STRETCHING PROG IN MANUFACTURIN

Lessons Learned from Impl

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WORK-RELATED MUSCULOSKELETAL DISORDERS (WMSDs) are a leading cause of disability and lost work time globally. In 2019, musculoskeletal disorders accounted for approximately 322.7 million cases worldwide, with low back pain representing most of these cases (67.15% of cases; Liu et al., 2022). Furthermore, since 1990, the median age range afflicted with WMSDs has risen from 35 to 39 years to 50 to 54 years in 2019 (Liu et al.). These disorders diminish the quality of life for affected workers and impose substantial economic burdens on employers and healthcare systems. The global economic cost of WMSDs is significant, with billions of dollars lost annually due to decreased productivity and medical expenses (NSC, 2016). Therefore, with the increasing age of the global workforce, employers must find ways to mitigate risk for WMSDs, especially among older workers.

Stretching to Prevent Injury

While several theories address the benefits of stretching before and after exercise, proper exercise protocols emphasize the importance of warming up before exercise and cooling down afterward (ACSM, 2020; Behm et al., 2001; Smith, 1994). Among various stretching techniques, static stretching is the most common. However, evidence suggests that static stretching alone may not be the most effective method for injury prevention. As a result, dynamic warm-ups, which incorporate functional and task-specific movements, have gained popularity. Dynamic stretching has been shown to increase body temperature, enhance activity-related flexibility and improve overall performance (ACSM, 2020; de Costa & Vieira, 2010; McMillian et al., 2006).

Workplace stretching programs have demonstrated several benefits in occupational settings, including increased range of motion, improved flexibility and reduced discomfort levels (Gasibat et al., 2017; Lee et al., 2014; Shariat et al., 2018; Szeto et al., 2013). Additionally, these programs have been shown to mitigate the effects of work-related psychosocial risk factors such as stress and low job satisfaction. They also contribute to enhanced feelings of self-worth, self-efficacy and personal attractiveness among participants (Gasibat et al., 2017; Lee et al., 2014; Moore, 1998).

Despite the well-documented benefits of stretching for injury prevention and workplace wellness, implementing these programs often presents challenges. Resistance from employees and management remains a common barrier, making it difficult to effectively adopt stretching routines in many organizational settings (Choi & Woletz, 2010; Lowe, 2007; Thompson, 2000).

KEY TAKEAWAYS

- **Occupational stretching programs are controversial in that many experts do not believe that they are worth the expense to implement. However, the positive psychological benefits should not be understated.**
- **This article focuses on the implementation of occupational stretching programs in a manufacturing facility by overcoming the barriers presented by other researchers. It features an observational analysis that discusses the barriers and facilitators for practitioners looking to implement a workplace stretching program in manufacturing.**
- **This article utilizes researcher and management observations, as well as subjective feedback from employees using surveys and focus groups, to explore the challenges faced in implementing an occupational stretching program amid a global pandemic.**

Benefits of Workplace Stretching Programs

Stretching has been an integral part of fitness routines for decades, where the notion of warming up muscles by increasing blood perfusion is traditionally used as a means of reducing an athlete's risk for injury (Bixler & Jones, 1992; Ekstrand et al., 1983; Hartig & Henderson, 1999). More recently, the relationship between stretching and injury rates has been less straightforward, with some researchers reporting a negligible change in muscle soreness (0.5 to 1 mm on a 100 mm scale) when a pre-activity stretching program is introduced (Herbert et al., 2011; Herbert & Gabriel, 2002; MacAuley & Best, 2002). Despite these mixed reviews on the effectiveness of stretching in reducing injury risk in athletes, worksite wellness initiatives often use occupational stretching programs as a means of increasing flexibility, thereby decreasing occupational injury rates (Lowe & Dick, 2015; Smith, 2013). This approach is effective in not only reducing the incidence of work-related injuries but also decreasing the cost of employee healthcare, although effectiveness varies by study (Aghilinejad et al., 2014; Aje et al., 2018; Cheng & Chang, 2009; Gartley & Prosser, 2011; Muyor et al., 2012).

While the research surrounding the physical effectiveness of workplace stretching programs presents mixed results and many can be found that support and oppose this approach,

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the psychological or psychosocial impact of such programs is much less controversial. Research suggests that these occupational stretching programs can help improve worker satisfaction and productivity; increase worker feelings of self-worth and personal physical attractiveness; improve staff morale and workplace culture; provide an opportunity for downtime, mindfulness, relaxation and self-care; and mitigate the risk for job burnout (Dahlan et al., 2019; King et al., 2021; Moore, 1998; Wahyu et al., 2020).

Workplace stretching programs can serve as a tool for improving interpersonal dynamics within the workplace. Group-based stretching programs have the potential to encourage collaboration, camaraderie and a shared commitment to health. This can lead to strengthened workplace morale and create a supportive culture (Carmichael et al., 2016; Kelly & Snow, 2019). Workplace stretching programs also offer a space for mindfulness, allowing employees to step away from their tasks and focus on self-care, which is a component of sound mental health (Mondal et al., 2025). In the long term, programs such as these may act as a buffer against the pressures of high-stress work environments, reducing the risk of employee burnout, injury and absenteeism (Kirsh & Gewurtz, 2021; Shaw et al., 2021; Tsutsumi et al., 2009). By promoting a well-rounded, holistic approach to employee well-being, workplace stretching programs have the potential to improve individual workplace experiences, but also to contribute to enhanced productivity among the organization.

In the long term, these programs may act as a buffer against the pressures of high-stress work environments, reducing the risk of burnout and absenteeism. Through promoting a holistic approach to employee well-being, stretching programs not only aim to enhance the individual experience of workers but also may contribute to overall productivity and harmony within the organization.

Given the research surrounding the benefits and contraindications of workplace stretching programs concerning their effectiveness in mitigating injury risk, this article presents an observational analysis that monitors the effectiveness of such a program, assuming that it was developed based on the American College of Sports Medicine (ACSM, 2018) guidelines for stretching and would therefore be unlikely to introduce any new risk through stretching alone. The primary goal for the program discussed in this article was to foster improved overall well-being, first by improving a worker's physical well-being, or their perception toward their physical well-being, and then by improving their mental well-being and morale.

The Problem

The management team for a Midwest manufacturing facility noted that many employees completed static stretches together before beginning their shift, but the stretching routine was informal and not rooted in stretching theory. Management was concerned that, given the increased average age of their workforce and their lack of training in proper stretching practice and technique, this routine could lead to an increase in workplace injuries. They were also concerned that the stretches could be ineffective and that this time spent stretching could be targeted at preparing the workers to start their shift. Researchers were invited to the facility to learn about job tasks, observe a typical work shift, and subsequently develop and implement a formalized stretching program for the employees. The researchers were tasked with developing a program rooted in stretching theory according to best practices. They sought to evaluate the feasibility of implementing an optimized stretching program in such a facility, identify roadblocks that would arise, and address those roadblocks throughout the process.

The stretching program was developed in summer and fall of 2019, during which time the researchers attended multiple meetings and observational sessions with facility management. The resulting 6-month intervention implementation occurred in November 2019. By March 2020, the program had halted due to shutdowns imposed because of the COVID-19 pandemic. Details from the initial 3 months of the program were published in Diesbourg and Rougeau (2021). Since publishing the initial findings, the intervention has been reinstated facility-wide across all three shifts, and the researchers had the opportunity to meet with employees to gather further insight and feedback regarding the program following its reimplementation. Due to social distancing regulations, the researchers were not permitted to enter the facility to gather the same physical fitness tests and measures as they were previously, so the researchers focused on working remotely to educate, implement and gather feedback during the post-shutdown launch of the program.

The initial intervention period before the COVID-19 pandemic proved to be effective in increasing employee flexibility and their feelings of overall well-being for those people who fully engaged with the program (Diesbourg & Rougeau, 2021).

When the program was reintroduced, it was expanded to include the second and third shifts to evaluate its long-term facility-wide effectiveness. The purpose of the current analysis is to better understand employee perceptions toward the best practice stretching program that was created for the facility. Furthermore, the authors sought to identify barriers that could prevent the adoption of such a program and how they could overcome these barriers. Building on the work presented by Yazdani and Wells (2018), the authors contextualized the barriers and facilitators for implementing a facility-wide occupational stretching program in a local manufacturing facility.

Materials

Participant Description

As management adopted the program facility-wide, all on-site employees were eligible to participate in the current analysis. Therefore, participants were those who took part in the stretching program, completed surveys or participated in focus groups.

Employee demographics differed between shifts. Management stated that the employees on the first shift (day shift) were older on average than those on the second shift (afternoon shift), and that the employees on the second shift were older on average than those on the third shift (night shift).

Stretching Program

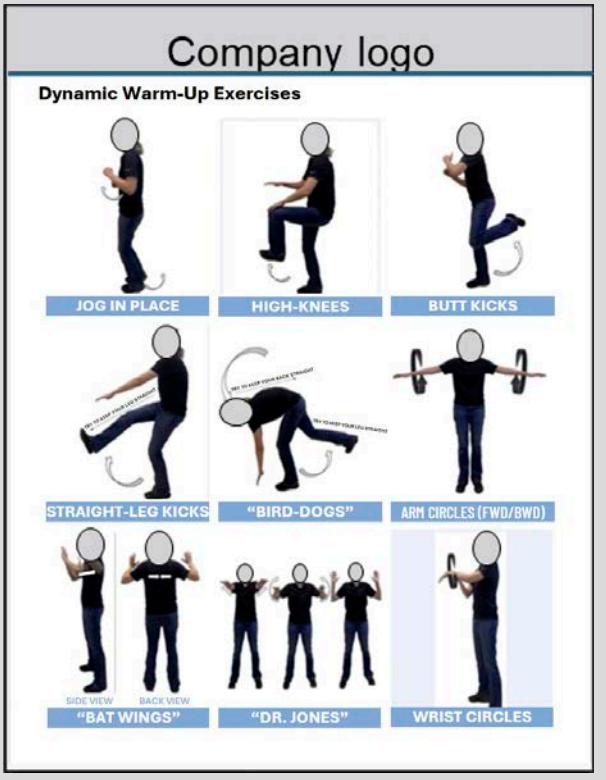
Details about the stretching program and its development have been published in Diesbourg and Rougeau (2021). To summarize, the employees were considered "occupational/industrial athletes," and their typical workday was treated as bouts of physical activity. Therefore, sports medicine and exercise science techniques could be applied to this group of workers by tailoring their physical activity to the "exercise" or physical activity that they undertake over the course of a shift (Callihan & Leonard, 2021; Stockel & Rindal, 2022). Based on best practices for stretching according to ACSM (Diesbourg & Rougeau), a combination of warm-up, static and cool-down stretching routines were developed.

A warm-up program was intended to prepare employees to begin their work shift. It consisted of 10 multisegment movements (e.g., jogging in place, high-knees, arm circles) performed for 30 seconds each. This program was designed to be completed as a group during the preshift meeting. The entire 5-minute protocol was projected onto a large screen so that everyone could follow along, similar to a traditional exercise video. Printed exercise cards (Figure 1) of the stretching program were provided to anyone who had difficulty seeing the screen or wanted to stretch independently.

The static stretching program was designed to be completed at the employee's workstation in the middle of the shift and was developed based on physical demands descriptions for each job. The researchers assembled a collection of 10 to 12 stretches for each type of physical demand element (e.g., pushing, carrying, fine finger movement, walking, driving) as described by Occupational Health Clinics for Ontario Workers (OHCOW, 2021). The safety and health team was instructed to use the physical demands descriptions that they had on file to assemble nine job-specific stretches to be completed mid-shift at each workstation. For example, stretches for jobs that required lifting and lowering focused more on the legs, back and shoulders, whereas stretches for jobs involving fine finger movement focused on the hands, wrists, neck and upper back (Figure 2). These stretches were then compiled as a 1-page exercise program card that was to remain at each workstation.

FIGURE 1
WARM-UP STRETCHES

Dynamic warm-up stretches were presented both in a video, which could be followed during the preshift meetings, and as printed exercise cards. Each exercise was to be completed for 30 seconds before moving on to the next. Employees were encouraged to exercise within their capabilities and modify the movements as needed; however, no specific modifications were provided.



The cool-down program was designed to be completed at the end of each shift and consisted of standing yoga-style flowing movements or positions to help relax tight and tired muscles after working. Stretches included standing poses such as warrior and tree yoga poses, which were held for 3 seconds before transitioning smoothly to the next pose. This program was presented both as a video and as a series of pictures on the wall near the punch clock (Figure 3). Management reported that employees often congregated in this area for 5 to 10 minutes at the end of their shifts after their relief had taken control of the machine. Management identified that this downtime could be a good opportunity for stretching while improving post-shift wellness measures.

Program Modifications for Reimplementation Post-Pandemic Shutdown

Before restarting the program following the pandemic-related shutdown, improvements were made to increase

FIGURE 2

EXAMPLE WORKSTATION EXERCISE CARDS

The mid-shift static stretches were developed based on elements noted in physical demands descriptions for each work area. These stretches were provided as exercise cards for each employee to follow independently at their workstation.

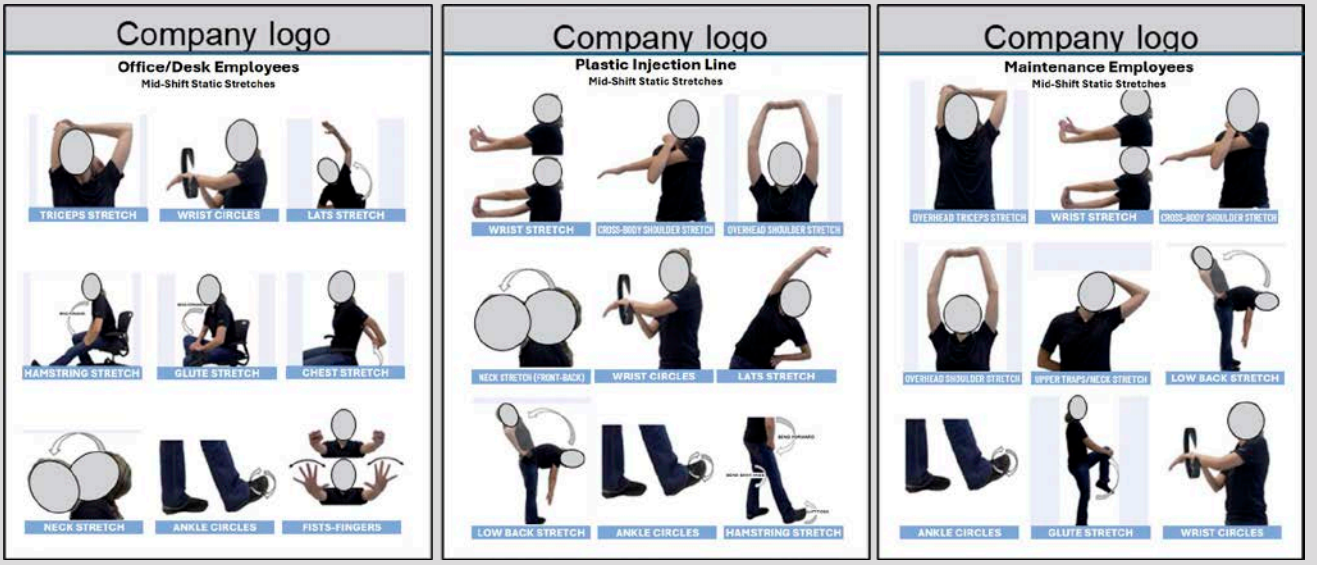
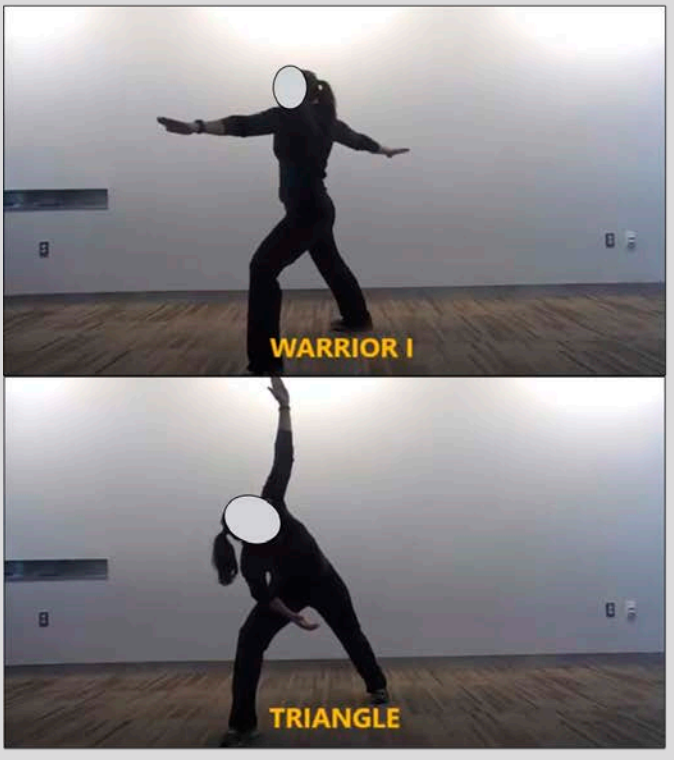


FIGURE 3

EXAMPLE YOGA-BASED COOL-DOWN STRETCHES

The standing yoga-based cool-down stretches were provided as a video (stored on the company intranet) and as exercise cards, which were to be posted near the punch clock where employees congregated at the end of the shift.



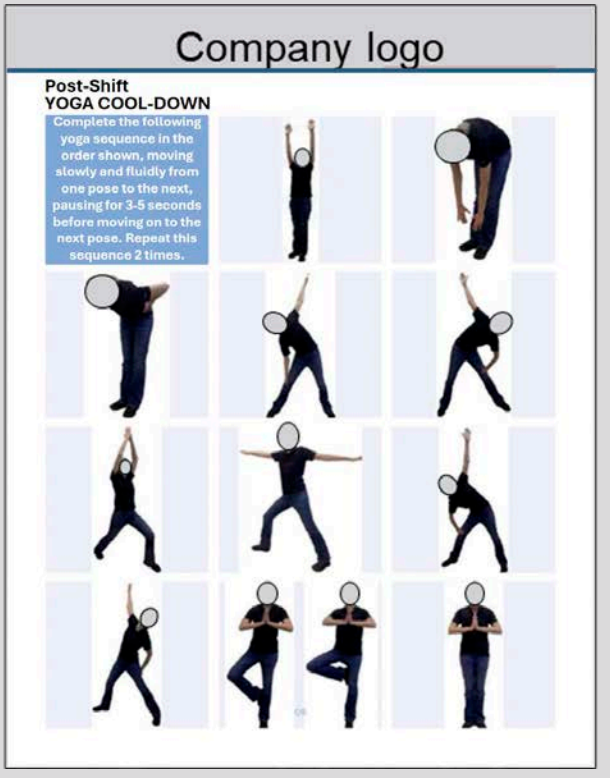


TABLE 1
PARTICIPANT DEMOGRAPHICS

Participant demographics for the 31 employees who participated in the fitness testing portion of the study.

	Male (*n* = 13)					Female (*n* = 18)				
Age (years)	**18 to 24**	**25 to 34**	**35 to 44**	**45 to 54**	**55 to 65**	**18 to 24**	**25 to 34**	**35 to 44**	**45 to 54**	**55 to 65**
n	1	3	4	2	3	0	2	3	8	5
Height (mm)	1905	1829 (89)	1759 (100)	1715 (90)	1592 (98)	--	1588 (54)	1702 (127)	1661 (85)	1621 (66)
Weight (kg)	100	88 (15)	87 (11)	66 (13)	98 (13)	--	34 (0)	73 (17)	84 (17)	86 (29)

Note. Values shown indicate the average (*SD*) height and weight for all individuals according to age and sex.

effectiveness and buy-in. A survey was distributed to first-shift employees to obtain their opinions on the first round of the intervention and whether they would consider participating in such a program in the future. These employees were also asked to provide ideas for improvements that would promote higher engagement with the program and recruit more people to participate.

Based on this feedback and conversations with occupational environmental, health and safety (EHS) professionals, the dynamic stretching videos were improved to include modifications for some of the stretches to allow employees to self-select the "easy," "moderate" and "advanced" versions of each exercise as needed.

During the initial launch, the researchers were on-hand at the facility to address any concerns and answer any questions. However, this was not a possibility for the second launch due to pandemic restrictions and social-distancing measures. To help provide information, educational videos were also created to help with the launch of the second round. These videos included facts about occupational stretching programs and best practices in stretching and were to be shown in the preshift meetings so that all employees had the opportunity to see them. Any questions or concerns that came up after watching the educational videos were to be directed to the researchers if the safety and health team could not effectively answer them.

Methods

Focus groups were held with employees from each of the three shifts after 3 months of facility-wide participation in the stretching program to gather further insight into how employees perceived the program and its effectiveness. Open-ended questions allowed the employees to provide their opinions without the influence of multiple-choice options in a survey. While safety and health representatives were present during these meetings, their relationship with the employees was one of transparency, and the employees were comfortable voicing their concerns to these individuals. Each focus group consisted of 10 to 15 individuals from different departments within the manufacturing section of the facility. Office and lab staff could not attend these meetings due to scheduling conflicts.

Results & Observations

Participant Demographics

Active participants in the first round of implementation consisted of 31 employees on the first shift (Diesbourg & Rougeau, 2021). These employees consented to participate in fitness testing and group stretching protocols, and while their engagement and attendance varied, the authors were able to generate some trends from the collected data. Participant demographics for the first round of implementation are shown in Table 1.

Employees who engaged with the focus groups following the second round of implementation post-pandemic represented all three shifts. While demographic information was not specifically collected for focus group participants, it was noted anecdotally and through conversations with the EHS team that the first shift is older on average, followed by the second shift, and then the third shift, which is generally younger on average than the other two shifts.

Researcher Observations During the First Round of Implementation

For employees who participated fully in the stretching program, the benefits were obvious. Improvements were noted in all flexibility measures (Figure 4) and several participants reported improved sleep and overall well-being (Diesbourg & Rougeau, 2021).

However, employee buy-in and participation rates varied. Some employees were eager to participate and did so fully, coordinating with their departments to complete all stretches as a group. Other employees were not interested in the program but completed the group stretches at the start of their shift because the rest of the group was participating. Similarly, some area supervisors were extremely invested in the program and worked diligently to get their employees on board, but this was a rare occurrence, and often supervisors told their employees to either stretch on their own or to not bother with the stretches at all. For employees who tried to complete the stretches on their own, they often felt judged and ridiculed by their colleagues and reported that they would try to find an isolated place to do the stretches until they were seen and then stopped doing them altogether.

Survey participation was similar in that a small subset of employees (*n* = 3) completed every survey that was sent to them, while others completed a survey occasionally at their convenience, creating an incomplete dataset that was difficult to interpret. More commonly, the survey link would go unopened. It quickly became apparent that electronic surveys would not be a feasible means of gathering information from this group of employees. The safety and health team suggested that it might be more effective to gather survey responses on paper and have one representative collect responses; however, this would eliminate the opportunity for anonymous responses, and having a representative gather the information could bias the responses received.

The most significant impediment faced in trying to launch the intervention came from organization management. Although management originally proposed the development of a stretching program backed by research, they were reluctant to do anything that would interfere with facility operations. Recommendations made by the researchers to improve participation rates—for example posting static stretching diagrams at each workstation and playing an audible tone to remind employees to stretch throughout their shift—were not well received. To reduce distraction and clutter at the machines, the static stretching cards were mounted on pillars, fences and walls in the general environment surrounding similar workstations. Employees repeatedly asked for copies of the stretches to be made available to help them remember what they were supposed to do without having to leave their stations. While the safety and health team discussed multiple

options to accommodate (e.g., creating a small pocket-sized book of safety and wellness procedures for each employee, inserting the stretching card into the procedures manual at each machine, laminating them to the work surface such that they would not get jammed by a part or create an impediment), none came to fruition.

More notably, management was not visibly engaging with the program themselves. Despite volunteering to participate in the data collection portion of the study, they were not completing their stretches throughout the day. When asked if they would be willing to pause operations for 3 minutes in the middle of the shift to have the entire facility complete their static stretches together as they did in their preshift meetings, management was dismissive and no alternative options were discussed.

Feedback From First-Shift Employees about the First Iteration

First-shift employees were asked about how frequently they participated in the individual stretching programs (Figure 5). They were also asked to provide feedback on the program by answering the following questions:

1) What factors prevented you from participating in the program? (Table 2, p. 28)

2) What factors led you to participate? What did you like about the program? (Table 3, p. 28)

3) What are some ways to increase participation in the program? (Table 4, p. 28)

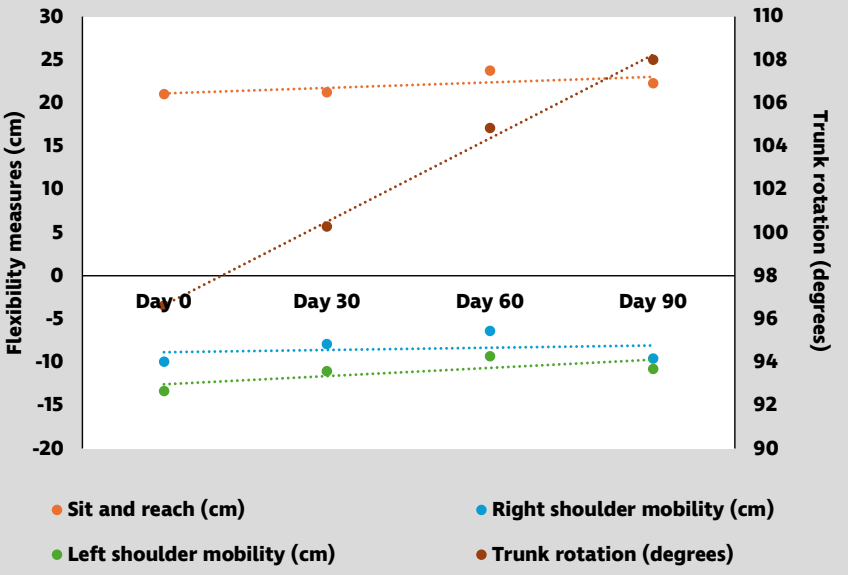
Reports from employees suggested that some of the exercises may have been too difficult for those with mobility limitations. As this was an older group of employees, this was valuable feedback and was the basis for providing modifications to the stretches in the second iteration of the program. Notably, straight-leg raises and jogging in place were the warm-up exercises employees experienced the most difficulty performing. While the straight-leg raise is more difficult for individuals with balance issues or lower extremity pain, this complaint was less surprising than that for jogging in place. Jogging in place is low impact, low exertion and should not have been a limitation to completing the program; however, this feedback provided a better idea of the fitness and mobility level of these employees. As such, modifications were provided for every possible exercise when the program was relaunched (Figure 6, p. 29). In general, employees reported enjoying stretching as a group before their shift. They noted that it was a "great way to start the day" and that it was "a good team-building activity."

Employee comments regarding the static stretches and yoga-based cool-down reinforced the researchers' observations. The employees noted that they did not have time to complete stretches during their shifts and that they did not want to take time out of their unpaid break times (e.g., lunch) to complete them. They also noted that they often forgot to complete stretches while working.

Employees also provided suggestions on how to increase participation in the program. They stated that all three sets of stretches should be completed in groups to improve accountability and encourage engagement with the program and that audible cues should be used to remind employees when it is time to complete the mid-shift stretches. They also indicated that they may be more apt to participate if there was an

FIGURE 4
FLEXIBILITY MEASURES (FIRST ITERATION)

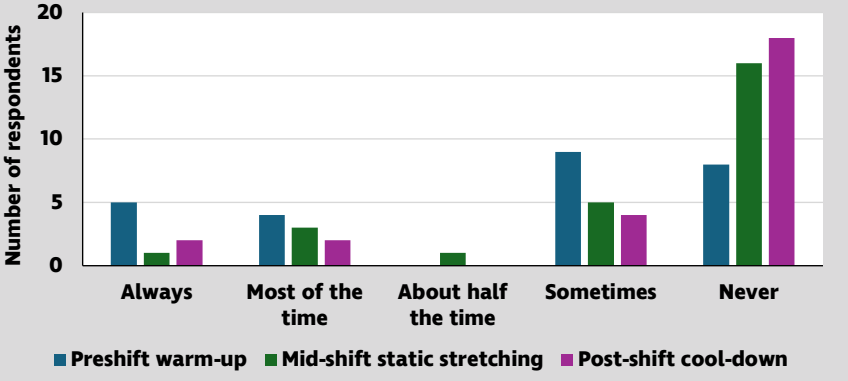
Average scores for all flexibility measures plotted over time during the first round of implementation.



Note. Dashed lines show the linear trend for each of the measures. Equations for each linear trendline are included to facilitate interpretation of the illustration, particularly the slight upward slope of each of these trendlines.

FIGURE 5
PARTICIPATION RATES

Participation rates for the three parts of the stretching program.



Note. The responses from employees suggest that the dynamic group warm-up before the shift has better participation than either of the other two parts of the program, with the yoga-based cool-down at the end of the day drawing the fewest participants.

TABLE 2
FACTORS PREVENTING PARTICIPATION

Employee responses to question: What were some factors that prevented you from participating in the stretching program?

Factors preventing you from participating	*n*
I don't have enough time in my day	14
I forget to do it	9
COVID got in the way (no more group meetings)	6
I would rather exercise at home	1
Injury preventing me from participating	3
Stretches are too difficult/painful	3
I feel embarrassed/self-conscious	3
Fell out of practice due to pandemic	2
Refuse to stretch alone	2
Lack of motivation	1
I'm too lazy	1
Just not for me	1

Note. Column *n* indicates the number of similar responses.

TABLE 3
INDIVIDUAL PARTICIPATION

Employee responses to question: What encouraged you to continue participating in the program? What did you like about the program?

What led you to participate?	*n*
I feel better overall	11
I feel that I'm more flexible	11
It's a fun group activity	6
I find I have increased energy	4
It is mandatory	2
I sleep better	2
I find it easier to complete my daily activities	2
It helps relieve pain or discomfort	1
It breaks up my day	1

Note. Column *n* indicates the number of similar responses.

TABLE 4
ADDITIONAL PARTICIPATION

Employee responses to question: What are some ways that would help encourage other employees to participate in the program?

What led you to participate?	*n*
Complete all stretches in groups	7
Incentive programs	7
Have management stretch too	4
Audible cues as reminders	4
Make stretches easier to find	2
Set to music to make stretching more fun	1

Note. Column *n* indicates the number of similar responses.

incentive program in place to reward those who engage more actively in the stretching program. Lastly, employees reported that having management fully buy in and support the stretching program would increase their willingness to participate.

Improvements Made Before Second Launch

Based on the feedback received from the first-shift employees after the shutdown of the initial program, some modifications were made before implementing the program facility-wide following the shutdown. One major improvement made to the dynamic warm-up stretching video was to present modifications that could help increase or decrease the difficulty of the exercise depending on each employee's physical ability. Furthermore, it became evident that there was a lack of understanding regarding the rationale and theory behind the development of the stretching program. Because researchers could not enter the facility at the time, educational videos were created to explain why the program was presented as it was and to educate employees on stretching best practices and ergonomics considerations at their workstations. These videos were emailed to each employee and stored on public computers in the break rooms for employees to watch when they had a chance. As the preshift meetings were suspended or altered to include fewer people and maintain social distancing guidelines, the videos would not be played for the entire department at one time but were left to each employee to review on their own. It became apparent that many employees had not watched the provided videos, and many did not even know the videos existed.

The authors provided recommendations about the accessibility of the program. Placing exercise cards at each workstation and increasing the visibility of various program elements were to be made a priority. The safety and health team had devised a plan for disseminating the stretches to each workstation and had also agreed to consider an audible cue to remind employees to stretch and proposed the creation of a window of time where the employee would have someone cover their machine briefly so that they could complete their midday stretches before they returned from their lunch break. The safety and health team also stated that they had worked with the company-wide health insurance provider to develop an incentive-based program for employees who actively participated. In addition, they established a wellness team to help champion the stretching program, lead the group stretches and remind employees to complete the midday stretches.

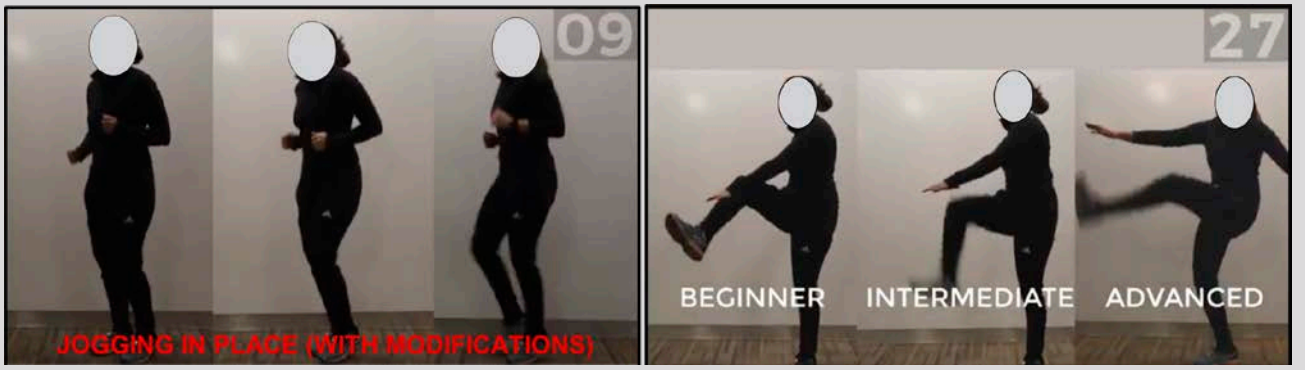
Focus Group Feedback 3 Months After the Second Iteration

After the launch of the second iteration of the program, focus groups were held with representatives of each department across all three shifts to gain a better understanding of the perception toward the program. The reviews were mixed.

The first- and second-shift employees were still generally satisfied with the program, although they stated that they were bored of completing the same program each morning and asked for more videos that they could follow. They also disliked some of the movements (e.g., standing bird-dog, jogging in place), stating that they were too difficult despite the modifications, especially given that they now had to be completed while wearing a mask. Employees also requested that the dynamic warm-up program be replaced with a static stretching program that targets the back, neck and shoulders, similar to what they were previously doing. They reported that they had never seen

FIGURE 6
WARM-UP VIDEOS (SECOND ITERATION)

The dynamic warm-up videos for the second round of implementation included modifications for the exercises that were deemed too difficult by the employees. The number in the top right-hand corner is a countdown timer to help visualize the 30-second timer for each exercise.



the educational videos and, therefore, were unfamiliar with the theory behind proper stretching practice and the value of dynamic warm-ups. Employees also noted that they did not know where the midday static stretching cards were located and that they did not have the time in their day to complete them. They requested that the static stretches be made available at each machine, as they believed that seeing the prescribed stretches there throughout the day would increase the chances that they would attempt some stretches between machine cycles or whenever they found the time.

Interestingly, employees noted that the peer-pressure behavior had reversed itself. During the first iteration of the program, workers felt self-conscious when they were found stretching alone; however, in the second iteration of the program, employees felt self-conscious about not participating in group stretching. This led to increased participation and was a direct result of area leaders and supervisors championing and leading the program at preshift meetings. Employees reported that the preshift stretching was motivating and helped them to "loosen up," and that it built a stronger group dynamic within their department.

However, the third-shift employees (the youngest of the three groups) painted a different picture about their experience with the program. They stated that they did not see the benefit of such a "lackadaisical" program and that the stretches contained in the preshift warm-up were too easy. They requested increased stretch intensity. They also voiced a preference for static stretching, stating that they preferred to "feel the stretch," and that while they did feel "more awake and alert," they did not feel more physically prepared to start their shift. These employees also stated that they wanted proof that this is the ideal format for stretching practice and argued that static stretches would be a more effective way to start the shift, making it clear that this group had also not seen the educational videos created for them.

With regards to the mid-shift static stretches, the third-shift employees stated that they did whatever stretch they felt they needed at the time, not what an exercise card guided them to do. Some employees said that they had never seen the static stretching cards posted around the facility, while others said that they preferred a larger menu of stretches that they could choose from based on how they felt at the time rather than the smaller subset of stretches that was curated for each area.

Even still, all employee groups reported that no one completed the yoga-based cool-down at the end of the shift, even though they still gathered around the punch clock and waited for their shift to end. Some employees noted that they had no idea an end-of-shift stretching program was developed for them and did not know where to find the videos containing these exercises. For ease of implementation, during the second iteration of the program, the post-shift cool-down was changed to repeat the same routine as the preshift warm-up; however, employees were instructed to complete all stretches at the "beginner" modification, as the post-shift cool-down was not intended to be difficult or strenuous.

EHS Team Observations 6 Months After the Second Iteration

After 6 months of promoting the second iteration of the program, the EHS team reported that the preshift stretching was going "better than it was before, mainly because employees don't really have a choice." Area leaders still worked the group warm-up into their preshift meetings, and everyone completed the program together.

However, the mid-shift stretching program was not as successful. After 18 months of working under COVID-19 protocols and regulations, the employees grew weary of being told what to do, what to wear and what not to do. They began to fight the administration on PPE and vaccination requirements, and stated that management could not dictate what the workers do on their own time regarding the static stretches in the middle of the shift. Since these stretches were not intended to be completed on the employees' own time, further inquiry into this statement was needed. If the messaging conveyed is that employees must complete these stretches during their breaks, the messaging should be reworded to clearly state that the time dedicated to stretching is on the company time, not the employees' own time. This same idea permeated to the end-of-shift stretching because employees saw the time spent around the punch clock at the end of the shift as their own time, and did not believe that their employer had any say over how they spent this time.

Discussion

Barriers to Program Development & Implementation

Yazdani and Wells (2018) identified eleven barriers and three facilitators in implementing worksite interventions aimed at reducing occupational injuries. The barriers included factors such as a lack of time or resources; lack of management support, commitment, or participation; lack of knowledge, training, or communication; and lack of control over the work environment, worker perception and scope of activities (Yazdani & Wells, 2018). In general, each of these barriers was encountered in the current intervention process,

although they did not all contribute equally to the difficulties in implementing the current program.

The administration's uninformed decision-making and unwillingness to implement researchers' recommended practices (e.g., print and mount stretching program cards for each workstation, develop informational materials to increase awareness for the program, pause production, set dedicated time aside for stretching) all pointed to a lack of time and resources. Yazdani and Wells (2018) described time constraints as managers struggling to schedule meetings to discuss the intervention and being unable to devote enough time to its successful implementation because their attention was divided. In this study, however, the shortage of time and resources was more relevant to the worker participation in the program. Management was initially supportive and enthusiastic about the program and expressed interesting in launching the stretching program across all their facilities globally; however, they were unwilling to carve out the necessary time in the middle of the shift for the employees to fully engage in the program.

The time and resources allocated for the preshift group warm-up were exceptional. Taking time out of the daily preshift meeting to foster this team-building opportunity served the employees well, and the benefits were clear. Moving forward, the priority should be on being more deliberate in finding other points where stretches could be completed and clearly communicating the benefits and expectations for those points. Examples of opportunities to incorporate stretch breaks can include the time between machine cycles—provided the exercises are readily available—and the time spent waiting around the punch clock. These would be ideal situations by which the program could permeate the entire length of the shift.

The lack of management support, commitment or participation was made evident by management's unwillingness to engage fully with the program. While administration was vocal about their support for the program, they did not put this support into action by participating in the program themselves. Management did, however, support the development of an employee wellness committee (a group of employees, management representatives, EHS professionals, and engineers) to champion the program, which would have gone a long way toward supporting and maintaining the stretching program. However, before the committee could make any changes, the wellness coordinator left the facility, the group disbanded and the committee dissolved. Had the incentive program come to fruition—whether supported financially by the company or through the health insurance provider—it could have been a facilitator for the program, improving participation through incentives.

Worker uncertainty about the rationale behind the stretching program pointed toward a lack of training and education, fostered by a lack of communication. Passive-information dissemination practices are ineffective means of communication and ensuring that everyone is on the same page. Simply emailing the training videos without checks and balances to ensure that they were opened and watched meant that most of the employees did not know the theory behind proper stretching practice and the background for why the program was structured as it was. Without experts on site to immediately answer questions and provide information, any questions that arose throughout the day were left unanswered and employees were more likely to drop out of the program altogether. Providing regular components of training, even brief communications during the preshift meeting each day and sharing tidbits of information, helped raise awareness for the program and the rationale behind it, thereby helping to develop champions who will keep the program afloat and increase its probability of success.

Lastly, the resistance to change and lack of control over the surroundings were the most significant barriers encountered in the implementation of this program. The COVID-19 pandemic introduced barriers that could not be predicted and, while its impact cannot go unnoticed, it is also not something that could have been controlled. The reluctance to change, however, is an issue that must be addressed. Employees were quite vocal in the focus groups about being unwilling to modify their stretching practice to the new format that was presented to them. Despite communications from management and the EHS team to the contrary, as well as the educational and orientation materials that the authors provided with the program, employees were insistent that their original static stretches were the best way to prepare for a shift and that the program presented to them was ineffective. The proposed program focused on the employees as groups and as individuals and failed to address the systematic and organizational barriers to success. While management was committed to integrating the stretching program participation within their employment standards, communication was vague and indicated that participation was optional, which led to barriers in recruiting actively engaged participants.

Other thematic barriers outlined by Yazdani and Wells (2018) were not as prevalent in this facility. Management and employees have a good rapport and seem to trust each other. In this facility, the distrust may have been the opposite of what Yazdani and Wells reported: instead of employees distrusting management's messages and fearing job loss, management may have feared appearing too rigid, which led to mixed messages about whether the program was mandatory. Yazdani and Wells also outlined the impact of process deficiencies, which, given the pandemic-related shutdown, were unavoidable in this situation. Without being able to enter the facility, the program relied on remote educational sessions and having someone in the facility act on the researchers' behalf without being able to oversee the program directly.

While Yazdani and Wells (2018) revealed a disproportionately large number of barriers to successful program implementation when compared to the facilitators, this analysis has provided the information necessary to overcome these factors.

Going Forward

The major limitation in implementing this program is the fact that the researchers are unable to be constantly and consistently on site to encourage participation and dispel any misconceptions. Such a program needs a champion—someone to run the program from inside the facility—and given all the safety and health issues inherent to working through a pandemic, the EHS team could not dedicate the necessary time to make this program a priority. If the company wants to improve this program and adopt it globally (as is their desired outcome), it must invest time and resources to make this happen.

One way to do this would be to hire an occupational wellness director. This person is responsible for programs such as this one as well as other wellness initiatives in the facility. To help with the large undertaking of implementing a program, the wellness director could hire interns from local colleges or universities, which can include students studying fields such as kinesiology, health promotion, public health or exercise science.

These interns could be present during each shift, lead the group stretches, remind employees of the midday stretches and provide modifications based on individual needs. While this approach may seem extreme, and hiring a full-time employee for such programs can seem expensive, these employee wellness programs have shown returns on investment as high as $6 for every $1 spent in the program (Berry, 2014; McCain, 2022). These cost savings stem from reduced injury metrics (which were not directly evidenced in the current analysis), increased satisfaction, morale and presenteeism, as well as reduced sick days and leaves of absence (Berry, 2014; McCain, 2022).

With a more dedicated team in place, it may be possible to implement the rest of the suggested improvements that have not been possible until now. The wellness team could improve the educational messaging, which can include providing tip sheets, more frequent training sessions and answers to any questions that the employees may have about the stretching program. Wellness interns could also complete an audit of the physical demands descriptions on file to ensure that they are up to date and that the recommended job-specific static stretches are appropriate for each workstation. The occupational wellness director could also revisit collaboration with the health insurance carrier to develop an incentive program that would further encourage engagement with the stretching program.

With the proper team in place, the communication and educational component that the researchers were unable to oversee this program could be rectified. From an educational perspective, the focus could be on helping employees understand the importance of proper stretching practice, the benefits of dynamic stretching compared to static stretching, and when each of these is best applied. Furthermore, the educational elements could extend beyond physical wellness and focus on the psychosocial benefits of workplace stretching programs. This would allow the wellness team to further develop and incorporate mental health into employee wellness programs, thereby helping to improve the culture and climate in the facility. Finally, beyond this educational element, having these champions—people who walk into meetings with a speaker and some engaging music and get everyone excited about the program—can help to facilitate the team building and group-centered nature of such a program.

Lastly, it has become clear that the employees generally were not willing to devote the necessary time and attention to this program for the sake of their own health. If the employer believes that improving employee wellness can reduce incident rates and lost-time claims and improve productivity and employee morale, then the employer must be more deliberate in enforcing participation in the stretching program. The language surrounding participation in such programs had been lax up until that point, although the administration later expressed interest in mandating participation. If participation in an employee wellness program is part of the company culture, management must ensure that employees are aware that participation is not optional.

Conclusions

While the benefits of occupational stretching programs are well documented and have been observed in the current facility, the barriers to implementing similar programs are numerous and prove extremely difficult to overcome. Unfortunately, this program was developed and initiated just before and during a global pandemic that slowed the progress significantly at every step and made it difficult to develop any forward momentum in terms of employee engagement. Fortunately, this program was implemented under worst-case conditions. If the barriers of the past two years can be overcome and a successful program established here, it could work anywhere—provided there are frontline employees to champion it from the start. **PSJ**

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