1993), Oz et al. (1999), Chen & Ross (2005), and Reilly (2010) that suggest that even the autonomy of supervisors is reduced because they have to act in a way to foster key performance indicators.

Finally, taking the exponential rise in published studies in the fields of work and business psychology and computer science into account, it is astonishing that electronic monitoring has not seen this exponential trend (note that half of the studies were conducted in or before 2008). The neglect of the importance of electronic monitoring research in these areas is worrisome. More and more employees are affected by electronic monitoring and trends like algorithmic management cannot exist without invasive employee monitoring (Galière, 2020; Möhlmann & Zalmanson, 2017). Beyond that, some scholars argue that monitoring is already the default in nowadays technological systems (Johnson et al., 2014) and thus is not a temporal phenomenon but will accompany employees and organizations for a long time. Research has the function to shed light which effects these trends have on employees. Thus, further research is warranted to gather more information on this topic.

23.2. Practical Implications

Practitioners and decision-makers in organizations should keep in mind how they implement and use a monitoring system and which HR measures go in line with electronic monitoring.

In addition, there should be special attention what an organization expects from a monitoring system. The current study showed that there is no beneficial influence of electronic monitoring on employees' performance and expectations should be changed into this direction.

Part VI.

General Discussion

24. Discussion of Findings

Based on previous research, the current dissertation aimed at getting a better understanding under which conditions employees perceive electronic monitoring as more or less threatening. The current findings highlight that (a) monitoring purposes are an important factor in the explanation of employees' and job applicants' reaction to electronic monitoring and (b) individual differences in trait competitiveness can explain different reactions of individuals to electronic monitoring. Beyond these findings, this dissertation showed that (c) participation is a relevant variable to explain effects of electronic monitoring within an organization, (d) diverging effects of monitoring on counterproductive work behavior can be explained by two opposing processes, and (e) a meta-analysis to synthesize existing studies finds a positive relationship of electronic monitoring with stress and a negative relationship with work satisfaction, but no effect on performance. Following, I discuss the findings more in-depth.

In a first step, the current dissertation aimed to substantiate previous findings of monitoring purposes on employees' well-being and work attitudes. More precisely, previous research found a link between controlling purposes and detrimental effects on employees' well-being and work attitudes, but developmental purposes were related to increased well-being and work attitudes (DelVecchio et al., 2013; Ravid et al., 2019; Wells et al., 2007). The current dissertation tried to extend these findings by showing that monitoring purposes also alter the relationship of electronic monitoring with employees' well-being and work attitudes. In Study 1 as well as in Study 2, developmental and controlling purposes showed direct effects which were in line with previous research: Developmental purposes were linked to increased work engagement, motivation, and satisfaction, but controlling purposes showed a negative relationship with these

variables. In addition, controlling purposes were associated with higher levels of stress. Both, developmental and controlling purposes, were positively associated with electronic monitoring. To conclude, the current dissertation was able to reproduce already existing findings on the positive impact of developmental purposes on employees' well-being and work attitudes and the negative impact of controlling purposes on work attitudes and stress. Thus, these results do strengthen the notion of differential effects of monitoring purposes (DelVecchio et al., 2013; McNall & Roch, 2009; Ravid et al., 2019; Wells et al., 2007).

However, it was not possible to find the proposed effect of monitoring purposes on the relationship of electronic monitoring with employees' well-being and work attitudes. In both studies, developmental purposes were expected to buffer the effect of electronic monitoring on the dependent variables and controlling purposes to strengthen these effects. In the current studies, we found no such relationship. To the contrary, there was even some evidence that developmental purposes strengthen the proposed relationship. So far, there is no conclusive explanation for the respective results. However, it could be possible that the interaction effect is overshadowed by effects of organizational culture (see Alder, 2001; DelVecchio et al., 2013). Alder (2001) proposed that employees perceive electronic monitoring differently depending on organizational culture. For example, employees in a bureaucratic culture may expect more control and accountability and thus accept electronic monitoring with a higher probability than employees in a supportive culture where employees may expect less control and more participative decision-making (cf., DelVecchio et al., 2013). However, this requires future research.

Beyond that, it was also a goal to investigate the role of participation and how it affects perception of monitoring in an organizational context. Previous research showed substantial influences of participation on the perception of electronic monitoring but neglected the organizational context (e.g., Alge, 2001; Douthitt & Aiello, 2001). In Study 1, results regarding participation suggest a protecting influence of participative leadership on the effects of monitoring on employees. However, employees' individual perception of the direct supervisor seems to be more important than differences between organizations. This may indicate that employees accept a certain use of monitoring techniques and corresponding leadership or drop out of the organization (cf. DelVecchio et al., 2013). Regarding works councils, there was some evidence that works councils help employees to evaluate new technologies with their advantages and disadvantages more realistically. In addition, critics of works councils argue that they often impede the introduction of new technologies at the workplace (cf., Hübler & Jirjahn, 2003). In Study 1, there was no difference in the number of monitoring techniques in organizations with and without works councils. Hence, the current results do not support this notion. Thus, works councils seem to be an important player in organizational processes and should receive more attention in psychological research (cf. Frege, 2002).

Study 2 contributed to the existing literature in two further ways: First, there was contradicting evidence on the effects of electronic monitoring on counterproductive work behavior (e.g., Martin et al., 2016; Yost et al., 2018). This contradicting evidence can be explained by at least two opposing processes: perceived detectability and psychological contract breach. On the one hand, monitoring harms the trust and the psychological contract between the organization and the employees (Alge & Hansen, 2013; Snyder & Cistulli, 2011). Due to the

mistrust of the management, employees might be deluded to conduct deviant behavior such as loafing or wasting supplies to retaliate this mistrust. On the other hand, monitoring is specifically aimed at preventing counterproductive work behavior by detecting this kind of behavior. If employees realize that they might be caught in committing such behavior, they probably refrain from doing it. In this regard, the findings of Study 2 can explain why different studies come to different conclusions. Future research should pay attention which process they focus on and how this might influence studies' results. Finally, Study 2 shows the relevance of trait competitiveness in explaining differences between individuals' reaction to electronic monitoring (and extends this variable from pay-for-performance to the field of monitoring research, Gläser et al., 2017). More precisely, monitoring can be a possibility for employees to compete with others and show their performance. However, in this study, competitiveness was also related to higher levels of perceived stress. Combining the findings of Study 2 and 3, highly competitive individuals seem to prefer a promoting environment. It might be possible that highly competitive individuals show higher performance in the presence of monitoring but experience also more stress. Hence, it seems to be worthwhile to investigate the interdependence of stress, competitiveness, and monitoring further to create working environments in which stress and performance is balanced.

Study 3 examined the relationship of monitoring purposes and an organizations' attractiveness to job applicants. The results show a negative impact of controlling purposes on job applicants' tendency to apply for a position at the respective organization. Therefore, public information on the implementation of monitoring systems influences probably whether individuals apply for a position at a certain organization or not. In addition, applicants with

high trait competitiveness evaluated organizations more favorably with supportive monitoring. However, this was not the case for organizations with controlling monitoring. Similar to the results of Study 1, this may hint at an attraction-selection-attrition-effect (DelVecchio et al., 2013; Schneider, 1987): Applicants with high competitiveness may actively seek for a position with supportive monitoring, if these information are available.

The conducted meta-analysis in Study 4 is the latest and most comprehensive one in the area of electronic monitoring (cf. Backhaus, 2019; Carroll, 2008). Study 4 is the first meta-analysis to incorporate different monitoring characteristics and evaluate their effect on employees' job satisfaction, stress, and performance. In addition, a sophisticated statistical model took dependencies between effect sizes into account. Study 4 showed that electronic monitoring has a negative impact on employees' work satisfaction and perceived stress. These relationships are slightly underestimated in laboratory settings. A rather surprising effect was that it was not possible to detect a stable positive relationship of electronic monitoring with performance which is the major justification for implementing an electronic monitoring system in organizations (e.g., Ball, 2010; Sewell & Barker, 2006). Thus, future research needs to explore different possibilities why this is the case. For example, electronic monitoring seems to be most effective, if the performance dimension is narrow like the number of pieces per day (Ravid et al., 2019). Employees put their attention to tasks that are monitored (Stanton & Julian, 2002) and might disregard other tasks which are not monitored. This way, disregarded tasks might reduce the overall performance. The consequences of monitoring is another factor that might influence this relationship. The effects of monitoring differ probably if employees are afraid of negative consequences by not achieving a performance target or if they get no performance bonus.

25. Limitations and Future Research Directions

In addition to the limitations presented in the respective studies, there are two broader and more general limitations of the current dissertation. First, Study 1 and Study 2 relied on self-report measures of electronic monitoring and dependent variables. Self-reports can be distorted by biases and employees might not always know which electronic monitoring measures are actually used at their workplace or not. In addition, some scales needed to be specifically developed for the current use. This was due to a lack of common measures in the area of electronic monitoring research (and regarding works councils). It would be beneficial for future research to develop scales which can be used in different settings. However, there are various reasons why this might be cumbersome. Implementation details of electronic monitoring systems vary over time and with technological advances (Cascio & Montealegre, 2016; Xu et al., 2018). For example, some years ago it was not possible to track the location of lorry-drivers because the Global Positioning System (GPS) was mainly intended for military use. After its opening for broader usage, location tracking of lorry-drivers became possible and cheaper over time. However, this system is not able to reliable track the location of persons in buildings and over short distances. After the availability of technologies such as RFID and Bluetooth this became possible and accessible to organizations (Roblek et al., 2016). This way, the location of employees can be tracked over short distances and indoors. Thus, measures that are designed to collect information on electronic monitoring systems have to balance the trade-off between being technology-agnostic (and broad) or becoming quickly outdated. In addition, it is an open question whether it is preferably to measure the existence of certain monitoring goals (e.g., location, time, performance) or to measure mainly the proposed characteristics by Ravid et al.

(2019) such as invasiveness, purpose, and feedback. The former is probably more objective while the latter is probably more thorough and additionally captures subjective perceptions. Despite these remaining issues, the newly developed scales and indices in the current dissertation to measure electronic monitoring and its characteristics showed expected relationships with other variables. This hints at good convergent and discriminant validity. Thus, the current measures can be a starting point for further scale developments.

Second, the current dissertation was mainly concerned with electronic monitoring (and its characteristics) while neglecting the broader work design in organizations (Parker, 2014). For example, Alge & Hansen (2013) stated that "relatively little is understood about why managers choose to implement electronic monitoring (versus those that do not)" (Alge & Hansen, 2013, p. 232). In this statement, Alge & Hansen (2013) see monitoring of employees as a deliberate decision of managers depending on specific antecedents. However, this stance does probably not live up to today's workplaces. Taking algorithmic management as an example, there is no managerial decision to implement a monitoring system or not (Duggan et al., 2020; Möhlmann & Zalmanson, 2017). Instead, collecting data over employees' activities is a necessity to adapt work processes to the current situation. Even in less extreme working regimes, data collection and monitoring are often the default in nowadays machines and software systems (Hirsch-Kreinsen et al., 2015). Thus, it is rather the other way round: Organizations have to decide how work processes can be designed without collecting too much of employees' data and how necessarily collected data can be protected. Accordingly, for future research it is probably not sufficient to measure electronic monitoring and its characteristics, but it is necessary to incorporate the working processes and working regime in which electronic monitoring is

applied. For example, in the case of pay-for-performance, electronic monitoring is necessary to pay the respective incentives and often desired by employees (even though this working design decision might provoke stress in employees who cannot perform to get the incentives). Drivers working for Uber are probably not angered because Uber knows where they are and where they are driving next, but because they have no influence on their payment, have to comply with an unfair evaluation system, and do not know how to object a ban from the Uber app. The current meta-analysis showed only small effects of electronic monitoring on employees' performance, stress perception, and work satisfaction. This is probably due to the circumstance that electronic monitoring is not applied on its own but in collection with certain work design decisions. Therefore, future research should focus – at least in part – not solely on electronic monitoring but on the broader circumstances which employees face in nowadays workplaces. This dissertation made a small step in this direction by taking participation in organizations into account.

26. Conclusion

Electronic monitoring at the workplace is still a prevailing issue and might be even more in the future. This dissertation showed that the purpose why organizations electronically monitor their employees plays an important role in the perception of electronic monitoring. Beyond that, the current findings imply that electronic monitoring is strongly embedded in its organizational context and needs to be evaluated from this perspective. Practitioners and researchers should pay attention to different characteristics of the monitoring system, the relation between monitoring and work design, the organizational context, and the employees.

This way, implications for employees' well-being, work attitudes, and performance can be better understood and predicted.

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A. Study III: Complete Scenarios

The following description was provided to all participants:

> ”The company MobilMaintenance is offering several positions for young professionals in the engineering sector. You are thinking about applying for one of the positions. The company offers services in the field of aviation maintenance. The company is often contracted, for example, when an airline cannot guarantee punctual and reliable maintenance due to a lack of personnel at an airport or when a private jet of a company needs maintenance.
>
> The requirements of the job advertised are to control and optimize maintenance procedures. In order to gain experience in maintenance procedures, an induction training course is held prior to the job, in which entry-level employees work together with experienced persons to carry out maintenance on aircraft. A former fellow student of yours has already been working at MobilMaintenance for one year. After seeing the job advertisement, you meet with him to get more information about the company and the job. According to his report, MobilMaintenance seems to have a fairly modern approach.
>
> During certain maintenance operations, all employees wear digital glasses that are connected to their work cell phones. The device can display information in the field of vision and contains both a camera and a microphone. This makes it possible to display maintenance plans quickly and easily and to record maintenance work by photo and voice recording. In addition, the camera of the digital glasses can also

transmit the employee's field of vision, thus enabling direct video telephony with the manager or an experienced mentor."

In the controlling framing condition, participants additionally received the following description:

"The exact recording of the maintenance work makes it possible to derive data on the work performance and quality of the individual employees. This allows the manager to get an idea of the level of performance of the employees. Through direct communication and the connection to the employee's field of vision, the manager or mentor can detect possible errors directly during maintenance."

Participants in the supportive framing condition instead received the following description:

"The accurate recording of maintenance work makes it possible for employees to retrieve data on their work performance and quality. Based on this data, they can get a timely impression of their opportunities for improvement and development. Through the direct communication and the transfer of the field of vision to the manager or the mentor, possible questions can be clarified directly during the maintenance and assistance can be given."

Finally, all participants read the following sentence:

"On the way home, you try to classify the newly acquired information about MobilMaintenance."

B. Study IV: Included Studies

The following studies were included in the current meta-analysis (for unpublished studies please write to the corresponding author of this meta-analysis):

- Adams & Mastracci (2019); Aiello & Svec (1993); Aiello & Kolb (1995); Bartels & Nordstrom (2012); Becker & Marique (2014); Bhave (2014); Carayon (1994); Carlson et al. (2017); Castanheira & Chambel (2010); Claypoole & Szalma (2019); Claypoole et al. (2019); Davidson & Henderson (2006); Day et al. (2012); Douthitt & Aiello (2001); Galinsky et al. (1995); Galletta & Grant (1995); Gosnell et al. (2020); Griffith (1993); Hassan et al. (2019); Henderson et al. (1998); Holman et al. (2002); Holman (2002); Holman et al. (2009); Huston et al. (1993); Irving et al. (1986); Jeske & Santuzzi (2014); Jeske & Santuzzi (2015); Karim et al. (2015); Kiziloğlu (2018); Kolb & Aiello (1996); Kolb & Aiello (1997); Luse & Burkman (2020); Mallo et al. (2007); Mellor et al. (2015); Moorman & Wells (2003); Nebeker & Tatum (1993); Rafnsdóttir & Gudmundsdottir (2011); Robinson (2020); Rogers et al. (1990); Silverman & Smith (1995); Sprigg & Jackson (2006); Stanton & Julian (2002); Stanton & Sarkar-Barney (2003); Story & Castanheira (2020); Thompson et al. (2009); Varca (2006); Visser & Rothmann (2008); Wang et al. (2013); Watson (2008); Watson et al. (2013)