nsc National Safety Council | MSD Solutions Lab an nsc program

MSD Solutions Index Pledge Community Report

Insights from the 2023-2024 MSD Solutions Index across the MSD Pledge Community

Year Two

Contents

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. The 2023-2024 Index was completed by 44 organizations, primarily located in the United States and largely representing manufacturing or professional, technical and scientific services. This second cycle of the Index continued to provide insights into the MSD Pledge community's successes, as well as where opportunity exists for improvement.

This report provides Index summaries within the Pledge community regarding worker health, safety and MSD prevention. Where appropriate, this report also compares responses from 2023-2024 to responses from 2022-2023. Similar to last year, 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 in 2023-2024. Higher overall Index results were seen in association with:

- Incorporating human factors
- Providing ergonomic equipment
- Fostering trust among different levels of the organization
- Involving frontline workers in decisions
- Tracking leading indicators
- Measuring organizational risk reduction
- Using employee perception surveys
- Sharing MSD solutions with external organizations

The report concludes with several recommendations to help organizations advance their MSD prevention and mitigation efforts.

Introduction

Born out of the 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 this 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

Charter Pledge members, those who signed the MSD Pledge prior to Fall 2023, are committed to reducing MSD rates by 25% by the year 2025. To allow for more individuality and to meet the unique needs of organizations, the MSD Pledge 2.0 was launched in the Fall 2023, which allows organizations the opportunity to declare their own MSD rate reduction goals and extends beyond the 2025 end date from the charter Pledge. Responses provided by organizations on the Index are used to measure the community's alignment to Pledge commitments. Completion of the Index provides Pledge organizations with personal insights into their areas of success and opportunity related to worker health, safety and MSD prevention. Furthermore, completion of the annual Index holds pledged 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 2023-2024 Index cycle opened on Dec. 5, 2023, and closed on June 30, 2024. Once analysis was complete, organizations received a report with individualized feedback based on their responses as a whole and within the three subsections. Results for 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 result. Correlations were conducted between pertinent variables for further analysis and are included throughout the report and in Appendix B. See the **2022-2023 MSD Solutions Index Report** for more information about survey and analysis methodology.

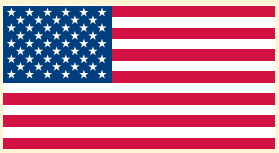
Pledge Community Year Two Findings

Community Demographics

A total of 44 organizations completed the 2023-2024 MSD Solutions Index. Respondents were senior-level leaders or safety and health professionals, with most completing the Index for their entire organization (81.8%), as opposed to a single department, with the majority headquartered in the United States (79.5%; Figure 1).

Over a quarter of respondents represent the manufacturing industry (29.5%), followed by the professional, scientific and technical services industry (13.6%). 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 large in size (40.9%), while others were small or medium (22.7%, 36.4%, 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, Bureau of Labor Statistics) and therefore the Index and MSD Pledge community data were used to determine the size range cut points for this report. This contrasts with the 2022-2023 Index results, in which most organizations completing the Index were medium in size (40.4%). This increased representation of larger organizations may account for other differences seen throughout the report.

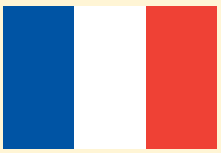
Figure 1. *Breakdown of Participation by Organization Headquarters*



USA 79.5%

Canada 11.4%

Ghana 2.3%



France 2.3%

Trinidad and Tobago 2.3%

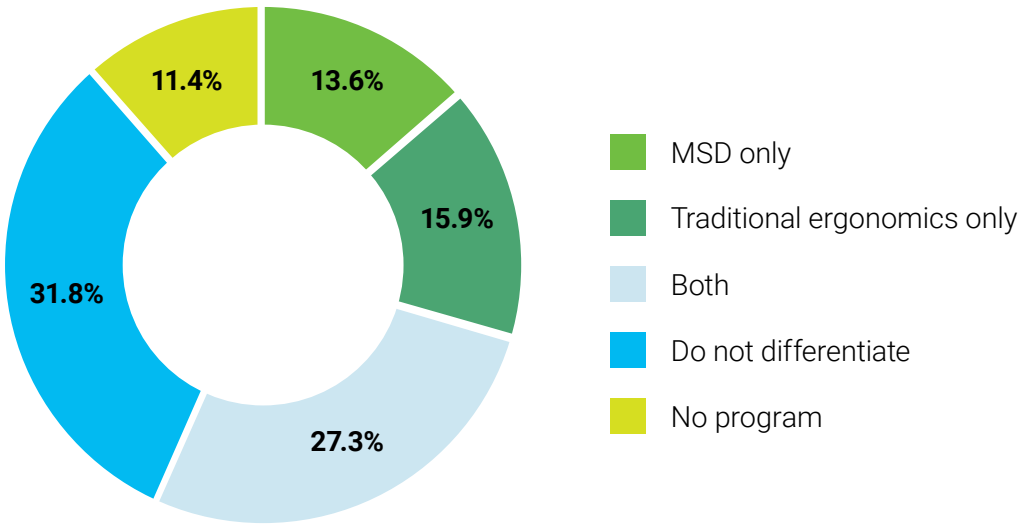
Table 1. *Respondents by Industry*

Respondent by Industry*	Percentage of Responding Organizations
Accomodation and Food Services	4.5%
Construction	4.5%
Educational Services	4.5%
Finance and Insurance	4.5%
Health Care and Social Assistance	2.3%
Information	4.5%
Manufacturing	31.8%
Professional, Scientific and Technical Services	20.5%
Public Administration	2.3%
Transportation and Warehousing	6.8%
Utilites	6.8%
Wholesale Trade	6.8%
*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, 88.6% had some form of MSD prevention and/or ergonomics program in place. As shown in Figure 2, 31.8% of respondents stated they do not differentiate between their ergonomics and MSD prevention programs, while 11.4% indicated they do not have either program. This is an improvement over last year, in which over 17% of respondents reported having neither an ergonomics nor MSD prevention program in place. **Moreover, this year, organizations who had some form of a program had higher overall Index results (r = .58, p < .001), higher safety culture results (r = .48, p = .001) and higher risk reduction results (r = .59, p < .001).**

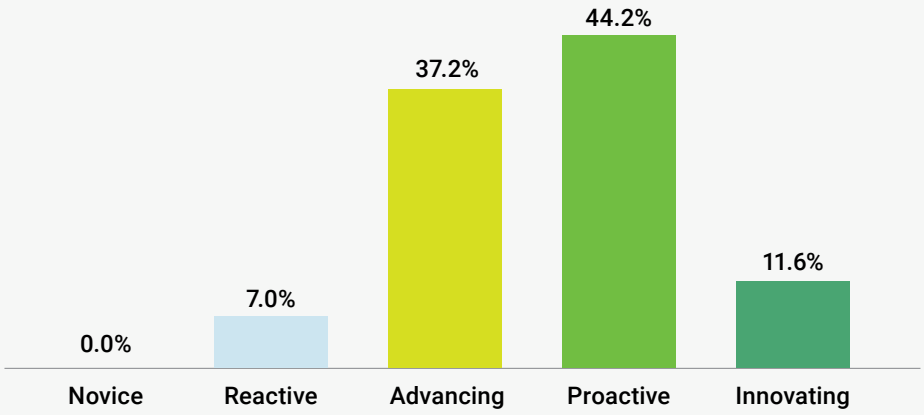
Figure 2. *Percentage of Responding Organizations with an MSD Prevention and/or Ergonomics Program*



Overall Index Summary

Most organizations (81.4%) who participated in the Index in the 2023-2024 cycle received overall results in the advancing (37.2%) or proactive (44.2%) categories, meaning organizations that completed the Index might have established MSD prevention and/or ergonomics strategies with opportunities for advancement. In contrast to findings from 2022-2023, in which no organizations received an overall result of innovating, 11.6% of organizations in 2023-2024 received overall results in the innovating category (Figure 3). No relationship was uncovered between an organization's overall Index result and organization size or length in the years that their MSD prevention/ergonomics program has been established. 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.

Figure 3. *Percentage of Respondents per Results Category for the Overall Index*



Organization Size

Smaller and medium organizations were likely to have initiated their ergonomics or MSD prevention programs within the past five years, while larger organizations had more tenured MSD prevention programs, with most large organizations having a decade or more since program establishment. This is similar to findings from last year, where larger organizations also had longer standing programs.

Larger organizations also were more likely to measure their risk reduction efforts (r = .43, p = .007). However, larger organizations saw lower reported levels of frontline worker involvement in decision making (r = -.38, p = .013) and interpreted their own ability to prevent MSDs more poorly than did smaller organizations (r = -.31, p = .040). Lastly, larger organizations were less likely to consider ergonomics in their purchasing decisions, such as how items are delivered to their organization (r = -.41, p = .006).

Overall Results and Risk Reduction

The extent to which human factors, such as environmental, organizational, or individual factors and characteristics, were designed into organizations' work processes is significantly positively correlated with an organization's overall Index result (r = .39, p = .01). Related to this, organizations that considered ergonomics in their purchasing decisions also had higher overall results (r = .34, p = .028). Organizations that more consistently provide workers with appropriate ergonomic tools and equipment were also found to have higher overall Index results (r = .31, p = .042). Further, organizations that internally measured risk reduction scored higher on the Index overall (r = .45, p = .005). Lastly, tracking more leading indicators was also related to higher scores on the Index overall (r = .50, p = .001). These major themes and relationships were seen in responses on the 2022-2023 MSD Solutions Index as well.

Overall Results and Safety Culture

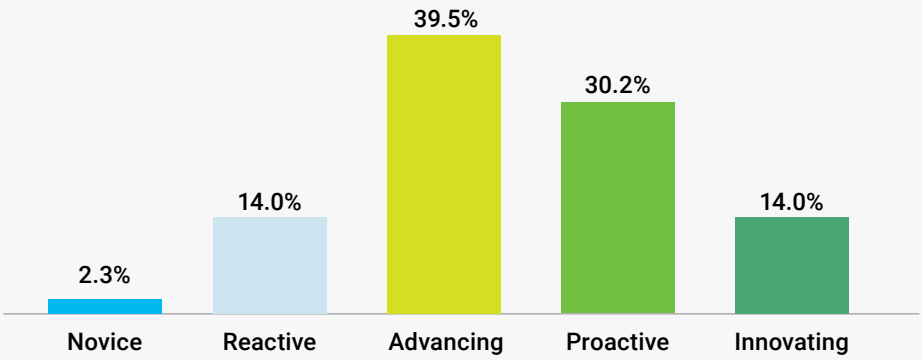
From the lens of safety culture, utilizing employee perception surveys was correlated with a stronger overall Index result (r = .38, p = .015). Similarly, the more frontline workers are involved in making organizational decisions, the stronger their overall Index result (r = .50, p = .001). Providing employees with a means to share their suggestions for ergonomic solutions was also correlated with stronger results on the Index overall (r = .41, p = .008). Related, sharing effective MSD solutions with external workplaces was also positively correlated with overall Index results (r = .31, p = .046).

Risk Reduction Subsection Summary

Of responding organizations, 39.5% received a result of advancing within the risk reduction subsection on the Index, 16.3% fell below the advancing category (2.3% novice; 14.0% reactive) and 44.2% were above the advancing category (30.2% proactive; 14.0% innovating; see Figure 4). This is an improvement from the 2022-2023 results, in which nearly double the number of companies fell below the advancing category (30.7% in 2022-2023 in comparison to 16.3% in 2023-2024). A significant, positive correlation exists between risk reduction results and organizational size (r = .49; 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 = .014). For participants, the more tenured an organization's program, the more risk reduction efforts initiated by the organization.

New analyses from the 2023-2024 results show that having risk reduction goals also leads to a higher score in the risk reduction subsection (r = .34, p = .048). Organizations that utilize technology for MSD prevention also reported stronger scores in the risk reduction subsection (r = .30, p = .050). Lastly, tracking more leading indicators than lagging indicators yielded higher scores in the risk reduction subsection (r = .46, p = .002).

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 industry, certain risk factors were most frequently selected such as awkward posture/ excessive bending or twists, lifting or carrying, prolonged sitting/standing and repetitive activities (computer-related). Similarly, the most impacted body parts were low back, followed by the shoulder/upper arm and wrist. The most commonly reported impacted body parts differed in comparison to 2022-2023 results. In 2022-2023, only 57.7% of organizations reported low back pain and injury, while in 2023-2024, 77.3% report low back impacts. A significant increase in organizations reporting low back pain validates other research stating the pervasiveness of low back pain and highlights a need for more low back injury solutions. Additionally, less organizations (2.3%) reported being unsure about their most commonly impacted body parts in 2023-2024, compared to 17.3% being unsure in 2022-2023. This indicates growth in the ability to better understand impacted body parts by organizations. These risk factors and affected body parts align with the demands commonly seen in the industries predominantly represented by Index respondents (Hembecker et al., 2017; Chinedu et al., 2020).

Table 2
Most Common MSD Risk Factors

Risk Factor	Percentage of Responding Organizations*
Awkward postures/excessive bending or twists	50.0%
Lifting or carrying	43.2%
Prolonged sitting/standing	31.8%
Repetitive activities (computer related)	31.8%
Repetitive activities (non-computer related)	29.5%
Forceful exertions	25.0%
Individual factors	20.5%
Static postures	20.5%
Pushing or pulling	18.2%
Reaching	11.4%
Overhead work	9.1%
Psychosocial factors	6.8%
Hand-arm vibration	4.5%
Lack of recovery or rest between tasks	4.5%

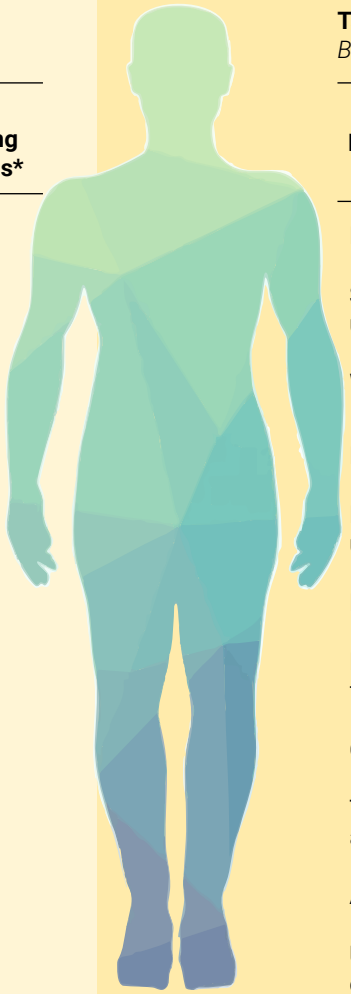


Table 3
Body Parts Most Impacted by MSDs

Body Part	Percentage of Responding Organizations*
Lower back	77.3%
Shoulder/ upper arm	61.4%
Wrist	50.0%
Hand/ fingers	27.3%
Neck/ upper back	27.3%
Knee	20.5%
Elbow/ forearm	11.4%
Other	6.8%
Trunk/ abdomen	4.5%
Ankle	2.3%
Unsure/ don't know	2.3%

*Sum totals above 100% as the questions were multi-select.

Analyzing MSD prevention programs, efforts and strategies uncovered other interesting insights. In 2023-2024, 75.8% of responding organizations reported tracking the number of MSDs occurring in their workplace. This is up from last year, in which only 65.3% reported tracking MSDs in their workplaces. In contrast to more commonly tracking lagging indicators in 2022-2023, in 2023-2024, Index participants were more likely to track leading indicators, with 65.1% of organizations tracking more leading indicators than lagging indicators. This is a powerful contrast from last year and is an area that will continue to be closely monitored in future years of the Index.

Additionally, many organizations reported they most frequently employ MSD interventions at the organizational level (e.g., workstation redesign; 67.4%). Fewer (27.9%) employed interventions at the personal level, such as with personal protective equipment. This is a change from 2022-2023 results, in which participants utilized personal and organizational interventions almost equally. Only 2.3% of organizations reported they most frequently used interventions at a systems level (e.g., automation, robotization). While improvements to intervention types are occurring within the Pledge community, these results underscore that the adoption of technological solutions is still in its infancy and may be far from replacing other intervention types.

Lastly, when asked what types of information assist in determining the need for ergonomics and workplace safety changes, 81.8% of respondents utilized employee feedback. This is similar to 2022-2023 results, where 80.4% of organizations utilized employee feedback when looking to make safety changes. Involving workers in MSD prevention design and implementation is imperative to MSD prevention success, so it is encouraging that a majority of respondents are continuing to gather employee feedback. Just over half (51.2%) indicated they utilized risk assessment tools, such as the Rapid Upper Limb Assessment (RULA), Rapid Entire Body Assessment (REBA) results or third-party feedback. This is up from last year, in which only 37.3% of organizations utilized standardized risk assessment tools.

Areas of Celebration

Within risk reduction, Index participants excelled and uncovered important relationships in several areas. Of the respondents, 59.1% rated their workplace's ability to prevent MSDs as either very good (47.7%) or excellent (11.4%). More organizations rated their ability to prevent MSDs as excellent in 2022-2023, with 26.9% of organizations rating themselves as excellent. This rating remains backed by significant, positive correlations between the self-rating of a workplace's ability to prevent MSDs, their Index overall result (r = .35, p = .023), their safety culture result (r = .41, p = .006), and their innovation and collaboration result (r = .32, p = 034). Risk reduction subsection results were also positively correlated with whether an organization had an MSD prevention program (r = .59, p < .001) and the length of time the program has been in place (r = .39, p = .014).

Currently, only 11.4% of respondents do not have an ergonomics/MSD prevention program. This is fewer organizations without a program in comparison to last year, in which over 17% did not have an ergonomics or MSD prevention program in place. Organizations without a program may benefit from reviewing MSD Solutions Lab resources, such as the **Sample Ergonomic Policy**.

Notably, organizations tracking 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

Findings in the risk reduction subsection indicate only 22.7% of respondents reported having risk reduction goals in their workplace. This is a decrease from 2022-2023 results, in which 42.3% of respondents had goals. Having measurable goals is an important factor in the process of reducing and eliminating workplace MSDs. 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.

Safety Culture Subsection Summary

In general, respondents showed slightly higher average scores in the safety culture subsection in comparison to 2022-2023 participants, with 58.1% of respondents in the proactive or innovating result categories in 2022-2023 (see Figure 5).

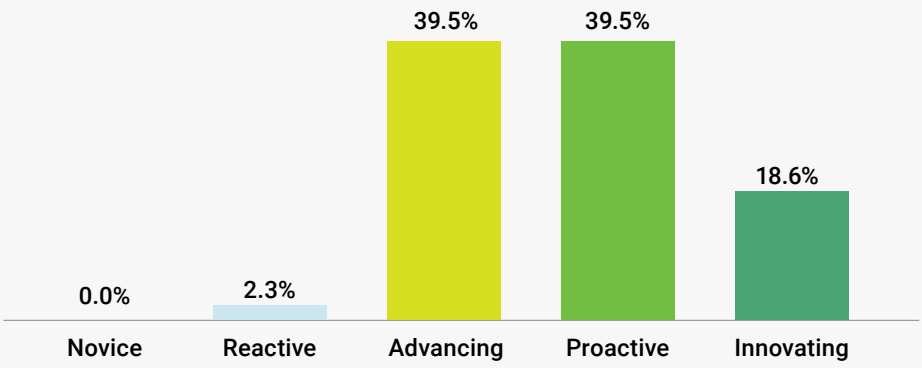


Figure 5. *Percentage of Respondents per Results Category for the Safety Culture Subsection*

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 workers felt comfortable bringing up MSD concerns. Conversely, 31.9% of respondents indicated their frontline workers were not involved in decision making about work schedules, which highlights a possible need for more schedule flexibility for workers within the Pledge community. Related, 20.4% of organizations reported not involving their workers in decisions about workflow. Again, if workers are not included in determining their work schedules and workflows, there may be an increased chance of MSDs due to overexertion or fatigue. Respondents were more likely to cite frontline worker involvement in decision making concerning workstation design, job tools, job or task redesign, and the physical work environment. Frontline workers were reportedly less involved in determining changes to their job tasks, tools, equipment or machinery, mental health and wellbeing initiatives, and their workplace's culture.

Mental fatigue and individual factors were the most commonly cited non-physical risk factors that could increase the likelihood of an employee injury. Non-physical risk factors such as these can negatively contribute to an organization's overall culture, including its safety culture. Specifically, non-physical risks such as low levels of supervisor support, poor collaboration between colleagues, high job demands, burnout and job dissatisfaction can lead to poor safety performance and safety culture (Andersen et al., 2019; Macfarlane et al., 2009; Melamed, 2009; Yang et al., 2023).

Areas of Celebration

Of respondents, 68.2% currently conduct employee perception surveys, which is comparable to the percentage conducting perception surveys in 2022-2023 (65.4%). These surveys are an effective way to measure workplace safety culture and non-physical 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. Organizations that conducted employee perception surveys were more likely to receive a higher safety culture result (r = .35, p = .026).

Organizations that consistently provide workers with appropriate ergonomic tools and equipment were also found to have higher safety culture subsection results (r = .41, p = .007). Incorporating human factors design principles into work processes and providing proper ergonomic tools and equipment were correlated with trust between workers and others in the organization (r = .47, p = .002; r = .31, p = .045, respectively), as well as the level of frontline worker involvement (r = .47, p = .002; r = .31, p = .045, respectively).

Additionally, 84.1% 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, organizations who have methods in place for sharing safety suggestions were more likely to receive a higher result on the safety culture subsection (r = .66; p < .001). Similarly, those who involved frontline workers in the facets of work improvement were more likely to receive a higher result on the safety culture subsection (r = .66, p < .001). 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

Ninety-five percent of respondents reported that non-physical risk factors contribute to MSDs in their workplace. This is up from responses last year, in which 84% of respondents indicated that non-physical risk factors contributed to MSDs at their workplaces. Of those respondents who believe non-physical risk factors contribute to MSDs, 48% could not quantify the impact of these factors, meaning that the presence of the risk factor is not measured or assessed. One of the main ways to measure the impact of non-physical 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. Pledge members and other organizations can reference assessments for non-physical risk factors for MSDs from the MSD Solutions Lab report, **Accounting for Non-Physical Risk Factors in MSD Prevention**. Other resources, such as a robust **fatigue toolkit** or supervisor training, may be beneficial to an organization's resource list as well.

Innovation and Collaboration Subsection Summary

In contrast to safety culture, the innovation and collaboration results were slightly lower than other subsections, with 27.9% of respondents scoring below average (see Figure 6). Yet, this is significantly less than responses from 2022-2023, where 44.3% of organizations scored below average. Related to this improvement, nearly half (46.5%) of responding organizations demonstrated above average results in 2023-2024. Based on these insights, Pledge organizations have enhanced their levels of innovation and collaboration in the past year, and should continue these efforts through trialing technology or sharing effective MSD solutions. No relationship was discovered between the innovation and collaboration result and organizational industry, size or program tenure. Companies of all sizes and program tenures should embrace strengthening their innovation and collaboration efforts.

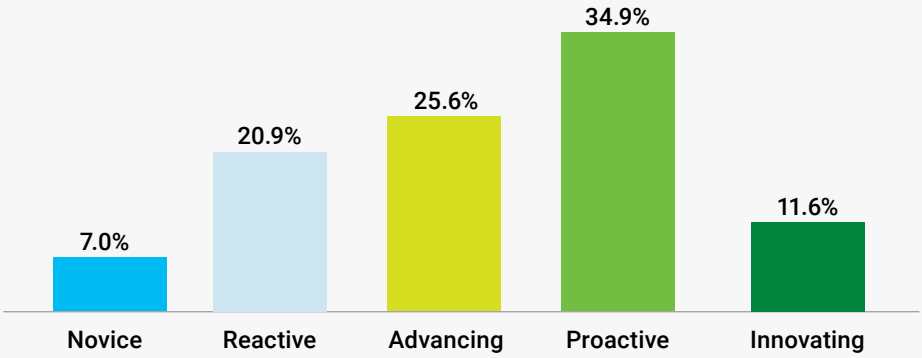


Figure 6. *Percentage of Respondents per Results Category for the Innovation and Collaboration Subsection*

Further, the innovation and collaboration subsection indicated that a large majority (97.7%) 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. There are more organizations sharing effective solutions internally in 2023-2024 than last year, in which only 89.6% reported engaging in such sharing of solutions internally. Moreover, a majority (76.7%) of organizations externally share effective solutions to combat MSDs at conferences or through other external communications in 2023-2024. This is also up significantly from last year, in which only 61.7% of organizations mentioned they were sharing effective solutions externally. 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

Pledge community efforts in the innovation and collaboration subsection seem promising. Data reveal that 86.1% of respondents are currently involved with MSD prevention technology in some way, with 23.3% currently using technology in their workplace, 14.0% testing or trialing a technology and 48.8% actively researching technology. More organizations in 2023-2024 were in the research phase of their technology implementation journeys, whereas in 2022-2023, more organizations were actively using technology.

Opportunities for Improvement

Those actively using technology decreased from 2022-2023, with only 23.3% of organizations utilizing technology for MSDs in their workplace in 2023-2024. These results show interest in technology for MSD prevention and underscore the importance of communicating with organizations about the availability of technology and providing opportunities for pilots. Organizations could benefit from finding and utilizing MSD prevention technologies through resources like the MSD Solutions Lab **pilot grant opportunities**, **emerging technology report** or the **NSC TechHub Marketplace**. Organizations are also encouraged to continue sharing their effective MSD solutions more broadly with external organizations. The MSD Solutions Lab is always available as a partner for publishing **case studies** with organizations highlighting their experiences trialing MSD solutions.

Longitudinal Insights

The 2023-2024 cycle of the MSD Solutions Index marked the second year of Index data collection. As such, of organizations who participated in the Index in 2023-2024, 60.5% also participated in 2022-2023. For those organizations with two years of data for analysis, several trends were uncovered. In general, organizations improved in their MSD mitigation efforts. Specifically, 76.9% of organizations who completed the Index in both years had better overall scores in 2023-2024 than 2022-2023. Risk reduction scores were improved for 73.1% of organizations when comparing 2022-2023 and 2023-2024 results. Similarly, 73.1% of organizations had higher scores in 2023-2024 than 2022-2023 in the safety culture subsection. Innovation and collaboration subsection results were higher for 61.5% of organizations in 2023-2024 in comparison to 2022-2023 scores. Lastly, 61.5% of organizations experienced increases in all subsections and overall between 2022-2023 and 2023-2024.

Collectively, these results suggest that organizations involved in the MSD Pledge are experiencing improvements to their MSD initiatives over time. More in depth analyses regarding engagement levels of MSD Pledge members would be valuable to consider in conjunction with Index results to more directly draw a connection between engagement in the Pledge and MSD Solutions Lab and improvements in MSD mitigation efforts.

Practical Implications

Data from the Pledge community in year two have shown overall positive results in:

- Tracking of MSD indicators, with improvements seen in year two for the number of organizations tracking leading indicators
- Sharing of effective MSD solutions and strategies within organizations and with external organizations
- Incorporation of published risk assessments as a means for risk reduction and hazard identification
- Safety cultures of organizations, with high levels of trust between workers within organizations and a general positive viewpoint of organizational culture

Utilization of a developed ergonomics and/or MSD prevention program to drive MSD mitigation efforts is in practice by the MSD Pledge community. As the average overall result for the Index this year was proactive, there remains room for improvement. Specifically, opportunities lie in quantifying non-physical risk factors, piloting and using technology for MSD prevention, and developing goals specific to MSD risk reduction.

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. This can be done through presenting at conferences, engaging in benchmarking sessions or capturing experiences in case studies. NSC is taking the lead on offering such platforms and 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 non-physical 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). 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.

Like any successful safety program, the best approaches to risk reduction are multidisciplinary and involve all levels of an organization. A two-part guide to support a thriving MSD program that contains information about key components an organization should have in place, and actions to be carried out through said components, can be found in the inaugural MSD Solutions Index Community Report. 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. Organizations are also encouraged to participate in the Index year over year to gather data to continue assessing and refining their MSD prevention programs.

Conclusion

Through the MSD Solutions Index, the MSD Solutions Lab received valuable information from 44 Pledge organizations. While many of our respondents are continuing and maturing their MSD prevention efforts, insights show room for improvement. Improvements by those organizations completing the Index for a second time, as well as safety culture efforts within the Pledge community can be celebrated, but more resources need to be devoted to risk reduction, specifically non-physical risk factors, with a secondary focus on innovation and collaboration. Additionally, the importance of goal setting around MSDs is important to ensure MSD mitigation is properly addressed. An emphasis on setting MSD prevention-related goals is an area of potential growth.

Looking forward, innovative and collaborative work should continue in the occupational safety and health community to identify, reduce and prevent MSDs. The second year of the Index has shown that we need to devote our focus, efforts and resources toward technology adoption, non-physical risk factor mitigation and risk reduction goal setting. 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

Author: Paige DeBaylo, Ph.D.

The author would like to acknowledge the vital contributions of the entire MSD Solutions Lab and MSD Solutions Lab Advisory Council in the development of the MSD Solutions Index.

The MSD Solutions Lab team also thanks the Pledge organizations who participated in the 2023-2024 MSD Solutions Index and those who volunteered their time to review this report.

Funding

This research was supported by Amazon.com, Inc. Its contents and results reflect the authors' contributions and are solely their responsibility, and do not necessarily represent the views of Amazon.

References

Andersen, L. L., Vinstrup, J., Villadsen, E., Jay, K., & Jakobsen, M. D. (2019). Physical and psychosocial work environmental risk factors for back injury among healthcare workers: prospective cohort study. *International journal of environmental research and public health, 16*(22), 4528.

Campbell Institute. (2013). Transforming EHS performance measurement through leading indicators. **https://www.thecampbellinstitute.org/wp-content/uploads/2017/05/Campbell-Institute-Transforming-EHS-through-Leading-Indicators-WP.pdf**

Chinedu, O. O., Henry, A. T., Nene, J. J., & Okwudili, J. D. (2020). Work-related musculoskeletal disorders among office workers in higher education institutions: A cross-sectional study. *Ethiopian Journal of Health Sciences, 30(5) , 715-724.*

Ellis, L. D. (2019, October 24). How Increasing Employee Engagement Improves Your Environmental Health and Safety Efforts. *Harvard T.H. Chan School of Public Health.* **https://www.hsph.harvard.edu/ecpe/employee-engagement-improves-environmental-health-and-safety/**

Hembecker, P. K., Reis, D. C., Konrath, A. C., Gontijo, L. A., & Merino, E. A. (2017). Investigation of musculoskeletal symptoms in a manufacturing company in Brazil: a cross-sectional study. *Brazilian journal of physical therapy, 21*(3), 175-183.

Macfarlane, G. J., Pallewatte, N., Paudyal, P., Blyth, F. M., Coggon, D., Crombez, G., ... & van der Windt, D. (2009). Evaluation of work-related psychosocial factors and regional musculoskeletal pain: results from a EULAR Task Force. *Annals of the rheumatic diseases, 68*(6), 885-891.

Melamed, S. (2009). Burnout and risk of regional musculoskeletal pain—a prospective study of apparently healthy employed adults. *Stress and Health: Journal of the International Society for the Investigation of Stress, 25*(4), 313-321.

Sheehan, C., Donohue, R., Shea, T., Cooper, B., & De Cieri, H. (2016). Leading and lagging indicators of occupational health and safety: The moderating role of safety leadership. *Accident Analysis & Prevention, 92*, 130-138. **https://doi.org/10.1016/j.aap.2016.03.018**

Sinelnikov, S., Inouye, J., & Kerper, S. (2015). Using leading indicators to measure occupational health and safety performance. *Safety Science, 72,* 240-248. **https://doi.org/10.1016/j.ssci.2014.09.010**

Stemn, E., Bofinger, C., Cliff, D., & Hassall, M. (2019). Examining the relationship between safety culture maturity and safety performance of the mining industry. *Safety Science.* **https://doi.org/10.1016/j.ssci.2018.12.008**

Yang, H., Lu, M. L., Haldeman, S., & Swanson, N. (2023). Psychosocial risk factors for low back pain in US workers: Data from the 2002–2018 quality of work life survey. *American journal of industrial medicine, 66*(1), 41-53.

Appendix A

Statistical Output

Correlations of Pertinent Numeric Variables

	Overall	RR	Cul	InnColl	AbPrev	Prog	ProgTen	MeasRR	RRGoals	IntType	HumFac	Purch	Tools	Surveys	MethShar	ShareInt	ShareExt	Tech	Leading	Size	YrOne	Invol	Trust	GenCult
Overall																								
RR	.915**																							
Cul	.901**	.679**																						
InnColl	.492**	.316*	.371*																					
AbPrev	.346*	0.19	.413**	.324*																				
Prog	.580**	.589**	.483**	0.213	0.126																			
ProgTen	0.163	.394*	-0.119	0.074	0.052	.c																		
MeasRR	.449**	.538**	0.277	0.167	0.063	0.127	0.187																	
RRGoals	0.278	.342*	0.143	0.171	0.115	0.031	0.206	.581**																
IntType	.394**	.455**	0.284	0.101	0.253	.591**	.396*	.339*	0.03															
HumFac	.391**	0.291	.419**	0.218	.368*	0.175	0.028	0.059	.334*	0.098														
Purch	.339*	0.153	.464**	0.208	.386*	0.298	-0.146	0.034	0.061	0.209	.499**													
Tools	.311*	0.126	.407**	.349*	.441**	.408**	-0.041	0.086	-0.038	.390**	.326*	.587**												
Surveys	.378*	.348*	.348*	0.191	0.212	0.154	0.003	0.268	0.23	-0.022	-0.06	0.118	0.115											
MethShar	.408**	.324*	.478**	0.065	0.045	.319*	-0.265	0.047	0.034	.321*	0.176	0.216	.310*	0.111										
ShareInt	0.181	0.207	0.109	0.105	-0.072	.481**	.c	0.212	.c	0.201	-0.177	0.171	0.251	.c	-0.055									
ShareExt	.309*	0.108	.305*	.673**	0.275	0.2	-0.176	-0.083	-0.145	0.11	0.211	0.245	.310*	-0.144	0.22	0.278								
Tech	0.214	.301*	0.049	0.163	0.05	0.062	.344*	0.192	-0.096	0.172	-0.015	-0.02	0.006	0.134	0.04	0.065	0.219							
Leading	.495**	.463**	.462**	0.163	.393**	.374*	0.251	.399*	0.223	.395**	0.264	.320*	.451**	0.144	.309*	0.289	0.124	0.208						
Size	0.277	.494**	0.025	0.017	-.309*	0.18	.436**	.425**	0.282	0.211	-0.142	-.414**	-0.264	0.288	-0.038	0.129	-0.173	0.241	0.094					
YrOne	0.229	0.293	0.103	0.118	-0.048	0.115	0.266	0.268	.398*	.377*	0.236	0.213	0.019	-0.003	0.275	-0.086	0.074	0.11	0.047	0.251				
Invol	.503**	0.245	.659**	.327*	.561**	0.006	-0.271	-0.055	0.115	-0.025	.467**	.369*	.307*	0.115	0.303	-0.262	0.263	0.167	0.17	-.377*	-0.049			
Trust	0.186	-0.045	.341*	.334*	.367*	-0.015	-0.154	0.046	-0.022	-0.055	.357*	0.199	.329*	-0.009	-0.143	0.075	0.244	-0.078	0.069	-0.254	-0.267	.426**		
GenCult	.601**	.367*	.738**	.313*	.637**	.370*	-0.156	0.168	0.126	.303*	.464**	.565**	.510**	0.147	.357*	0.038	0.299	0.168	.512**	-.389**	0.08	.723**	.393**	

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

Appendix B

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 α = .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).