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MSD Solutions Index
Pledge Community Report

Insights from the MSD Solutions Index across the MSD Pledge Community

2022-2023

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Executive Summary

The MSD Solutions Index (Index) is a survey launched by the MSD Solutions Lab in 2022 designed to evaluate an organization's musculoskeletal disorder (MSD) prevention initiatives. It represents three focus areas of MSD prevention at the organizational level: risk reduction, safety culture, and innovation and collaboration. In its inaugural year, the 2022-2023 Index was completed by 52 organizations, primarily located in the United States and largely representing manufacturing or professional, technical and scientific services industries. The 2022-2023 cycle provided many key insights into the MSD Pledge community's successes, as well as where opportunity exists for improvement.

This report provides provides a summary of Index results regarding worker health, safety and MSD prevention. Overall, it was found that Pledge community organizations are excelling most in their safety cultures, but less in areas of risk reduction and innovation and collaboration efforts. Higher overall Index results were seen in association with the incorporation of human factors, provision of ergonomic equipment, trust among different levels of the organization, frontline worker involvement in decisions and tracking of leading indicators. The report concludes with several recommendations and steps to help organizations advance their MSD prevention and mitigation efforts.

Introduction

Born out of the groundbreaking MSD Solutions Lab at the National Safety Council, the MSD Solutions Index is an annual survey designed to help organizations understand and further advance their unique MSD safety journeys. The Index is available to organizations who have signed the MSD Pledge: an initiative to create a community of businesses that can work together with the shared goal of reducing MSDs. This initiative aims to reach its goal through three focus areas:

- **Risk reduction:** Understanding and analyzing the causes of MSD injuries and investing in solutions and practices to reduce risk
- **Safety culture:** Promoting and ensuring a workplace where safety excellence, transparency and accurate reporting are equally valued – understanding that all workers, at every level of an organization, have a role to play in the safety and health of the workplace
- **Innovation and collaboration:** Leveraging best practices and sharing learnings and innovations to improve safety practices across the community

Overall, charter Pledge members are committed to reducing MSD rates by 25% by the year 2025. Responses provided by organizations upon Index completion have been used to measure the progress of the community's alignment to Pledge commitments. Completion of the Index provides Pledge organizations with personal in-sights into their areas of success and opportunity related to worker health, safety and MSD prevention. Furthermore, completion of the annual Index holds Pledge organizations accountable for their pledged commitment to advancing their risk reduction, safety culture, and innovation and collaboration efforts to further MSD reduction and prevention.

Participants received an overall Index result, as well as results for risk reduction, safety culture, and innovation and collaboration subsections, which fell into one of the following five categories:

- **Innovating:** Alignment to and progress along the MSD Pledge is desirable and ideal – indicates an organization should continue its current practices of learning and investing in new innovations and sharing successes with others but continue to actively search for ways to grow and improve
- **Proactive:** Alignment to and progress along the MSD Pledge is strong – indicates an organization has well-executed prevention efforts where MSDs are anticipated and prevented before they occur, with some areas for growth and improvement
- **Advancing:** Alignment to and progress along the MSD Pledge is satisfactory – indicates an organization is building solutions to manage MSD risks and hazards, with several areas for growth and improvement
- **Reactive:** Alignment to and progress along the MSD Pledge is moderate – indicates an organization is responsive to injuries when they occur, with many areas for growth and improvement
- **Novice:** Alignment to and progress along the MSD Pledge is rudimentary – indicates an organization has few MSD prevention efforts in place, may not be fully aware of the issues related to MSDs or may not know where to start

Survey Methodology

The Index was designed with three subsections each encompassing a focus area of the MSD Pledge: risk reduction, safety culture, and innovation and collaboration. Items on the survey were developed by the MSD Solutions Lab team and were informed by literature on MSD prevention, current MSD risk assessment tools and input from internal and external subject matter experts. Experts consisted of ergonomists, academics, consultants, practitioners and industry representatives in the disciplines of ergonomics, injury prevention, industrial engineering and industrial/organizational psychology. This pool of experts also conducted regular and complete reviews of the Index, both in its subsections and as a whole.

The final 2022-2023 Index included 46 questions addressing the three subsections of risk reduction, safety culture, and innovation and collaboration using multiple-choice, yes/no, Likert scale or open-ended answer options. The survey was administered through Qualtrics and allowed for different avenues of survey progression dependent upon each organization's unique responses. Each Pledge organization received an individual link to complete the Index via email, with reminder emails regularly sent to non-participating organizations throughout the administration period. Participants were also provided with a glossary of terms to ensure that terminology was commonly understood among all survey respondents (see Appendix A).

The 2022-2023 Index cycle opened on Dec. 12, 2022, and closed on June 1, 2023. Once the analysis was complete, organizations received a report with individualized feedback based on their responses as a whole and within the three subsections. Results on each of the three subsections of the survey were calculated and those results were summed to provide organizations with their overall Index result. Participants could receive different results across the three subsections (e.g., a novice result on risk reduction and a proactive result on safety culture). The three subsection results are used together to determine an organization's overall Index results. Correlations were conducted between pertinent variables for further analysis and are included through-out the report and in Appendix B. See Appendix C for a more detailed survey and analysis methodology.

Part One: Pledge Community Year One (Baseline) Findings
Community Demographics

A total of 52 organizations out of 165 Pledge organizations completed the 2022-2023 MSD Solutions Index by June 1, 2023, representing a 31.5% response rate. While response rates are heavily influenced by several factors including level of interest, survey structure and distribution method, a response rate between 25% and 35% was expected since electronically delivered surveys (via email) generate lower response rates than pen and paper (Saleh & Bista, 2017; Yun & Trumbo, 2000). Respondents were senior-level leaders or safety and health professionals, with most completing the Index for their entire organization (86.5%), as opposed to a single department, with the majority headquartered in the U.S. (88.5%; Figure 1).

Over a quarter of respondents represent the manufacturing industry (26.9%), followed by the professional, scientific and technical services industry (21.3%). Of responding organizations, 59.6% have some of their staff working remotely, while 61.5% report some of their staff working hybrid. Most responding organizations were medium in size (40.4%), while others were small or large (26.9%, 32.7%, respectively). For the purposes of this report and the MSD Pledge community, small organizations have less than 50 employees, medium organizations have 50 – 1,000 employees and large organizations have over 1,000 employees. Standard size ranges for businesses vary depending on the source used (e.g., Healthcare.gov, Small Business Administration, BLS) and therefore the Index and MSD Pledge community data were used to determine the size range cut points for this report.

Figure 1

Breakdown of Participation by Organization Headquarters

| USA | Canada | Australia | France | United Kingdom |
| 88.5% | 5.8% | 1.9% | 1.9% | 1.9% |

Table 1

Respondents by Industry

Respondent by Industry*	Percentage of Responding Organizations
Manufacturing	26.9%
Professional, Scientific and Technical Services	21.3%
Transportation and Warehousing	9.7%
Health Care and Social Assistance	9.7%
Utilities	7.7%
Construction	3.8%
Public Administration	3.8%
Educational Services	3.8%
Other Services (except Public Administration)	3.8%
Accommodation and Food Services	1.9%
Finance and Insurance	1.9%
Information	1.9%
Retail Trade	1.9%
Wholesale Trade	1.9%
*Some respondents who selected "Other" as their industry were recoded by the authors based on NAICS code for ease of analysis	

Community Ergonomics and MSD Prevention

For the purposes of the Index, a traditional ergonomics program was defined as a systematic process for identifying, analyzing and controlling organizational, job task and individual risk factors. An MSD prevention program was defined as a traditional ergonomics program plus additional tools and information specifically for MSD prevention. Of all responses, 82.7% had some form of MSD prevention and/or ergonomics program in place. As shown in Figure 2, 40.4% of respondents stated they do not differentiate between their ergonomics and MSD prevention programs, while 17.3% indicated they do not have either program.

Figure 2

Percentage of Responding Organizations with an MSD Prevention and/or Ergonomics Program

- MSD program only
- Traditional ergonomics program only
- Both
- Do not differentiate between programs
- No programs

Overall Index Summary

A majority of organizations (84.6%) who participated in the Index in the 2022-2023 cycle received overall results in the advancing (38.5%) or proactive (46.1%) categories, meaning organizations that completed the Index might have established MSD prevention and/or ergonomics strategies with opportunities for advancement (Figure 3). No relationship was uncovered between an organization's overall Index result and industry type, size or length in the years that their MSD prevention/ergonomics program has been established. However, smaller and medium organizations were likely to have initiated their programs within the past five years, while larger organizations tend to have more tenured MSD prevention programs, with most large organizations having a decade or more since program establishment.

While not measured on the Index, it is suspected that larger organizations have more resources in terms of people, time and money to devote to an MSD or ergonomics program. As a result, larger organizations likely have dedicated ergonomic staff, regularly conduct assessments and can invest in more complex MSD solutions such as emerging technology. Larger organizations also were more likely to administer employee perception surveys ($r = .33$, $p = .028$). However, larger organizations saw lower levels of trust ($r = -.48$, $p < .001$) and lower reported levels of frontline worker involvement in decision making ($r = -.56$, $p < .001$). Lastly, larger organizations were less likely to provide their workers with the proper ergonomic tools and equipment ($r = -.33$, $p = .016$). An explanation for these findings relating to organization size is unclear and requires more study, but could be the logistics of managing larger organizations, levels of direct contact between employees or employee involvement in decisions.

Figure 3

Percentage of Respondents per Results Category for the Overall Index
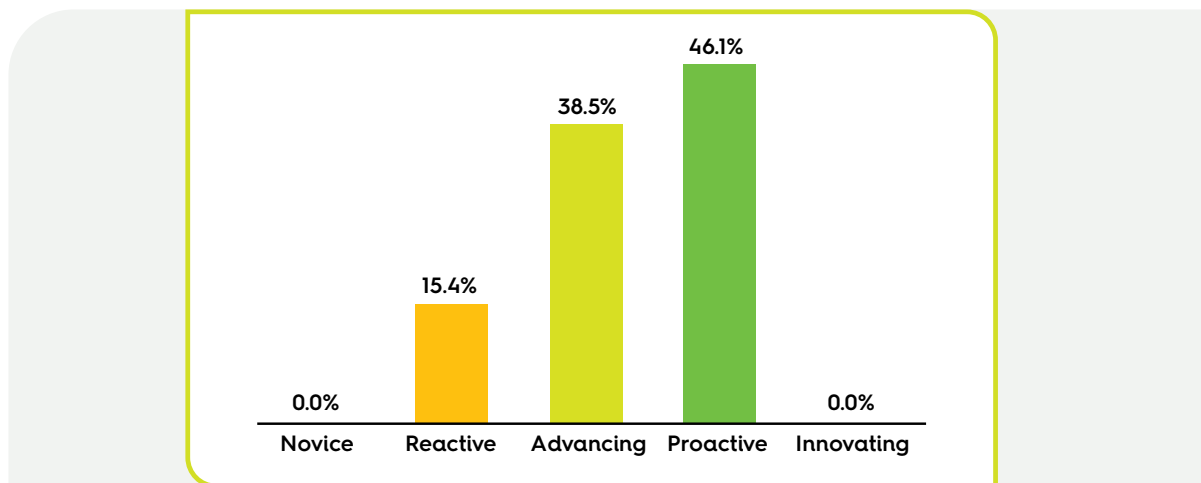
As expected, due to the structure of the survey questions, risk reduction, safety culture, and innovation and collaboration subsection results were highly correlated with an organization's overall result on the Index. It was also found that the extent to which human factors were designed into organizations' work processes is significantly positively correlated with an organization's overall Index result ($r = .42$, $p = .002$). Organizations that more consistently provide workers with appropriate ergonomic tools and equipment were also found to have higher overall Index results ($r = .33$, $p = .019$).

From the lens of safety culture and psychological safety, the stronger the trust between workers and other employees in an organization, the stronger their overall Index result ($r = .32$, $p = .020$). Lastly, the more frontline workers are involved in making organizational decisions, the stronger their overall Index result ($r = .44$, $p = .002$). While these results were expected due to the scoring structure of the survey (e.g., higher levels of indicated trust yield a higher result on the culture section, which in turn yields a higher overall Index result), these correlations give a level of validation that the Index items are providing helpful information for the Index overall.

Risk Reduction Subsection Summary

Of responding organizations, 44.2% received a result of advancing within the risk reduction subsection on the Index, 30.7% fell below the advancing category (1.9% novice; 28.8% reactive) and 25.1% fell above the advancing category (21.2% proactive; 3.9% innovating; Figure 4). No relationship was discovered between the risk reduction results and industry type. However, a significant positive correlation exists between risk reduction results and organization size ($r = .44$; $p = .001$). In other words, larger organizations tend to score more favorably on items in the risk reduction subsection, potentially due to resource flexibility (e.g., personnel, budget). Additionally, a significant positive correlation was uncovered between risk reduction results and years that an MSD prevention/ergonomics program has been established ($r = .39$; $p = .012$). The more tenured an organization's program, the higher the risk reduction efforts initiated by the organization.

Figure 4

Percentage of Respondents per Results Category for the Risk Reduction Subsection
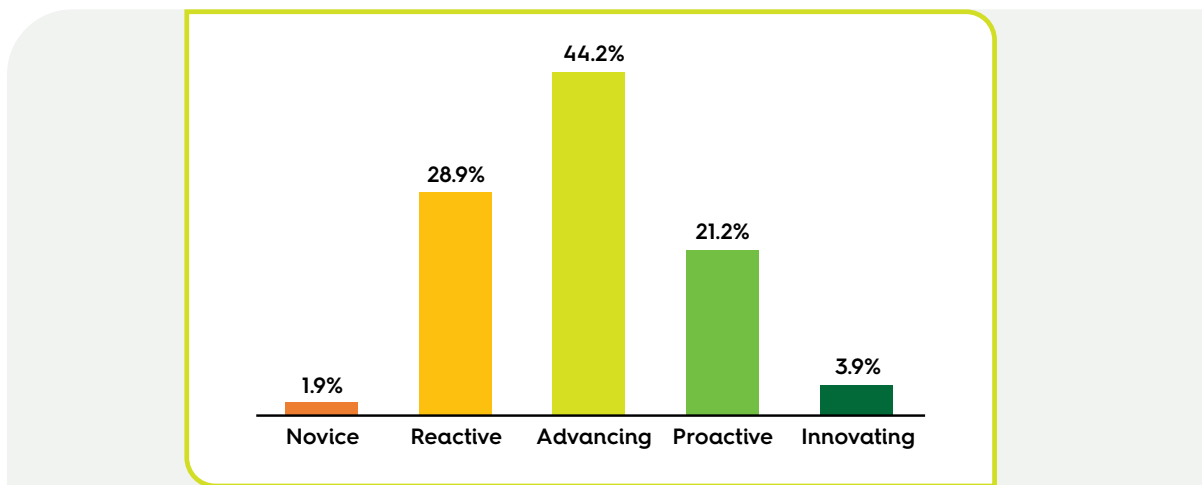
Tables 2 and 3 below reflect the most common risk factors and impacted body parts across the Pledge community. Due to the high participation of organizations from the manufacturing industry and professional, scientific and technical services industry, certain risk factors were most frequently selected such as awkward posture/excessive bending or twists, lifting or carrying and repetitive activities (computer-related). Similarly, the most impacted body parts were the shoulder and low back, equally rated as the most impacted, followed by the wrist and neck. These risk factors and affected body parts align with the demands commonly seen in the industries predominantly represented by Index respondents (Chinedu et al., 2020; Hembecker et al., 2017).

Table 2

Most Common MSD Risk Factors

Risk Factor	Percentage of Responding Organizations*
Awkward postures/excessive bending or twists	53.9%
Lifting or carrying	40.4%
Repetitive activities (computer related)	34.6%
Prolonged sitting/standing	30.8%
Pushing or pulling	28.9%
Forceful exertions	25.0%
Static postures	21.2%
Repetitive activities (non-computer related)	19.2%
Individual factors	11.5%
Overhead work	9.6%
Lack of recovery or rest between tasks	5.8%
Reaching	3.9%
Gripping	3.9%
Temperature extremes (heat/cold)	1.9%
Psychosocial factors	1.9%
Hand-arm vibration	1.9%
Organizational factors	1.9%
Other	1.9%
*Sum totals above 100% as the question was multi-select	

Table 3

Body Parts Most Impacted by MSDs

Body Part	Percentage of Responding Organizations*
Shoulder	57.7%
Low back	57.7%
Wrist	42.3%
Neck	32.7%
Knee	17.3%
Hand	15.4%
Elbow	7.7%
Trunk	5.8%
Hip	3.9%
Ankle	3.9%
Other	3.9%
Unsure	17.3%
*Sum totals above 100% as the question was multi-select	

Analyzing MSD prevention programs, efforts and strategies uncovered other interesting insights. Of the 52 respondents, 65.3% reported tracking the number of MSDs occurring in their workplace. Lagging indicators were the most commonly tracked MSD prevention indicators, with 65.3% of Pledge organizations who completed the Index tracking OSHA or comparable logs and workers' compensation claims. However, fewer organizations are tracking leading indicators, such as the number of high-risk jobs eliminated (12.2%) or the number of jobs where MSD risk was reduced (16.3%).

Additionally, many organizations reported they most frequently employ MSD interventions at the personal level (e.g., personal protective equipment; 42.0%) and/or organizational level (e.g., workstation redesign; 46.0%), but only two (3.8%) organizations reported they most frequently used interventions at a systems level (e.g., automation, robotization). This provides further evidence that while technological solutions are available, their adoption is still in its infancy among MSD Pledgees.

Lastly, when asked what types of information assist in determining the need for ergonomics and workplace safety changes, 80.4% of respondents utilize employee feedback. Less (37.3%) indicated they utilized risk assessment tools, such as the Rapid Upper Limb Assessment, Rapid Entire Body Assessment results or third-party feedback. Involving workers in MSD prevention design and implementation is imperative to MSD prevention success, so it is encouraging that a majority of respondents gather employee feedback.

Areas of Celebration

Within risk reduction, Index participants excelled and uncovered important relationships in several areas. Of the respondents, 53.8% rated their workplace's ability to prevent MSDs as either very good (26.9%) or excellent (26.9%). This rating is backed by significant positive correlations between the self-rating of a workplace's ability to prevent MSDs, their Index overall result ($r = .34$, $p = .013$) and their safety culture result ($r = .36$, $p = .009$). Risk reduction subsection results were also positively correlated with whether an organization had an MSD prevention program ($r = .28$, $p = .047$).

Additionally, 42.3% of respondents reported having risk reduction goals in their workplace. These goals were focused on risk reduction methods such as ergonomic assessments, prevention through design and staff training. Many organizations also had MSD reduction goals ranging from a 10-25% reduction in MSDs to zero MSDs. Having measurable goals is an important factor in the process of reducing and eliminating workplace MSDs. Ideally, these goals should be specific, measurable, action-oriented, realistic and time-bound (SMART), as this method of goal setting has been proven to effect lasting change through increased motivation and clarity (Locke & Latham, 1990).

Notably, organizations that track more leading rather than lagging indicators of MSDs received significantly better results in all subsections and on the Index overall (see Appendix B). Identifying preventive actions that qualify as leading indicators results in increased incident reporting, increased hazard awareness and reporting, and clearer occupational health and safety decision-making (Sheehan et al., 2016; Sinelnikov et al., 2015).

Opportunities for Improvement

Currently, 17.3% of respondents do not have an ergonomics/MSD prevention program. Those organizations without a program received guidance from the MSD Solutions Lab on kickstarting their MSD prevention and ergonomics journey. Alternatively, organizations who seek to improve their program can find guidance within the MSD Solutions Lab Sample Ergonomic Policy.

Findings in the risk reduction subsection indicate that 48.1% of respondents do not have risk reduction goals in their workplace. Those aiming to set risk reduction goals should identify their high-risk tasks and main risk factors. In combination with risk analysis, goal setting could show where and how to make the most needed improvements.

Methods for MSD risk reduction measurement ranged across several different mediums. For example, some Pledge members who completed the Index indicated the use of third-party software to track and calculate reduction, while others used OSHA 300 logs, ergonomic assessment or audit information, job analyses or key performance indicators analyses. This indicates an insufficient consensus in the community about the best way to measure and track MSD risk reductions. Some recommended ways to best measure and track MSD risk reduction are as follows:

• MSD risk assessments to identify risk factors, including periodic risk assessments as a proactive approach
• Injury and incident reports

- Tracking of leading indicators such as leadership support, ergonomics/MSD reduction steering committees, worker participation, hazard identification and assessment, hazard prevention and control, ergonomics education and training, program evaluation and improvement, and open communication
- Workplace observations (e.g., Gemba walks, employee surveys and feedback)
- Benchmarking with similar industries

Safety Culture Subsection Summary

In general, respondents showed slightly higher average results in the safety culture subsection, with 42.3% of respondents in the proactive result category (see Figure 5). No relationship was uncovered between an organization's safety culture result and industry type, organization size or tenure of an MSD/ergonomics program.

Figure 5

Percentage of Respondents per Results Category for the Safety Culture Subsection
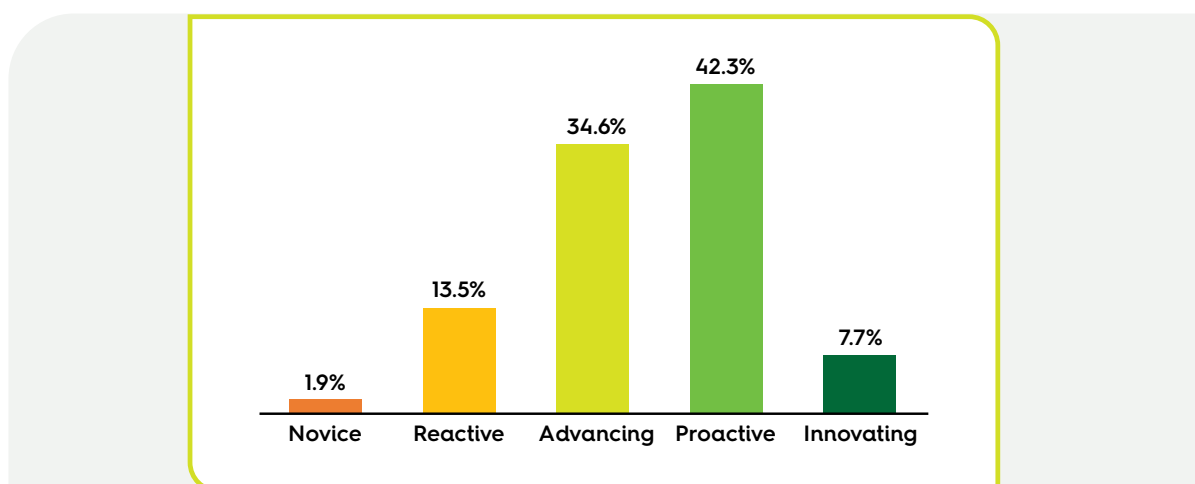
Most organizations responding to the Index indicated strong levels of trust between workers and other workers, supervisors, senior leadership, other management and safety teams. The majority of respondents indicated their organization had open communication and that they felt comfortable bringing up MSD concerns. However, 21.2% of respondents did not feel their senior leadership communicates the importance of MSD prevention to workers, while 30.7% neither agreed nor disagreed that their senior leadership communicates the importance of MSD prevention. Respondents were more likely to cite frontline worker involvement in decision making concerning workstation design, job or task redesign, the physical work environment, workflow, mental health and wellbeing, work schedule and the return-to-work process. Frontline workers were reportedly less involved in determining changes to their job tasks, tools, equipment or machinery and their workplace's culture.

Mental fatigue and lack of training, personnel, equipment and tools were the most commonly cited psychosocial risk factors that could increase the likelihood of an employee injury. Psychosocial risk factors such as these can negatively contribute to an organization's overall culture, including its safety culture. Specifically, psychosocial risks such as low levels of supervisory support, poor collaboration between colleagues, high job demands, burnout and job dissatisfaction can lead to poor safety performance and safety culture (Anderson et al., 2019; Macfarlane et al., 2009; Melamed, 2009; Yang et al., 2023). Given that these risks are relatively straightforward when informing subsequent hazard control plans, organizations are well-positioned to take action and strengthen their safety cultures. For example, a robust fatigue toolkit or supervisor training may be beneficial to an organization's resource list.

Areas of Celebration

Of respondents, 65.4% currently conduct employee perception surveys. These surveys are an effective way to measure workplace safety culture and psychosocial MSD risk factors (e.g., job satisfaction, leadership support, job autonomy) that may be impacting workers. Given the importance of these surveys, a majority of Index respondents utilizing them is worthy of recognition. These surveys provide data on which areas are most in need of change. Organizations that conducted employee perception surveys were more likely to receive a higher safety culture result ($r = .40$, $p = .005$). Results also indicate the extent to which human factors were designed into organizations' work processes is positively correlated with an organization's overall Index result ($r = .42$, $p = .002$) and safety culture subsection result ($r = .71$, $p < .001$).

Organizations that consistently provide workers with appropriate ergonomic tools and equipment were also found to have higher overall Index results ($r = .33$, $p = .019$) and safety culture subsection results ($r = .31$, $p = .027$). Incorporating human factors design principles into work processes and providing proper ergonomic tools and equipment were correlated with overall trust between workers and others in the organization ($r = .43$, $p = .002$; $r = .52$, $p < .001$, respectively), as well as the level of frontline worker involvement ($r = .51$, $p < .001$; $r = .43$, $p = .002$, respectively).

Additionally, 86.5% of respondents have methods in place for workers to share safety improvement suggestions, mostly through reports to a supervisor or the safety team. As such, those who reported frontline workers' direct involvement in improving working conditions were more likely to receive a higher result on the safety culture subsection ($r = .67$; $p < .001$). Similarly, those who involved frontline workers in facets of work improvement were more likely to receive a higher overall result on the Index ($r = .44$, $p = .002$). By involving frontline workers in safety efforts, employers demonstrate that the most impactful risks are being addressed and their employees' voices are valued.

Opportunities for Improvement

Eighty-four percent of respondents reported that psychosocial risk factors contribute to MSDs in their workplace. However, of those respondents who believe psychosocial risk factors contribute to MSDs, 50% could not quantify the impact of these factors. One of the main ways to measure the impact of psychosocial risk factors, such as fatigue or workplace stress, is to conduct perception surveys that include all levels of employees. Efforts can be made by the Pledge community to measure such risk factors to better understand their potential impact on employees.

Innovation and Collaboration Subsection Summary

In contrast to safety culture, the innovation and collaboration results demonstrated slightly lower average results, with 30.8% of respondents scoring as reactive (see Figure 6). However, over half (55.7%) of responding organizations demonstrated advancing, proactive or innovating results (26.9%, 25.0%, 3.8%, respectively). Based on these insights, Pledge organizations can enhance safety efforts by focusing on improving innovation and collaboration, such as trialing technology or sharing effective MSD solutions. No relationship was discovered between the innovation and collaboration results and organization industry, size or program tenure. Companies of all sizes and program tenures should embrace strengthening their innovation and collaboration efforts.

Figure 6

Percentage of Respondents per Results Category for the Innovation and Collaboration Subsection
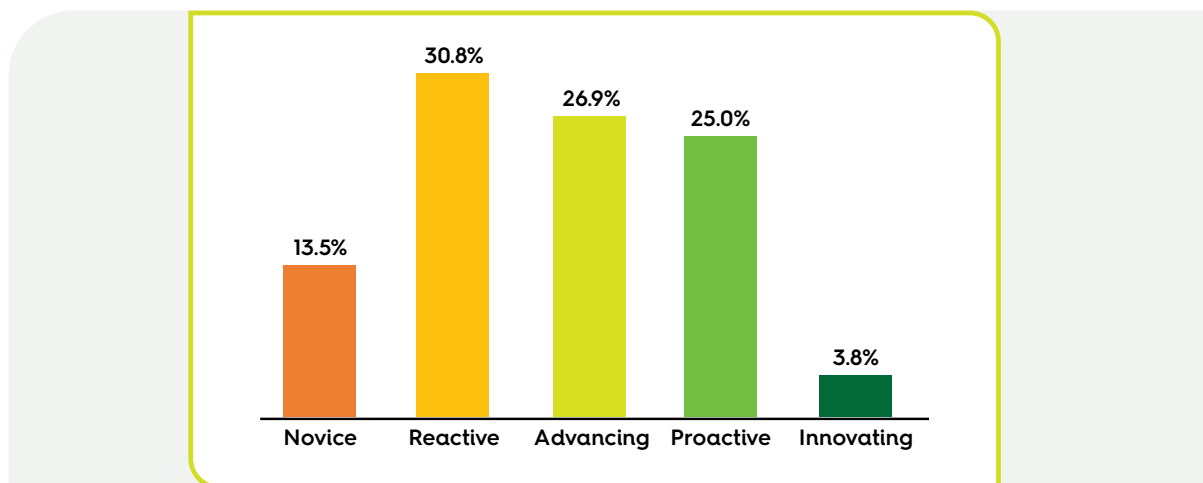
Further, the innovation and collaboration subsection indicated that a large majority (89.6%) of organizations are sharing effective solutions to combat MSDs internally through either formal methods such as ergonomics challenges, or informal methods such as word of mouth. Moreover, a majority (61.7%) of organizations externally share effective solutions to combat MSDs at conferences or through other external communications. Collaboration both within workplaces and with other workplaces helps the greater community learn what strategies may be beneficial when implementing and refining MSD programs.

Areas of Celebration

Initial Pledge community efforts in the innovation and collaboration subsection seem promising. Data reveal that 80.8% of respondents are currently involved with MSD prevention technology in some way, with 36.5% currently using technology in their workplace, 13.5% testing or trialing a technology and 30.8% actively researching technology. These responses demonstrate there is an appetite to utilize technology for the reduction and prevention of MSDs, and this will be a focus of the lab moving forward.

Opportunities for Improvement

Two focus areas for improvement were identified within the innovation and collaboration subsection. For innovation, 19.2% of respondents reported having little to no knowledge of MSD prevention technology solutions. Organizations could benefit from finding and utilizing MSD prevention technologies through resources like the MSD Solutions Lab emerging technologies report, summaries of available technology or the NSC TechHub Marketplace. Regarding collaboration, 89.6% of respondents reported sharing effective MSD solutions within their organization, such as with other sites or departments. However, only 61.7% of respondents reported sharing these solutions externally, such as through conferences. Collaboration and discussion of best practices within the greater business community are encouraged to foster further learning and MSD risk reduction.

Part Two: Actions for Employers

In summary, the year one data from the Pledge community have shown overall positive results in:

- Tracking of MSD indicators
- Involving frontline workers in determining where improvements can be made
- Building workplace communication on the importance of MSD prevention
- Allocating resources to build and improve current MSD prevention processes

Efforts have been made by the Pledge community to reduce and prevent MSDs. As the average overall result for the Index this year was proactive, there remains room for improvement. Specifically, opportunities lie in improving methods of tracking MSDs, quantifying psychosocial risk factors, and continually monitoring and assessing physical risk factors within an organization.

For organizations more advanced in their MSD reduction and prevention journey, it is recommended to share their best practices for MSD tracking with the business community and those newer to their MSD journey. To this effect, NSC is taking the lead in developing and sharing MSD resources with organizations, regardless of industry type, size, location or pledge status. Similarly, it is vital for innovating organizations to continue pioneering and sharing their proven processes of tracking, measuring and other efforts to alleviate psychosocial MSD risk factors.

Creating a culture of safety is linked to lower workplace injuries, safer working operations and more engaged employees (Ellis, 2019; Stemn et al., 2019). A positive safety culture is arguably one of the most important aspects within the workplace and remains an area that an organization can continuously improve. For those seeking to enhance their culture, an initial understanding of the workforce's unique needs is a must. This can be

achieved through several methods of engagement, which may include employee interviews, focus groups or validated, third-party employee perception benchmarking. Organizations that conduct employee perception surveys should deploy these at a minimum of an annual cadence to measure change. Organizations seeking to improve their MSD rates and outcomes should promote the understanding that their culture is determined by its people.

Like any successful safety program, the best approaches are multidisciplinary and involve all levels of an organization. Below is a two-part guide to support a thriving MSD program: key components an organization should have in place, and actions to be carried out through said components. What works for one workplace may not work for another, so trial and error may be expected during the development of a robust MSD prevention program.

The following components are integral to an organization's robust MSD culture:

Leadership buy-in

Engage senior leadership, including support from an active C-suite sponsor. Management should recognize the significance of MSD/ergonomic program goals and promote practices that aim to eliminate or reduce risks within each organizational level. Buy-in facilitates a culture of safety from the top down and demonstrates empathy and compassion of senior leadership.

A designated MSD solutions champion

This individual should represent your workforce and be empowered to enact changes regarding MSDs and MSD solutions. They should develop, implement and enforce an MSD solutions program tailored to unique workforce and organizational needs, with input from all levels of workers within the organization. In a small business, MSD solutions champions are most often "incidental safety and health professionals" – staff members who are charged with overseeing team safety but do not have formal training in ergonomics or injury prevention.

An empowered MSD solutions team

Creating and empowering an MSD solutions team provides a structure for collaboration throughout the organization. This team should represent the people in your workforce (e.g., frontline workers) and include voices from all levels within the organization. This team should also identify, prioritize and mitigate physical and psychosocial risks of MSDs across your organization.

Employee feedback

Collect and respond to employee feedback regularly on existing job tasks and demands, risks and ideas for solutions (e.g., through safety huddles). This demonstrates that leadership values their employees and is interested in their needs and hearing what solutions are needed from those affected.

Company-wide accountability

Instill a sense of ownership across all levels of the organization to uphold company values and participate in safety protocols, including full adoption and usage of MSD solutions. Make sure leadership is actively involved and held accountable, empower managers and frontline supervisors, and frequently engage, involve and include workers in MSD prevention efforts.

Evaluation of progress

It's vital to measure the progress of your MSD program and safety culture, and track the impact, solutions effectiveness, return on investment and year-over-year change. Several metrics can be used to measure impacts such as hazard identification, observations and corrective actions. As mentioned, annual employee perception surveys are the best way to measure safety culture. The MSD Solutions Index can be used to measure the effectiveness year over year of inaugural or established MSD prevention/ergonomic programs.

Once these components have been established and personnel resources have been allocated to MSD prevention, several action steps listed below can be taken to create an impactful program. An inaugural step is to join the MSD Solutions Lab on the journey to prevent MSDs in the workplace.

Step One: Establish core program components and assess program health.

This can help in the provision of targeted solutions specific to unique workplaces. It is important to note that solutions do not have to be fancy or expensive to be effective. Program basics such as building awareness of MSD risks, educating workers and management in identifying risk factors, implementing effective ergonomics trainings, having current MSD policies and procedures, and promoting safety culture can play just as much of a role without the use of special tools or technological solutions.

Step Two: Identify areas of physical risk factors with the involvement of frontline workers and implement improvements.

No one knows the risks of a job better than the people who do that job every day. Identify job tasks more highly associated with injuries or specific body parts that are disproportionately affected by the type of work conducted. Interventions can be developed by engaging frontline workers and brainstorming solutions for job tasks. Involving frontline workers promotes a sense of ownership and empowerment and conveys that management cares for worker wellbeing. Such a rapport fosters a culture of teamwork, open communication, conflict resolution and continuous improvement in the workplace.

Step Three: Account for psychosocial risk factors.

While awkward postures, force of exertion and repetition are key when addressing MSDs, programs should include multifaceted education on components such as individual factors (e.g., age, gender, anthropometry) and psychosocial elements (e.g., work pace, task demands, job control, social support at work). For example, regular requests for workers' input during job (re)design and process evaluation safeguard against low job control. Engagement with frontline workers also fosters their active involvement, addressing another factor that influences their psychosocial risk. Building relationships and gaining employee trust incorporates psychosocial hazard prevention into the organization's MSD policies, training and hazard assessment tools. Such an integrated program emphasizes the equivalence of psychosocial and physical risk factors.

Step Four: Ensure MSD solutions are equitable for all employees.

The goal of ergonomics is to match or design job requirements for any worker, thus fostering an inclusive and just work environment. Identifying, developing and implementing MSD solutions per the diverse needs, backgrounds and conditions of workers is vital. This process encourages employee engagement through open

communication and active listening (Downey et al., 2015). In doing so, organizations can identify areas where disparities may exist and find equitable solutions, leading to a healthier and more productive workplace. For a more significant influence, organizations should also consider equity audits. These audits involve gathering and analyzing pertinent data, implementing measures to address equity concerns and consistently monitoring equity progress.

Conclusion

Through the MSD Solutions Index, the MSD Solutions Lab received valuable information from 52 Pledge organizations. While many of our respondents had already begun their MSD prevention efforts, insights show room for improvement. Safety culture within the Pledge community can be celebrated, but more resources need to be placed on risk reduction, specifically psychosocial risk factors, with a renewed focus on innovation and collaboration. In response to this need, the MSD Solutions Lab will focus on resources that target risk reduction as well as innovation and collaboration to nurture community growth in these areas.

Continued and improved engagement in subsequent years among the Pledge community is anticipated. Organizations are encouraged to take part in the Pledge and the Index regardless of where they are in their MSD prevention efforts. As international respondents were underrepresented this year, more diverse and global community growth each year is expected. Finally, the Index was primarily completed by senior-level leaders or safety and health professionals. Efforts to gather responses from frontline workers on their perspectives of MSD prevention initiatives are planned to complement insights gained from the Index.

Looking forward, innovative and collaborative work should continue in the occupational safety and health community to identify, reduce and prevent MSDs. The baseline year has shown that we need to devote our focus, efforts and resources toward technology adoption and MSD program development. Valuable insights into the areas of need within the Pledge community have been gained and the lab looks forward to continuing with organizations as they embark on their MSD solutions journey.

Authors and Acknowledgements

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Appendix A

Glossary of Terms Provided to Respondents

Ad Hoc: Something done as necessary or needed.

Culture/Perception Surveys: A survey or questionnaire used to gauge employee opinions, mood and/or morale as they relate to the workplace.

Direct Measurement Devices: Physical or observable measures of MSD risk factors such as monitors, gauges and motion capture tools.

Discomfort Survey: A practical tool done through a survey or questionnaire that helps determine, prioritize and record workers' ergonomic issues.

Electromyography (EMG): Recording electrical activity of muscle tissue by using electrodes attached to the skin.

Employee: Includes all individuals on the company payroll, such as frontline workers, managers, supervisors and senior leadership.

Ergonomics: The process of designing or arranging workplaces, products and systems so they fit the people who use them.

Ergo Competition: A competition designed to promote and award ergonomics-related solutions through training, teamwork, engineering and other factors. For example, the Ergo Cup Competition.

Ergonomics Program: A systematic process or program aimed at fitting or designing work to fit the worker, as well as identifying, analyzing and controlling workplace, work and worker risk factors.

Frontline Worker: Responsible for executing the day-to-day tasks of the workplace, such as production or shipping.

Gig Workers: Those earning income outside of traditional long-term employment, typically in the service sector, through temporary, short-term or contracted work.

Goniometer: An instrument that measures the available range of motion at a joint.

Hierarchy of Controls: A step-by-step approach to eliminating or reducing workplace hazards.

Human Factors: Concerned with what we know about people, their abilities, characteristics and limitations to design equipment, environments and jobs.

Intervention: Approach to reduce, prevent, control or eliminate a musculoskeletal hazard, risk factor or disorder.

Job Rotation: An organizational strategy implemented to reduce workers' exposure to ergonomic hazards by rotating from one workstation to another.

Job Safety Analysis: A procedure to assist with the integration of health and safety principles into daily job tasks, operations or processes.

Manager: An employee responsible for the functioning of a workplace or team.

Musculoskeletal Disorder (MSD): Injuries or disorders that affect the musculoskeletal system (i.e., muscles, nerves, tendons, joints, cartilage and spinal disks).

MSD Prevention Program: Policies and actions that aim to reduce and prevent MSDs.

MSD Solutions Team: A group of individuals within the workplace that create and implement an MSD prevention program.

OSHA 300 Log: Legally required form in the U.S. for employers to track and report work-related injuries and illnesses, and the severity of each case.

Overtime Work: Any hours worked that exceed normally scheduled working hours.

Prevention: Deterring the onset or minimizing the risk of a hazard or disorder.

Prevention through Design (PtD): A process that seeks to reduce work-related injuries and illnesses through the inclusion of prevention factors in all work designs.

Risk Assessment Tools: Tools for measuring MSD risks and symptoms such as the NIOSH lifting equation, the Rapid Upper Limb Assessment (RULA), or self-reported surveys and questionnaires.

Safety Team: Those responsible for implementing policies and procedures designed to protect employees from work-related injury or illness.

Seasonal Workers: Workers who work temporarily for an organization to meet temporary needs during certain times of the year.

Senior Leadership: Refers to upper management, executive and C-suite employees.

Shiftwork: The practice of setting work hours in such a way as to provide 24-hour coverage for business operations. Typically, the hours are divided into three shifts of 12 a.m. to 8 a.m., 9 a.m. to 5 p.m. and 5 p.m. to 1 a.m.

Stop Work Authority: A responsibility and obligation given to employees and contract workers to stop work when conditions or behaviors are perceived as unsafe.

Supervisor: Responsible for overseeing the day-to-day tasks of employees; may work on the job floor as a front-line supervisor.

Wearable Sensors: Technology that is designed to track MSD incidence or risk while being worn; examples include inertial measurement units, smartwatches and smart glasses.

Workers: All employees who are not in a managerial position.

Workplace: The site at which employees perform their day-to-day tasks such as an office, factory or health care setting.

Work Hardening: A structured program, often led by an occupational therapist, designed to help an employee return to their pre-injury work level.

Appendix B

Statistical Output

Correlations of Pertinent Variables

	Overall	Risk Reduction	Safety Culture	Innovation and Collaboration	Organization Size	MSD/Ergonomics Program	Human Factors	Ergonomics Tools	Surveys	Frontline Worker Involvement	Employee Trust	Leading Tracking
Overall												
Risk Reduction	.675**											
Safety Culture	.711**	.301*										
Innovation and Collaboration	.587**	.382**	.285*									
Organization Size	.017	.443**	-.166	.049								
MSD/Ergonomics Program	.266	.277*	.152	.082	.127							
Human Factors	.421**	.270	.477**	.247	-.223	-.011						
Ergonomics Tools	.326*	.174	.306*	.257	-.333*	.088	.299*					
Surveys	.279	.201	.404**	.122	.325*	-.142	.157	.115				
Frontline Worker Involvement	.440**	.047	.681**	.092	-.563**	-.143	.508**	.429**	.109			
Employee Trust	.323*	-.061	.637**	.102	-.484**	.051	.432**	.516**	.070	.672**		
Leading Tracking	.594**	.549**	.364**	.329*	.022	.411**	.166	.114	.052	.250	.162	

**Significant at the 0.01 level (2-tailed).
 *Significant at the 0.05 level (2-tailed).

Appendix C

Measuring 25% Reduction in MSD Rates by 2025

To measure a reduction in MSD rates, baseline data – also known as year one data – is needed. The collection of these data allows for a starting point to understand where an organization is within their MSD journey, and as a comparison metric for future years. As these data are collected and collated over time from pledged organizations, a trend is expected to appear demonstrating whether a reduction has occurred.

Several pieces of data are collected on the Index that will be used to measure progress toward the 25% reduction in MSD rates goal starting in year two. Data sources include:

- OSHA 300 Log
  - Cases with Days Away from Work (Column H)
  - Total Number of Cases with Job Transfer or Restriction (Column I)
  - Total Number of Other Recordable Cases (Column J)
  - Days Away from Work (Column K)
  - Days on Job Transfer or Restriction (Column L)
  - Total Number of Injuries (Column M1)
  - Total Number of All Other Illnesses (M6)
- Organization Reported Number of MSD-related Injuries per Year

Analysis Methodology

After survey closure, collected data were reviewed for completion and cleaned for analysis. Data were cleaned in Excel (Microsoft Corporation, 2016), and statistical analyses were conducted in the Statistical Package for the Social Sciences version 22 (SPSS, Chicago, IL). Analyses conducted included descriptives and Pearson's correlations with $\alpha = .05$, and thematic coding. Scale scores of like items (e.g., items concerning employee trust and items concerning frontline worker involvement) were also calculated. Variables of interest included industry, organization size, use of ergonomic tools and equipment, use of employee perception surveys, involvement of frontline workers in decision-making, trust amongst employees, and the presence of an MSD prevention and/or ergonomics program and results for the overall Index and the three subsections.

Definitions

Correlation: A statistical test that determines whether two variables are related. In a positive correlation, as the value of one variable increases, the value of the other variable increases as well. In a negative correlation, the value of one variable increases as the value of the other variable decreases. *Note: A correlation simply reflects the existence of a relationship between two variables rather than cause and effect.*

- **Pearson correlation:** This type of correlation determines a relationship between two numerical variables. The statistical value for a Pearson correlation, denoted as r, ranges between 1 and -1. A negative r-value indicates a negative correlation, while a positive r-value indicates a positive correlation. The closer the value is to -1 or 1, the stronger the correlation (for example, $r = .7$ is a stronger correlation than $r = .3$).

Normal distribution: Data pattern that forms a symmetrical, bell-shaped curve on a graph. The curve is centered on the average value for the data set. Simple normal distribution examples are human height and weight and can be represented by a bell-shaped curve.

Statistical significance: This signifies whether the results of a statistical test are likely due to chance or a factor of interest.

- **P value:** The value that denotes statistical significance. This report defines statistical significance as a *p*-value of .05 or less.

Leading indicator: Proactive, preventative and predictive measures that monitor and provide current information about the effective performance, activities and processes of an environment, health and safety management system that drive the identification and elimination or control of risks in the workplace that can cause incidents and injuries (Campbell Institute, 2013).

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