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Managers' and safety representatives' perspectives on electronic monitoring and occupational health in the transport and logistics industries in Sweden

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ABSTRACT

Objectives. Qualitative research on electronic monitoring in relation to occupational health remains limited. This study aimed to explore managers' and safety representatives' perspectives on how electronic monitoring in the transport and logistics industries has influenced the work environment, including job demands and available resources. **Methods.** A qualitative study design employing semi-structured interviews was used to collect open-ended data and explore the views of managers and safety representatives regarding electronic monitoring. Data were analysed using content analysis and consisted of 16 semi-structured interviews with participants from 15 organizations within the transport and logistics industries in Sweden. **Results.** The content analysis identified two main categories: electronic monitoring and organizational culture (with sub-categories: purpose of electronic monitoring; and electronic monitoring and the social work environment); and electronic monitoring and employee well-being (with sub-categories: electronic monitoring and employee impact; and ethical surveillance practices). **Conclusions.** Although electronic monitoring in the transport and logistics sectors offers security advantages, it may also adversely affect recovery, autonomy and team cohesion. To mitigate these risks, monitoring systems should be implemented ethically, with transparency and an emphasis on support rather than control. Furthermore, ensuring sufficient recovery time within driver schedules and workflows is essential for promoting occupational health.

KEYWORDS

digitalization; electronic monitoring; integrity; job demands; occupational health; organizational culture; occupational safety and health; surveillance

1. Introduction

Electronic monitoring systems are increasingly being implemented across various industries, including the transport and logistics sectors in Sweden [1]. In the workplace, electronic monitoring encompasses not only visual surveillance but also the observation of behaviors such as speech and actions. Common forms include security cameras, wiretaps, GPS tracking and Internet usage monitoring [2]. In the transport and logistics industries, electronic monitoring is associated with benefits such as enhanced security and safety for both employees and goods [3,4]. However, concerns have been raised regarding its potential negative impact on occupational health, particularly when there is a mismatch between job demands and available resources. A meta-analysis has shown that electronic monitoring reduces job satisfaction and increases stress levels, with performance targets and feedback further exacerbating this relationship [5]. Other studies have also confirmed the link between electronic monitoring and elevated stress risk [1,6]. Moreover, the same meta-analysis found no significant association between electronic monitoring and improved performance [5]. Health-promoting leadership styles can buffer the negative effects of electronic monitoring; however, conveying such leadership remotely may be more challenging [7]. Leadership behaviors that support employee decision-making and encourage collegial cooperation are therefore recommended when implementing new technologies [8]. These findings highlight the importance of exploring how managers and safety representatives address electronic monitoring in relation to occupational health.

Workplace monitoring is not a new phenomenon; however, digital technologies have enabled employers to monitor workers both within and beyond the physical workplace [1,2]. The history of workplace monitoring is complex, and its effects on employees have been debated for decades [9]. Monitoring practices can be traced back to the early 20th century, when, much like today's electronic systems, the primary motivation was to enhance safety and reduce occupational accidents [9]. In recent years, growing awareness has emerged regarding the potential negative impact of electronic monitoring on occupational health [5,10]. Consequently, efforts have been made to regulate its use to ensure monitoring practices are both effective and ethical [11]. Nonetheless, limited evidence exists as to whether electronic monitoring systems are actually implemented in ways that align with these ethical and effectiveness standards.

From a theoretical perspective, this article is grounded in the job demands–resources (JD-R) model [12]. This conceptual framework posits that all occupations involve specific risk factors associated with the development of work-related stress, which are categorized as either job demands or job resources. In the transport and logistics industries, common job demands include physical factors such as awkward working postures, manual handling, repetitive tasks and whole-body vibration [13], as well as psychosocial factors including shift work, solitary work and low decision latitude [14]. Job resources refer to aspects that facilitate goal achievement, reduce job demands or promote personal growth, learning and development [12]. Electronic monitoring may function as

a job resource by enhancing safety and security, but it may also act as a job demand by increasing stress and anxiety [10]. The JD-R model is applicable across a range of occupational contexts, including transport and logistics [12], and can be further operationalized into more specific models of work-related stress, such as the demand–control–support model proposed by Karasek and Theorell [15].

The transport and logistics industries share several similarities in terms of working conditions, electronic monitoring practices and employee characteristics. In both sectors, employees are responsible for managing the flow of goods and services from origin to consumption to meet customer demands. This includes the transportation of passengers and cargo, as well as the warehousing and storage of goods. In-house logistics refers to companies delivering goods directly to customers from the nearest store location, whereas outsourced logistics involves collaboration with third-party delivery services to manage distribution operations [16,17]. Broadly, the transport industry focuses on the physical movement of goods and people, while the logistics industry emphasizes the coordination and management of the supply chain. Electronic monitoring is increasingly common in both the transport and logistics industries, where it is primarily used to ensure the safety and security of employees and goods. In Sweden, regulations are in place to safeguard employee privacy in relation to electronic monitoring. Employers are required to inform employees about the use and purpose of such systems, and employees have the right to access any personal data collected about them [18]. Additional similarities between the two industries in terms of working conditions and employee characteristics include shift work, low decision latitude, lower average educational levels and a predominance of male employees [16,17].

Electronic monitoring is employed in the transport and logistics industries to improve efficiency, safety and customer service. However, the effectiveness and ethical implications of its use in these sectors in Sweden remain insufficiently understood. The legal framework governing electronic monitoring should be clear, transparent and non-discriminatory [2,18]. Although such systems are often introduced to enhance safety and reduce accidents, concerns have been raised regarding their potential negative impact on the work environment [1,2]. Within the context of occupational health, it is essential to examine how electronic monitoring affects the work environment, particularly in relation to job demands and resources. Therefore, the aim of this study was to explore managers' and safety representatives' perspectives on how electronic monitoring in the transport and logistics industries has influenced the work environment, including job demands and available resources. The following research questions were raised:

- RQ1: What is the work environmental purpose of electronic monitoring in the transport and logistics industries from the managers' and safety representatives' perspective?
- RQ2: How do managers and safety representatives perceive the influence of electronic monitoring on job demands?
- RQ3: What resources and strategies do managers and safety representatives recommend to effectively balance job demands amidst the implementation of electronic monitoring?

Table 1. Participant socio-demographics ($N = 16$).

Characteristic	Value
Sex (n)	
Men	16
Women	0
Age (years), mean (range)	51 (36–66)
Industry	
Transport	10
Logistics	6
Number of employees in companies, mean (range)	889 (17–8428)
Position	
Manager	8
Safety representative	8
Years in current position, mean (range)	11 (1–33)

2. Methods

2.1. Design

A qualitative study design using semi-structured interviews was employed to gather open-ended data and explore managers' and safety representatives' perspectives on the work environment in the transport and logistics industries, specifically in relation to electronic monitoring. Semi-structured interviews were selected to ensure a focused exploration of the research topic while allowing flexibility to probe relevant issues that emerged during the interview process.

2.2. Data collection and participants

Data on experiences of electronic monitoring in relation to the work environment were collected through 16 semi-structured interviews with managers and safety representatives, recruited from 15 organizations within the transport and logistics industries (Tables 1 and 2). The majority of the safety representatives were regional, representing multiple organizations within the sector. The decision to interview managers and safety representatives was based on their broad, strategic perspectives on electronic monitoring, as well as their influential roles within organizational structures. Their positions provided them with the authority to influence the work environment directly, thereby strengthening the relevance and depth of the data. This approach enhanced the informational power of the sample and supported the rationale for the sample size, in line with the principle that the greater the relevance and richness of the information provided, the fewer participants are required [19].

An interview guide was developed by the authors in alignment with the study aim and methodological recommendations. The guide included a range of questions related to the digitalization of work, with a particular focus on electronic monitoring (Appendix 1). Follow-up questions were used as needed to clarify or deepen understanding based on the participants' responses. The questions were designed to elicit reflections on both the participants' own organizations and the industry more broadly. For this publication, only data specifically relevant to electronic monitoring were analysed. Potential participants were identified through strategic sampling, drawing on contacts from employer associations and trade unions [20], as well as prior knowledge of suitable organizations within the transport and logistics industries. In addi-

Table 2. Comparison of characteristics in the transport and logistics industries.

Job characteristic	Transport industry	Logistics industry
Educational level	Low educational attainment	Low educational attainment
Gender distribution	Male-dominated	Mixed but more male representation
Physical job demands	High (partly manual labour, driving)	Moderate to high (partly manual handling)
Psychological job demands	Moderate (tight schedules, safety concerns)	Moderate (coordination, deadlines)
Emotional demands	Low to moderate	Low
Time pressure	High (strict deadlines)	High (constant scheduling pressure)
Lonely work	High (long hours alone driving)	Low to moderate (team environments but can involve isolated tasks)
Electronic monitoring	High (GPS tracking, telematics systems, dashcams, electronic logging device)	Moderate (barcode tracking, security cameras, productivity tracking)

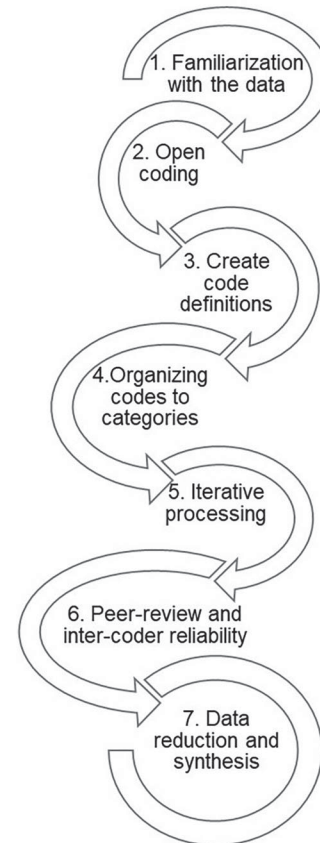
tion, a small number of participants were recruited through snowball sampling. Interested managers and safety representatives responded to an email invitation that included an information sheet and informed consent documentation. Proficiency in the Swedish language was required for participation. A total of 16 semi-structured interviews were conducted via the Zoom video conferencing platform; 10 from the transport industry and six from the logistics industry (Table 1). All interviews were audio-recorded and transcribed verbatim. The interviews ranged from 39 to 58 min in length, with an average duration of 51 min.

2.3. Data analysis

The data were analysed using content analysis, a qualitative method that condenses and organizes data into meaningful categories through systematic comparison and interpretation. Content analysis is particularly well suited to research questions where meaning is implied rather than explicitly stated [21]. Given the similarities between the transport and logistics industries in terms of working conditions, employee characteristics and the use of electronic monitoring systems, the data were analysed as a single group. Initially, the interview recordings were reviewed, and the transcribed data were read multiple times to gain a comprehensive understanding. An inductive approach was employed, beginning with open coding to identify and highlight data segments relevant to the study aim [21,22]. Transcripts were re-read, with notes taken in the margins until no new insights emerged. These notes were then transferred to coding sheets, from which preliminary categories were derived. During categorization, these initial categories were compared and grouped according to conceptual similarities (Figure 1 and Table 3). To enhance credibility, two interviews from each industry were independently coded by two of the authors. Any discrepancies in coding were resolved through consensus. The structured and transparent process of content analysis supports the replicability of the study and contributes to high transferability of findings when properly conducted [21].

2.4. Main theme and categories

The primary theme identified through content analysis of managers' and safety representatives' insights into how electronic monitoring has influenced the work environment in the transport and logistics industries was 'occupational health and safety in the context of electronic monitoring at work' (Table 3). This overarching theme comprised two main categories: 'electronic monitoring and organizational culture', which included

**Figure 1.** Content analysis process.

the sub-categories 'purpose of electronic monitoring' and 'electronic monitoring and the social work environment'; and 'electronic monitoring at work and employee well-being', which included the sub-categories 'electronic monitoring and employee impact' and 'ethical surveillance practices'. The research question concerning the work environment-related purposes of electronic monitoring in the transport and logistics industries is addressed within the sub-category 'purpose of electronic monitoring'. Furthermore, the resources and strategies recommended by managers and safety representatives to balance job demands in the context of electronic monitoring are captured in the sub-category 'ethical surveillance practices'. Perceptions of how electronic monitoring affects job demands are reflected in the sub-categories 'electronic monitoring and employee impact' and 'electronic monitoring and the social work environment' (Table 3). While managers and safety representatives expressed differing views on electronic monitoring, all quotes have been anonymized to maintain participant confidentiality in accordance with ethical standards.

Table 3. Codes, sub-categories, categories and themes of work environmental aspects in the context of electronic monitoring at work.

Theme	Occupational health and safety in the context of electronic monitoring at work			
Category	Electronic monitoring and organizational culture		Electronic monitoring and employee well-being	
Sub-category	Purpose of electronic monitoring (32 codes) RQ1	Electronic monitoring and the social work environment (19 codes) RQ2	Electronic monitoring and employee impact (16 codes) RQ2	Ethical surveillance practices (28 codes) RQ3
Codes	Profiling of information (5 codes)	Integrity and personal privacy (6 codes)	Work intensification (6 codes)	Information and transparency (5 codes)
	Physiological and psychological security (8 codes)	Collegial trust (7 codes)	Highly regulated work, low autonomy (5 codes)	Avoid over-control (10 codes)
	Coordination and planning (6 codes)	Collegial camaraderie (6 codes)	Misinterpretation of electronic monitoring (5 codes)	Work schedule with margin for recovery (8 codes)
	Control and traceability (5 codes)	–	–	Monitor to support not punish (5 codes)
	Compliance with the law (8 codes)	–	–	–

Note: RQ = research question.

Quotes marked with identifiers 'T' indicate participants from the transport industry, while those marked with identifiers 'L' represent participants from the logistics industry.

3. Results

3.1. The work environmental purpose of electronic monitoring in the transport and logistics industries from the perspective of managers and safety representatives

From the perspectives of managers and safety representatives, the work environment-related purposes of electronic monitoring in the included industries involve information profiling, physiological and psychological safety, coordination and planning, control and traceability, and ensuring legal compliance (Table 3). Information profiling refers to the various parameters monitored by electronic systems and their ability to generate detailed profiles. Participants noted that these profiling capabilities are valuable for identifying potential threats and preventing harm to both employees and cargo:

The system monitors if the engine is running, if the handbrake is engaged, if the steps for input are active, if the waste input is functioning, if the plate between the cabin and the rear part compresses the waste. It has good profiling capabilities. (T10)

Participants further described that electronic monitoring is commonly used to enhance both physiological and psychological safety, thereby promoting a secure work environment. For instance, video recordings were noted as valuable for providing critical information in the event of accidents or insurance claims:

There is also a safety aspect to this. If we start thinking about where a car is and why it has been stationary for so long, it may be that something has happened to the driver. (T4)

In addition, participants noted that electronic monitoring systems facilitated improved route coordination and picking order planning through real-time updates. Managers and safety representatives also emphasized the role of electronic monitoring in ensuring control and traceability of cargo and goods, as well as in supporting legal compliance and maintaining operational order. In the context of transport and logistics, this includes monitoring driving speeds and ensuring the lawful handling of goods and cargo:

It's good because it's a security for us. We can follow things that go in and out of the building. We can see if something leaves the building in a way it shouldn't, and such things. (L3)

3.2. Managers' and safety representatives' perceptions of electronic monitoring's influence on job demands

The use of electronic monitoring was reported to contribute to work intensification, characterized by increased physical and psychological job demands (Table 3). Participants explained that these systems enable the rapid identification and filling of scheduling gaps, which can lead to an accelerated work pace. Moreover, the presence of monitoring may create both internal and external pressures to maintain consistently high performance levels:

There is a lot of statistics and such. The employees have a certain target to meet per division or per person every day [...] It can be stressful to have to achieve a certain number of items per shift. (L5)

Job autonomy was reported to be constrained by tightly regulated work processes and prescriptive task guidance, e.g., systems such as pick-by-voice. Participants also highlighted that some employees misunderstood both the purpose and scope of electronic monitoring. This was particularly evident during the initial implementation phase, before employees had become familiar with the technology or had received adequate information about its intended use:

It is possible to follow-up on what everyone is doing every minute. That it is a disadvantage for the individual. (L2)

The truck drivers may think that we sit in the office and watch what they do all day. Then, it can certainly feel like they are under electronic monitoring, even though they may not be. (T4)

Participants also reported that constant monitoring of employees' actions could generate tension and undermine trust between employers and employees. Several emphasized the importance of respecting individual integrity in the workplace. For instance, an unplanned stop during a delivery route or production task could simply indicate a bathroom break, rather than a work-related issue:

The manager can call a driver and ask, 'Why did you drive off the road and stop for 7 minutes?' That is pure electronic monitoring. I

mean, surely you have the right to drive off the road and go to the bathroom! (T9)

A lack of employee trust may contribute to increased job demands for both employees and employers. Some participants emphasized the importance of balancing electronic monitoring with the promotion of trust and a supportive work environment. Achieving this balance, they noted, requires managers to maintain a realistic understanding of employees' working conditions:

There is so much that you can measure, but the employer needs to know how to interpret the information [...] For example, if many employees are working together and someone drops something, and the colleagues help the person to pick it up. Then, they are being questioned, 'Why is there ten minutes between picking up these orders?' (L2)

Participants frequently described a perceived contradiction between fostering positive workplace relationships and team cohesion, and achieving other professional goals such as productivity or sustainable driving. For example, truck drivers might take a minor detour to have lunch with colleagues, or logistics personnel may engage in brief conversations with co-workers – actions that support social interaction but may be viewed as inefficiencies under strict monitoring systems:

You can see where the person is going. He's going to have lunch, [...] 'You can't drive all over town just to have lunch', says the employer. Which you can understand, it's a truck; it's not cheap to drive it around. At the same time, maybe he wants to eat with his colleagues. (T7)

3.3. Resources and strategies recommended by managers and safety representatives for balancing job demands during the implementation of electronic monitoring

Recommended resources and strategies for balancing job demands during the implementation of electronic monitoring include prioritizing transparency and clear communication, avoiding overly controlling management practices, designing work schedules that allow for recovery time and adopting a monitoring approach that supports rather than penalizes employees (Table 3). Information and transparency were emphasized as essential for ensuring that employees understand the purpose, limitations and functions of monitoring systems. Participants described this as an effective strategy to prevent misunderstandings and build trust. Additionally, the ethical and transparent use of electronic monitoring, supported by clear workplace policies and guidelines, was seen as critical to fostering a supportive organizational culture:

Everyone is aware that security cameras exist. Also, how it is used; it is only used when needed. No one is sitting there controlling what you do; it's more if something happens, you can go back and look, and only certain people have access to the video material. (L6)

Some participants emphasized the importance of organizing work schedules to include sufficient breaks and rest periods to support employee well-being. Given the physical and psychological demands inherent in the transport and logistics industries, employees require adequate recovery time to reduce the risk of accidents and injuries associated with work-related stress and fatigue:

Some drivers feel that they don't have enough time to complete what is required to drive in the time they have on the tachograph.

Then I usually say, 'Well, then it's not actually a problem with the tachograph, but rather a problem with the planning'. You should have less to do all the time. T3

Finally, participants underscored the importance of adopting a supportive rather than punitive approach to electronic monitoring. They emphasized that the implementation of such systems should be informed by a holistic understanding of the work environment, with particular attention to employee well-being, privacy and the potential implications for occupational health:

If you have noticed that someone who underperforms via electronic monitoring, then assist to improve the planning on that route; if that is the problem, so to speak. Additionally, if someone is having excessive rest periods in different places due to illness, then rehabilitation should be discussed. (T10)

4. Discussion

In recent years, the pervasive integration of electronic monitoring into various industries, including the transport and logistics industries, has provoked a discussion about occupational health aspects. While such systems are often introduced to enhance safety and security, and reduce workplace accidents, concerns have also been raised about their potential adverse effects on job satisfaction and employee well-being [1,2,5,6,10]. By examining both the positive and negative impacts of electronic monitoring in relation to job demands and resources, this study offers valuable insights into the use of electronic monitoring in the workplace, specifically from the perspectives of managers and safety representatives.

Consistent with previous research [1,5,6], the findings of this study suggest that electronic monitoring can contribute to compressed schedules and intensified workloads, often resulting in increased pressure to work more quickly and efficiently. Data-driven route optimization has also been shown to impose rigid time constraints, further exacerbating these demands [23]. These findings align with the operationalization of job demands within the demand–control–support model [15], which posits that high demands coupled with low levels of control can lead to job strain and elevated stress. Employees in the transport and logistics industries typically have limited autonomy regarding how and when tasks are performed, thereby increasing the risk of job strain [10,15]. Elevated job demands, including work intensification, can adversely affect employees' health by impairing their ability to psychologically detach from work and recover from work-related stress [24,25]. The findings of this study highlight several factors contributing to work intensification in the context of electronic monitoring. Firstly, the data generated through such systems can lead to increased productivity demands or expectations, whether imposed by human managers or algorithmic management systems [10]. Employees may be closely monitored and compared based on productivity metrics, leading to both implicit and explicit performance expectations. This level of surveillance may contribute to heightened pressure and reduced autonomy in daily work tasks. In addition, electronic monitoring enables the optimization or 'maximization' of set-up times, often resulting in consistently fully booked work schedules [23]. Secondly, many companies now offer real-time updates to customers, such as information on packing status, driver routes and estimated delivery times. This places additional pressure on employees to meet rising customer expectations. Thirdly, when managers question minor deviations in driving

routes or brief pauses in manufacturing for reasons related to security, scheduling or efficiency, employees may begin to avoid taking necessary micro-breaks, potentially compromising their well-being in order to avoid scrutiny.

This is concerning, as internal recovery through micro-breaks has been shown to effectively preserve energy levels and prevent fatigue. Such breaks have also been associated with improved performance [26], whereas previous research indicates that electronic monitoring does not yield the same benefits [5]. In the long term, sufficient recovery both during and after the workday is essential for maintaining good health, while inadequate recovery can contribute to symptoms of exhaustion [25]. Furthermore, increased work intensification in the transport industry has been linked to a higher risk of musculoskeletal disorders [27]. From an occupational health perspective, it is therefore critical that organizations in the transport and logistics sectors implement electronic monitoring policies that support, rather than hinder, opportunities for recovery.

The findings indicate that managers and safety representatives were aware that employees may sometimes feel they are being monitored, even when this is not the case. This highlights the critical importance of transparency in the use of electronic monitoring within the transport and logistics industries. It is essential that employees have a clear understanding of the capabilities and limitations of these systems [1,2]. Such transparency helps to prevent misunderstandings and alleviate potential concerns regarding privacy. Moreover, transparent communication can serve as an organizational asset by fostering trust between employers and employees. When employees are fully informed about the scope and purpose of monitoring systems, they are more likely to view them as tools for enhancing workplace safety and efficiency, rather than as mechanisms of unwarranted surveillance [1,2].

Furthermore, the findings related to electronic monitoring and workplace culture underscore the need to strike a balance between monitoring practices and the cultivation of a supportive work environment, one that includes trust in employees. Achieving this balance requires managers to maintain a realistic understanding of employees' working conditions or, in the case of algorithmic management, to ensure that systems are implemented with reasonable and context-sensitive performance expectations [10]. It is also important to note that electronic monitoring has been associated with reduced employee trust in management [28]. Positive relationships with both co-workers and managers are vital for fostering a healthy and productive work environment. When employees experience supportive interpersonal relationships, job satisfaction and engagement are more likely to increase [29]. Such relationships can also enhance teamwork and collaboration, ultimately contributing to greater productivity. Conversely, the absence of strong interpersonal connections may negatively affect occupational health outcomes [30,31]. Therefore, it is essential to ensure that employees have opportunities to develop and maintain meaningful relationships with their colleagues. This may be particularly important in industries where employees spend much of their working time in isolation, such as truck drivers in the transport sector. For these workers, the opportunity to take a lunch break with colleagues even if it requires a minor detour may be especially valuable. Therefore, work schedules that support both recovery and social interaction should be considered. Furthermore, positive relationships between managers and employees, underpinned

by mutual understanding of each other's work conditions, have been shown to enhance employee engagement [30,31]. As such, managers should avoid overly controlling practices through electronic monitoring systems unless clearly justified, in order to preserve trust and promote a supportive work environment.

In Sweden, the transport and logistics industries are regulated by labour laws designed to promote fair working conditions. The Swedish Work Environment Act outlines general requirements for ensuring a safe and healthy work environment, including the prevention of work-related illness and accidents, and the promotion of overall well-being at work [32]. The use of electronic monitoring in the workplace is subject to the General Data Protection Regulation (GDPR) [18], which mandates that employers obtain informed consent from employees prior to implementing monitoring measures. Additionally, employers must ensure that such monitoring is necessary, proportionate and clearly aligned with its intended purpose. Additionally, employers are required to provide clear information to employees regarding the use of electronic monitoring systems, including the types of data collected, the purposes of data collection and employees' rights to access and rectify their personal data [18]. The findings of this study suggest that electronic monitoring systems may be misused, posing a risk of excessive control over employees. Conversely, employees may lack sufficient understanding of how these systems are used by managers or algorithmic management tools. As a result, best practices for the ethical implementation of surveillance in the transport and logistics industries should prioritize transparency, proportionality and active employee involvement. According to the European Data Protection Board, electronic monitoring systems used to track vehicles and driver behavior must be implemented with clear justification, ensuring that they are necessary and proportionate to their intended purpose [33]. Compliance with the GDPR is essential, particularly with regard to data minimization and employees' rights to information and informed consent [18]. Ethical implementation also requires consideration of potential psychosocial risks, such as reduced autonomy or increased work-related stress. Therefore, ongoing dialogue and active engagement with employees and their representatives are warranted [34]. Involving employees in the design and evaluation of monitoring systems can improve acceptance and help mitigate adverse health effects [35]. Ultimately, electronic monitoring should not be used for punitive purposes but, rather, to enhance safety and provide constructive, supportive feedback.

4.1. Recommendations for electronic monitoring in the transport and logistics industries

- Transparent and justified electronic monitoring:
 - define scope, purpose and legal compliance (e.g., the GDPR);
 - engage unions and employees in policy development;
 - restrict electronic monitoring to work-related activities, ensuring necessity and proportionality;
- Avoid over-surveillance:
 - prevent excessive control and micromanagement, but foster trust and autonomy in employee performance;
- Sustainable schedules and workflows:
 - design schedules with recovery margins to reduce work-related stress and fatigue;

- encourage workflows that support teamwork and cohesion;
- Regular policy review:
 - regularly review policies to ensure compliance and fairness;
 - adapt policies based on technological advancements and employee feedback.

4.2. Strengths and limitations

As with all research, this study has both strengths and limitations in relation to its aim and methodology. The qualitative design was well suited to the study's objectives, as it allowed for an in-depth exploration of participants' experiences and perceptions, insights that may not have been captured through a quantitative approach. This facilitated a context-sensitive understanding of how electronic monitoring influences workplace dynamics within the transport and logistics industries. The use of content analysis further strengthened the study, providing a robust and systematic method for interpreting qualitative data [21]. The study sample is considered sufficient based on the principle of informational power [19]. The use of a semi-structured interview guide provided the benefits of both structured and unstructured approaches, yielding comparable, reliable data while allowing flexibility to probe for deeper insights and maintain focus on the research topic [36]. However, content analysis, like all qualitative methods, has certain limitations, including the potential for bias. Recall bias may occur if participants struggle to accurately remember past events. Additionally, results may be influenced by interviewer or participant bias. Social desirability bias is another possible limitation, where participants may provide responses they perceive as socially acceptable rather than entirely truthful [37]. To help mitigate this, the sample included both safety representatives and managers, providing a diversity of perspectives. Furthermore, participants were asked to reflect not only on their own organization's practices but also on conditions in the industry more broadly, thereby broadening the scope and reducing the potential impact of individual-level bias. Generally, managers tended to describe the impact of electronic monitoring on the work environment more positively when referring to their own organization, compared to their views on the industry as a whole. Additionally, the decision to limit interviews to managers and safety representatives, rather than including employees directly, may introduce potential bias in interpreting how electronic monitoring affects the work environment. However, safety representatives serve as spokespersons for employees, drawing on their interactions and feedback to offer a broader and more informed perspective [8]. Additionally, a previous Swedish study involving employees, managers and safety representatives found that safety representatives and employees often shared similar experiences concerning the digital work environment [8]. Nevertheless, the decision to focus interviews on managers and safety representatives in the present study was based on their broader organizational perspective on electronic monitoring, as well as their positions within the organizational hierarchy, which grant them direct influence over the work environment.

All participants in this study were men, which may partially limit the transferability of the findings. However, both the transport and logistics industries are male-dominated sectors (Table 2), which presented challenges in recruiting female participants. It remains unclear whether the findings would

have differed with greater female representation. Nonetheless, workplace monitoring has the potential to reinforce gender-stereotypical behaviors, particularly when surveillance systems are not designed with gender sensitivity in mind [38]. Furthermore, electronic monitoring that detects or infers health-related issues specific to women, such as menstruation or pregnancy, raises significant ethical and privacy concerns [39]. To enhance credibility, two interviews from each industry were double-coded and compared. The trustworthiness of the analysis was further strengthened by interdisciplinary input from the co-authors, whose backgrounds include ergonomics, occupational health, public health, occupational therapy, sociology and human-computer interaction. However, the findings presented in this article would benefit from being complemented by quantitative research to examine associations between electronic monitoring and variables such as performance, job demands, resources, recovery and leadership styles [5]. Furthermore, studies that explore the employee perspective would offer valuable insights into the subjective experiences and perceived impacts of electronic monitoring within the transport and logistics industries.

5. Conclusion

While electronic monitoring in the transport and logistics industries offers clear safety benefits, it may also adversely affect recovery, autonomy and team cohesion. To mitigate these drawbacks, managers should implement monitoring systems ethically and transparently, ensuring they are used to support rather than excessively control employees. Furthermore, integrating adequate recovery time into work schedules and workflows is essential for promoting employee health and sustaining long-term performance.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Ethical approval

All procedures performed in the study were in accordance with the ethical standards of the Declaration of Helsinki [40] or comparable ethical standards. This study was approved by the Swedish Ethical Review Authority #2022-02587-01.

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Appendix 1. Semi-structured interview guide for the digital work environment in the transport and logistics industries.

Topic	Main questions – Examples of sub-questions
Background characteristics	<p>Can you tell me a little about yourself?</p> <ul style="list-style-type: none"> – Age? – Number of years in the industry? – Number of years at the current company? <p>Tell me a little about your business and your role in the company/organization?</p> <ul style="list-style-type: none"> – For example, how many employees? – Who are your main customers? – What does the daily operation look like?
The digital work environment	<p>Please tell me a little about the technology and digital tools you use in the workplace. Give examples of different digital tools or new technology used (IT systems, apps, control panels, etc.)</p> <ul style="list-style-type: none"> – How long have you been working with these digital tools? – What did it look like before this kind of technology was implemented? Manual work? – How was the organization involved in the implementation process for this technology? – What was the main incentive to implement this technology in the organization? 1. How do you experience that digitalization and the introduction of new technology has influenced the work environment in your organization/industry? – How has the digitalization improved the work situation for employees in your organization/industry? – How has digitalization degraded the work situation for employees in your organization/industry? – How have the ICT demands influenced the overall job demands for employees in your organization/industry?
ICT demands and requirements	<p>How do you experience that the digitalization of work has influenced the employees' job demands?</p> <ul style="list-style-type: none"> – In what ways has the digitalization of work changed work tasks and routines for employees? – Is there any particular function/competence that is especially important to efficiently cope with ICT demands at work? – What digital competence do the employees in the organization/industry have, in general? – How does the company work to ensure that employees can efficiently cope with the new technology and ICT demands at work? – How do you consider the digital competence in the recruitment of new employees?
Resources and support	<p>What kind of support is needed for your employees to cope with the technology and ICT demands effectively?</p> <ul style="list-style-type: none"> – What kind of support is offered in your organization/industry to cope with the ICT demands? – How is the availability of time to learn to handle new technology and digital tools in your organization? – What do you do when the technology fails to work properly? – Is the support sufficient? If not, what is missing?
Professional identity	<p>Does the digitalization and ICT demands influence the professional identity? If so, how?</p> <ul style="list-style-type: none"> – Has the digitalization influenced the relationship or contact with customers/clients? If so, how? – Are the employees dissatisfied with anything related to digitalization of work? If so, what?
IT systems and user experience	<p>How well are the IT systems and digital tools in your organization adapted to the employees (users)?</p> <ul style="list-style-type: none"> – How well are the IT systems and digital tools adopted to your organization/industry?
Electronic monitoring and security	<p>How do you experience that the digitalization has influenced the employee security?</p> <ul style="list-style-type: none"> – Better or worse? More or less risks? <p>What is your experience of electronic monitoring in the workplace?</p>
Future scouting	<p>What do you think that the digitalization of work will look like in your organization/industry in the future?</p> <ul style="list-style-type: none"> – How do you believe that will influence the work environment?
Closing question	<p>Is there anything I forgot to ask about, or anything else you would like to add to the interview?</p>

Note: ICT = information and communications technology; IT = information technology.