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Development of the PIPA Method—Participate, Identify, Prioritize, and Act

An Employee-Centered Risk Management Tool for Preventing Musculoskeletal Disorders

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Objective: The aim was to present the development of Participate, Identify, Prioritize, and Act (PIPA) method, a participatory risk management tool to help retail employers identify hazardous work tasks and implement improvements to prevent musculoskeletal disorders. **Methods:** Using the knowledge-to-action framework, PIPA development involved the following three phases: initial concept design, iterative survey development, and feasibility testing through a pilot study. Phases 1 and 2 included discussions with retail representatives, and phase 3 evaluated user perceptions through a pilot study in two retail stores using semistructured interviews. **Results:** The PIPA method captured relevant ergonomic issues and facilitated employee input on potential improvements. Challenges included low participation and difficulties in organizing workshops. Participants highlighted the need for strong communication and flexible engagement strategies. **Conclusions:** The PIPA method offers a valuable approach to ergonomic risk management through employee involvement in the retail sector.

Keywords: ergonomics, feasibility, participatory, psychosocial and organizational factors, retail sector, work environment

Work-related musculoskeletal disorders (WMSDs) remain a significant cause of sick leave globally, including in Sweden.^{1,2} These disorders, which encompass a spectrum of conditions affecting

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LEARNING OUTCOMES

- To gain insight into the development of the Participate, Identify, Prioritize, and Act (PIPA) method as a comprehensive tool for identifying and addressing ergonomic risks in the workplace.
- To describe the importance of integrating employee participation throughout all stages of the risk management process to address musculoskeletal disorders in the retail sector.
- To recognize the significance of continuous feedback and iterative development in enhancing the usability and effectiveness of risk management tools in dynamic work settings.

the muscles, tendons, ligaments, and other components of the musculoskeletal system, often lead to considerable pain, discomfort, and, in severe cases, long-term disability for those affected. Hence, preventing WMSDs by identifying and managing risks in the work environment is crucial not only for safeguarding the health and well-being of employees but also for ensuring and even improving productivity and work quality.³ Employers have a legal obligation to implement systematic risk management processes to ensure a safe and healthy work environment.^{4,5} This cyclical process involves identifying risks, assessing their severity, implementing measures to reduce these risks, and evaluating the effectiveness of those measures.^{4,5} By following this structured approach, employers can effectively address and reduce ergonomic exposures that contribute to the development of WMSDs. However, the etiology of musculoskeletal disorders is multifactorial and influenced by various types of exposures in the work environment. These include not only exposures related to manual handling such as repetitive tasks, lifting, unfavorable work postures but also psychosocial and organizational factors, such as high job demands and stress.^{6,7}

To assess the risks of WMSDs associated with various exposures, a vast number of tools are available, including checklists, observational methods, and technical measuring instruments.^{8–10} These tools, which often target specific dimensions of exposure, help quantify exposure levels and are more accurate in assessing single work tasks and less reliable in assessing multipurpose work tasks.^{11,12} Because of the complexity of musculoskeletal disorders, some researchers argue that assessing different types of exposures related to WMSDs separately is insufficient. Instead, they emphasize the need for a more comprehensive approach, focusing both on risk assessment and the management of hazardous ergonomic exposures.^{12–14} Furthermore, as argued by Oakman and Macdonald, such an approach should ideally be based on employees' own experiences of their work environment and ensure their active participation in the risk management process together with management.¹⁵

A participatory approach to the risk management process involves collaboration between managers, employees, and health and safety representatives. Reviews indicate that this approach is effective in improving workplace conditions and reducing WMSDs.^{16,17}

Macdonald and Oakman¹³ argue that participatory approaches should be integrated throughout the whole risk management process. However, it is noteworthy that few comprehensive risk management methods incorporate a participatory approach while also serving as guidance for the whole risk management cycle. Most existing tools aimed at WMSD prevention primarily focus on the risk assessment part of the risk management process. As mentioned above, these tools are useful for quantifying and assessing specific exposures; moreover, they provide results regarding risk levels and indicate whether they increase the risk of WMSDs. However, the information gained from a risk assessment tool needs to be further processed within the risk management cycle. The assessment becomes meaningful only when employers have a robust and ongoing risk management process in place. Unfortunately, this is rarely the case, as many employers lack the necessary frameworks and would benefit from guided support throughout the risk management process—from identifying hazardous exposures to evaluating the effectiveness of implemented actions.¹⁸ Therefore, there is a need for methods that not only assess potential risks but also provide guidance for the risk management process as a whole, including support for employee participation in the risk assessment process.

A method that supports the whole risk management process is the Risk management Assessment tool for Manual handling Proactively (RAMP), intended for assessing physical ergonomic risks related to manual handling. RAMP is a comprehensive tool that focuses on thorough exposure assessments.¹⁹ Another comprehensive risk management method that prioritizes employee participation is “A Participative Hazard Identification and Risk Management” (APHIRM).¹⁵ This methodology consists of digital tools that facilitate the assessment and management of risk factors associated with both manual handling and psychosocial and organizational aspects of the work environment. The assessments in APHIRM are conducted through an extensive survey administered to employees, which captures hazardous exposures by asking the respondent to rate the severity of various exposures that may affect the musculoskeletal system on a 5-point scale. The results account for the impact of both manual and psychosocial exposures on WMSDs and form the basis for determining how to proceed with risk control.

Another novel comprehensive risk management method is STAMINA (Structured and Time-effective Approach through Methods for an INclusive and Active working life). This method is designed to support participatory systematic work environment management and has been implemented in several organizations, primarily municipalities.²⁰ The method serves as a support model for identifying any work environment issues that affect employees but does not include a risk assessment for any specific exposure. In contrast to APHIRM, where employees rate the severity of various exposures, the STAMINA method uses a web-based questionnaire to gather employees’ perceptions of their current work situation. The collected data are compiled into an index that is shared with the manager responsible for occupational health. The index serves as a basis for recurring work environment dialogs with employees, ensuring that everyone is actively involved in systematically addressing and identifying possible solutions regarding the current work environment issues. The STAMINA method has proved to be effective in improving work environment conditions and fostering employee engagement in work environment management.^{21,22}

The STAMINA method is a proactive approach designed to harness the insights of the employees’ experiences with their current work situation in order to identify solutions for a better work environment in general. This focus on real-time feedback from employees is interesting and can be an important source for identifying hazardous exposures, such as those linked to the development of WMSDs. Research has shown that experiencing musculoskeletal discomfort at work is associated with an increased likelihood of developing WMSDs in the future.^{23,24} The STAMINA approach is interesting to develop and test as a method for preventing WMSDs, especially in workplaces that include multipurpose work tasks.

The Retail Sector

The retail sector in Sweden is one of the largest employment sectors, with several hundred thousand individuals working in both full-time and part-time positions.²⁵ Musculoskeletal disorders are prevalent in this sector.^{26,27} In recent years, changes have occurred in the sector due to the introduction of new work methods, such as e-commerce, order picking services, and home deliveries of e-orders. These developments have intensified picking tasks in both warehouse and retail settings, exposing workers to ergonomically potentially harmful conditions, such as repetitive tasks, heavy lifting, and high levels of stress. In Sweden, a supervisory review conducted by the Swedish Work Environment Authority has identified shortcomings throughout the systematic work environment management process in the retail sector.²⁸ Representatives from the retail sector in Sweden have reported challenges in conducting effective risk assessments for ergonomic risk factors, as the work often involves multipurpose tasks. They report that existing risk assessment tools are of limited value and rarely lead to meaningful improvements in the workplace. Therefore, there is a need for a feasible method that supports the entire risk management process and takes a more comprehensive approach, rather than focusing solely on specific exposures.

This research project aims to combine knowledge and experience from participatory risk management methods (eg, STAMINA and APHIRM) with insights from the retail sector about its ergonomic challenges. The goal is to develop a new method that can assist retail employers in early identification of hazardous work tasks and the implementation of targeted improvements to prevent musculoskeletal disorders.

The objective of this article is to describe the development process of the Participate, Identify, Prioritize, and Act (PIPA) method and to explore the experiences of using the PIPA method 1.0 in the retail sector.

THEORETICAL FRAMEWORK AND OVERVIEW

The theoretical foundation for this study is the knowledge-to-action (KTA) framework, a well-established model for translating research knowledge into practical applications.^{29,30} The KTA framework guided the development of the PIPA Method, ensuring that the knowledge generated from research and practice was effectively translated into actionable strategies for workplace risk management. The iterative nature of the KTA framework also allows for continuous refinement of the PIPA method based on user feedback, ensuring its ongoing relevance. This framework aligns with the principles of user-centered design, which incorporates users into the design process to better understand their needs and preferences.³¹ User-centered design methods are applicable to all product development, particularly when ergonomics are a priority.³²

The development process of the PIPA Method comprises four phases (Fig. 1). In phase one, the initial concept was outlined, and a user needs analysis was conducted. The information gathered in phase one was used in phase two, where, in collaboration with representatives from the retail sector, the content of the PIPA Method 1.0 was developed iteratively. In phase three, feasibility was tested through a pilot study, and the results were used to refine the method. Phase 4 (marked in gray) involves the planned usability evaluation of the PIPA Method 2.0. This paper is limited to presenting the development process, covering phases 1 through 3. Phases 1 and 2 are detailed in the development section, while phase 3 outlines the method and findings of the feasibility evaluation, including the pilot study. The study received approval from the Swedish Ethics Review Authority (D-nr 2021-06843-01).

DEVELOPMENT

Phase 1—Initial Concept

The research group outlined the concept of the PIPA method. The group consisted of the authors of this paper (K.E., Ph.D.; T.H.,

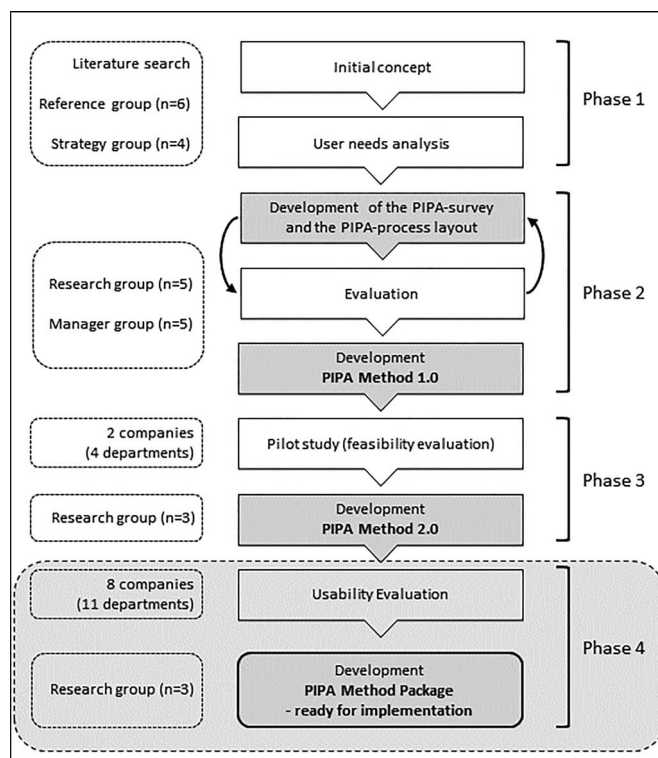


FIGURE 1. The development and evaluation process of the PIPA Method.

Assoc. Prof.; M.S., Prof.; T.N., Ph.D.) and a fellow researcher (P.J., Ph. D.). The concept of the PIPA method was grounded in the idea of a participatory, employee-centered risk assessment approach. Inspiration was drawn from the STAMINA model, which emphasizes the value of simple, direct questions to employees as a basis for work environment measures.²⁰ Furthermore, a key assumption behind the PIPA method is that risk assessments for WMSD do not necessarily need to be quantitative; instead, qualitative feedback from employees can offer valuable insights, making the process more accessible and user-driven. Employees often possess valuable insights into potential solutions for addressing work environment issues.³³ Based on the experience of the research group, findings from earlier research, and inspiration from APHIRM¹⁵ and STAMINA,²⁰ an initial concept for the PIPA method was formed. The content and subject matter, focused on the prevention of WMSDs, were designed to highlight issues based on the experiences of employees performing the work tasks and how these tasks affect their performance and physical symptoms. The PIPA method was built upon four cornerstones:

- The process should mimic and follow the steps in systematic work environment management, as known to managers through the Swedish Work Environment Act.³⁴
- The process should provide support to the management, in terms of not being time consuming.
- The assessment would be based on workers’ experiences of the work environment, focusing not only on identifying hazardous tasks but also on suggesting how these hazards could be addressed.
- The process should be built on collaboration between employees and employers (a participatory approach).

User Needs Analysis

To gather insights regarding the overall concept, needs, and requirements for the PIPA method, the research team conducted three group discussions with representatives from both management and

employees in the retail sector. The first group discussion was held in February 2021 and involved a reference group from the Swedish Retail and Wholesale Council, which is a foundation consisting of employers’ associations and national labor unions. The reference group comprised three labor representatives and three employer representatives. The second and third group discussions were held in May and June 2021, with a “Strategy Group” that included one representative from the Retail Labor Union, one from the Retail Employers Association, and two health and safety managers from large retail organizations. All participants had extensive knowledge of occupational health and safety in the retail sector.

Due to the COVID-19 pandemic, the discussions were held remotely by K.E., T.H., and T.N. via the digital platform Zoom. The length was approximately 1 hour. The aim of the discussions was to gather information on participants’ experiences and views on how to support retail employers in preventing WMSD.

The groups were highly focused on the risk assessment aspect and expressed that it was challenging to evaluate ergonomic exposure in the retail sector, as the work is multifactorial. They were unsure how to address all hazardous exposures using any of the existing risk assessment tools. The researchers presented their concept of a participatory method, where the risk assessment would be based on the experiences of the employees. Participants were then asked to reflect on this idea.

The participants emphasized the need for guidance in the sector on how to assess risks for WMSDs, as well as the need for an easy-to-use method that employers could administer independently, without requiring external consultants. They also highlighted the importance of allowing employees to suggest action proposals and stressed the need to involve management in the process, as they have the authority to make decisions about investing in action proposals.

This information, along with the initial concept, formed the basis for the first design draft of the PIPA method. This work was carried out by K.E., T.H., and T.N. The PIPA method included a process description based on the plan-do-check-act cycle. Each step in the cycle was designed to include different components that needed to be

developed: a survey to identify hazardous exposures, a draft report, and a draft action plan. The creation of these components formed the next stage of the development process.

Phase 2—Development of the Components in the PIPA Method

In the second phase, the content and layout of the components in the PIPA method, especially the PIPA survey, which forms the work environment assessment part, were iteratively developed and evaluated through two group discussions with a group of store managers. The group consisted of five store managers (two female/three male) representing five different companies within the grocery and consumer goods sectors. The discussions were held by K.E., T.H., and T.N. remotely, via the digital platform Zoom. These meetings were held in October and November 2021, with method development occurring in between. Each meeting lasted approximately 90 minutes. The aim of the discussions was to gain insight into the managers' thoughts regarding the concept as a whole, employee involvement in the process, most importantly, the PIPA survey questions. The focus was on how to formulate the questions so that they would be easy for respondents to understand while also providing meaningful input to the managers. The purpose of the survey was to identify troublesome work task/s and/or work situation/s (Appendix A, <http://links.lww.com/JOM/B996>) by asking employees how their bodies felt while working. The questions were intended to identify specific work task/s or work situation/s that caused problems and to ask employees if they had any ideas for potential solutions or improvements.

The discussions highlighted the following factors to be considered during development:

- The impact of stress on physical health, emphasizing the need to address these issues in the survey.
- How to motivate younger employees to participate in the survey. It was noted that many employees in the retail sector are younger and may not yet experience physical discomfort. As a result, they may not understand the importance of their input in preventing WMSDs. This ties into how the PIPA method should be distributed and presented to employees.
- How managers should handle numerous suggestions for improving the work environment. There was concern about raising employee expectations, which could be difficult to manage. This highlights the need for a strategy on how to involve employees in the process effectively.

Regarding input related to the design of the PIPA survey, it emerged that the survey should be short and web-based, ensuring it would take no more than 5 minutes for employees to answer. The initial question should be broad, allowing it to address the complexity of work and encompass physical, psychosocial, and organizational aspects. As highlighted by one participant: 'It has become much more complex to work in the store compared to 5–10 years ago... Nowadays, there's a lot more digitalization in our daily routines.'

The formulation of the questions in the PIPA survey was discussed multiple times during the group discussions. It was also emphasized that simple language and clear formulation were essential for ensuring the questions were easy to understand for those who should answer it. Once a final version of the questions was agreed upon, their validity was tested qualitatively by interviewing 15 people (working in both the retail sector and other sectors) about their thoughts on the questions, ensuring clarity and ease of understanding. Overall, the responses indicated that the questions were well formulated and easy to understand. For example, respondents had no trouble distinguishing between work tasks and work situations. However, one person noted, 'that discomfort after work situations is not immediately felt, while

discomfort after work tasks are' and suggested that it might be difficult to 'catch' work situations in the questions.

Regarding the overall process, the discussions highlighted the need for a clear organizational structure when implementing the PIPA method, such as establishing a group responsible for overseeing the process. Additionally, involving employees in a workshop to prioritize proposed actions for improving the work environment could help foster a shared understanding of which actions will be addressed. Based on the feedback from the group discussions and individual interviews about the PIPA survey, the PIPA method 1.0 was developed.

The PIPA Method Version 1.0.

The PIPA Method 1.0 is illustrated in Figure 2. Its circular layout is designed to represent the method's foundation in the continuous "plan-do-check-act" risk management cycle. In addition to the layout and the descriptions of each step shown below, guidance for conducting the workshop and a simple action plan template were also developed.

Step 1: Getting Started—Form PIPA Group

This step is influenced by the APHIRM toolkit and research showing the importance of anchoring the process in management.^{15,35} It is also informed by research exploring the experiences of both ergonomist consultants and company representatives, which describes the value of a start-up meeting for planning and preparation.^{18,36} As with the APHIRM toolkit, this step is not part of the ongoing process, but it is essential for anchoring the process. In the "Getting started step," the management of a company/store initiates the process by establishing a PIPA group. This group includes, for example, a manager, health and safety personnel, and an employee safety representative. One person is appointed as the PIPA process leader, who should have the authority to make decisions regarding the costs associated with

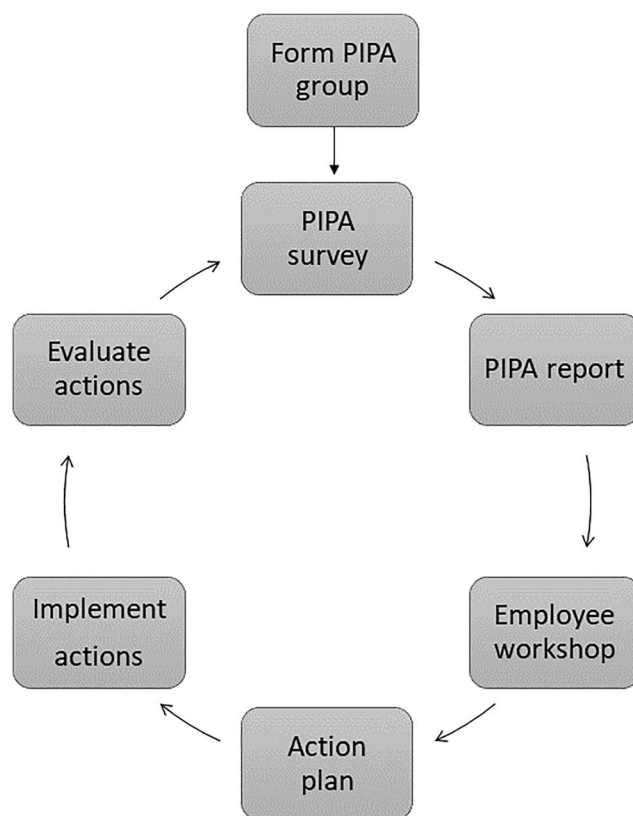


FIGURE 2. The PIPA-method version 1.0.

implementing action proposals. Upon the formation of the PIPA group, the PIPA process leader should communicate the purpose and functioning of the PIPA process to the employees. This entails providing information about their active participation in the PIPA survey, where they can offer insights into potential risks within the work environment, as well as suggest recommendations for suitable actions.

Step 2: PIPA Survey

This phase initiates the process among the employees. A web-based questionnaire is distributed, consisting of one main question and three supplementary questions (Appendix A, <http://links.lww.com/JOM/B996>). The main question is: 1) Do you have work tasks and/or work situations that are demanding and cause pain, discomfort, or fatigue in your body?

If a respondent states a positive answer, the supplementary questions appear. The respondent is then asked to provide a brief description of the work task/situation, followed by an assessment of how much the work task/situation affects their work. This question was inspired by the Self-Estimated Functional Inability Questionnaire, which asks respondents to rate how the intensity of pain affects their ability to work.³⁷ The goal is to understand how the “problematic” work tasks/situations affect productivity.

Step 3: PIPA Report

The questionnaire responses are compiled into a group level report showing: the number of respondents; the distribution of work tasks/work situations that cause pain, discomfort, or fatigue (which identifies hazardous tasks/situations); the discomfort levels of those work tasks/work situations (representing simple risk levels); and given action proposals for improvement.

Step 4: Employee Workshop

The PIPA process leader presents the survey results to employees in a meeting, where they discuss, prioritize, and agree on tasks for improvement and appropriate actions. A simple guide has been developed to assist the process leader in conducting the workshop (Appendix B, <http://links.lww.com/JOM/B997>).

Step 5: Action Plan

The agreed-upon actions are summarized in an action plan, which includes the planned actions, targeted hazardous work tasks or situations, implementation dates, responsible individuals, and how and when the actions will be evaluated. The action plan should preferably be signed by the PIPA process leader and an employee representative. It should be posted on a notice board so that everyone can view the plan.

Steps 6 and 7: Implementation and Evaluation

The final steps involve the implementation of the actions, followed by their evaluation. The action plan guides the implementation and evaluation of these actions.

PHASE 3—PILOT STUDY—FEASIBILITY TEST OF THE PIPA METHOD 1.0

Method

An interview study was conducted to explore users’ (store managers and store employees) perceptions and suggestions for modifying the PIPA method before further testing and usability evaluation. This approach was chosen to obtain detailed and nuanced feedback directly from the users.

Two different stores within the retail sector were purposively selected to test the PIPA-method 1.0. The inclusion criteria were: more than 10 employees working at least half-time and a person (eg, store manager, health and safety manager) responsible for implementing the process. Recruitment was conducted through direct invitations to different stores. The participating stores were: Company A, a store

within a building supply chain. They tested the PIPA method in three departments: the warehouse, shop, and sales department. The PIPA group at Company A consisted of the branch store manager, managers from each department (warehouse, shop, and sales manager), and employee safety representatives from each department. The PIPA survey was sent via direct email to 32 employees, and 23 (72%) responded. Two reminders were sent over a period of 2 weeks. Company B, a store within a retail chain for consumer goods; they tested the PIPA method in the Kitchen Production department. The PIPA group at Company B consisted of the Kitchen Production manager and one employee safety representative from the department. The PIPA survey was sent via direct email to 83 employees, and 26 (31%) responded. Four reminders were sent over a period of 4 weeks. In total, interviews were held with seven participants, representing the PIPA groups as well as employees who completed the survey. However, no employees from Company B chose to participate in the interviews (Table 1).

Data were collected through semistructured interviews, exploring participants’ thoughts on the different steps in the overall PIPA process, the PIPA survey, and the PIPA report. The goal was to gather suggestions for improving the PIPA method. Moreover, descriptive examples from the responses gathered through the PIPA survey are provided to elucidate the various types of answers that emerged from the survey results. The interviews ranged from 15 to 30 minutes and were conducted via Zoom video conferencing. The first author of this paper conducted the interviews. Participants gave their consent for audio recording, and the recordings were transcribed verbatim.

Data analysis was conducted using thematic analysis (Braun and Clarke, 2006), focusing on the predefined questions corresponding to the overall PIPA process, survey, and report. The analysis involved reading the interviews thoroughly, initial coding of relevant data segments, identification of patterns within these codes in order to encapsulate participants’ insights for further development of the PIPA process. NVivo 12 software (QSR International Pty. Ltd., Australia) was used to assist with data management and coding.

Findings From the Pilot Study

The pilot test of the PIPA method 1.0 highlighted both strengths and areas for improvement. Generally, managers found the process to be smooth and familiar, as it followed the Systematic Work Environment Management procedure. Participants appreciated the structured approach, which ensured that no steps were overlooked, especially when it came to evaluating actions.

‘The structure, the order in the flow... What is sometimes overlooked is primarily the final part the evaluation. What was the outcome? You gather information and receive feedback, but then not much else happens. For me, there wasn’t anything particularly new in the PIPA process. It feels, for me, like a natural way to work on making improvements in the work environment.’ (Company A, Manager)

TABLE 1. Description of Interviewees

Role	Company	Age
Branch store manager (PIPA group)	A	57
Employee safety representative (PIPA group)	A	53
Employee (store)	A	53
Employee (warehouse)	A	53
Employee (sales department)	A	67
Kitchen production manager (PIPA group)	B	32
Employee safety representative (PIPA group)	B	49

PIPA, Participate, Identify, Prioritize, and Act.

The survey was distributed to the employees through their personal work e-mail addresses. Response rates were particularly low in Company B and in one of the departments at Company A. The interviewees emphasized the importance of anchoring the PIPA survey to maximize participation and, thereby, the input from employees. They suggested utilizing existing communication channels, such as morning meetings and social networks, to better inform and encourage participation. Furthermore, they recommended using diverse communication strategies, such as direct emails, open links, and QR codes, as crucial for effective dissemination of the PIPA survey.

'We have several channels that we use on a daily basis, so to speak. These include our so-called [internal] social network called Jammer. Additionally, we also share information during our daily morning meetings, for example. I feel that we could have informed employees about this before conducting the survey—about the importance of participating and expressing their opinions and views.' (Company B, Safety representative)

The questions in the survey on ergonomic issues were generally well received, with employees finding them straightforward and well-designed. The survey captured issues related to both ergonomic strain and stress. Examples of the responses captured by the PIPA survey are shown in Table 2. The participants appreciated the opportunity to propose improvements, even if they did not experience any issues themselves. This feedback demonstrates employees' awareness of the importance of ergonomics and their willingness to contribute to improvements.

The PIPA report was valued for its simplicity and clear flow, making it easy for users to understand the described demanding work tasks/work situations and proposed actions quickly. The accompanying guidelines further clarified the steps and provided support, ensuring that even those unfamiliar with the process could understand how to proceed.

'The structure and flow are quite clear for someone who is not familiar with this working process. This is how it should be done. We also had the guidance, which is very helpful. It provides even more detailed explanations, advising on things to consider and how to organize the process. These questions can serve as support.' (Company A, Manager)

Participants also used the report as a living document, useful for ongoing reference and action planning. It was frequently reviewed in monthly meetings, underscoring its role in continuous improvement.

'I particularly like that it is very simple. It is easy to browse through and see what actions we need to take, what we can act upon, or what needs further discussion.' (Company B – Manager)

TABLE 2. Examples of Responses to Challenging Tasks/Work Situations and Suggestions for How to Address Them From the PIPA Survey

Work Task/Work Situation	Action Proposals
Stressful and many lifts due to broken aids, long shifts at the checkout, incomplete schedule.	Whole equipment: trolleys, high-pressure hoses, etc. Better staffing: a better basic schedule to avoid the stress of moving staff between departments
Lifting of boards from shelf to sawing room.	Lifting table that can be rolled into the saw room or other device that helps with lifting and handling of boards.
Working at the checkout causes knee pain. Standing too long at the checkout is very stressful for knees but also for the mind.	There needs to be rotation at stations.

Despite the overall positive feedback, practical challenges were encountered in both test companies. Gathering employees for workshops proved difficult, largely attributed to a lack of time or competing priorities. The production manager at Company B explained, 'We haven't really had the opportunity to hold an employee meeting in that way.' However, in Company A, this challenge led to an alternative approach, where safety representatives acted as intermediaries between the employees and the PIPA group. The safety representatives spoke individually with each employee about the report and the action proposals to gather a more comprehensive picture. This information was then discussed with the manager, who served as the PIPA process leader.

'Yes, everyone has had the opportunity to express their thoughts and opinions. Ideally, they are also alone with me, so they have been able to develop the solutions themselves.' (Company A, Safety Representative)

Besides the alternative approach of engaging employees through direct communication instead of an employee meeting, Company A followed the outlined PIPA process and developed a thorough action plan. A responsible person was appointed for each action proposal, and deadlines were set for when and how the actions should be evaluated. In Company B, however, the process following the PIPA report was less clear. The action proposals were not incorporated into a formal action plan, and the process was somewhat unstructured. The safety representative explained that this was due to the department lacking a solid framework for handling such processes.

'Because we haven't really had any dedicated meetings for that purpose. We haven't really had the time. Our department is well-known for not being great at documentation. We identify issues, then we take action, and then follow up to see if it has improved. But we're not very good at writing it all down. No, no action plan has been developed for this.' (Company B, Safety representative)

DISCUSSION

The development and feasibility testing of the PIPA method highlight its potential as a participatory, employee-centered tool for ergonomic risk management. Unlike traditional approaches that focus on quantifying exposures based on frequency, intensity, and duration, the PIPA method shifts attention to employees' subjective experiences of workload and strain in their tasks. This emphasis on employee input provides a more holistic understanding of ergonomic risks, offering insights into physical, psychosocial, and organizational factors. It also enables the early identification of issues that could contribute to WMSDs.

The pilot study demonstrated that the PIPA survey captured relevant issues related to ergonomic strain and provided employees with an opportunity to suggest specific actions to mitigate the identified risks. Both physical factors as well as psychosocial and organizational factors were captured in the PIPA survey (Table 2). These results show that the PIPA method aligns with the growing emphasis on psychosocial and organizational factors in ergonomics research. While physical factors have traditionally dominated the field, there is an increasing recognition of the importance of psychological, social, and organizational aspects of work in influencing WMSDs.^{38–40} By focusing on the subjective experiences of employees, the PIPA method allows for a more comprehensive assessment that includes physical, psychosocial, and organizational factors. This holistic approach can contribute to a better understanding of the complex interactions between employees, tasks, and the work environment.¹³

Challenges and Areas for Improvement

Despite the positive feedback regarding the PIPA method's structure and clarity, several challenges were identified during the pilot

study that need to be addressed in the further development of the PIPA method to enhance its usability. One of the primary issues was the low participation rate in the PIPA survey, particularly at Company B. This highlights the need for robust communication strategies to ensure that employees are informed about the importance of their participation and the potential impact of their feedback on workplace safety improvements. As noted by participants, utilizing existing communication channels and emphasizing the importance of the survey is a practical approach that could enhance engagement. Although several strategies were used to improve the response rate, such as direct emails, reminders, a simple design, and a survey length of around 5 minutes,⁴¹ diversifying dissemination strategies, such as distributing the survey via QR codes, could further increase participation rates.⁴²

Furthermore, the pilot study showed that in order to improve the PIPA process, enhanced support and training may be necessary for participants in the PIPA group, especially in companies that lack established routines for managing the work environment. Training managers and safety representatives on the PIPA method could ensure a deeper understanding of the process and foster a culture of accountability. Clear guidelines for creating action plans, including assigned responsibilities and establishing timelines for evaluation, would help facilitate follow-through on identified actions and improve the overall effectiveness of the method.

Another challenge identified was the difficulty in gathering employees for workshops, which is critical for discussing survey results and prioritizing action proposals. It is important to find ways to keep employees engaged throughout the PIPA process, as the method is based on a participatory approach that includes the active involvement of employees in the identification, assessment, and control of ergonomic risks.⁴³ The PIPA method aims to integrate participatory ergonomics by involving employees in all phases of the risk management process—from the initial identification of problematic work tasks through the PIPA survey to the discussion and prioritization of actions. This is based on the understanding that employees play a central role in shaping their work environment. Studies have shown that by allowing employees to voice their concerns and propose solutions, a collaborative environment is fostered where employees feel valued and empowered.^{21,22} Furthermore, employee participation can lead to more effective and sustainable ergonomic interventions.⁴³ The alternative approach employed in Company A, where safety representatives acted as intermediaries, proved effective, but it also highlighted the need for flexibility in engaging employees. Given the varying dynamics in different workplaces, this led to the decision to remove the workshop from the next version of the PIPA process. The PIPA method could benefit from incorporating alternative engagement strategies while still emphasizing the importance of employee involvement in developing action plans. One way to ensure that employees are well-represented throughout the PIPA process is to include a diverse group of employees in the PIPA group.

Future Development of the PIPA Method

The pilot study has provided valuable insights into areas for improvement in the PIPA method, including enhanced communication strategies, flexibility in employee involvement, and support and training for the PIPA group. These insights will guide the further development of the PIPA Method 2.0, refining it before its usability evaluation. As the method is adjusted based on user experiences, it can evolve to better meet the needs of different workplaces. Programs/interventions that are adaptable and can be modified to fit the needs of an organization have a better chance of successful implementation.⁴⁴ The iterative nature of the KTA framework,^{29,30} which guided the development of the PIPA method, supports this ongoing refinement, ensuring that the method remains responsive to the changing dynamics of the retail sector. The new version, PIPA method 2.0, will be tested in a larger usability study within the retail sector to explore its usability, feasibility, and outcomes.

CONCLUSIONS

Thus, the PIPA method offers a promising approach to ergonomic risk management by prioritizing employee input and addressing physical, psychosocial, and organizational risk factors in the retail sector. By actively involving employees in identifying hazards and formulating solutions, the PIPA method can contribute to a culture of safety and collaboration, leading to meaningful improvements in workplace conditions. While challenges related to participation and engagement were identified, the insights gained from the pilot study provide a solid foundation for further development and refinement of the method. As the retail sector continues to evolve, the PIPA method has the potential to serve as a valuable tool for employers seeking to enhance the health and well-being of their workforce. Continued testing and refinement will help validate its utility across different settings, ultimately contributing to a safer and healthier work environment.

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